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Ammaroo Rock Phosphate

Karinga Lakes Brine Potash

Titleholder: Rum Jungle Resources Ltd
Operator: Rum Jungle Resources Ltd
Titles Agent: Complete Tenement Management
Tenement: EL 28872
Project Name: Karinga Lakes Potash
Report Title: [Partial relinquishment report on EL 28872, Karinga Lakes Potash](#)
Author: John Dunster
Corporate Author: Rum Jungle Resources Ltd
Target Commodity: Potash / schoenite
Date of Report: 27/02/2015
Datum/Zone: GDA94/ Zone 53
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SUMMARY

EL 28872 is one of seven contiguous granted ELs and two ELAs in Rum Jungle Resources' Karinga Lakes Potash Brine Project. The Karinga Lakes project has advanced beyond exploration with a JORC 2012 brine potash resource of 8.4 million tonnes K_2SO_4 including over 70% in the Measured and Indicated category. A Scoping Study has been completed. The project awaits further approvals and funding. All titles are now in the name of Rum Jungle Resources after it bought out the remaining JV proportion held by Reward Minerals and its subsidiary. The project now has group technical reporting as GR360. As part of a rationalisation of the holdings in the Karinga Lakes Project, 58 sub-blocks are being partially relinquished from EL 28872. No on-ground work was conducted on the area being relinquished.

PHYSIOGRAPHY, ACCESS AND LOGISTICS

Location

EL 28872 is located in semi-desert country 150 km southwest of Alice Springs on the Kulgera 1:250 000 map sheet (Figure 1).

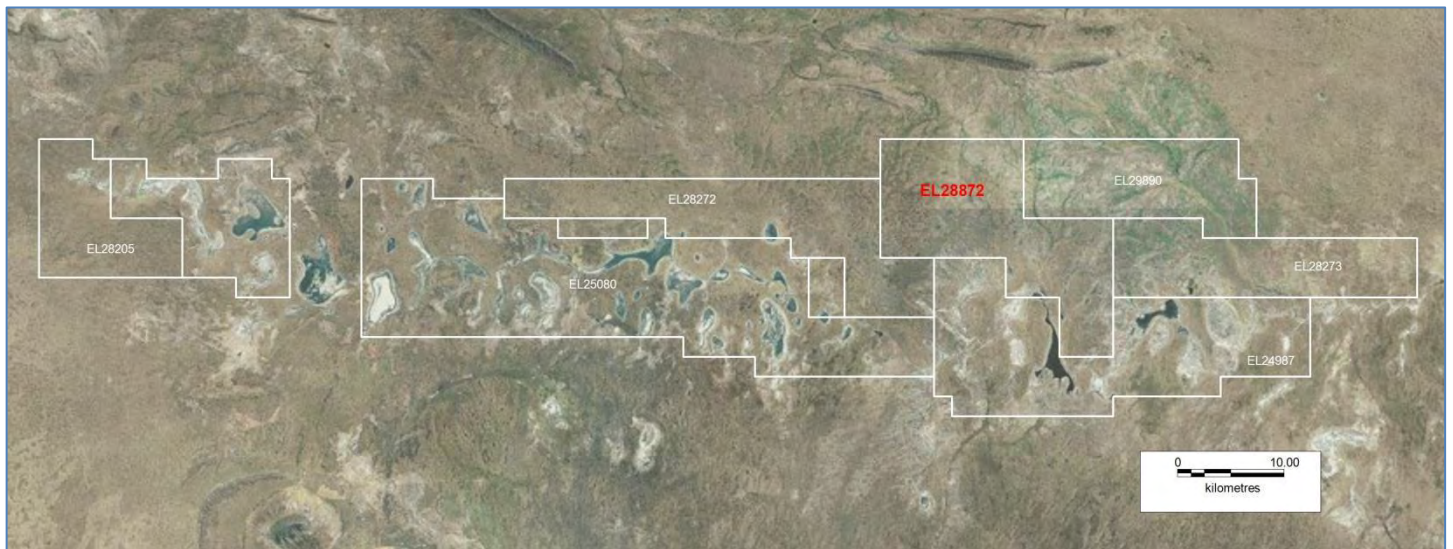


Figure 1. Topography and Rum Jungle Resources' tenements in the project area shown on satellite Imagery. EL 28872 is labelled in red.

