Eden Energy Ltd

ACN 109 200 900

First Annual Report

Witchellina Project
GELs 166, 167, 168

13th July 2005 to 12th July 2006

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1 Introduction

1.1 Background

Elevated temperature gradients are recognized in the Roxby Downs area in close association with anomalous radioactivity concentrated at shallow depth in the Olympic Dam Iron Oxide Copper Gold (IOCG) orebody. Considerable thicknesses of sediments are present in the Adelaide Geosyncline, Arrowie Basin and Torrens Basin. A number of geophysical anomalies are present in the region that can be interpreted to be due to deeply buried IOCG systems. Petratherm Ltd have highlighted the potential for radiogenic iron oxide systems to create geothermal resources, the so called RIO model.

The RIO model envisages natural, low-level, radiogenic decay – principally from uranium – resulting in extremely high heat production rates. Measured heat production in RIO bodies may be a s much as 50 times greater than those from average granitoids, and Petratherm report that their modelling showed that under favourable conditions, temperatures in excess of 200ºC may be generated at depths of around 3km depth. The conclusion being that radiogenic elements concentrated in such RIO systems could lead to significant thermal anomalism at more economic depths than granite-hosted systems such as that currently under investigation by Geodynamics Ltd in the Moomba area.

Eden recognised that key component in the RIO model was having adequate sediment accumulation above a RIO body to trap a commercial heat resource.

The West Well geophysical anomaly was defined by WMC during their exploration for more Olympic Dam type systems in 1979. However preliminary drill testing (the WWD1 hole was drilled to 762m) and modelling of the potential field data showed that the target, although possessing Olympic Dam-like characteristics, was too deep to be of interest as a mineral resource.

The West Well anomaly is located 80km east of Roxby Downs and 60km west of Leigh Creek on Witchelina Station. Access for drill rigs is via Myrtle Springs Station via station tracks and the old WMC access track. Drill hole WWD1 is located immediately adjacent to the shoreline of Lake Torrens.

Two main components are required for a heat reservoir within the earth's crust to achieve the required temperature for commercial power generation:

(a) Primary heat production within the reservoir

The primary heat production from within a buried body results largely from radioactive decay of minerals within the body. Hence, large bodies which are relatively rich in such minerals will have the ability to generate anomalously large amounts of heat. In particular large, late stage granite plutons or large mineralised systems rich in radioactive minerals are potential targets. In addition, the temperature of such reservoirs would be enhanced if they are located in an area of anomalous heat flow within the crust, such as the fairly well defined area occupying a large portion of northeastern South Australia.

(b) Insulation of the heat reservoir

It is essential that the heat generated within the reservoir be trapped effectively, and the most efficient natural insulators are fine grained sediments, in particular carbonaceous shales and coal seams. Modelling by others indicates that around four to five kilometres of sedimentary cover would be required to blanket a granitic heat reservoir to ensure sufficient heat was retained. Large mineralised systems rich in radioactive minerals may require less sedimentary cover, possibly as little as 2-3 km.

Following a review of public domain and in-house information, the West Well area was selected as a potential RIO system with the advantage of around 3km of sediments above it. Furthermore the Witchellina/Mulgaria station area also appears to overlie a buried Hiltaba granitoid with potential to enriched in uranium and therefore be anomalously hot as well.

Eden applied for a group of GELs to cover these targets, the minimum GEL area being too small to cover the identified area of interest.

1.2 Licence Data

Geothermal Exploration Licence 166 (GEL166) was granted on 7th September 2004 with an initial term of five years over an area of 462km^2.

Geothermal Exploration Licence 167 (GEL167) was granted on 13th July 2005 with an initial term of five years over an area of 497km^2.

Geothermal Exploration Licence 168 (GEL168) was granted on 7th September 2004 with an initial term of five years over an area of 468km^2.

Figure 1 shows the licence locations.

In March 2005, Eden applied for Variations and Suspensions to the Work Programmes for these GELs to amalgamate their work programmes into a single regional project and to streamline compliance reporting. The proposed variations were approved by PIRSA in May 2005 and a revised common expiry date of 12th July 2010 adopted.

1.3 Period

In accordance with Section 33 of the Petroleum Regulations 2000, this report details work conducted during the first permit year of GELs 166, 167 and 168.

2 Work Requirements

The revised Year 1 work programme negotiated by Eden with PIRSA for the combined Witchellina GELs (166,167, 168) comprised:

- Geological and geophysical review (to be carried out in the area covered by GELs 166, 167 & 168).

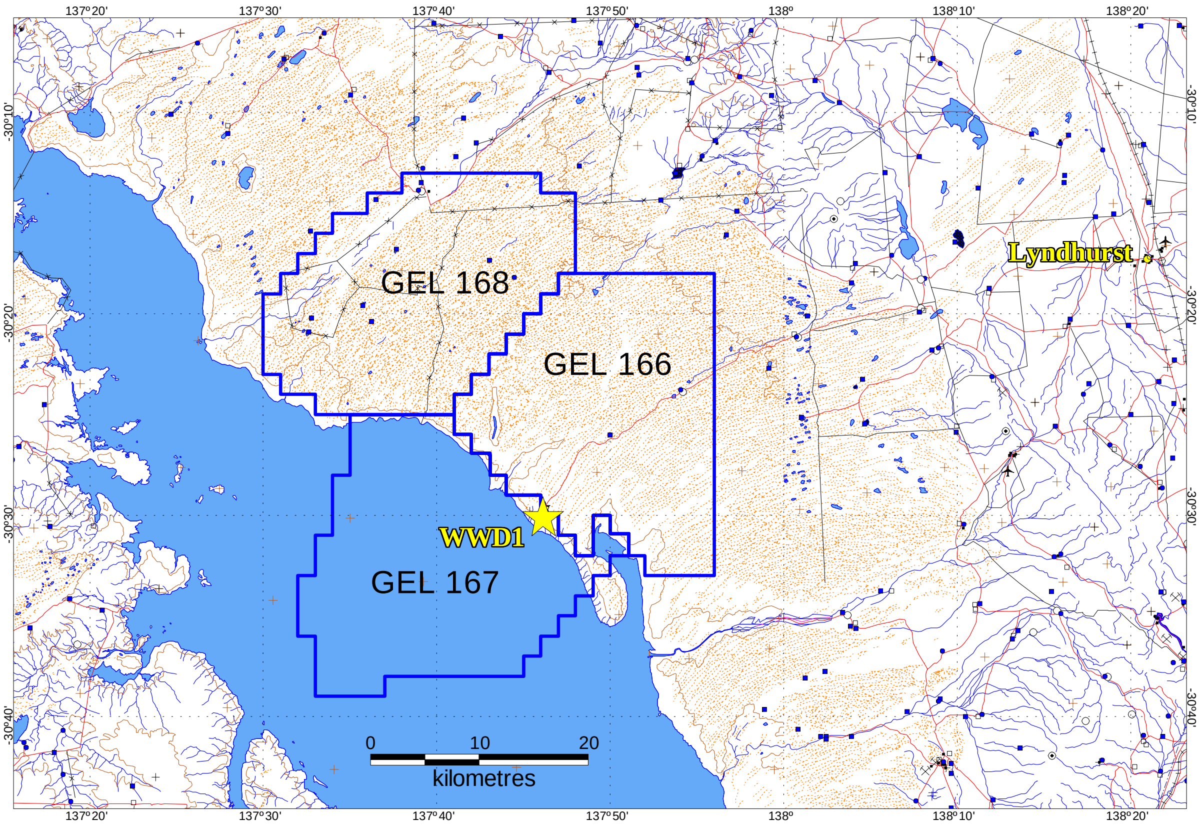

Figure 1: Location of GELs 166, 167 & 168 - The Witchellina Project

3 Work Conducted

During the first year of the licences Eden concentrated on reviewing all the available data for the area.

The successful application for a small amount of SA PACE funding to attempt a re-entry of the WWD1 to collect thermal data lead to Eden accelerating the permitting processing and concluded with the successful completion of an Environmental Impact Report and approval of a new Statement of Environmental Objectives for the project area.

3.1 Geological Review

During the first year of the licences, Eden has focussed on acquiring and reviewing all the available open file data relevant to the project area.

A review of the published literature on the geology of the region was undertaken, with particular attention to IOCG mineralisation, regional tectonics and sedimentary fill of the Adelaide Geosyncline.

Detailed information about geology of the West Well area, particularly from WWD1 was obtained. The geologist and drillers associated with drilling WWD1 were interviewed and as much information about the hole as possible was obtained (see Appendix 1).

WMC attempted to test the geophysical anomaly with drill hole WWD 1, which was located on the northeastern shore of Lake Torrens on the axis of the magnetic and gravity highs. Drilling to a depth of 762.10m failed to intersect basement. The summary Geological Log is:

000.00 - 072.20	Quaternary, Tertiary, Cretaceous
072.20 - 520.77	Neoproterozoic Bunyeroo Formation
520.77 - 529.26	Neoproterozoic ABC Range Quartzite
529.26 - 762.10	Neoproterozoic Bayley Range Formation (Tregolana Shale equivalent).

EOH

WMC concluded that the location of the West Well area on the eastern side of the Torrens Hinge Zone accounts for the significantly thicker sequence of the Wilpena Group in this area than they originally expected. The sequence intersected in WWD1 is most probably underlain by older Neoproterozoic sediments of the Adelaide Geosyncline, and hence the depth to the West Well anomaly causative body in this area probably exceeds 1000m, as indicated by the geophysical modelling and assessment of the known stratigraphy elsewhere in the Adelaide Geosyncline.

The northern Olympic Province in South Australia is acknowledged as probably the most important region on a world-wide basis for very large, uranium-rich, iron oxide multi-metal deposits. The province contains the Olympic Dam deposit, which contains the world’s largest known uranium resource, as well as a number of other large, but undeveloped iron oxide multi-metal resources, such as Wiirda and Acropolis. The Olympic Province offers substantial potential for further discoveries, with a number of large geophysical anomalies either untested or interpreted to be at depths uneconomic for a mineral resource. Some of these latter systems are attractive for geothermal energy, provided that they are sufficiently large, anomalously rich in radioactive minerals and buried at sufficient depth under suitable cover rocks to retain generated heat. The West Well anomaly is interpreted by Eden to be a highly prospective target of this type.

