# H1 (HYDROGEOLOGICAL ASSESSMENT)

## LAKE WELLS SULPHATE OF POTASH PROJECT (LSOP)
## PROCESS/POTABLE WATER SUPPLY
## EASTERN GOLDFIELDS, WESTERN AUSTRALIA

AUSTRALIAN POTASH

*The Australian SOP Company*

**CONTENTS**

## 1. INTRODUCTION

Australian Potash Ltd (APC) is investigating the feasibility of developing the Lake Wells Sulphate of Potash Project (LSOP). The project is located on the southern and western portions of Lake Wells, some 500km north-east of Kalgoorlie and 160km north east of Laverton (refer Figure 1.1).

The existing land use is an operating cattle station. The station water use is considered minimal, with 11 windmills pumping groundwater from the superficial deposits.

APC hope to produce 150,000 tonnes per annum (TPA) of Sulphate of Potash (SOP). SOP is contained within hypersaline groundwater (brine) occurring in the Tertiary sediments (palaeovalley), situated beneath and adjacent to Lake Wells. APC propose that the brine will be abstracted at a rate of approximately 17GL/yr, subject to solar-evaporation and SOP recovered from the residual salts.

This report presents a hydrogeological assessment of the Archean bedrock (basement) in the south of the area, including the results of targeted exploration drilling, in support of a 5C licence application to abstract approximately 0.8GL/yr of groundwater for process and potable water supply. A separate report will be issued in support of a 5C licence to abstract the brine.

In accordance with current guidance documentation (Government of Western Australia Department of Water, 2009), and following discussion with the regulator responsible for the site (Simon Page (APC) and Andrew Naskos (Department of Water and Environmental Regulation (DWER))), this report presents a H1 level of assessment.

Although the final location of the planned process/supply borefield is currently not known, it is anticipated that all work will be carried out within the area of the off playa envelope agreed between the Western Australian Environmental Protection Authority (EPA) and APC.

### 1.1 Field Program

Following on from a desk-top study incorporating a review of published geological mapping and aeromagnetic data (Bunting, Jackson & Chin 1978 and Milligan & Brodie 1998[1] and 1998[2]), APC identified a series of lineaments in the basement. It was assumed that these features represented fractures and/or dykes, indicating potential secondary permeability in the area. Targets for process/potable groundwater exploration bores were subsequently derived following detailed resistivity surveying carried out by APC (Terran Imaging 2017[1] and 2017[2]).

The location of exploration borehole drilling carried out (including existing groundwater abstractions on site using windmills), are presented in Figure 1.2.

Fieldwork carried out to date by APC in support of this H1 assessment includes the following:

- Geophysical surveys incorporating resistivity technique at 20 locations;
- Drilling and installation of 17 monitoring bores (MB) - 1,194m drilled;
- Drilling and installation of 13 production bores (PB) - 962m drilled;
- Groundwater sampling followed by laboratory analysis at 10 locations.

**Note: Although pumping testing was carried out prior to groundwater sampling at these 10 locations, the results are considered preliminary and will not be published here.**

### 1.2 Tenements

The LSOP occurs within the following tenements:

| | |
|---|---|
| M38/1274 | LWE |
| M38/1275 | APC |
| M38/1276 | LWE |
| E38/2742 | LWE |
| E38/2988 | APC |
| E38/2114 | APC |
| E38/1903 | APC |
| E38/3039 | APC |
| E38/2113 | APC |
| E38/3021 | APC |
| E38/3109 | APC |
| E38/3018 | APC |
| E38/2988 | APC |
| E38/3244 | APC |
| E38/3225 | APC |
| E38/3226 | APC |

APC tenements are owned by Australian Potash Ltd. LWE tenements are owned by Lake Wells Exploration Pty Ltd. APC have rights to explore and mine for potash on LWE tenements through a joint-venture agreement with LWE (announced on 11th December 2015).


**FIGURE 1.1: SITE LOCATION PLAN**

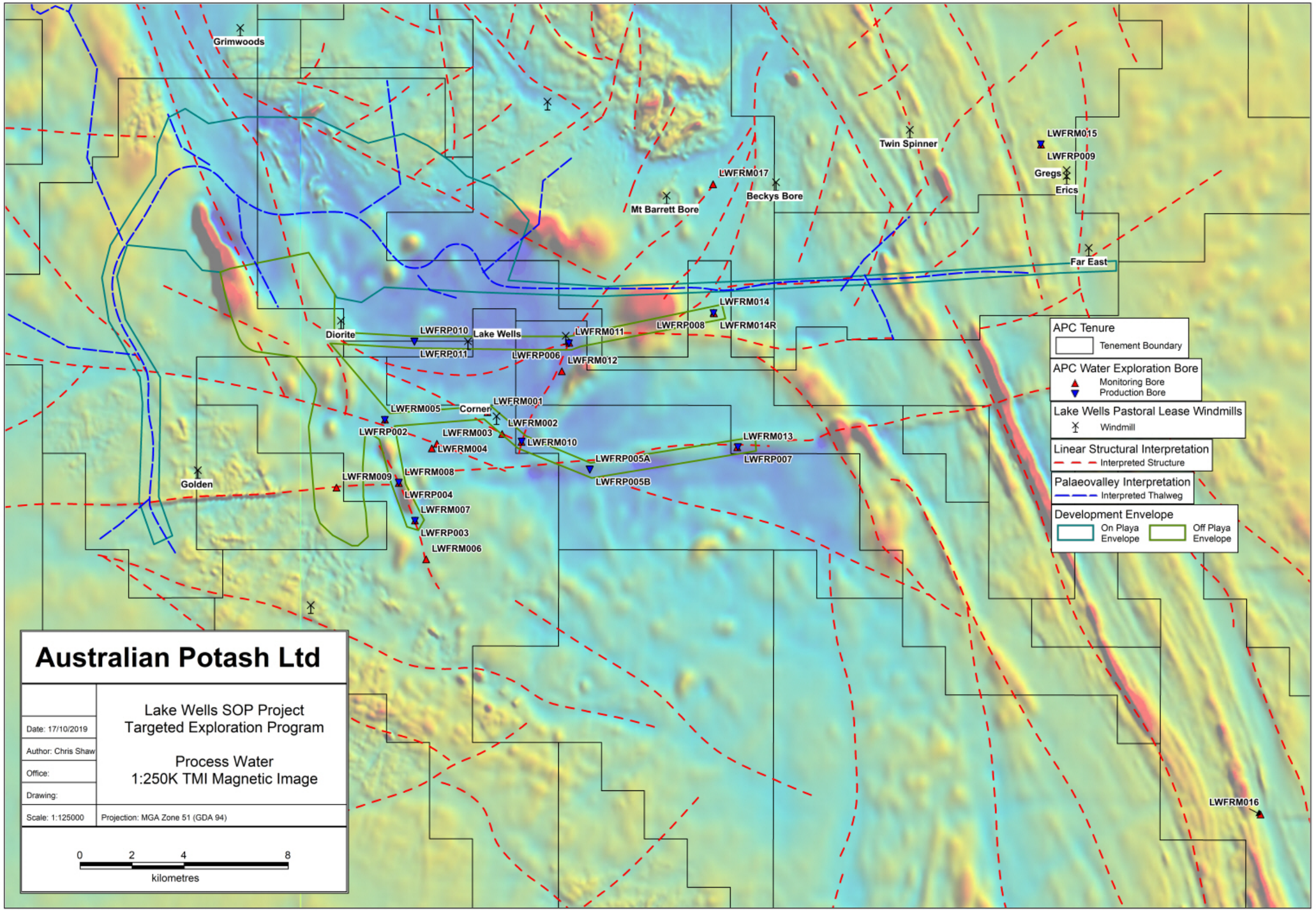



**FIGURE 1.2: TARGETED EXPLORATION AREA**

## 2. CLIMATE/RAINFALL

The LSOP is situated in an arid region with an average annual rainfall of approximately 200mm. The climate is characterised by hot dry summers with occasional storm activity and cold winters, with average maximum temperatures of around 30°C. Day time temperatures can exceed 40°C during the summer (December to February), with overnight temperatures below zero possible during the winter (June to August). Statistics for the town of Laverton are shown for comparison purposes in Table 2.1.

**TABLE 2.1: LAVERTON CLIMATE STATISTICS (STATION NO. 012045, AFTER BOM, 2019)**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual | Period |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mean Maximum (°C)** | 35.8 | 34.8 | 31.9 | 27.2 | 22.1 | 18.5 | 17.8 | 20 | 24.5 | 28 | 32.1 | 34.9 | 27.3 | 1900-1971 |
| **Mean Minimum (°C)** | 20.5 | 20 | 18 | 13.9 | 9.5 | 6.6 | 5.2 | 6.4 | 9.5 | 12.8 | 16.6 | 19.3 | 13.2 | 1900-1971 |
| | | | | | | | | | | | | | | |
| **Mean rainfall (mm)** | 26.5 | 31.4 | 31 | 21.9 | 22.5 | 23.1 | 16.2 | 13.1 | 8.8 | 9.7 | 14.9 | 18.5 | 237.9 | 1899-2019 |
| | | | | | | | | | | | | | | |
| **Mean number of days of rain ≥ 1 mm** | 2.5 | 2.7 | 2.8 | 2.6 | 3 | 3.4 | 3 | 2.4 | 1.4 | 1.5 | 2.1 | 2.4 | 29.8 | 1899-2019 |

The topography of the area is dominated by open, scattered mulga and spinifex sand plains with playa lakes and low kopai dunes; there are stands of Marble Gum where sand cover is deeper. The sand dune areas are part of the western margin of the Great Victoria Desert.

Central to this fresh/process water exploration is a range of low hills composed of outcropping Archean greenstone rocks.

Pan evaporation rates for the area are estimated to be 3,200 mm/year, such that the potential evaporation rates in the area far exceed the annual rainfall. Inundation of the lake is likely to only occur following infrequent, large rainfall events.

The LSOP occurs in the south west region of the Lake Wells playa lake system. A review of available SRTM data for the region indicates the south west lake area is estimated to have a catchment area of 6,600 $km^2$, with most of the catchment area flowing from the west. The southwest playa lake chain has an approximate surface area of 170 $km^2$.

## 3. GEOLOGICAL SETTING

The LSOP is located on the north-eastern margin of the Archaean Yilgarn Craton where the geology comprises weathered Archean basement overlain by sedimentary deposits. The LSOP brine resource occurs within the Wells-Carnegie palaeovalley system, which originally flowed from Lake Carnegie (north of the project area) and discharged to the south via Lake Wells, (Beard J. S., 2005). The Wells-Carnegie system was extensive, with eroded valleys up to 170 m deep and drainage to the Eucla coast (Beard, J., 2002). Thus, sediments underlying the current Lake Wells playa lakes infill a large Tertiary palaeovalley and are likely to be extensive over a wide area both upstream and downstream.

The proposed source of the process and potable water supply for the operation is the Archean basement, including dolerite, basalt, granite, porphyry, felsic volcanoclastics and ultramafic schistose rocks adjacent to the playa system. Specifically, structural features were targeted which were assumed to represent fractures and/or dykes, and this has been demonstrated by drilling.

The location of the exploration bores constructed by APC are presented in Figure 1.2, with the borehole logs in Appendix A.

### 3.1 Hydrogeology

The Northern Goldfields area is underlain by weathered and fractured Archaean basement, which forms the northern portion of the Yilgarn Goldfields fractured-rock groundwater province. Fractured rock aquifers comprise greenstones, granitoids and minor intrusive rocks that are characterised by secondary permeability, which may also be enhanced by chemical dissolution along fracture lines. (A.D Allen, 1996) noted that large supplies of groundwater may be obtained from bores to 100m depth, particularly where these intersect fractured chert and banded iron-formations, regional structural features, fault and shear zones.

The storage and hydraulic conductivity of these aquifers is largely related to the degree of fracture intensity. Rock solution associated with fracturing is rare below the weathered zone owing to fracture closure, although significant groundwater has been intersected at depth within localised fracture and fault systems.

The local geological structure is the dominant feature controlling the occurrence of fractured-rock aquifers, with the lithology of the rocks having limited influence and affecting only the extent of structural development. The lateral continuity of the aquifer systems along the dominant geological structures is poorly understood, although ellipsoidal drawdowns associated with mine dewatering suggest that the aquifers are strongly anisotropic with the greatest permeability parallel to the major structures (S.L Johnson, D.P Commander and C.A Boy, 2000).

The groundwater flow systems in the Northern Goldfields are maintained by rainfall recharge (Allen, 1996). Most recharge is likely to occur during heavy rainfall when it is augmented by recharge from surface runoff and local flooding.

Based on a review of groundwater monitoring carried out by APC in November 2018, the depth to groundwater in the area varies between ~6 and 36m below ground level (bgl) (refer Table 3.1). This can be compared to depth to the brine in the area of Lake Wells, which is at or near to the surface.

Recorded groundwater levels over the entire LSOP area, together with NASA's Shuttle Radar Topography Mission (SRTM) data to set bore elevations, have been used to plot groundwater level contours (refer Figure 3.1). Based on a composite of groundwater levels across the LSOP area between 2016 and 2018, the groundwater level is estimated to range between 445 and 452 mRL, with the general flow direction from the areas of outcropping basement towards Lake Wells, where evaporation occurs.

Observations during the APC field program indicate airlift yields during drilling of between 1 and 15L/s. Based on a review of data in Table 3.1, elevated yields appear to be associated with fractures in the area. In addition, there was evidence of these fractures extending laterally, with reports of lost circulation events and water issuing from nearby bores while drilling at several locations. Although there was evidence that the frequency of these fractures decreases with depth (maximum depth of fracture encountered while drilling ~70m bgl in LWFRP005B), based on a geophysical survey carried out by APC (Fathom Geophysics, 2019), there is also evidence that these fractures may extend beyond a depth of 400m bgl, with fractures extending laterally 10's km over the project area (Figure 3.2).

Based on the relatively deep depth to groundwater in the area of the basement, it is assumed that recharge associated with rainfall events will be minimal. Instead, recharge will be focussed on the area of the palaeovalley and Lake Wells.

The recorded groundwater quality data from 6 of the 10 bores sampled is fresh (i.e. TDS <3,000mg/L), with the remaining bores either brakish (LWFRP009) or saline (LWFRP006, 008 and 011), indicative of the proximity and/or hydraulic connection with the brine of the palaeochannel (refer Table 3.2, Figure 3.3 and Appendix C).

Figure 3.4 presents a schematic cross section in the area of production bore LWFRP004 looking east.

## TABLE 3.1: DEPTH TO GROUNDWATER (NOVEMBER 2018)

| Location | Easting (MGA) | Northing (MGA) | Strata Encountered | DTW November 2018 (m bgl) | Maximum Airlift Yield Drilling (L/s) | Comments |
|---|---|---|---|---|---|---|
| *Monitoring Bores* | | | | | | |
| LWFRM001 | 507,161 | 6,978,218 | Basement | 15 | N/D | Broken ground 17-18m bgl, fractures 19-24m bgl and broken ground 24-25m bgl. |
| LWFRM002 | 507,722 | 6,977,381 | Basement | 16 | 1 | Broken ground/fractured material 38-39m bgl. |
| LWFRM003 | 505,219 | 6,977,005 | Basement | 13 | Nil | Broken ground/fractured material 37m bgl. |
| LWFRM004 | 505,027 | 6,976,833 | Basement | 13 | Nil | |
| LWFRM005 | 503,233 | 6,977,930 | Basement | 22 | 8 | Fracture zone/broken ground 32-36m bgl. Highly jointed 36-40m bgl. |
| LWFRM006 | 504,806 | 6,972,577 | Basement | 10 | Nil | |
| LWFRM007 | 504,379 | 6,974,065 | Basement | 13 | N/D | Fracture zone/rubbly ground 24-36m bgl. |
| LWFRM008 | 503,762 | 6,975,508 | Basement | 19 | N/D | Rubble zone 22-26m bgl. |
| LWFRM009 | 501,373 | 6,975,328 | Basement | 12 | 0.3 | Fractured zone 33m bgl and 52m bgl. |
| LWFRM010 | 508,461 | 6,977,079 | Basement | 17 | 1 | Fractured zone 26m bgl and 36-38m bgl. |
| LWFRM011 | 510,295 | 6,980,875 | Alluvium/Basement | 6 | Nil | Fractured in Basement at 32m bgl. EOH at 50m bgl due to loss circulation - water flowing from nearby production bore during drilling ~30m away. |
| LWFRM012 | 510,006 | 6,979,785 | Alluvium/Basement | 11 | 0.1 | Fractured zone in Basement at 61m bgl. |
| LWFRM013 | 516,733 | 6,976,879 | Basement | 23 | 0.1 | |
| LWFRM014 | 515,836 | 6,982,004 | Alluvium - sandy Clay and Calcrete | 7 | 4* | Cavity 22-25m bgl. |
| LWFRM015 | 528,377 | 6,988,470 | Basement | 36 | 4 | |
| LWFRM016 | 536,786 | 6,962,808 | Basement | 20 | 0.1 | |
| LWFRM017 | 515,806 | 6,986,948 | Basement | 12 | Nil | Fractured zone 50-53m bgl and 64m bgl. |
| *Production Bores* | | | | | | |
| LWFRP001 | 6,978,217 | 507,171 | Basement | 15 | 0.2 | Broken ground 20m bgl and major fracture/broken ground 23m bgl. |
| LWFRP002 | 6,977,923 | 503,227 | Basement | 22 | 15-20 | Fractured/broken ground 28-36m bgl - reported air exiting old hole ~50m away. Broken/fractured ground 46m bgl. Lost circulation event 56m bgl. |
| LWFRP003 | 6,974,056 | 504,381 | Basement | 13 | 5 | Rubbly ground 24 and 26m bgl. Gravelly zone 33m bgl. Rubble zone 34-36m bgl. |
| LWFRP004 | 6,975,519 | 503,759 | Basement | 19 | 8 | Fractured ground 26m bgl and 28-29m bgl. Fractured ground 37m bgl and 40-46m bgl. Fractured ground 53m bgl and 58-62m bgl. Fractured zone at 66m bgl. |
| LWFRP005A | 6,976,024 | 511,073 | Basement | 20 | 2 | Fractured zone at 34m bgl. Broken ground at 36m bgl. 5-10cm void at 68m bgl. |
| LWFRP005B | 6,976,017 | 511,080 | Basement | 20 | 3.5 | Fractured zone at 37m bgl, 39m bgl, 45m bgl, 48m bgl, 55m bgl, 62m bgl and 69m bgl. |
| LWFRP006 | 6,980,855 | 510,278 | Ferricrete/Basement | 5 | 3.5 | |
| LWFRP007 | 6,976,879 | 516,760 | Basement | 23 | 1.5 | |
| LWFRP008 | 6,982,006 | 515,818 | Alluvium - Sand and Clay | 7 | 5 | |
| LWFRP009 | 6,988,476 | 528,366 | Basement | 36 | 2 | Fractured zone at 60m bgl, broken/fractured zone 67-68m bgl. Soft drilling - like sand at 70m bgl. |
| LWFRP010 | 6,980,924 | 504,360 | Basement | 10 | 1.2 | |
| LWFRP011 | 6,980,910 | 504,360 | Basement | 10 | 1.8 | |
| LWFRP012 | 6,977,091 | 508,469 | Basement | 16 | 4.0 | |

* LWFRM014 - airlift yield during development (hole drilled mud rotary).

