Geothermal Exploration Licence 207
Roxby Downs
South Australia

First Annual Exploration Report

Year End
18th July 2006

Prepared by

C.E.Stafford BSc (Hons), BSc PhD

26 July 2007

Granite Power Ltd, Level 6, 333 George Street, Sydney, NSW 2000

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TABLES

1 INTRODUCTION

1.1 Background

Exploration was initiated in the Roxby Downs area to investigate the geothermal potential of basement rocks underlying thick sequences of Late Proterozoic sediments to the south of the northwest-trending Andamooka fault. This geothermal target is located 20 km southwest of the Olympic Dam mine, presenting a local market for any generated power. In addition, Olympic Dam is connected to the Eastern Australian high voltage power lines.

1.2 Period

This report covers the first year of tenure from 19th July 2005 to 18th July 2006

1.3 Licence Data

Geothermal Exploration Licence 207 Roxby Downs was granted on the 19th July 2005, for a period of five years, to Proactive Energy Developments Ltd (PED) to explore for geothermal energy. On the 19th February 2007 PED changed its name to Granite Power Ltd ("Granite Power").

The tenement covers an area of approximately 386 km^2, commencing at a point of intersection of 30°36 00 S (GDA94) and longitude 136°35"00'E (GDA 94). From there the tenement extends east to longitude 136°41"06'E (GDA94), south to latitude 30°41"30'S (GDA94), east to longitude 136°50"00'E (GDA94) , south to latitude 30°48"00'S (GDA94), west to longitude 136°35"00'E (GDA94) and north to point of commencement.

2 WORK REQUIREMENTS

The work requirements for GEL 207 for each year of tenure are detailed in Table 1 below:

Year	Minimum Work Requirements
One	• Geological and geophysical studies.
Two	• Geological and geophysical studies. • Deepening of existing stratigraphic holes.
Three	• Conduct down-hole seismic induction probes, cross-well tomography, gamma, resistivity and temperature logging. • Drill one deep well to test the temperature gradient within the target granite host rock reservoir.
Four	• Drill one deep well (within 1000 metres of the year 3 well) and conduct circulation testing between the two wells.
Five	• Construction of a 25MW pilot power station.

Table 1: Yearly work requirements for GEL 207

3 WORK CONDUCTED

In accordance with the Year One Work Requirement, geological and geophysical studies were undertaken for the GEL 207 area.

3.1 Geological Studies

Historical deep drill hole data acquired from open file sources was analysed and mapped to aid a geological and geothermal interpretation of GEL 207 to be used in determining a proposed deep drill hole location. These historic holes were drilled by Western Mining Corporation (WMC), Seltrust and more recently, Green Rock Energy, who deepened a prior WMC-Seltrust joint venture well in 2005.

In February 2006, an orientation surface geochemical survey was conducted by Geoplan Services Pty. Ltd and Mr Hamish Paterson (WMC's supervising geologist from 1983-2002) for Uranium Exploration Australia Limited (UXA) over Exploration Licence No 3428 (EL 3428).

GEL 207 overlaps EL 3428. UXA shared the results of that survey with PED and the results were used to help exploration within GEL 207.

During the survey samples were taken close to PED's proposed drill hole site in GEL 207. For comparison, drill cuttings were also collected from a public road side where Green Rock Energy drilled the Blanche-1 hole to 1800m in 2005.

3.2 Geophysical Studies

Relevant public domain geophysical surveys of the Olympic Dam area were acquired and the data plotted with respect to GEL 207. These are presented in a separate report (see Table 3).

At a meeting in January 2006, with Geoscience Australia geophysicists, geophysical modelling strategies were discussed which could improve the understanding of the geology of GEL 207. In addition, current interpretations of magnetics, gravity and seismics were also discussed.

During this reporting year, an agreement was secured with Schlumberger to conduct down hole temperature measurement during the proposed drilling programme using state-of-the-art geophysical down hole probe technology. This data would be used in the geological and geothermal interpretation.

3.3 Proposed Drill Hole

A proposed drill hole Roxby D-1 was selected at the Bambridge Well site (30°41"07.8' S, 136°36"10.6' E). This site was interpreted to be on the edge of a gravity-high zone. Intended maximum drill hole depth is 1000m. This well, when drilled will be named Bambridge Well - 1.

3.4 Environmental Assessment

An environmental assessment report was commissioned by PED to evaluate the proposed drill hole location and environs. This work was commissioned in July 2006 and undertaken by Fatchen Environmental Pty Ltd, but not completed within this reporting period.

4 YEAR ONE EXPENDITURE

Activity	Year 1 Cost AUD
Commercial in Confidence	

Table 2: Year One expenditure to 18th July 2006

5 YEAR TWO WORK PROGRAMME

Geological and geophysical studies are planned for Year 2, in addition to an environmental assessment report of the proposed drilling site at Bambridge Well.

6 COMPLIANCE WITH THE PETROLEUM ACT (REGULATION 33)

6.1 Regulated Activities

No regulated activities were undertaken by PED in GEL 207 during this first reporting period.

6.2 Compliance

Security of $50,000 was not lodged prior to commencement of Year 2, being the licence year during which drilling activities were to be performed. Granite Power has yet to conduct drilling activities and that security has yet to be lodged. It is likely that Granite Power will submit a variation to its current work program for GEL 207 which, if approved, may postpone drilling activities.

The foregoing matter was raised and discussed in a meeting of representatives of PIRSA and PED on 28 July 2006.

The submission of this report has been delayed due to a shortage of available qualified personnel to complete, in turn due to a necessary diversion of resources towards fund-raising.

Expenditure in the first year of exploration was below requirement. The reasons for this are as with the late reporting and this incident of non-compliance is duly noted.

Granite Power has recently undergone a corporate restructuring and acknowledges these non-compliance matters.

6.3 Management of Non-Compliance

Granite Power Ltd recognises the importance of regulatory observance and is committed to future compliance. Granite Power has recently undertaken a corporate restructuring and is in the process of developing systems that will ensure that future work and reporting requirements for GEL 207 are met.

6.4 Management Systems

Granite Power is committed to ensuring the highest standards of corporate governance. To this end the company has a suite of policies in place or being implemented which substantially comply with ASX ‘best practice’ guidelines. Audits to date (the last being for the 2005-06 financial year), which, pursuant to the IFR Standards with which the company complies, cover management systems, have not identified any deficiency or failure and have not identified a potential need for corrective actions.

6.5 Reports and Data

Author	Title	Digital file
Granite Power Ltd.	Compilation of geological and geophysical maps for GEL 207	Maps GEL207.pdf

Table 3: Year One Work Programme reports for GEL 207

6.6 Reportable Incidents

No reportable incidents occurred.

6.7 Foreseeable Threats

No threats have been identified.

6.8 Proposed Operations for the Ensuing Year

See Section 5 above.

7 REFERENCES

Crawford, M. *et al*. (2006) Geophysics and structures, south of Olympic Dam SA: can they be used as geothermal gradients before drilling? MESA Journal, May 2006, Adelaide.

Green Energy Annual Report for 2004-05.

Hawley, D.L. (2006) Geochemical and Radiometric Survey of Stuart Shelf Part of Gawler Craton ELs, Confidential Company Report for Uranium Exploration Australia.

Marossecky, A. (2006) Geophysical compilation of GA data and airborne geophysical survey for GEL207 and surrounds.

Skirrow M., *et al.* (2005) Seismic survey (AGSO) and graphic projections and interpretation of the Olympic Dam deposit, Geoscience Australia.

Geothermal Exploration Licence 207
Roxby Downs
South Australia

Second Annual Exploration Report

Year End
18th July 2007

Prepared by

C.E.Stafford BSc (Hons), PhD
4 September 2007

Granite Power Ltd, Level 6, 333 George Street, Sydney, NSW 2000

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TABLES

1 INTRODUCTION

1.1 Background

Exploration was initiated in the Roxby Downs area to investigate the geothermal potential of basement rocks underlying thick sequences of Late Proterozoic sediments to the south of the northwest-trending Andamooka fault. This geothermal target is located 20 km southwest of the Olympic Dam mine, presenting a local market for any generated power. In addition, Olympic Dam is connected to the Eastern Australian high voltage power lines.

1.2 Period

This report covers the second year of tenure from 19th July 2006 to 18th July 2007

1.3 Licence data

Geothermal Exploration Licence 207 (Roxby Downs) was granted on the 19th July 2005, for a period of five years, to Proactive Energy Developments Ltd (PED) to explore for geothermal energy. On the 19th February 2007 PED changed its name to Granite Power Ltd ("Granite Power").

The tenement covers an area of approximately 386 km^2, commencing at a point of intersection of 30°36 00 S (GDA94) and longitude 136°35"00'E (GDA 94). From there the tenement extends east to longitude 136°41"06'E (GDA94), south to latitude 30°41"30'S (GDA94), east to longitude 136°50"00'E (GDA94) , south to latitude 30°48"00'S (GDA94), west to longitude 136°35"00'E (GDA94) and north to point of commencement.

2 WORK REQUIREMENTS

Changes to the Minimum Work Requirements for GEL 207 were accepted by the Director of Petroleum and Geothermal, Minerals and Energy Resources, PIRSA, on the 10th August 2007 and entered on the public register (Petroleum Act 2000, S.115).

The revised and accepted minimum work requirements for each year of tenure are detailed in Table 1 below:-

Year	Minimum Work Requirements
One	• Geological and geophysical studies
Two	• Geological and geophysical studies • Environmental studies
Three	• Drill one stratigraphic hole (or deepen existing stratigraphic hole) to a depth of 1000m • Conduct down-hole seismic induction probes, cross-well tomography, gamma, resistivity and temperature logging • Acquire 10km of 2D seismic • Geological and geophysical studies
Four	• Drill one pilot well to a depth of 4000m • Conduct well test and fracture stimulation
Five	• Drill second well to depth of 4000m • Conduct circulation testing between the two wells • Commence planning review of pilot plant.

Table 1: Revised yearly work requirements for GEL 207

3 WORK CONDUCTED

In accordance with the Year Two Minimum Work Requirement, geological and geophysical studies were undertaken for the GEL 207 licence area and an environmental assessment was made of the proposed Bambridge Well-1 site.

3.1 Geological and geophysical studies

A geological consultancy, Earth Resources Australia, was commissioned by Granite Power Ltd to undertake a review of geothermal prospectivity for all of the Company's South Australia tenements and licence application areas, including GEL 207. This was review was completed in May 2007.

3.2 Environmental assessment

An environmental assessment report was commissioned by PED in July 2006 to evaluate the proposed Bambridge Well-1 drill-hole location and environs. The work was undertaken during August and September 2006 by Fatchen Environmental Pty. Ltd ("Fatchen Environmental").

In it's report, Fatchen Environmental refers to the proposed Bambridge Well-1 site as "Roxby D-1".

Bambridge Well-1 is located on the Roxby Downs Station at 30°41"07.8' S/136°36"10.6' E.

4 YEAR TWO EXPENDITURE

Activity	Year 1 Cost AUD
Drilling activities	
Seismic activities	Commercial in
Technical evaluation and mapping	Confidence
Other surveys	
Facility construction and modification	
Operating and administration expenses (not already covered under another heading	
Total Expenditure for Year 2	

Table 2: Year Two expenditure to 18th July 2007

5 YEAR THREE WORK PROGRAM

Exploration in Year 3 will continue with further geological and geological studies with a view to constraining the depth to basement, characteristics of the sediment cover and determining the temperature at depth. If a review of these factors is encouraging or indeterminate with the available data, then exploration will further continue by acquiring new seismic data and the drilling of a slim hole for the purposes of temperature and stratigraphic analysis

6 COMPLIANCE WITH THE PETROLEUM ACT (REGULATION 33)

6.1 Regulated activities

The drill site environmental assessment performed in August 2006 was the only regulated activity conducted during this reporting period.

6.2 Compliance

While Ministerial approval was not obtained before the environmental assessment was performed and a notice of entry was not served on any affected landholder, PIRSA did waive the requirement for Ministerial approval and the landholder did waive the requirement for a notice of entry.

Security of $50,000 was not lodged prior to commencement of Year 3, being the licence year during which drilling activities are now to be performed (following approval of the variation to the work program for GEL 207).

Granite Power acknowledges this non-compliance matter.

6.3 Management of non-compliance

Granite Power recognises the importance of regulatory observance and is committed to future compliance. A new corporate structure and the development of policies and management will ensure that future work and reporting and expenditure requirements for GEL 207 are satisfied.

The security will be lodged within 30 days of the date of submission of this report.

6.4 Management systems

Granite Power is committed to ensuring the highest standards of corporate governance. To this end the company has a suite of policies in place or being implemented which substantially comply with ASX ‘best practice’ guidelines. Audits to date (the last being for the 2006-7 financial year), which, pursuant to the IFR Standards with which the company complies, cover management systems, have not identified any deficiency or failure and have not identified a potential need for corrective actions.

6.5 Reports and data

Author	Title	Digital file
T.Fatchen Fatchen Environmental Pty Ltd	Proactive Energy Developments Ltd & Uranium Exploration Australia Ltd Environmental Assessment Report Bambridges Well GEL207 Geothermal Project: Proposed Exploration Drilling at Roxby D No. 1 (30°41’ 07.8” S, 136° 36’ 10.6”E)	Environmental Assessment Report Roxby D-1.pdf
Earth Resources Australia.	Review of Geothermal Potential of GEL 207 “Roxby Downs”	Earth Resources Australia GEL 207 Review.pdf

Table 3: Year Two Work Program reports for GEL 207

6.6 Reportable incidents

No reportable incidents occurred.

6.7 Foreseeable threats

No threats have been identified.

6.8 Proposed operations for the ensuing year

See Section 5 above.

Geothermal Exploration Licence No. 207
(Roxby Downs)
South Australia

Third Annual Report

Period 19 July 2007 to 18 January 2009

Prepared by

C.E.Stafford BSc (Hons), PhD
12 March 2009

LEVEL 6, 9 BARRACK STREET, SYDNEY NSW 2000, AUSTRALIA
TEL: +61 2 8252 6100
FAX: +61 2 8252 6199
EMAIL: INFO@GRANITEPWR.COM
WWW.GRANITEPWR.COM

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1 INTRODUCTION

1.1 Background

Exploration was initiated in the Roxby Downs area to investigate the geothermal potential of basement rocks underlying thick sequences of Late Proterozoic sediments to the south of the northwest-trending Andamooka fault. This geothermal target is located 20 km southwest of the Olympic Dam mine, presenting a local market for any generated power. In addition, Olympic Dam is connected to the Eastern Australian high voltage power lines.

1.2 Period

This report covers the third year of tenure from 19 July 2007 to 18 January 2009. This reporting period includes a six month suspension period from 3 July 2008 to 2 January 2009 (inclusive).

1.3 Licence data

Geothermal Exploration Licence No. 207 (Roxby Downs) (“GEL 207”) was granted on 19 July 2005, for a period of five years, to Proactive Energy Developments Ltd (“PED”). On 19 February 2007, PED changed its name to Granite Power Ltd (“Granite Power”).

On 3 July 2008, an application for suspension of GEL 2007 was submitted to Primary Industries and Resources, South Australia (“PIRSA”) by the Granite Power. This application was approved by PIRSA on 18 July 2008, with the suspension in place from 3 July 2008 to 2 January 2009 (inclusive).

GEL 207 covers an area of approximately 386 km^2, commencing at a point of intersection of 30°36 00 S (GDA94) and longitude 136°35"00'E (GDA 94). From there the tenement extends east to longitude 136°41"06'E (GDA94), south to latitude 30°41"30'S (GDA94), east to longitude 136°50"00'E (GDA94), south to latitude 30°48"00'S (GDA94), west to longitude 136°35"00'E (GDA94) and north to point of commencement.

2 WORK REQUIREMENTS

The original minimum work requirements for GEL 207 are contained in Table 1 below:

Year of Term of Licence	Minimum Work Requirements
One	• Geological and geophysical studies.
Two	• Geological and geophysical studies. • Deepening of existing stratigraphic holes.
Three	• Conduct down-hole seismic induction probes, cross-well tomography, gamma, resistivity and temperature logging. • Drill one deep well to test the temperature gradient within the target granite host rock reservoir.
Four	• Drill one deep well (within 1000 metres of the year three well) and conduct circulation testing between the two wells.
Five	• Construction of a 25MW pilot power station.

Table 1: Original yearly work requirements for GEL 207

Changes to the minimum work requirements for GEL 207 were accepted by the Minister on 10 August 2007 and subsequently entered on the public register.

The revised minimum work requirements as at 10 August 2007 are detailed in Table 2 below.

Year	Minimum Work Requirements
One	• Geological and geophysical studies
Two	• Geological and geophysical studies • Environmental studies
Three	• Drill one stratigraphic hole (or deepen existing stratigraphic hole) to a depth of 1,000m • Conduct down-hole seismic induction probes, cross-well tomography, gamma, resistivity and temperature logging • Acquire 10km of 2D seismic • Geological and geophysical studies
Four	• Drill one pilot well to a depth of 4,000m • Conduct well tests and fracture stimulation
Five	• Drill second well to a depth of 4,000m • Conduct circulation testing between the two wells • Commence planning review of pilot plant.

Table 2: Minimum yearly work requirements for GEL 207 as at 10 August 2007

Further changes to the minimum work requirements for GEL 207 were accepted by the Minister on 9 December 2008 and subsequently entered on the public register.

The revised minimum work requirements as at 9 December 2008 are detailed in Table 3 below.

Year of Term of Licence	Minimum Work Requirements
One	• Geological and geophysical studies
Two	• Geological and geophysical studies • Environmental studies
Three	• Geological and geophysical studies;
Four	• Geological and geophysical studies;
Five	• Geological and geophysical studies. • Drill at least one heat flow hole (or deepen existing hole for heat flow purposes) to depth of up to 1,000 metres. • Undertake thermal conductivity measurements on sampled core and follow-up thermal modelling.

Table 3: Minimum yearly work requirements for GEL 207 as at 9 December 2008

3 WORK CONDUCTED

Granite Power undertook both a reinterpretation of the regional magnetics and gravity data publicly available across the tenement. Granite Power also undertook thermal conductivity analyses and 1D thermal modelling for GEL 207 (see reports in Table 5).

4 THIRD YEAR EXPENDITURE

Activity	Year 3 Cost AUD
Drilling activities	nil
Seismic activities	nil
Technical evaluation and mapping	$21,308.26
Other surveys	nil
Facility construction and modification	nil
Operating and administration expenses (not already covered under another heading	$6,082.73
Total for Year 3	**$27,390.99**

Table 4: Third year expenditure to 18 January 2009

5 COMPLIANCE WITH THE PETROLEUM ACT (REGULATION 33)

5.1 Regulated activities

No regulated activities were conducted during this reporting period.

5.2 Compliance

No matters of non-compliance are noted for this reporting year.

5.3 Management of non-compliance

Granite Power continually monitors its exploration activities to ensure compliance with the Petroleum Act. The Company understands the importance of regulatory observance and is committed to future compliance.

5.4 Management systems

Granite Power is committed to ensuring the highest standards of corporate governance. To this end the company has a suite of policies in place or being implemented which substantially comply with ASX 'best practice' guidelines. Audits to date (the last being for the 2007-8 financial year), which, pursuant to the IFR Standards with which the company complies, cover management systems, have not identified any deficiency or failure and have not identified a potential need for corrective actions.

5.5 Reports and data

Author	Title	Digital file
Peter Gunn	Identification of Basement Lithologies using Gravity and Magnetic Data GEL 207, Olympic Dam Area, SA.	Basement Lithologies GEL 207.pdf
Duanne White, Granite Power Ltd	Assessment of Thermal Conductivity and Heat Flow in GEL 207	Thermal Conductivity GEL 207.pdf

Table 5: Third year reports for GEL 207

5.6 Reportable incidents

No reportable incidents occurred.

5.7 Foreseeable threats

No threats have been identified.

5.8 Proposed operations for the ensuing year

Operations this year will comprise continued geological and geophysical review and analysis and interpretation of existing data and any newly acquired data.

Geothermal Exploration Licence No. 207
(Roxby Downs)
South Australia

Fourth and Final Annual Report

Period 19 January 2009 to 22 December 2009

Prepared by

C. E. Stafford BSc (Hons), PhD
22 December 2009

LEVEL 6, 9 BARRACK STREET, SYDNEY NSW 2000, AUSTRALIA
TEL: +61 2 8252 6100
FAX: +61 2 8252 6199
EMAIL: INFO@GRANITEPWR.COM
WWW.GRANITEPWR.COM

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1 INTRODUCTION

1.1 Background

Exploration was initiated in the Roxby Downs area to investigate the geothermal potential of basement rocks underlying thick sequences of Late Proterozoic sediments to the south of the northwest-trending Andamooka fault. This geothermal target is located 20 km southwest of the Olympic Dam mine, presenting a local market for any generated power. In addition, Olympic Dam is connected to the Eastern Australian high voltage power lines.

1.2 Period

This report covers the fourth year of tenure from 19 January 2009 to application for surrender on 22 December 2009.

1.3 Licence data

Geothermal Exploration Licence No. 207 (Roxby Downs) ("GEL 207") was granted on 19 July 2005, for a period of five years, to Proactive Energy Developments Ltd ("PED"). On 19 February 2007, PED changed its name to Granite Power Ltd ("Granite Power").

On 3 July 2008, an application for suspension of GEL 2007 was submitted to Primary Industries and Resources, South Australia ("PIRSA") by the Granite Power. This application was approved by PIRSA on 18 July 2008, with the suspension in place from 3 July 2008 to 2 January 2009 (inclusive).

GEL 207 covers an area of approximately 386 km^2, commencing at a point of intersection of 30°36 00 S (GDA94) and longitude 136°35"00'E (GDA 94). From there the tenement extends east to longitude 136°41"06'E (GDA94), south to latitude 30°41"30'S (GDA94), east to longitude 136°50"00'E (GDA94), south to latitude 30°48"00'S (GDA94), west to longitude 136°35"00'E (GDA94) and north to point of commencement.

2 WORK REQUIREMENTS

The minimum work requirements as of 9 December 2008 are detailed in Table 1 below.

Year of Term of Licence	Minimum Work Requirements
One	• Geological and geophysical studies
Two	• Geological and geophysical studies • Environmental studies
Three	• Geological and geophysical studies;
Four	• Geological and geophysical studies;
Five	• Geological and geophysical studies. • Drill at least one heat flow hole (or deepen existing hole for heat flow purposes) to depth of up to 1,000 metres. • Undertake thermal conductivity measurements on sampled core and follow-up thermal modelling.

Table 1: Minimum yearly work requirements for GEL 207

3 WORK CONDUCTED

In this fourth year of exploration, Granite Power continued with geological and geophysical studies, including some 3D geological modelling.

4 FINAL YEAR EXPENDITURE

Activity	Year 4 Cost AUD
Drilling activities	nil
Seismic activities	nil
Technical evaluation and mapping	$7,108.70
Other surveys	nil
Facility construction and modification	nil
Operating and administration expenses (not already covered under another heading	$1,106.25
Total for Year 4	**$8,214.95**

Table 2: Third year expenditure to 22 December 2009

5 COMPLIANCE WITH THE PETROLEUM ACT (REGULATION 33)

5.1 Regulated activities

No regulated activities were conducted during this reporting period.

5.2 Compliance

No matters of non-compliance are noted for this reporting year.

5.3 Management of non-compliance

Granite Power continually monitors its exploration activities to ensure compliance with the Petroleum Act. The Company understands the importance of regulatory observance and is committed to future compliance.

5.4 Management systems

Granite Power is committed to ensuring the highest standards of corporate governance. To this end the company has a suite of policies in place or being implemented which substantially comply with ASX 'best practice' guidelines. Audits to date (the last being for the 2008-9 financial year), which, pursuant to the IFR Standards with which the company complies, cover management systems, have not identified any deficiency or failure and have not identified a potential need for corrective actions.

5.5 Reports and data

No external reports have been prepared in this reporting year.

5.6 Reportable incidents

No reportable incidents occurred.

5.7 Foreseeable threats

No threats have been identified.

5.8 Proposed operations for the ensuing year

No further operations are planned on this tenement and surrender of the tenement is being sought.

Compilation of GIS-based maps generated during the Year 1 Work Programme for

GEL 207
Roxby Downs

March 2007

Granite Power Ltd.
Level 6, 333 George Street
Sydney
NSW 2000

Granite Power Ltd was previously known as Proactive Energy Developments Ltd

Summary

Geothermal Exploration Licence 207 Roxby Downs was granted to Proactive Energy Developments Ltd (PED) on the 19th July 2005. On 31st January 2007, PED changed its name to Granite Power Ltd (GPL).

This document comprises a compilation of GIS-based maps generated using publicly available geophysical and geological data, and collected field data during GPL's first year of exploration of GEL 207, to 19th July 2007. This data is plotted to demonstrate the relationship of the tenement location with respect to geological or geophysical features. Also included in this compilation are interpretative maps showing depth to basement and thicknesses of various formations overlying the basement. These maps are being used in an on-going interpretation of the geothermal potential of GEL 207.

