

ASX ANNOUNCEMENT

6 September 2022

SIGNIFICANT GEOTHERMAL POTENTIAL OF MILLUNGERA BASIN CONFIRMED AS GREENVALE SECURES TWO NEW PERMITS

Highlights:

- Independent expert affirms geothermal potential of Millungera Basin identified in Queensland Geological Survey Report.
- Millungera Basin total identified stored thermal energy likely to exceed 611,000 petajoules (@ 90% probability).
- Greenvale awarded two EPMs – Julia Creek & Longreach – paving the way for the start of initial exploration activities.

Greenvale Mining Limited (ASX: **GRV**, “**Greenvale**” or “the **Company**”) is pleased to announce important advancements in its geothermal strategy in central and north-western Queensland.

The Company has received an independent assessment, from Ascendience Geoscience, of previous inferred geothermal resource estimates reported by the Geological Survey of Queensland (GSQ) for the Millungera Basin. Ascendience has confirmed the findings of the GSQ report, which assessed the basin's total stored thermal energy potential at over **611,000 petajoules** of inferred geothermal potential. For reference, one petajoule is the equivalent of approximately 278-gigawatt hours or the annual energy consumption of around 19,000 Australian homes in any given year.

The Company has also been awarded two EPMs, EPM 28487 – Julia Creek and EPM 28488 – Longreach (see **Figure 1**), which it is investigating for geothermal potential. The grant of the EPMs will allow the Company to explore the mineralisation potential of the associated geothermal fluids in these areas. The permits have been granted for five years, commencing on 29 August 2022. Greenvale's team will assess the regions awarded for a full suite of critical elements, including lithium, tellurium, silver and other rare earth elements.

The EPM 28487 – Julia Creek award allows the Company to investigate the Millungera Basin's mineral potential. At the same time, it awaits the grant of the associated exploration permit for geothermal energy (EPG), EPG 2023.

Newly appointed Greenvale CEO, Mr. Mark Turner, said: *“The independent confirmation of the geothermal potential of the Millungera Basin supports our decision to prioritise exploration of this area and allows us to move forward with the planning of a comprehensive exploration program. We also welcome the grant of the two EPMs as we prepare to commence on-ground activities in the first half of 2023.”*

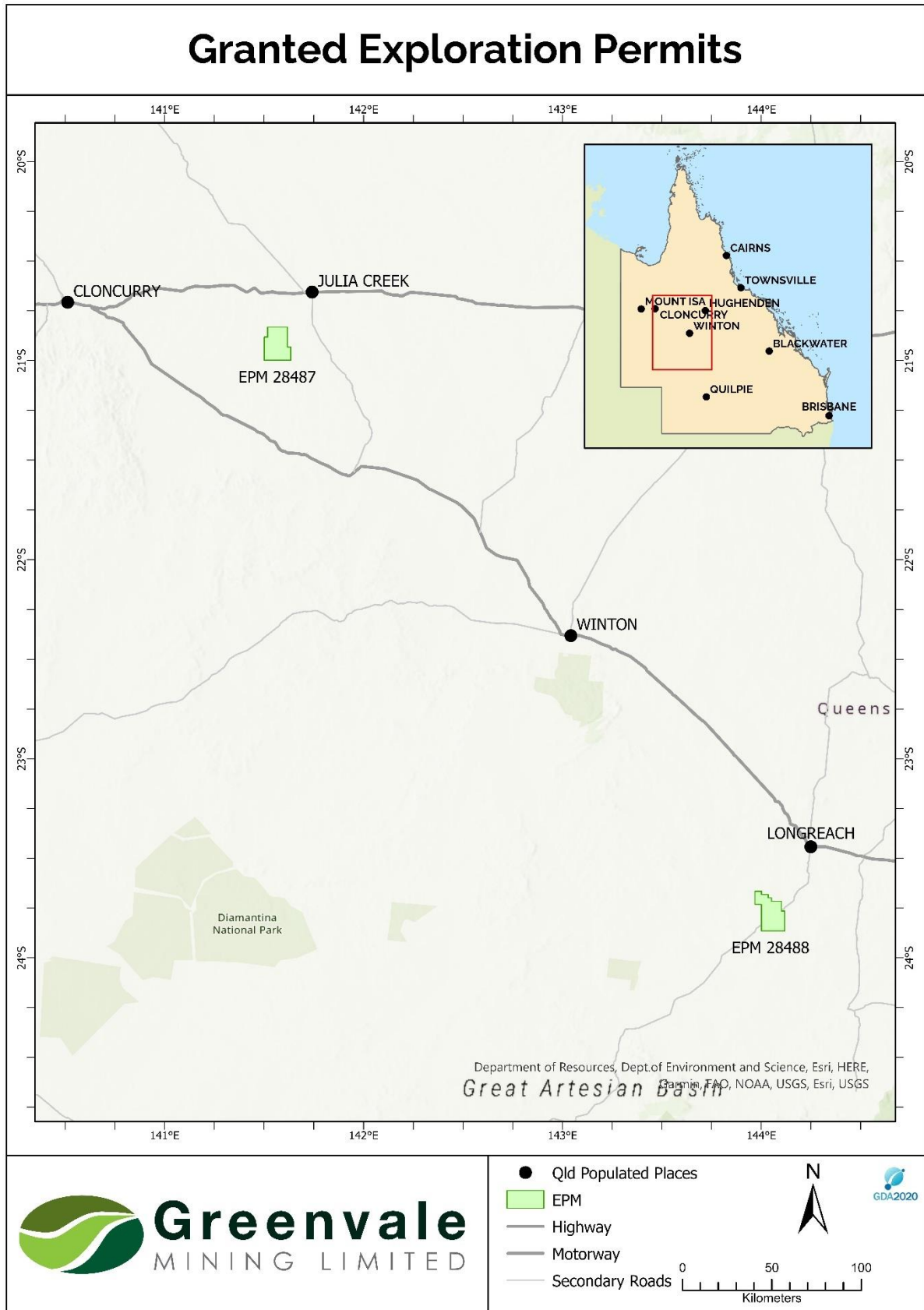


Figure 1: Awarded Exploration Permit Areas (Minerals) – EPM 28487 & EPM 28488.

