

# GELs 191, 192 & 193

Pacific Hydro Pty Ltd  
Great Artesian Basin Conventional Geothermal Project

Annual Report – Licence Year 5  
1 October 2011 – 30 September 2012

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## 1. Introduction

Pacific Hydro Pty Ltd is a leading Australian renewable energy company developing, delivering and operating projects in Australia, Brazil and Chile. Pacific Hydro has over 670MW of operating hydro and wind assets and a further 2,000+ MW in the project development pipeline. Pacific Hydro is a wholly owned subsidiary of the Industry Funds Management (IFM) Australian Infrastructure Fund.

### 1.1 Licence Data

Exploration Licences GEL188 to GEL205 (inclusive) were granted to Pacific Hydro on 1 May 2005 covering a licence an area of approximately 9,000km<sup>2</sup> for an initial term of 5 years. In the first half of 2006, Pacific Hydro surrendered GELs 188, 189 and 190 on the west end of the contiguous licence block and added GELs 236, 237, and 238 on the eastern border. This brought the total area under licence in the 18 GELs to approximately 8,820km<sup>2</sup>.

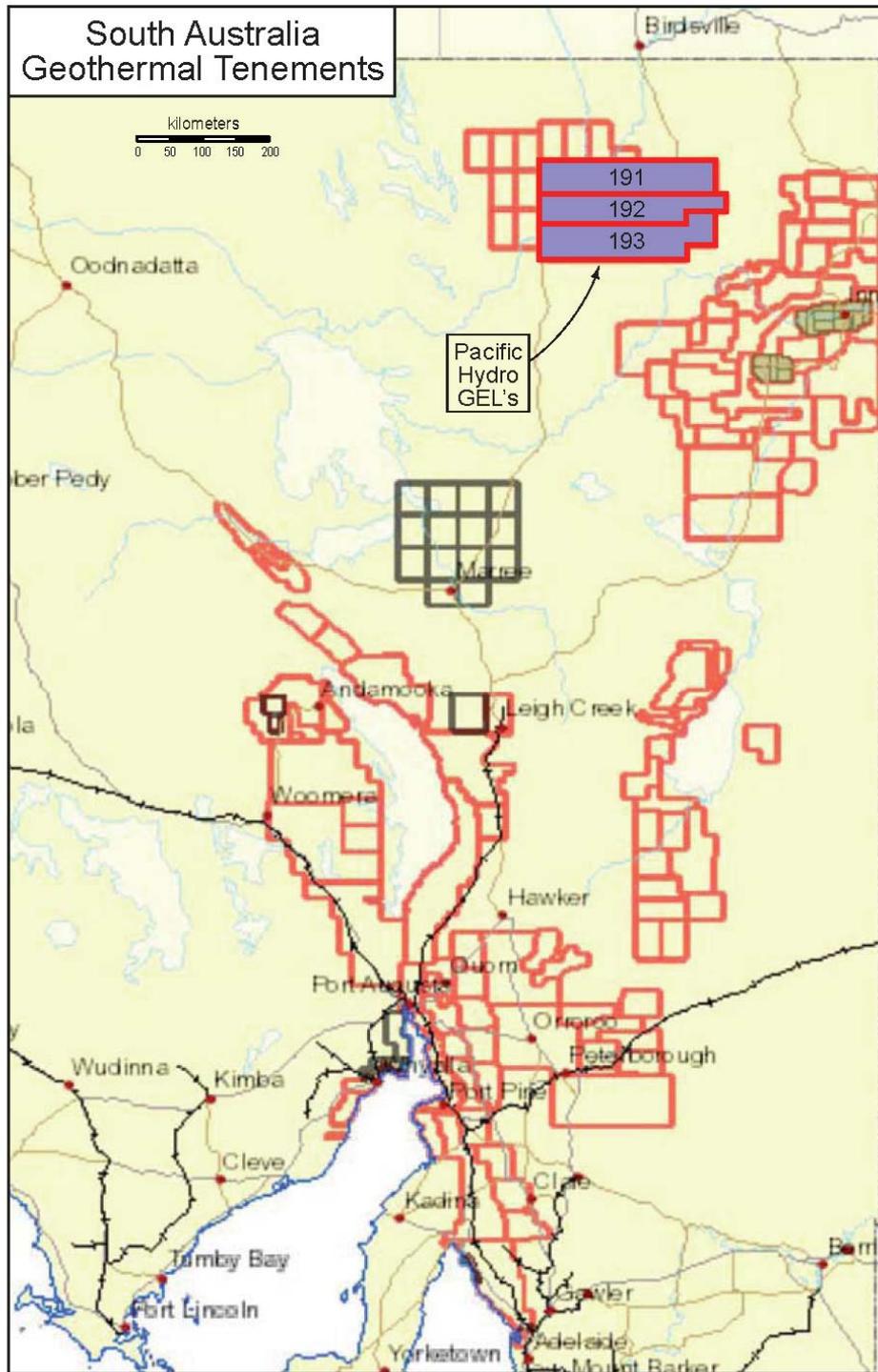
To simplify GEL administration and align the work program schedules for all the GELs, in January 2011 Pacific Hydro obtained approval from PIRSA to consolidate the 18 license areas into 3 larger blocks. This was done in accordance with 2009 amendments to the *Petroleum and Geothermal Energy Act 2000*, which allowed for individual geothermal exploration license areas to up to 3,000 km<sup>2</sup>. These licence blocks consist of:

- GEL 191 (2,966.1 km<sup>2</sup>);
- GEL 192 (2,849.8 km<sup>2</sup>); and
- GEL 193 (2,964.1 km<sup>2</sup>).

Pacific Hydro's three GELs are elongate in an east-west direction. The GELs are located in the Cooper Basin in South Australia's far north-east upon the Clifton Hills Station pastoral lease and are accessible via the Birdsville and Walker's Crossing Tracks

### 1.2 Resource Concept

Pacific Hydro's Great Artesian Basin Geothermal Project is based on exploration and development of easily accessible, Hot Sedimentary Aquifer resources in north-eastern South Australia. The conventional resource targeted for production is comprised of medium enthalpy, sediment-hosted aquifers at 2 kilometres depth with high porosity and permeability. The energy reserves contained in the resource are potentially very large, well beyond the initial 400MW plant contemplated. The project will be developed using currently available drilling and power generation technologies, both with a long track record of success. Pacific Hydro's project is not reliant on a yet-to-be commercialised, engineered solution to access the heat resource. The project requires negligible water consumption as full re-injection of produced geothermal fluid and use of an air-cooled, closed-loop organic Rankine cycle (ORC) binary power generation system is proposed



## 2. Permit Summary

In January 2011, a revised work program was approved. This approval applies uniformly to GELs 191, 192 and 193 and consolidated has corrected the previous misalignment of the work program schedules which existed across the earlier 18 GEL blocks.

**Table 1: Work Program (Condition 1) - Approved by PIRSA in January 2011, GEL's 191, 192 & 193**

Work Program (Condition 1) Year	Time Period	Minimum Work Requirements
Year 1		Geological and Geophysical review
Year 2		Geological and Geophysical review
Year 3	1 Oct 2010 – 30 Sept 2011	Identify slim hole target and prepare approvals
Year 4	1 Oct 2011 – 30 Sept 2012	Fill-in gravity data and modelling
Year 5	1 Oct 2012 – 30 Sept 2013	Drill 1 slim hole

### 2.1 Resource Exploration Program

#### 2.1.1 Drilling Targets

In 2008, Pacific Hydro obtained a Work Area Clearance (A080024) for slim-hole sites Ngapaturu-1 and Ngapapirna-1 and associated access routes from the Dieri Aboriginal Corporation. These two slim-hole sites are located within a gravity low centred in the eastern portion of GEL 192 which is considered prospective for elevated thermal gradients. In September 2008, Pacific Hydro lodged an Activity Notification Application to drill one 900m well at Ngapaturu-1. The site is adjacent to the Walker's Crossing Track approximately 5km south of the Gap Dam, where an area of approximately 500m x 500m was surveyed and "cleared" for the proposed exploratory drilling by the Dieri Aboriginal Corporation.

In Licence Year 4 and 5, (Year 3 and 4 of Work Program), Pacific Hydro's geothermal development partner, Layman Energy Associates, Inc has continued resource analysis to confirm the location of the preferred slim-hole target(s). Two 400m depth slim-holes are now proposed. Further information is provided in Sections 2.1.2 and 4.5.

#### 2.1.2 Resource Assessment Activities

Resource assessment activities undertaken by Pacific Hydro during Licence Year 5 (Year 4 of Work Program) included the following:

- Developed a budget for the project based on costs estimates provided previously by drilling companies for drilling of the two planned 400 metre holes, based on previously prepared well design and drilling program.
- Identified areas of coverage for planned in-fill gravity survey to eliminate gaps in existing coverage, to be conducted in Year 5 (Year 4 of Work Program).
- Issued a Request for Proposal (RFP) to gravity survey contractors to conduct fill-in gravity survey in the area of the currently defined gravity low within the Pacific Hydro license area and interpret the results. Pacific Hydro received proposals from 4 contractors and is currently finalizing its analysis of the quotes to select a contractor for the work.