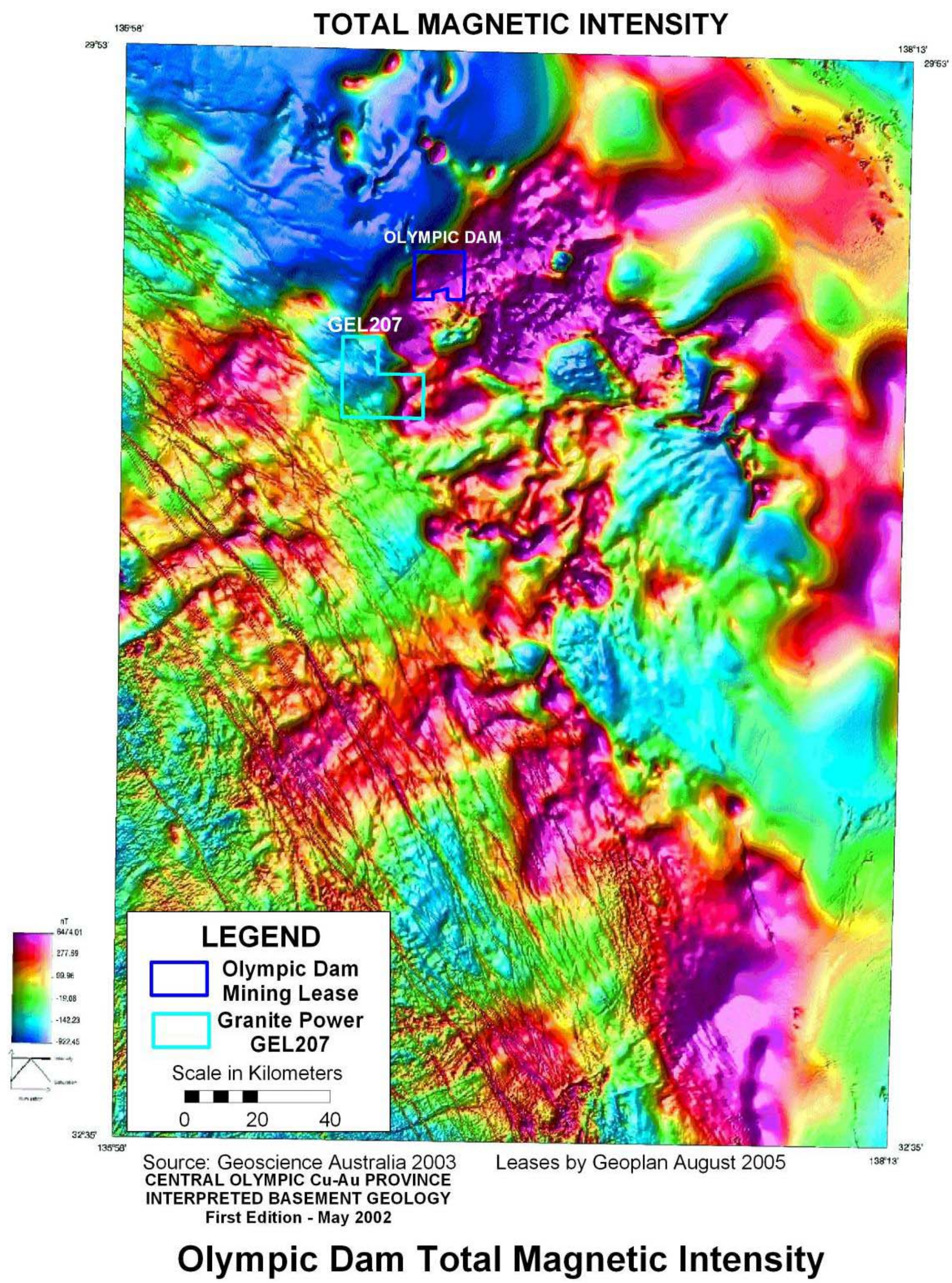


Figure 1: Total magnetic intensity of the Olympic Dam area

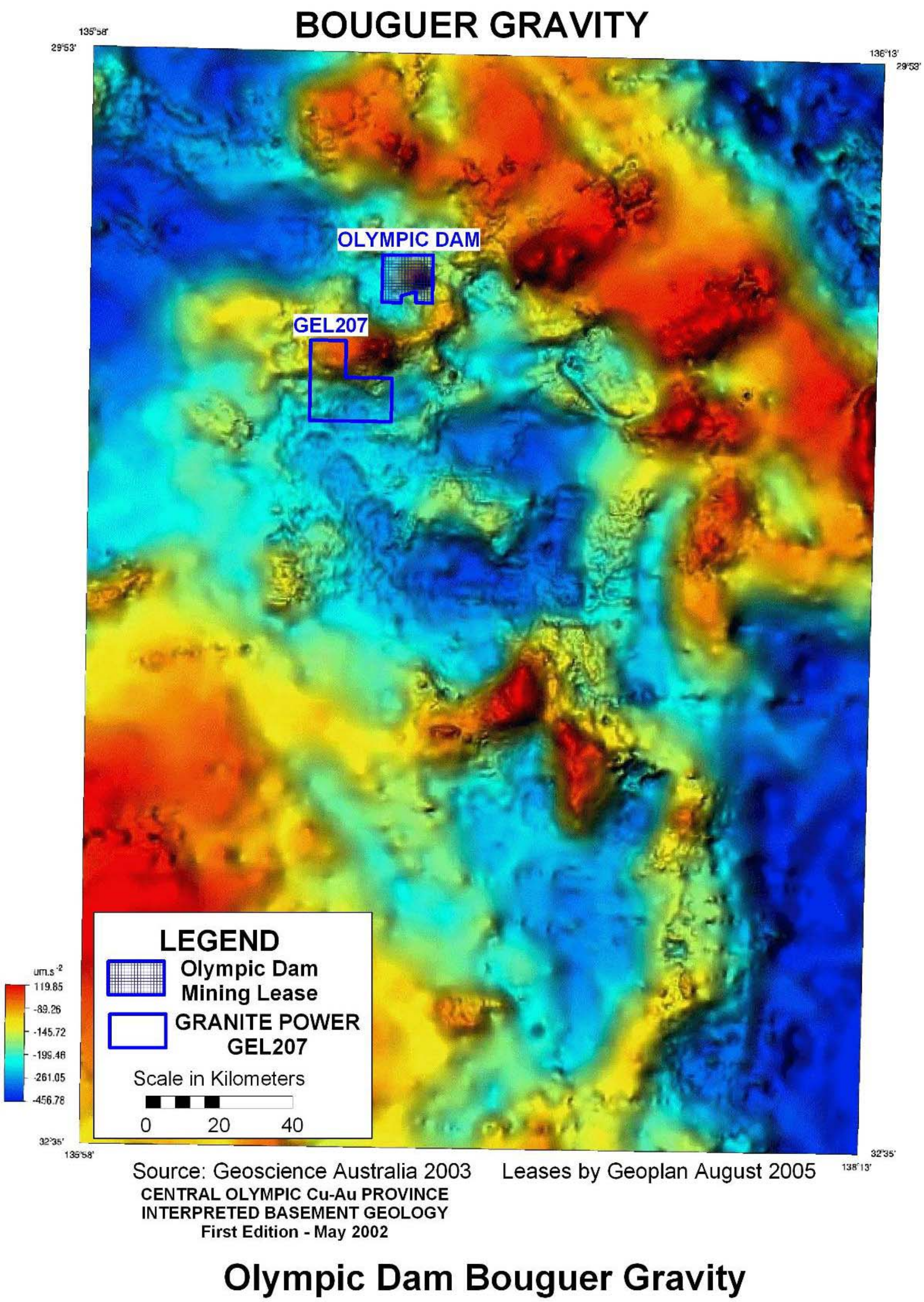


Figure 2: Bouguer gravity map of the Olympic Dam area

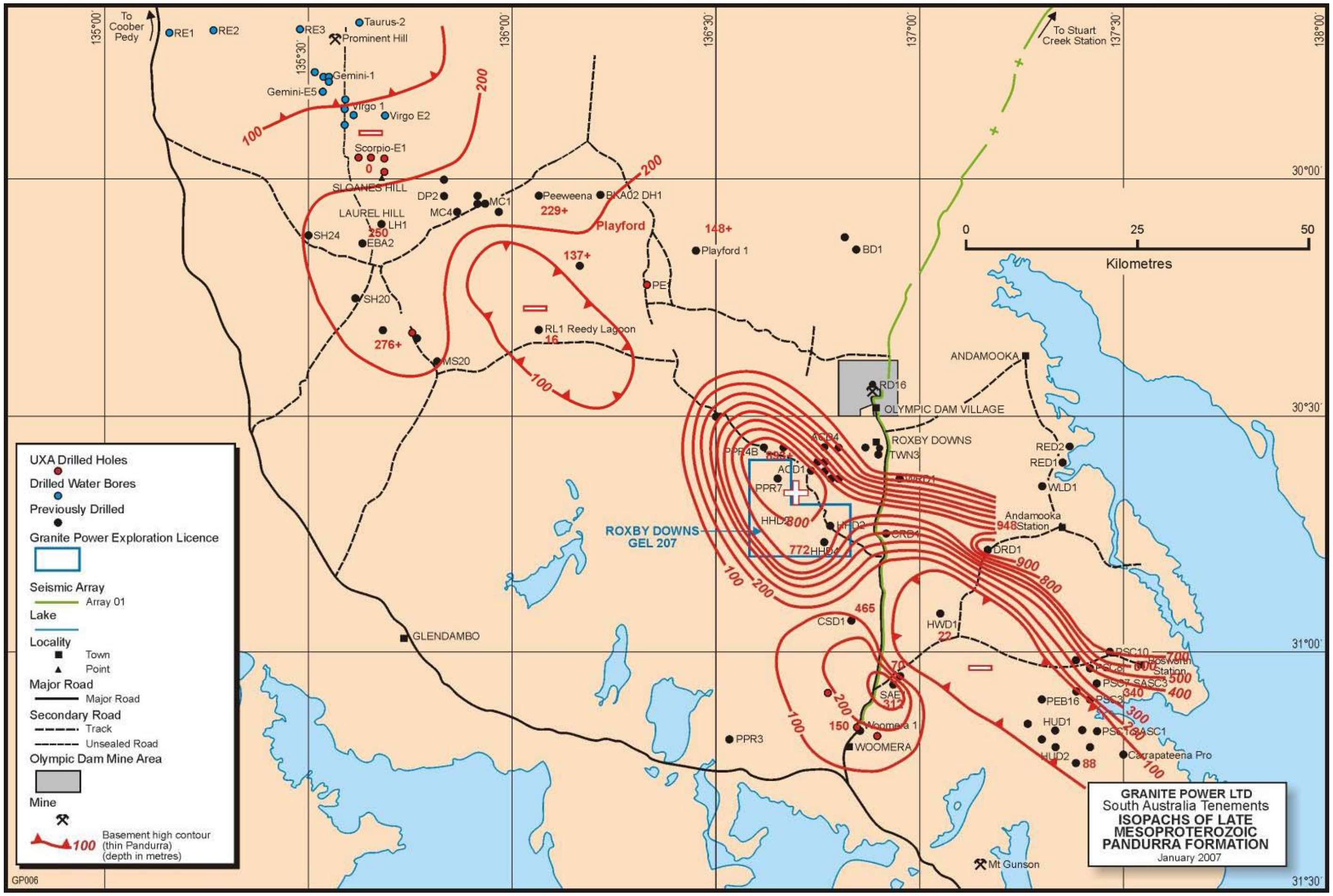


Figure 3: Map showing isopachs of late Mesoproterozoic Pandurra Formation

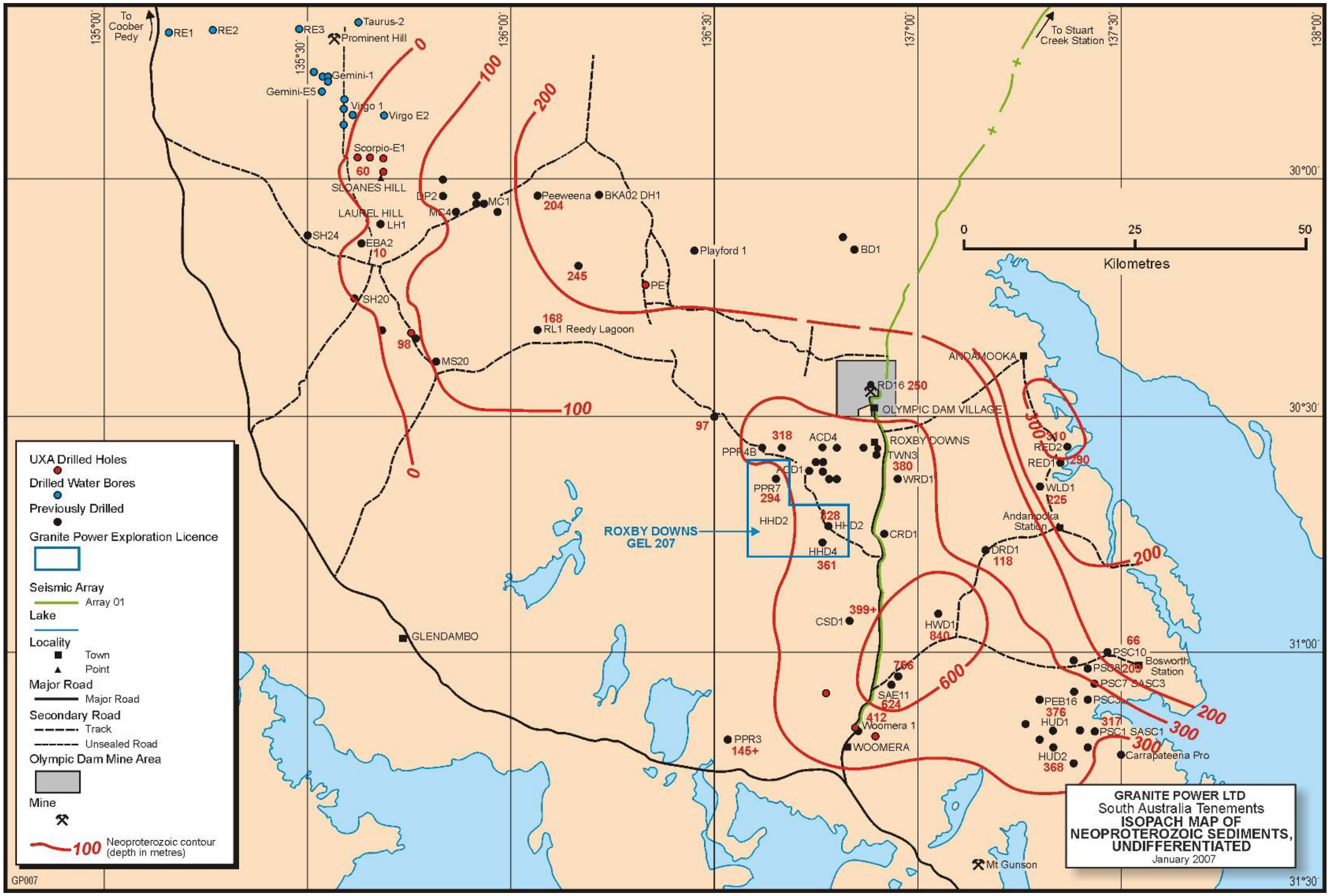


Figure 4: Isopach map of Neoproterozoic sediments, undifferentiated

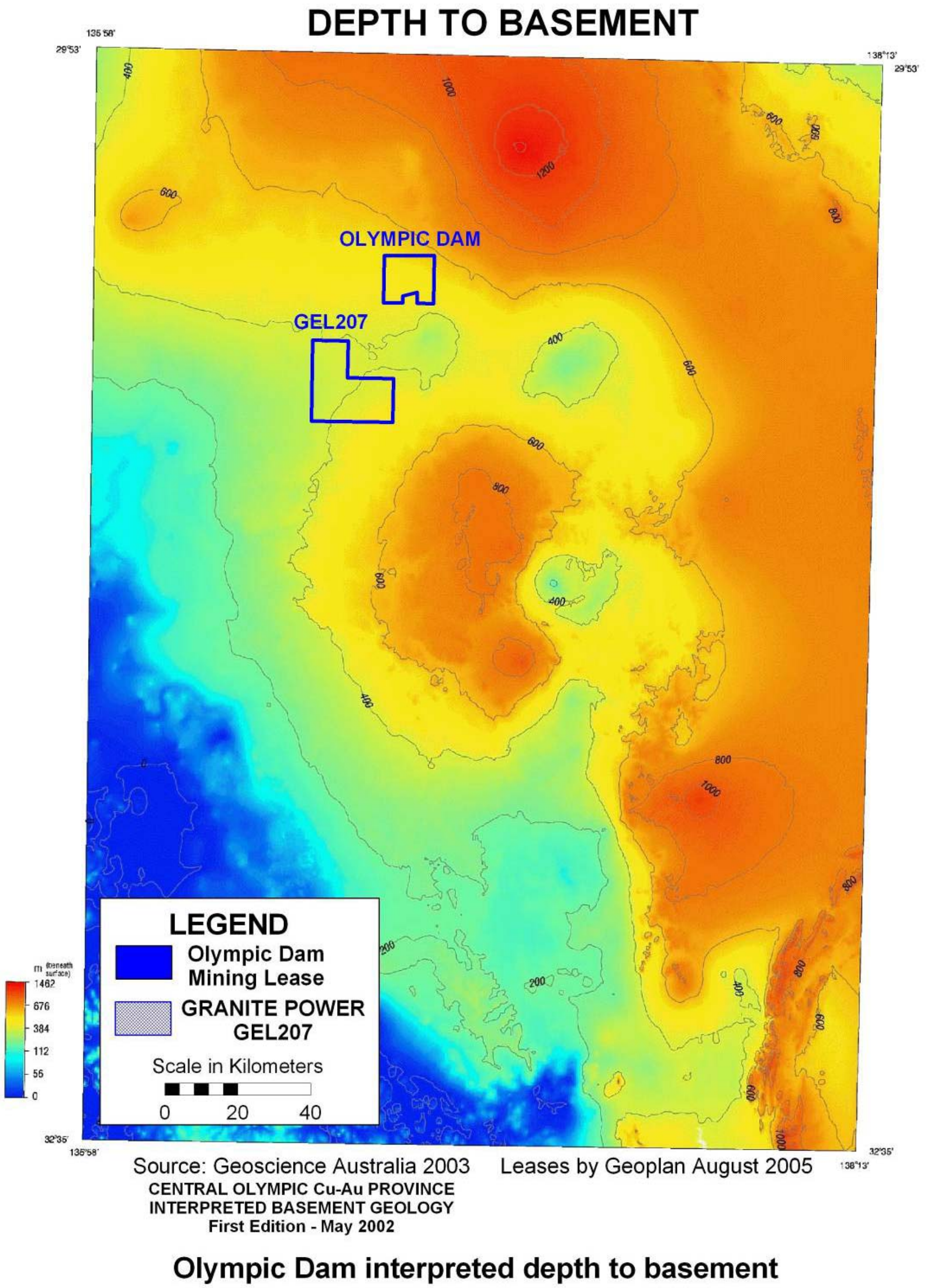


Figure 5: Depth to basement map (depth in metres)

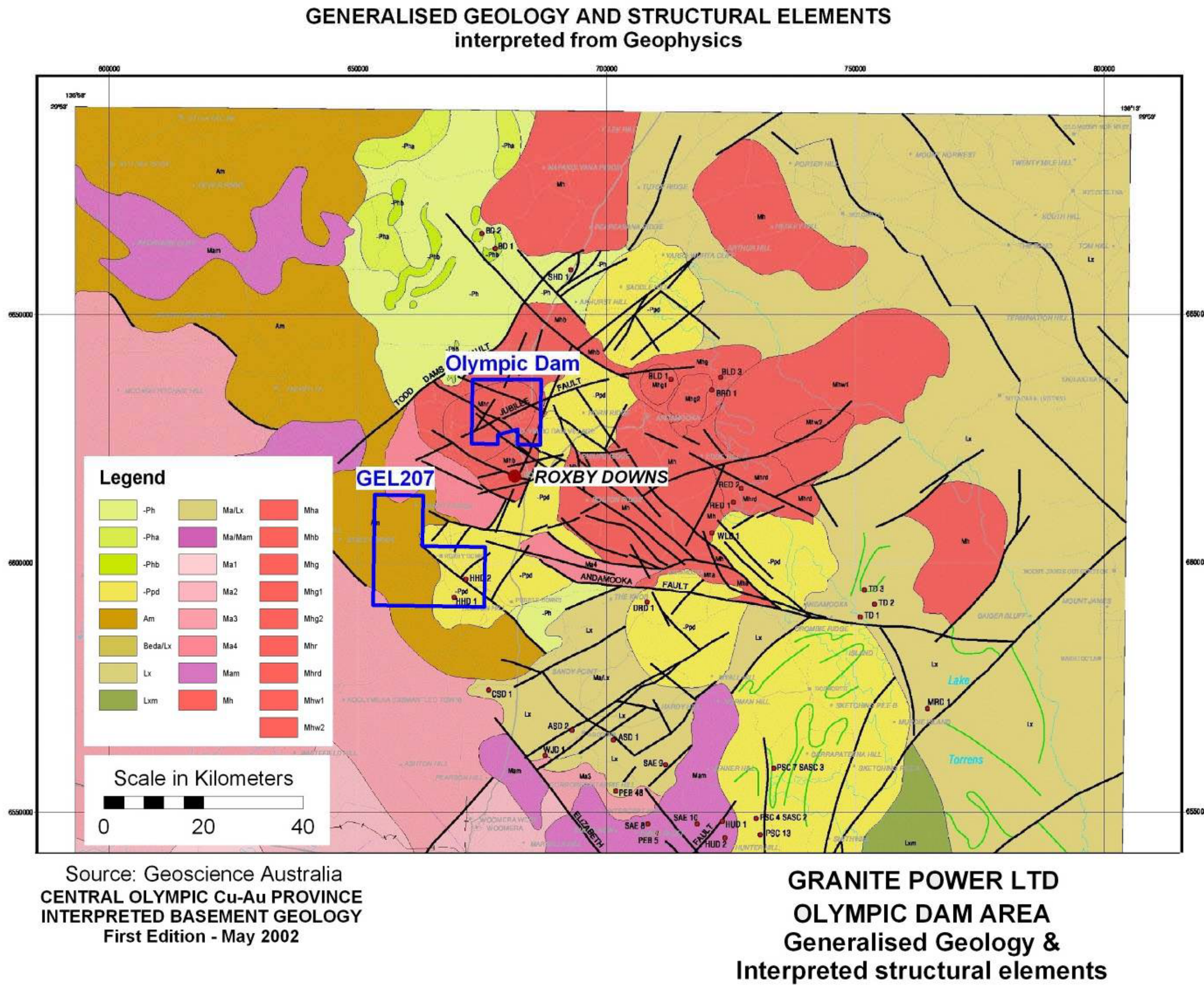


Figure 6: Generalised geology and structural elements regional map

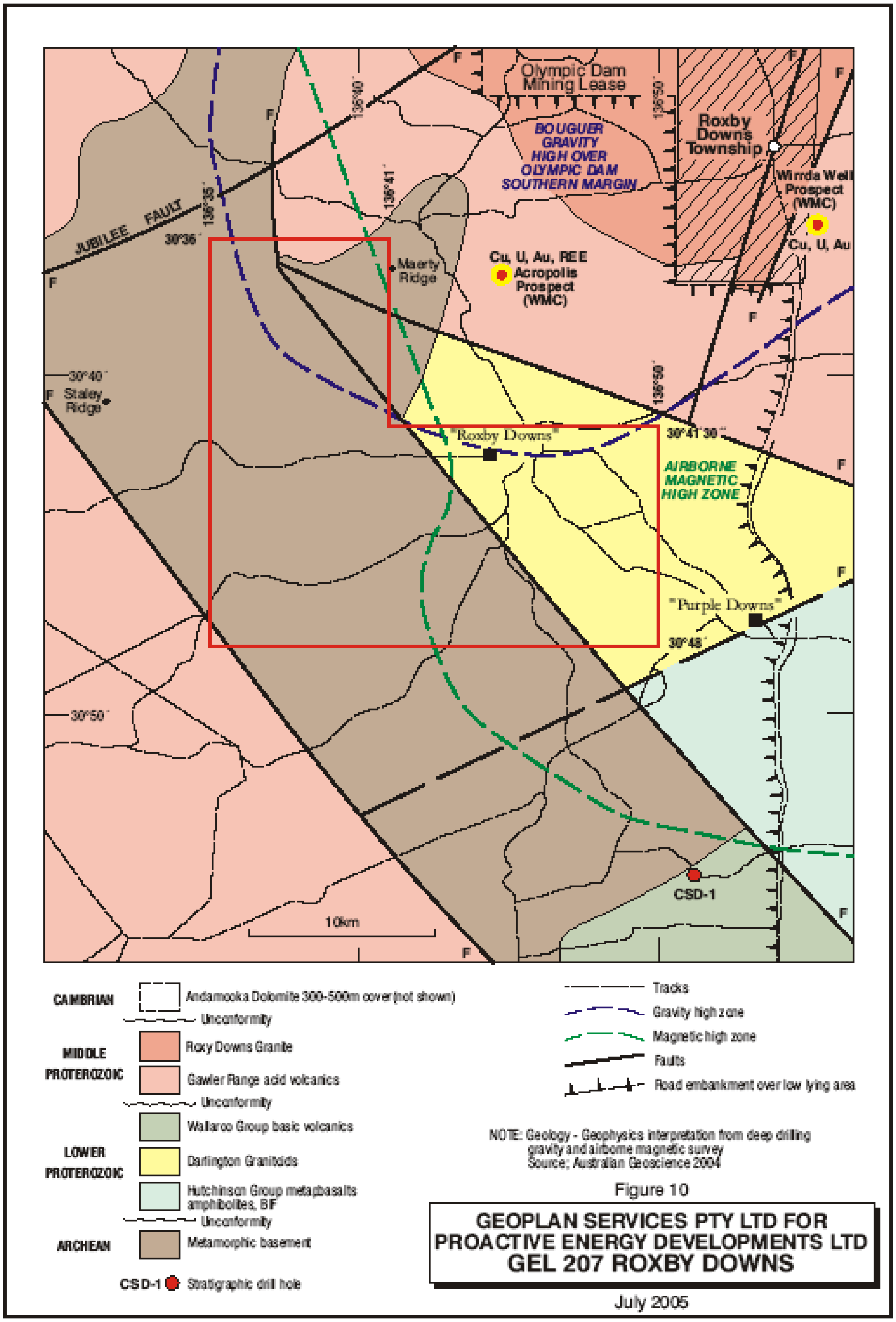


Figure 7: Interpreted basement geology for GEL 207

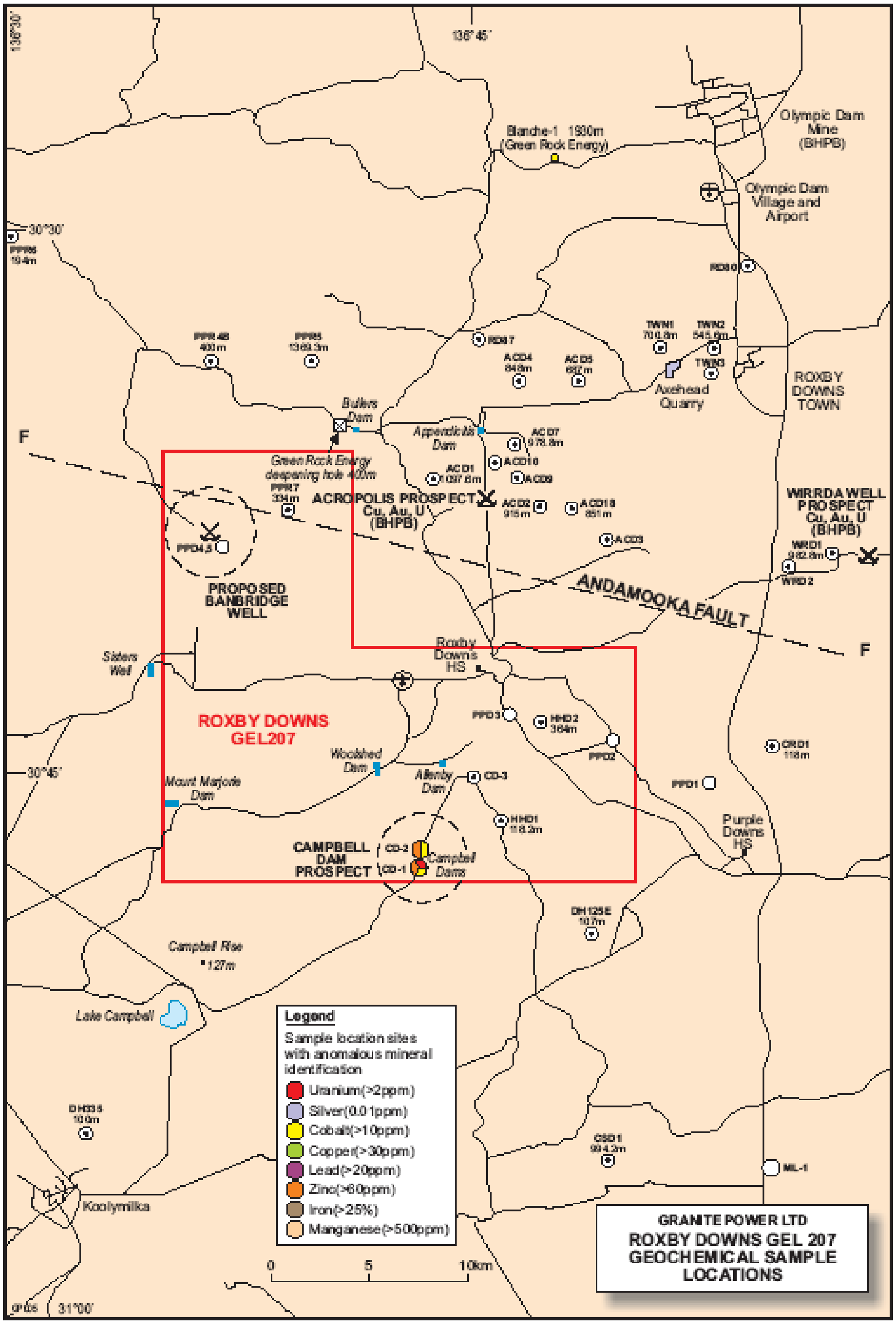


Figure 8: Map showing sampling locations for the geochemical and radiometric survey

Authorship and data sources

Figure 1: Total magnetic intensity of the Olympic Dam area

Map generated by Amos Computing/Geoplan Services Ltd for GPL using Geoscience Australia's 2003 data and showing the regional magnetic intensities with respect to the GEL 207 tenement and the Olympic Dam mining lease.

Figure 2: Bouguer gravity map of the Olympic Dam area

Map generated by Amos Computing/Geoplan Services Ltd for GPL using Geoscience Australia's 2003 data and showing the regional bouguer gravity with respect to the GEL 207 tenement and the Olympic Dam mining lease.

Figure 3: Map showing isopachs of late Mesoproterozoic Pandurra Formation

Map generated by Geodrafting Ltd for GPL showing the interpreted thicknesses of the Panduura Formation with respect to the GEL 207 tenement . The map shows that this formation is interpreted to be at its thickest over the northern part of GEL 207. Also shown is the position of the north-south seismic line (ASGO 2003 seismic survey).

Figure 4: Isopach map of Neoproterozoic sediments, undifferentiated

Map generated by Geodrafting for GPL showing the thickness of Neoproterozoic sediments interpreted from public domain deep drilling, water bores, geology and geophysics data.

Figure 5: Depth to basement map

Map generated by Amos Computing/Geoplan Ltd for GPL showing the interpreted regional depth to basement, in metres, with respect to the GEL 207 tenement .

Figure 6: Generalised geology and structural elements regional map

Map generated by Amos Computing/Geoplan Ltd for GPL showing the generalised geology and structural elements interpreted from geophysics (Geoscience Australia).

Figure 7: Interpreted basement geology for GEL 207

Map generated by Amos Computing/Geoplan Services Ltd for GPL showing the interpreted basement geology using public domain deep drilling data, gravity and airborne magnetic data (Australia Geoscience 2004).

Figure 8: Map showing sampling locations for the geochemical and radiometric survey

Map generated by Geodrafting/Geoplan Ltd for GPL showing the sample locations for the geochemical/radiometric survey over GEL 207, undertaken by Geoplan Services Ltd.

Review of
Geothermal Potential in
GEL 207 Roxby Downs

Extracted from

"Review of Geothermal Potential
of
Tenements held by
Granite Power Ltd
in
South Australia"

by M.R. Bunny and I.M. Milligan

ERA Report A473 April 2007

MAP REFERENCE:
1:250,000 Andamooka SH53-12

Extract of ERA Report No A473
Date: April 2007
Prepared by
M.R.Bunny & I.M.Milligan
for
Granite Power Ltd

ABN 56 000 889 887
Mineral Exploration Consultants - Established 1971
Suite 2.06, 56 Delhi Road, NORTH RYDE NSW 2113
(PO Box 432, CHATSWOOD NSW 2067)
AUSTRALIA
Telephone (02) 9887 1366
Facsimile (02) 9887 1388
era@earthres.com.au

1.0 INTRODUCTION

Earth Resources was engaged by Granite Power Ltd to review a number of geothermal exploration licences (GELs) and exploration licence applications (GELAs) in South Australia, as shown in Figures 1.1 and 1.2:

Tenement	Name Area	Applied	Granted	Expires	km^2
GEL207	Roxby Downs	12-Jul-06	19-Jul-05	18-Jul-10	386
GEL251	Prominent Hill	18-Jul-06	17-Oct-07	16-Oct-11	479
GEL252	Millers Creek		17-Oct-07	16-Oct-11	452
GELA256	Westfield				452
GELA257	Weedina				451
GELA258	Phillipson	18-Aug-06			491
GELA259	Karkaro				460

Preamble

A study by Neumann et al (2000), based on sparse heat flow data, defined a broad zone of above average heat flows extending from the South Australia coast northwards through the central-east and north-east of the state. This covers the Stuart Shelf, Delamarien (Adelaide) Fold Belt and the Curnamona Province and is referred to as the **South Australian Heat Flow Anomaly (SAHFA)**.

The high heat flows are related to anomalously high levels of uranium and thorium in Mesoproterozoic granite, felsic volcanics and gneisses. Where such granites are overlain by a substantial thickness of later sediments, the heat generated by radioactive decay within the granites is trapped, and temperatures may reach levels amenable to exploitation by hot fractured rock technologies.

Other heat sources relevant to this zone are

- Mesoproterozoic radiogenic iron oxide deposits (Olympic Dam style mineralisation) which may generate higher heat flows than the granites.
- Palaeozoic (mid-Carboniferous) granites underlying the Cooper Basin; whilst of lower heat flow the thick (>3km) cover of coal, sandstone and siltstone provides a very effective thermal blanket.

Whilst no definitive references have been located, high heat production is not noted from the Palaeoproterozoic and Archaean granites of the Gawler Craton.

In the far south-east of the state, more recent volcanic activity in the Mount Gambier area has produced locally anomalous heat flows which are unrelated to the SAHFA.

Target areas for geothermal exploration in the SAHFA require the following:

- Thick sedimentary cover, preferably by rocks with good insulating properties (eg coal measures) and poor permeability to limit heat loss through conductive water movement. Cover in the range of 2 to 4 kilometres is desirable.
- A high heat source – Mesoproterozoic granite and/or radiogenic iron oxide deposit or – if sufficient cover - Palaeozoic granite.

Data Sources

Principal data sources for this study are the South Australian State MGA GIS Data Set (2006), and numerous downloads from the SARIG website. Certain drillhole data have been obtained from the online SARIG drillhole database without downloading. All relevant data are appended to this report in digital (DVD) format.

2.0 GEL207 ("Roxby Downs")

GEL207 has an area of 386 square kilometres and lies on the south-west corner of a group of six GELs (all held by Green Rock Energy or its subsidiaries) and two GEL applications (joint applications by Perilya and Green Rock Energy) centred on the Olympic Dam Cu-Au-U mine. The tenements lie on the Andamooka 1:250,000 sheet.

Geothermal exploration in this area has the aim of producing power for the Olympic Dam mine and village, with excess power being directed to the South Australian power grid through the existing high voltage feed to Olympic Dam. In comparison with much of the remote areas of central and northern South Australia, infrastructure in the region is good with the sealed road access to Olympic Dam passing within 6 kilometres of GEL207.

The following assessment of the geothermal potential of GEL207 is based principally on data from the SA State Dataset and a geophysical interpretation by Direen and Lyons (2002). Drill hole data have been sourced from the SARIG on-line website - *SA Geodata Drillhole database*. Geoscience Australia carried out a deep seismic reflection survey across the Olympic Dam region in 2003 and this provides some generalised data applicable to GEL207 (Lyons, 2005; Lyons, 2006).

Surface Geology (Figure 2.1)

Cambrian age **Andamooka Limestone** extends over most of GEL207 with overlying Cretaceous **Bulldog Shale** across the southern third of the tenement. Areas of dune sand occur through the tenement. The area is flat lying with a slight rise in elevation over the Bulldog Shale in the south (Heaton Hill). There is essentially no drainage development.

Drillhole Data

Only three drillholes are indicated to fall within GEL207 on the SA State Dataset; viz PPR7, HHD1 and HHD2. There is a broad distribution of drillholes in the surrounding region, and an intense concentration over the Olympic Dam ore body and a number of other mineral prospects (Acropolis, Windabout, Mount Gunson etc). Stratigraphic data is not available for a large number of these drillholes, however, and few holes penetrate to depths in excess of 1,000 metres.

Within GEL207, only **HHD1** (WMC) penetrated to geothermal basement, intersecting Palaeoproterozoic age gneiss (**Hutchison Group**) at a depth of 1,186 metres. Cover rocks included 772 metres of Mesoproterozoic **Pandurra Formation**. A temperature survey of this hole (ENV06562 p808) indicated a bottom hole temperature of 50°C and temperature gradients of 50° to 60°C per kilometre in the Tregolana Shale (138 to 361 metres) but reduced to 15° to 30°C over most of the Pandurra Formation. The Pandurra Formation is described by Drexel (1993, p139) as a "thick, monotonous unit of unmetamorphosed, flat-lying, arenaceous redbed sediments". It has been dated at a minimum age of 1,424 Ma, but overlies the **Gawler Range Volcanics** and **Hiltaba Suite** granites (~1,580 Ma). On the basis of its unmetamorphosed and generally flat lying nature, this unit can be regarded as constituting thermal insulation, even though it is only minimally younger than the main heat producing Hiltaba granites of the region. On the basis of aeromagnetic interpretation, Anderson (1978) has indicated a thickness of almost 1,600 metres for the Pandurra Formation near Mt Eba, approximately 100 kilometres to the north-west of GEL207 (18 kilometres south of GEL252).

Relevant stratigraphic data has been sourced from the SARIG drillhole database, and this indicates several other holes in the region to have intersected a significant thickness of

Pandurra Formation (Table 2.1, Figure 2.2). The most relevant to GEL207 is **PPR5 SAP1** (Australian Selection Pty Ltd, 1979) which lies just to the north of the tenement. After intersecting 477 metres of Cambrian and Neoproterozoic sediments, the drillhole entered Pandurra Formation, and terminated still in that unit at a depth of 1,369 metres.