Habitation and Land Use

EL 28872 is on Mount Ebenezer and Lyndavale pastoral stations which run cattle. This is the only land use of the EL. Apart from the pastoral stations, the nearest points of habitation are Aboriginal communities, the largest of which is Imanpa (population between 180 and 250), 7 km north of the Lasseters Highway and about 17 km from Mt Ebenezer Roadhouse which is owned and run by the community. The community is predominantly Pitjantatjara and Yankunyatjara although Walpiri, Luritja and Arrernte people also live there. The community is split into three camps, the bottom, middle and the top camp. The bottom and middle camps are for Anangu and the white staff who work in the community live in the top camp. Imanpa has a clinic which was built in 1986 and a visiting nurse with an ambulance.

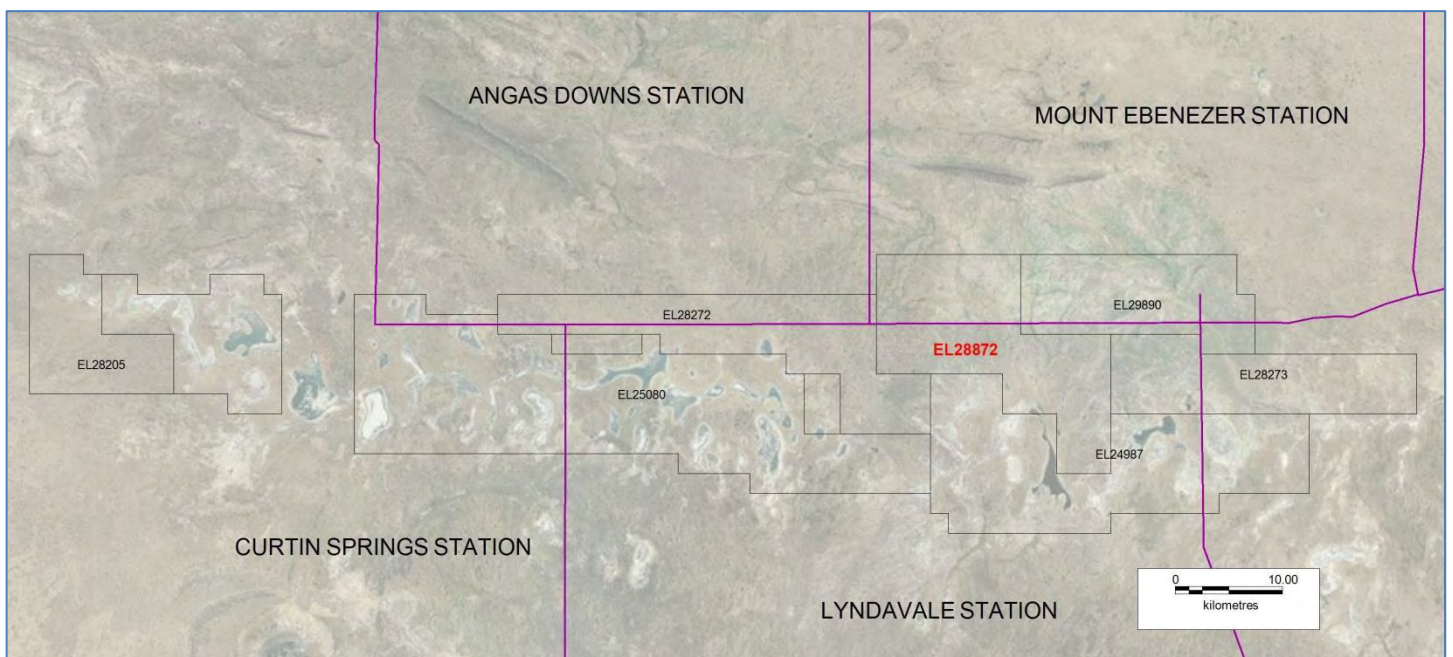


Figure 2. Pastoral stations in the project area shown on a satellite image.