DESKTOP REVIEW OF THE MILLUNGERA BASIN

The Company recently engaged independent experts from Ascendience Geoscience to assess the published GSQ technical report, *Queensland Geology 14: An assessment of the geothermal energy potential of northern and eastern Queensland* (Talebi et al., 2011).

The brief was for Ascendience to specifically review the report and ascertain if the conclusions that pertain to the assessment of the geothermal resource potential of two identified sites in the Millungera Basin are sound.

Previous regional studies of geothermal energy potential have relied heavily on sub-surface temperature data from petroleum wells, such as the OzTemp database developed by Geoscience Australia (Gerner and Holgate, 2010).

A focus on the Millungera Basin arose following the acquisition of deep seismic reflection surveys conducted in 2006 and 2007 by Geoscience Australia (Korsch et al., 2011) that led to the discovery of this previously unknown sedimentary basin, noting that the stratigraphy of this newly-discovered basin was poorly constrained.

Based on the seismic and field data, several granitic bodies are interpreted to occur immediately below the Millungera Basin, highlighting a potential radiogenic heat source for a hot rock geothermal system. Anomalous fluoride concentrations recorded in the overlying Carpentaria Basin are thought to be derived from fluid-rock interactions involving a granitic basement (Evans, 1996) and lend further support to the proposition that a hot rock geothermal system could be exploited through an Enhanced Geothermal System (EGS) development.

INFERRED GEOTHERMAL RESOURCE ESTIMATES

Two exploratory shallow wells, GSQ Julia Creek 1 (Faulkner et al., 2012) and GSQ Dobbyn 2 (Fitzell et al., 2012), were drilled at two separate sites in the Millungera Basin. These fully cored wells provided the opportunity to understand better the age and composition of rocks in the basin. The wells also allowed for precise temperature and thermal conductivity analyses to evaluate the deeper geothermal potential.

Based on temperature and thermal conductivity data collected from the GSQ Julia Creek 1 and GSQ Dobbyn 2 wells and the mapped extent of the inferred granitic bodies at depth, estimates of the stored thermal energy were made (**Table 1**).

A mean resource temperature, representing a mid-point between the 150°C cut-off temperature and the modelled temperatures at 5km, coupled with the thickness between the depth at which the cut-off temperature is reached down to 5km, was used, together with the mapped area of the inferred granite and inputs for rock density and specific heat capacity to calculate a thermal energy estimate reported in petajoules.

Whilst more data will be needed to address the model's assumptions and uncertainties. The results thus far are encouraging with the data collected to date indicating the considerable geothermal potential of the area.

Tectonic Unit		Total stored thermal energy – PJ (90% probability)	Electric power potential – Mwe (90% probability)	Annual electricity generation – GWh (90% probability)
Millungera Basin – South		> 296 000	> 1 460	> 11 510
Millungera Basin – North	Area A	> 185 000	> 912	> 7 190
	Area B	> 130 000	> 640	> 5 045
Total		> 611 000	> 3 012	> 23 745

Table 1: Result from Monte Carlo simulation, estimation of stored thermal energy, equivalent power output and annual electricity generation for the inferred resource areas at 90% probability (modified from Talebi et al., 2014).

CONCLUSIONS OF THE ASCENDIENCE REVIEW

The Ascendience review concludes that the GSQ report is of high quality and provides a comprehensive screening level assessment that accurately describes the presence of an inferred geothermal resource across two separate areas within the Millungera Basin.

The conclusions are well-supported by the available data and while several important qualifications regarding assumptions that have been relied upon are recognised, this in no way detracts from the integrity of the report or the validity of the conclusions.

FUTURE WORK FOCUS

Greenvale's future work programs will look to further constrain the potential of the identified inferred geothermal resource by addressing several key uncertainties highlighted in the Ascendience review. Most of these issues are identified in the GSQ report and reflect the screening nature of the work completed. The Company's future works programs will look to address these issues through:

- An increase in data density through the acquisition of additional critical geophysical data
- Evaluating the possible impact on basin temperature gradients from water flow through the overlying Great Artesian Basin
- Further characterisation of the insulation potential of cover sequences that are required to trap generated heat effectively
- Completion of preliminary well planning to evaluate the feasibility of drilling to the 5km depth-floor that is assumed in the GSQ calculation of stored thermal energy
- Investigation of the regional stress field to evaluate the fracturing potential for an EGS development.

INDEPENDENT EXPERT

The geological information presented in this document is based on information compiled by Dr Mark Lisk.

Dr Mark Lisk is Chief Geologist for Ascendience Group and holds a PhD in petroleum systems analysis from Curtin University and an MSc. Honours degree in geothermal systems from the University of Auckland.

Dr Lisk has more than 30 years' experience in the oil and gas sector, with a specialty in assessing the thermal history of sedimentary basins. He has previously worked as a Principal Geologist for Woodside Energy Ltd and a Senior Research Scientist with the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

AUTHORISED FOR RELEASE

This announcement has been approved by the Board for release.

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