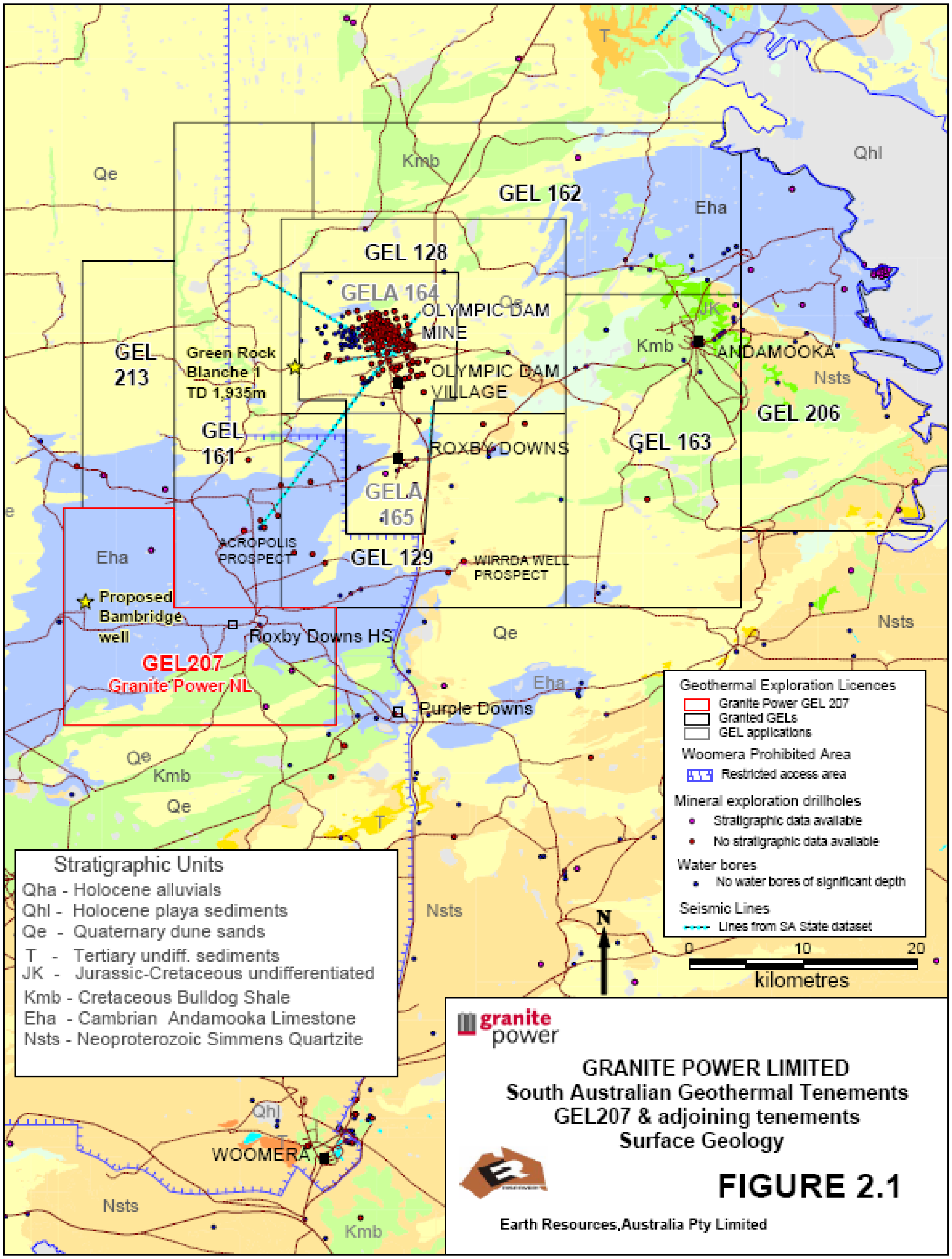
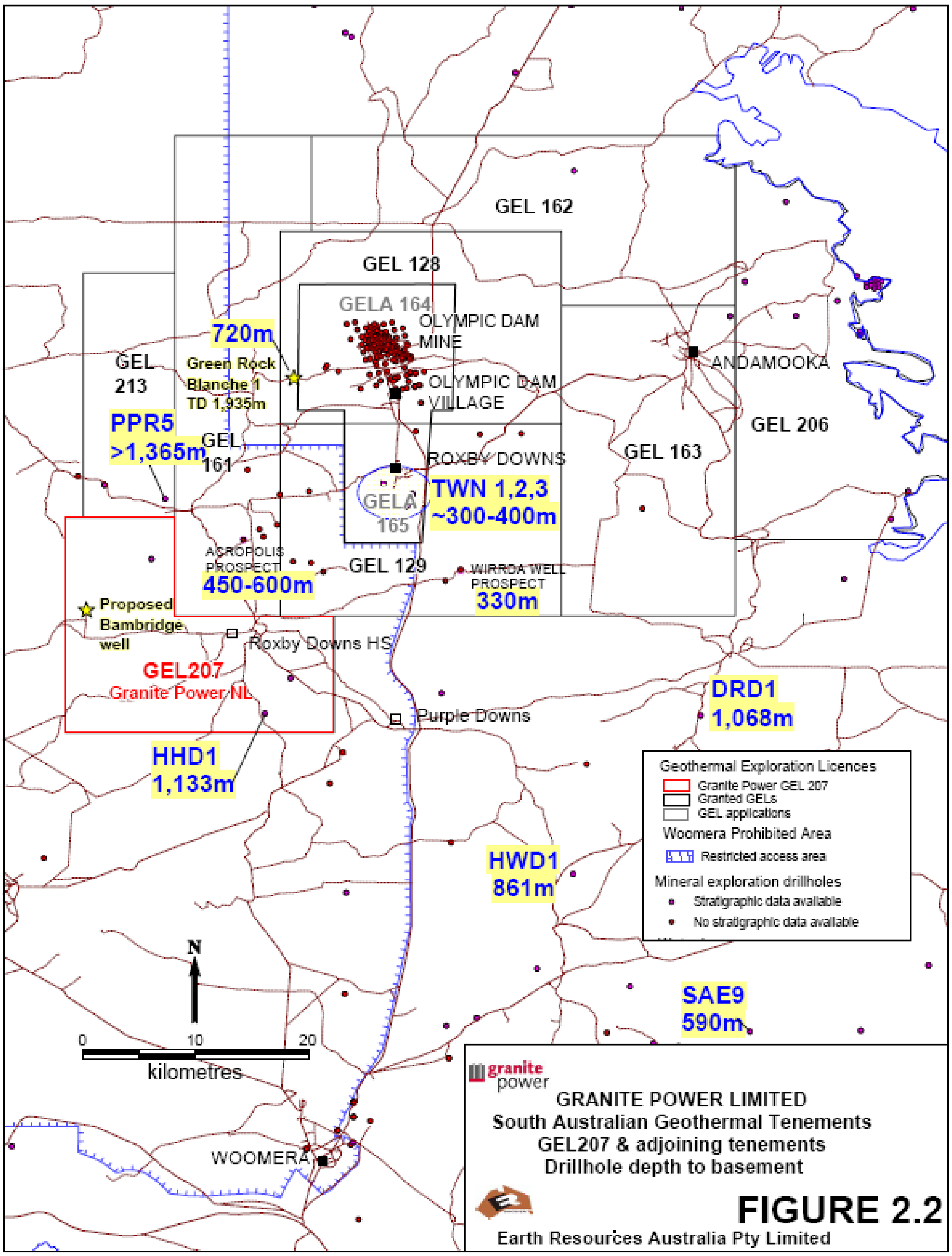


Table 2.1: Drillholes relevant to GEL207 & intersecting basement

Hole	*SARIG DH#*	*Depth to basement*	*Pandurra Fm Thick.*	*Basement Lithology*
HHD1	*18160*	*1,133*	*772*	*Gneiss (Palaeoproterozoic)*
PPR5	*138322*	*>1,369*	*>892*	*Sandstone (Pandurra Fm)*
TWN1	*18162*	*414*	*0*	*Granite (Hiltaba)*
TWN2	*18163*	*303*	*0*	*Granite (Hiltaba)*
TWN3	*18163*	*288*	*0*	*Diorite (Hiltaba)*
HWD1	*20770*	*861*	*21*	*Felsic breccia (GRV)*
DRD1	*20769*	*1,068*	*950*	*Microgranite Palaeoproterozoic)*
SAE9	*165070*	*590*	*350*	*Porphyry (GRV)*
SAE11	*165125*	*936*	*312*	*Porphyry & sediments (GRV)*

(GRV - Gawler Range Volcanics – Mesoproterozoic)



Potential for radiogenic heat from uranium mineralisation

The Pandurra Formation has potential for uranium mineralisation within suitably permeable beds in structurally dilated zones, and at its basal unconformity. During the erosion and unroofing of the Olympic Dam deposit, surface waters and groundwater may have remobilised uranium and carried it to suitable deposition sites. Had suitable redox conditions been present, uranium minerals may have been deposited; such deposits, if they exist, may present a source of radiogenic heat. On the basis of heat generated per cubic metre this would probably be greater than for granite, however the size of such mineralisation – if indeed present - is not likely to be great.

Gamma logs for drillholes DRD1 and HHD1 (ENV06562 p795, 800) indicate very variable gamma traces across the Pandurra Formation. It should be noted, however, that the low temperature gradient across the Pandurra Formation in HHD1 (noted above) does ***not*** support any significant heat generation within or immediately below the unit at that location.

Blanche 1 geothermal exploration well

Exploration by Green Rock Energy has included the drilling of the Blanche 1 geothermal well[1] in 2005. This well was drilled to a depth of 1,934.6 metres, with granite (Burgoyne Batholith, **Wirrida Subsuite** of the Hiltaba Suite) intersected beneath approximately 720 metres of cover rocks. A total of 1,218 metres of granite, described in the Green Rock Energy 2006 Annual Report as “hot” and “fractured” (numerous horizontal fractures noted), was cored. Although this appears to be quite a promising granite for geothermal purposes, it is under insufficient cover to be a suitable target.

Logging of Blanche 1 indicated average temperature gradients of 60°C/km in cover sediments and 30°C/km in the granite. A temperature of 85°C was measured at 1,800m and heat production from the granite of 9uW/m3 was determined. Core measurements indicated conductive heat flow through the granite to be 94 mWm^{-2}.

The disparity between the gradient measured in cover rocks and that measured in the granite highlights the importance of a significant thickness of cover. Based on the available data, a bottom hole temperature of 200°C could not be expected at a depth of less than 6 kilometres at the Blanche 1 site. By comparison, with equivalent gradients and 3 kilometres of cover, a temperature of 200°C would be reached at 3.7 kilometres.

Note 1 Blanche 1 information from Green Rock Energy annual reports 2005, 2006

Interpretation of Basement Features & Lithologies (Figure 2.3)

Based on the interpretation by Direen and Lyons, the major portion of GEL207 is underlain by Archaean metasediments (Am). Granitoid areas are limited to the south-eastern third of the licence where Palaeoproterozoic **Donington Grantoid Suite** (Ppd) is indicated. Some caution in accepting this interpretation is advised however, since the WMC drill log shows drillhole HHD1 to terminate in foliated gneiss of the **Hutchison Group** (also Palaeoproterozoic).

Mesoproterozoic Hiltaba suite granites (which are considered to provide the main “hot” granites in the region, and which have been intersected in Blanche 1, as noted) are interpreted **not** to occur within MEL207; the closest being approximately 10 kilometres to the north-east. Such granites, and the associated **Gawler Range Volcanics**, appear to be restricted to the north of a major fault system, trending slightly north of west (the **Andamooka thrust system** noted by Hawley, 2007). This fault is interpreted to lie just to the south of the Acropolis Prospect and across the north-east corner of GEL207, where Gawler

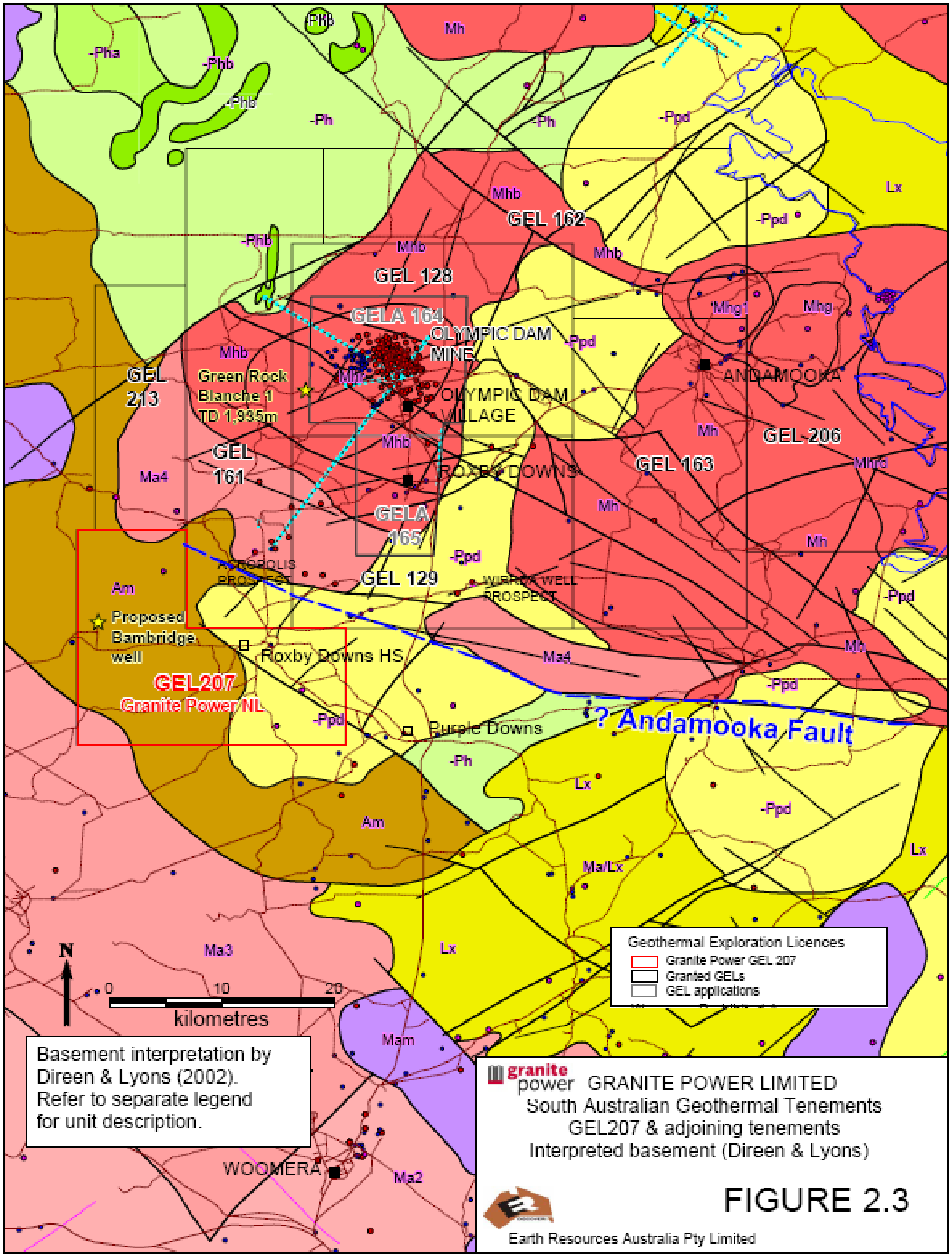
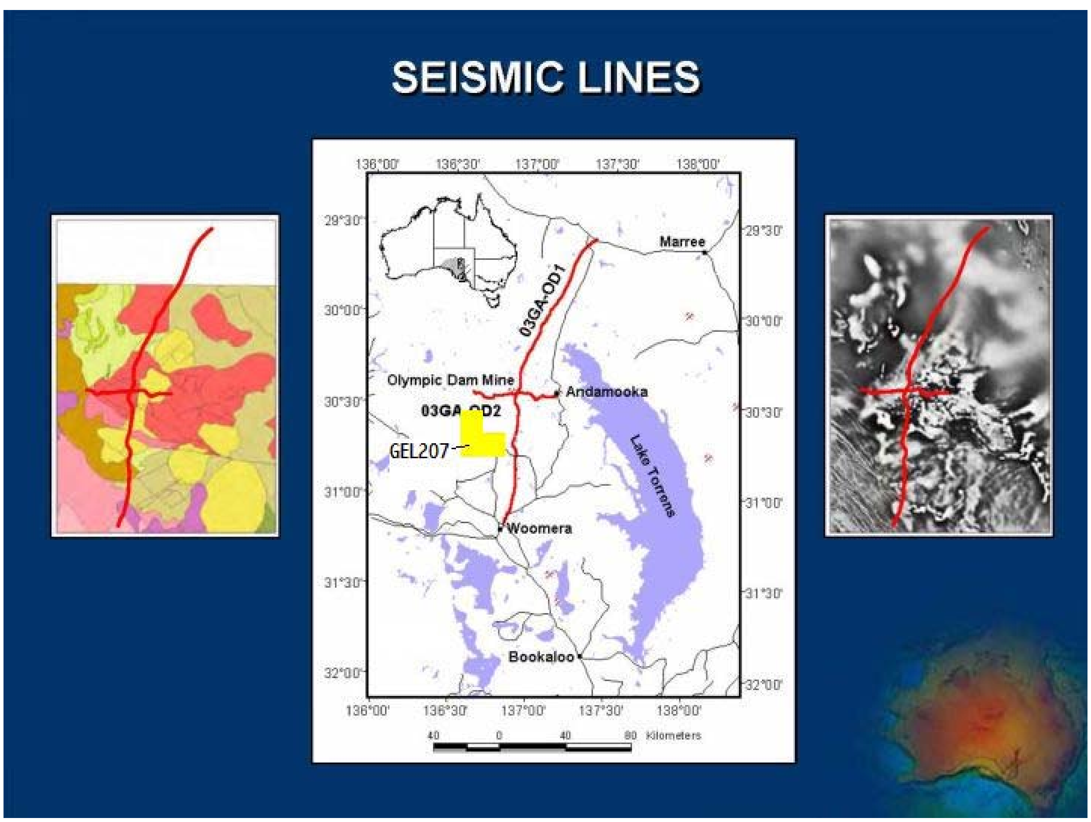

GEL 162
GEL 128
GELA 164
OLYMPIC DAM MINE
OLYMPIC DAM VILLAGE
ROXBY DOWNS
GEL 213
Green Rock Blanche 1 TD 1,935m
GEL 161
GELA 165
GEL 163
GEL-206
ANDAMOOKA
GEL 129
ACROPOLIS PROSPECT
WIRRDA WELL PROSPECT
Proposed Bambridge well
GEL207
Granite Power NL
Roxby Downs HS
Purple Downs
? Andamooka Fault
WOOMERA
0 10 20
kilometres
N
Geothermal Exploration Licences
Granite Power GEL 207
Granted GELs
GEL applications
Basement interpretation by Direen & Lyons (2002). Refer to separate legend for unit description.
granite power
GRANITE POWER LIMITED
South Australian Geothermal Tenements
GEL207 & adjoining tenements
Interpreted basement (Direen & Lyons)
FIGURE 2.3
Earth Resources Australia Pty Limited

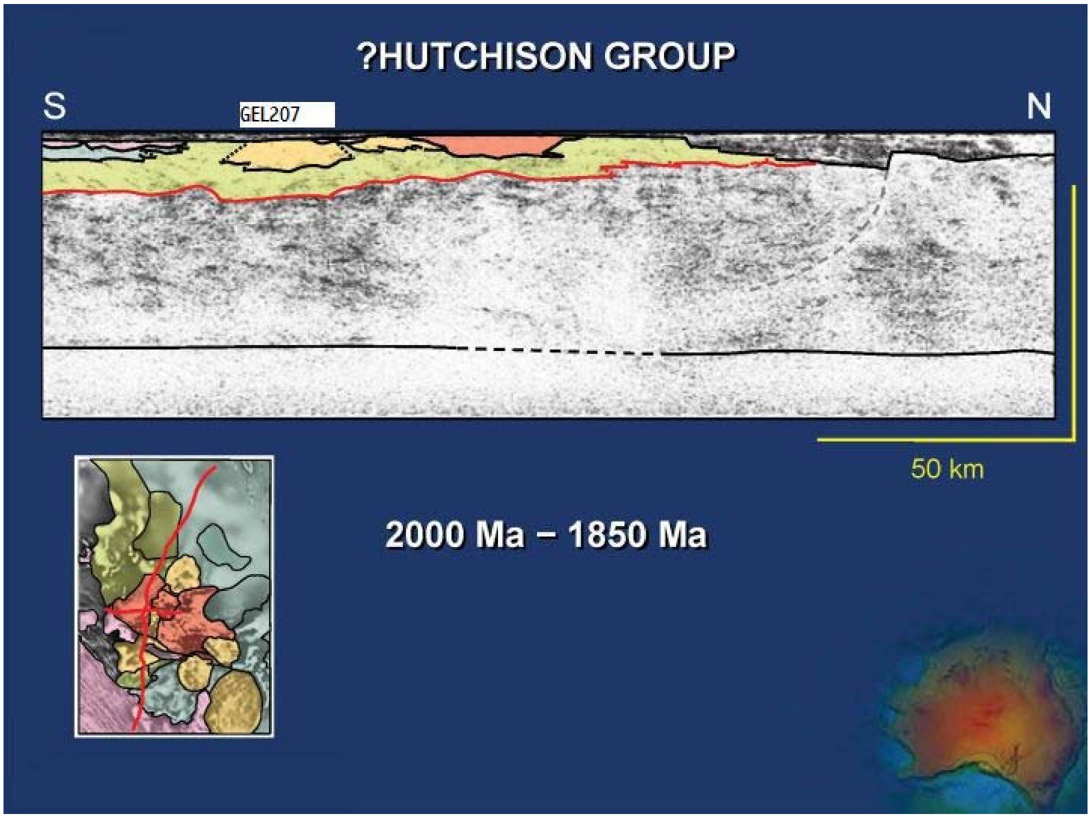
Table 2.2: Key to Basement units on Figure 2.3

Symbol	Age	Unit
Mh	*Mesoproterozoic*	*Hiltaba Suite granitoids - undifferentiated*
Mhb		*Burgoyne Igneous Complex (Hiltaba Suite)*
Ma4		*Gawler Range Volcanics (GRV) - undifferentiated*
Ma2		*GRV - Eucarro Dacite, Yantea Rhyodacite & equivalents*
Ma3		*GRV - Nonning Rhyodacite, Bunburn Dacite & equivalents*
Mam		*GRV - Mafic Gawler Range Volcanics*
Lx	*Palaeoproterozoic*	*Wallaroo Group - undifferentiated*
Ppd		*Donington Granitoid Suite*
Ph		*Hutchison Group - undifferentiated*
Pha		*Hutchison Group - amphibolite*
Phb		*Hutchison Group - banded iron formation*
Am		*Archaean Archaean metamorphics*

Geoscience Australia deep seismic lines location map (from Lyons 2005)
With approximate location of GEL207



North-South section interpretation (from Lyons 2005) – GEL207 location is approximate



Range Volcanics (?**Waganny Dacite**; Ma4) may just extend into the tenement. Another small area of Gawler Range Volcanics is interpreted to occur in the far south-west (**Nonning Rhyodacite, Bunburn Dacite** and equivalents; Ma3) however these are not associated with Hiltaba Granites.

Depth to basement contours from Direen and Lyons (op cit) indicate less than 400 metres cover over the north-western part of GEL207 but deepening in the south-east to approximately 500m. It is evident that their interpretation of "basement" is age based (top of Mesoproterozoic) and hence includes the Pandurra Formation. As noted above, we have considered this unit as part of the thermal blanket, and depth to the base of the thermal insulator sequence is substantially deeper than their basement contours indicate.

Key to interpreted Proterozoic units

Monochrome (upper veneer)	Neoproterozoic cover (surface 300m to 6km thick)
Flesh pink	Burgoyne Batholith (Hiltaba Suite granitoid) – principal heat source
Pale pink	Gawler Range Volcanics (south end)
Pale blue	Wallaroo Group (south end)
Yellow	Donington Suite
Pale green	?Hutchison Group

Comment on the Proposed Bambridge Exploration Well

We are not aware of the criteria for selecting the Bambridge well site, but it is in an area where maximum depth of cover can be expected. While this is probably in excess of 1,100 metres, it is unlikely to be greater than 1,500 metres. It is of concern that there is no indication of granitic basement at this location.

Summary of Potential

The limited data available indicates thermal insulating cover over GEL207 (largely provided by the Pandurra Formation) is in excess of 1 kilometre but on the basis of more regional data, this thickness is considered unlikely to exceed 1,500 metres. Cover is thus anticipated to be better than for the Blanche 1 well but still not ideal for a geothermal target.

The apparent absence of “hot” granites of the Hiltaba Suite within GEL207 downgrades the geothermal potential of the tenement. Older Donnington Suite granites are not expected to exhibit the high heat flows typical of the Hiltaba Suite granites. The possibility of uranium mineralization within, or at the basal unconformity of the Pandurra Formation may provide an additional heat source.

On the basis of both the limited thickness of thermal insulation (unlikely to exceed 1.5 kilometres) and the apparent absence of a proven heat source, the geothermal potential of GEL207 must be considered low.

If it is considered desirable to retain the tenement for strategic reasons (viz proximity to Olympic Dam and grid infrastructure) further work prior to the drilling of Bambridge 1 should include:

- Detailed geophysical modelling to estimate cover depth and, if possible, interpret basement lithologies.
- Inspection, thermal conductivity testing and spectrometer logging of Pandurra Formation core from WMC drillhole HHD1.
- Preparation of a “depth of cover” isopach map based on the depth to base of the Pandurra Formation (effectively a combination of the Geodrafting “Neoprotero thick” and “Pandurra thickness” figures.)

7.0 REFERENCES

(Downloaded data which has been referenced in the text – including Open File Envelope references- is not reiterated below. This information accompanies the digital copy of this report)

Anderson C.G. 1978 Magnetic interpretation in the northwestern Stuart Shelf area, South Australia. *South Australia. Geological Survey. Quarterly Geological Notes,* 68:4-7

Direen, N.G.and Lyons, P., compilers. 2002. Geophysical interpretation of the Central Olympic Cu-Au Province. Canberra: Geoscience Australia. MapInfo data from Geoscience Australia
website at *http://www.ga.gov.au/rural/projects/gawler.jsp*

Drexel J.F., Preiss W.V. and Parker A.J., 1993. The geology of South Australia. Vol.1, The Precambrian. *South Australia. Geological Survey. Bulletin, 54.*

Lyons P., 2005. Crustal structure of the Olympic Dam region: Constraints from deep seismic reflection profiles. In: Abstracts of the Mineral Exploration Through Cover Conference, Adelaide, South Australia, June 24, 2005, p.36.

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PROACTIVE ENERGY DEVELOPMENTS LTD & URANIUM EXPLORATION AUSTRALIA LTD

ENVIRONMENTAL ASSESSMENT REPORT

BAMBRIDGES WELL GEL207 GEOTHERMAL PROJECT:

PROPOSED EXPLORATION DRILLING AT ROXBY D NO. 1

(30°41’ 07.8” S, 136° 36’ 10.6”E)

Prepared for

Proactive Energy Developments Ltd

by

Fatchen Environmental Pty Ltd

Adelaide, September 2006

UXA-06-01

Author: TJ Fatchen

v1.1

FATCHEN ENVIRONMENTAL PTY LTD *ACN 060 780 734*

Ecological Survey, Management and Planning *ABN 420 607 807 34*

7 Hutchinson St (PO Box 462) Mt Barker SA 5251
Tel.: (08) 8391 1164 Fax: (08) 8391 5156

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TABLES

FIGURES

1. PROPOSED ACTIVITIES

1.1 Introduction

This document provides a risk assessment and the basis for environmental compliance for proposed exploratory drilling by Proactive Energy Developments Ltd & Uranium Exploration Australia Ltd ("PED-UXA") for the Roxby Downs Geothermal Project in GEL 207 at Bambridge's Well #1 (30°41' 07.8" S, 136° 36' 10.6"E). The proposed well Roxby D No. 1 is on Roxby Downs pastoral station, some 38km southwest of Roxby Downs Township (Figures 1, 2). The proposed drill hole is intended to indicate the geothermal potential of part of GEL 207, with siting selected as being on the edge of a gravity-high zone, with geothermal drilling by PED as a follow-on to minerals exploration drilling by UXA in EL 3428. The test well, to a maximum depth of 1000m, will be used to measure the geothermal gradient.

The test well will follow minerals exploration percussion drilling to some 400m. The test well will be a diamond-drilled tail to 1000m or to basement if this is shallower.

The well will be finished cased and subsequently utilised as a monitoring/measurement hole.

The well differs from a petroleum exploration well in its purpose, small scale, limited depth, and the low probability of any oil discovery. However, the proposed drilling activity is still reasonably covered by the current Cooper Basin drilling Statement of Environmental Objectives (Santos 2003). Differences of scale and site are considered in the present document.

1.2 Location and access

1.2.1 Location

Drilling is proposed at in GEL 207 at Roxby D No. 1 (30°41' 07.8" S, 136° 36' 10.6"E), near Bambridge's Well on Roxby Downs Station. The drill site is on a limestone plateau area, common to the region Roxby Downs-Olympic Dam-Andamooka. The site is above the depression containing the pastoral Bambridge's Well, a dug well into surface (unconfined) aquifers (Figures 1-3). The site is distant from any public National Park, Conservation Park or Regional Reserve. It does not impinge on the Olympic Dam SML.

1.2.2 Access

There is a well-developed mining and pastoral local infrastructure (Figures 1, 2):

- Major, sealed public roads between Woomera and Roxby Downs Township
- Maintained station access road between the Woomera road and Roxby Downs Station
- Maintained pastoral tracks between Roxby Downs Station and the site.

The existing road and track system allows immediate access to the wellsite.

1.3 Drilling

1.3.1 Responsibilities

PED-UXA's nominated representative(s) will be responsible for supervision of the initial site preparation, enforcement of vehicle movement limitations, cultural heritage issues, tidiness and cleanliness of the site and access, and supervision and documentation of remediation works. The drilling contractor will have responsibility for the actual drilling operation, reporting to PED-UXA.

1.3.2 Drilling operation

A two-stage drilling operation is proposed for the hole, as the initial drilling (by UXA) will be seeking minerals (uranium) under a separate exploration licence. The mineral hole will be percussion-drilled to some 400m. The subsequent diamond-drilled tail, for geothermal measurement, will be drilled to a variable total depth, currently an estimated maximum 1000m. The stratigraphy is summarised in Appendix 1.

Both upper and lower holes will be cased. In particular, the upper hole needs to be cased to protect the unconfined aquifer(s) supplying stockwater to the nearby Bambridge's Well. Groundwater pressure issues are not expected for the minerals hole, and there have been no cases of problems in other holes drilled in the area.

The diamond drilling will initially be by HQ size diamond core to total depth, cased with HQ size casing and grouted permanently in place.

The hole will be kept open for logging, and possible subsequent stress monitoring and other activities in later parts of the development program.

Diamond drilling is currently proposed with a UDR1000 rig, rated to 1000m, but there is a possibility of use of a UDR1200 rig, rated to 1600m. Details are provided in PED-UXA's Drilling Operations Manual (DOM). Pad layout is indicated in Figure 4

Drilling will follow industry-accepted practice for diamond drilling. Procedures and operations will be defined in PED-UXA's Drilling Operations Manual (DOM). The drilling contractors will be required to regularly test casing integrity in the normal course of drilling. Tests will be reported to, and tracked by PED-UXA. Muds used will be non-toxic, and will comply with onshore drilling standards, as specified in PED-UXA's Drilling Operations Manual.

1.3.3 Drilling period and parameters

Drilling of the mineral hole is anticipated for October or November 2006, subject to any "blackout" period imposed by the Department of Defence. The diamond tail drilled under the Petroleum Act could commence early November 2006. Duration for the diamond drilling would be some 20 days. The generic drilling parameters are:

Drilling date	November 2006
Total depth	1000m
Primary Objective	Basal Granites/Gneisses if within maximum depth
Surface hole size	140mm (drilled as mineral hole)
Surface hole casing	102mm, steel (drilled as mineral hole)
Surface hole depth	400m (drilled as mineral hole)
Tail size	HQ size diamond core to proposed total depth
Shoe depths	77mm hole casing shoe set at total depth
Well duration (diamond tail only)	20 days drill, log and evaluate, diamond drilling

1.4 Drillsite requirements

The wellsite will require a level and firm pad for the rig and associated vehicles. The proposed hole is in an area with massive limestone immediately below a shallow sandy soil, requiring no or only minor importation of borrow material for load-bearing. The site is not subject to water run-on hazards. The site was relocated to higher ground from an originally selected point in a drainage depression (Figure 5).

The pad area needed for diamond drilling will be some 20m x 40m. Indicative equipment and sump arrangements are shown in Figure 4. The total area affected by pad construction would be some 30m x 50m. In view of the proximity to a stock water supply fed by unconfined aquifers, sumps will be lined for water retention while drilling.

Accommodation for drill crews and PED-UXA personnel will be a combination of a towed on-site caravan for active shift use and off-site formal accommodation at Woomera.

1.4.1 Rubbish

Rubbish will be held on site for later removal to disposal facilities at Woomera or Roxby Downs.

1.4.2 Drilling water supply and associated general facilities

Drilling and operation water will be sourced either from Bambridge's Well stock water, by arrangement with BHPB as leaseholder of Roxby Downs Station, or trucked if necessary from Roxby Downs township.

1.4.3 Drinking water supply

Potable water for personal use will be obtained from Roxby Downs/Olympic Dam

1.4.4 Radiological issues

It is possible that the drilling will intersect radioactive materials in the radiogenic Roxby Downs Granite and associated rocks, if not in upper formations. Appropriate procedures will be in place, together with appropriate radiation monitoring equipment, to detect any heightened environmental radiation and minimise spread of contamination.

1.5 Transportation and other infrastructure

The proposed drilling does not require major road convoys or significant traffic movements. Vehicular movements will use defined access. The two rig and caravan moves in and out would involve some four truckloads. While drilling is underway, there are likely to be daily movements of personnel from external accommodation at Roxby Downs or Woomera. There may be occasional movements of a water truck locally to limit dust generation on access.