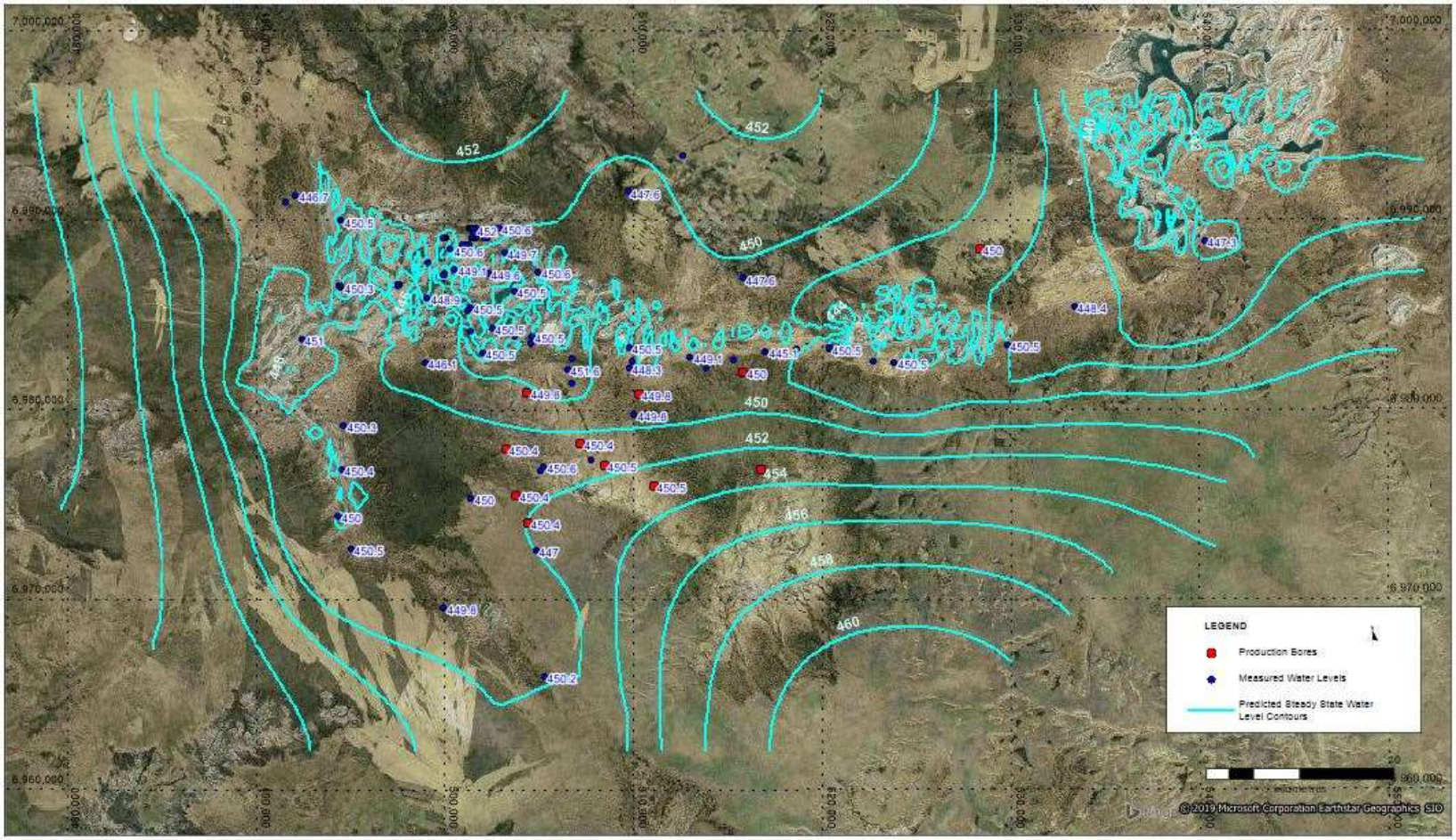



**FIGURE 3.1: COMPOSITE GROUNDWATER ELEVATIONS (2016-2018)**

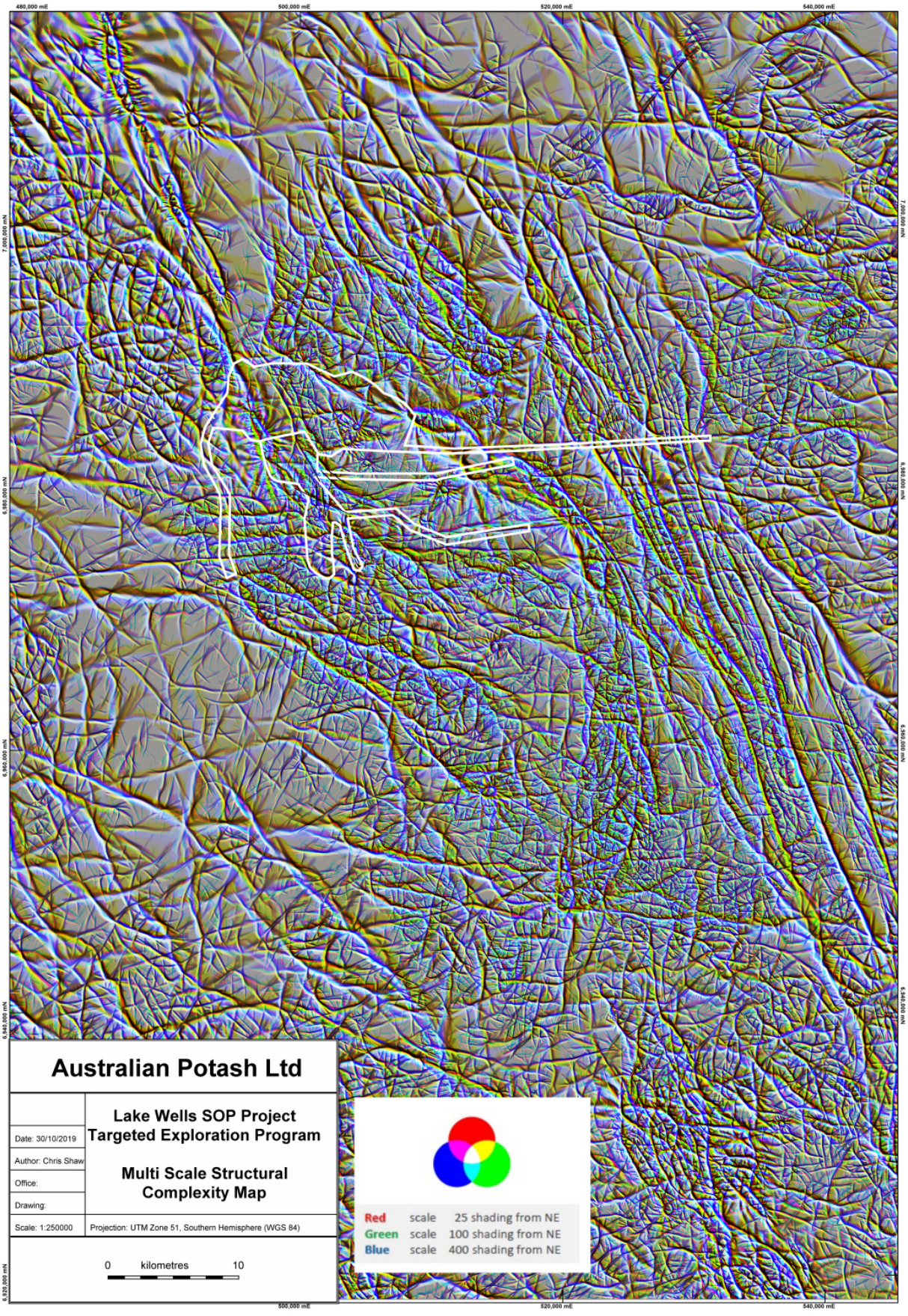


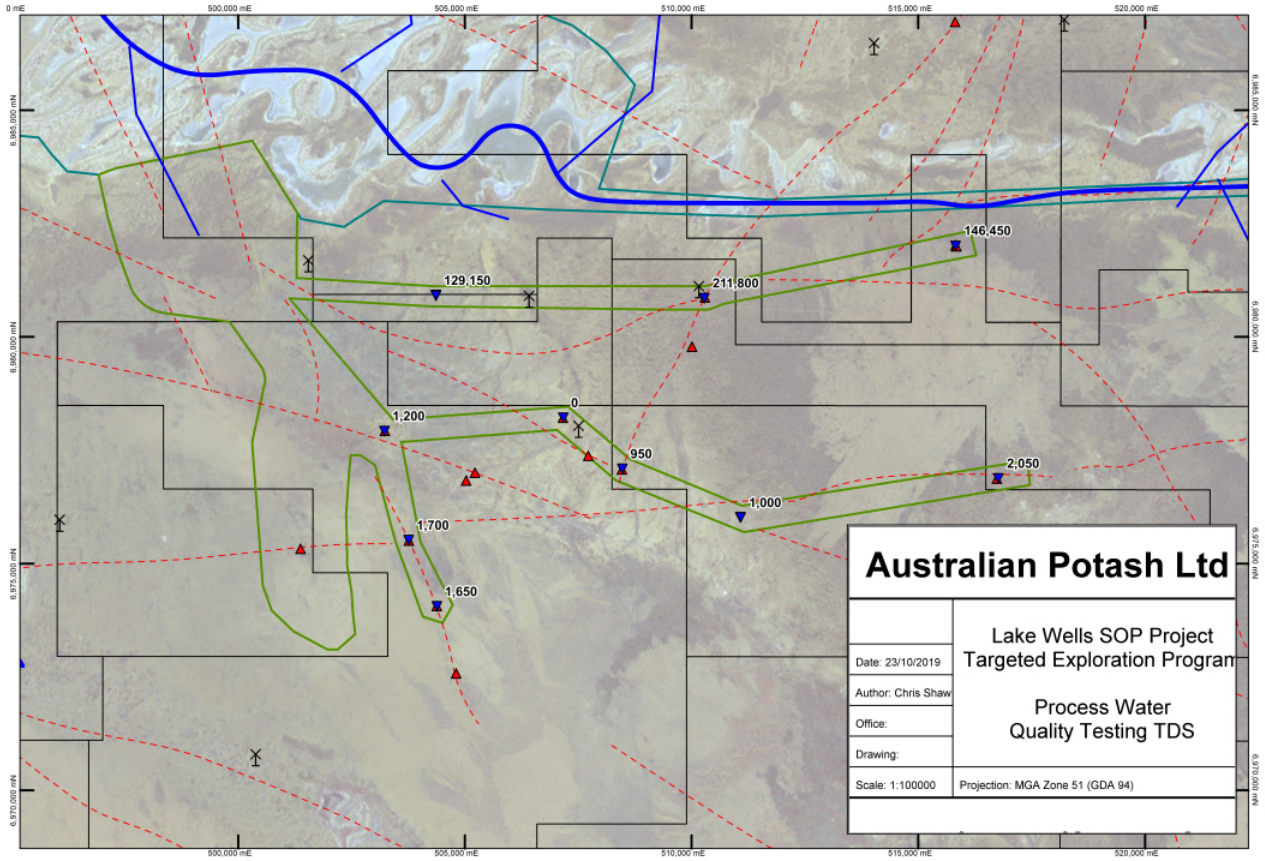

**Figure 3.2: MULTI SCALE STRUCTURAL COMPLEXITY MAP**

## Table 3.2: GROUNDWATER LABORATORY ANALYSIS TDS (mg/L)

| Location | Easting (MGA) | Northing (MGA) | TDS (mg/L) |
|---|---|---|---|
| *Production Bores* | | | |
| LWFRP001 | 6,978,217 | 507,171 | N/D |
| LWFRP002 | 6,977,923 | 503,227 | 1,200 |
| LWFRP003 | 6,974,056 | 504,381 | 1,650 |
| LWFRP004 | 6,975,519 | 503,759 | 1,700 |
| LWFRP005A | 6,976,024 | 511,073 | N/D |
| LWFRP005B | 6,976,017 | 511,080 | 1,000 |
| LWFRP006 | 6,980,855 | 510,278 | 211,800 |
| LWFRP007 | 6,976,879 | 516,760 | 2,050 |
| LWFRP008 | 6,982,006 | 515,818 | 146,450 |
| LWFRP009 | 6,988,476 | 528,366 | 5,650 |
| LWFRP010 | 6,980,924 | 504,360 | N/D |
| LWFRP011 | 6,980,910 | 504,360 | 129,150 |
| LWFRP012 | 6,977,091 | 508,469 | 950 |

**N/D = No data**

**Cells in red water considered too high in TDS for process/potable use and these locations will be discounted in future work**




## Figure 3.3: CONCENTRATION OF TDS (mg/L) IN PRODUCTION BORES

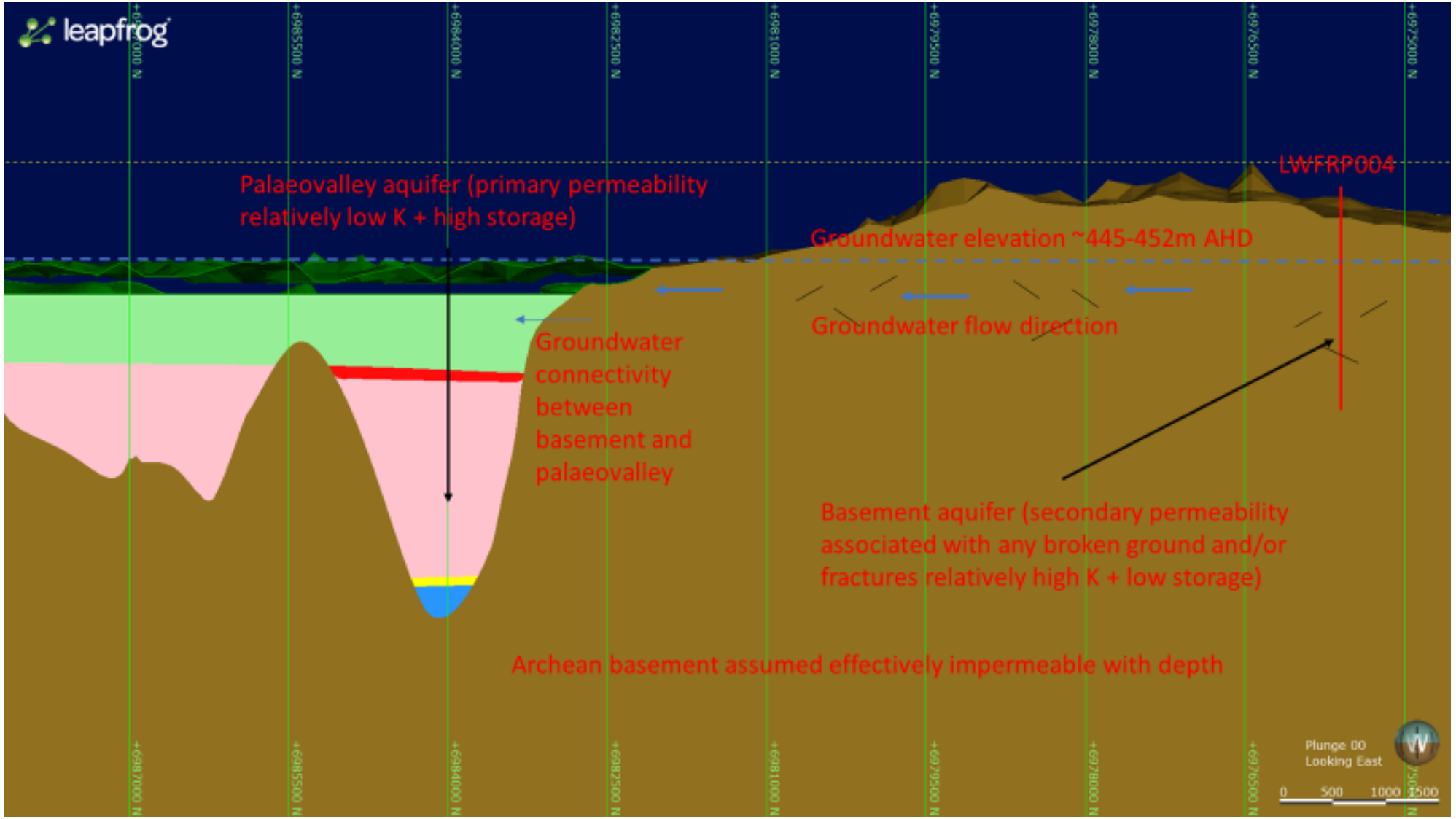



**Figure 3.4: SCHEMATIC CROSS SECTION - AREA OF LWFRP004 LOOKING EAST (E= 503,759, N=6,975,519)**

## 4. EXISTING GROUNDWATER USE

The existing and anticipated future use of the area including an operating cattle station relies on a supply of water from 11 windmills, pumping groundwater from superficial deposits (refer Figure 1.2).