3.1.1 Mineralisation

The Olympic Dam copper-uranium-gold deposit is a type example of Proterozoic Iron Oxide Copper Gold (Uranium) mineralisation. It is located 650km north-northwest of Adelaide in South Australia and was discovered in 1975 (Reeve et al 1990). It has an areal extent exceeding 20km^2 with vertical thicknesses of mineralization up to 350m. The deposit occurs in the basement beneath around 350m of unmineralised, flat-lying Adelaidian to Cambrian sediments in the Stuart Shelf Region of South Australia. The basement rocks to the deposit are un-metamorphosed and are probably younger than 1580 Ma. The deposit is spatially coincident with strong gravity and magnetic anomalies and associated with the intersection of west-northwest and north-northwest trending lineaments.

The deposit, which contains 2.1 billion tonnes at 1.4% copper, extends for 5km in a northwest-southeast orientation and is over 2km wide. Olympic Dam is the world's sixth largest copper resource and the world's largest uranium deposit. Copper sulphide mineralisation occurs beneath 350m of flat-lying, barren sedimentary cover within the 1.6Ga Olympic Dam Breccia complex (Reeve et al, 1990). The host rock to the ore is the Roxby Downs Granite. One interpretation has the mineralised fluids containing copper, uranium, gold, silver and iron deriving from a source at depth, possibly from a basaltic magma. The fluids migrated upwards along a major fracture within the Earth's crust, causing violent explosive reactions with the granite in a near surface environment, similar to the crater lake districts seen in some parts of New Zealand.

The Proterozoic sediments comprising the local basement sequence are predominantly complex breccias ranging from matrix-poor granite breccias to matrix-rich polymict breccias containing clasts of a variety of rock types. Dolerite dykes, plugs and sills intrude the basement rocks but not the flat-lying cover sediments.

Unmineralised granite occurs near the margins of the deposit, while towards the centre of the deposit the rock type comprises clasts or fragments of granite and iron oxide in the form of haematite in variable proportions. The very centre of the deposit is haematite-rich with up to 60% iron and does not contain copper mineralisation. The core of the deposit represents a leached zone where sulphide material has possibly been scavenged. Within the mineralised zones surrounding the barren core, the four commodities do not occur in discrete zones but are mixed together and cannot be mined selectively.

3.1.2 Regional Tectonics

The Gawler Craton underlies the greater part of South Australia (e.g. Preiss 1987; Coney et al. 1990). It is defined as that region of crystalline basement of Archaean to Mesoproterozoic age that has undergone no substantial deformation except for minor brittle faulting since 1450Ma. The Gawler Craton is subdivided into a number of discrete tectonic subdomains based on structural, metamorphic and stratigraphic character. These include the Christie and Coulta Subdomains which contain most of the exposed Archaean rocks; the Cleve Subdomain which is a Palaeoproterozoic fold belt on eastern Eyre Peninsula; the Moonta Subdomain which, although considered an extension of the Cleve Subdomain, includes stratigraphically younger rocks; the Mesoproterozoic Gawler Ranges Volcanic Province; and the Wilgena, Nuyts and Nawa Subdomains of mixed or complex character.

At ~2000Ma, along what is now its eastern margin, the Gawler Craton underwent substantial extension to form a major elongate basin into which a ~1950-1845Ma mixed shallow-water clastic and chemical sedimentary succession (including iron formation, and carbonates) was deposited. Subsequent deformation of this basin during the Kimban Orogeny (1845-1700 Ma), accompanied by intrusion of large volumes of granite, led to the formation of a broad fold belt or orogen known as the Cleve Subdomain. The Moonta Subdomain is approximately parallel to and east of the Cleve Subdomain, and consists of syn-Kimban orogeny silicic volcanics, chemical and clastic sediments, and earliest Mesoproterozoic granitoids.

The Stuart Shelf is not strictly a tectonic unit of the Gawler Craton, but defines the region of Neoproterozoic to Cambrian platformal sedimentation developed upon the existing craton (i.e., underlain by Gawler Craton including GRV and Hiltaba granites).

The Olympic Dam Cu-U-Au deposit may also be related to a mantle plume but, in this case the link is less obvious (Campbell & Davies, ANU 2005). The ore body formed at around 1590Ma, as part of the Gawler Range event, an aerial extensive association of volcanics and anorogenic granites known as the Hiltaba event. The Hiltaba igneous activity can be attributed to a mantle plume. Hiltaba intrusives are commonly U-enriched, such as at the Roxby Downs Granite and therefore form a potential geothermal target in their own right. The close temporal spatial relationship between the volcanics and the granites suggests that heat required to form the granites must also come from the plume. Since the Olympic Dam ore body forms part of this association it is likely that it too is directly or indirectly related to the plume. In this regard it may be significant that the ore body is cut by light REE-enriched hydrous alkali dykes. If, as the geophysical evidence suggests, Olympic Dam is underlain by a large intrusion of similar composition, it would form an ideal source for the Cu, U, Au and LREE in the ore body.

The localizing structure for the deposit is a northwest trending trough or graben which is arched about a northeast axis. Arching parallel to the graben long-axis also occurs in some areas. Strike-slip and dip-slip faults occur both parallel to, and at a high angle to, the graben long axis. The Greenfield Formation is preserved in downfaulted blocks in the crest of the structural arch. It is considered that the graben-fill sediments were deposited in an arid subaerial environment during rifting or strike-slip faulting. The strata-bound sulphide mineralization is syngenetic or syndiagenetic and is probably related to local volcanism. The younger transgressive mineralization is epigenetic and was introduced into favourable structural zones. The uranium and rare earths were deposited during and after the sulphide mineralizing phase.

These factors important in the formation of Olympic Dam are also thought to relevant in the formation of numerous other IOCG systems in the region. For example, around Olympic Dam there are the Acropolis, Wiirda, Oak Dam, Emmie Bluff and Titan IOCG deposits, with numerous other geophysical anomalies that are also very likely IOCG systems. Some of the gravity and magnetic anomalies are due to mafic intrusions, related to the Hiltaba intrusive events, but considered unlikely to be attractive from a geothermal perspective. The West Well anomaly may therefore be either deeply buried IOCG system or a mafic intrusive.

3.2 Modelling & Interpretation of Geophysical Data

Public domain magnetic and gravity data were compiled and re-processed. The historical modelling by WMC for the area was reviewed.

The West Well Anomaly is located under the north portion of Lake Torrens and extends onto the northeastern shore of the lake (see **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.**). The centre of the original geophysical grid established by WMC is approximately 25km southwest of the old Ediacara homestead. Regional geophysical surveys defined a large, co-incident intense magnetic (25km in length) and gravity (35km) feature. Both are elongate in an ESE direction with the gravity centre 6km east of the magnetic centre.

Detailed ground geophysical surveys by WMC in the 1970s did not significantly alter the nature of these features, although the gravity anomaly of 10mgal was more precisely located (see **Error! Reference source not found.**). The magnetic anomaly has an amplitude of approximately 2000 nT. (see **Error! Reference source not found.**)

Geophysical modelling by WMC of the gravity anomaly using a horizontal cylinder and a density contrast of 0.1, suggested a depth of at least 1200 m. A depth of at least 1000 m to the magnetic source was determined using a vertical prism model with maximum slope (Paterson and Muir 1986, Env 6562). Later modelling by Tasman Resources (unpublished internal company data) on other similar geophysical features in the area suggested that the depths to the features maybe deeper than the WMC estimates, with depths of 2 km to 4 km more likely.

3.3 Thermal Data Review

Professor James Cull from Monash University reviewed geothermal constraints for the area and undertook preliminary modelling of thermal parameters.

3.3.1 Geothermal Constraints

The present day heat flow records for South Australia and western New South Wales, are largely based on the compilation of Cull (1982). The available data comprise 23 individual heat flow records and show systematic variations in surface heat flow (q_s) across South Australia. The measured heat flow increases from ~50mWm^2 in the western Gawler Craton to greater than 90mWm^2 in the vicinity of the western boundary of the Adelaide fold belt before falling to ~65-75mWm^2 in the vicinity of the Willyama Inliers (including Broken Hill) in the eastern parts of the fold belt. These data clearly show that the western boundary of the fold belt is located within a province of unusually high heat flow.

Geologically, this anomalous heat flow province corresponds with regions in which the major crustal growth occurred in the Palaeoproterozoic through Mesoproterozoic provinces, and is clearly 'hotter' than the older fragments of the western Gawler craton where the major crust forming events are Archaean in age.

The South Australian heat flow anomaly forms part of a broad band of elevated surface heat flow through the central part of Australia termed the 'Central Australian heat flow province' by Sass and Lachenbruch (1977). Importantly, this province corresponds approximately with the distribution of Palaeo- and Meso-Proterozoic crust in the Australian continent including the Mount Isa Inlier (q_s ~ 80mWm^2), Tennant Creek (q_s ~100mWm^2) and the U-rich provinces in the north of the Northern Territory (q_s ~ 100mWm^2).

The observation that the heat flow anomaly extends beyond the margins of the fold belt, suggests that it reflects anomalous heat production rates in the basement rocks, an interpretation supported by the widespread U-mineralisation in Mesoproterozoic rocks in the various cratons surrounding the Adelaide fold belt (Sandiford et al 2002). The local influence of elevated U-concentrations on the heat flow field has been demonstrated in a detailed study by Houseman et al. (1989) around the Roxby Downs Cu-U-Au-Ag deposit on the Stuart Shelf. This is a region of the Gawler craton bordering the Adelaide fold belt covered by a thin veneer of essentially undeformed Neoproterozoic sediment.

Houseman et al (1989) note significant variations in heat flow on a 10km scale, with anomalies directly related to U-mineralisation. In this region a background heat flow of around $75mWm^2$ is observed at distances of >5km from the deposit with heat flow rising to $128mWm^2$ above the deposit. Since U-mineralisation is believed to predate deposition of the Neoproterozoic sediments of the Adelaide Geosyncline and Stuart shelf (Johnson and Cross, 1995), it seems likely that the basement beneath the Adelaide fold belt inherited similar spatial variations in heat production. However lateral equilibration of geothermal anomalies may provide substantial filtering of any near-surface expression (Jaupert, 1983).