Access and Logistics

Access to EL 28872 is from the Lasseter Highway which runs east-west through the project area and crosses the northern part of the EL. The EL is also serviced by numerous station tracks shown below. Mount Ebenezer Station and roadhouse on EL 28872 was used as a logistic base, as was a transportable camp owned by Rum Jungle Resources and located in the south of the project area. This camp was removed in 2014.

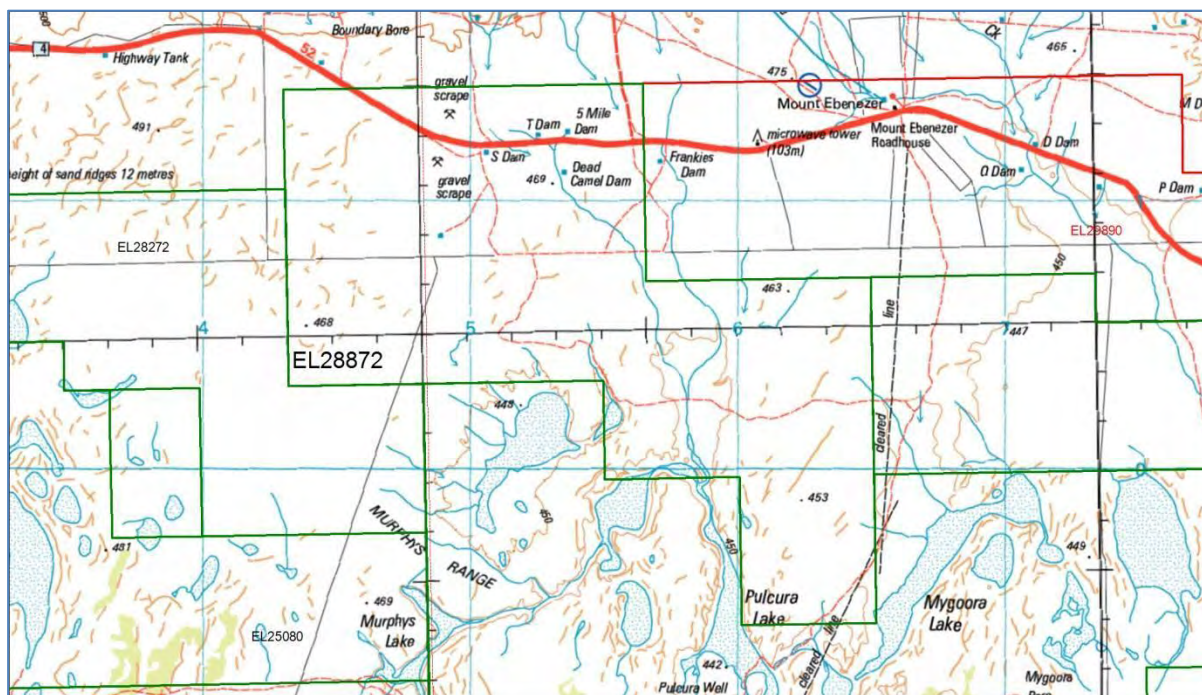


Figure 3. Access in EL 28872.

Climate

The climate is classified as semi-arid with long hot summers and relatively mild winters. A feature of the winter months is the marked diurnal fluctuations in temperature, which can range from sub-zero overnight to mid twenties (°C) or higher during the day. Daytime summer temperatures rarely fall below 30°C and there are often long periods with days in excess of 40°C. On the salt lakes themselves, temperatures can be even higher because of reflected heat.

The average rainfall is about 250-300 mm, most of which falls in the mid to late summer, and the average annual evaporation is 3,000-4,000 mm.