Although it is anticipated that the volume of groundwater abstracted is minimal, the actual volume pumped is not known.

## 4. ASSESSMENT OF POTENTIAL IMPACTS

Potential impacts associated with the proposed development, together with associated mitigating measures are as follows:

- Groundwater drawdown in the basement aquifer associated with pumping groundwater for process/potable supply impacts existing groundwater users utilising the superficial deposits on site. Although it is assumed pumping groundwater for process/potable supply will not impact the cattle station bores, should any deleterious impact occur on site, APC is committed to providing an alternative supply of water to the operators.

- Pumping groundwater for process/potable supply adversely impacts subterranean fauna (Bennelongia, 2018). Based on the fractured nature of the basement (i.e. aeromagnetic data indicates evidence of lineaments, assumed representing fractures and/or dykes extending across the area, subsequently corroborated by AP borehole drilling, demonstrating broken-rubbly ground, voids, joints and lost circulation events, with water issuing from nearby bores while drilling), it is considered likely that there is good connectivity within the upper layers of the basement and that the stygofauna species recorded from the production/monitoring/pastoral bores are more widely distributed through the region.

## 5. REFERENCES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**Bunting, J.A., Jackson, M.J., & Chin, R.J.,** 1978 : 1 : 250 000 Geological Series – Explanatory Notes THROSSELL ( Sheet SG 51-15), Western Australia.

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**S.L Johnson, D.P Commander and C.A Boy.,** 2000. Groundwater Resources of the Northern Goldfields, Western Australia, Water and Rivers Comission Report HG, 2, 1999

**Milligan, P.R. & Brodie, R,** 1998 [1]: Fractional Vertical Derivative to the order of 1.5 of Total Magnetic Intensity (reduced to the pole) Greyscale Pixel-Image Map of Throssell, Western Australia, scale 1: 250 000, AGSO.

**Milligan, P.R. & Brodie, R,** 1998 [2]: Total Magnetic Intensity (reduced to the pole) With First Vertical Derivative Colour Pixel-Image Map of Throssell, Western Australia, scale 1: 250 000, AGSO.

**Terran Imaging,** 2017[1]: Resistivity Survey of Seven Sites at Lake Wells, 22nd March 2017

**Terran Imaging,** 2017[2]: Resistivity Survey of Seven Sites at Lake Wells, 4th June 2017

**APPENDIX A**

BOREHOLE LOGS

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# COMPOSITE WELL LOG

**Bore No:** LWFRM001

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 31/05/2017
**Completed:** 2/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-66m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 8"
5.5-66m = 6"

**Area:** Lake Wells
**Elevation:**
**Easting:** 507161
**Northing:** 6978218
**Projection:** GDA 94 zone 51

**Static Water Level:** 14.13 (mbtoc) **Date:** 26/07/2017
**Remarks:** 0.44m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 10 | | | Colluvium: medium brown, coarse sand and clays. Alluvial material. | | | 203mm ID Blank Steel Casing; 53mm ID Blank PVC CL12 (0.44magl - 11.5mbgl) | |
| 10 – 60 | | | Saprolite: amphibolite, light grey to green black, strongly weathered to 26m then mostly fresh, fine to coarse grained mafics with minor feldspar and trace quartz, massive to foliated. Trace iron oxide staines and coats. | | FWS. Broken ground (17 to 18m)<br>Fractured (19.5m)<br>Fractured (23m)<br>Fractured (24m)<br>Broken ground (24.5 - 25.5m)<br>Broken ground, slight increase in flow (28m)<br>EOH. Broken ground | 1.6mm - 3.2mm Graded Gravel; 53mm ID Slotted PVC CL12 (1mm slots) (11.5mbgl - 35.5mbgl); 53mm ID Blank PVC CL12 (35.5mbgl - 59.5mbgl); 53mm ID Slotted PVC CL12 (1mm slots) (59.5mbgl - 65.5mbgl); Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM002

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 2/06/2017
**Completed:** 3/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-72m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 11"
5.5-72m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 507722
**Northing:** 6977381
**Projection:** MGA zone 51 GDA 94

**Static Water Level:** 16.15 (mbtoc) **Date:** 23/07/2017
**Remarks:** 0.41m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion Diagram | Well Completion Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Clay: Transported material, red brown, stiff, sandy silty clay. | | | 273mm OD Blank Steel Casing | |
| | | | Clay: Silty clay, orange brown to pale green, stiff. Sample balling. | | | | |
| 10 | | | | | | 53mm ID Blank PVC CL12 (0.41magl - 17.3mbgl) | |
| | | | Meta Basalt: grey, strongly weathered to fresh, weakly foliated to massive when fresh, clay when weathered. Iron oxide throughout. | | | | |
| 20 | | | Meta Granite: light grey extremely weathered to weathered, occasionally foliated to gneiss. Iron oxide throughout. | | FWS. Seepage through clay (20m) | 53mm ID Slotted PVC CL12 (1mm slots) (17.3mbgl - 23.3mbgl) | |
| | | | Meta Basalt: dark grey, extremely weathered, foliated. Occasional light green grey clay coats (fuchite?). | | | 53mm ID Blank PVC CL12 (23.3mbgl - 29.3mbgl) | |
| 30 | | | Clay: extremely weathered meta basalt, khaki. | | | | |
| | | | Meta Basalt: dark grey, moderately weathered to fresh, very fine grained to occasionally medium grained (amphibolite). Iron oxide coats throughout. | | Airlift = 1 (L/s). Sudden increase in airlift and then back into clay which restricted the flow (34m) | 53mm ID Slotted PVC CL12 (1mm slots) (29.3mbgl - 41.3mbgl) | |
| 40 | | | Meta Basalt: dark grey, moderately weathered, very fine grained to occasionally medium grained (amphibolite), fractured zone with iron oxide throughtout. | | Broken ground, fractured material (38 to 39m) | | |
| | | | Meta Basalt: dark green to black, moderately weathered to fresh, foliated, occasional light green clays (fuchite?). | | Airlift = 0.25 (L/s) (48m) | | |
| 50 | | | | | Airlift = 0.25 (L/s) (54m) | 53mm ID Blank PVC CL12 (41.3mbgl - 65.3mbgl) | |
| | | | | | | 1.6mm - 3.2mm Graded Gravel | |
| 60 | | | | | Airlift = 0.25 (L/s) (60m) | | |
| | | | | | Airlift = 0.25 (L/s) (66m) | | |
| 70 | | | | | Airlift = 0.25 (L/s). EOH. (72m) | 53mm ID Slotted PVC CL12 (1mm slots) (65.3mbgl - 71.3mbgl) | |
| | | | | | | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM003

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 4/06/2017
**Completed:** 4/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-70m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 11"
5.5-70m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 505219
**Northing:** 6977005
**Projection:** GDA 94 zone 51

**Static Water Level:** 25.32 (mbtoc) **Date:** 23/07/2017
**Remarks:** 0.40m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 20 | | | Meta Basalt: light brown to dark grey, strongly to extremely weathered, very fine grained, occasional pale green clay (fuchite?). Iron oxide throughout. | | | 273mm OD Blank Steel Casing; 53mm ID Blank PVC CL12 (0.40magl - 33.5mbgl) | |
| 20 – 30 | | | Meta Basalt: grey to dark green, strongly weathered, very fine grained, massive to foliated, occasional pale green clay (fuchite?). Iron oxide on joint faces. | | | | |
| 30 – 40 | | | Meta Basalt: grey to dark green, very fine grained, massive to foliated, extremely weathered, occasional pale green clay (fuchite?). Iron oxide on joint faces. Grey and green clays. | | | | |
| 40 | | | Meta Basalt: dark grey, very fine grained, mostly fresh, foliated. Iron oxides on joint faces. | | FWS. Broken ground, fractured material (37m) | 53mm ID Slotted PVC CL12 (1mm slots) (33.5mbgl - 45.5mbgl) | |
| 40 – 50 | | | Quartzite: pale green grey, very fine grained, massive, minor iron oxide stains. | | Small flow, mostly vapour (42m) | | |
| 50 – 60 | | | Meta Basalt: dark grey to black, very fine grained, mildly foliated, occasional iron oxide stains. | | Small flow, mostly vapour (48m) | | |
| 60 – 70 | | | Granodiorite: light grey, fine to coarse grained, trace iron oxides on fractures. | | Vapour only (54m); Vapour only (60m); Vapour only (66m) | 1.6mm - 3.2mm Graded Gravel; 53mm ID Blank PVC CL12 (45.5mbgl - 63.5mbgl); 53mm ID Slotted PVC CL12 (1mm slots) (63.5mbgl - 69.5mbgl); Fallback | |
| 70 | | | | | Vapour only. EOH (70m) | | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM004

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 5/06/2017
**Completed:** 6/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-65m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 11"
6-65m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 505027
**Northing:** 6976833
**Projection:** GDA 94 zone 51

**Static Water Level:** 28.35 (mbtoc) **Date:** 23/07/2017
**Remarks:** 0.50m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 10 | | | Granite: light brown and pink, extremely weathered, fine to coarse grained. Iron oxides throughout. | | | 273mm OD Blank Steel Casing | |
| 10 – 20 | | | Meta Basalt: black, extremely weathered to grey and brown clay. Very fine grained, massive to foliated, Iron oxide throughout. | | | | |
| 20 – 30 | | | Granite: light pink and brown, weakly to strongly weathered, fine to coarse grained, iron oxide coats and stains. | | | 1.6mm - 3.2mm Graded Gravel | |
| 30 – 40 | | | Meta Basalt: dark grey, very fine to fine grained, strongly to extremely weathered to grey to brown clays, mildly foliated, iron oxides throughout. | | | 53mm ID Blank PVC CL12 (0.50magl - 58.5mbgl) | |
| 40 – 50 | | | Granite: light grey, strongly weathered, massive to mildly foliated. | | | | |
| 50 – 60 | | | Meta Basalt: grey to black, fresh, massive to mildly foliated, no iron staining. | | | | |
| 60 | | | Granodiorite: fresh, medium to coarse grained, trace iron stains. | | Hole left at 54m overnight, small quantity of water accumulated<br>EOH (65m) | 53mm ID Slotted PVC CL12 (1mm slots) (58.5mbgl - 64.5mbgl)<br>Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM005

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 9/06/2017
**Completed:** 10/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-70m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-70m = 6.5"

**Area:** Lake Wells
**Elevation:**
**Easting:** 503233
**Northing:** 6977930
**Projection:** GDA 94 zone 51

**Static Water Level:** 22.91 (mbtoc) **Date:** 18/06/2017
**Remarks:** 0.57m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: red brown soil with silcrete, calcrete and ferricrete (white, yellow orange and red), up to pebble size. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Meta Mafic: as above but with extremely weathered meta mafics, grey to dark grey, foliated to massive. | | | | |
| | | | Meta Mafic: grey to dark grey, very fine to fine grained, weakly foliated, variably mottled extremely weathered to fresh. Occasional quartz and feldspar elongate blebs. Iron oxides and stains on joints and fractures. | | | | |
| | | | Meta Mafic: as above but weathered to pale green. | | | | |
| 20 | | | Meta Mafic: grey to dark grey with occasional khaki, very fine to fine grained, weakly foliated, varously weathered, variably mottled extremely weathered to fresh. Occasional quartz and feldspar elongate blebs. Iron oxides and stains on joints and fractures. | | | | |
| 30 | | | Meta Mafic: as above but fresh and with pale green grey sillicious "aplite", very broken rock 34 to 36m. Fracture zone 32 to 34m. | | Fracture Zone and broken ground (32m - 36m)<br>FWS (34m) | 1.6mm - 3.2mm Graded Gravel<br>53mm ID Blank PVC CL12 (0.57magl - 58mbgl) | |
| 40 | | | Meta Volcanic: Siliceous meta volcanics (?), light grey (fresh) to khaki (altered?), hard, massive siliceous microcystaline groundmass with occasional white blebs (possibly after feldspar). Highly fractured 36 to 40m, with iron oxide and manganese coats and stains. | | Airlift = 8 (L/s). Highly jointed (36m - 40m) | | |
| 50 | | | Meta Mafic: dark grey, very fine grained, white blebs (after feldspar?), weakly foliated. Iron oxide coats and stains throughout but becoming trace after 66m. Fracture zone 62 to 66m (driller reported). | | Airlift = 5 to 8 (L/s) (50m) | | |
| 60 | | | | | Water increasing due to fractures (drillers observation) (62m - 66m)<br>Airlift = 8 (L/s) (66m) | 53mm ID Slotted PVC CL12 (1mm slots) (58mbgl - 70mbgl) | |
| 70 | | | | | Airlift = 8 (L/s). EOH (70m) | Fallback | |

File Ref: \\dc01\Jobs\058\2.TECH\Borelogs\Fresh\Monitoring Bores.zip\

Well No: LWFRM005

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# COMPOSITE WELL LOG

**Bore No:** LWFRM006

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 11/06/2017
**Completed:** 12/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-78m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-78m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 504806
**Northing:** 6972577
**Projection:** GDA 94 zone 51

**Static Water Level:** 10.06 (mbtoc) **Date:** 17/06/2017
**Remarks:** 0.43m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 80 | | | Alluvium: red brown loose soil with pisolite gravel, plus quartz and weathered feldspars after pink granite. | | | | |
| | | | Granite: pink to pinky grey, medium to coarse grained, quartz, oerthoclase, biotite plus trace clear mica (muscovite?). Extremely weathered at top grading to fresh at 26m. Mildly foliated in places. Occasional to minor water stains and iron oxide coats throughout. | | | | |
| | | | Meta Mafic: (xenolith?) black, biotite rich, fine grained foliated igneous rock with occasional quartz. Locally increased iron staining but no increase in water. | | | | |
| | | | Granite: pink to pinky grey, medium to coarse grained, quartz, orthoclase, biotite plus trace clear mica (muscovite?). Extremely weathered at top grading to fresh at 26m. Mildly foliated in places. Trace water stains and iron oxide coats. Last 2 m not logged due no sample collected. | | FWS (56m)<br>damp sample (66m)<br>minor water (77m)<br>EOH (78m) | 273mm OD Blank Steel Casing<br>1.6mm - 3.2mm Graded Gravel<br>53mm ID Blank PVC CL12 (0.43magl - 66mbgl)<br>53mm ID Slotted PVC CL12 (1mm slots) (66mbgl - 78mbgl)<br>Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM007

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 15/06/2017
**Completed:** 16/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-78m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-78m = 6"

**Area:** Lake Wells
**Elevation:**
**Easting:** 504379
**Northing:** 6974065
**Projection:** GDA 94 zone 51

**Static Water Level:** 13.83 (mbtoc) **Date:** 17/06/2017
**Remarks:** 0.42m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion Diagram | Well Completion Notes |
|---|---|---|---|---|---|---|---|
| 0 – 6 | | | Alluvium: red brown loose soil with calcrete and lithics. | | | 273mm OD Blank Steel Casing | |
| 6 – 16 | | | Granite: Calcrete, lithics and pisolites, overall light grey and orange. Lithics mostly after extremely weathered granite. | | | | |
| 16 – 24 | | | Granite: light grey and orange, extremely weathered, mostly plagioclase and mafics. Iron oxide coats and stains throughout. | | | | |
| 24 – 26 | | | Meta Granite: "Pink Quartzite", fresh, purple/pink fine to coarse grained massive rock. Fracture Zone. | | Fracture zone, rubbly zone (24m - 36m) | 1.6mm - 3.2mm Graded Gravel | |
| 26 – 32 | | | Meta Granite: slightly weathered, light grey, foliated. Plagioclase>quartz>mafics except where foliated - mafics dominate. Fracture Zone. | | | 53mm ID Blank PVC CL12 (0.42magl - 66mbgl) | |
| 32 – 36 | | | Meta Granite: "Pink Quartzite", fresh, purple/pink fine to coarse grained massive rock. Fracture Zone. Iron oxide coats and stains | | | | |
| 36 – 42 | | | Meta Granite: fresh, light grey, foliated. Plagioclase>quartz>mafics except where foliated - mafics dominate. | | | | |
| 42 – 48 | | | Meta Granite: fresh, light grey and pink, occassionally foliated. Plagioclase>quartz>mafics except where foliated - mafics dominate. Minor to trace iron coats and stains. | | | | |
| 48 – 78 | | | Meta Granite: fresh, light grey, Occasionally foliated. Plagioclase>quartz>mafics except where foliated - mafics dominate. Fracture Zone. | | EOH (78m) | 53mm ID Slotted PVC CL12 (1mm slots) (66mbgl - 78mbgl) | |
| | | | | | | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM008