3.3.2 Model Data

PIRSA open file data are relatively limited since there are few prospects for oil exploration in this area. However there has been considerable interest in the Olympic Dam mineral deposit and several deep wells have been drilled to locate possible analogues.

Only limited stratigraphic data are available from BRD1 a deep mineral exploration hole. However the geological setting is relatively well known from extensive geothermal modelling of the Olympic Dam area (Houseman et al 1989). Consequently representative values are available for thermal conductivities of the major units in the area and there is some reasonable stratigraphic control on unit intervals. The resulting estimates of temperature (Figure 2) are considered well constrained except for variations in heat production associated with anomalous concentrations of U in near-surface layers. Local concentrations associated with iron oxide deposits comparable to Olympic Dam cannot be discounted.

Several significant lineaments are visible in the airborne magnetic data; a general grain is consistent with the north-westerly structural trends in the area. However the magnetic response near GELs 166, 167 and 168 is dominated by the Torrens Hinge Zone with additional complexities associated with north-easterly faulting near Andamooka (e.g. Parker, 1990). Similar trends are evident in the regional gravity data and these may provide a focus for further exploration designed to locate deep fractures suitable for fluid circulation.

3.3.3 Recommendations from Data Review

Cull (2005) concluded that temperature models are reasonably well developed for this Witchellina Project area and that general temperature-depth targets can be readily established.

Normally deep sediments are required to provide adequate thermal insulation for heat produced by limited radioactive decay within the basement sequence. However there are proven high-level deposits of anomalous uranium mineralisation in the area associated with iron-oxide bodies. Consequently there may be local heatflow anomalies offering access to high temperatures at relatively shallow depth (Jaupart 1983).

If possible these prospects should be explored using direct observations of the geothermal gradient; multiple drill-holes are required for this purpose penetrating to depths >100m and preferably >200m to detect systematic variations in surface heatflow.

Indirect evidence for elevated temperatures may also be obtained using magnetotelluric surveys to locate zones of anomalous electrical resistivity. Apart from providing a vertical profile of resistivity/temperature MT data should provide additional evidence for the location of basement fractures and lineaments evident on the airborne magnetic and gravity data. The features will provide a focus for any future exploration and trial drilling for fluid production.

Some independent estimates of basement depth and Curie temperature variations may be obtained by spectral processing of magnetic data to determine maximum spatial wavelengths associated with deep basement topography.

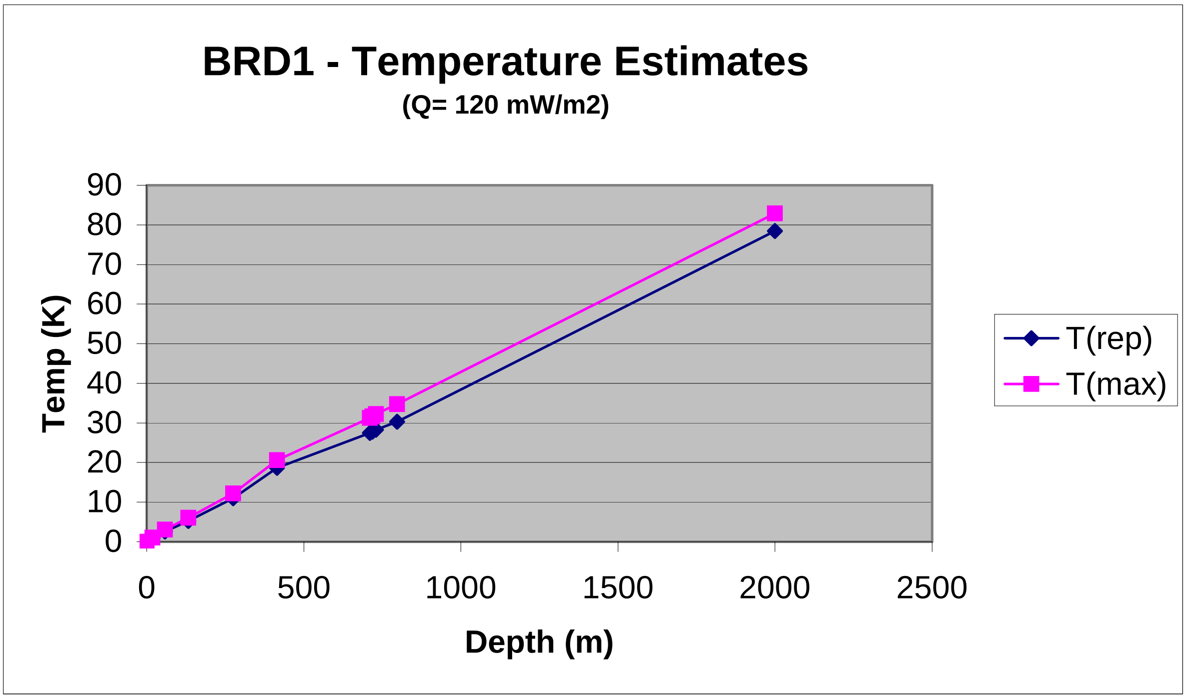

Figure 2: GELs 166, 167 & 168 - Temperature estimates for BRD1 assuming no anomalous local heat production.

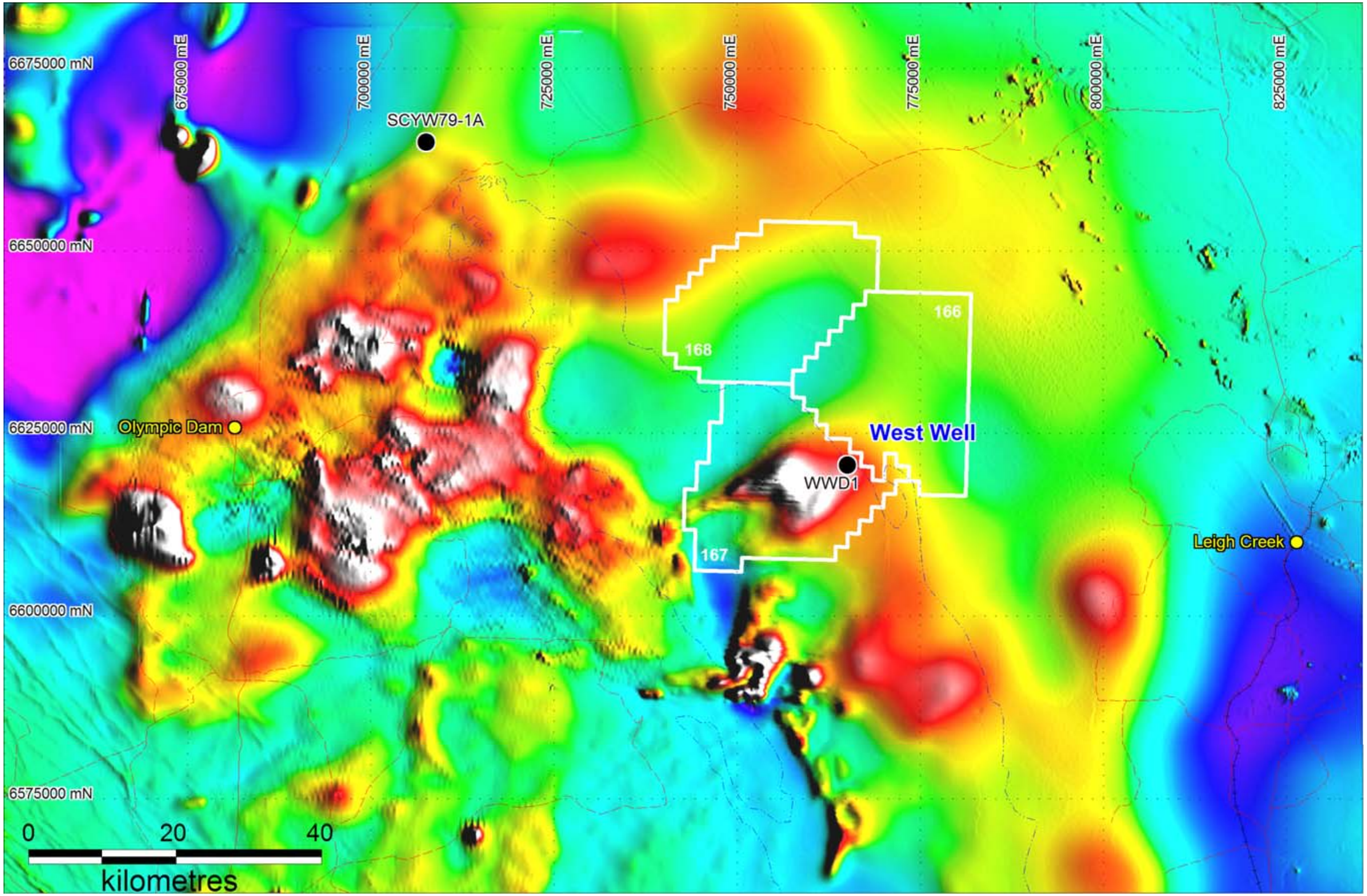

Figure 3: Lake Torrens Project area on Regional Magnetics (RTP TMI).