- Conducted general research regarding hot sedimentary aquifer (HSA) projects for applicability to Pacific Hydro's license area. Investigated potential for collaboration with the South Australia Centre for Geothermal Energy Research at the University of Adelaide on their proposed study of HSA projects in Australia that have drilled a production test well (Celsius-1 well; Salamander-1 well).

### **2.1.3 Cultural Heritage Agreements**

GELs 191 to 193 are across portions of three different Native Title claims, including the following:

- Dieri Native Title Claim Group
- Yandruwandha Yawarrawarrka Traditional Land Owners (Aboriginal Corporation)
- Wangkangurru Yarluyandi Native Title Claimants

In order to facilitate environmental survey, cultural heritage surveys and future resource assessment activities, during Year 4 of the Work Program, Pacific Hydro has also:

- Finalised and executed a cultural heritage agreement with the Yandruwandha Yawarrawarrka Traditional Land Owners
- Commenced negotiations with the legal representatives of the Wangkangurru Yarluyandi Native Title Claimants with the view to finalising a cultural heritage survey agreement. The slim hole proposed near Pandieburra-1 is within Wangkangurru Yarluyandi country.

Pacific Hydro had previously finalised and executed a cultural heritage agreement with the Dieri in 2008.

## **3. Regulated Activities**

As described above, environmental and field surveys were undertaken in April 2008. Pacific Hydro has continued to maintain good relations with the primary landholder Clifton Hills Pastoral Company (CHPC). The Activity Notification Application for drilling of a 900-metre slim-hole at Ngapaturu-1 was lodged in September 2008, although was not pursued to approval as Pacific Hydro was unable to secure a suitable drill rig at the stage. This Application will need to be modified to change the depth at Ngapaturu-1 to 400 metres, and expanded to include drilling of another 400-metre hole located near the Pandieburra-1 water bore (See Section 4.5 below).

No regulated activities have been undertaken since October 2011 (i.e. within Licence Year 5).

## **4. Compliance Issues**

### **4.1 Report and Data Submissions**

Pacific Hydro lodged its Licence Year 4 (Work Program Year 3) Annual Report on 29 November 2011. Upon request this was re-submitted with minor amendments on 16 May 2012.

### **4.2 Licence Non-compliances**

Pacific Hydro has not complied with the Work Program Year 4 requirement to undertake fill-in gravity data acquisition and modelling by 30 September 2012. Pacific Hydro will seek to vary the Condition 1 Work Program to reflect this non-compliance and any subsequent adjustments to the Work Program Year 5 requirement .

### **4.3 Reportable Incidents**

No reportable incidents occurred.

#### **4.4 Threat Prevention**

No foreseeable threats have been identified.

#### **4.5 Future Work Program**

Following Layman Energy's further assessment, Pacific Hydro's exploratory program has been refined. The refined plan proposes to drill a 400-metre slim hole at the Ngapaturu-1 site in the eastern portion of GEL 192. A second slim hole of similar depth is now proposed to be drilled near the Pandieburra-1 water supply bore, located in the central portions of GEL 191. This will compliment downhole temperature data Pacific Hydro has previously obtained from Pandieburra-1 at 1,400 metres depth.

The target locations for these slim holes will be confirmed by gravity data acquisition and modelling. Pacific Hydro is currently in the process of engaging a gravity survey contractor to undertake this work. To date, Pacific Hydro has issued a Request for Proposal (RFP) and received proposals from four (4) contractors. Engagement of a contractor is expected in late 2012 and subject to completing the statutory notifications, logistic arrangements and weather conditions, the field work is expected to be undertaken in early 2013.

Environmental and cultural heritage surveys will need to confirm the precise location for a new slim-hole site near Pandieburra-1.

##### **4.5.1 Green Rock Memorandum of Understanding**

In August 2011, Pacific Hydro formally partnered with Australian geothermal exploration company Green Rock Energy through a binding Memorandum of Understanding (MOU). The MOU covers Pacific Hydro's GEL area that is the subject of this Annual Report and also Green Rock Energy's licences in the North Perth Basin, Western Australia. Green Rock's experience in geothermal exploration will compliment Pacific Hydro's experience in developing and operating renewable energy assets.

Initial power projects of at least 25MW are contemplated in both the North Perth Basin and the Great Artesian Basin, leading to hundreds of MW of generation from each Basin over the coming decade.

## **5. Expenditure Statement**

The summary of Pacific Hydro expenditures under Licence Year 5 (Work Program Year 4) of GELs 191-193 is attached as Appendix 1.