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 17/06/2017
**Completed:** 19/06/2017
**Drilled:** Ausdrill
**Logged By:** Australian Potash

**Method:** 0-72m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-72m = 6"

**Area:** Lake Wells
**Elevation:**
**Easting:** 503762
**Northing:** 6975508
**Projection:** GDA 94 zone 51

**Static Water Level:** 18.95 (mbtoc) **Date:** 29/06/2017
**Remarks:** 0.37m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: red brown soil with lithics, quartz etc. | | | 273mm OD Blank Steel Casing | |
| | | | Quartzite: light creamy white, very fine grained, massive, iron oxide coats and stains throughout. | | | | |
| 10 | | | Granite: extremely weathered, mostly green grey but minor pink, medium to coarse grained, plagioclase, quartz, mafics (including biotite), and green alteration or weathering. Occasional biotite schist lenses. Some quartzite chips as above but possibly up hole contamination. Iron oxide coats and stains throughout. | | | | |
| | | | Quartzite: light creamy white, very fine grained, massive, iron oxide coats and stains throughout. | | | | |
| 20 | | | Granite: extremely weathered, mostly green grey but minor pink, medium to coarse grained, plagioclase, quartz, mafics (including biotite), and green alteration or weathering. Occasional biotite schist lenses. Some quartzite chips as above but possibly up hole contamination. Iron oxide coats and stains throughout. | | rubble zone (22m - 26m) | | |
| | | | Granite: strongly weathered, pink and yellow brown (when weathered), medium to coarse grained. Iron oxide coats and stains throughout. Rubble zone 22 to 26m, possible pagmatic phase. | | | | |
| 30 | | | | | | 53mm ID Blank PVC CL12 (0.37magl - 60mbgl) | |
| | | | Granite: moderately weathered, light grey, plagioclase, mafics and quartz. Trace iron oxide coats and stains, but strong manganese coatings in/ on joints and partings. | | | | |
| 40 | | | Pegmatite: coarse quartz, pink and white feldspars. Manganese coats and minor water stains. | | | | |
| | | | Granite: fresh, light pinky grey. Occasional iron and manganese coats and stains. | | | | |
| 50 | | | | | | | |
| | | | Meta Mafic: black, mafics and plagioclase, very fine to fine grained, mildly foliated, no iron oxide stains or coats. | | | | |
| | | | Meta Granite: fresh, light pinky grey. Occasional iron and manganese coats and stains. | | | | |
| 60 | | | Meta Mafic: black, mafics and plagioclase, very fine to fine grained, mildly foliated, no iron oxide stains or coats. | | | 53mm ID Slotted PVC CL12 (1mm slots) (60mbgl - 72mbgl) | |
| | | | | | | Fallback | |
| 70 | | | Granite: pink, orthoclase and plagioclase, quartz, mafics, no iron stains. | | EOH (72m) | | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM009

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 19/06/2017
**Completed:** 20/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-72m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-72m = 5"

**Area:** Lake Wells
**Elevation:**
**Easting:** 501373
**Northing:** 6975328
**Projection:** GDA 94 zone 51

**Static Water Level:** 11.93 (mbtoc) **Date:** 20/07/2017
**Remarks:** 0.43m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: red brown loose soil with trace calcrete and extremely weathered rock fragments. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Quartzite: extremely weathered, pink, orange and light grey. | | | | |
| 20 | | | Meta Mafic: dark grey to black, khkai where weathered, massive to foliated, iron stains and coats on faces. | | | | |
| | | | Granite: extremely weathered to weathered, pink, orange and light grey. | | | | |
| 30 | | | Meta Granite: fresh, mostly grey with occasional pink phases, massive to slightly foliated. Mafics 5 to 15%, plagioclase>orthoclase>quartz. Occasional to trace iron oxide stains. | | FWS. dry sample (32m) fracture (33m) | 53mm ID Blank PVC CL12 (0.43magl - 60mbgl) | |
| 40 | | | | | Airlift = 0.1 (L/s). bucket test (42m) | | |
| 50 | | | | | fracture (51.5m) | | |
| 60 | | | | | | 53mm ID Slotted PVC CL12 (1mm slots) (60mbgl - 72mbgl) | |
| 70 | | | | | Airlift = 0.30 (L/s). EOH (72m) Completed Bore: EC = 11000 uS/cm | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM010

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 21/06/2017
**Completed:** 22/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-72m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-72m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 508461
**Northing:** 6977079
**Projection:** GDA 94 zone 51

**Static Water Level:** 16.93 (mbtoc) **Date:** 29/06/2017
**Remarks:** 0.42m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: red brown silty soil with extremely weathered granite, clear quartz and calcrete (?) fragments. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Granite: extremely weathered, white, orange and brown, angular clear quartz up to 10 mm, occasional smokey vein quartz. Feldspars weathered to orange and white, occasional muscovite. Water stains and iron oxide coats throughout. | | FWS, soft broken ground (21m) | | |
| 20 | | | Quartzite: (recrystalised granite?), pink, yellow brown and cream, siliceous, massive rock. Pink is fine grained granite, yellow brown is iron oxide and water stained fine grained strongly weathered granite. | | Fracture (25.5m) | | |
| 30 | | | Granite: pink, medium grained, strongly weathered, massive to foliated. Pink is orthoclase. Water stains and iron oxide coats throughout. | | Increase in water (29m)<br>Airlift = 0.5 (L/s) (30m)<br>Picked up water in soft ground (31.5m) | 53mm ID Blank PVC CL12 (0.42magl - 60mbgl) | |
| 40 | | | Meta Granite: moderately weathered, light grey to pinky grey, fine to medium grained, weakly foliated rock. Mostly plagioclase with up to 5 % mafics.Iron oxide coats and stains on joints and fractures. | | Airlift = 1 (L/s) (36m)<br>fracture zone (36 - 38m) | | |
| 50 | | | Granite: fresh, light grey, variously foliated. Iron oxide coats and stains common to 56m, then trace to EOH. | | Airlift = 0.8 (L/s). EC = 1465 uS/cm (42m)<br>Airlift = 0.8 (L/s). EC = 1456 uS/cm (48m)<br>Fracture. EC = 1482 uS/cm (53.5m) | | |
| 60 | | | | | EC = 1468 uS/cm (60m) | 53mm ID Slotted PVC CL12 (1mm slots) (60mbgl - 72mbgl) | |
| 70 | | | | | Airlift = 0.9 (L/s). EC = 1412 uS/cm (66m)<br>Airlift = 0.8 (L/s). EOH (72m)<br>Completed Bore: EC = 1519 uS/cm | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM011

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 29/06/2017
**Completed:** 29/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-50m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 12"
5.5-50m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 510295
**Northing:** 6980875
**Projection:** GDA 94 zone 51

**Static Water Level:** 6.64 (mbtoc) **Date:** 1/07/2017
**Remarks:** 0.35m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: red brown loose soil with rock fragments,clay, sand, silt. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Alluvium: red brown alluvium, sand and pebbles, subrounded to rounded. | | | 53mm ID Blank PVC CL12 (0.35magl - 16mbgl) | |
| 20 | | | Meta Mafic: grey metamorphic, massive, weakly weathered, iron oxide stained surfaces present. | | | 53mm ID Slotted PVC CL12 (1mm slots) (16mbgl - 28mbgl) | |
| 30 | | | Meta Mafic: grey metamorphic, massive, some chips are micaceous and foliated, iron stained surfaces abundant, some quartz. | | rod stuck in hole, formation may be very fractured (32m) | | |
| 40 | | | | | | Fallback | |
| 50 | | | | | can't drill deeper, no returns, water flowing from production bore 30m away. EOH (50m) | | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM012

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 30/06/2017
**Completed:** 1/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-72m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 12"
5.5-72m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 510006
**Northing:** 6979785
**Projection:** GDA 94 zone 51

**Static Water Level:** 9.29 (mbtoc) **Date:** 23/07/2017
**Remarks:** 0.23m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 5 | | | Alluvium: red brown loose soil. | | | 273mm OD Blank Steel Casing | |
| 5 – 10 | | | Alluvium: red brown soil with some cemented soil, some black stains, magnetite? Fragments. | | | | |
| 10 – 15 | | | Alluvium: subrounded sand to fine gravel. | | | | |
| 15 – 50 | | | Meta Mafic: grey metamorphic,massive, highly weathered solid fragments many weathered on all surfaces, abundant light green to brown soft clay. | | first moisture (14m)<br>very small amount of water <0.1 (L/s) (26m)<br>very small amount of water (33m) | 50mm ID Blank PVC CL12 (0.23magl - 65mbgl) | |
| 50 – 60 | | | Meta Mafic: dark grey metamorphic, massive,fresh, pyrite present in grey metamorphic and quartz veins. | | fracture, no water (61m) | | |
| 60 – 70 | | | Meta Mafic: grey-green metanorphic, massive fresh, pyrite in small flecks. | | | 50mm ID Slotted PVC CL12 (1mm slots) (65mbgl - 71mbgl)<br>Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM013

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 4/07/2017
**Completed:** 5/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-84m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 11"
6-84m = 6"

**Area:** Lake Wells
**Elevation:**
**Easting:** 516733
**Northing:** 6976874
**Projection:** GDA 94 zone 51

**Static Water Level:** 23.31 (mbtoc) **Date:** 23/07/2017
**Remarks:** 0.33m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: soil, silty, red brown, transported. | | | 203mm ID Blank Steel Casing | |
| | | | Siltstone: silty sandy, red-brown and pale yellow-brown, indurated transported material.Sand mostly angular to rounded, spherical to elongate. | | | | |
| 10 | | | Granite: extremely weathered, khaki, fine to coarse quartz, feldspar, biotite and trace muscovite, iron oxide staining throughout. Pink aplite vein 10 to 12m, thence occasionally. | | | | |
| 20 | | | Granite: strongly weathered, dark green, fine to coarse quartz, feldspar, biotite and trace muscovite, iron oxide staining throughout. Occasional pink aplite veins. | | | 53mm ID Blank PVC CL12 (0.33magl - 48mbgl) | |
| 30 | | | | | | | |
| 40 | | | | | | | |
| 50 | | | Granite: fresh. Fractured zone. Iron oxides common unil 54m. | | Airlft = 0.1 (L/s). Salty. (52m) | 53mm ID Slotted PVC CL12 (1mm slots) (48mbgl - 54mbgl) | |
| | | | Granite: fresh. No iron oxides. | | | | |
| 60 | | | Granite: fresh. Trace iron oxides as joint coatings. | | | | |
| | | | Granite: fresh. Fractured zone 66 to 68m with iron staining, otherwise occaional iron oxides on joints. | | | 53mm ID Blank PVC CL12 (54mbgl - 78mbgl) | |
| 70 | | | | | | | |
| 80 | | | | | EOH (84m) | 53mm ID Slotted PVC CL12 (1mm slots) (78mbg -l 84mbgl) | |
| | | | | | | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM014

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 24/07/2017
**Completed:** 24/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-48m = Conv Mud
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-48m = 6.5"

**Area:** Lake Wells
**Elevation:**
**Easting:** 515828
**Northing:** 6982022
**Projection:** GDA 94 zone 51

**Static Water Level:** 7.36 (mbtoc)
**Date:** 27/07/2017
**Remarks:** 0.40m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram / Notes |
|---|---|---|---|---|---|---|
| 0 – 10 | | | Alluvium: top soils, gravels and sand to gritty, sandy clay and possibly calcrete. | | Seepage (10m) | 203mm ID Blank Steel Casing; 53mm ID Blank PVC CL12 (0.40magl - 24mbgl) |
| 20 | | | Sand and Sandy Clay: with gravels of calcrete, possible paleo-channel. | | Cavity, sandy clay and calcrete (22 - 25m); Airlift = 1.5 (L/s) (24m) | |
| 30 | | | Sand and Sandy Clay | | Airlift = 3 (L/s) (30m) | 53mm ID Slotted PVC CL12 (1mm slots) (24mbgl - 48mbgl) |
| 40 | | | Sand and Sandy Clay | | Airlift = 4 (L/s) (42m) | |
| | | | Clay: Red clay. | | EOH (48m) | Fallback |
| 50 | | | | | | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM015

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 10/07/2017
**Completed:** 11/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-78m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-78m = 6"

**Area:** Lake Wells
**Elevation:**
**Easting:**
**Northing:**
**Projection:** GDA 94 zone 51

**Static Water Level:** 35.97 (mbtoc) **Date:** 22/07/2017
**Remarks:** 0.34m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: Red-brown, gritty clay (completely weather granite?). | | | 203mm ID Blank Steel Casing | |
| 10 | | | Quartz Veining | | | 53mm ID Blank PVC CL12 (0.34magl - 14mbgl) | |
| | | | Granite: Brown, gritty clay (completely weathered granite). | | Seepage (10m) | | |
| 20 | | | Quartz Veining | | Cavity, sandy clay and calcrete (22 - 25m) | | |
| | | | Granite: Brown, gritty clay (completely weathered granite). | | Airlift = 1.5 (L/s) (24m) | | |
| 30 | | | Quartz Veining | | | | |
| | | | Granite: Brown, gritty clay (completely weathered granite). | | Airlift = 3 (L/s) (30m) | | |
| 40 | | | Granite: Brown, gritty clay (completely weathered granite). | | | | |
| | | | Granite: Pink-brown, weathered granite, completely weathered to clay in parts. | | Airlift = 4 (L/s) (42m) | 53mm ID Slotted PVC CL12 (1mm slots) (14mbgl - 78mbgl) | |
| 50 | | | | | | | |
| 60 | | | Granite: Very silicous. | | | | |
| | | | Granite: Grey, little weathering. | | | | |
| 70 | | | | | | | |
| 80 | | | | | EOH (78m) | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM016

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 13/07/2017
**Completed:** 14/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-78m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-78m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 536786
**Northing:** 6962808
**Projection:** GDA 94 zone 51

**Static Water Level:** 20.01 (mbtoc) **Date:**
**Remarks:** 0.49m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 6 | | | Sand: red brown, well sorted, unconsolidated, fine to medium grained, quartz dominant dune sand. | | | 12" ND Blank Steel Casing | |
| 6 – 10 | | | Gravel: red brown, angular, cemented ironstone derived gravel. | | | | |
| 10 – 12 | | | Sand: brown, fine to medium grained, indurated quartz sands + minor clay. | | | | |
| 12 – 16 | | | Gravel: light brown, strongly weathered, calcretised, granite derived gravels + clay. | | | | |
| 16 – 18 | | | Gravel: light brown to cream, strongly oxidised, calcretised, granite derived gravels. | | | | |
| 18 – 44 | | | Granite: soft, white, strongly oxidised, kaolinite rich clays and granite dervived quartz grains. | | No flow (0 - 40m) | 53mm ID Blank PVC CL12 (0.49magl - 64.7mbgl) | |
| 41 | | | | | Seepage (41m) | | |
| 44 – 54 | | | Granite: moderately oxidised, cream to light brown, coarse grained, angular, pink plagioclase rich biotite granite. | | No flow (41 - 66m) | | |
| 54 – 78 | | | Granite: pink to brown, fresh, coarse grained, angular, plagioclase rich biotite granite. | | Airlift = 0.1 (L/s). EOH (78m) | 53mm ID Slotted PVC CL12 (1mm slots) (64.7mbgl - 76.7mbgl) | |
| 78 | | | | | | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRM017

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 14/07/2017
**Completed:** 15/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-69m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-69m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 515806
**Northing:** 6986948
**Projection:** GDA 94 zone 51

**Static Water Level:** 19.05 (mbtoc) **Date:** 23/07/2017
**Remarks:** 0.46m Stick up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram / Notes |
|---|---|---|---|---|---|---|
| 0 – 6 | | | Clay: brown strongly oxided saprolitic clay. | | | 12" ND Blank Steel Casing |
| 6 – 14 | | | Clay: yellow brown to brown, strongly oxided saprolitic clay + abundant calcite/gypsum. | | | |
| 14 – 15 | | | Mafic: red brown strongly oxidised mafic. | | | |
| 15 – 26 | | | Meta Basalt: brown to blue weakly oxidised, fine grained, foliated, amphibole rich, crystalline metabasalt. | | | |
| 26 – 69 | | | Meta Basalt: mostly blue weakly oxidised to fresh, fine grained, foliated, amphibole rich, crystalline metabasalt. | | Fracture (50.2m)<br>Fracture (52m)<br>Fracture (53.3m)<br>Fracture (64m)<br>EOH. Dry hole (69m) | 53mm ID Blank PVC CL12 (0.46magl - 54mbgl)<br>53mm ID Slotted PVC CL12 (1mm slots) (54mbgl - 66mbgl)<br>Fallback |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP001

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 29/05/2017
**Completed:** 31/05/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-67m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 11"
2-67m = 6", 5.5-67m = 6"