Land Systems, Flora and Fauna

Several flora and fauna studies have been undertaken and were reported under the Mining Management Act.

Heritage Sites

A search of the NT Heritage Register held by NRETAS shows no Declared Heritage Sites in EL 28872. Individual archaeological surveys have also been conducted by specialist contractors on behalf of Rum Jungle Resources and have been reported elsewhere.

EXPLORATION AND PROJECT RATIONALE

The Karinga salt lakes and sub-surface aquifers have a defined resource of potassium- and magnesium-rich sulfate brines. Potash and/or schoenite fertiliser can be produced by simple staged solar evaporation and flotation and /or other onsite treatments.

Australia has no producing potash mines. Around 350,000 tonnes of potash is imported into Australia annually from Canada and is worth around \$200 million. Potash of sulfate and schoenite are utilised as high-end fertiliser products globally, as they have a lower salt index than muriate of potash and are often preferred in crops sensitive to chloride or susceptible to fertiliser burn. Sulfate of potash and schoenite attract premium pricing in comparison to the more common muriate of potash. The Karinga Salt Lake Project is strategically well located adjacent to the Lasseter

Highway and within close proximity of the Central Australian Railway line, providing access north to the port of Darwin and proximity to Asian markets and south to domestic markets.

HISTORY OF TENURE AND MINERAL TITLES ACT REPORTING

Rum Jungle Resources has multiple granted tenements along a string of salt lakes from Curtin Springs to Mount Richards Dam, having previously tested as far east as Erldunda. New applications extend the project to the western end of Lake Amadeus, making a total length of 280 km of the Central Australian Groundwater Discharge Zone.

EL 28872 was applied for on 04/07/2011 and was granted on 06/03/2012 for a period of six years. It covered 79 sub-blocks or 245.41 km². EL 28872 had not been reduced prior to this report in which 58 sub-blocks are being relinquished leaving 21 sub-blocks or 65.21 km². This partial reduction of EL 28872 was part of a major reduction of the project area undertaken in early 2015. All the titles in the Karinga Lakes project were transferred into a single company name so project expenditure and group technical reporting can be applied for. The latter was approved as GR360 on 04/02/2015. DME still requires individual partial relinquishment reports.

MINING MANAGEMENT ACT

The Karinga Lakes Project is being worked under DME Authorisation 0565-02 and the associated MMP. The MMP for 2014 field work covered only track clearing and the drilling of monitoring bores. DME referred this MMP to the NT EPA.

NT WORKSAFE

As part of an NT-wide move by Worksafe to improve its monitoring and inspections of exploration and mining projects, Worksafe required Rum Jungle Resources to redo its Safety Management System and update its Risk Management Plans for each project including Karinga. Consultants Switched on to Safety were engaged to completely update Rum Jungle Resources WHS&E. The most recent NT Worksafe inspection of the Karinga Lakes Project was conducted by Nigel Butler on 12-13/12/2013.

CENTRAL LAND COUNCIL

Despite being on pastoral land, the Central Land Council has become involved. On 13 November 2014, an on-country courtesy meeting was held with Traditional Owners and the Central Land Council at Imanpa.

GEOLOGICAL AND HYDROLOGICAL SETTING

EL 28872 overlies the southwestern sector of the Amadeus Basin in the Northern Territory. The Amadeus Basin covers approximately 150,000 km² and extends into Western Australia. It is comprised of a Neoproterozoic to mid-Palaeozoic succession of predominantly shallow marine sedimentary rocks and attains a thickness of up to 14,000 m. The siltstones of the central Amadeus Basin have weathered into a modern topographic low. This depression contains a chain of Cenozoic playa salt lakes. Quaternary sand dunes, up to 30 m high, encroach onto the depression. The dunes are mostly vegetated and stable. The playas presently occupy only the lowermost topographic depressions in swales between dunes. Quaternary calcrete and silcrete duricrusts (of vadose origin) are characteristically superimposed on Amadeus Basin outcrops, forming escarpments, several metres high along the margins of some of the playa lakes. Low-relief gypsum-sand "islands" are also present in some of the playas.