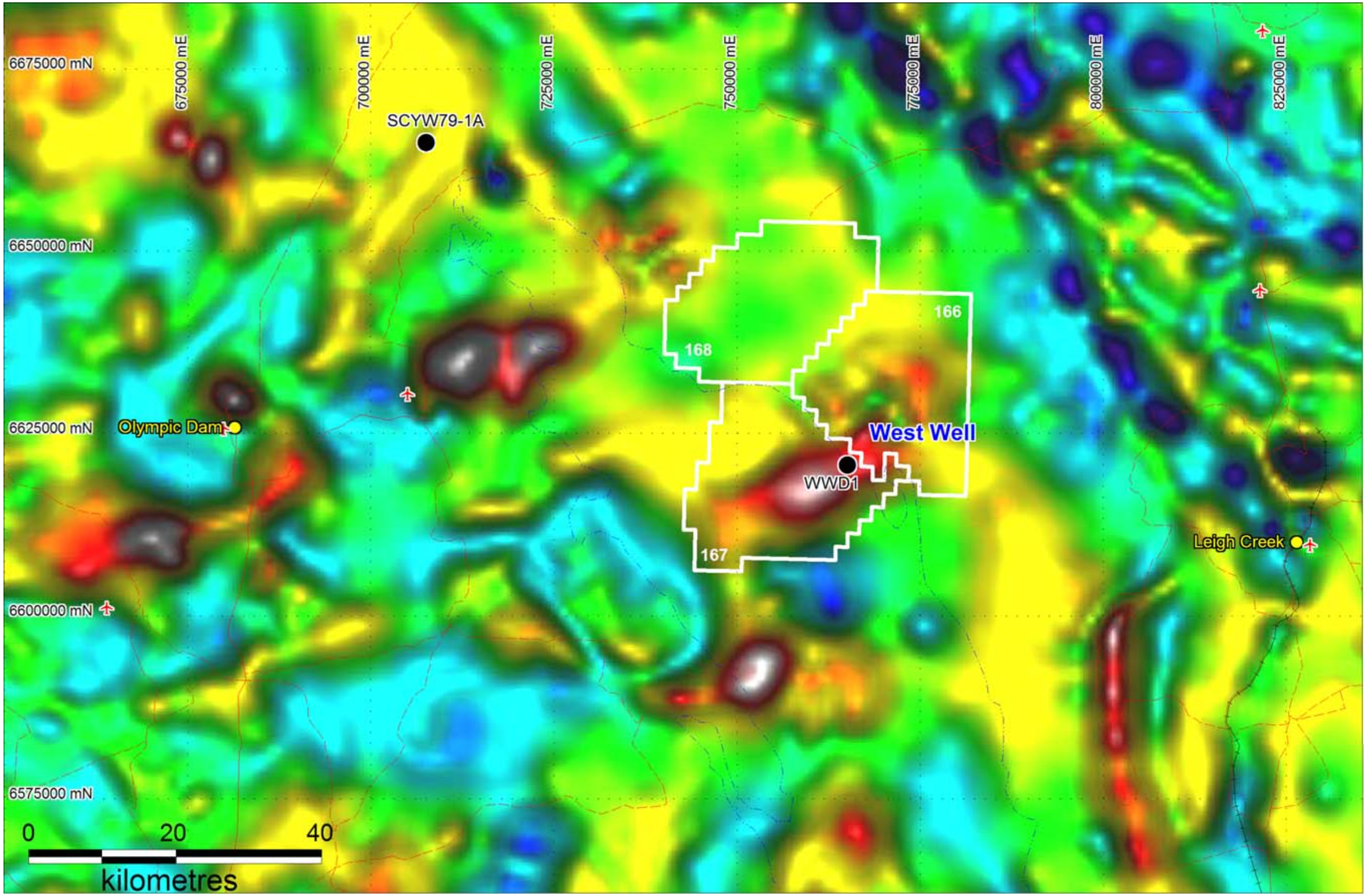

Figure 4: Lake Torrens Project on regional Gravity image (1VD BA)

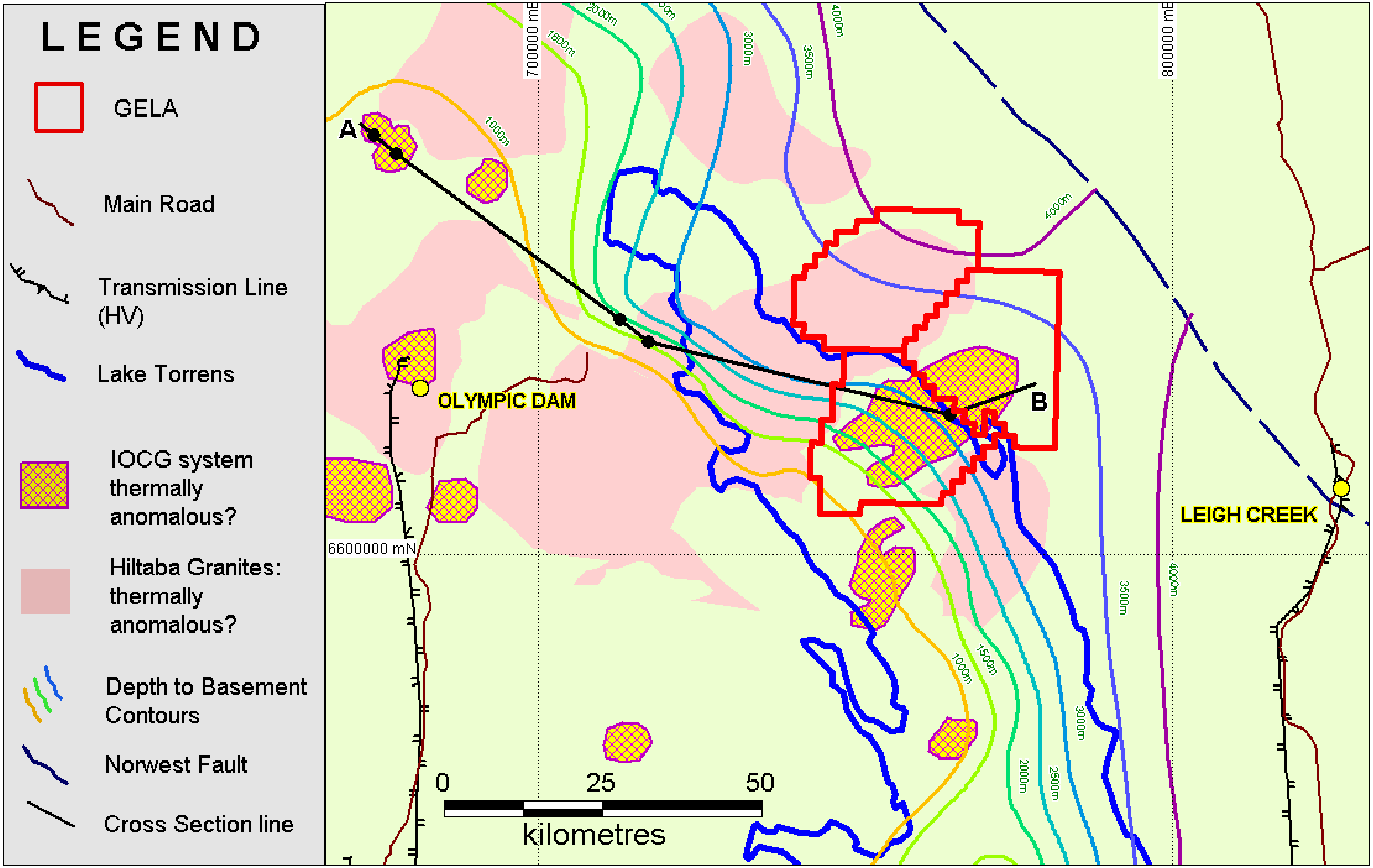

Figure 5: West Location Map, showing interpreted depth to basement, possible geothermal targets and infrastructure

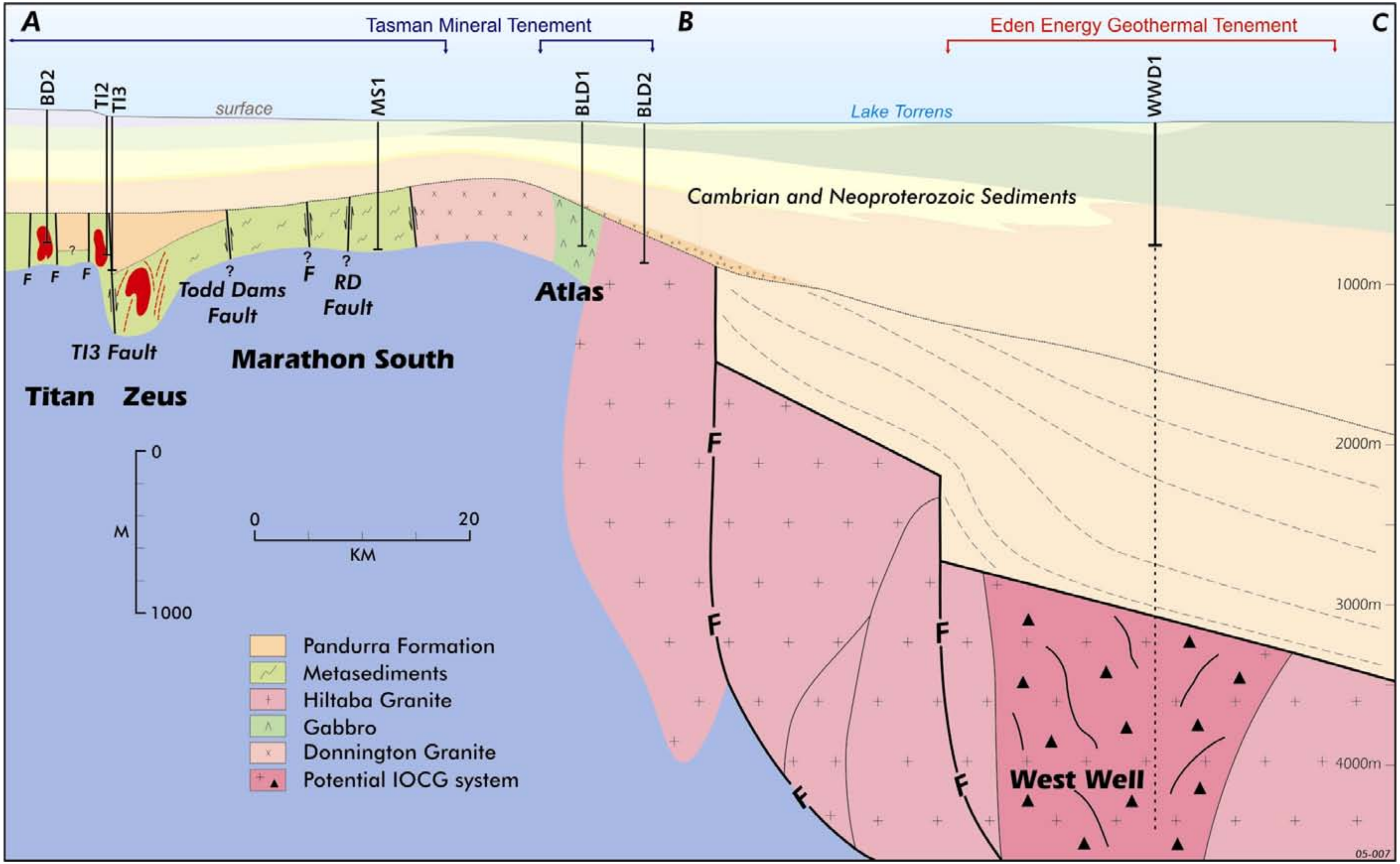

Figure 6: Interpreted Cross Section across the Torrens Hinge Zone, showing the Neoproterozoic sediments fill overlying the West Well Iron Oxide System

4 Year 1 Expenditure

Table 1: Witchellina Project Year 1 Expenditure

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5 Year 2 Work Programme

Work planned for the second year of GELs 166,167 and 168 will be designed to increase our knowledge of the depth to basement and heat flow in the project area.