**Area:** Lake Wells
**Elevation:**
**Easting:** 507171
**Northing:** 6978217
**Projection:** GDA 94 zone 51

**Static Water Level:** 15.13 (mbtoc) **Date:** 21/07/2017
**Remarks:** 0.53m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Colluvium: Medium brown, coarse sand and clays. Alluvial material. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Saprolite: AMPHIBOLITE, light grey to green black, strongly weathered to 26m then mostly fresh, fine to coarse grained mafics with minor feldspar and trace quartz, massive to foliated. Trace iron oxide staines and coats. | | Airlift = 0.2 (L/s)<br>Minor fracture, hard dolerite (11m)<br>FWS<br>Airlift = 0.2 (L/s) | 149.9mm ID Blank PVC CL12 (0.53magl - 12.5mbgl) | |
| 20 | | | | | Broken ground (20m)<br>Major fracture (22.5m)<br>Airlift = 0.2 (L/s)<br>Broken ground (23m)<br>Soft drilling (26.5m)<br>Very hard drilling (28m)<br>Airlift = 0.1 (L/s) | | |
| 30 | | | | | Extremely hard drilling (28.5m)<br>Airlift = 0.1 (L/s) | 1.6mm - 3.2mm Graded Gravel | |
| 40 | | | | | Airlift = 0.2 (L/s) | 149.9mm ID Slotted PVC CL12 (1mm slots) (12.5mbgl - 66.5mbgl) | |
| 50 | | | | | Airlift = 0.2 (L/s) | | |
| 60 | | | | | Soft drilling (52m)<br>Airlift = 0.2 (L/s)<br>Soft drilling (54m)<br>Airlift = 0.2 (L/s) | | |
| 70 | | | | | Completed Airlift 2/6/17 - 0.2 (L/s)<br>EOH. | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP002

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 6/06/2017
**Completed:** 9/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-70m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 11"
5.5-70m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 503227
**Northing:** 6977923
**Projection:** GDA 94 zone 51

**Static Water Level:** 23.41 (mbtoc) **Date:** 18/06/2017
**Remarks:** 0.29m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: transported alluvim Light brown/ red brown, silt to coarse sand and gravels (lithics), minor calcrete. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Mudstone: calcrete or extremely weather mudstone (?), cream, fine grained, iron oxide and manganese stains and coatings on joint and fracture faces, no clay. | | | | |
| 20 | | | Quartzite: light brown, massive, microcrystaline, siliceous and hard, Fe oxide and Mn coats. Occasional softer material (carbonate/dolomite?). Broken ground and very large chips (>10cm). | | FWS. (25m) | 149.9mm ID Blank PVC CL12 (0.29magl - 33.5mbgl) | |
| 30 | | | Meta Volcanic: light grey (fresh) to khaki (altered), hard, massive siliceous microcrystaline groundmass with occasional white blebs (possibly after feldspar), with occasional softer light brown folliated rock (meta claystone/siltstone ?). Common large sample chips (>10 cm), typically with joint faces and Fe oxide and Mn coats and stains. | | Fracture zone/broken ground, lost circulation 28 - 36m, air exiting old dry well ( 503177 mE, 6977929 mN, 18m deep approx 50m north of LWFRM005), which was plugged. | 149.9mm ID Slotted PVC CL12 (1mm slots) (33.5mbgl - 39.5mbgl) | |
| 40 | | | Meta Mafic: black, very fine grained groundmass, weakly foliated, occasional light medium to coarse white blebs. Occasional quartz veining. Occasional iron oxide coats and water stains throughout. | | Airlift = >10 (L/s). (38m). | 149.9mm ID Blank PVC CL12 (39.5mbgl - 51.5mbgl) | |
| 50 | | | | | Airlift = > 8 (L/s). Broken ground, fractured material @46m. | | |
| 60 | | | Meta Mafic: as above, (basalt/dolerite?), black, very fine grained groundmass, weakly foliated, occasional light medium to coarse white blebs. Trace iron oxide coats and water stains, with completely filled (annealed) joint voids. | | No airlift due to lost circulation (re-established once drilling again). (56m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (51.5mbgl - 63.5mbgl) | |
| 70 | | | | | Airlift ~15 to 20 (L/s). Too much water to measure, v-notch not feasible without major earthworks and delay - will hydraulic test later. (58m) | 149.9mm ID Blank PVC CL12 (63.5mbgl - 69.5mbgl) | |
| | | | | | Airlift = > 10 (L/s). Some lost circulation. (70m) EOH. | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP003

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 13/06/2017
**Completed:** 14/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-78m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 11"
5.5-78m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 504381
**Northing:** 6974056
**Projection:** GDA 94 zone 51

**Static Water Level:** 13.83 (mbtoc) **Date:** 17/06/2017
**Remarks:** 0.46m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: transported alluvim Light brown/ red brown, silt to coarse sand and gravels (lithics), minor calcrete, extremely weathered. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Granite: extremely weathered, with cream, orange, pink and light brown lithics. Trace bioite schist. Iron oxides and stains throughout. | | | | |
| 20 | | | Granite: pink, extremely weathered grading down to weathered, with occasional pink "quartzite" ( rubbly around 23.5 and 25.5, large > 5cm chips). Orthoclase >plagioclase>quartz>mafics. Occasional bioite schist. Fractures at 27.5, 28 to 28.5 and 29.5m. Iron oxide coats and stains throughout. | | FWS. (20.5m)<br>Rubbly - Drillers observation. (23.5m)<br>Airlft = 1.7 (L/s). bucket test. EC = 1263 uS/cm. (24m)<br>Rubbly - Drillers observation. (25.5m) | 149.9mm ID Blank PVC CL12 (0.46magl - 30mbgl)<br>1.6mm - 3.2mm Graded Gravel | |
| 30 | | | Granite: light grey, fresh from 34m. Mostly white feldspars with mafic (mostly biotite) flecks throughout. Occasional mafic-rich intervals (xenoliths?) Driller reports "gravelly" zone 33 to 33.2m. Large joint bounded chips (> 3 cm) in 34 to 36m sample interval. Occasional iron oxide coats and stains. | | Airlift = 3.5 to 4 (L/s) estimate. (30m)<br>Driller reports "gravelly" zone. (33 - 33.2m)<br>Rubble zone - large joint bounded chips (> 3 cm). (34-36m)<br>Airlift = 5 (L/s) estimate. (36m)<br>Airlift = 2 (L/s) estimate. (42m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (30mbgl - 36mbgl) | |
| 40 | | | Granite: light grey, fresh, as above, but with occasional pink phases and black, very fine grained foliated mafic phases. Occasional iron oxide coats and stains. | | | | |
| 50 | | | Granite: meta granite, pink, orthoclase >plagioclase>quartz>mafics. Trace iron oxies and stains. | | Airlift = 3.0 (L/s) bucket test. (48m)<br>Airlift = 3.5 (L/s) bucket test. EC = 1273 uS/cm. (54m) | 149.9mm ID Blank PVC CL12 (36mbgl - 66mbgl) | |
| 60 | | | | | | | |
| 70 | | | | | Airlft = 4 to 5 (L/s) estimate. EC = 2400 uS/cm. (66m)<br>Airlft = 4 to 5 (L/s) estimate. EC = 2200 uS/cm. (72m)<br>Airlft = 4.6 (L/s) bucket test. EC = 2720 uS/cm. (78m)<br>EOH. Completed Bore: EC = 2490 uS/cm. | 149.9mm ID Slotted PVC CL12 (1mm slots) (66mbgl - 78mbgl)<br>Fallback | |
| 80 | | | | | | | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP004

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 16/06/2017
**Completed:** 17/06/2017
**Drilled:** Ausdrill NW
**Logged By:** Acqua Drill

**Method:** 0-78m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 12"
5.5-78m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 503759
**Northing:** 6975519
**Projection:** GDA 94 zone 51

**Static Water Level:** 19.17 (mbtoc) **Date:** 29/06/2017

**Remarks:** 0.45m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: transported soil red brown, with clay and quartz chips. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Granite: clayey red brown soil with major quartzite chips and boulders, with dark (mafic) inclusions. | | | | |
| | | | Granite: extremely weathered, green grey with clear vein quartz chips. Other quartz is milky with dark inclusions. Iron oxide coats and stains throughout. | | | 149.9mm ID Blank PVC CL12 (0.45magl - 24mbgl) | |
| | | | Quartzite: white to orange with mafic inclusions. Massive but highly fractured (broken ground) Iron oxide coats and stains throughout. | | | | |
| 20 | | | Granite: extremely weathered, sample clayey and dark green but only quartz grains coated in green weathered mineral are retained in seive. | | | | |
| | | | Quartzite: white and orange quartz, massive Iron oxides and stains throughout. Very coarse chips from 20 to 24m. | | FWS. Airlift = 1.5 (L/s). (23m) | 1.6mm - 3.2mm Graded Gravel | |
| | | | Pegmatite Vein: large quartz and pink feldspar chips. Trace blue/green massive clay. | | Driller observed fractures (25.5, 28, 28.5, 29 and 29.5m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (24mbgl - 30mbgl) | |
| 30 | | | Quartzite: white and orange quartz, massive,Iron oxides and stains throughout. | | Airlift ~ 8 to 10 (L/s) estimate (30m) | | |
| | | | Granite: light grey, quartz has mafic inclusions. Possibly with pegmatic phases given large quartz chips (>5mm). Iron oxide coats and stains throughout. | | Airlift ~ 8 (L/s) estimate (36m) | | |
| 40 | | | Granodiorite: light grey, mostly quartz and white feldspar with minor biotite and mafics, with occasional pink (alkali feldspar?) intervals . Common iron oxide coats and stains on joint and defect faces. | | Fractures (drillers observation) (37 and 39.5m) | | |
| | | | | | Fracture zone 40-46m | | |
| | | | | | Airlift ~ 8 (L/s) estimate (42m) | 149.9mm ID Blank PVC CL12 (30mbgl - 60mbgl) | |
| 50 | | | | | Airlift ~ 8 (L/s) estimate (48m) | | |
| | | | | | Fracture (drillers observation) (53m) | | |
| | | | | | Airlift ~ 8 (L/s) estimate (54m) | | |
| | | | | | Numerous fractures (58 - 62m) | | |
| 60 | | | | | Airlift ~ 8 (L/s) estimate (60m) | | |
| | | | | | Fracture (65.5m) | | |
| | | | Meta Mafic: (Gabbro?), black fine to medium grained (occasionally coarse) mafics and white feldspar, wealky foliated. Minor iron oxide coats and stains possibly on contact fracture, but otherwise no coats or stains observed. | | Airlift ~ 8 (L/s) estimate. EC = 3000uS/cm. (66m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (60mbgl - 72mbgl) | |
| 70 | | | | | Airlift ~ 6.7 (L/s) measured. EC = 3050 uS/cm. (72m) Completed Bore. EC = 3080 uS/cm. | Fallback | |
| 80 | | | | | EOH. | | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP005A

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 22/06/2017
**Completed:** 23/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-84m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 12"
5.5-78m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 511073
**Northing:** 6976024
**Projection:** GDA 94 zone 51

**Static Water Level:** 20.44 (mbtoc) **Date:** 29/06/2017
**Remarks:** 0.29m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: soil, red brown, loose, silty with weathered rock fragments and quartz boulders/pebbles. | | | 273mm OD Blank Steel Casing | |
| 10 | | | Granite: extremely weathered, dark green grey due to mafics. | | | | |
| | | | Granite: weakly weathered, pink, fine to coarse grained, massive, large chips (previously described as "Quartzite"). Iron oxide coats and stains throughout. | | | 149.9mm ID Blank PVC CL12 (0.29magl - 36mbgl) | |
| 20 | | | Granite: as above but strongly to extremely weathered and sample grains generally small (rarely > 2mm). | | | 1.6mm - 3.2mm Graded Gravel | |
| 30 | | | Granite: moderately weathered, pink, fine to coarse grained, massive, large chips (>5 cm) due to strongly jointed rock. "Broken ground" reported at approximately 35.5m. Iron oxide coats and stains throughout. | | FWS in fracture. (34m) Broken ground (35.5m) | | |
| | | | Granite: slightly weathered to 39m then fresh, deep reddish pink, fine to coarse grained, massive, large chips. Iron oxide coats and stains throughout. | | | | |
| 40 | | | Granite: fresh, dark pink, massive. Main feldspar orthoclase with subordinate plagioclase, quartz and mafics. Mafic increasing with depth till dark pinky grey from 48 m. Trace water stains but Mn joint coatings common. Large sample chips from 76 to 78m. | | AirIft = 1.35 (L/s). "Fresh" water. (40 - 42m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (36mbgl - 42mbgl) | |
| | | | | | AirIft = 1.57 (L/s). "Fresh" water. (46m) | | |
| 50 | | | | | AirIft = 1.33 (L/s). "Fresh" water. (54m) | | |
| | | | | | | 149.9mm ID Blank PVC CL12 (42mbgl - 72mbgl) | |
| 60 | | | | | AirIft = 1.54 (L/s). "Fresh" water. (60m) | | |
| | | | | | 5 to 10 cm void (67.5m) | | |
| 70 | | | | | | | |
| | | | | | AirIft = 1.71 (L/s). "Fresh" water. (78m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (72mbgl - 84mbgl) | |
| 80 | | | | | AirIft = 1.52 (L/s). "Fresh" water. (84m) | | |
| | | | | | EOH. | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP005B

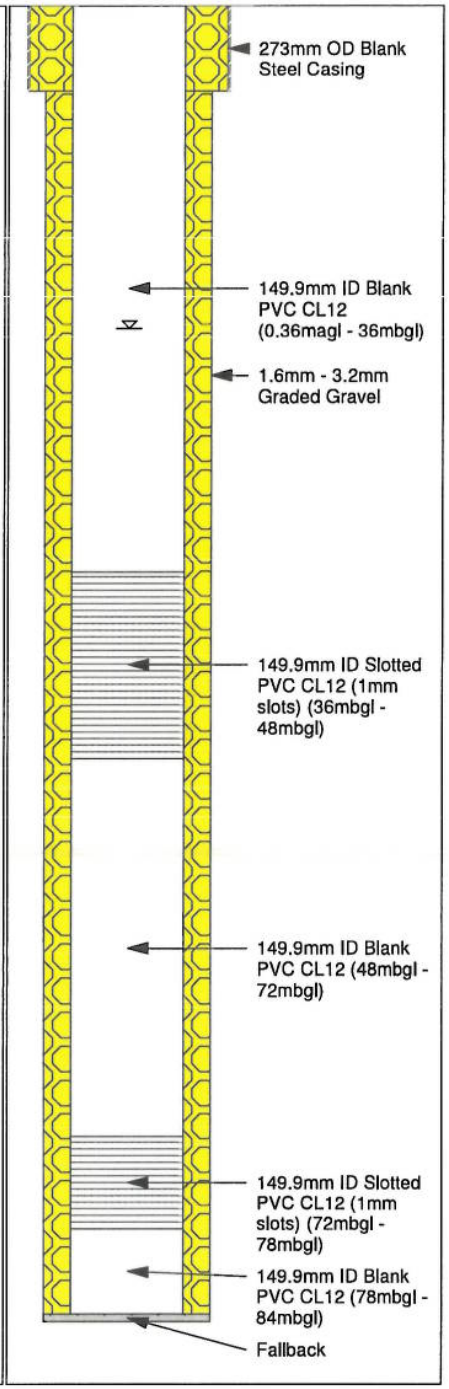
**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 23/06/2017
**Completed:** 26/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-84m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 12"
5.5-84m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 511080
**Northing:** 6976017
**Projection:** GDA 94 zone 51

**Static Water Level:** 20.53 (mbtoc) **Date:** 29/06/2017
**Remarks:** 0.36m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 34 | | | Alluvium: red brown soil, loose with sand, silt, clay, and rock fragments<br>Granite: yellow-white weathered | | FWS in fracture. (33m)<br>Airlift = 1.5 (L/s) (36m)<br>Fractures (37 and 39m)<br>Airlift = 2 (L/s) (42m)<br>Fractures (44.5 and 47.5m)<br>Airlift = 2.5 (L/s) (48m)<br>Airlift = 2.5 (L/s) (54m)<br>Fracture (55m)<br>Airlift = 3 (L/s) (60m)<br>Soft ground (60.5m)<br>Fracture (62m)<br>Airlift = 3 (L/s) (66m)<br>5 to 10 cm void (67.5m)<br>Fracture (69m)<br>Soft ground (70m)<br>Airlift = 3.5 (L/s) (72m)<br>Airlift = 3.5 (L/s) (78m)<br>Airlift = 3.5 (L/s) (84m)<br>EOH. Completed Bore: EC = 1586 uS/cm. Airlift = 1.2 (L/s). (84m) |  | 273mm OD Blank Steel Casing<br>149.9mm ID Blank PVC CL12 (0.36magl - 36mbgl)<br>1.6mm - 3.2mm Graded Gravel<br>149.9mm ID Slotted PVC CL12 (1mm slots) (36mbgl - 48mbgl)<br>149.9mm ID Blank PVC CL12 (48mbgl - 72mbgl)<br>149.9mm ID Slotted PVC CL12 (1mm slots) (72mbgl - 78mbgl)<br>149.9mm ID Blank PVC CL12 (78mbgl - 84mbgl)<br>Fallback |
| 34 – 84 | | | Granite: grey, fresh with pink feldspar and biotite | | | | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP006

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 27/06/2017
**Completed:** 27/06/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-66m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-5.5m = 12"
5.5-66m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 510279
**Northing:** 6980859
**Projection:** GDA 94 zone 51