The sediments in the modern playa lakes and their palaeo-drainages contain brines formed by the evaporation of surface and near-surface water from infrequent and largely unpredictable rain and flooding events.

Most importantly, the lakes are also fed from groundwater discharge in the Central Australian Groundwater Discharge Zone as described below.

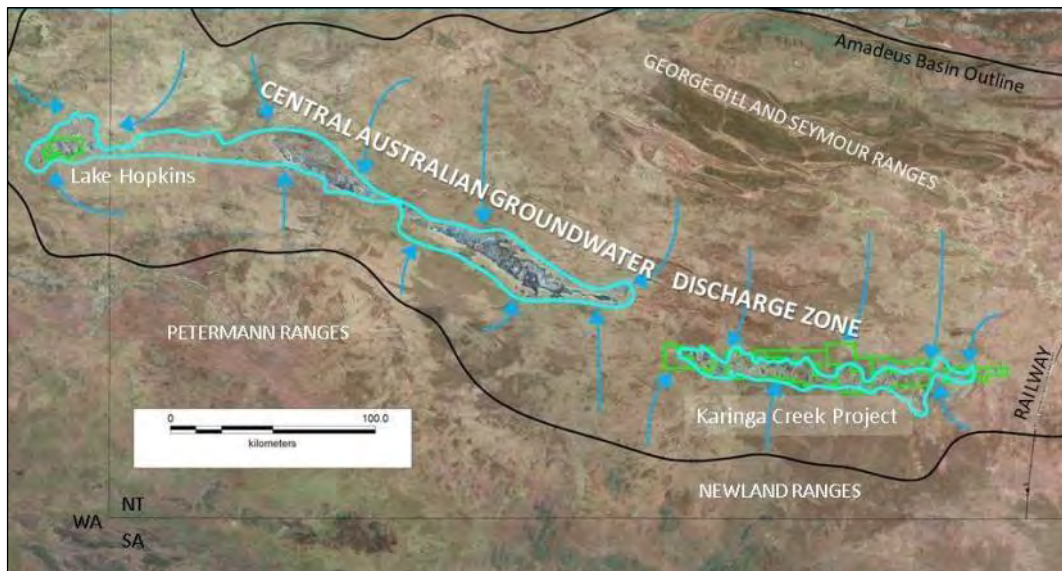


Figure 4. Regional view of the Central Australian Groundwater Discharge Zone (outlined in light blue) running from Lake Hopkins in WA through to Karinga Lakes, nearest the railway. The blue arrows indicate sub-surface flow. Rum Jungle Resources Ltd titles are shown in green.