Part of this aim will be accomplished by undertaking a magnetotelluric (MT) survey.

Should an appropriate drilling rig become available then a re-entry of WWD1, as originally planned with part PACE funding, will be attempted, or a new hole may be drilled in the WWD1 area to address the question of the heatflow associated with the West Well geophysical anomaly and possible ‘Mulgaria Granite’.

6 Compliance with the Petroleum Act (Reg. 33)

6.1 Summary of the regulated activities conducted under the licence during the year

Eden has not undertaken any regulated activities as defined under the Petroleum Act in GELs 166, 167 and 168 during the licence year.

6.2 Report for the year on compliance with the Act, these Regulations, the licence and any relevant Statement of Environmental Objectives

Given that no regulated activities were undertaken during the reporting period, many of the regulations are inapplicable at this stage and no non-compliances have been noted, with the exception of late submission of this report.

Part of the project area covers the Lake Torrens National Park. To enable the re-entry of the WWD1 with the PACE funding noted above, Eden produced an SEO based on a new Environmental Impact Report.

6.3 Statement concerning any action to rectify non-compliance with obligations imposed by the Act, these regulations or the licence, and to minimise the likelihood of the recurrence of any such non-compliance

Eden recognises the importance of achieving regulatory compliance and is committed to achieving appropriate practices in its management strategies, work practices and procedures. Eden is committed to operating in an environmentally and socially responsible manner.

6.4 Summary of any management system audits undertaken during the relevant licence year, including information on any failure or deficiency identified by the audit and any corrective action that has, or will be, taken

Eden is a new company and is developing appropriate systems and documentation to cover Field Operations, Environmental Management, Health and Safety issues and compliance checklists to ensure the requirements of relevant Acts and Regulations are met.

Eden's activities have been essentially desktop studies at this stage and no management system audits have been undertaken as yet.

6.5 List of all reports and data relevant to the operation of the Act generated by the licensee during the relevant licence year

Most of the work conducted during the first licence year comprised compilation of various public domain data and preparation of a number of memoranda by consultants. The contents of the memoranda have been incorporated into this report.

No new surveys or data relating to the tenement have been acquired.

6.6 Report on any Incidents reportable to the Minister under the Act and Regulations during the relevant Licence Year

No reportable incidents occurred.

6.7 Report on any reasonably foreseeable threats (other than threats previously reported on) that reasonably present, or may present, a hazard to facilities or activities under the licence, and a report on any corrective action that has, or will be, taken

No threats have been identified.

6.8 Statement outlining operations proposed for the ensuing year

See Section 5 above.

7 Key References

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8 Appendix 1 - Information about WWD1

The presence of the old WMC drill hole WWD1 at West Well provides the opportunity for a cost effective test of the heat production from the geothermal target. Re-entering the hole and clearing it out to the original depth and temperature logging of the hole, coupled with petrophysical measurements on the archived drill core as well as new core from the bottom of the hole will enable a robust estimate of the likely heat flow and temperatures at depth to be made.

Open file data and interviews of former WMC staff associated with drilling WWD1 provided the following information about the hole.

The hole was drilled in 1978 to a total depth of 762.1m and completed on 13th June 1978. The recorded location co-ordinates are incorrect but Eden staff have visited the WWD1 collar location and it is easy to find with the steel collar pipe still protruding from the ground.

Precollar depth was 72m, drilled with a Schramm rig, hole diameter 4.5 or 5 inches.

The hole was plugged and pressure cemented for the first 20m to control a very small "artesian" water flow. The flow was described as "more annoying than significant", and is not considered to present any problems with hole re-entry. The presence of the plug is a positive factor that will have preserved the hole and prevented collapse of the top of the hole (a major cause of problems re-entering holes elsewhere in the district). The collar was located on the shoreline of Lake Torrens.

The hole was cored from 72 m to final depth, with 141.0 m of NQ followed by 549.1 m of BQ. All of the core and cuttings from 6 m to 72 m are stored in the PIRSA Core Library, though the state of the core (which was mostly shales) is not known, though the shales are likely to have suffered significant degradation.

Access to the drill site is relatively straight forward with station tracks suitable for road vehicles to within 10 km of the collar. The final stretch of track is easily negotiated with a Landcruiser but is not suitable for a drill rig. The last 10 km of track to the hole will require quite an amount of work to repair creek crossings and a sandy patches on dunes. Track repairs will require both a front end loader and a grader. The work is difficult to estimate but based on the quote given following a site visit by the contractor it will take 4-7 days to complete.

Eden consider the track repairs to be an integral part of the exercise to obtain geothermal data from WWD1 and have therefore included the costs in the proposal.

The re-entry operation would involve drilling out the cement plug with HQ core, following which the rig would run a BQ string to the bottom of hole clearing any obstructions on the way. Given the remote location, stable geological environment, and competent nature of the Neoproterozoic sequence in the hole, no problems are envisaged in clearing the hole for temperature logging. It is anticipated that clearing the hole will take between two and five shifts, depending on the ease of drilling out the surface cement plug and the depth of the hole which is cemented.

The long period since drilling of the hole means that a stable, equilibrated temperature regime will be present in the hole allowing high quality data to be collected.

Second Annual Report

Witchellina Project
GELs 166, 167, 168

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1 Introduction

1.1 Background

Elevated temperature gradients are recognized in the Roxby Downs area in close association with anomalous radioactivity concentrated at shallow depth in the Olympic Dam Iron Oxide Copper Gold (IOCG) orebody. Considerable thicknesses of sediments are present in the Adelaide Geosyncline, Arrowie Basin and Torrens Basin. A number of geophysical anomalies are present in the region that can be interpreted to be due to deeply buried IOCG systems – the so called Radiogenic Iron Oxide (RIO) model.

The RIO model envisages natural, low-level, radiogenic decay – principally from uranium – resulting in extremely high heat production rates. Measured heat production in RIO bodies may be a s much as 50 times greater than those from average granitoids, and Petratherm report that their modelling showed that under favourable conditions, temperatures in excess of 200ºC may be generated at depths of around 3km depth. The conclusion being that radiogenic elements concentrated in such RIO systems could lead to significant thermal anomalism at more economic depths than granite-hosted systems such as that currently under investigation by Geodynamics Ltd in the Moomba area.

Eden recognised that key component in the RIO model was having adequate sediment accumulation above a RIO body to trap a significant heat resource.

The West Well geophysical anomaly was defined by WMC during their exploration for more Olympic Dam type systems in 1979. However preliminary drill testing (the WWD1 hole was drilled to 762m) and modelling of the potential field data showed that the target, although possessing Olympic Dam-like characteristics, was too deep to be of interest as a mineral resource.

The West Well anomaly is located 80km east of Roxby Downs and 60km west of Leigh Creek on Witchelina Station. Access for drill rigs is via Myrtle Springs Station via station tracks and the old WMC access track. Drill hole WWD1 is located immediately adjacent to the shoreline of Lake Torrens.

Eden applied for a group of GELs to cover these targets, the minimum GEL area being too small to cover the identified area of interest.

1.2 Licence Data

Geothermal Exploration Licence 166 (GEL166) was granted on 7th September 2004 with an initial term of five years over an area of 462km^2.

Geothermal Exploration Licence 167 (GEL167) was granted on 13th July 2005 with an initial term of five years over an area of 497km^2.

Geothermal Exploration Licence 168 (GEL168) was granted on 7th September 2004 with an initial term of five years over an area of 468km^2.

Figure 1 shows the licence locations.

In March 2005, Eden applied for Variations and Suspensions to the Work Programmes for these GELs to amalgamate their work programmes into a single regional project and to streamline compliance reporting. The proposed variations were approved by PIRSA in May 2005 and a revised common expiry date of 12th July 2010 adopted.