**Static Water Level:** 6.96 (mbtoc) **Date:** 29/06/2017 **Remarks:** 0.42m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: Soil, red-brn, loose, silty with weathered rock fragments. | | | 273mm OD Blank Steel Casing | |
| | | | Ferricrete: red-brown. | | | | |
| 10 | | | Saprolite: red-brown weathered rock fragments, larger fragments iron stained on all sides. | | FWS, very little flow (10m) | 149.9mm ID Blank PVC CL12 (0.42magl - 22mbgl) | |
| 20 | | | | | Airlift = 0.5 (L/s) (18m) | | |
| | | | Saprolite: light green, almost white highly weathered rock fragments. | | Airlift = 1.3 (L/s) (24m) | 1.6mm - 3.2mm Graded Gravel | |
| 30 | | | Basalt: dark green-grey weathered, foliated basalt, iron stained fracture surfaces, many fragments iron stained on all surfaces. | | Airlift = 1.9 (L/s) (30m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (22mbgl - 34mbgl) | |
| | | | Basalt: dark green-grey foliated basalt, some micaceous foliation surfaces, iron stained fracture surfaces. | | | 149.9mm ID Blank PVC CL12 (34mbgl - 40mbgl) | |
| 40 | | | | | Airlift = 2.8 (L/s). conductance = 162uS (42m) | | |
| 50 | | | | | | 149.9mm ID Slotted PVC CL12 (1mm slots) (40mbgl - 52mbgl) | |
| | | | | | Airlift = 3.4 (L/s) (54m) | | |
| 60 | | | | | | 149.9mm ID Blank PVC CL12 (52mbgl - 64mbgl) | |
| | | | | | Slow drilling | | |
| | | | | | Airlift = 4 (L/s) (66m) | Fallback | |
| 70 | | | | | EOH. Completed Bore: EC = 188 uS/cm. (66m) | | |

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Well No: LWFRP006

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# COMPOSITE WELL LOG

**Bore No:** LWFRP007

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 2/07/2017
**Completed:** 3/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-84m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 11"
6-84m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 516759
**Northing:** 6976875
**Projection:** GDA 94 zone 51

**Static Water Level:** 23.30 (mbtoc) **Date:** 23/07/2017
**Remarks:** 0.34m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram / Notes |
|---|---|---|---|---|---|---|
| 0 | | | Alluvium: soil, silty, red brown, transported. | | | 273mm OD Blank Steel Casing |
| | | | Siltstone: silty sandy, red-brown and pale yellow-brown, indurated transported material.Sand mostly angular to rounded, spherical to elongate. | | | |
| 10 | | | Granite: extremely weathered, khaki, fine to coarse quartz, feldspar, biotite and trace muscovite, iron oxide staining throughout. Pink aplite vein 10 to 12m, thence occasionally. | | | 149.9mm ID Blank PVC CL12 (0.34magl - 36mbgl) |
| 20 | | | Granite: strongly weathered, dark green, fine to coarse quartz, feldspar, biotite and trace muscovite, iron oxide staining throughout. Occasional pink aplite veins. | | | 1.6mm - 3.2mm Graded Gravel |
| 30 | | | | | | |
| 40 | | | | | Wet sample (42m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (36mbgl - 48mbgl) |
| 50 | | | Granite: fresh. Fractured zone. Iron oxides common unil 54m. | | Airlift = 1.5 (L/s) (48m) | 149.9mm ID Blank PVC CL12 (48mbgl - 54mbgl) |
| | | | Granite: fresh. No iron oxides. | | | 149.9mm ID Slotted PVC CL12 (1mm slots) (54mbgl - 60mbgl) |
| 60 | | | Granite: fresh. Trace iron oxides as joint coatings. | | Airlift = 1.5 (L/s) (60m) | |
| | | | Granite: fresh. Fractured zone 66 to 68m with iron staining, otherwise occaional iron oxides on joints. | | | 149.9mm ID Blank PVC CL12 (60mbgl - 72mbgl) |
| 70 | | | | | | |
| 80 | | | | | EOH. | 149.9mm ID Slotted PVC CL12 (1mm slots) (72mbgl - 84mbgl) |
| | | | | | | Fallback |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP008

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 5/07/2017
**Completed:** 6/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-52m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-52m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 515818
**Northing:** 6982006
**Projection:** GDA 94 zone 51

**Static Water Level:** 7.45 (mbtoc) **Date:** 21/07/2017
**Remarks:** 0.36m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 10 | | | Alluvium: top soils, gravels and sand to gritty, sandy clay and possibly calcrete. | | FWS (10m)<br>Airlift = 0.1 (L/s) (18m) | 273mm OD Blank Steel Casing<br>149.9mm ID Blank PVC CL12 (0.36magl - 23.8mbgl) | |
| 20 | | | Sand and Sandy Clay: with gravels of calcrete, possible paleo-channel. | | Airlift = 1.5 (L/s). (21m) | | |
| 30 | | | Sand and Sandy Clay | | Airlift = 4 (L/s). (30m)<br>Airlift = 4.5 (L/s) (36m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (23.8mbgl - 41.8mbgl) | |
| 40 | | | Sand and Sandy Clay | | Airlift = 5 (L/s). (42m) | | |
| | | | Clay: Red clay. | | | Fallback | |
| 50 | | | Clay: Gritty clay and possibly calcrete. | | Airlift = 3 (L/s). (48m) | | |
| | | | | | EOH. Completed Bore: EC = 138800 uS/cm. (52m) | | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP009

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 8/07/2017
**Completed:** 10/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-93m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-93m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 528367
**Northing:** 6988477
**Projection:** GDA 94 zone 51

**Static Water Level:** 36.12 (mbtoc) **Date:** 25/07/2017
**Remarks:** 0.32m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 | | | Alluvium: Red-brown, gritty clay (completely weather granite?). | | | 273mm OD Blank Steel Casing | |
| | | | Quartz Veining | | | | |
| 10 | | | Granite: Brown, gritty clay (completely weathered granite). | | | | |
| | | | Quartz Veining | | | | |
| 20 | | | Granite: Brown, gritty clay (completely weathered granite). | | | 1.6mm - 3.2mm Graded Gravel | |
| | | | Quartz Veining | | | 149.9mm ID Blank PVC CL12 (0.32magl - 53.9mbgl) | |
| 30 | | | Granite: Brown, gritty clay (completely weathered granite). | | | ▽ | |
| | | | Granite: Brown, gritty clay (completely weathered granite). | | Airlift = 0.5 (L/s) (42m) | | |
| 40 | | | Granite: Pink-brown, weathered granite, completely weathered to clay in parts. | | Airlift = 1 (L/s) (48m) | | |
| 50 | | | | | Airlift = 1.5 (L/s) (56m) | | |
| | | | Granite: Very silicous. | | Fracture (60m) | | |
| 60 | | | Granite: Grey, little weathering. | | Airlift = 1 (L/s) (65.5m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (53.9mbgl - 71.9mbgl) | |
| | | | | | Broken drilling (67m) Fracture (68m) | | |
| 70 | | | | | Soft drilling - like sand (70m) | 149.9mm ID Blank PVC CL12 (71.9mbgl - 77.9mbgl) | |
| 80 | | | | | | 149.9mm ID Slotted PVC CL12 (1mm slots) (77.9mbgl - 83.9mbgl) | |
| | | | | | | 149.9mm ID Blank PVC CL12 (83.9mbgl - 89.9mbgl) | |
| 90 | | | | | Airlift = 2 (L/s) (90m) EOH. Completed Bore: EC = 138800 uS/cm. | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP010

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 16/07/2017
**Completed:** 17/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-72m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-72m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 504365
**Northing:** 6980914
**Projection:** GDA 94 zone 51

**Static Water Level:** 10.28 (mbtoc) **Date:** 22/07/2017
**Remarks:** 0.46m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion | |
|---|---|---|---|---|---|---|---|
| | | | | | | Diagram | Notes |
| 0 | | | Alluvium: red brown dune sand + common, weakly, oxidised, dark blue/black, fine to medium grained mafic. | | | 273mm OD Blank Steel Casing | |
| | | | Mafic: dark blue/black, fine to medium grained, weakly oxidised crystalline mafic. | | | 149.9mm ID Blank PVC CL12 (0.46magl - 11.5mbgl) | |
| 10 | | | Dolerite: dark blue/black, fine to medium grained, fresh crystalline dolerite. | | Airlift = 1 (L/s). water flow at 14m ~1 (L/s) (12m) | | |
| | | | | | Airlift = 1 (L/s) (18m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (11.5mbgl - 17.5mbgl) | |
| 20 | | | Intrusive: grey, fine to coarse grained, weakly oxidised, porphyritic intermediate intrusive. | | | | |
| | | | Dolerite: dark blue/black, fine to medium grained, fresh dolerite. | | Airlift = 1 (L/s). EC = 5000 to 5500 uS/cm. (24m) | 1.6mm - 3.2mm Graded Gravel | |
| 30 | | | | | Airlift = 1 (L/s) (30m) | | |
| | | | | | Airlift = 1 (L/s) (36m) | 149.9mm ID Blank PVC CL12 (17.5mbgl - 47.5mbgl) | |
| 40 | | | Dolerite: white, fine to coarse grained, felsic porphyry + dolerite. | | | | |
| | | | Dolerite: dark blue/black, fine to medium grained, fresh dolerite, minor quartz veining. | | Airlift = 1 (L/s) (42m) | | |
| 50 | | | | | Airlift = 1.2 (L/s). incrementally more water flow ~1.2 (L/s). EC = 15000 uS/cm. (48m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (47.5mbgl - 53.5mbgl) | |
| | | | | | Airlift = 1.2 (L/s) (54m) | | |
| 60 | | | | | Airlift = 1.2 (L/s) (60m) | 149.9mm ID Blank PVC CL12 (53.5mbgl - 65.5mbgl) | |
| | | | | | Airlift = 1.2 (L/s) (64m) | | |
| 70 | | | | | Airlift = 1.2 (L/s). EC = 25000 uS/cm. (68m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (65.5mbgl - 71.5mbgl) | |
| | | | | | EOH. | Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP011

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 18/07/2017
**Completed:** 20/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-74m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-74m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 504359
**Northing:** 6980912
**Projection:** GDA 94 zone 51

**Static Water Level:** 10.24 (mbtoc) **Date:** 22/07/2017
**Remarks:** 0.42m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 6 | | | Alluvium: weakly, oxidised, dark blue/black, fine to medium grained mafic + minor red brown sand. | | Airlift = 1.5 (L/s).(20m) | 273mm OD Blank Steel Casing | |
| 6 – 16 | | | Dolerite: dark blue/black, fine to medium grained, weakly oxidised dolerite. | | | 149.9mm ID Blank PVC CL12 (0.42magl - 18mbgl) | |
| 16 – 18 | | | Porphyry: softer moderately oxidised medium to coarse grained intermediate porphyry. | | | 1.6mm - 3.2mm Graded Gravel | |
| 18 – 24 | | | Dolerite: weakly oxidised, dark blue/black, fine to medium grained dolerite. | | Airlift = 1.5 (L/s) (24m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (18mbgl - 24mbgl) | |
| 24 – 36 | | | Dolerite: dark blue/black fine to medium grained fresh dolerite. | | Airlift = 1.5 (L/s) (30m) | 149.9mm ID Blank PVC CL12 (24mbgl - 36mbgl) | |
| 36 – 38 | | | Dolerite: wealy oxidised, white, fine to coarse grained felsic porphyry + common dolerite. | | Airlift = 1.545 (L/s) (36m) Flow increased at 38-41m | 149.9mm ID Slotted PVC CL12 (1mm slots) (36mbgl - 42mbgl) | |
| 38 – 74 | | | Dolerite: dark blue/black, fine to medium grained, fresh dolerite, minor quartz veining. | | Airlift = 1.8 (L/s) (42m)<br>Airlift = 1.8 (L/s). EC = 85000 uS/cm. (48m)<br>Airlift = 1.8 (L/s) (54m)<br>Airlift = 1.8 (L/s) (60m)<br>Airlift = 1.8 (L/s) (64m)<br>Airlift = 1.8 (L/s) (68m)<br>Airlift = 1.8 (L/s). Completed Bore: EC = 185000 uS/cm. (72m)<br>EOH. (74m) | 149.9mm ID Blank PVC CL12 (42mbgl - 66mbgl)<br>149.9mm ID Slotted PVC CL12 (1mm slots) (66mbgl - 72mbgl)<br>Fallback | |

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# COMPOSITE WELL LOG

**Bore No:** LWFRP012 (4A)

**Client:** Australian Potash
**Project:** Lake Wells Potash Project

**Commenced:** 20/07/2017
**Completed:** 21/07/2017
**Drilled:** Acqua Drill
**Logged By:** Australian Potash

**Method:** 0-66m = Conv Hammer
**Fluid:** Air
**Bit Record:** 0-6m = 12"
6-66m = 9"

**Area:** Lake Wells
**Elevation:**
**Easting:** 508469
**Northing:** 6977091
**Projection:** GDA 94 zone 51

**Static Water Level:** 16.51 (mbtoc) **Date:** 26/07/2017
**Remarks:** 0.15m Stick Up

| Depth (mbgl) | Strat | Graphic Log | Lithological Description | Aquifer | Field Notes | Well Completion: Diagram | Well Completion: Notes |
|---|---|---|---|---|---|---|---|
| 0 – 10 | | | Alluvium: red brown surface sands + strongly oxidised ferruginous chips. Hardpan: red brown ferruginous hardpan gravels with strongly weathered angular ferruginous granite fragments. Saprolite: white, strongly weathered and kaolinised granite leaving quartz gravels and kaolin clay. Weak plasticity. | | | 273mm OD Blank Steel Casing; 149.9mm ID Blank PVC CL12 (0.15magl - 24mbgl); 1.6mm - 3.2mm Graded Gravel | |
| 10 – 20 | | | Granite: white, weakly weathered coarse grained crystalline, felsic granite chips minor Fe staining. | | water flow ~1.5( L/s) (20m) | | |
| 20 – 30 | | | | | Airlift = 4 (L/s). EC = 2000uS/cm. (24m) | | |
| 30 – 40 | | | | | Airlift = 4 (L/s) (30m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (24mbgl - 36mbgl) | |
| 40 – 50 | | | Granite: white fresh, grey-white, coarse grained, felsic granite often foliated. | | Airlift = 4 (L/s). EC = 2000 uS/cm. (42m) | 149.9mm ID Blank PVC CL12 (36mbgl - 48mbgl) | |
| 50 – 60 | | | | | Airlift = 4 (L/s) (48m) | 149.9mm ID Slotted PVC CL12 (1mm slots) (48mbgl - 54mbgl) | |
| | | | | | Airlift = 4 (L/s) (54m) | | |
| | | | | | Airlift = 4 (L/s). EC = 2000 uS/cm. (60m) | 149.9mm ID Blank PVC CL12 (60mbgl - 65.8mbgl) | |
| | | | | | EOH. | Fallback | |