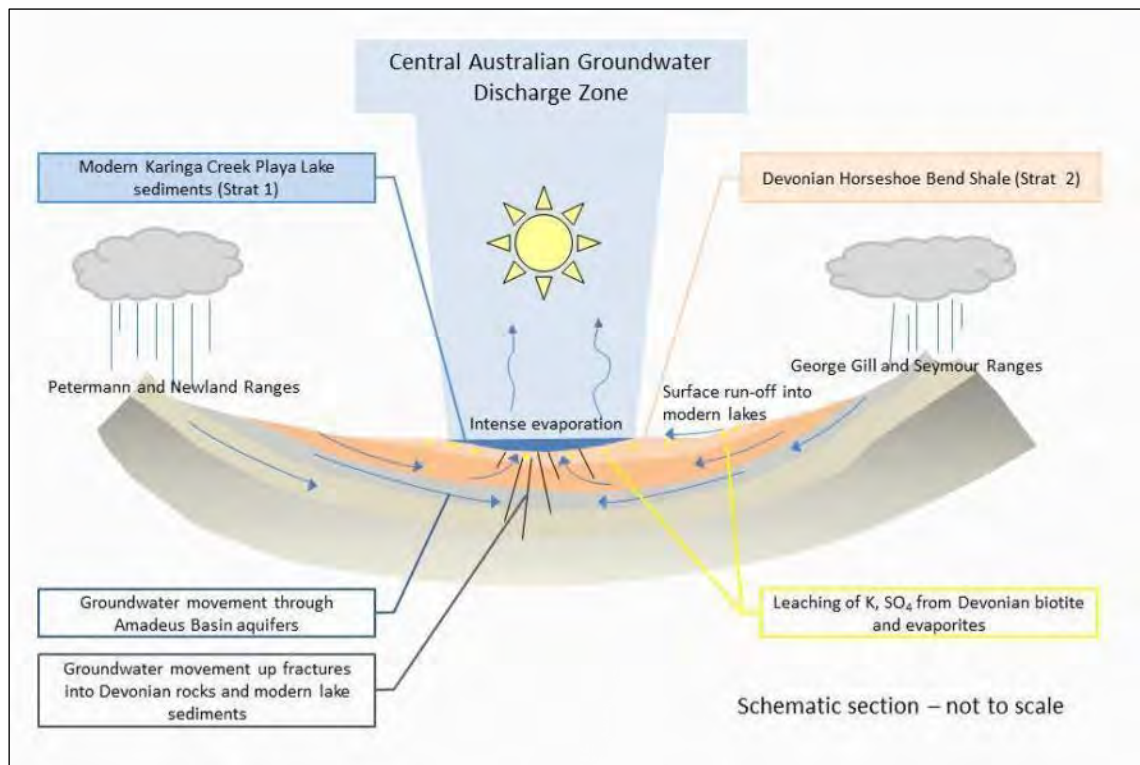


Figure 5. Schematic diagram of how the Central Australian Groundwater Discharge Zone works.

The Devonian Horseshoe Bend Shale forms low mesas around many of the lakes and constitutes the lake “floor”. Where it is fractured and/or deeply weathered, the Horseshoe Bend Shale is a brine aquifer in its own right; being the local discharge point for the Central Australian Groundwater Discharge Zone. It is hydraulically connected to the brine in the modern lake sediments, to collectively form a single brine aquifer. The Horseshoe Bend Shale was/is evaporitic, containing sulfate and chloride evaporites. It also contains locally abundant detrital biotite. The evaporites have been leached out over geological time and have almost certainly contributed to the brine, both within the shale and within the lake sediments. These migrating brines have also liberated additional potassium from the weathering biotite.

JORC 2012 RESOURCE

On 20/02/2104, the Karinga Lakes brine potash resource estimate was increased to a total of 8.4 million tonnes K₂SO₄ including over 70% in the Measured and Indicated category. This is equivalent to 19 million tonnes of schoenite.

Resource Category	Potassium (tonnes)	K ₂ SO ₄ (tonnes)	Schoenite (tonnes)
Measured	2,600,000	5,800,000	13,000,000
Indicated	210,000	460,000	1,100,000
Inferred	950,000	2,100,000	4,900,000
Total	3,800,000	8,400,000	19,000,000

Table 1. Karinga Lakes Brine Resource (entries have been rounded).

The Karinga Lakes Potash Resource is a brine hosted resource. The potassium is dissolved in brines that are contained in aquifers below the dry salt lake surface. The JORC code was not designed for use in connection with minerals that are dissolved in brines. It is generally accepted that geological uncertainties are greater when dealing with the estimation of brine resources.

The sulfate of potash tonnage represents the in-situ brine with no recovery factor applied. It will not be possible to extract all of the contained brine by pumping of trenches; the amount which can be extracted depends on many factors including the permeability of the sediments, the drainable porosity, and the recharge dynamics of the aquifers.

Brine is hosted within two stratigraphic units:

- Modern lake bed sediments, and
- Devonian weathered siltstone of the Horseshoe Bend Shale

Potassium tonnage was calculated individually for each stratigraphic unit at each lake. Potassium tonnage was calculated as:

- Bulk volume x porosity x brine concentration.