1.6 Well abandonment

The present intention is to case and maintain the well as an observation well for the immediate future. The well will be capped and locked when not in use. In the event of closure of the project, the well would be secured and locked at surface, but left unplugged. It should be noted that questions of artesian aquifers mixing do not arise in this location, and oil formation protection is not at issue. Detail of abandonment would be addressed in an Abandonment Programme Application which would be submitted to PIRSA for approval.

2. SUMMARY OF LOCAL ENVIRONMENT

2.1 Land use

The proposed drillsite is on Roxby Downs station, in an area intended to serve low intensity livestock grazing. The site does not impinge on the Roxby Downs township or SML.

The nearest conservation reserve is the Lake Torrens salina, east of Andamooka and far distant from the drilling site

The drillsite is within the Woomera Prohibited Area.

The district is one of the most heavily environmentally scrutinised and documented areas of arid Australia: the most recent integrated summary is provided in Kinhill Engineers (1997).

There are no special wilderness or conservation attributes known for the area:

- The area is consistently under domestic grazing.
- The district has a continuing focus on mineral exploration and development, and on industrial and township development associated with the dominating Olympic Dam mine, smelter and refinery and the equally dominating, in terms of acreage affected, Andamooka Opal Fields.
- There is a high resident population in Roxby Downs and Andamooka combined.

Wilderness values are reduced accordingly.

2.2 Landform, soils, vegetation and habitat

2.2.1 Land system summary

The drillsite and access is on an exposure of limestone within the undulating plain of sand sheets, dunes and silcrete rises mapped by Laut *et al* (1977) as the Moondiepitchnie Environmental Association, of some 13,000km^2.

The Quaternary dunefields are superimposed over tertiary plateau surfaces, and over an ancient dune system resulting in north-south trending silcrete rises. The siliceous dunes are generally low, average height around 6m. Dune spacing varies from dense to very sparse, and the soils of dunefields varies accordingly, from deep red sands in dunes, to sandy gradational soils in narrower interdunes, to thin sand or loam veneers on limestone or silcrete plateau surfaces, to friable clay loams on fully exposed plateau surfaces.

The drillsite is on a limestone exposure with minimal slope (Figure 3, 6 *et sequ)*.

Drainage is immediately local only, into sumps or dolines into the Andamooka Limestone.

2.2.2 District vegetation and habitat

The dunefield vegetation has most recently been summarised in Kinhill (1997).

Spacing of dunes influences soils in swales and interdunes, and consequently vegetation. Where dunes are close together, perched swales have clayey sands and vegetation little different from crests. As dune spacing increases, the clay content of interdune soils increases, with a continuum from sands to gradational sandy clays. Mulga *Acacia aneura* and Western myall *Acacia papyrocarpa* appear in sandy clay and loamy clay swales and interdunes, and along the margins of dunes where dune spacing is wider still and underlying plateau surfaces are exposed. Generally, ground cover in clay or sandy clay interdunes in low open shrubland dominated by dwarf chenopod shrubs, primarily bladder saltbush *Atriplex vesicaria* and low bluebush *Maireana astrotricha.* Where limestone exposures, or shallow loam soils immediately over limestone are present, as is the case for the drillsite, bluebush *Maireana sedifolia* replaces *M astrotricha.* Common associated grasses are *Enneapogon avenaceus* and *E cylindricus* (bottlewashers), and kerosene grass *Aristida contorta.*

Vegetation on deep sands of the Recent sandridges is variously low open woodland of white cypress pine *Callitris glaucophylla,* tall open shrubland of horse mulga *Acacia ramulosa* or shrubland-tall open shrubland of sandhill wattle *Acacia ligulata,* narrow-leaved hopbush *Dodonaea viscosa* ssp *angustissima*, and punty bushes *Senna artemisiodes* subspecies. Common associated tall shrub or low tree species include bullock bush *Alectryon oleifolium.* Ground cover is largely ephemeral and highly variable, as high as 70% in a growth period, partly from the alien mustard **Brassica tournefortii,* to almost zero in drought periods, as at present. The most consistent constituents are grasses, especially *Aristida holathera,* and the ubiquitous buckbush **Salsola kali.*

Fauna implications

The drilling site can be expected to share the vertebrate fauna examined at length at the Olympic Dam mine (Kinhill Engineers 1997).

2.2.3 Drilling site

The site and access were examined in the field 14 September 2006, in company with representatives of BHPB land management. The originally proposed hole (Figure 5) was shifted at the requirement of both the Mining Act and BHPB land management, as being too close to the stock watering point at Bambridge's Well. The site was shifted out of low-lying ground subject to run-on onto adjoining low plateau surfaces, with a station fenceline interposed. On field inspection, a further minor shift was made to minimise the amount of bluebush likely to be lost in clearing the pad.

The current drillsite is on an almost level plateau area with shallow to skeletal sandy clay loams over sheet limestone, with some platy limestone exposures (Figures 6-10). There are no run-on or run-off issues.

Vegetation is low open shrubland of bluebush *Maireana sedifolia* mixed with the short-lived perennial *Zygophyllum aurantiacum.* Combined subshrub cover is some 15%, with heights 40-60cm. There is a sparser understorey of spear grass *Stipa nitida* and copperburr *Sclerolaena obliquicuspis*, with cover 5%-10%. About the drilling site are emergent punty bushes *Senna artemisioides* and juvenile myall *Acacia papyrocarpa* 1.5-2.5m. with cover up to 2%. The area is characterised by strong regeneration of myalls, with numerous saplings present. There has been little obvious dieback of mature myalls in the general area.

The original vegetation is likely to have been bladder saltbush *Atriplex vesicaria* and bluebush *Maireana sedifolia*, with the former eliminated from the area partly due to proximity to a major stock water, and partly from sheer domestic grazing pressures in the past.

The following plant species have been recorded on and immediately about the proposed pad:

**Salsola kali*	Buckbush
**Schismus barbatus*	Barbary grass
Acacia papyrocarpa	Western myall
Acacia tetragonophylla	Dead finish
Enneapogon avenaceus	Bottlewashers
Goodenia pinnatifida	
Lycium australe	Australian boxthorn
Maireana cf appressa	
Maireana sclerolaenoides	Copperburr
Maireana sedifolia	Bluebush
Minuria leptophylla	Minnie daisy
Sclerolaena brachyptera	Short-winged copperburr
Sclerolaena obliquicuspis	Grey copperburr
Senna artemisioides coriacea	Desert cassia
Senna artemisioides filifolia	Desert cassia

Senna artemisioides petiolaris	Punty bush
Sida corrugata	
Stipa nitida	Spear grass
Zygophyllum aurantiacum	

Apart from the two ubiquitous aliens **Salsola kali* and **Schismus barbatus*, no other aliens were observed present at the time of inspection. However, given the proximity to the water, and the evidence of past overgrazing, other alien and weed species can be expected to appear from time to time, without any reference to importation via drilling equipment.

At present, the fire risk is low to very low.

2.3 Biophysical significance and sensitivity

2.3.1 Communities and species under the EPBC and NPW Acts

The drill site does not contain any community listed in schedules of the EPBC Act.

The plant *Ophioglossum polyphyllum*, listed as "Rare" under Schedule 9 of the National Parks and Wildlife Act 1972 is present in the district (TJ Fatchen, personal collections), but there is no appropriate habitat immediately about the drill site and hence it is unlikely to be present.

The Plains Rat *Pseudomys australis* is known to be present on the Arcoona Plateau near Woomera. The species is listed as "Vulnerable" both under Schedule 8 of the NPW Act 1972 and under the EPBC Act. However, it is associated with stony tableland, not the limestone exposures present at the drillsite, hence it is unlikely to be in the area of the drillsite.

The yellow bellied sheath-tailed bat *Saccolaimus flaviventris* is a rare species present in the district, possibly as a transient (Kinhill Engineers 1997).

2.3.2 Significant or unusual areas

The densely vegetated drainage, hollows and solution cavities in the low-lying ground around Bambridge's Well, although comprising commonly met plant species, present a vegetative structure uncommon in the district. The drillsite, following moves out of the lower ground, does not impinge on these areas.

2.3.3 Western myall deaths

There has been a high percentage of recent deaths of western myall *Acacia papyrocarpa* in the district, with the proportion, from direct observation, higher near Roxby Downs township than in more distant areas. Most deaths appear to have taken place within the last 7-8 years, implying a high mortality rate for the local populations, given the long lifespan of the trees. There appear to be few or no dieback deaths at present near the drilling site, but it is likely that the dieback will affect at least some trees in proximity to proposed drilling, regardless of whether drilling is undertaken or not.

2.4 Groundwater

The mineral hole will have intersected an unconfined aquifer, which supplies the nearby Bambridge's Well, in surficial deposits or in the upper part of the Andamooka Limestone.

Either or both the mineral hole or the diamond-drilled tail may also intersect aquifers in:

- The base of Andamooka Limestone
- In the Corraberra Sandstone

The unconfined aquifer is good stock (cattle) water, according to Roxby Downs Station management, which puts salinity at some 4000mg/L. The Andamooka Limestone and

Corraberra Sandstone groundwaters are saline (NaCl), 20,000 - 40,000 mg/L, with up to 5000 mg/L sulphates, and detectable levels of uranium and radium (WMC 1997). The Arcoona Quartzite / Corraberra Sandstone aquifers are hydraulically continuous across the Stuart Shelf, including the locality proposed here for exploration drilling. The Andamooka Limestone aquifer is less extensive but given the exposures at the drilling site is likely also to be present.

There is no connection to the Great Artesian Basin, which despite frequent popular reports to the contrary, has its limits more than 100km to the north. In this regard, the current proposal differs significantly from petroleum and geothermal exploration below the Cooper and Eromanga Basins, where all wells will intersect the GAB.

1.1 Indigenous heritage

Full heritage clearance procedures will be followed before any activities involving earthworks or clearing commence. At the time of compilation of this report, we understand that heritage clearance in consultation with appropriate Native Title claimants had been recently completed.

1.2 Non-indigenous heritage

Bambridge's Well (date uncertain) is believed to have been dug in the early stages of pastoral development (late 19th Century). No other sites or items of non-indigenous heritage are near the drilling site or local access. Non-indigenous heritage aspects along station tracks or public roads, particularly the original Roxby Downs and Purple Downs homesteads and associated outbuildings, will not be affected by proposed operations.

2. RISKS ARISING FROM PROPOSED ACTIVITIES

2.1 Summary

Possible risks, their avoidance or amelioration, and environmental objectives to be pursued during operations are summarised in Table 1.

2.2 Downhole risks

There are no anticipated downhole risks other than those normally associated with hardrock drilling. Downhole engineering is outlined in section 1.3 above and detail provided in the PED-UXA DOM and its attachments.

2.3 Risks to the biophysical environment

The primary risks to the natural environment from drilling concern construction of the drilling pad. Other risks to the natural environment are low. There are no unusual characteristics of landform, soil or surficial geology, or habitat which might suggest an increased likelihood for the presence of rare, threatened or vulnerable plant or animal species. The species known to be in the immediate area have been shown to be tolerant of drilling activity through their persistence despite the extent and intensity of surface drilling operations associated with the Olympic Dam development.

2.4 Risks to the cultural environment

Risks to Aboriginal cultural heritage mainly concern the potential for damage to sites in the creation of access and the drilling pads. In the majority of cases, the drillsites, pads and access already exist, although they may not have been subject to heritage clearance at the time they were constructed.

Before any clearing or earthmoving activities start, access and wellsites, and possible borrow sites, will be inspected, layouts modified where warranted and the drilling site specifically cleared by representatives of the appropriate Native Title Claimants.

In the absence of any particular non-indigenous heritage items or relationships, the activities pose no risk to non-indigenous cultural aspects.

2.5 Environmental objectives and reportable incidents

2.5.1 Drilling

The proposed drilling and access activities, although directed at exploratory drilling for hot rock information rather than full-scale drilling at the scale of a conventional oil rig, are still generally covered by the *South Australia Cooper Basin Operators Statement of Environmental Objectives: Drilling and Well Operations* (Santos 2003). Differences lie in the level of implementation needed to achieve the environmental objectives, given the smaller scale and the simpler engineering concerned, and given differences in the specific Roxby Downs landscape.

Table 1 provides a summary of relevant objectives, risks and proposed actions for drilling and initial production testing. Reference should be made to Appendices the Cooper Basin SEO (Santos 2003) for assessment criteria.

2.5.2 Serious and reportable incidents

Serious and reportable incidents under Section 85 (1) of the Petroleum Act will be those listed as part of the preceding Statements of Environmental Objectives, with the exception of those relating to gas supply. The likelihood of oil or gas discoveries in the drilling is minimal, and there are no trunk gas pipelines in the region.

Reporting formats and procedures will be provided, or where a subcontractor provides services, specified in PED-UXA's Emergency Response Plan for this operation.

Table 1: Risks, impacts and management in relation to environmental objectives

Environmental objective	Possible impact	Main sources of risk	Avoidance, management, mitigation
1. Minimise risk to public and third parties			
Minimise public and third party risks	Creation of new public risks: public using rig road; well blowouts; post-drilling; radiological issues.	Access risks, wellsite risks	The drillsite is distant from public access, within the Woomera Prohibited Area and on station tracks usually locked to public access. Signage on station track south of the well, warning against trespassing, and warning of danger associated with truck movements. Liaison with landholders regarding movements. At drilling rig, regular integrity testing. Drilling may intersect uranium deposits: standard radiological monitoring procedures for shallow drilling followed, cuttings and groundwater disposed in drilling sump with eventual soil covering.
Minimise fire risk; prevent the spread of any fires to wellhead	Loss of resource (also OH&S considerations not covered in this EAR)	Drill site, campfires	Prevention of fires. Fire equipment available. Emergency response plan in place. Fire inductions. Current (Spring 2006) fuel loads are too low to support a wildfire.
2. Minimise disturbance and soil contamination			
Minimise soil impacts	Accelerated soil erosion. Development of borrow areas.	Access and pad construction	The drillsite is alongside existing station track and is reachable by conventional vehicles without new access provision. Drillsite placed to minimise need for clearing of soil or vegetation. Any borrow needed will be taken, by arrangement with station management, from nearby clay mounds resulting from digging of cattle loading bays. Surface scrapings of soil and plant material stockpiled on cleared edge for later re-spreading.

Table 1 cont...

Environmental objective	Possible impact	Main sources of risk	Avoidance, management, mitigation
(2. Minimise disturbance and soil contamination)			
Avoid storage and loading facility spills; rapid cleanup and impact minimisation following spills	Pollution through local fuel tank or filling point spills	Vehicle and plant refuelling, drilling operations.	Most refuelling will be from trailers. Trailer filling to have spill protection/recovery materials and procedures. Any non-trailer (overhead tank) refuel areas, fuel/oil drum storage and chemical storage will be HDPE/clay floored and locally bunded (flooring and bunding clay sourced from sumps or from nearby station sources, with permission of station management). Refuel areas' contaminated soil to be disposed in sump, with drilling muds, at end of drilling. Filling systems and storage tank operation in accordance with AS1940 *The Storage and Handling of Flammable and Combustible Liquids*
3. Avoid introduction of pest species			
Prevent introduction of pest plants	Establishment of further alien species in the locality	Importation on vehicles	Requirement for contractor/other vehicles to be clean prior to entering district. Alien introduction due to drilling operation is a very low incremental risk, given the long-term pastoral use of Roxby Downs station and given the major township development.
4. Minimise disturbance to drainage patterns; avoid contamination of surface and shallow groundwaters			
Avoid drainage alterations	Downstream shifts; erosion	Access and pad construction	Drainage in all cases is purely local and any interception by drillsite or access will be minor to negligible.
Avoid storage and loading facility spills; rapid cleanup and impact minimisation following spills	Pollution through local fuel tank or filling point spills	Vehicle and plant refuelling, drilling operations.	See (2) above
Avoid other sources of surface and groundwater contamination	Mud or chippings contamination of surface and surface waters	Escape of drilling muds from sumps	No formation water released beyond area of drilling activity. Production water, either formation water or drilling brines, will be returned to the drilling sump for evaporative disposal. Sumps lined to protect unconfined (surface) aquifer feeding Bambridge's Well. No water will be released to surrounding land. Drilling sites and sumps out of surface drainage, locally bunded with small "speed-hump" style bunds.
5. Avoid disturbance to sites of cultural and heritage significance			
Avoid disturbance to sites of Aboriginal and European heritage significance	Intrusion or physical site damage to areas of Aboriginal and European heritage significance	Access and pad construction, vehicle and people movement	Existing and proposed access and all potential drilling sites and supporting infrastructure including borrow areas to be inspected, modified for impact minimisation and cleared for indigenous heritage prior to operations. Control of vehicle and personnel movement off pad and defined access. No sites of

	significant non-indigenous heritage near drilling sites.

Table 1 cont...

Environmental objective	Possible impact	Main sources of risk	Avoidance, management, mitigation
(5. Avoid disturbance to sites of cultural and heritage significance)			
Minimise visual impacts	Visual impacts through obtrusive access and pad development and/or visible long-term persistence of pad and access.	Access and pad construction	Minimal construction of drilling pad wherever possible. Drilling area selected and placed to minimise clearing of bluebush and tall shrubs. Wheeltrack access from existing road. Minimal borrow requirements, met with local sources or sump material. Active rehabilitation of pad on abandonment. The site is not accessible to the public or public view without access to Roxby Downs pastoral tracks.
6. Minimise loss of aquifer pressures and avoid aquifer contamination			
Minimise formation damage in drilling	Physical damage to formation beyond the drillhole.	Drilling	Low risk given percussion and diamond drilling, and local stratigraphy. Use of controlled water loss/low solids drilling muds. Casings applied and cemented as detailed in PED-UXA's DOM
Prevent cross-connection between aquifers, and between aquifers and reservoirs	Contamination of higher-quality groundwater with lower-quality waters (salinity, trace elements).	Missing or inadequate casing or plugging post-drilling.	Local unconfined aquifer (stock water quality feeding Bambridge's Well) protected by casing. Other aquifers are sub-artesian, and high-salinity (Andamooka Limestone and Arcoona Quartzite / Corraberra Sandstone) and will be behind casing. The drilling contractor required to run regular integrity tests. Procedures and requirements given via PED-UXA's DOM
7. Minimise disturbance to native vegetation and fauna			
Avoid impacts on high biological value or wilderness value areas	Direct physical impact on high biological or wilderness value areas; fires started at pad	Access and pad construction; fires	Not in high value area. Procedures/inductions and equipment to limit fire risks (under 1 above). Currently (Spring 2006) fuel loads will not carry wildfires.
Minimise disturbance to vegetation and habitat	Physical damage to soils, vegetation and habitat; wildfire	Access and pad construction or upgrade; Fires at drilling site	No new road construction requirements. Pad located to minimise removal of perennial vegetation. Stockpiling of surface soil and debris from scraped areas (drill pad, sumps, pits) for later use in rehabilitation. Post-operations rehabilitation works at wellsite. See procedures to limit risks of fires, under "Minimise fire risks" in 1 above.

Table 1 cont...

Environmental objective	Possible impact	Main sources of risk	Avoidance, management, mitigation
(7. Minimise disturbance to native vegetation and fauna)			
Avoid disturbance to rare, endangered, vulnerable species and communities	Physical removal of rare, endangered, vulnerable species	Access and pad construction	Plant and fauna species in NPW Act and EPBC Act schedules are present though dispersed throughout the district, and have been persistent despite the major activity associated with the Olympic Dam mine/smelter/refinery development. Any such species if present at the drillsite can be expected to be found widely in the immediate district, as no specific habitat peculiarities exist at drillsite.
8. Minimise air pollution and Greenhouse gas emissions			
	Combustion by-products, particulates, vented hydrocarbon or CO2 release	Well testing, drilling	Probably not likely to arise. Any testing carried out in accordance with industry-accepted standards
9. Maintain/enhance partnerships in community			
	Liaison with local pastoral and mineral operations		Affected parties notified and consulted on proposed activities
10. Avoid or minimise disturbance to stakeholders and associated infrastructure			
Minimise adverse impact on livestock	Interference with stock	Disturbance to stock grazing	Drillsite moved from original location to 200m distant from stock water (Bambridge's Well) in a location satisfactory to station management. Temporary fencing around pad while drilling proceeds and while sumps dry. Daily movement (water truck, crew) organised to minimise impact on watering stock. Liaison maintained with Station management.
Avoid contamination of stockwaters with hydrocarbons	Interference with stock; pollution of stock water	No hydrocarbons expected	No formation water or brines released beyond actual drilling pad. Sumps lined to protect unconfined aquifer supplying Bambridge's Well
Minimise adverse impact on Regional Reserve operations	Not applicable in this area		
11. Optimise waste reduction and recovery			
Minimise waste handling and disposal impact	Creation of wastes: sewerage, litter, overflow and spillage	Disposal of wastes while drilling	Sewage held locally via removable septic tank or portable toilets. Wastes on site confined by bins/skips. Disposal eventually to EPA-licenced waste disposal facility at Roxby Downs or Woomera. Minor non-toxic wastes, chippings and muds disposed in drill sump. Litter cleanup during and post-drilling.

Table 1 cont...

Environmental objective	Possible impact	Main sources of risk	Avoidance, management, mitigation
12. Remediate and rehabilitate operational areas to agreed standards.			
Rehabilitate unsuccessful or suspended wellsite and access	wellsite and access permanently left in place if with visual impact, changed soil surfaces, colour contrasts	Post-drilling	Cleanup, sump and pits filled, facilities removed. Some scarification may be used to roughen pad surface. Topsoil stockpiled from levelled or cut areas respread over pad.
Undertake long-term planning for rehabilitation for potential producing wellsite	Not applicable in this case: well will remain (capped) as a monitoring bore		

3. MINIMISING IMPACTS AND IMPACT RISKS

3.1 Emergency responses

An Emergency Response Plan will be developed and will be applied by PED-UXA.

3.2 Responsibilities, inductions and training

PED-UXA will use contractors for all operations; contractors' operating manuals, particularly drilling operations manuals, and responsibilities will be documented in PED-UXA's DOM or associated documents.

For general environmental aspects, PED-UXA's nominated representative will be responsible for supervision of the initial site preparation, enforcement of vehicular movement limitations, tidiness and cleanliness of the site and access, supervision of remediation works, and general documentation of operations.

An induction or equivalent briefing will be provided to contractors and employees. Contractors subsequently are responsible for their employees' inductions, and will be required to have in place induction procedures and materials.

3.3 Consultation

Formal notifications of operations will have been provided to stakeholders prior to any operations:

- Department of Defence for operations within the Woomera Prohibited Area
- Pastoral leaseholder/management for the area (Roxby Downs station), including direct liaison and visits.
- The ALRM
- The Barngarla, Kokatha and Kujani Native Title Claimant groups, including joint heritage survey
- BHPB, in relation to access and the use of exploration information and drill holes, and as operators of the Olympic Dam mine and holders of the Olympic Dam Special Mining Lease.

3.4 Minimising impact on access

3.4.1 Existing access

There will be a very small incremental impact on public roads, primarily due to movement of personnel on a daily basis and rig moves in and out. Any station road damage will be made good.

3.4.2 New access

The pad is immediately alongside a station track, and no additional access construction is required.

3.4.3 Dust

All access surfaces will generate some dust. Some watering of access may be needed to limit bulldust generation. Dusting will be of relatively short-term duration.

3.5 Minimising impact of pad construction

The diamond-drilled tail will follow directly on percussion drilling associated with uranium exploration, without the need for further pad construction. The construction of the percussion drilling pad will be minimal given the good load-bearing qualities of the continuous limestone sheet with skeletal soil cover. The main disruption will be the digging of sumps, which can be rectified in subsequent rehabilitation. Additional clay, where needed, can be taken by arrangement form the clay dumps associated with loading ramps a few hundred metres distant without the need to open new borrow pits.

4. EVALUATION AND MONITORING

4.1 Subsurface

Procedures for monitoring and evaluation of subsurface will be documented in PED-UXA's DOM or associated documents. In the process of drilling, continuous reports will be produced, including an evaluation component in relation to environmental as well as other risks. Evaluations will be provided both in the daily well reports and in the Final Well Report, and will cover all aspects of subsurface operations including environmental. Drilling and event logs will be maintained and reported in the daily well reports and in the Final Well Report.

4.2 Surface

For general environmental monitoring and evaluation, the Cooper Basin Drilling SEO, including Appendix 1, will be applied. Following the initial archeological and general environmental inspections of the site pre-operations, the main continuous monitoring tool is photographic. Photographs will be taken at all stages of development. File records are held of archeological inspections and of environmental inspections.

5. SITE CLEANUP AND REMEDIATION

5.1 Suspension and abandonment

The well is intended to be retained as an "open" hole, with secure and permanent surface caps, for use in subsequent seismic and temperature monitoring. There is also a future possibility of the hole being used for local fracturing experimentation.

5.2 Wellsite

Sumps will be backfilled, but backfilling will be delayed until the sumps have largely dried. Stock will be excluded in the interim by maintenance of the temporary fencing established at the start of drilling. Clay originally from the sumps will be used for backfill. Backfilling will be to slightly above original ground level, to allow for slumping.

All debris will be removed to appropriate waste disposal or recycling.

The pad area will be lightly scarified, and any remaining stockpiled excess clay and plant debris loosely spread over the pad to speed natural revegetation.

5.3 Access

All access to the site is via pastoral track and road system. Damage associated with rig movement in and out and with drilling will be repaired at the end of the programme.

6. REFERENCES

Kinhill Engineers (1997) *Olympic Dam Expansion Project Environmental Impact Statement.* Prepared for WMC (Olympic Dam Corporation Pty Ltd). Kinhill Engineers, Adelaide, May 1997

Laut, P, Heyligers PC, Keig, G, Loffler, E, Margules, C, Scott, RM and Sullivan, ME (1977) *Environments of South Australia Province 7 Western Pastoral.* Division of Land Use Research, CSIRO, Canberra.

Santos (November 2003) *South Australia Cooper Basin Operators Statement of Environmental Objectives: Drilling and Well Operations*. Santos Ltd, Adelaide.

7. FIGURES

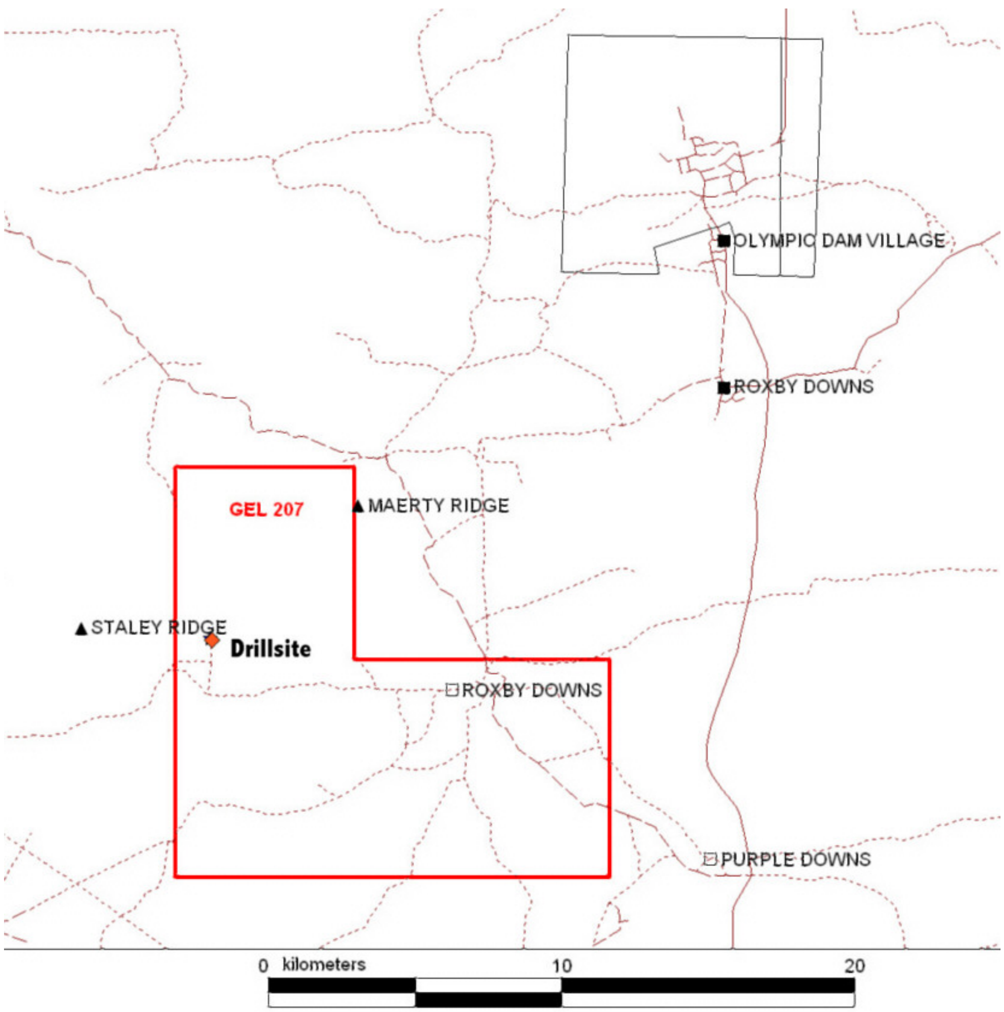


Figure 1. Boundaries of GEL 207 in relation to local infrastructure.

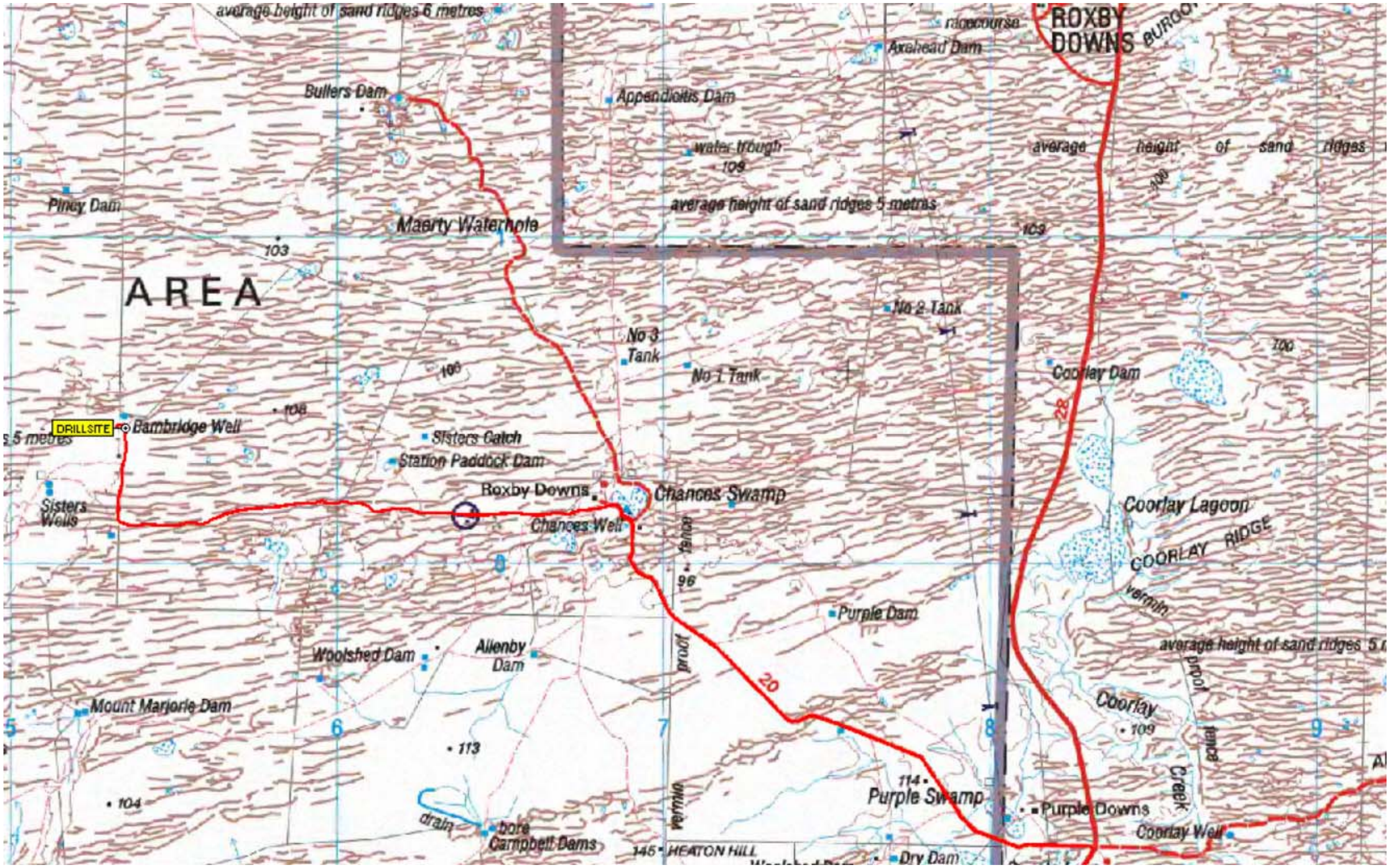


Figure 2 District topography. **Map base NATMAP 1:250,000 ANDAMOOKA**

Figure 3. LANDSAT frame of southern Roxby Downs dunefield areas. Major limestone exposures are outlined. Access to drillsite is along station tracks running through dune corridors or across limestone plateau areas.