1.3 Period

In accordance with Section 33 of the Petroleum Regulations 2000, this report details work conducted during the second permit year of GELs 166, 167 and 168 (13 July 2006 to 12 July 2007)

2 Work Requirements

Work requirements for GEL 166/167/168 are as follows:

Year of Term of Licence	Licence Dates	Minimum Work Requirements
One	13 July 2005 to 12 July 2006	Geological and geophysical review. (to be carried out in the area covered by GEL's 166, 167 and 168)
Two	13 July 2006 to 12 July 2007	Seismic and/or magneto-telluric surveys. (to be carried out in the area covered by GEL's 166, 167 and 168)
Three	13 July 2007 to 12 July 2008	Drill one test well and conduct thermal and stress analysis. (to be carried out in the area covered by GEL's 166, 167 and 168)
Four	13 July 2008 to 12 July 2009	Investigate development issues and conduct preliminary feasibility (and preliminary EIS) study. (to be carried out in the area covered by GEL's 166, 167 and 168)
Five	13 July 2009 to 12 July 2010	Convert test well to injection well; Conduct hydraulic stimulation test of thermal reservoir; Drill trial production well; Conduct fracture, circulation and recovery tests. (to be carried out in the area covered by GEL's 166, 167 and 168)

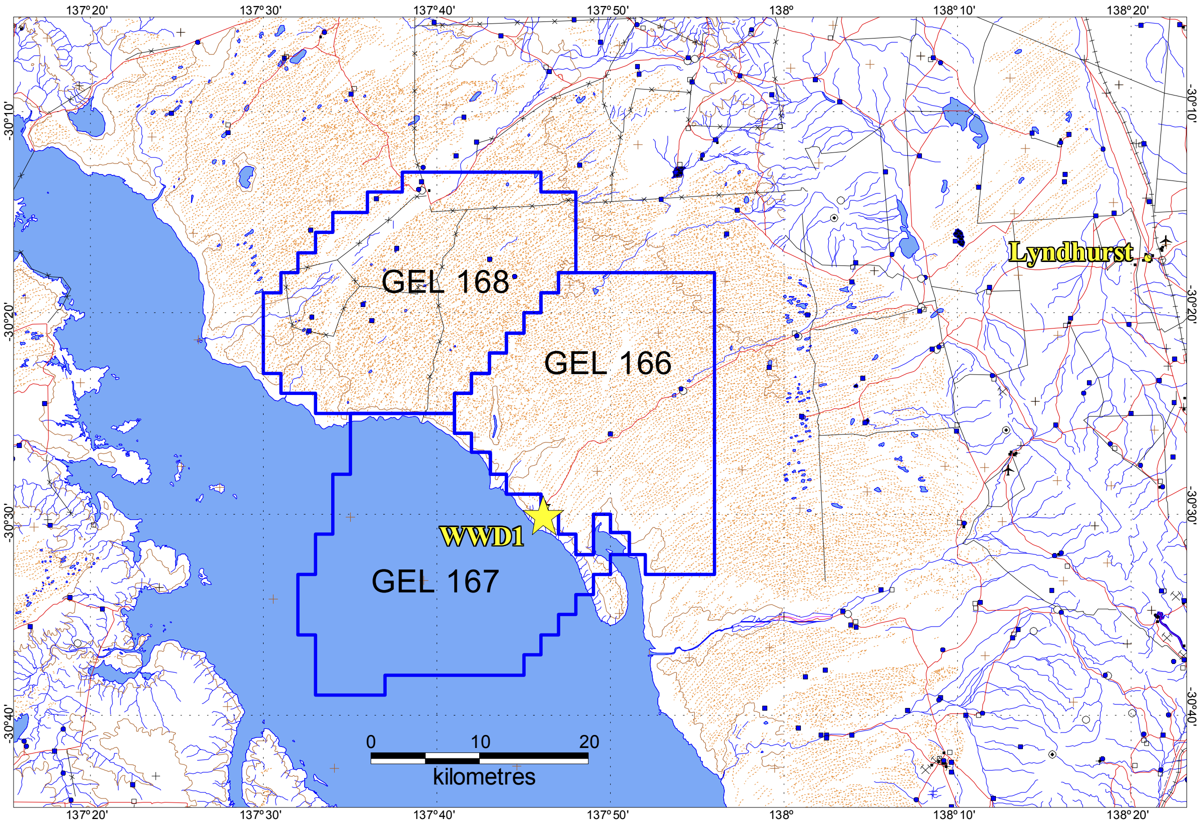

Figure 1: Location of GELs 166, 167 & 168 - The Witchellina and Mulgaria Projects

3 Work Conducted

During the second year of the licences Eden finalised reviews of all the available data for the area and selected several areas for test holes for estimation of heatflow.

Reconnaissance visits were made to check the access to the sites and enable preliminary permitting and planning to occur.

The planned magnetotelluric survey was unable to be completed during this year of the licence due to no appropriate geophysical contractors being available. Subsequently, Eden plans to conduct orientation MT surveys at a number of its other GELs in SA, and pending the processing, analysis and interpretation of these surveys a decision on the effectiveness of the technique and its applicability to the environments within GELs 166-168 will be made.

Results from the seismic and/or MT survey/s were to be used to finalise the most suitable drilling targets in the licences, however the postponement of the MT survey means that targets have been selected based on the potential field data available for the area.

4 Year 2 Expenditure

See Appendix 1.

5 Year 3 Work Programme

Work planned for the third year of GELs 166,167 and 168 will be designed to increase our knowledge of the depth to basement and heat flow in the project area.

Eden considers the most appropriate way to advance the project at this stage is to drill two 400m wells, one in GEL 166 and one in GEL 168, to estimate the heat flows of the two geothermal models proposed for the area – a RIO target on GELs 166/7 and a thermal anomalous Hiltaba Granite in GEL 168.

A variation to the work program will be sought from PIRSA to reflect this.

6 Compliance with the Petroleum Act (Reg. 33)

6.1 Summary of the regulated activities conducted under the licence during the year

Eden has not undertaken any regulated activities as defined under the Petroleum Act in GELs 166, 167 and 168 during the licence year.

6.2 Report for the year on compliance with the Act, these Regulations, the licence and any relevant Statement of Environmental Objectives

Given that no regulated activities were undertaken during the reporting period, many of the regulations are inapplicable at this stage and no non-compliances have been noted, with the exception of late submission of this report.

Part of the project area covers the Lake Torrens National Park. To enable the re-entry of the WWD1 with the PACE funding noted above, Eden produced an SEO based on a new Environmental Impact Report. The planned drilling activities are not located within the National Park.

Eden's late submission of this report and its inability to acquire a magneto-telluric survey in the Year 2 reporting period constitutes non-compliance with the licence conditions, as a variation was not obtained.

6.3 Statement concerning any action to rectify non-compliance with obligations imposed by the Act, these regulations or the licence, and to minimise the likelihood of the recurrence of any such non-compliance

Eden recognises the importance of achieving regulatory compliance and is committed to achieving appropriate practices in its management strategies, work practices and procedures. Eden is committed to operating in an environmentally and socially responsible manner.

As indicated in section 5 above, a variation to the work program will be sought from PIRSA to reflect appropriate changes.

6.4 Summary of any management system audits undertaken during the relevant licence year, including information on any failure or deficiency identified by the audit and any corrective action that has, or will be, taken

Eden is a new company and is developing appropriate systems and documentation to cover Field Operations, Environmental Management, Health and Safety issues and compliance checklists to ensure the requirements of relevant Acts and Regulations are met.

Eden's activities have been essentially desktop studies at this stage and no management system audits have been undertaken as yet.

6.5 List of all reports and data relevant to the operation of the Act generated by the licensee during the relevant licence year

Most of the work conducted during the second licence year comprised interpretation of various public domain data.

No new surveys or data relating to the tenement have been acquired.

6.6 Report on any Incidents reportable to the Minister under the Act and Regulations during the relevant Licence Year

No reportable incidents occurred.

6.7 Report on any reasonably foreseeable threats (other than threats previously reported on) that reasonably present, or may present, a hazard to facilities or activities under the licence, and a report on any corrective action that has, or will be, taken

No threats have been identified.

6.8 Statement outlining operations proposed for the ensuing year

See Section 5 above.

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Third Annual Report

Witchellina, Mulgaria Project

GELs 166, 167, 168

For the period 13/07/2007 to 12/04/2009

HELD BY: Eden Energy Ltd
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1. Introduction

1.1 Background

GELs 166, 167 and 168 are located on the north eastern edge of Lake Torrens within the Arrowie and Torrens Basins. Previous studies in this area have shown it to have potential for the discovery of geothermal resources. The Radiogenic Iron Oxide (RIO) model for the generation of geothermal resources and the more widely recognised granite hosted system are both continuing to be investigated in this area.

1.2 Licence Data

Geothermal Exploration Licences 166, 167 and 168 were granted on between the 7th September 2004 and 13th July 2005 (GEL167) and were given single regional project status in May 2005, with a common expiry date of 12th July 2010. In July 2008 the licences were suspended from 2 July 2008 to 1 October 2008, and subsequently the three licences were again suspended for the period from and including 2 October 2008 to 1 April 2009. The revised expiry date of these tenements is now 12 April 2011. They total an area of 1427km^2.

Prior to the completion of licence year 3, Eden Energy applied to Primary Industries & Resources SA to surrender these licences (dated 7th April 2009)..

Figure 1 shows the location of the licences.

1.3 Period

In accordance with Section 33 of the Petroleum Regulations 2000, this report details work conducted during the third permit year of these GELs.

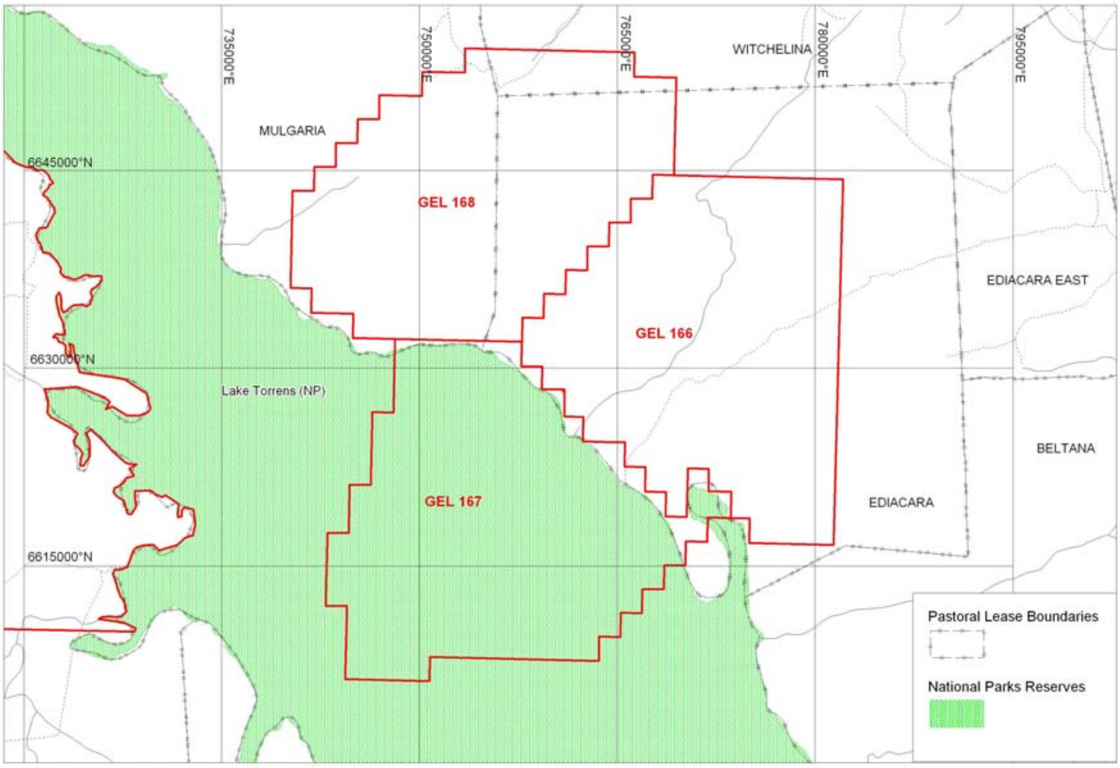

Figure 1 Location map of GELs 166, 167 and 168

2. Work Requirements

At the commencement of licence year 3, the annual work programme negotiated by Eden with PIRSA for GELs 166, 167 and 168 comprised:

Licence Year	Licence dates	Minimum Work Program
Year 1	*12 July 2005 – 12 July 2006*	*Geological and geophysical studies*
Year 2	*13 July 2006 – 12 July 2007*	*Geological and geophysical studies*
Year 3	*13 July 2007 – 12 April 2009*	*Drill two prospecting wells (500 m each)*
Year 4	*13 April 2009 – 12 April 2010*	*Geological and geophysical studies, preliminary feasibility study, investigate development issues*
Year 5	*13 April 2010 – 12 April 2011*	*Drill one test well (3,500 m to 4,000 m) and conduct flow test*

3. Work Conducted

During licence year 3, there was no on ground work conducted within these tenements.

Hot Dry Rocks Pty Ltd was engaged to undertake a comprehensive review of GELs 166, 167 and 168 in late 2008. HDRPL provided EDE with a report on a risk analysis of the reservoir and temperature aspect of the geothermal play identified within these tenements, and an outline of the work required to allow for the calculation of an inferred resource that would be compliant with the *Australian Geothermal Reporting Code, 2008,* for this area.

The required work programme for GELs 166, 167 and 168 was to drill two prospecting wells, each to a depth of 500 metres. Eden Energy confirms that the work programme commitment was not met. Accordingly, a non-compliance has been listed below in Section 6.

4. Year 3 Expenditure

Please refer to Appendix 1.

5. Year Four Work Programme

As Eden Energy have applied to surrender GELs 166, 167 and 168 and licence year four will not be realised, there is no work programme planned.

6. Compliance with the Petroleum Act (Reg. 33)

6.1 Summary of the regulated activities conducted under the licence during the year

Eden did not undertake any regulated activities during the year. Office-based studies were completed.

6.2 Report for the year on compliance with the Act, these Regulations, the licence and any relevant Statement of Environmental Objectives

(1) Eden has not complied with Section 33 (1) of the Regulations pertaining to the provision of an annual report within two months after the end of the licence year.

(2) Eden Energy did not meet the minimum work programme commitment for this licence block (the drilling of two prospecting wells did not occur). Therefore, Eden Energy lists a non-compliance in this respect.

6.3 Statement concerning any action to rectify non-compliance with obligations imposed by the Act, these regulations or the license, and to minimise the likelihood of the recurrence of any such non-compliance

General Eden Energy recognises the importance of achieving regulatory compliance and is committed to achieving appropriate practices in its management strategies, work practices and procedures. Eden is committed to operating in an environmentally and socially responsible manner.

(1) Eden Energy will review its management strategies to ensure that more robust systems are put in place to reduce the likelihood of administrative oversight from occurring again in the future regarding annual reporting requirements. This case of non compliance was influenced to some degree due to the present day market forces taking some of the company focus from the reporting requirements associated with being the registered tenement holder.

(2) Subsequent to the application to surrender the licences and the end of licence year 3, Eden Energy applied for a variation to the work programme requirements to ensure Eden remained in good standing as a geothermal licence operator. As such, Eden Energy applied to PIRSA to vary the existing work programme to the following:

Licence Year	**Licence dates**	**Minimum Work Program**
Year 1	*12 July 2005 – 12 July 2006*	*Geological and geophysical studies*
Year 2	*13 July 2006 – 12 July 2007*	*Geological and geophysical studies*
Year 3	*13 July 2007 – 12 April 2009*	*Geological and geophysical studies*
Year 4	*13 April 2009 – 12 April 2010*	*Geological and geophysical studies, preliminary feasibility study, investigate development issues*
Year 5	*13 April 2010 – 12 April 2011*	*Drill one test well (3,500 m to 4,000 m) and conduct flow test*

Should PIRSA accept the variation of the work programme and the surrender of the licences, the non-compliance of not meeting minimum work programme commitments is rectified. Future confirmation of the application to vary the licence conditions will be included on the Licence Register on PIRSA’s website. Confirmation of the surrender of the licences will also be available on the PIRSA Licence Register.

6.4 Summary of any management system audits undertaken during the relevant licence year, including information on any failure or deficiency identified by the audit and any corrective action that has, or will be, taken

Eden is a new company and has developed appropriate systems and documentation to cover Field Operations, Environmental Management, Health and Safety issues and compliance checklists to ensure the requirements of relevant Acts and Regulations are met.

As these systems are newly developed and the work conducted to date has not shown any deficiencies in the systems, no management system audits have been undertaken as yet.

6.5 List of all reports and data relevant to the operation of the Act generated by the licensee during the relevant licence year

Description of Report/Data	Date Due	Date Submitted	Compliant / Non-Compliant
Terratherma – Risk Assessment of Identified Geothermal Plays. Internal strategic and analysis report by HDRPL Oct 2008	NA	with this report	
Geothermal Tenements – schedule of activities. Internal report by HDRPL June 2008.	NA	with this report	

6.6 Report on any Incidents reportable to the Minister under the Act and Regulations during the relevant Licence Year

No reportable incidents occurred.

6.7 Report on any reasonably foreseeable threats (other than threats previously reported on) that reasonably present, or may present, a hazard to facilities or activities under the licence, and a report on any corrective action that has, or will be, taken

No threats have been identified.

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SERVICES
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Terratherma – Risk Assessment of Identified Geothermal Plays.

Prepared for Terratherma Ltd

October 2008 Final Report

Ben Waining

Executive summary

Terratherma hold significant acreage of geothermal tenements in South Australia and NSW. In order to allow for the strategic planning of required exploration activities across these tenements and for the development of a roadmap to inferred resource estimation, an analysis of the current level of knowledge and work required has been conducted. This report sets out each of the Terratherma geothermal plays on a tenement by tenement basis.

Details of the known elements of each of the plays have been provided in the context of what is known and what is still required to be ascertained to allow for the development of inferred resources, as per the *Australian Geothermal Reporting Code*. An Inferred Resource is defined as an estimation of thermal energy in place to a low level of confidence.

The status of each of the plays varies considerably in terms of the information held, and what is required for the calculation of inferred resources. All the tenement areas require some drilling of heat flow holes to constrain this aspect of the geothermal system assessments. Reservoir size and types also requires further investigations to allow for calculation of inferred resources to any level of confidence. This aspect of the required works should be possible with detailed analysis of known geological settings and existing geophysics. There is scope for the acquisition of further geophysics in many of the areas to further constrain reservoir geological settings. Deep drilling has been presented as an option to provide greater insights into the geology and temperatures at depth, it is however not seen as a requirement for the development of inferred resources due to the low level of confidence required in the estimation of thermal energy.

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1.0 Introduction

This document outlines the current level of knowledge and available data for each of Terratherma's geothermal projects, and so provides an indication of the risks associated with the reservoir and temperature (heat flow, thermal resistance) aspects of each of the identified plays. The aim of this report is to allow Terratherma to develop a roadmap for their exploration activities that will allow for the determination of Inferred Resources (as per the *Australian Geothermal Reporting Code, 2008*) contained within each of the identified plays.

The Inferred Resource category, as defined in the *Australian Geothermal Reporting Code, 2008*), requires each play to have sufficient data to enable the calculation of thermal energy in place, to a low level of confidence. The resource is inferred from geological, geochemical and geophysical evidence and is assumed but not verified as to its ability to deliver the geothermal energy. A reasonable understanding of the three dimensional subsurface geology, measurements (can be indirect) of temperature (heat flow and conductivity to allow for extrapolations of temperature below measured depths), and sufficient information to allow for an estimate of the areal and volumetric extent of the resource are required to progress exploration results to the Inferred Resource category. It should not be necessary to undertake deep drilling to gain an inferred resource estimation, however this approach is an option that may constrain geological and geophysical assumptions.

In the context of the plays within the Terratherma tenements the required information will include (but should not necessarily be limited to): building of a geological model, measurements of heat flow and conductivity with associated analysis and extrapolation of temperatures to depth (specifically to depths where temperature would exceed an economic cut off of 150°C), analysis of available geophysical data (seismic, gravity and MT) to determine extent, depth and thickness of target reservoir units, and possible sequence stratigraphy analysis of seismic data to determine the probability of encountering permeable sedimentary units of suitable thickness.

A summary sheet of requirements per tenement is provided at the end of each chapter. These summaries outline of the interpreted geological risks and uncertainties associated with two of the key geothermal system requirements (temperature and reservoir) and also provide a guide for further work. The fourth key element of a geothermal system – water, has not been considered in this report.