Ordinary kriging interpolation was used for resource estimation at a cut-off of 3,000 mg/L potassium. The average potassium grade of the lakes using this cut-off is 4,760 mg/L.

Porosity values were assigned to each stratigraphic unit on the basis of measured porosity in 142 samples obtained from the 2013 sonic drill core samples. 71 porosity samples were sent to E-Precision laboratory in Perth and 71 porosity samples were sent to the British Geological Survey Hydrogeological Properties and Processes Laboratory in Wales. Median porosity values for each stratigraphic unit were determined as follows:

- Modern lake bed sediments -33%
- Devonian Horseshoe Bend Shale -36%

The total resource is contained beneath 25 lakes with a total area of 132 km². The average thickness of the identified resource is 17m.

The potash brine resource is based on data acquired over four years, including:

- 93 brine samples from hand dug pits
- 4 small backhoe trenches which were pump tested
- 8 vibracore drill holes
- 73 sonic drill holes
- 200 aircore drill
- 42 installed 50 mm piezometers around drill holes and 48 piezometers around trenches
- 47 installed 100 mm wells
- 10 pumping tests from 100 mm wells
- 4 long term pump tests from 3 trenches and a well
- 142 porosity samples

The full JORC 2012 Resource Statement, the ASX announcement and all the relevant JORC reporting tables have been supplied to DME previously.

SCOPING STUDY

The results of the Karinga Scoping Study were announced 14 December 2014. A review of the extractable brine resource, chemical composition and processing analytics, process flow sheet design, mass balance work and general brine extraction and processing facility layout was completed by China International Chemical Consulting Corporation (CICCC). GHD Australia completed estimates of Australian capital and operating costs, based on the CICCC design. Baseline regional market studies for both sulphate of potash and potassium magnesium sulphate were also conducted.

Two development scenarios were studied to a scoping study level of accuracy (+/- 40% capital and operating costs):

Scenario 1

- 125,000 tonnes per annum of sulphate of potash (SOP) for a minimum of 10 years of production. 75% of the in-situ potash brine resource is in the Measured and Indicated JORC (2012) categories.

Scenario 2

- 100,000 tonnes per annum of potassium magnesium sulphate (schoenite) for a minimum of 15 years of production. For scenario 2, it is considered that there are sufficient recoverable brines in the known in-situ resource and without recharge to support the 15 year operation envisaged.

Schoenite is an intermediate product of the sulphate of potash process. Scenario 2 is approximately one fifth the size of scenario 1 and represents the potential to develop a small scale start up, using a smaller number of lakes thus decreasing the environmental footprint and significantly lower energy usage due to lower volumes of brines being pumped smaller distances and avoiding the need to create steam that is used to convert schoenite to SOP.

The following table summarises the scoping study level economic assumptions for the project:

		Scenario 1	Scenario 2
SOP Sold	tpa	125,000	
Schoenite Sold	tpa		100,000
Minimum Life	years	10	15
Estimated wholesale market price	\$/t	\$700-\$800	\$400-\$450
Estimated operating costs including transport	\$/t	\$300-\$370	\$140-\$160
Estimated Total Capex	\$AM	340	93
Contingency included in Total Capex	\$AM	50	14

tpa – tonnes per annum

\$/t – Australian dollars per tonne

\$AM- millions of Australian dollars

The Opex range provided in the table above is determined by the gas supply scenario. The upper bound is when gas is delivered by CNG from Alice Springs and the lower bound assumes gas supplied via pipeline from emerging regional production. In order to take one of the development scenarios forward to a bankable feasibility study, it will be necessary to secure funding through the establishment of a joint venture. As previously announced to the ASX, Flagstaff Partners have been engaged to facilitate a formal investment process.

SUB-BLOCKS BEING RELINQUISHED

A major rationalisation of the titles in the Karinga Lakes Project was undertaken in early 2015. As part of that process, 58 sub-blocks are being relinquished from northern EL 28872, as shown below. This leaves 21 sub-blocks or 65.21 km².