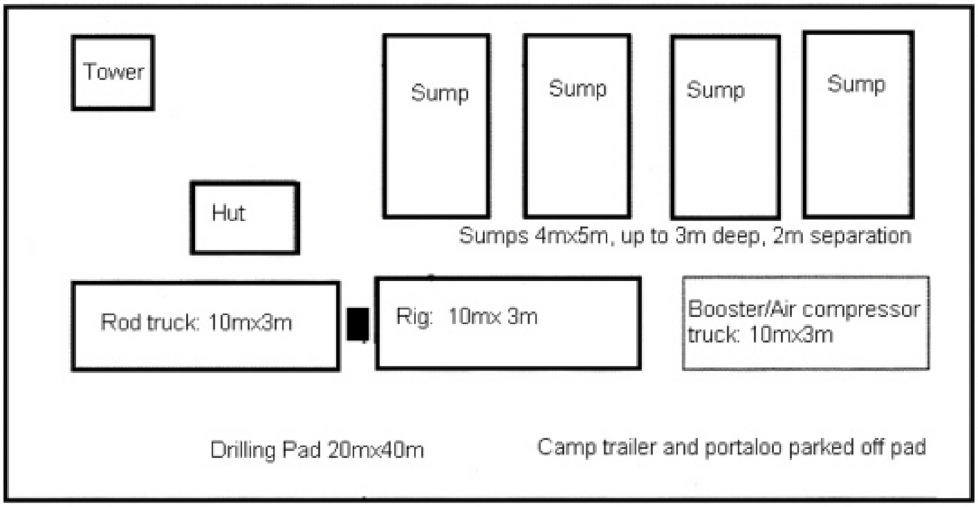


Figure 4. Pad requirement for proposed drilling (based on UDR1200 rig)

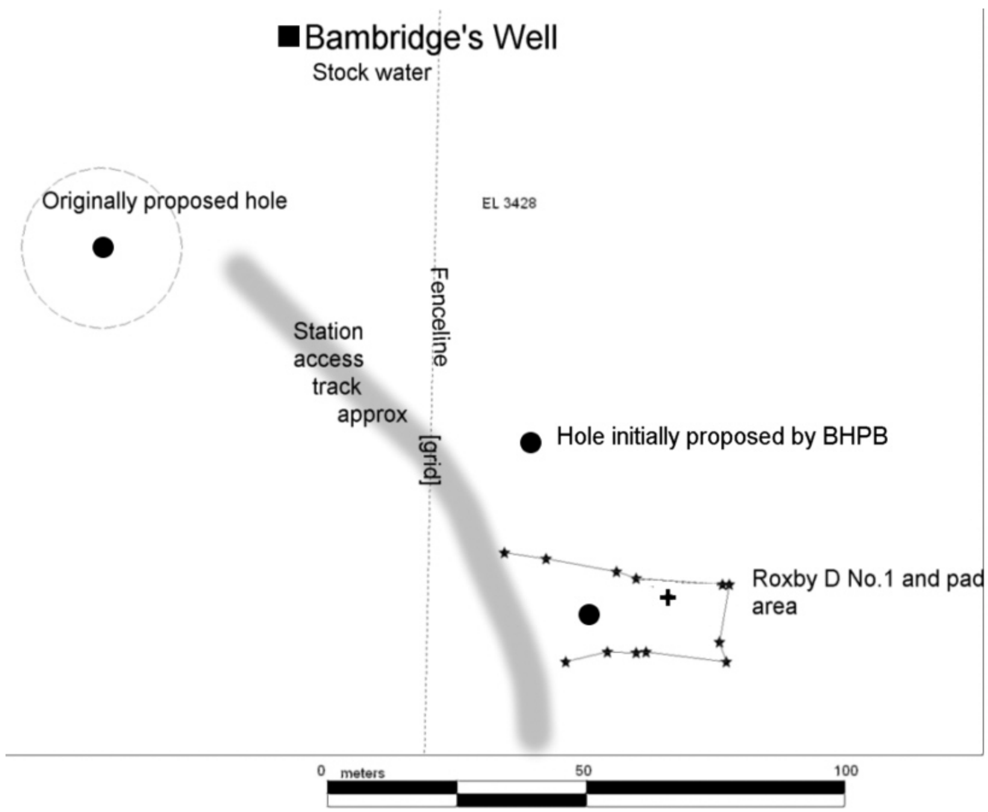


Figure 5. Detail of locality of proposed Roxby D No. 1 drillhole. North to top of figure. The shift from the originally proposed hole to east of the fence was required to move the hole a minimum of 100m from a stock water, and also avoiding issues with stock by interposing the existing fence. The shift further south to the present hole was undertaken in consultation with BHPB to minimise the numbers of perennial bluebush needing removal. The cross within the pad area is a juvenile myall which can be avoided with care.

Figure 6. Proposed pad area, looking west from eastern end. Pad is located to minimise removal of bluebush *Maireana sedifolia* (foreground). Main cover short-lived perennial, shrubby twinleaf *Zygophyllum aurantiacum* and copperburr *Sclerolaena obliquicuspis.* Green shrubs are juveniles of punty bush *Senna artemisioides* subspp. A single myall sapling is present in the pad area (not visible).

Figure 7. Pad area looking east, reverse of Figure 6. Most of pad is clear of bluebush. Young and mature myall *Acacia papyrocarpa* L and R of frame are beyond pad area limits. Flagging tape on bluebushes is indicative of general pad edge, although not a mandatory limit.

Figure 8. Rejected pad site with bluebush cover throughout.

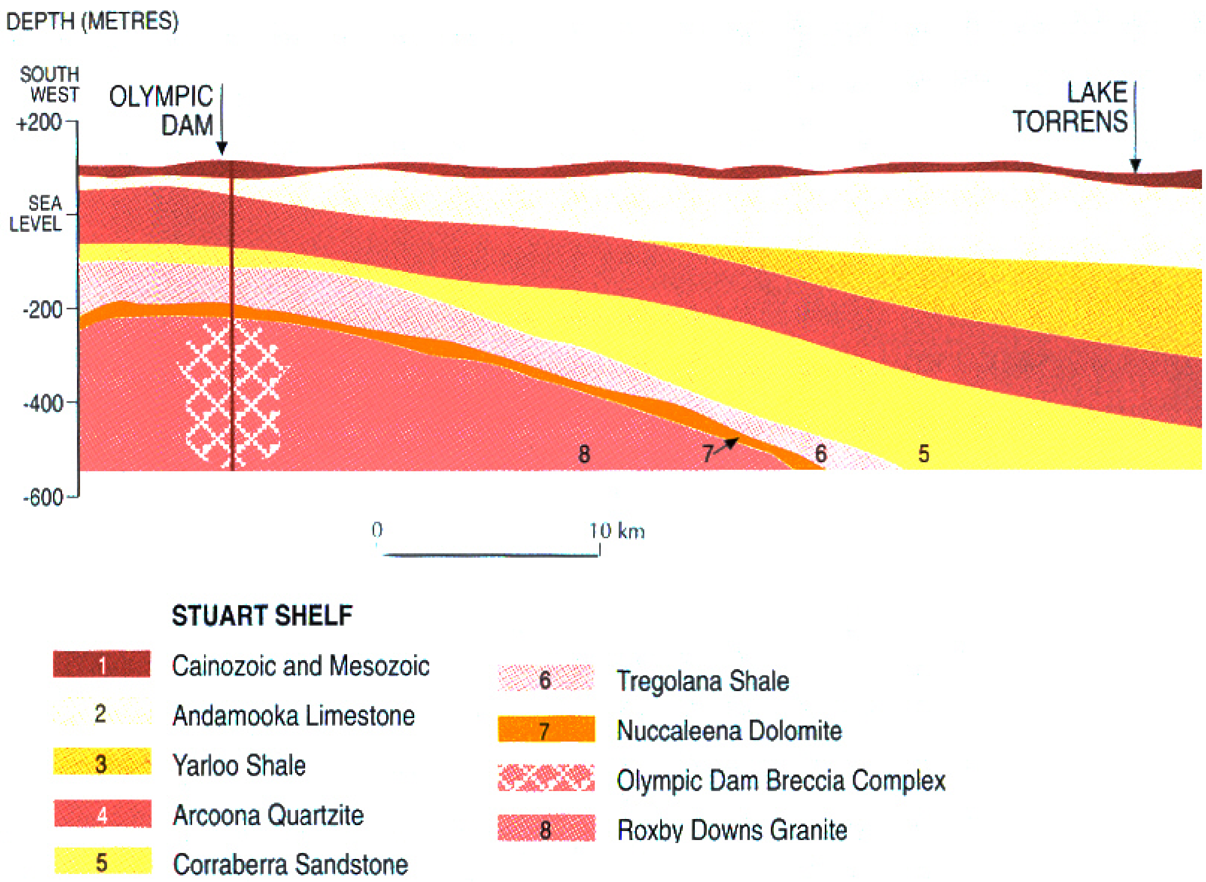
Figure 9. Start of entry from station track to proposed pad area.

Figure 10. Station track approaches to drillsite over limestone and calcareous loam exposures. Clay mound at shed is left from digging of loading ramps and may be used for borrow if required.

Figure 11. Roxby Downs Station east-west access through dunefield. Western myall *Acacia papyrocarpa* groves on clayey sand interdunes and low clayey sand rises. No roadworks other than maintenance are envisaged.

APPENDIX 1. STRATIGRAPHY

Regional stratigraphy diagram (simplified from Kinhill Engineers 1997, Figure 3.2.)



Records for holes local to Roxby D No 1 (source: PIRSA open file)

HHD 1 (136.7691015 -30.7826060)

Depths in metres

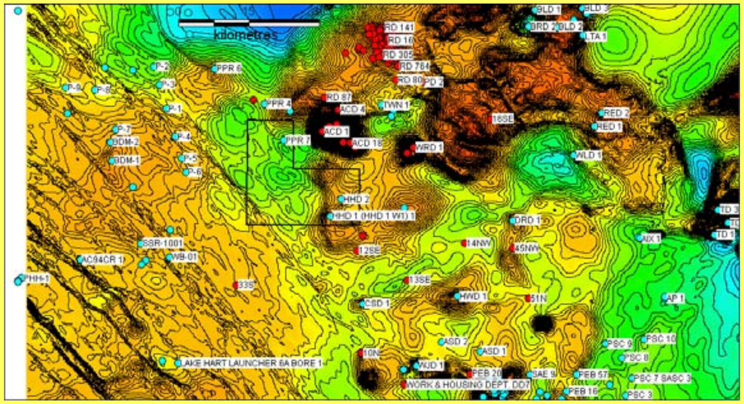
0-4 Oxidised orange sand	Surficial
4-10 Laminated cherty siltstone	Surficial
10-22 Iron rich clay with sandy oxidised limestone?	Andamooka Limestone
22-138 Med. gr. well sorted and rounded quartzite-sandstone with minor shale	Yarloo Shale + Arcoona Quartzite
138-361.1 Laminated shale with quartzite near top and interbedded siltstone	
361.1-1132.8 Med.-coarse gr. sandstone with conglomerate beds and shaley zones	Corraberra Sandstone
1132.8-1186.2 Foliated granitic gneiss with hematitic and sericitic alteration	Roxby Downs Granite

PPR 7 (136.6636507 -30.6385784)

Depths in metres

0-9 Soil and med.-coarse gr. sand	Surficial
9-40 Partly oolitic cavernous limestone	Andamooka Limestone
40-42 Shale	Corraberra Sandstone
42-130 Fine-coarse gr. sandstone with minor shale	
130-172 Fine-med. gr. sandstone over wacke	
172-334 Partly silty shale	

IDENTIFICATION OF BASEMENT LITHOLOGIES USING GRAVITY AND MAGNETIC DATA GEL207, OLYMPIC DAM AREA, SOUTH AUSTRALIA



Prepared for Granite Power Limited by –

Peter Gunn MSc, PhD, FAIG
Consulting Geophysicist
16 Plunkett Road, Mosman,
NSW 2088 Australia
Tel/fax: +612 9968 1209
Email: gunngeo@primusonline.com.au

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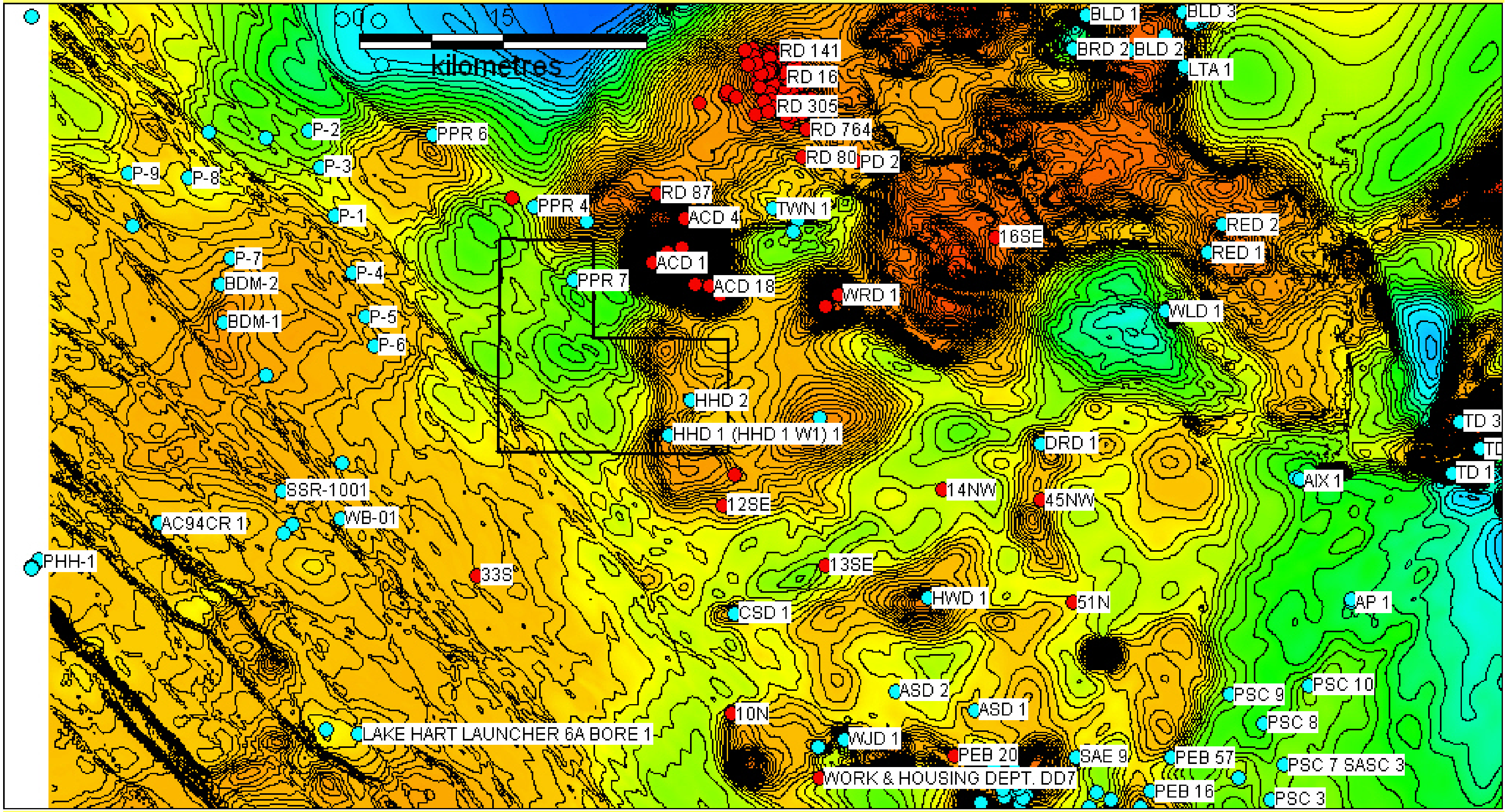
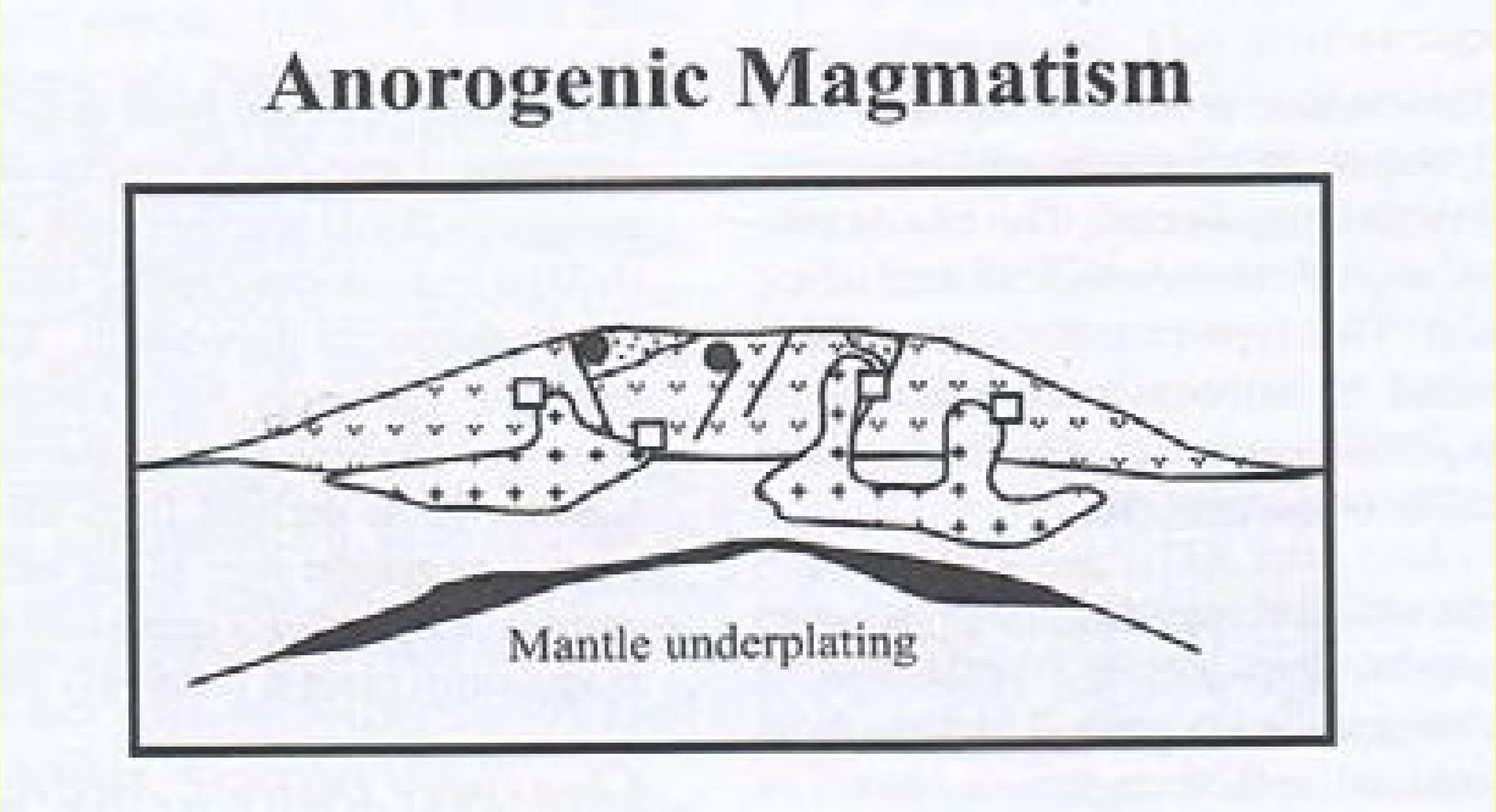


Reduced to pole magnetic intensity with 50 nt contours
GEL207 is outlined



Model showing how mantle underplating due to mantle plume activity can create overlying granites and volcanic rocks.
From Hitzman (2000)

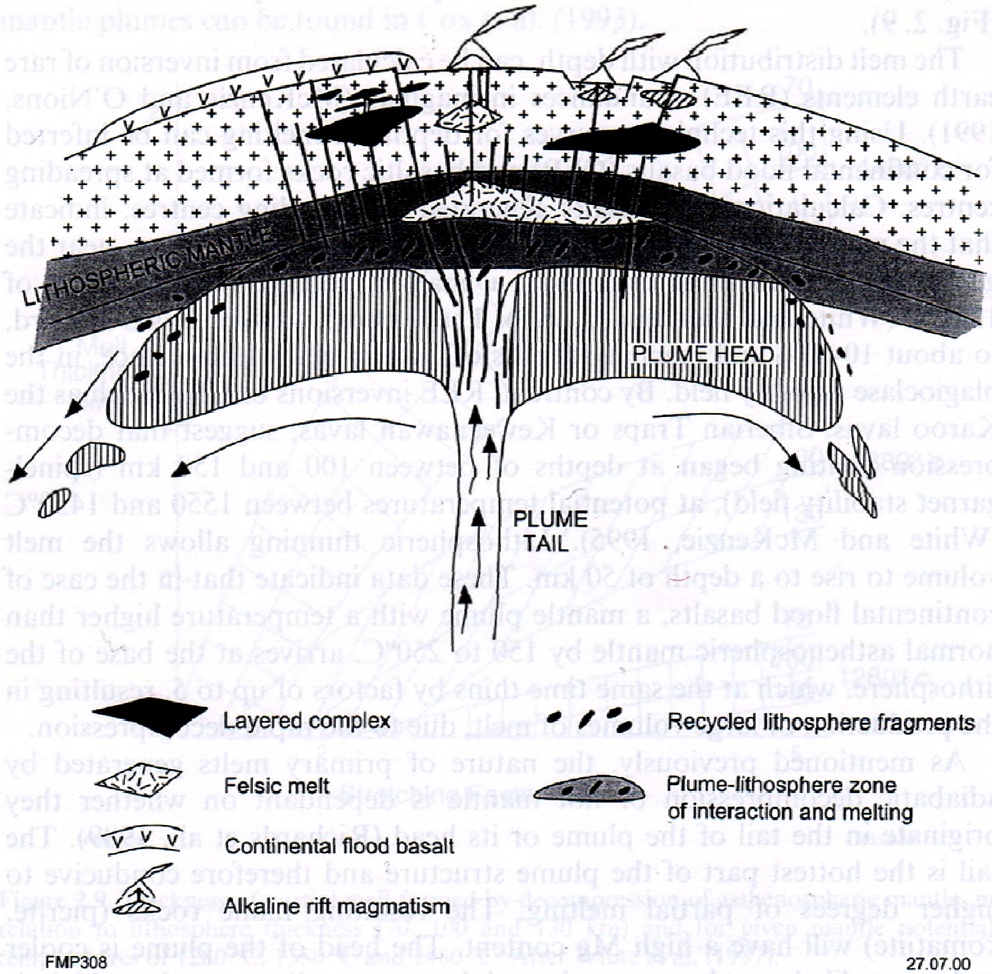


Figure 2.10. Schematic representation of a mantle plume impacting onto the lithosphere; the mushroom-shaped head of the plume adiabatically melts due to decompression. The melt may entrain pieces of lithosphere, the resulting magmas percolate upward through fractures in the crust, forming reservoirs at higher crustal levels. Some of these magma reservoirs erupt to the surface, forming continental flood basalts, or volcanoes, others solidify in situ, forming layered igneous complexes. Primitive, high-Mg, melts, derive directly from the plume axis and may contribute to the early phases of flood basalts. Lateral movement of plume melts may erode the lithospheric thermal boundary layer and carry fragments of lithosphere back into the mantle. Not to scale. See also Fig. 3.22.

Model of mantle plume in Pirajno (2000)

The large magnetic anomaly in the Olympic Dam area can be interpreted as due to a deep sill emplaced as a result of mantle plume activity

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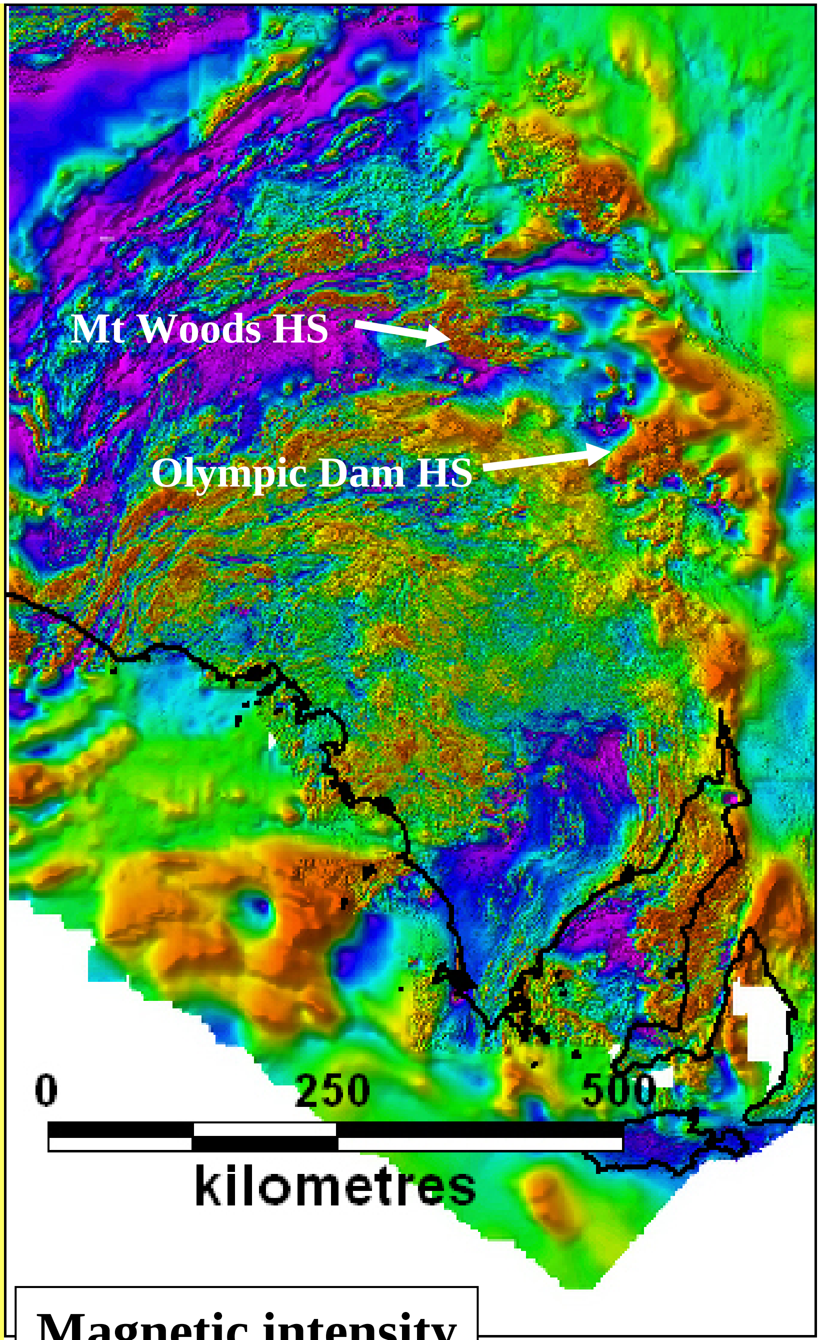
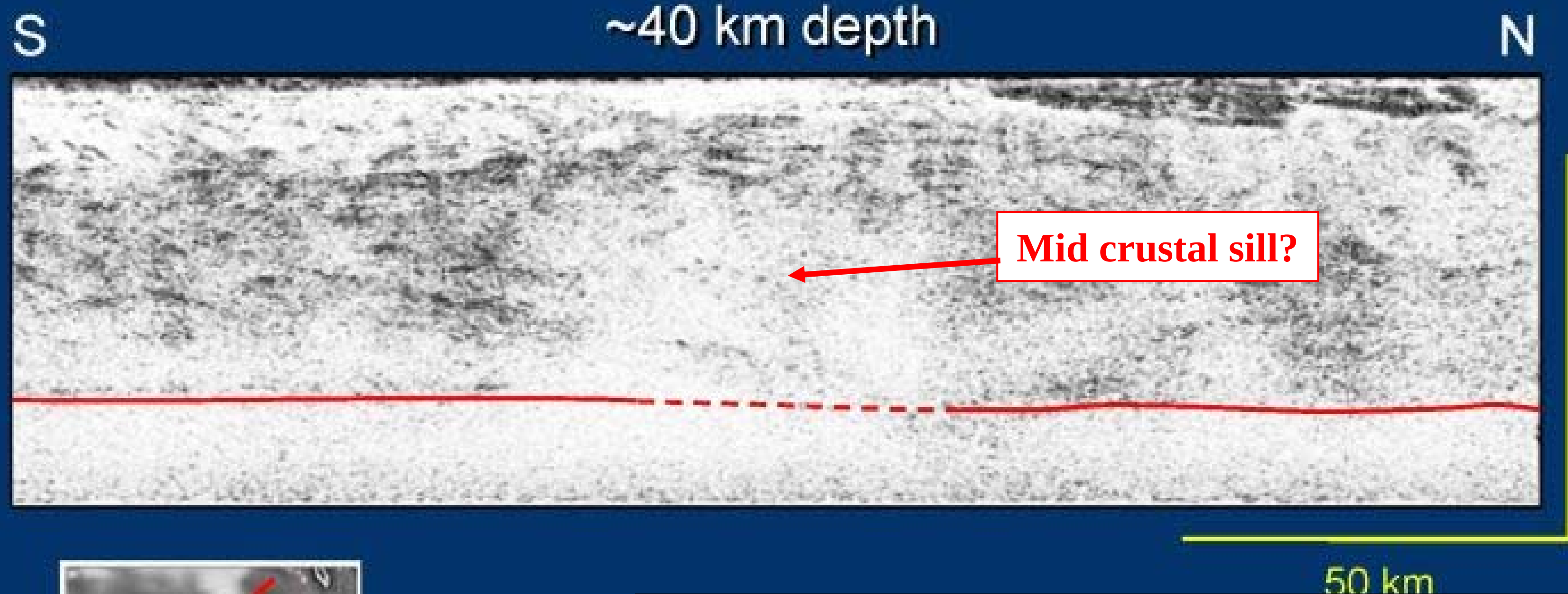
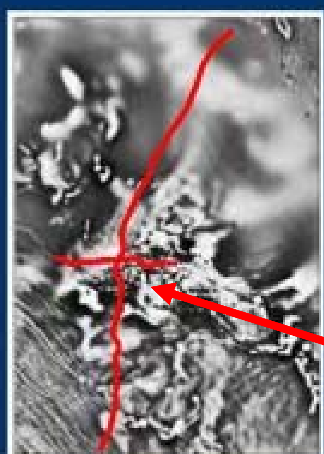