6.0 GEL 166, 167 & 168 (Witchellina/Mulgaria)

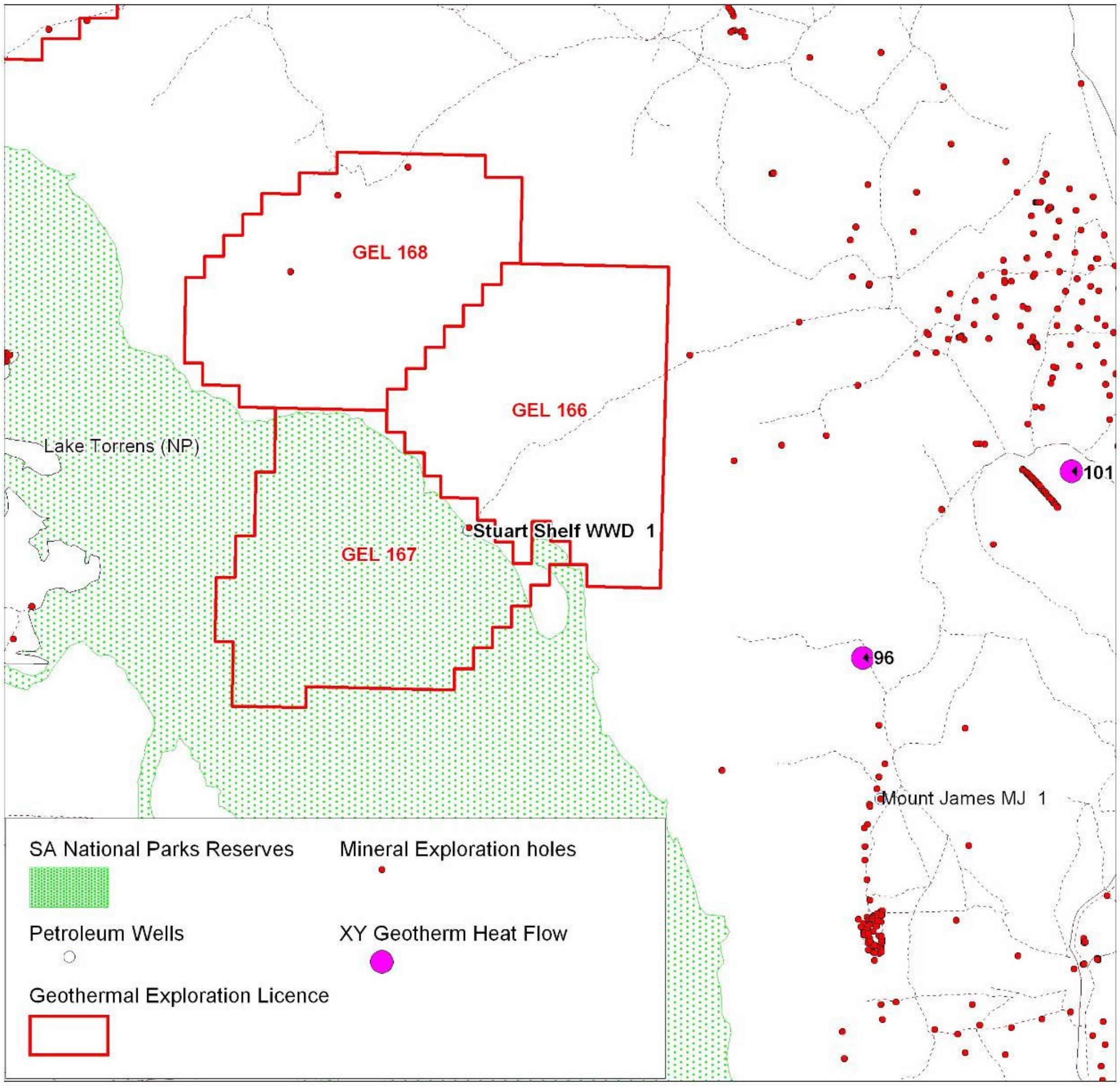

Figure 6.1 Location and work to date on GELs 166-168

6.1 GEL 166, 167 & 168 key risks.

6.1.1 Thermal Resistance (insulation)

Based on the SEEBASE sediment thickness data there is up to 9000 m of Proterozoic sediment (Adelaidean) over the interpreted basement in the area. This suggests a moderate risk (due to lack of published conductivity data for these sediments) of there being sufficient thermal insulation in this area, especially for any DBSA type play. The tenements lie to the east of the Torrens Hinge Zone, a zone of known thick Proterozoic sediment accumulation overlying the eastern margin of the Gawler Craton. Torrens Energy has released heat flow results and temperature extrapolations for its Parachilna Project that suggest that the thermal resistivity of the

Adelaidean sediments in this region is sufficient to allow for the development of elevated temperatures shallower than 5 km.
A WMC report (1986 partial relinquishment report EL 783, 784 and 1316 – Stuart Shelf) describes the area as being part of the Torrens Complex with a difficult to determine basement composition with possible deep iron formation affinities, lying beneath thick Adelaidean sediments.

6.1.2 Heat Flow

There are no recorded temperatures known from within this project area. The lack of temperature data and the inconclusive interpretations of basement lithologies suggest a high risk associated with heat flow. There are two published elevated heat flow values located approximately 40 km east (101 mW/m²) and 25 km SE (96 mW/m²). Neither of these locations appears to be sited on contiguous gravity or magnetic image signatures. Therefore, the risk that these elevated heat flow values are not applicable in the tenement area remains high. Should these published heat flow data to the east, and the values reported by Torrens Energy (to the south) indicate regionally elevated heat flow, then heat flow in the tenement area may be similarly elevated.

6.1.3 Temperature

There are no known available published temperature data for this area. If elevated heat flow exists within this area and the insulating properties of the overlying Adelaidean sediments provide sufficient thermal resistance, then suitable conditions for elevated temperatures within economic depths should exist.

6.1.4 Reservoir

There is insufficient knowledge of the properties of the Adelaidean sediments for determining the probability for the development of a DBSA reservoir. An EGS type play may be investigated either in the Proterozoic sediments/metasediments or crystalline basement where it lies within economic depths. There are no drill intercepts of the basement within this area, so the prediction of crystalline basement is speculative and contains a high degree of risk. The speculative WMC interpretation of a deep iron formation is the most relevant to this area. Sediment thicknesses of up to 9000 m are indicated by the SEEBASE data.

6.1.5 Land Access

GEL 167 is coincident with the Lake Torrens National Park. Whilst this Park is proclaimed to allow for access under the Mining and Petroleum Acts of SA, it would require significant investments in time and human resources to undertake suitable studies to ensure environmental issues were dealt with in the planning stages of an exploration/development program. In addition to these requirements the logistics of exploration on a salt lake surface (especially for drilling type operations, or use of any heavy machinery) could be a major difficulty, and would incur significant extra cost to any program.
Eden Energy undertook much of the environmental assessment, indigenous heritage notifications and approvals work required by the Petroleum Act for drilling operations between late 2005 and mid 2007. Work approvals were in place for the drilling out of a cement plug (at 20 m) in Stuart Shelf WWD1 and obtaining further core from the bottom of this hole, and also for the drilling of a new well (Witchellina 1) to the east of

the existing well. These approvals remain largely in place allowing for less investment required in the regulatory approvals of any further drilling work in a specific area.
Tenements 166 and 168 do not have any known issues associated with land access.

6.2 Plays:

6.2.1 Deeply Buried Sedimentary Aquifer (DBSA)

It is highly unlikely that the conditions in this area would support the development of a DBSA type play.

6.2.2 Engineered Geothermal Systems (EGS)

It would be expected that the likely target for this area would be an EGS type play, either within suitable Proterozoic sediments at depth or within the crystalline basement. The unknown stratigraphy and basement type, due to lack of drill penetration in this region, does not allow for any reduction in the risks associated with the development of a suitable reservoir.

6.3 Inferred Resource Requirements

For the estimation of an inferred resource, this area requires the confirmation and quantification of elevated heat flow. After confirmation of high heat flow, further investigations on the thermal resistance, basement type and reservoir potential can be undertaken.

Steps to an Inferred Resource: GEL166 - 168

- Ascertain heat flow for the area (off Lake Torrens).
- Drilling of at least two heat flow wells in 166 and 168 tenements.
- Build geological model to provide input to reservoir investigations.
- Confirm existence of suitable reservoir (geophysical study/physical sampling – drill)
- Ascertain areal extent and thickness of identified reservoir (seismic/MT/gravity)
- Input data to 3D modeller (eg "GeoTherm") for inversion and 3D heat flow modelling and mapping.

Task	Timeline – setup	Timeline – execution	Cost
Drilling – Heat Flow holes x 2 - 3	6 months lead in: regulatory approvals, securing of rig.	±2 weeks / 500m hole. 4 – 6 weeks total	$300 000 per well
Geological investigations/ modelling (MT/seismic/ other	Survey design and access negotiations ± 3 months - interpretation ±1 month wait	Data acquisition approx 2 weeks. Interpretation: ±1 month	Dependant on survey type and design

geophysics)			
Deep Drilling	6 months, post above efforts. Rig securing, regulatory approvals	±6 – 8 weeks for 3 – 5 km deep slim hole.	approx. $5M to 3500 m.

GEL 166-168	Witchellina: Torrens Hinge Zone	1456.84 km^2

Temperature at Depth

Positive Indications
Regional heat flow is elevated for area (Torrens Hinge Zone), expected good thermal resistance in Adelaidean sediments.
Significant Unknowns:
No measured temperatures from tenements. No significant knowledge of sediment lithologies.
Negative Indications:
none known
Best Estimate based on current Information
based on surrounding values (Torrens Energy to South, Austherm heat flow values to east) temperatures suitable for geothermal resources should be obtainable within 5 km of surface.

Risk Analysis		Uncertainty analysis
No known temperature or heat flow data from tenement area.	0.3	

Actions to de-risk Temperature at Depth

Drill heat flow holes across tenement to confirm assumptions of heat flow. Constrain underlying geological assumptions to allow for extrapolation of temperature to depth.

Reservoir

Positive Indications
deep sedimentary cover interpreted (FrogTec), allowing for possibility of DBSA type play.
Significant Unknowns
basement lithology and depth. Sedimentary properties at target depth. Local stress regime.
Negative Indications
none known

Risk Analysis		Uncertainty analysis
Lack of knowledge of potential reservoir units.	0.3	

Actions to de-risk Reservoir

Review and interpretation of existing geophysical data to determine/constrain depth and physical properties of target reservoir. Drill deep well and test reservoir conditions.

Geological Risk	0.090

6.4 Summary Table GEL 166 - 168