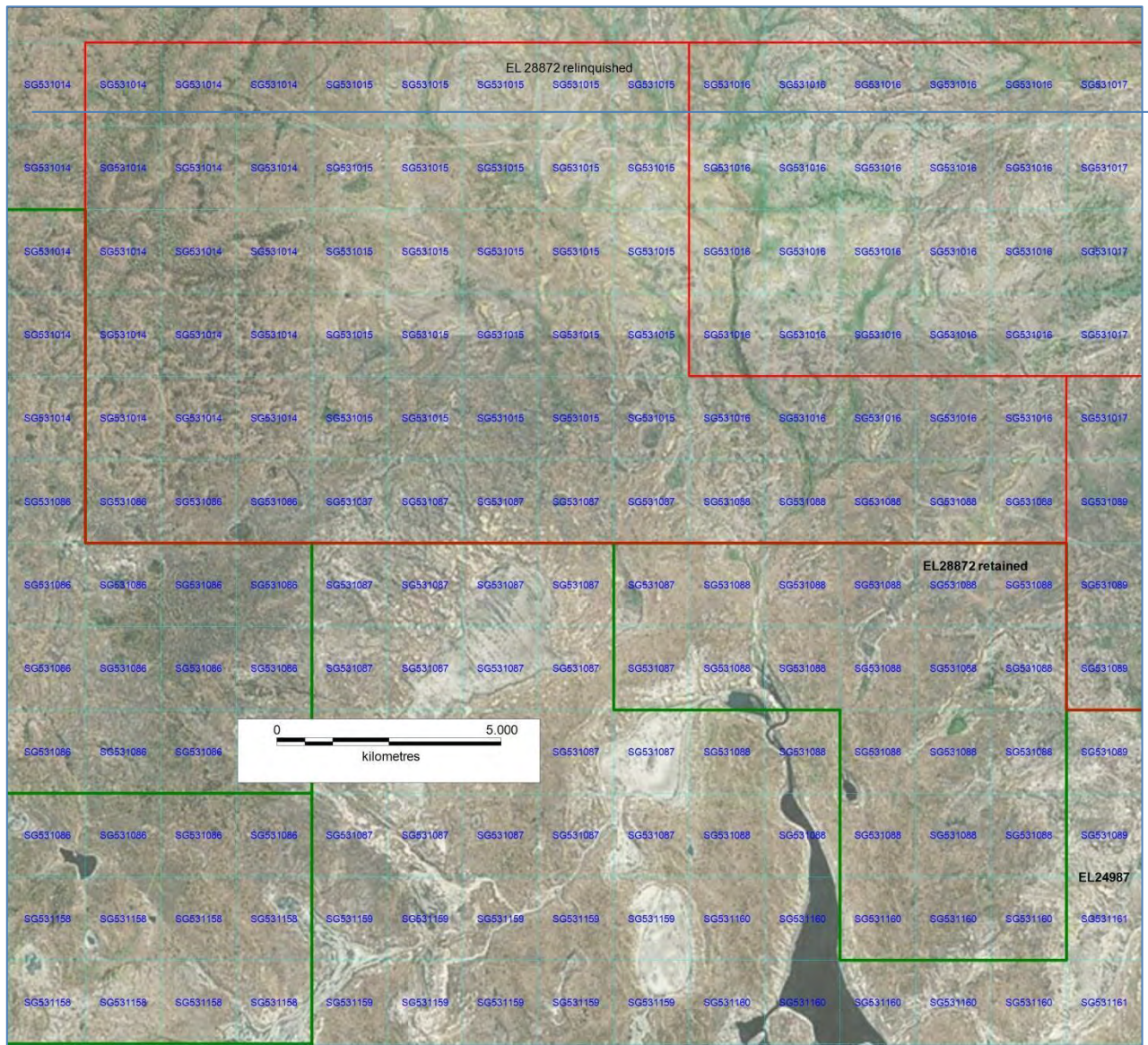


Figure 6. Sub-blocks being relinquished from EL 28872 shown in red.