Magnetic intensity South Australia

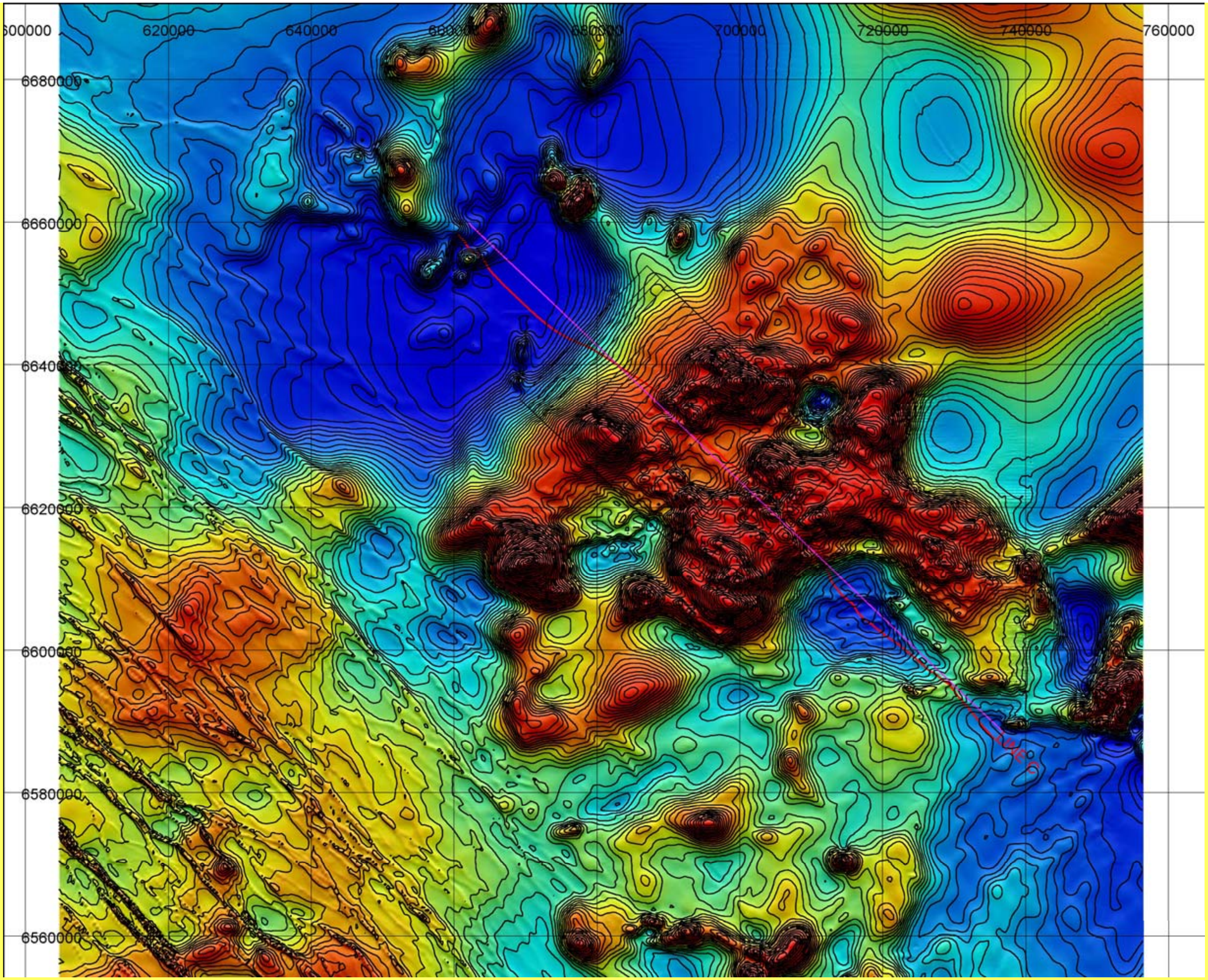
MOHOROVIČIĆ DISCONTINUITY
~40 km depth



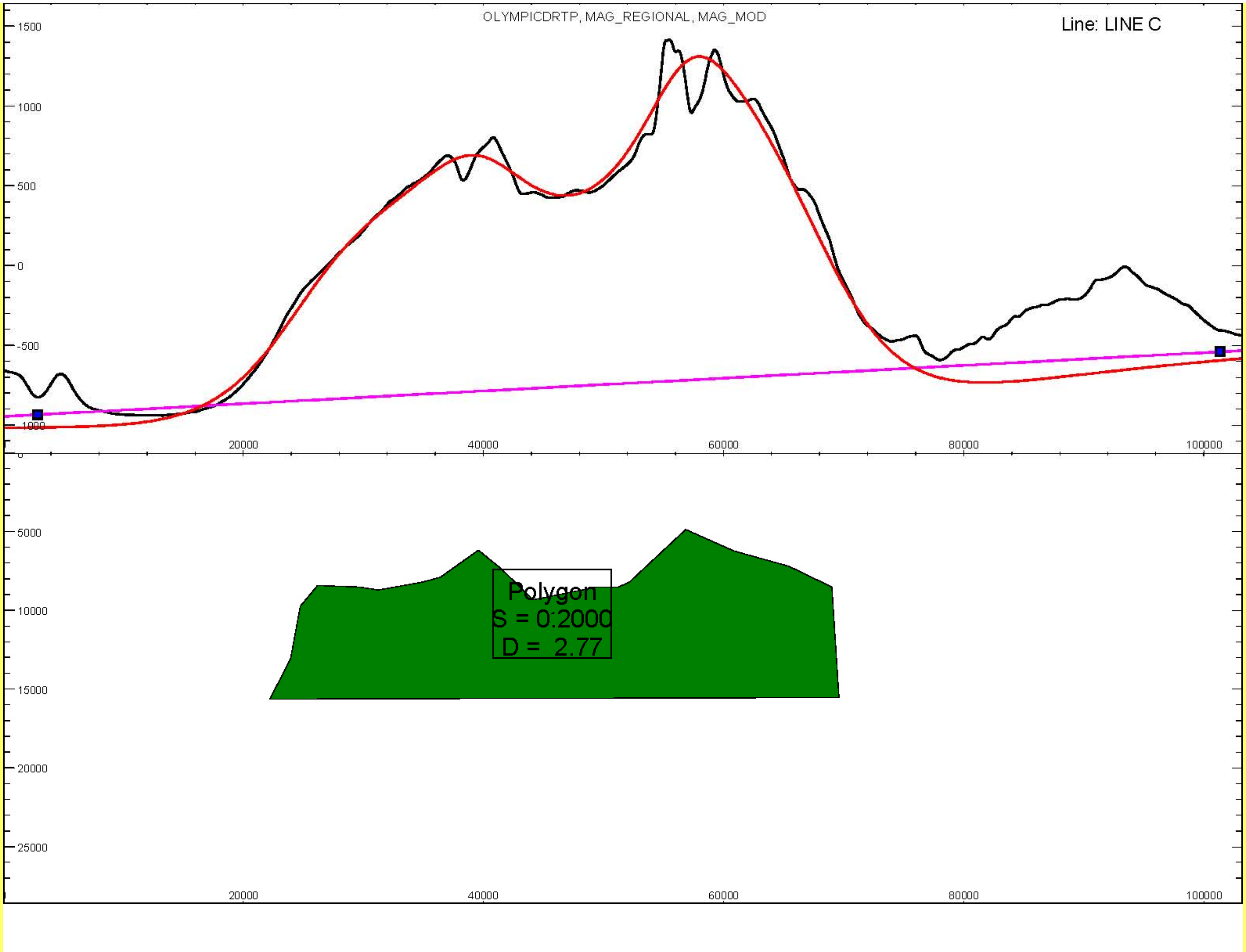


Geoscience Australia deep seismic across the Olympic Dan ara showing a “blank area” that could be indicating a large igneous body

Magnetic image

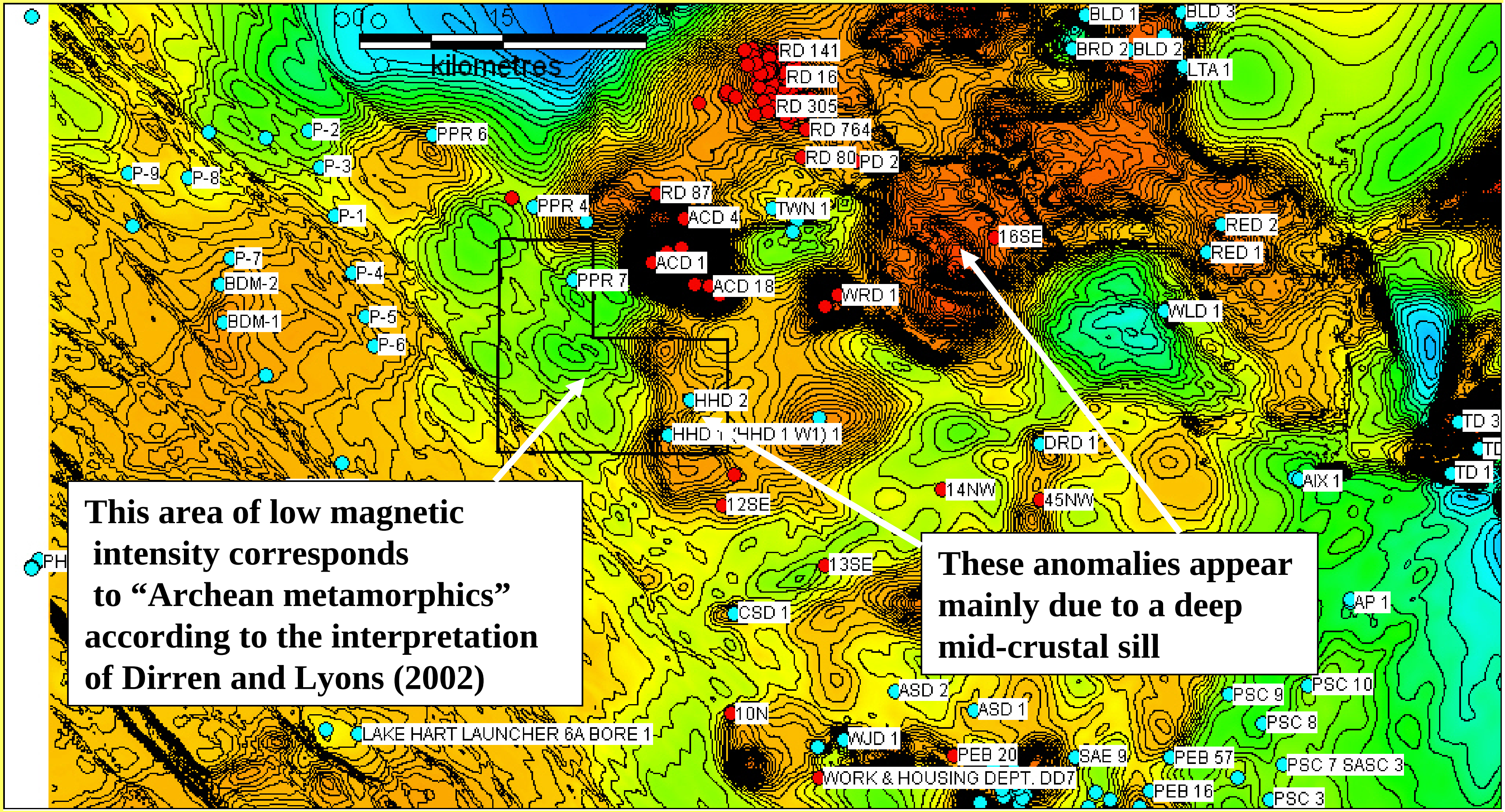


Magnetic intensity reduced to pole with 50 nt contours showing modelled profile



Results of modelling showing that most of the magnetic response in the Olympic Dam area is due to a deep mid-crustal sill. The sharper anomalies are due to shallower, overlying magnetic rock units.

Magnetic intensity reduced to pole



Although hole HDD1 Encountered granitic gneiss at 1132 metres the following modelling shows that the magnetic response in its vicinity is probably arising from a deeper unit

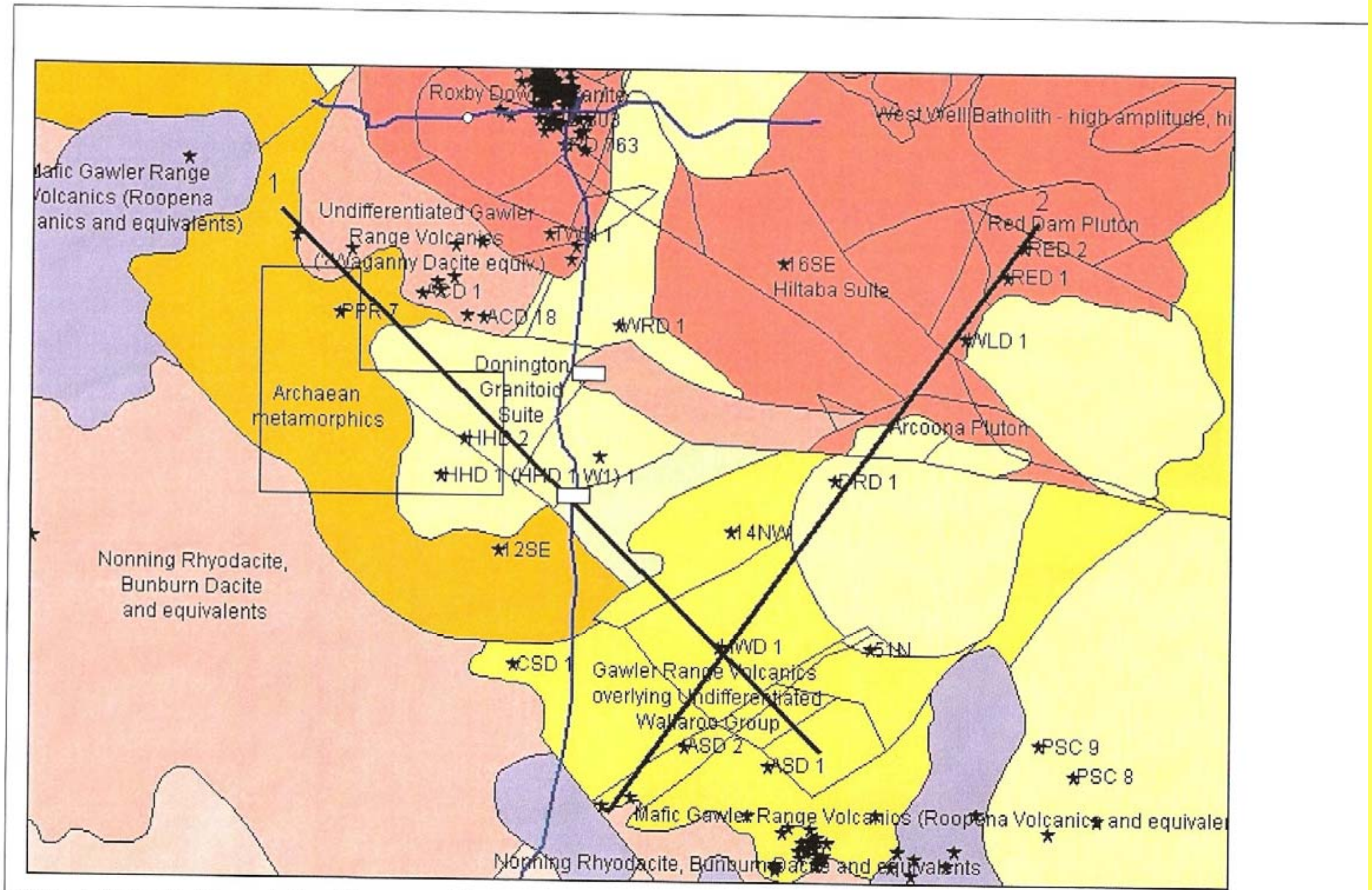
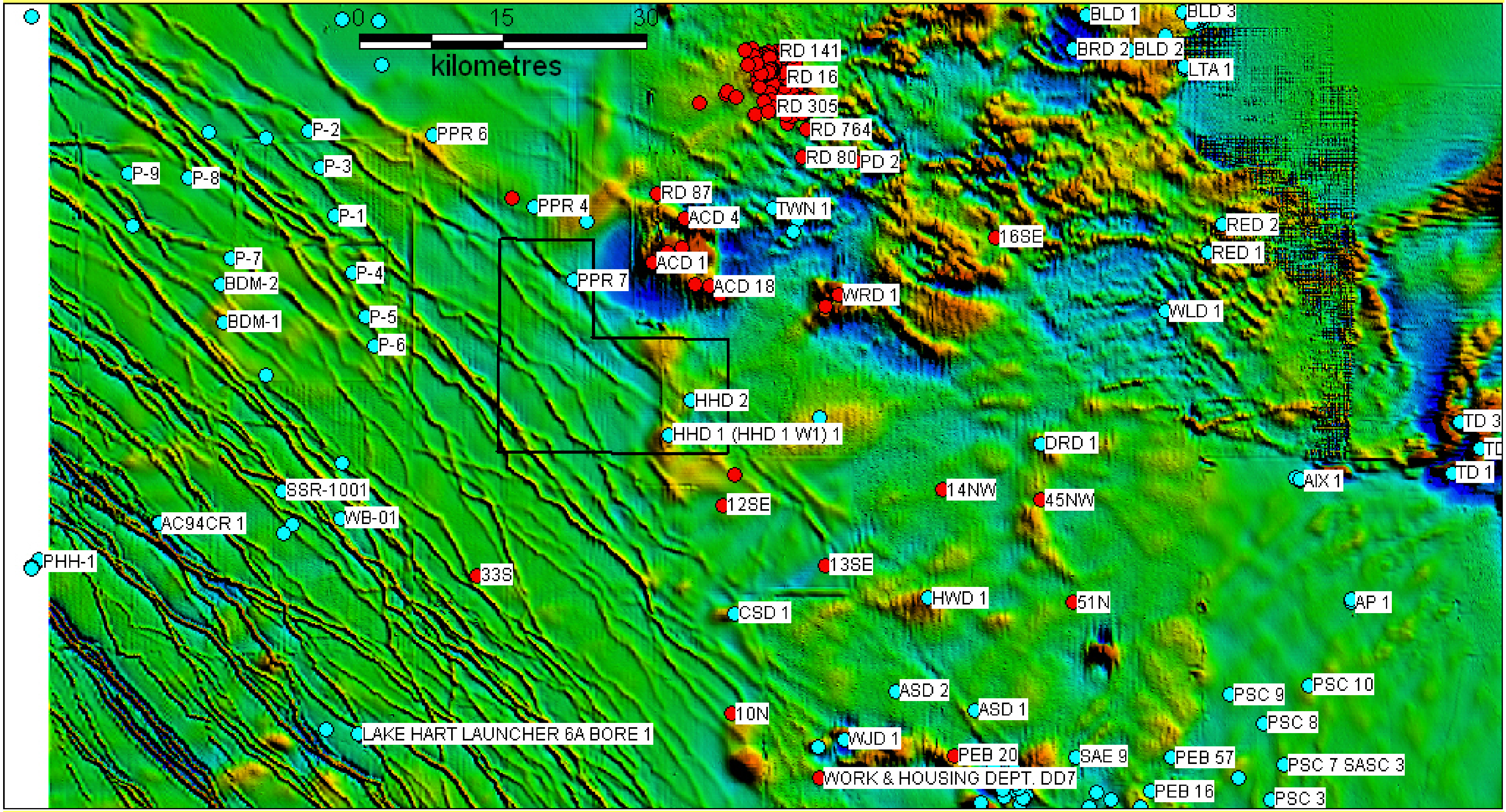
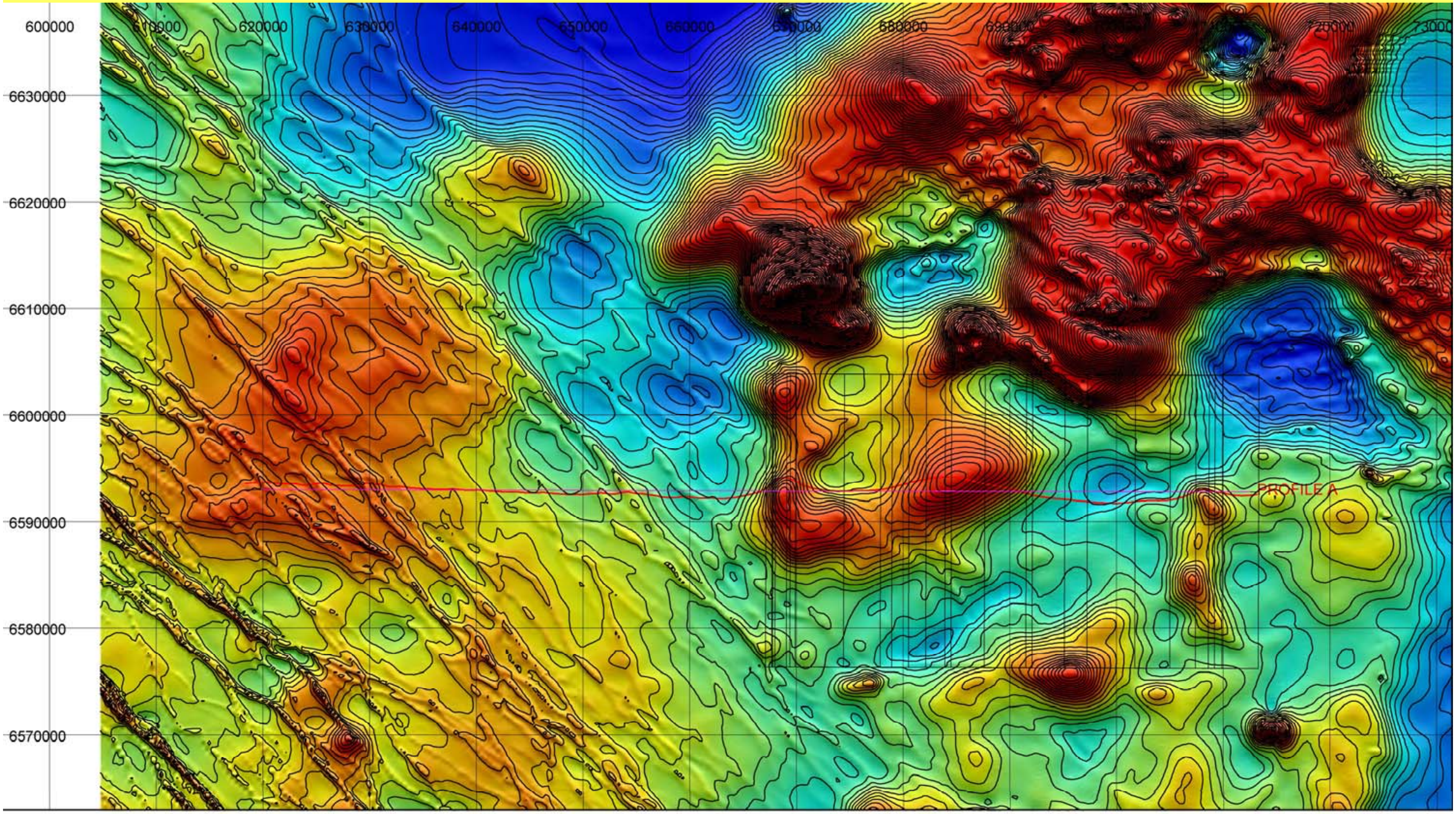


Figure 5. Magnetic interpretation of basement lithology by Direen and Lyons (2002). Black lines indicate sections in Figures 2 and 3, while blue lines indicate location of the seismic traverses in Figures 1 and 4, although note that Figure 4 only displays the area between the two white boxes.

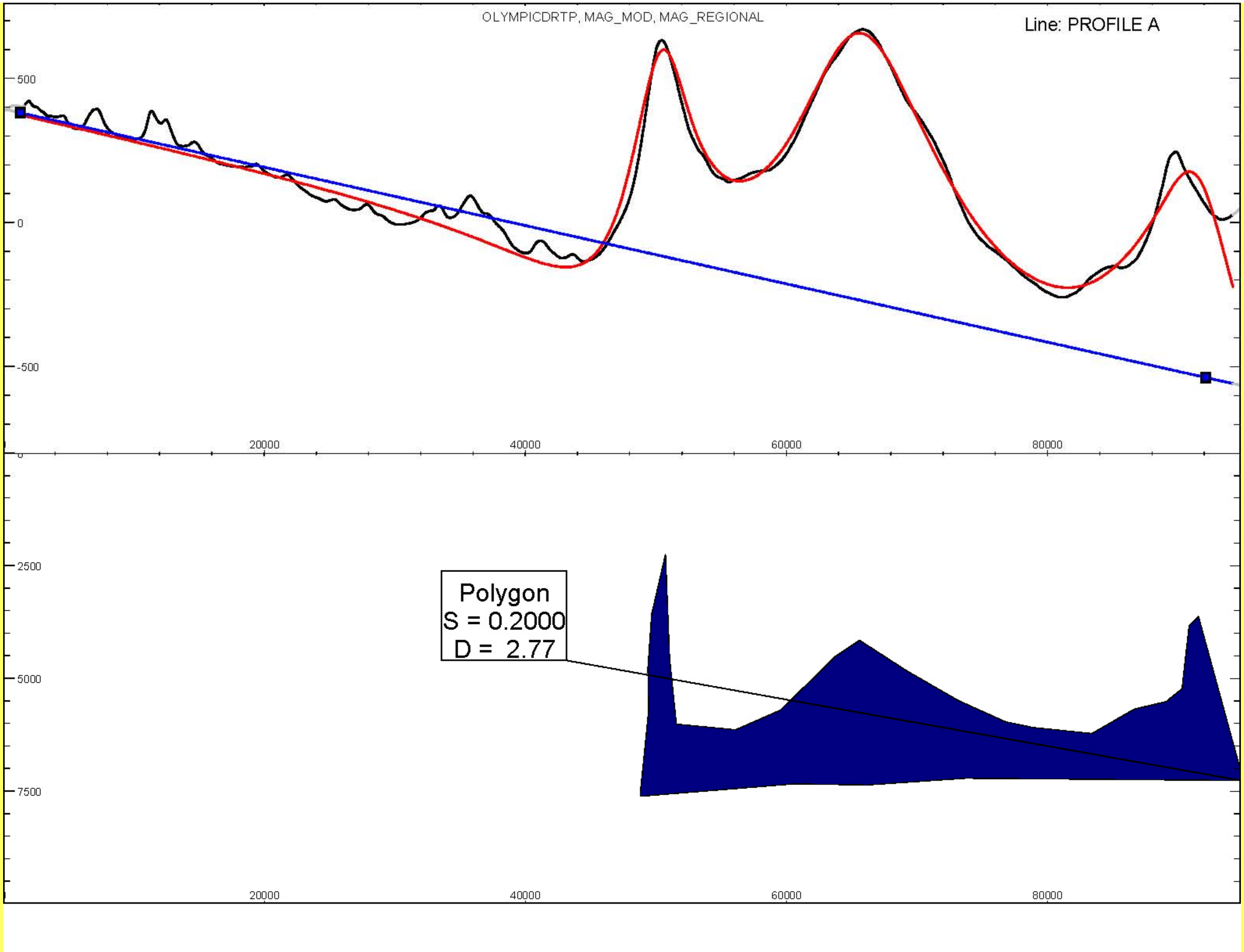
The author considers that the outlines shown realistically outlines different features visible in the magnetic data. The critical issue with this interpretation is how much control has been given by drillholes, particularly 12SE and PPR7, in identifying the lithologies.



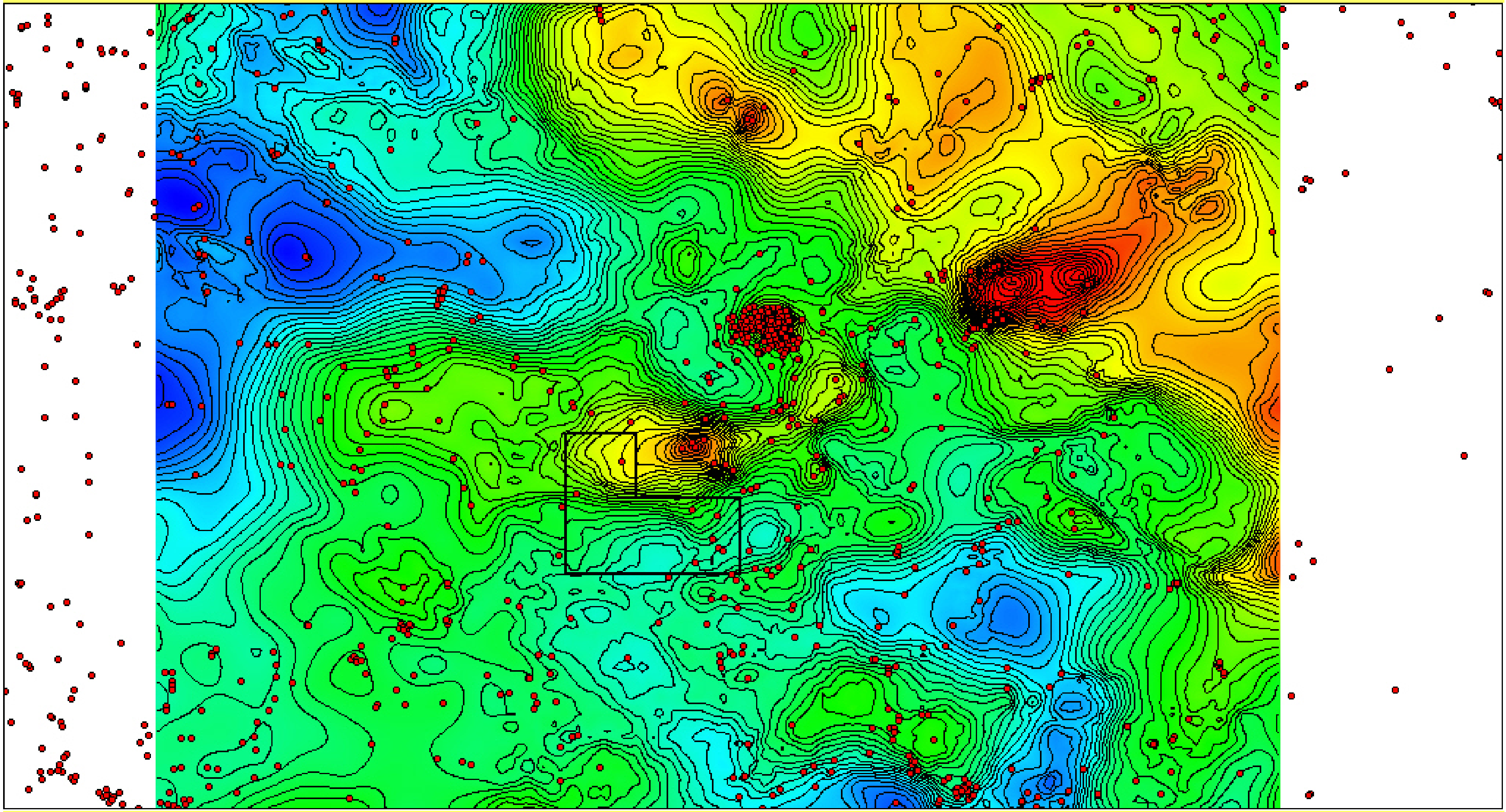
First vertical derivative (vertical gradient) of magnetic intensty reduced to pole. This image highlights detail in the magnetic data. The Gairdner Dyke Swarm is very obvious.



Reduced to pole magnetic intensity with 50 nt contours showing location of Profile A modelled in the next slide.