**APPENDIX B**

GROUNDWATER ELEVATION DATA (2017-2019)

| Bore ID | Easting | Northing | Top of Casing RL | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LWDRM001 | 492,407.77 | 6,983,719.14 | 449.10 | N/D | N/D | N/D | N/D | N/D | N/D | 14/11/17 | 47.84 | 401.26 | N/D | N/D | N/D | N/D | N/D | N/D | 17/10/2019 | 3.14 | 445.96 |
| LWDRM002 | 497,530.85 | 6,986,613.02 | 447.60 | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/17 | 2.64 | 444.96 | N/D | N/D | N/D | 14/12/2018 | 3.10 | 444.50 | 17/10/2019 | 4.70 | 442.90 |
| LWDRM003 | 497,529.96 | 6,986,622.00 | 447.60 | N/D | N/D | N/D | 18/10/2017 | 3.00 | 444.60 | 13/11/17 | 2.57 | 445.03 | N/D | N/D | N/D | 14/12/2018 | 3.07 | 444.53 | 17/10/2019 | 3.89 | 443.71 |
| LWDRM004 | 494,440.04 | 6,986,515.05 | 448.69 | N/D | N/D | N/D | N/D | N/D | N/D | 14/11/17 | 5.92 | 442.77 | N/D | N/D | N/D | 27/11/2018 | 5.89 | 442.80 | 17/10/2019 | 5.96 | 442.74 |
| LWDRM005 | 494,396.89 | 6,986,522.68 | 448.63 | N/D | N/D | N/D | 18/10/2007 | 5.00 | 443.63 | 14/11/17 | 4.60 | 444.03 | 24/05/2018 | 4.00 | 444.63 | 27/11/2018 | 4.30 | 444.33 | 17/10/2019 | 4.26 | 444.37 |
| LWDRM006 | 492,438.38 | 6,983,721.61 | 448.91 | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/17 | 4.09 | 444.82 | N/D | N/D | N/D | 27/11/2018 | 5.08 | 443.83 | 17/10/2019 | 4.69 | 444.22 |
| LWDRP001 | 497,537.96 | 6,986,641.54 | 447.16 | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/17 | 2.23 | 444.93 | N/D | N/D | N/D | 14/12/2018 | 2.55 | 444.61 | 17/10/2019 | 3.57 | 443.60 |
| LWDRP002 | 494,411.29 | 6,986,520.15 | 448.39 | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/17 | 3.65 | 444.74 | N/D | N/D | N/D | 12/12/2018 | 3.66 | 444.73 | 17/10/2019 | 3.62 | 444.77 |
| LWFRP006 | 510,277.52 | 6,980,854.62 | 452.02 | 29/06/2017 | 6.96 | 445.06 | 17/10/2017 | 6.00 | 446.02 | N/D | N/D | N/D | 25/05/2018 | 7.00 | 445.02 | 13/11/2018 | 5.48 | 446.54 | 17/10/2019 | 7.21 | 444.81 |
| LWFRP008 | 515,818.45 | 6,982,006.16 | 451.35 | 21/07/2017 | 7.45 | 443.90 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D |
| LWFRP009 | 528,365.51 | 6,988,475.89 | 481.30 | 25/07/2017 | 36.12 | 445.18 | 17/10/2017 | 35.00 | 446.30 | N/D | N/D | N/D | 26/05/2018 | 38.00 | 443.30 | 15/12/2018 | 36.84 | 444.46 | 17/10/2019 | 36.25 | 445.05 |
| LWFRP010 | 504,359.92 | 6,980,924.40 | 456.44 | 22/07/2017 | 10.28 | 446.16 | 16/10/2017 | 10.59 | 445.85 | N/D | N/D | N/D | 24/05/2018 | 9.98 | 446.46 | 13/11/2018 | 10.05 | 446.39 | 17/10/2019 | 10.27 | 446.17 |
| LWFRP011 | 504,359.51 | 6,980,910.15 | 456.38 | 22/07/2017 | 10.24 | 446.14 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 9.97 | 446.41 | 17/10/2019 | 10.19 | 446.19 |
| LWFRM011 | 510,293.10 | 6,980,875.13 | 451.78 | 1/07/2017 | 6.64 | 445.14 | 17/10/2017 | 6.00 | 445.78 | N/D | N/D | N/D | 25/05/2018 | 5.40 | 446.38 | 13/11/2018 | 5.84 | 445.94 | 17/10/2019 | 6.39 | 445.39 |
| LWFRM012 | 510,005.82 | 6,979,784.84 | 455.90 | 23/07/2017 | 9.29 | 446.61 | 18/10/2017 | 9.00 | 446.90 | N/D | N/D | N/D | 25/05/2019 | 11.54 | 444.36 | 13/11/2018 | 10.99 | 444.91 | 17/10/2019 | 11.23 | 444.67 |
| LWFRM014R | 515,836.33 | 6,982,000.94 | 451.63 | 27/07/2017 | 7.36 | 444.27 | 17/10/2017 | 6.00 | 445.63 | N/D | N/D | N/D | 25/05/2018 | 7.54 | 444.09 | 13/11/2018 | 6.85 | 444.78 | 17/10/2019 | 7.29 | 444.34 |
| LWFRM015 | 528,374.78 | 6,988,466.42 | 481.41 | 22/07/2017 | 35.97 | 445.44 | 17/10/2017 | 40.00 | 441.41 | N/D | N/D | N/D | N/D | N/D | N/D | 15/12/2018 | 36.35 | 445.06 | 17/10/2019 | 35.85 | 445.57 |
| PLAC002 | 503,666.05 | 6,986,261.92 | 445.87 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 29/11/2018 | 1.22 | 444.65 | 17/10/2019 | 1.83 | 444.04 |
| PLAC003 | 504,410.69 | 6,986,866.05 | 459.73 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 29/11/2018 | 1.50 | 458.23 | 17/10/2019 | N/D | N/D |
| PLAC004 | 502,862.24 | 6,989,580.10 | 445.76 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 29/11/2018 | 0.44 | 445.32 | 17/10/2019 | N/D | N/D |
| PLAC006 | 501,478.99 | 6,989,303.64 | 447.91 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 15/11/2018 | 3.24 | 444.67 | 17/10/2019 | 3.33 | 444.59 |
| PLAC009 | 502,288.94 | 6,985,444.85 | 447.08 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/12/2018 | 1.26 | 445.82 | 17/10/2019 | 2.56 | 444.52 |
| PLAC010 | 501,396.48 | 6,984,205.10 | 445.77 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 30/11/2018 | 1.20 | 444.57 | 17/10/2019 | 1.26 | 444.51 |
| PLAC018 | 501,343.83 | 6,985,429.53 | 446.69 | 24/06/2017 | 1.91 | 444.78 | 18/10/2017 | 2.00 | 444.69 | 12/11/17 | 1.90 | 444.79 | 27/05/2018 | 1.80 | 444.89 | N/D | N/D | N/D | 17/10/2019 | 2.25 | 444.44 |
| PLAC019 | 520,414.06 | 6,983,278.38 | 444.48 | 24/06/2017 | 0.80 | 443.68 | N/D | N/D | N/D | 13/11/17 | 0.87 | 443.61 | N/D | N/D | N/D | N/D | N/D | N/D | 17/10/2019 | 0.08 | 444.40 |
| PLAC020 | 523,823.13 | 6,982,465.91 | 444.48 | 24/06/2017 | 1.44 | 443.04 | N/D | N/D | N/D | 13/11/17 | 1.32 | 443.16 | N/D | N/D | N/D | N/D | N/D | N/D | 17/10/2019 | 1.83 | 442.65 |
| PLAC021 | 529,839.81 | 6,983,430.92 | 448.31 | 24/06/2017 | 5.78 | 442.53 | N/D | N/D | N/D | 13/11/17 | 5.83 | 442.48 | N/D | N/D | N/D | N/D | N/D | N/D | 17/10/2019 | 5.94 | 442.36 |
| PLAC022 | 509,757.15 | 6,983,325.17 | 449.45 | 24/06/2017 | 5.03 | 444.42 | N/D | N/D | N/D | 13/11/17 | 5.04 | 444.41 | N/D | N/D | N/D | 13/11/2018 | 4.39 | 445.06 | 17/10/2019 | 5.12 | 444.33 |
| PLAC024 | 494,458.48 | 6,989,992.46 | 447.98 | 24/06/2017 | 1.86 | 446.12 | N/D | N/D | N/D | 16/11/17 | 1.85 | 446.13 | N/D | N/D | N/D | 13/12/2018 | 2.32 | 445.66 | 17/10/2019 | 2.05 | 445.93 |
| PLAC025 | 497,500.35 | 6,986,618.73 | 448.24 | 24/06/2017 | 2.79 | 445.45 | N/D | N/D | N/D | 16/11/17 | 2.61 | 445.63 | N/D | N/D | N/D | 27/11/2018 | 2.80 | 445.44 | 17/10/2019 | 2.69 | 445.55 |
| PLAC026 | 492,427.95 | 6,983,713.02 | 448.77 | 24/06/2017 | 4.34 | 444.43 | 18/10/2017 | 5.00 | 443.77 | 14/11/17 | 4.11 | 444.66 | 24/05/2018 | 4.00 | 444.77 | 27/11/2018 | 2.43 | 446.34 | 17/10/2019 | 4.49 | 444.27 |
| PLAC027 | 494,503.28 | 6,976,879.88 | 450.27 | 24/06/2017 | 4.32 | 445.95 | N/D | N/D | N/D | 15/11/17 | 4.4 | 445.87 | N/D | N/D | N/D | 30/11/2018 | 4.57 | 445.70 | 17/10/2019 | 4.48 | 445.79 |
| PLAC028 | 509,898.86 | 6,982,552.61 | 449.81 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 3.01 | 446.80 | 17/10/2019 | 4.34 | 445.47 |
| PLAC029 | 515,302.47 | 6,982,655.65 | 451.57 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 5.94 | 445.63 | 17/10/2019 | 6.77 | 444.81 |
| PLAC030 | 506,499.64 | 6,982,145.24 | 449.06 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 3.40 | 445.66 | 17/10/2019 | 3.89 | 445.18 |
| PLAC031 | 509,717.44 | 6,982,268.07 | 449.50 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 3.87 | 445.63 | 17/10/2019 | 4.26 | 445.24 |
| PLAC032 | 512,971.62 | 6,982,786.75 | 456.33 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 11.78 | 444.55 | 17/10/2019 | 11.47 | 444.86 |
| PLRC001 | 512,982.56 | 6,982,791.67 | 457.20 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 11.25 | 445.95 | 17/10/2019 | 12.54 | 444.66 |
| PLRC004 | 540,337.07 | 6,988,903.80 | 442.54 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 6.22 | 436.32 | 17/10/2019 | 4.55 | 437.99 |
| PLRC005 | 493,509.27 | 6,974,415.04 | 450.89 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 4.81 | 446.08 | 17/10/2019 | 4.99 | 445.90 |
| PLRC008 | 499,029.23 | 6,982,584.61 | 449.52 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 15/11/2018 | 4.85 | 444.67 | 17/10/2019 | 4.92 | 444.60 |
| PLRC009 | 492,073.82 | 6,991,314.97 | 450.08 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 17/10/2019 | 3.98 | 446.10 |
| PLRC010 | 491,561.69 | 6,990,950.58 | 450.95 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 17/10/2019 | 4.87 | 446.08 |
| PLRC011 | 506,694.12 | 6,982,702.52 | 451.46 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 6.17 | 445.29 | 17/10/2019 | 6.71 | 444.75 |
| PLRC012 | 506,694.71 | 6,981,395.48 | 451.75 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 13/11/2018 | 6.84 | 444.91 | 17/10/2019 | 6.63 | 445.12 |
| PLWDD001 | 501,331.39 | 6,985,395.46 | 446.01 | 24/06/2017 | 1.03 | 444.98 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 27/11/2018 | 0.53 | 445.48 | 17/10/2019 | 2.01 | 444.00 |
| PLWDD002 | 494,432.74 | 6,986,505.78 | 448.54 | 28/06/2017 | 7.31 | 441.23 | N/D | N/D | N/D | 21/11/17 | 6.14 | 442.40 | N/D | N/D | N/D | 13/12/2018 | 6.15 | 442.39 | 17/10/2019 | 6.10 | 442.44 |
| PLWDD003 | 492,409.66 | 6,983,712.86 | 448.75 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 27/11/2018 | 4.17 | 444.58 | 17/10/2019 | 4.19 | 444.56 |
| PLWDD004 | 497,510.75 | 6,986,593.19 | 448.26 | N/D | N/D | N/D | 5/03/2017 | 0.70 | 447.56 | N/D | N/D | N/D | N/D | N/D | N/D | 14/11/2018 | 2.81 | 445.45 | 17/10/2019 | 2.41 | 445.85 |
| PLWDD005 | 497,511.24 | 6,986,643.05 | 447.73 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 14/11/2018 | 2.21 | 445.52 | 17/10/2019 | 3.16 | 444.57 |
| TPB001 | 501,353.35 | 6,985,418.08 | 447.00 | 27/06/2017 | 2.61 | 444.39 | N/D | N/D | N/D | 12/11/17 | 2.55 | 444.45 | N/D | N/D | N/D | 13/12/2018 | 2.86 | 444.14 | 17/10/2019 | 2.77 | 444.23 |
| TPB002 | 501,342.98 | 6,985,397.96 | 446.84 | 27/06/2017 | 3.42 | 443.42 | N/D | N/D | N/D | 12/11/17 | 2.5 | 444.34 | N/D | N/D | N/D | 13/12/2018 | 2.41 | 444.43 | 17/10/2019 | 10.67 | 436.17 |
| TPB003 | 492,414.01 | 6,983,734.12 | 448.71 | 27/06/2017 | 8.47 | 440.24 | N/D | N/D | N/D | 18/11/17 | 59.6 | 389.11 | N/D | N/D | N/D | 14/12/2018 | 7.45 | 441.26 | 17/10/2019 | 7.33 | 441.38 |

| Bore ID | Easting | Northing | Top of Casing RL | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | Date | DTW (m btoc) | SWL (m AHD) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PLRC016 | 499,896.28 | 6,969,555.23 | 453.78 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 4.39 | 449.39 | 17/10/2019 | N/D | N/D | | |
| PLRC017 | 494,308.07 | 6,974,391.11 | 451.83 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 5.84 | 445.99 | 17/10/2019 | 5.29 | 446.54 | | |
| PLRC018 | 494,599.82 | 6,979,183.98 | 450.84 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 7.61 | 443.23 | 17/10/2019 | 5.87 | 444.97 | | |
| PLRC019 | 513,813.63 | 6,982,188.25 | 451.12 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 6.60 | 444.52 | 17/10/2019 | 6.18 | 444.93 | | |
| PLRC020 | 518,624.91 | 6,983,240.20 | 448.30 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 4.67 | 443.63 | 17/10/2019 | 4.25 | 444.05 | | |
| PLRC021 | 522,709.39 | 6,982,573.44 | 446.29 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 4.63 | 441.66 | 17/10/2019 | 4.14 | 442.16 | | |
| PLRC023 | 533,384.03 | 6,985,399.01 | 445.73 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 16/12/2018 | 3.68 | 442.05 | 17/10/2019 | 5.77 | 439.96 | | |
| PLMB001 | 501,362.66 | 6,985,408.61 | 447.61 | 28/06/2017 | 7.31 | 440.30 | N/D | N/D | N/D | 15/11/17 | 6.15 | 441.46 | N/D | N/D | N/D | N/D | N/D | N/D | 17/10/2019 | 14.34 | 433.27 | | |

Cells in red assumed erroneous and will be validated with subsequent work on site

**APPENDIX C**

LABORATORY ANALYTICAL RESULTS (GROUNDWATER)

LPD9001 LWFRP002
LPD9002 LWFRP005B
LPD9003 LWFRP004
LPD9004 LWFRP007
LPD9005 LWFRP007 (repeat)
LPD9006 LWFRP009
LPD9007 LWFRP012
LPD9008 LWFRP003
LPD9009 LWFRP011
LPD9010 LWFRP008
LPD9004 LWFRP006
LPD9010 LWFRP006 (repeat)

Bureau Veritas Minerals Pty Ltd
MINERAL TESTING & LABORATORY SERVICES
ABN: 30 008 127 802
58 Sorbonne Crescent Canning Vale
Perth WA 6155 Australia
Telephone (08) 9456 0404
Facsimile (08) 9456 0403

Reference: **u279403**
Date Finished: 31/08/2017
Order:
Project:
Date Received: 23/08/2017
Samples Analysed: **10**

# FINAL ANALYSIS REPORT

## Analysis of Mineral Samples

for

**Australian Potash Limited**

31 Ord Street West Perth Western Australia 6005

**Attention:** Mr C Kraut

**Authorised By:**

Tom Lowther
Operations Manager
Bureau Veritas Minerals Pty Ltd

Bureau Veritas Minerals Pty Ltd
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Perth WA 6155 Australia
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Facsimile (08) 9456 0403

**Reference:** u279403 **Order Number:**

| | Al mg/L | Sb mg/L | As mg/L | B mg/L |
|---|---|---|---|---|
| **Detection Limit** | 1 | 0.005 | 0.01 | 1 |
| LPD9001 | 3 | <0.005 | <0.01 | <1 |
| LPD9002 | 1 | 0.010 | <0.01 | 3 |
| LPD9003 | <1 | 0.010 | 0.01 | 2 |
| LPD9004 | 1 | <0.005 | <0.01 | 3 |
| LPD9004 Rpt | 2 | <0.005 | <0.01 | 2 |
| LPD9005 | 6 | <0.005 | <0.01 | <1 |
| LPD9006 | 1 | <0.005 | <0.01 | 3 |
| LPD9007 | 1 | <0.005 | <0.01 | 3 |
| LPD9008 | <1 | <0.005 | 0.08 | 1 |
| LPD9009 | 1 | <0.005 | 0.06 | 1 |
| LPD9010 | 1 | <0.005 | 0.08 | 3 |
| LPD9010 Rpt | <1 | <0.005 | 0.10 | 3 |
| Std Nominal | 100 | | | 2 |
| Determined | 100 | <0.005 | 0.01 | 3 |
| Std Nominal | <1 | | | <1 |
| Determined | 1 | 0.100 | 0.50 | 1 |
| Std Nominal | 4 | | | |
| Determined | 3 | 0.060 | 0.10 | 1 |
| Std Nominal | | | | |
| Determined | <1 | 1.15 | 1.00 | <1 |
| Std Nominal | | | | |
| Determined | <1 | 10.2 | 9.91 | 1 |
| Std Nominal | <1 | | | <1 |
| Determined | <1 | NR | NR | <1 |
| Std Nominal | | | | |
| Determined | <1 | NR | NR | 2 |

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Facsimile (08) 9456 0403

**Reference:** u279403 **Order Number:**

| | Be mg/L | Ba mg/L | Bi mg/L | Cd ug/L |
|---|---|---|---|---|
| **Detection Limit** | 0.005 | 0.01 | 0.001 | 10 |
| LPD9001 | <0.005 | 0.02 | 0.003 | <10 |
| LPD9002 | 0.010 | 0.06 | 0.005 | <10 |
| LPD9003 | 0.010 | 0.04 | 0.006 | <10 |
| LPD9004 | <0.005 | 0.04 | <0.001 | <10 |
| LPD9004 Rpt | <0.005 | 0.04 | <0.001 | <10 |
| LPD9005 | <0.005 | 0.04 | <0.001 | <10 |
| LPD9006 | <0.005 | 0.06 | <0.001 | <10 |
| LPD9007 | <0.005 | 0.05 | <0.001 | <10 |
| LPD9008 | <0.005 | 0.04 | <0.001 | <10 |
| LPD9009 | <0.005 | 0.03 | <0.001 | <10 |
| LPD9010 | <0.005 | 0.02 | <0.001 | <10 |
| LPD9010 Rpt | <0.005 | 0.02 | <0.001 | <10 |
| Std Nominal | | | | |
| Determined | <0.005 | <0.01 | <0.001 | <10 |
| Std Nominal | | | | |
| Determined | <0.005 | 2.27 | 0.100 | 100 |
| Std Nominal | | | | |
| Determined | 0.100 | 0.11 | 0.100 | 100 |
| Std Nominal | | | | |
| Determined | 1.00 | 1.00 | 1.00 | 1.00L |
| Std Nominal | | | | |
| Determined | 10.0 | 10.0 | 10.2 | 10.0L |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |

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Facsimile (08) 9456 0403

**Reference:** u279403 **Order Number:**

| | Cr mg/L | Co mg/L | Cu mg/L | Fe mg/L |
|---|---|---|---|---|
| **Detection Limit** | 0.5 | 0.5 | 0.5 | 1 |
| LPD9001 | 0.5 | 1.5 | 1.0 | <1 |
| LPD9002 | <0.5 | <0.5 | <0.5 | <1 |
| LPD9003 | <0.5 | <0.5 | 1.0 | <1 |
| LPD9004 | <0.5 | 0.5 | 1.0 | <1 |
| LPD9004 Rpt | <0.5 | <0.5 | 0.5 | <1 |
| LPD9005 | 0.5 | <0.5 | 0.5 | <1 |
| LPD9006 | <0.5 | 1.0 | 0.5 | 1 |
| LPD9007 | <0.5 | 0.5 | 1.5 | <1 |
| LPD9008 | 0.5 | 1.0 | 1.5 | <1 |
| LPD9009 | <0.5 | <0.5 | 1.0 | <1 |
| LPD9010 | <0.5 | 0.5 | <0.5 | <1 |
| LPD9010 Rpt | <0.5 | 1.0 | 0.5 | 1 |
| Std Nominal | 20.0 | 10.0 | 20.0 | 200 |
| Determined | 19.5 | 10.0 | 20.5 | 200 |
| Std Nominal | <0.5 | <0.5 | <0.5 | <1 |
| Determined | 0.5 | 0.5 | <0.5 | <1 |
| Std Nominal | | 1.0 | | 2 |
| Determined | <0.5 | 1.0 | 0.5 | 3 |
| Std Nominal | | | | |
| Determined | 0.5 | 1.0 | 1.0 | <1 |
| Std Nominal | | | | |
| Determined | <0.5 | 0.5 | <0.5 | <1 |
| Std Nominal | <0.5 | <0.5 | <0.5 | <1 |
| Determined | 0.5 | 0.5 | 0.5 | <1 |
| Std Nominal | | | | |
| Determined | 0.5 | <0.5 | 0.5 | <1 |

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Facsimile (08) 9456 0403

**Reference:** u279403 **Order Number:**

| | Li mg/L | Mn mg/L | Mo mg/L | Pr ug/L |
|---|---|---|---|---|
| **Detection Limit** | 0.05 | 0.5 | 0.01 | 2 |
| LPD9001 | 0.10 | <0.5 | 0.01 | <2 |
| LPD9002 | 0.05 | <0.5 | 0.01 | <2 |
| LPD9003 | 0.15 | <0.5 | 0.02 | <2 |
| LPD9004 | 0.05 | <0.5 | <0.01 | <2 |
| LPD9004 Rpt | 0.05 | <0.5 | <0.01 | <2 |
| LPD9005 | 0.10 | 0.5 | <0.01 | <2 |
| LPD9006 | 0.10 | <0.5 | <0.01 | <2 |
| LPD9007 | 0.10 | <0.5 | <0.01 | <2 |
| LPD9008 | <0.05 | 1.5 | <0.01 | <2 |
| LPD9009 | 0.15 | <0.5 | <0.01 | <2 |
| LPD9010 | 0.10 | 1.5 | <0.01 | <2 |
| LPD9010 Rpt | 0.10 | 1.5 | <0.01 | <2 |
| Std Nominal | | 20.0 | | |
| Determined | <0.05 | 20.0 | <0.01 | <2 |
| Std Nominal | | <0.5 | | |
| Determined | <0.05 | <0.5 | 0.10 | <2 |
| Std Nominal | | 1.5 | | |
| Determined | 0.10 | 2.0 | 0.10 | 108 |
| Std Nominal | | | | |
| Determined | 1.00 | <0.5 | 1.00 | 1.00L |
| Std Nominal | | | | |
| Determined | 10.0 | 0.5 | 10.0 | <2 |
| Std Nominal | | <0.5 | <0.01 | |
| Determined | NR | <0.5 | NR | NR |
| Std Nominal | | | | |
| Determined | NR | <0.5 | NR | NR |

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MINERAL TESTING & LABORATORY SERVICES

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58 Sorbonne Crescent Canning Vale
Perth WA 6155 Australia
Telephone (08) 9456 0404
Facsimile (08) 9456 0403

**Reference:** u279403 **Order Number:**

| | Rb ug/L | Se mg/L | Ag ug/L | Te mg/L |
|---|---|---|---|---|
| **Detection Limit** | 1 | 0.1 | 20 | 0.01 |
| LPD9001 | 17 | <0.1 | <20 | <0.01 |
| LPD9002 | 20 | <0.1 | <20 | <0.01 |
| LPD9003 | 21 | <0.1 | <20 | <0.01 |
| LPD9004 | 14 | <0.1 | <20 | <0.01 |
| LPD9004 Rpt | 13 | <0.1 | <20 | <0.01 |
| LPD9005 | 15 | <0.1 | <20 | <0.01 |
| LPD9006 | 7 | <0.1 | <20 | <0.01 |
| LPD9007 | 11 | <0.1 | <20 | <0.01 |
| LPD9008 | 384 | 0.2 | <20 | <0.01 |
| LPD9009 | 358 | 0.1 | <20 | <0.01 |
| LPD9010 | 458 | 0.1 | <20 | <0.01 |
| LPD9010 Rpt | 465 | 0.2 | <20 | <0.01 |
| Std Nominal | | | | |
| Determined | <1 | <0.1 | <20 | <0.01 |
| Std Nominal | | | | |
| Determined | <1 | <0.1 | 100 | <0.01 |
| Std Nominal | | | | |
| Determined | 71 | 0.1 | <20 | 0.10 |
| Std Nominal | | | | |
| Determined | 1.01L | 1.0 | <20 | 1.00 |
| Std Nominal | | | | |
| Determined | 10.0L | 10.0 | 10.0L | 10.0 |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |

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**Reference:** u279403 **Order Number:**

| | Th ug/L | U mg/L | Sn mg/L | V mg/L |
|---|---|---|---|---|
| **Detection Limit** | 5 | 0.01 | 0.02 | 0.5 |
| LPD9001 | <5 | 0.02 | <0.02 | 0.5 |
| LPD9002 | 5 | 0.02 | <0.02 | <0.5 |
| LPD9003 | 5 | 0.05 | <0.02 | <0.5 |
| LPD9004 | <5 | 0.03 | <0.02 | <0.5 |
| LPD9004 Rpt | <5 | 0.03 | <0.02 | 0.5 |
| LPD9005 | <5 | <0.01 | <0.02 | <0.5 |
| LPD9006 | <5 | <0.01 | <0.02 | <0.5 |
| LPD9007 | <5 | 0.03 | <0.02 | <0.5 |
| LPD9008 | <5 | <0.01 | <0.02 | 0.5 |
| LPD9009 | <5 | <0.01 | <0.02 | <0.5 |
| LPD9010 | <5 | <0.01 | <0.02 | <0.5 |
| LPD9010 Rpt | <5 | <0.01 | <0.02 | <0.5 |
| Std Nominal | | | | 20.0 |
| Determined | <5 | <0.01 | <0.02 | 20.0 |
| Std Nominal | | | | <0.5 |
| Determined | <5 | 0.10 | 0.08 | 0.5 |
| Std Nominal | | | | |
| Determined | 100 | 0.10 | 0.08 | <0.5 |
| Std Nominal | | | | |
| Determined | 1.00L | 1.00 | 1.00 | <0.5 |
| Std Nominal | | | | |
| Determined | 10.0L | 9.99 | 10.0 | <0.5 |
| Std Nominal | | | | <0.5 |
| Determined | NR | NR | NR | <0.5 |
| Std Nominal | | | | |
| Determined | NR | NR | NR | 0.5 |

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**Reference:** u279403 **Order Number:**

| | Y ug/L | Ca mg/L | Mg mg/L | Na mg/L |
|---|---|---|---|---|
| **Detection Limit** | 5 | 1 | 5 | 10 |
| LPD9001 | <5 | 79 | 60 | 180 |
| LPD9002 | 10 | 69 | 45 | 220 |
| LPD9003 | 10 | 110 | 105 | 370 |
| LPD9004 | <5 | 203 | 95 | 380 |
| LPD9004 Rpt | <5 | 201 | 100 | 380 |
| LPD9005 | <5 | 461 | 105 | 1340 |
| LPD9006 | <5 | 106 | 45 | 200 |
| LPD9007 | <5 | 92 | 55 | 390 |
| LPD9008 | <5 | 218 | 5240 | 39600 |
| LPD9009 | <5 | 508 | 5630 | 44600 |
| LPD9010 | <5 | 509 | 8250 | 64600 |
| LPD9010 Rpt | <5 | 513 | 8350 | 65200 |
| Std Nominal | | 100 | 105 | 2300 |
| Determined | <5 | 103 | 100 | 2320 |
| Std Nominal | | 1000 | 1000 | <10 |
| Determined | <5 | 1040 | 1040 | 20 |
| Std Nominal | | 2 | 10000 | <10 |
| Determined | 100 | 2 | 10100 | <10 |
| Std Nominal | | | | |
| Determined | 1.00L | 6 | 5 | 30 |
| Std Nominal | | 2000 | 2000 | 20000 |
| Determined | 10.0L | 1980 | 1960 | 19900 |
| Std Nominal | | <1 | <5 | 10000 |
| Determined | NR | <1 | 5 | 10000 |
| Std Nominal | | | | 100000 |
| Determined | NR | 1 | <5 | 99600 |

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**Reference:** u279403 **Order Number:**

| | K mg/L | Ni mg/L | Pb mg/L | S mg/L |
|---|---|---|---|---|
| **Detection Limit** | 10 | 0.5 | 0.05 | 10 |
| LPD9001 | <10 | 2.5 | <0.05 | 60 |
| LPD9002 | <10 | <0.5 | <0.05 | 40 |
| LPD9003 | <10 | 3.0 | <0.05 | 60 |
| LPD9004 | 30 | 1.0 | <0.05 | 100 |
| LPD9004 Rpt | 30 | 1.0 | <0.05 | 110 |
| LPD9005 | 40 | <0.5 | <0.05 | 140 |
| LPD9006 | <10 | 1.0 | <0.05 | 70 |
| LPD9007 | 20 | 0.5 | <0.05 | 50 |
| LPD9008 | 2100 | 2.0 | <0.05 | 4700 |
| LPD9009 | 2000 | 4.5 | <0.05 | 5670 |
| LPD9010 | 3090 | 2.0 | 0.05 | 8100 |
| LPD9010 Rpt | 3120 | 2.5 | 0.05 | 8080 |
| Std Nominal | 50 | 20.0 | | 70 |
| Determined | 50 | 20.0 | <0.05 | 70 |
| Std Nominal | <10 | <0.5 | | <10 |
| Determined | <10 | <0.5 | 0.20 | <10 |
| Std Nominal | | 1.0 | | |
| Determined | <10 | 0.5 | 0.10 | <10 |
| Std Nominal | 24400 | | | 10000 |
| Determined | 24600 | 0.5 | 1.00 | 10200 |
| Std Nominal | 9750 | | | 4000 |
| Determined | 9700 | 1.0 | 10.0 | 4000 |
| Std Nominal | <10 | <0.5 | <0.05 | <10 |
| Determined | 10 | <0.5 | NR | <10 |
| Std Nominal | | | | |
| Determined | 40 | 1.0 | NR | <10 |

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**Reference:** u279403 **Order Number:**

| | SO4 mg/L | Zn mg/L | Cl mg/L | TDS mg/L |
|---|---|---|---|---|
| **Detection Limit** | 10 | 0.5 | 50 | 50 |
| LPD9001 | 180 | <0.5 | 250 | A1.20000 |
| LPD9002 | 120 | <0.5 | 300 | A1.00000 |
| LPD9003 | 180 | 0.5 | 600 | A1.70000 |
| LPD9004 | 300 | <0.5 | 700 | A2.05000 |
| LPD9004 Rpt | 330 | <0.5 | 750 | A2.10000 |
| LPD9005 | 420 | <0.5 | 2500 | A5.65000 |
| LPD9006 | 210 | <0.5 | 300 | 950 |
| LPD9007 | 150 | <0.5 | 500 | A1.65000 |
| LPD9008 | 14100 | 1.5 | 63750 | A129.150 |
| LPD9009 | 17000 | 1.0 | 71000 | A146.450 |
| LPD9010 | 24300 | <0.5 | 103700 | A211.800 |
| LPD9010 Rpt | 24200 | <0.5 | 103900 | A211.700 |
| Std Nominal | 210 | 20.0 | | |
| Determined | 210 | 20.0 | 300 | A150.050 |
| Std Nominal | | <0.5 | | |
| Determined | <10 | <0.5 | 149600 | A251.850 |
| Std Nominal | | 1.0 | | |
| Determined | <10 | 1.5 | NR | NR |
| Std Nominal | 30000 | | | |
| Determined | 30600 | <0.5 | NR | NR |
| Std Nominal | 12000 | | | |
| Determined | 12000 | <0.5 | NR | NR |
| Std Nominal | <10 | <0.5 | | |
| Determined | <10 | <0.5 | NR | NR |
| Std Nominal | | | | |
| Determined | <10 | <0.5 | NR | NR |

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**Reference:** u279403 **Order Number:**

| | SG gm/cc | Alkalinity mg/L | HCO3 Alk mg/L | CO3 mg/L |
|---|---|---|---|---|
| **Detection Limit** | 0.01 | 10 | 10 | 10 |
| LPD9001 | 1.00 | 200 | 200 | <10 |
| LPD9002 | 1.00 | 140 | 140 | <10 |
| LPD9003 | 1.00 | 320 | 320 | <10 |
| LPD9004 | 1.00 | 150 | 150 | <10 |
| LPD9004 Rpt | IS | 150 | 150 | <10 |
| LPD9005 | 1.00 | 70 | 70 | <10 |
| LPD9006 | 1.00 | 80 | 80 | <10 |
| LPD9007 | 0.99 | 290 | 290 | <10 |
| LPD9008 | 1.08 | 120 | 120 | <10 |
| LPD9009 | 1.09 | 120 | 120 | <10 |
| LPD9010 | 1.14 | 70 | 70 | <10 |
| LPD9010 Rpt | IS | 80 | 80 | <10 |
| Std Nominal | | | | |
| Determined | 1.10 | NR | 60 | <10 |
| Std Nominal | | | | |
| Determined | NR | NR | 370 | 10 |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |
| Std Nominal | | | | |
| Determined | NR | NR | NR | NR |

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**Reference:** u279403 **Order Number:**

| | ANION meq/L | CATION meq/L |
|---|---|---|
| **Detection Limit** | 0.01 | 0.01 |
| LPD9001 | 14.8 | 17.0 |
| LPD9002 | 13.8 | 16.8 |
| LPD9003 | 27.1 | 30.2 |
| LPD9004 | 29.0 | 35.4 |
| LPD9004 Rpt | 31.0 | 35.8 |
| LPD9005 | 80.7 | 91.8 |
| LPD9006 | 14.4 | 17.9 |
| LPD9007 | 23.0 | 26.7 |
| LPD9008 | 2090 | 2220 |
| LPD9009 | 2360 | 2480 |
| LPD9010 | 3430 | 3590 |
| LPD9010 Rpt | 3440 | 3620 |
| Std Nominal | | |
| Determined | NR | NR |
| Std Nominal | | |
| Determined | NR | NR |
| Std Nominal | | |
| Determined | NR | NR |
| Std Nominal | | |
| Determined | NR | NR |
| Std Nominal | | |
| Determined | NR | NR |
| Std Nominal | | |
| Determined | NR | NR |
| Std Nominal | | |
| Determined | NR | NR |

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These results pertain to the samples as received at this laboratory.
Where standards are reported, the nominal value for the element is reported above the result found.

"IS" Implies insufficient sample for this determination

"NR" Implies result is not required for this determination

"L" Implies this result reported in mg/L

**Sample Storage**
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The excess material (Residue) will be held after 30 days

The pulp samples (Pulp) will be held after 60 days as per instructions.

**Sample Preparation**
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**Reference:** u279403 **Order Number:**

**Digest and Analysis:**
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Test for Alkalinity

Alkalinity,CO3,HCO3,Alk
have been determined volumetrically.

Samples have been evaporated to constant dryness at 180C. The remaining salt is cooled and analysed gravimetrically.

TDS
have been Gravimetric

Chloride in solution

Cl
have been determined volumetrically.

Density of the sample has been determined by liquid pycnometry. Density has been expressed in units of grams per cubic centimeter.

The solutions have not been treated other than by dilution.

Al,B,Ca,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,S,SO4,V,Zn
have been determined by Inductively Coupled Plasma (ICP) Optical Emission Spectrometry.
Ag,As,Ba,Be,Bi,Cd,Li,Mo,Pb,Pr,Rb,Sb,Se,Sn,Te,Th,U,Y
have been determined by Inductively Coupled Plasma (ICP) Mass Spectrometry.

ANION,CATION
have been calculated from other components assayed.