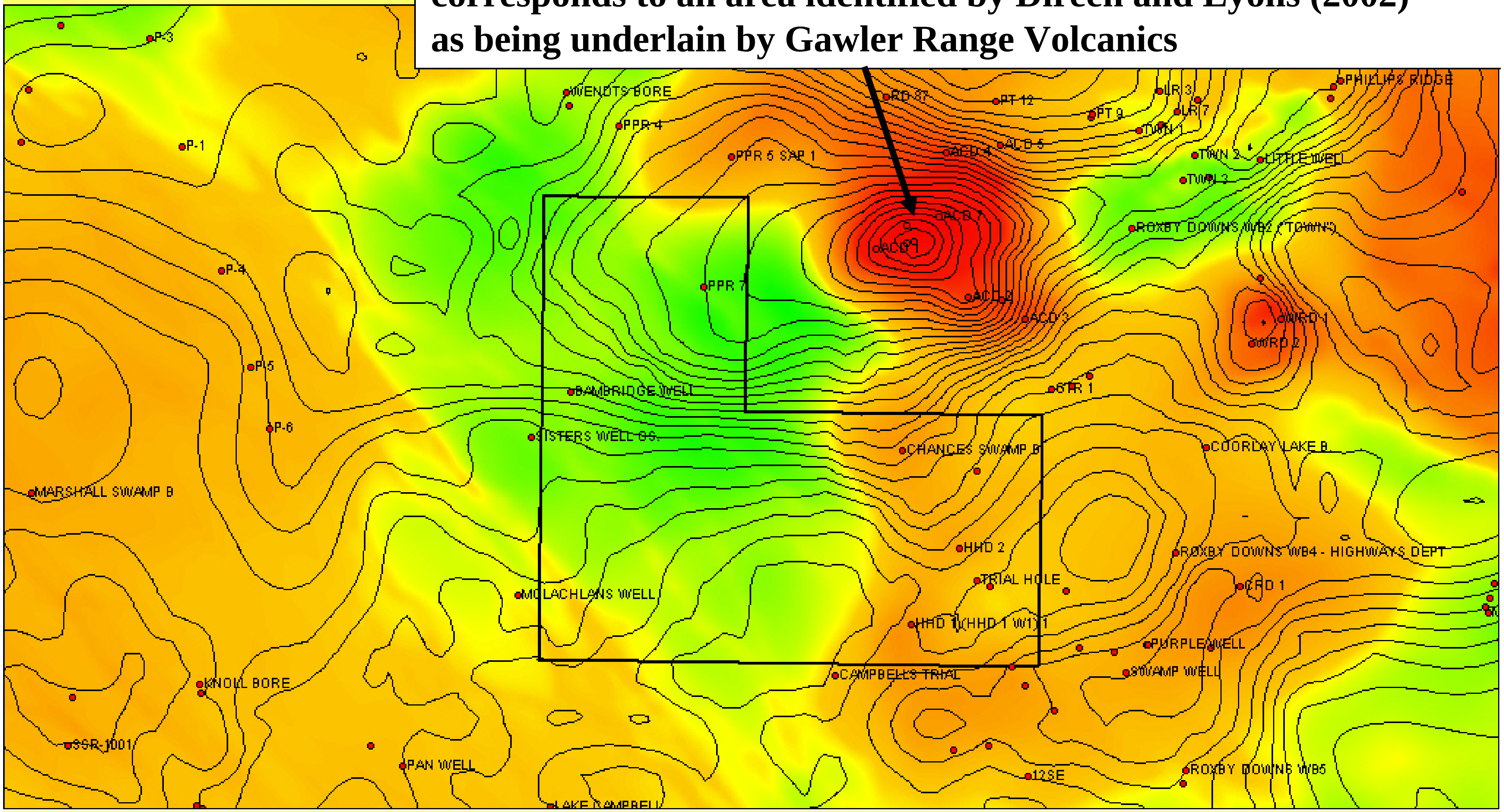


Again the modelling is suggesting that most of the magnetic response is due to a deep sill that is probably below granite gneiss drilled in HHD1



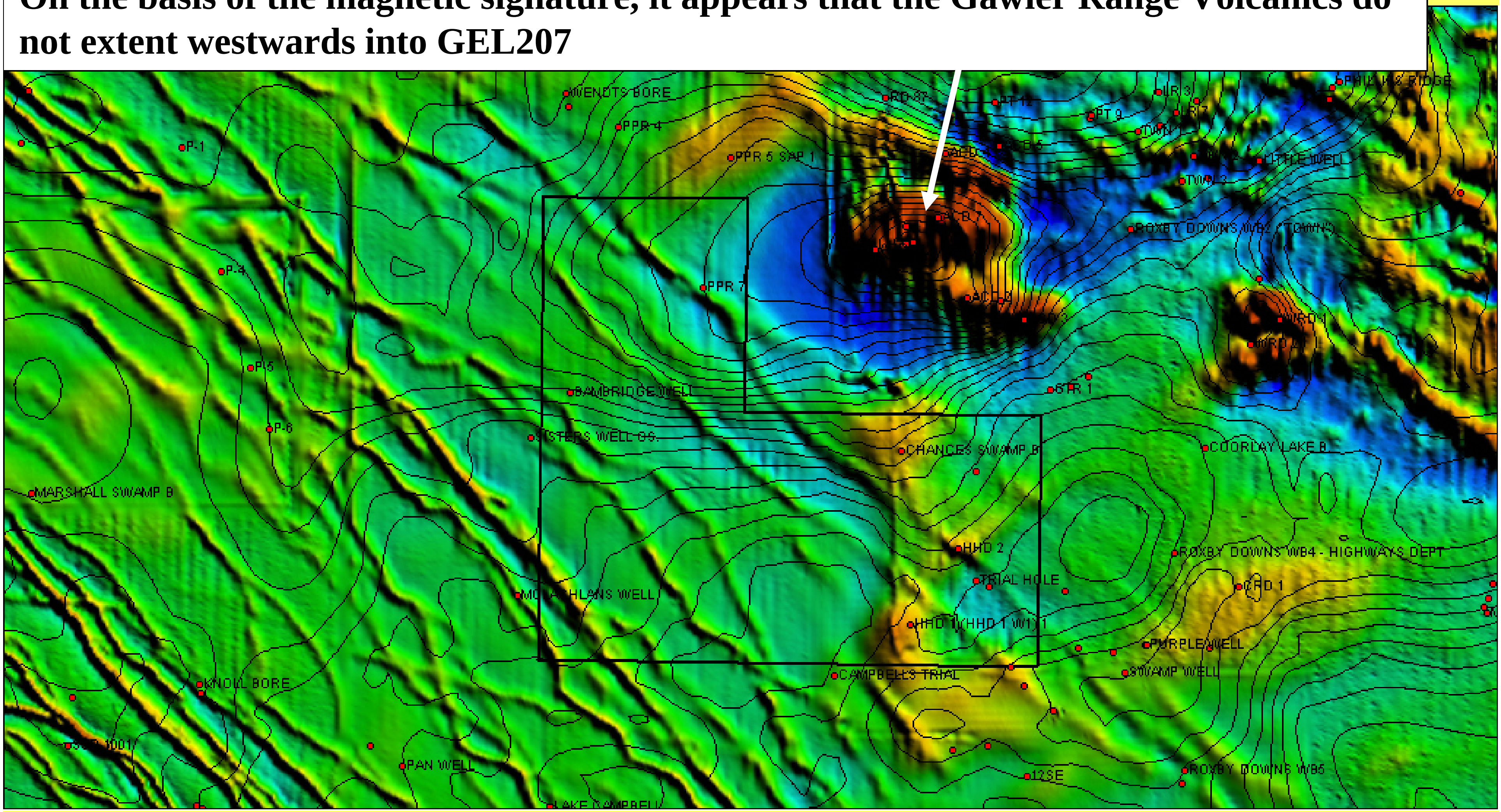
Bouguer gravity with 1 milligal contours. The gravity low in the south of GEL207 is thought to be due to granite in the basement. In the author's opinion no significant granite body is likely to exist beneath the northern portion of GEL207.

This combination of a local gravity and magnetic highs corresponds to an area identified by Direen and Lyons (2002) as being underlain by Gawler Range Volcanics

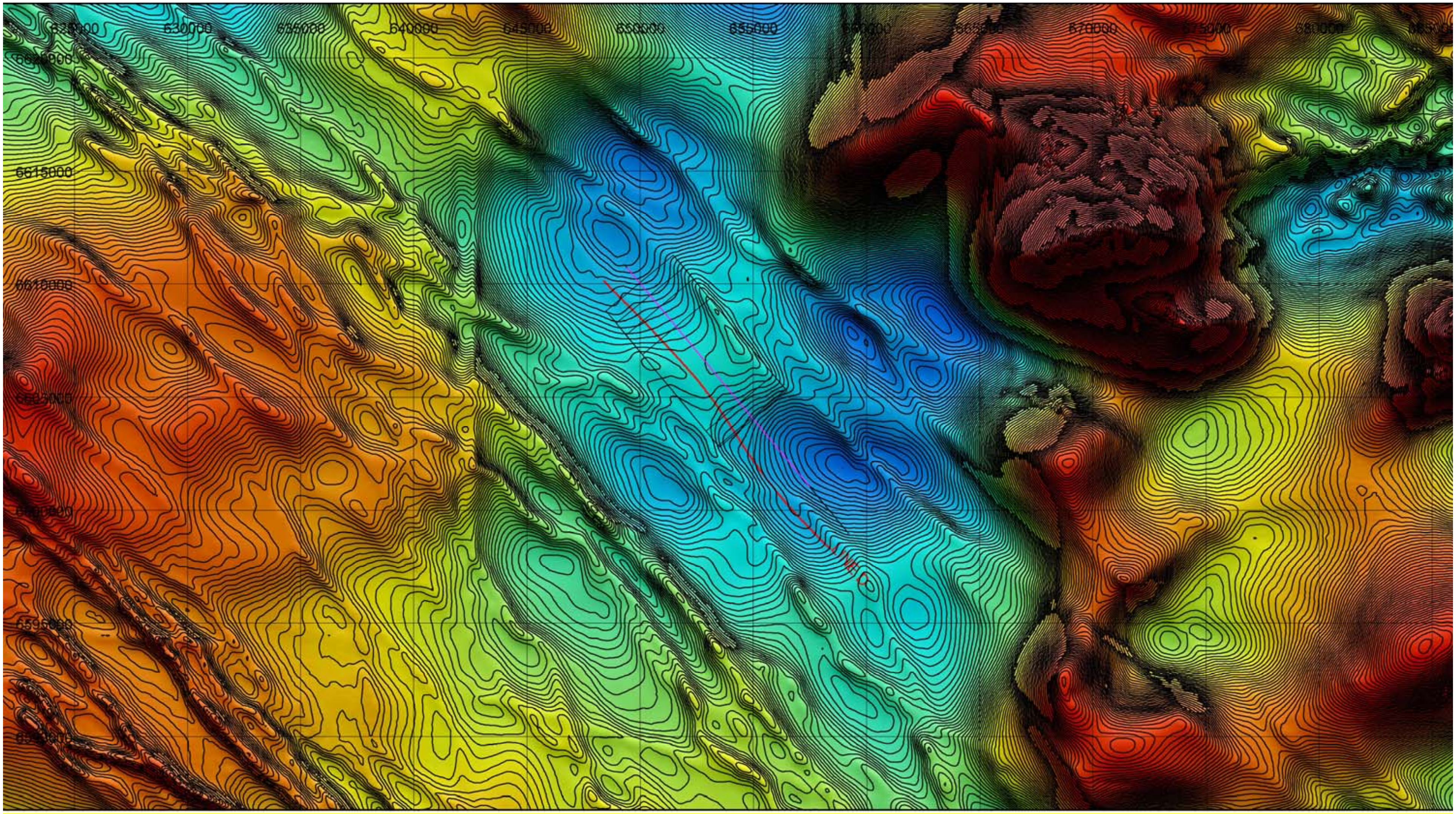


Bouguer gravity contours on an unshaded image of magnetic intensity reduced to the pole.

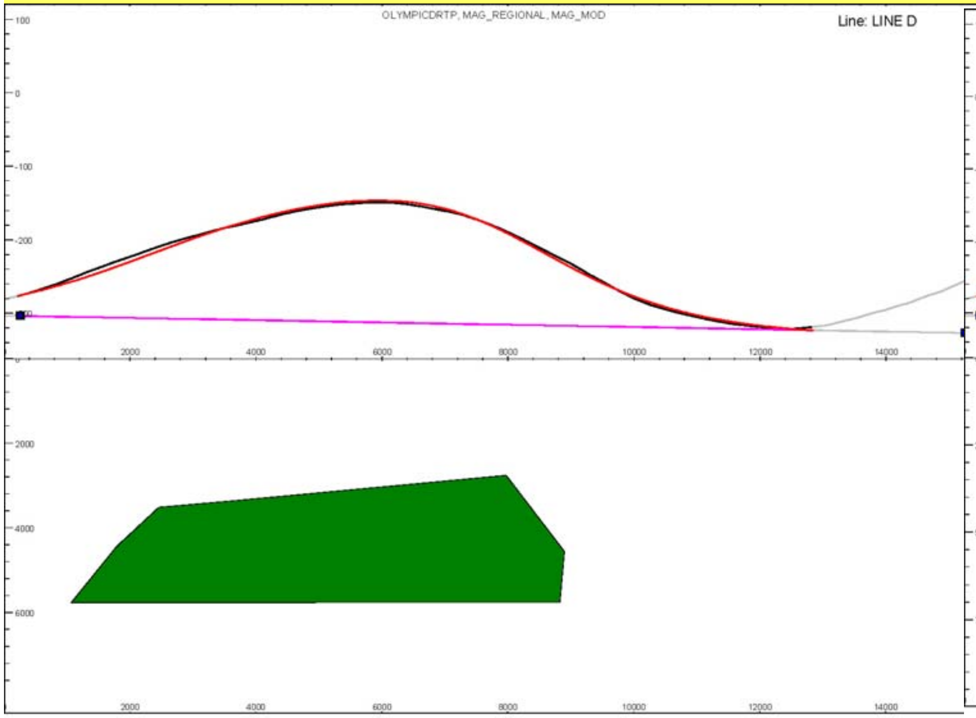
This combination of a local gravity and magnetic highs corresponds to an area identified by Direen and Lyons (2002) as being underlain by Gawler Range Volcanics. On the basis of the magnetic signature, it appears that the Gawler Range Volcanics do not extent westwards into GEL207

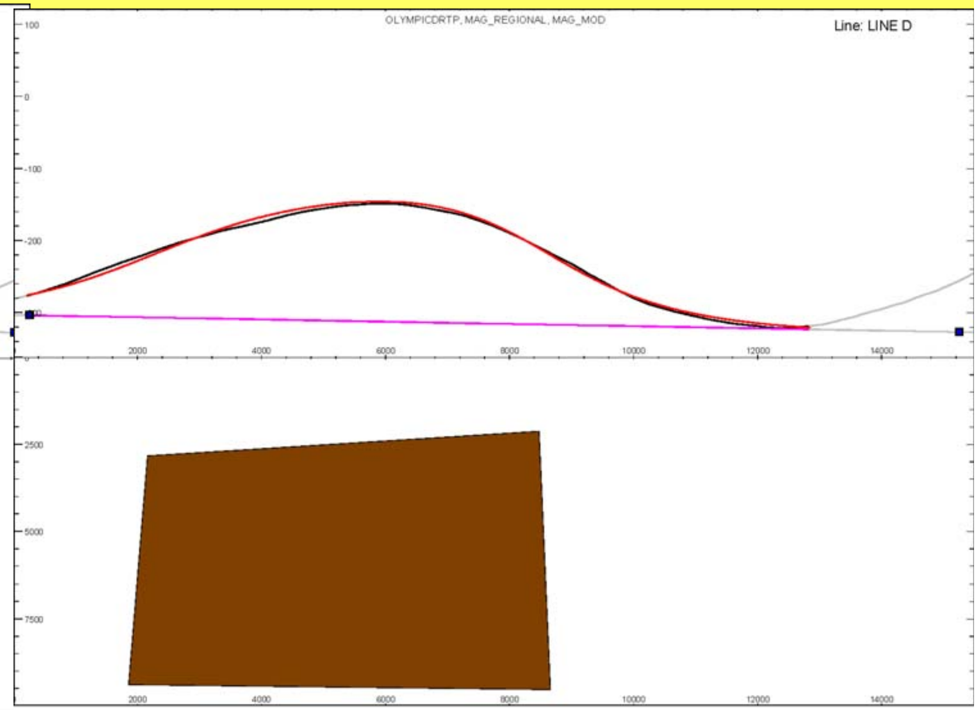


First vertical derivative (vertical gradient) of magnetic intensty reduced to pole. This image highlights detail in the magnetic data. The Gairdner Dyke Swarm is very obvious.

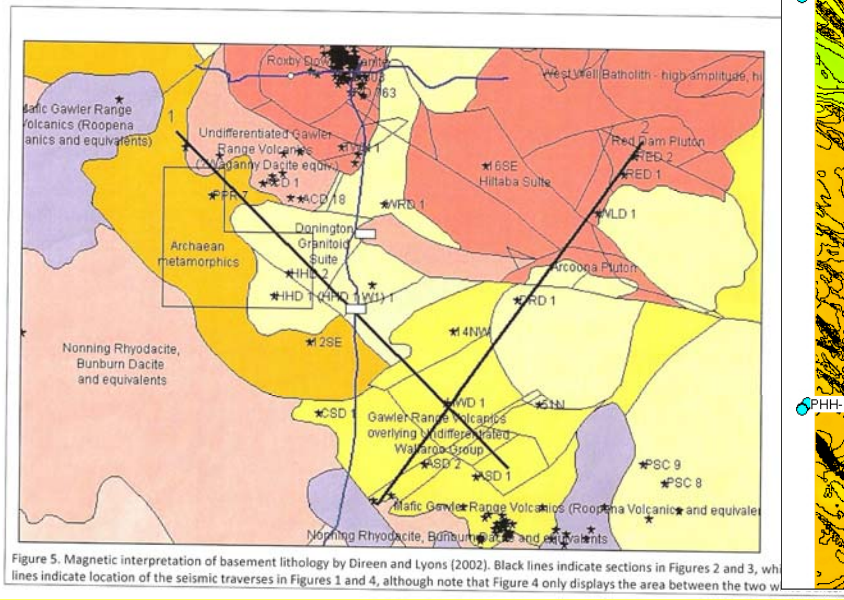


Magnetic intensity reduced to pole with 50 nt contours showing location of profile modelled in the next slide. The object of this modelling is to have an idea of the depth to the magnetic units beneath GEL207.





Two alternative models that fit the data. Despite the ambiguity, the results are indicating a depth of around 2 – 2.5 km to the top of the magnetic unit in the area.



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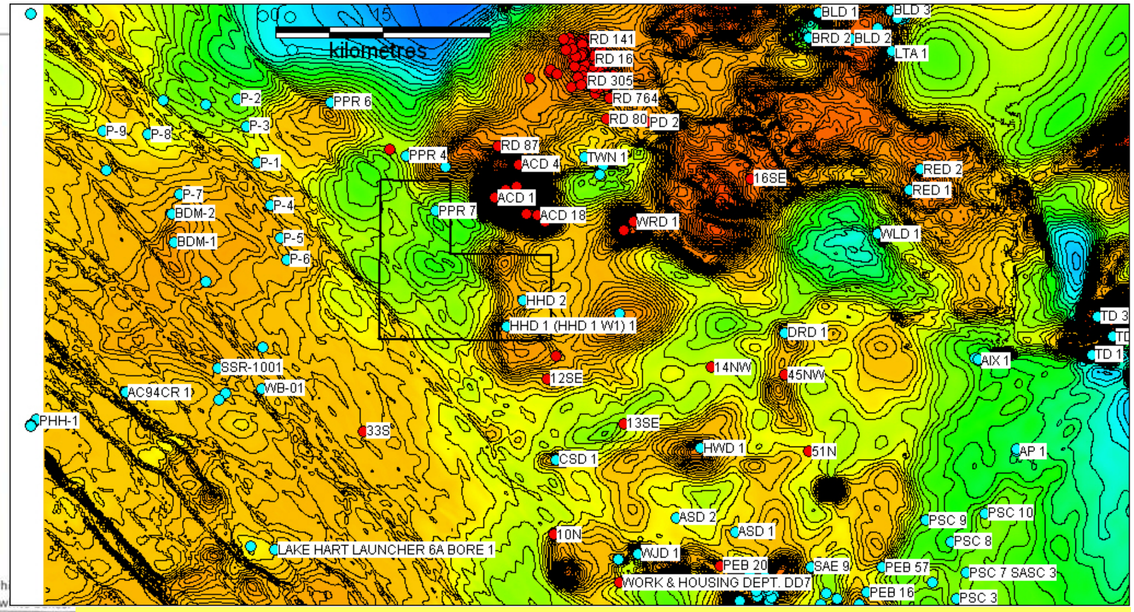


CONCLUDING COMMENTS

• **The western portion of GEL207 overlies an area of low magnetic intensity where the shallowest basement rocks may have a depth of 2.0 – 2.5 km. Direen and Lyons (2002) have identified this area as "Archean metamorphics". Available drill data needs to be checked to determine what justification they have for this conclusion. Drill hole HHD1 intersected granitic gneiss at 1132m. Modelling in the area of HHD1 suggests that the magnetic response in the area of HHD1 are from a deeper unit and this result may be indicating that "granite gneiss" in the area is not very magnetic and could correspond to the area of low magnetic intensity.**

• **Gawler Range Volcanics immediately west of GEL207 appear to have a distinct magnetic response that does not extend into GEL207**

• **Gravity data is suggesting that granite only underlies the south of GEL207**

Assessment of thermal conductivity and heat flow in GEL207

Duanne White, GPL

Geology and thermal conductivity:

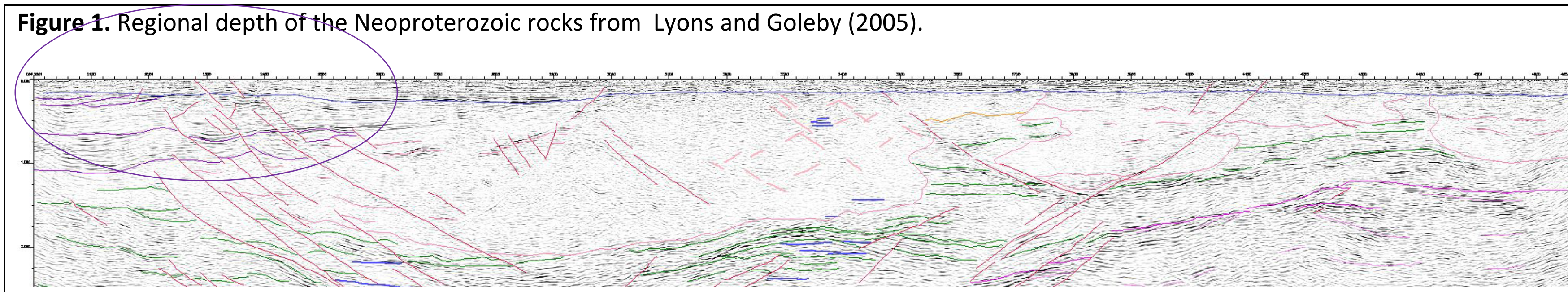
The cover sequence of Mesoproterozoic and Neoproterozoic units in this area appears to be fairly undeformed and continuous across the region (Figures 1 to 3). This is evidenced in both the lack of faulting observed in the regional seismic survey (Lyons and Goleby, 2005) and the continuity of units across the region in drill hole data. Thus, the stratigraphy of these units is reliable and can be quite easily constructed.

The upper units consist of Neoproterozoic Arcoona quartzite and the Canberra sandstone (λ = 3.8 ± 0.2), which are interbedded with shale to about 200 m below surface, followed by about 200 m of Tregolana Shale (λ = 2.2 ± 0.2). These units are underlain by a 600-1000 m thick sequence of clean quartz sandstones and/or quartzite of the Mesoproterozoic Pandurra Formation, of which the thermal conductivity is not well constrained. In Blanche 1, the thermal conductivity of this unit was measured at about 4.5 ± 0.2, however, the temperature logs in this unit suggest that this is too high and a more realistic estimate is in the order of 3.8 ± 0.2. On the contrary, the thermal log from PPR5 implies a high thermal conductivity for this unit – in the order of about 4.3 ± 0.2 again. The uncertainty in the thermal conductivity of this unit has significant implications for the determination of heat flow in this area.

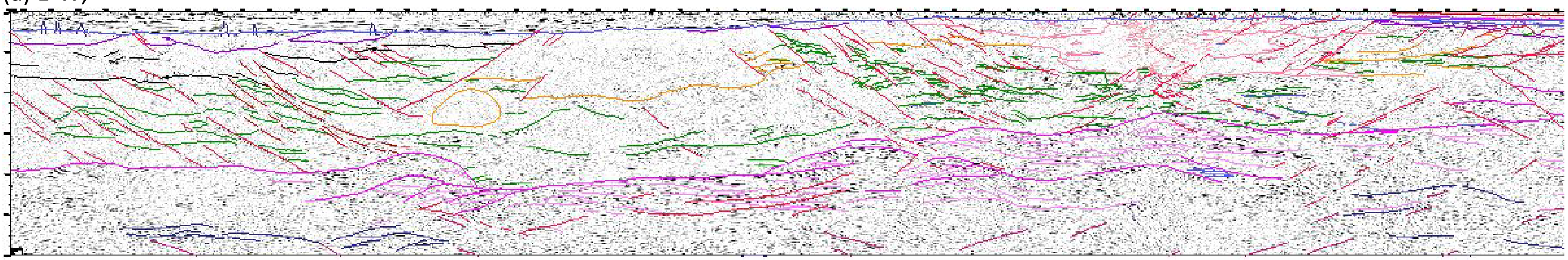
The only hole that reached basement within the lease was HHD 1, which struck thermal basement in granitic gneiss at 1132 m. The trend for the depth to basement is to increase in depth to both the south and particularly to the west, so it is reasonable to assume that the cover sequence will be thicker in the western half of the tenement, a notion that is supported by the fact that PPR5, located ~5km to the north of the western arm of the tenement reached over 1300 m without striking pre-Mesoproterozoic units. However, the true depth to thermal basement is difficult to ascertain in this area as there are no deeper drill holes nor seismic data available in the lease area itself. The aeromagnetic maps of the region provide some justification for interpreting a relatively deep depth to basement in the western part of the lease, both due to the low Total Magnetic Intensity (TMI) in this area, and also the subdued nature of the NW-SE trending dykes that are particularly distinct across the parts of the map where the Mesoproterozoic and Neoproterozoic cover is known to be shallow (Figure 4). However, the subhorizontal trend of the contact between the Mesoproterozoic and older rocks indicates it is highly unlikely that this sequence extends deeper than 2 km in any part of the lease (Figure 5).

Based on the interpretation of the aeromagnetic surveys and drill hole data in this region by Direen and Lyons (2002; Figures 3), the granite gneiss intercepted in HHD1 probably underlies the Mesoproterozoic and Neoproterozoic sediments throughout the eastern part of the tenement, while the eastern half of the tenement is underlain by rocks with a low TMI, probably Achaean metamorphic rocks. Based on the interpretation of the seismic traverse undertaken by Geoscience Australia in 2003, the granite gneiss is assumed to continue to 2s TWT (6k depth) on the eastern margin of the tenement (Figure 6), and is underlain by the same Achaean metamorphics that underlie the western part of the tenement. The nature of the basement in the western part of the tenement is more difficult to establish. The interpretation by Direen and Lyons (2002) suggests that this area is likely to be underlain by Achaean gneiss. However, the high gravity area in the north-western part of the tenement (Figure 7) suggests that these units are much more dense, which suggest that there may be a continuation of the Gawler Range Volcanics – possibly the Waganny Dacite that underlies the cover sequence in the Acropolis prospect, and is interpreted to underlie the western arm of the E-W seismic traverse to a depth of ~3 km (Lyons and Goleby, 2005). This interpretation is also supported by the 3D magnetic/gravity inversion performed during the Geoscience Australia Gawler Project (Figure 8). Should this be the case, then this raises the likelihood of an increased thermal gradient as igneous mafic units typically have relatively low thermal conductivities.

Figure 1. Regional depth of the Neoproterozoic rocks from Lyons and Goleby (2005).



(a) E-W,



(b) S-N.

Note the continuity of the Neoproterozoic unites (above the blue line at the top of each diagram. The purple circle denotes the mafic volcanic units to ~3 km depth roughly 20 km north of GEL 207.

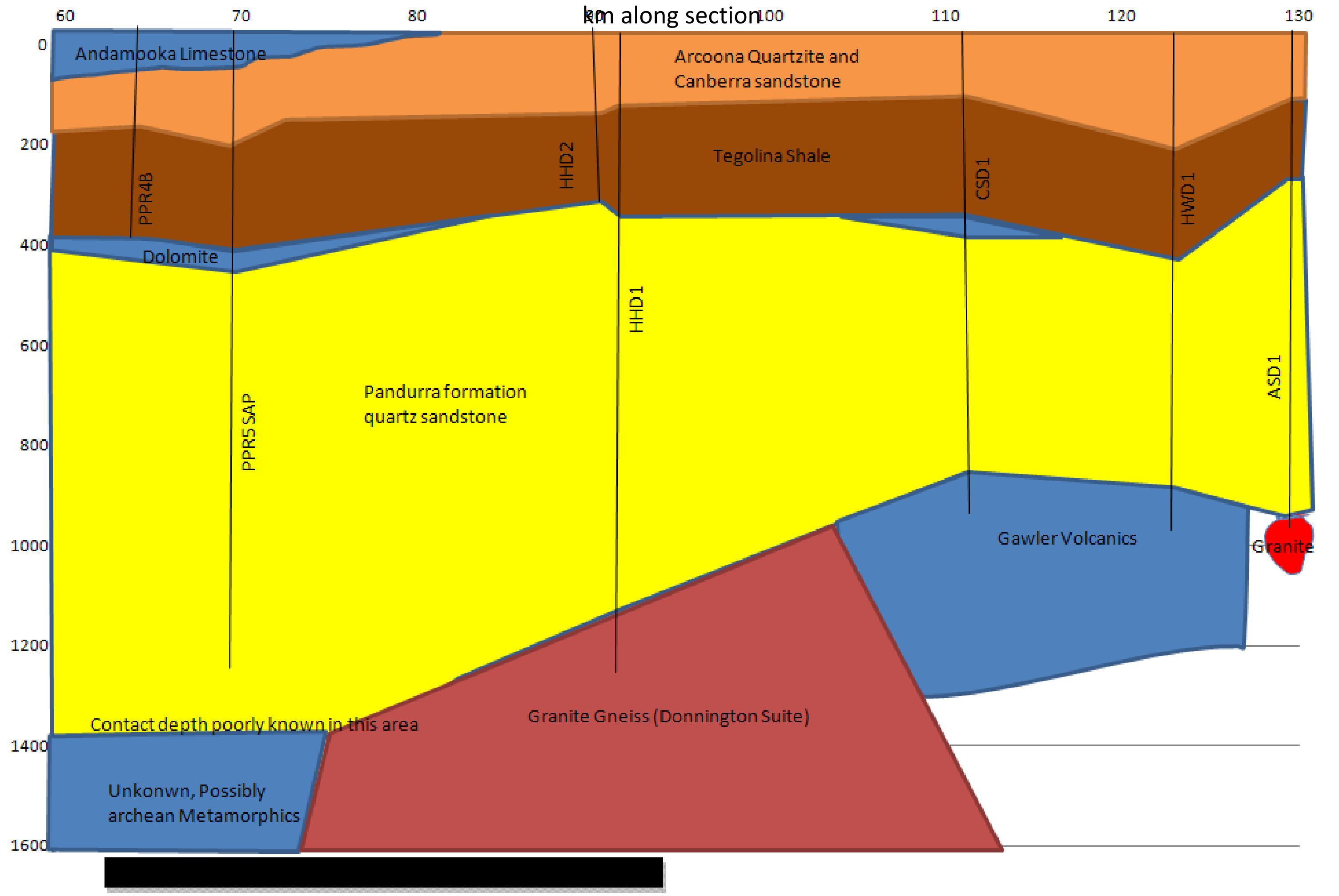


Figure 2. NW-SE geological cross section through GPL tenement 207. Black rectangle indicates GPL lease extent

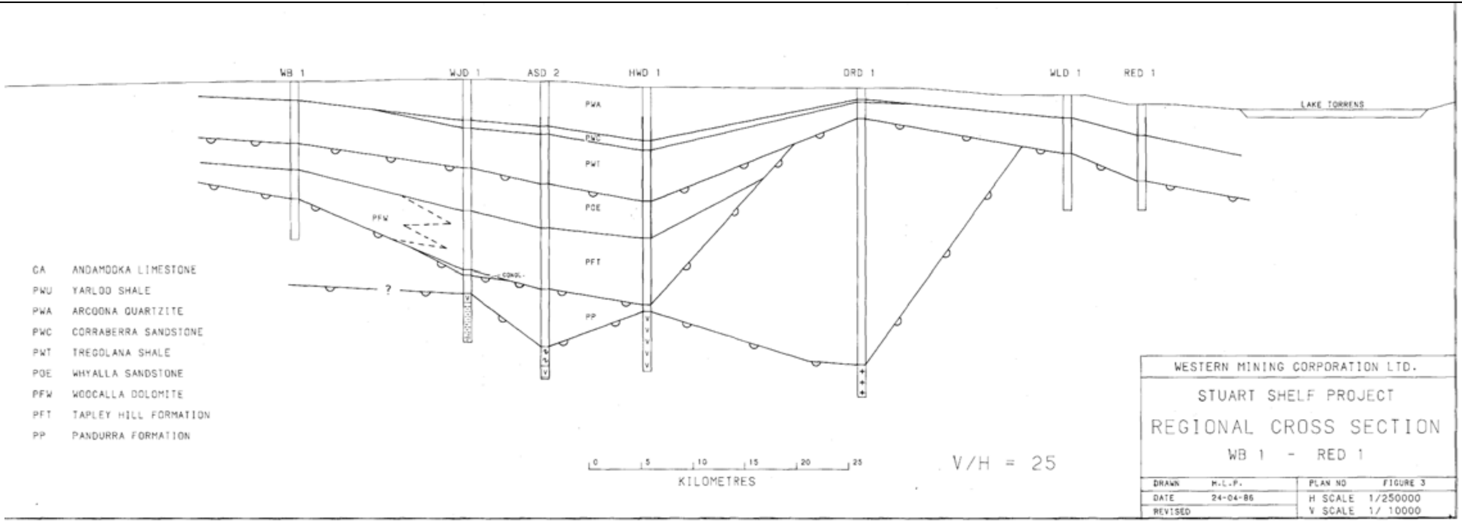


Figure 3. SW-NE geological cross section to the east of GPL tenement 207. From WMC 1986

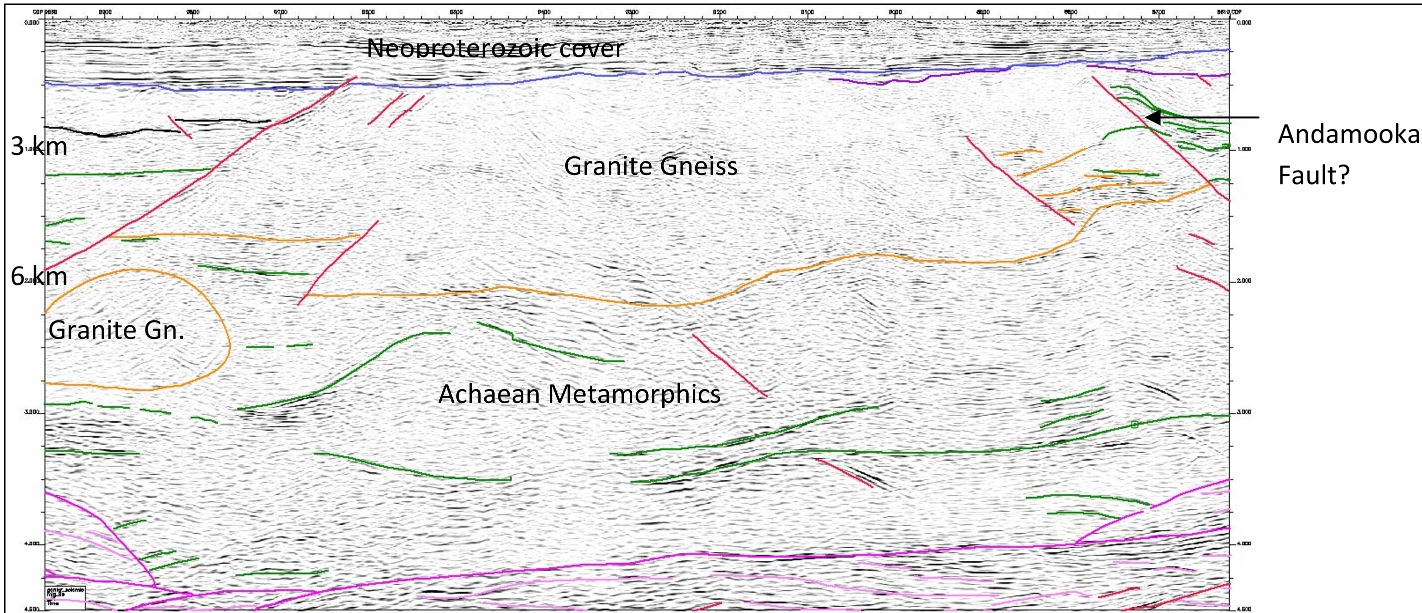
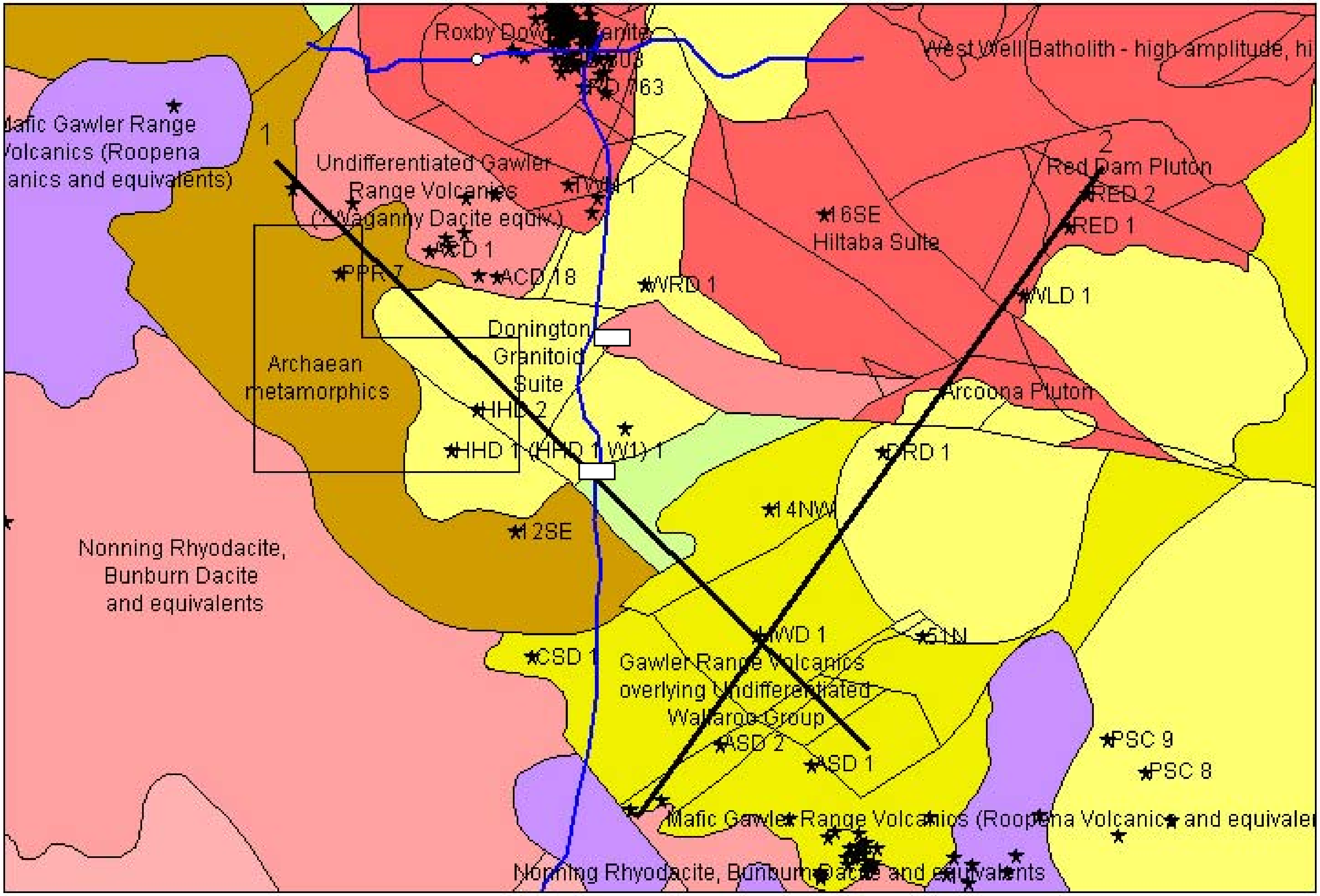


Figure 4. N-S deep seismic line, ~5 km to the east of the eastern boundary of the tenement, with units interpreted from Lyons and Goleby (2005)



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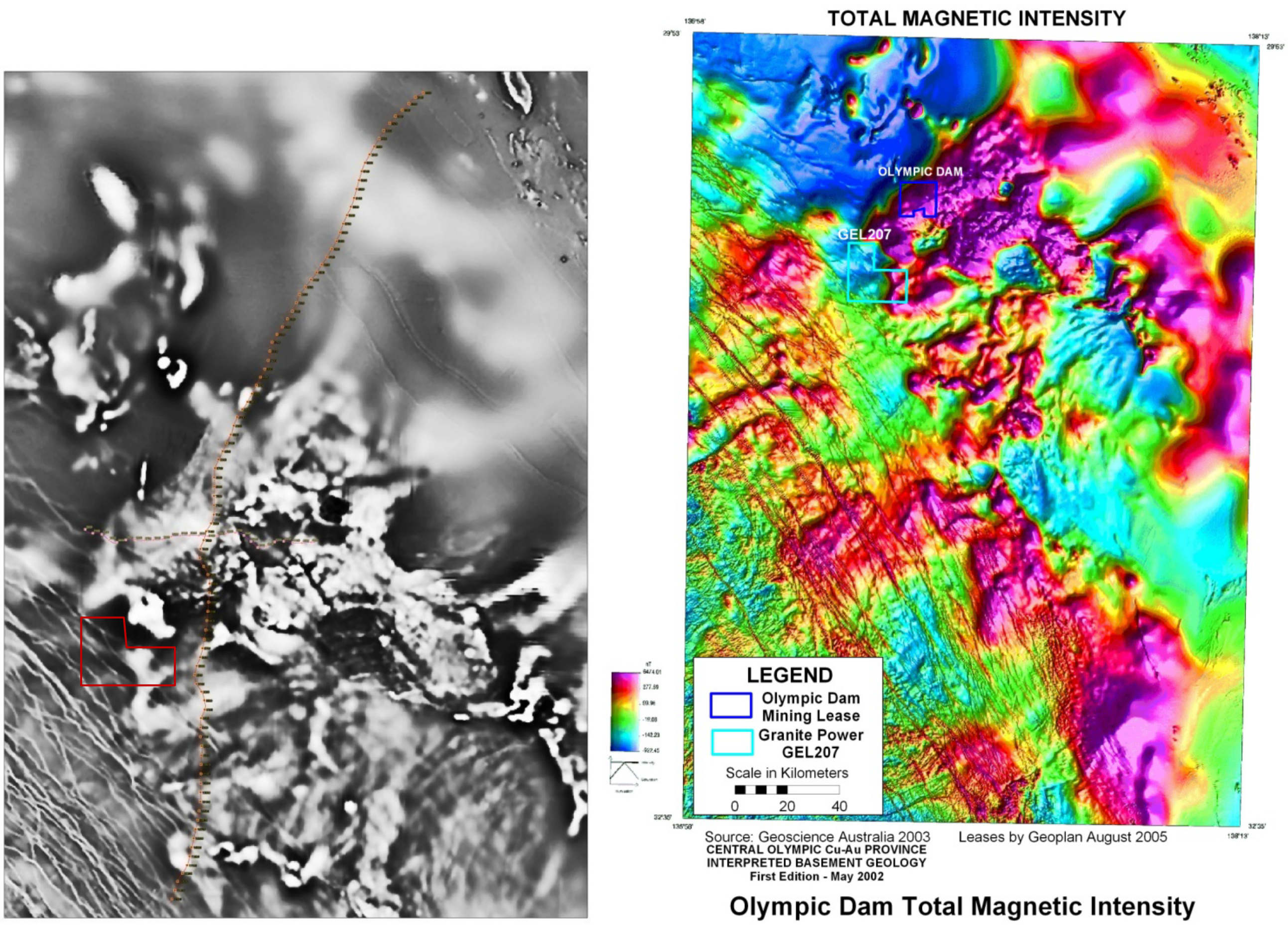

Figure 6. Colour and BnW images of Total Magnetic intensity in the area of GEL 207

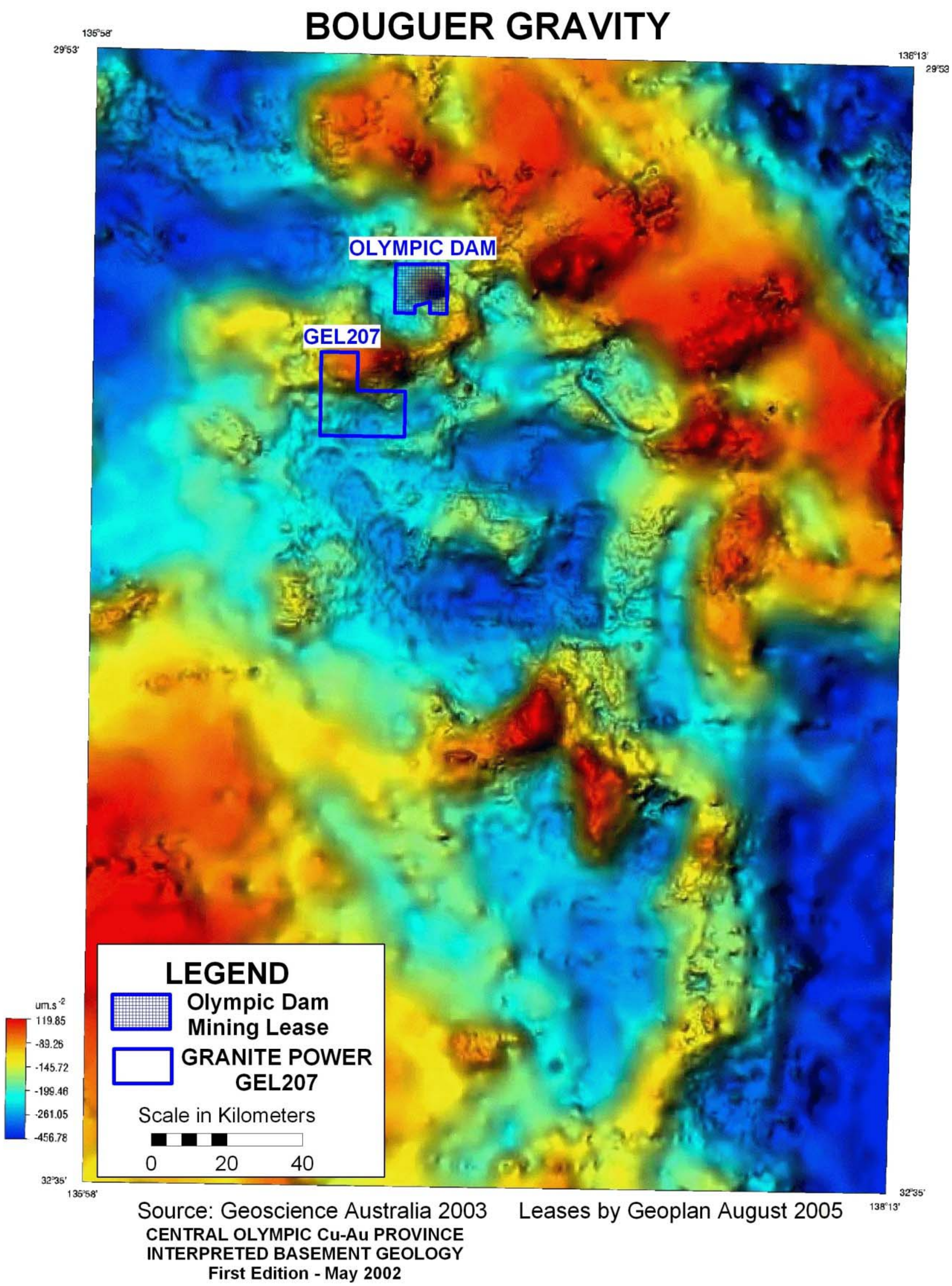

Figure 7. Bouger Gravity anomalies within the region around GEL 207

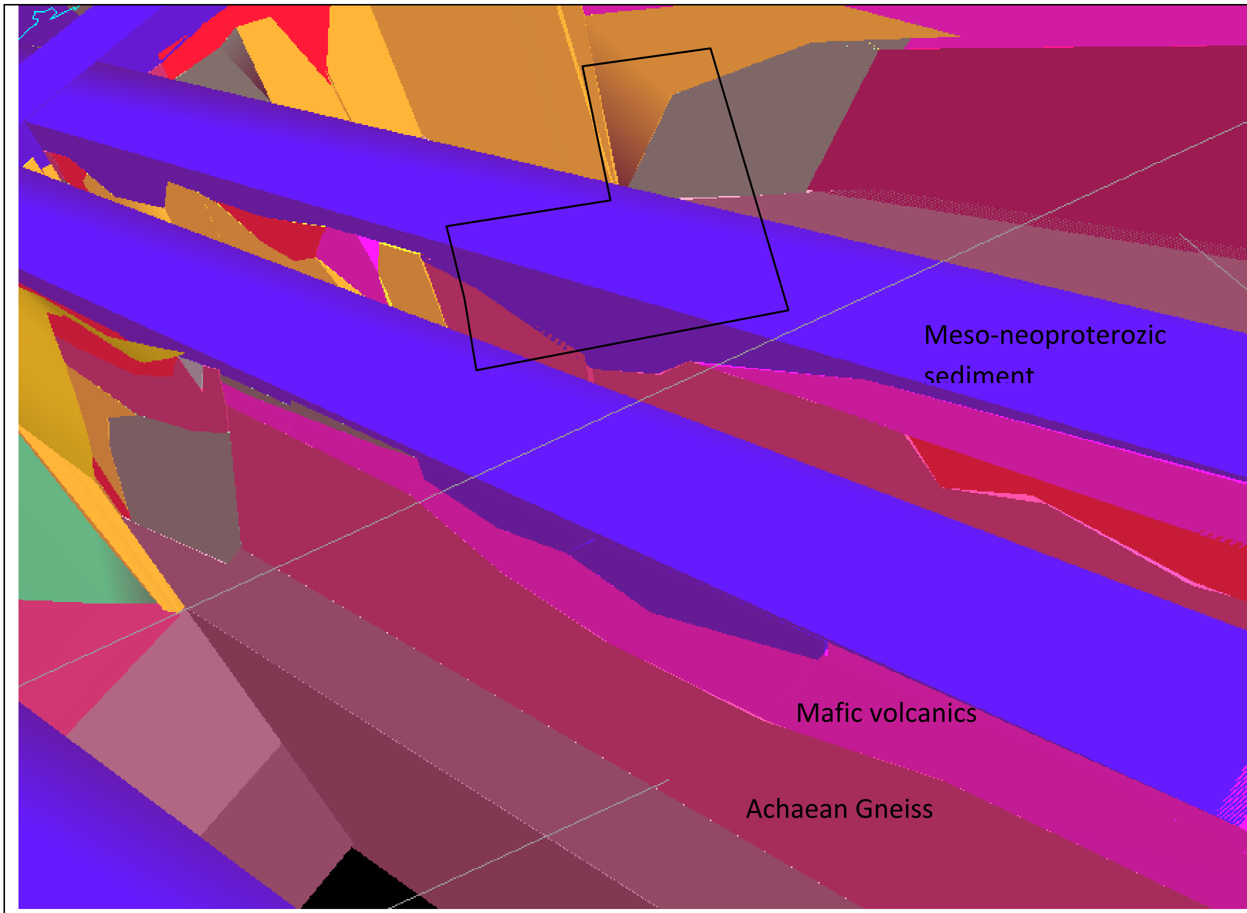

Figure 8. sections from the 3D gravity and magnetic inversion by Geoscience Australia. These suggest that there is potential for thick Neoproterozoic cover across the western half of the tenement, and possibly some mafic units on the NW corner.

Heat Flow measurements

Heat flow was calculated at two locations, in the eastern part of the tenement at HHD 1, and a few km to the north through PPR 5. Western Mining Company hole HHD 1 attained an uncorrected bottom of hole temperature of 50°C at 1186 m. The Mesoproterozoic - Neoproterozoic cover sequence in this hole, which including an upper sequence of shale and a lower sequence of sandstone/quartzite is estimated to have a thermal conductivity of 3.2 +/- 0.9 W/mK (Table 1), using the thermal conductivity values of Blanche 1 where possible, and literature values where sequences have not been measured. Assuming the corrected bottom of hole temperature is 54°C, the heat flow estimate for this hole is 93 +/- 22 mW/m^2. Similarly, the thermal conductivity for the sequence in PPR 5, has a bottom of hole temperature of 42 degrees at 700 meters depth (note that the temperature sensor stopped working at this depth). The assigned thermal conductivity to this depth was 3.5 +/- 0.9 W/mK, which provides a heat flow of 101 +/- 25 mW/m^2.

Table 1. Lithology and thermal conductivity of units in HHD 1

Formation	Top (m)	λ	σ	Descriptive lithology
Quaternary dune sand	0	3.49	1.36	Oxidised orange sand
unknown	4	1.71	0.62	laminated cherty siltstone
unknown	10	2.08	0.58	iron rich clay with sandy oxidised limestone
Tent Hill - Arcoona quartzite /Corraberra Sandstone	22	3.96	1.31	medium grained well sorted and rounded quartzite-sandstone with minor shale
Tregolana Shale	138	2.13	0.74	laminated shale with quartzite near top and interbedded siltstone
Pandurra Formation	361.1	4.55	1.35	medium-coarse grained sandstone with conglomerate beds and shaley zones
Donington Granitoid suite?	1132.8	3.22	0.73	foliated granitic gneiss with hematitic and sericitic alteration
Bottom of Hole	1186	**3.59**	**0.90**	Harmonic average λ and uncertainty

Table 2. Lithology and thermal conductivity of units in PPR 5

Unit	Top (m)	λ	σ	Descriptive lithology
Andamooka limestone	0	2.72	0.99	Partly silty, sandy, dolomitic, oolitic limestone
Tent Hill formation, Arcoona quartzite	74	4.27	1.32	Partly silty fine-coarse gr. sandstone, quartzite
Tent Hill, Corraberra sandstone	192	3.32	1.33	Fine gr. sandstone over wacke and shale
Tapley hill or Tent hill	226	2.10	0.67	Finely laminated shale with minor silt and dolomite
Unknown	423.23	4.07	1.20	Dolomite, stromatolitic towards base
Unknown	425.05	3.03	1.17	Thin siltstone over pebbly sandstone
Unknown	426.7	3.54	1.06	Dolomitic siltstone with calcite filled fractures
Pandurra Formation	464.5	4.00	1.36	Fine-coarse gr. sandstone with qtz + qtzt pebble cglm layers
Pandurra Formation	476.9	4.00	1.36	Fine-v. coarse gr sandstone, grit, conglom. and shale layers
Bottom of Hole	1369.3	**3.45**	**0.90**	Harmonic average λ and uncertainty

Temperature profiles

Three temperature profiles were constructed, based on the known and potential lithological units in the area (Figures 9-11). All three share a similar sequence of Mesoproterozoic and Neoproterozoic cover rocks to 1100 m, and for consistency use the thermal conductivities used to determine the heat flow measurements. Also, all three assume a basement of granite or granite gneiss, with a thermal conductivity of 3.2. In the first scenario, the cover sequence is directly underlain by granite, while the second and third scenarios assume a layer of mafic volcanic material (0.9 and 1.9 km thick respectively) with a thermal conductivity of 2.0 lies between these two units. While only in the optimistic third profile does the temperature approach 200 degrees at 5 km depth, it is worth noting the wide margin for error that is produced by the lack of certainty in the heat flow of this area.

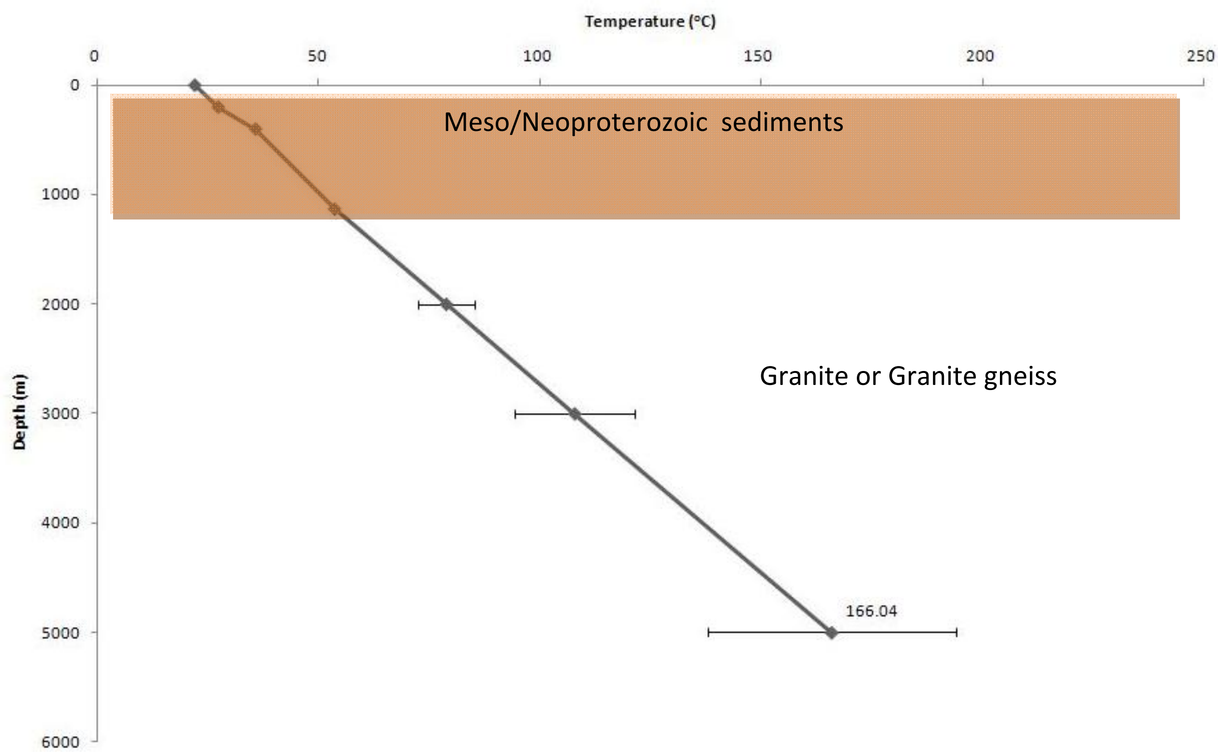

Figure 9. Post-paleoproterozoic sediment to 1100m, followed by granite (λ=3.2)

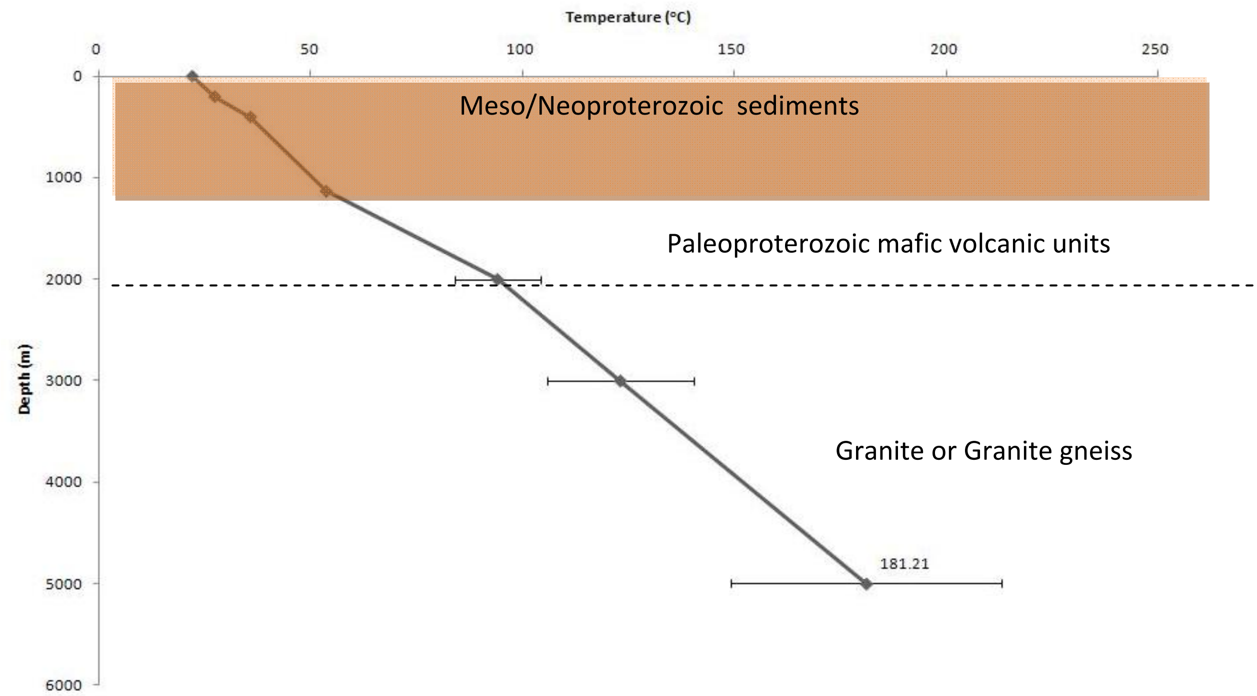

Figure 10. Post-paleoproterozoic sediment to 1100m, followed by mafic volcanic units (λ=2.0)to 2000m then granite/gneiss (λ=3.2) to 5000 m.

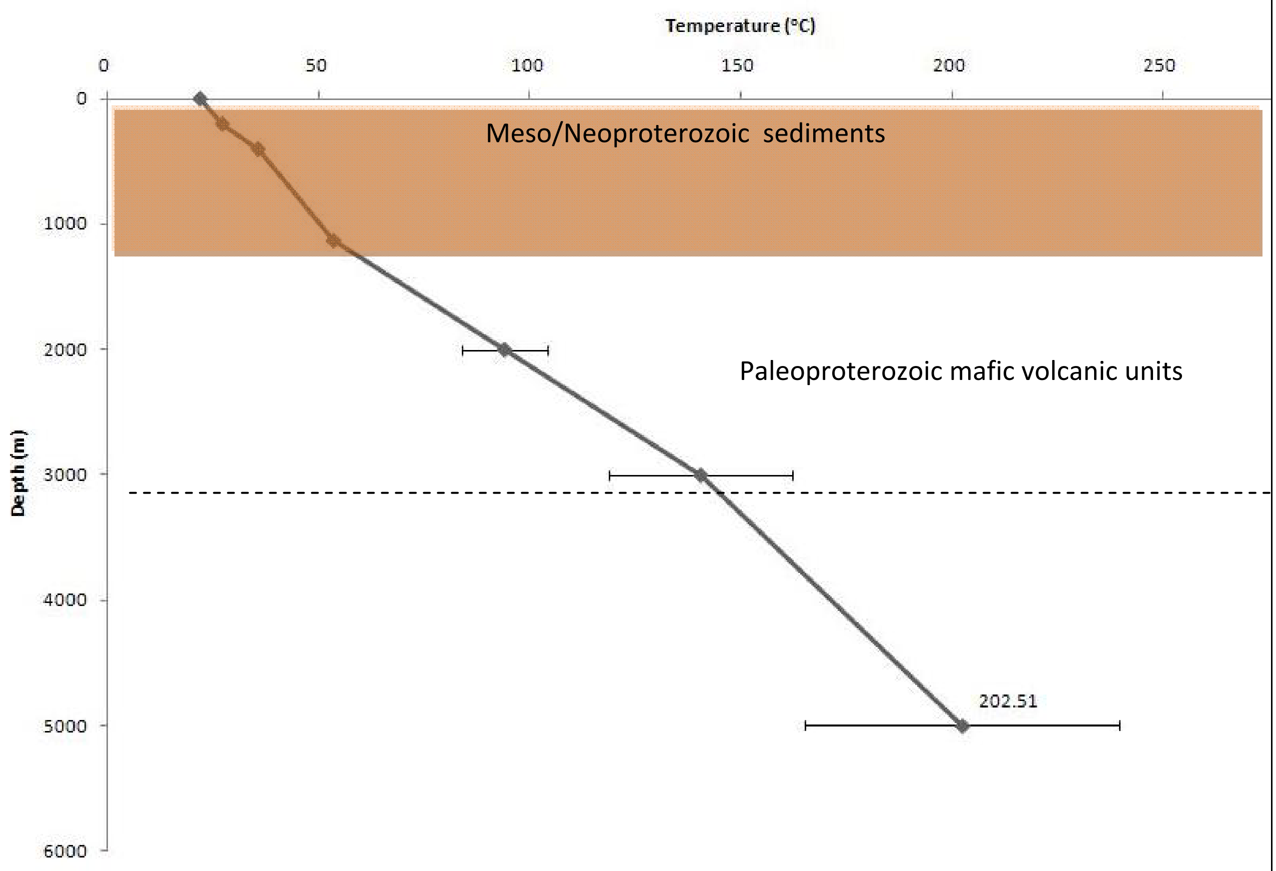

Figure 11. Post-paleoproterozoic sediment to 1100m, followed by mafic volcanic units (λ=2.0) to 3000m then granite/gneiss (λ=3.2) to 5000 m.

Recommendations

- The potential for achieving temperatures of >200 °C at 5 km depth in this tenement appears to be moderate to low.
- Soft sediments are unlikely to be present below 2 km depth.
- Should further work be carried out on this tenement, the following would aid in determining the prospectivity:
    - More thermal conductivity measurements on the Pandurra Formation in order to better assess heat flow rates in the area
    - Geophysical (seismic?) surveys and/or drilling to assess the likelihood of insulating mafic bodies underlying the cover rocks in the NW part to the tenement.

Update, Feb 28, 2008.

Drilling of AS07D01 in the Westcropolis Prospect by Minotaur resources intersected "felsic Gawler Range Volcanics (GRV) immediately to the east of the northern arm of the tenement. This lies in an area of the gravity high mentioned in the report above, but importantly in the area of the magnetic low. Thus, it is likely that this unit of the GRV is not observed on the magnetic image. As such it is probable that is extends across the northern part of GEL 207, which raises the prospectivity of this part of the tenement. However, at present we have no hard data on the thermal conductivity of this unit, which could range from a reasonably insulating value of ~2 to a standard basement value of ~3. Further, we have no information on the thickness of the unit in this hole, or across our tenement. The best data available is from the GA seismic line to the north, where it ranges from 0 to 2 km in thickness. This range in thickness fits well with expert advice from Martin Fairchild who is of the opinion that this unit fills pre-existing valleys in the basement and is therefore very variable in thickness.

In order to progress from this point we would need to confirm:

1. The thermal conductivity of the unit by analyzing samples from AS07D01 or a similar hole drilled in our tenement.

2. The extent of the GRV across the tenement – from the existing gravity image it appears that the unit only exists on the north-west corner of the tenement. This is roughly 7 x 7 km in area, and would probably not be large enough to produce a commercially extractable resource on its own. However, it may be viable if pursued as a joint-venture with the areas to the north and east that are currently under exploration licenses by Green Rock Energy.

3. The thickness and morphology of the GRV in the region of GEL 207, either by a seismic survey, or by drilling through the unit to a depth that would prove up the prospectivity of this potential resource – i.e. to 2.5-3 km.

4. The source of the heat anomaly in this region. Given the anomalously high U content of both the Pandurra formation and the GRV in this region, it is possible that the high heat flow values are due to upper crustal sources, rather than heat from depth. If this was the case, then the high heat flows (and hence high thermal gradients) intersected in PPR5 and HHD1 may not exist at depth, which further downgrade the likelyhood of finding temperatures of >200 °C at reasonable depth.

References

Western Mining Corp. Ltd, 1986, Open File Envelope No. 6562: EL 783, EL 784 and EL 1316, Stuart Shelf, partial relinquishment report for the period 16/1/81 TO 30/6/86.

Lyons and Goleby, 2005, The 2003 Gawler Craton Seismic Survey: Notes from the Seismic Workshop held at Gawler Craton State of play 2004. Geoscience Australia Record 2005/19

Direen and Lyons, 2002. Gawler Craton 3D crustal model, Olympic Dam Cu-Au province. https://www.ga.gov.au/map/web3d/gawler/model.html