Appendix C: 2014 Monitoring Results and Interpretation

Quarterly monitoring of the pressure in artesian bores and water level in sub-artesian bores was undertaken in 2014 in accordance with the interim Groundwater Monitoring Plan. Monitoring was completed on seven bores which were considered representative of both “deep” and “shallow” bores in the area of greatest modelled drawdown in the 2013 UWIR.

Groundwater pressure and water level trends is presented in the 2014 Annual Groundwater Monitoring Report (Attachment B) and summarised below.

Pressure data, collected at three artesian bores (RN5028, RN5033 and RN5229) during each 2014 groundwater monitoring event is provided in Figure C-1, Figure C-2 and Figure C-3 respectively.

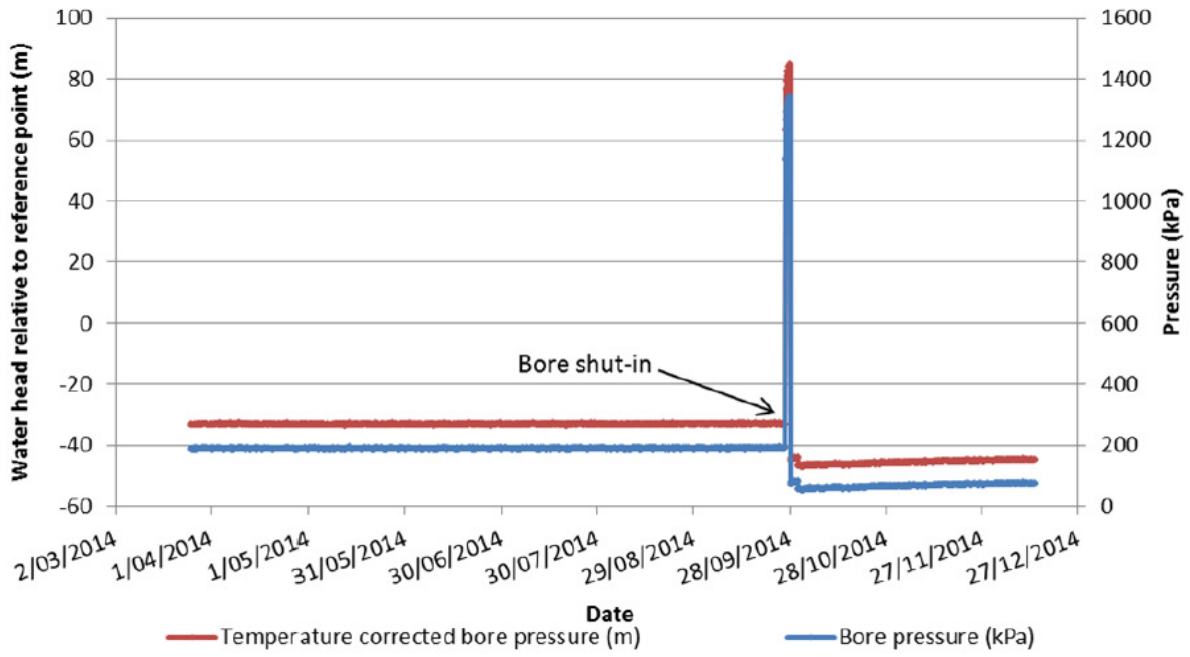

Figure C-1. Bore 5028 – 2014 Pressure Data

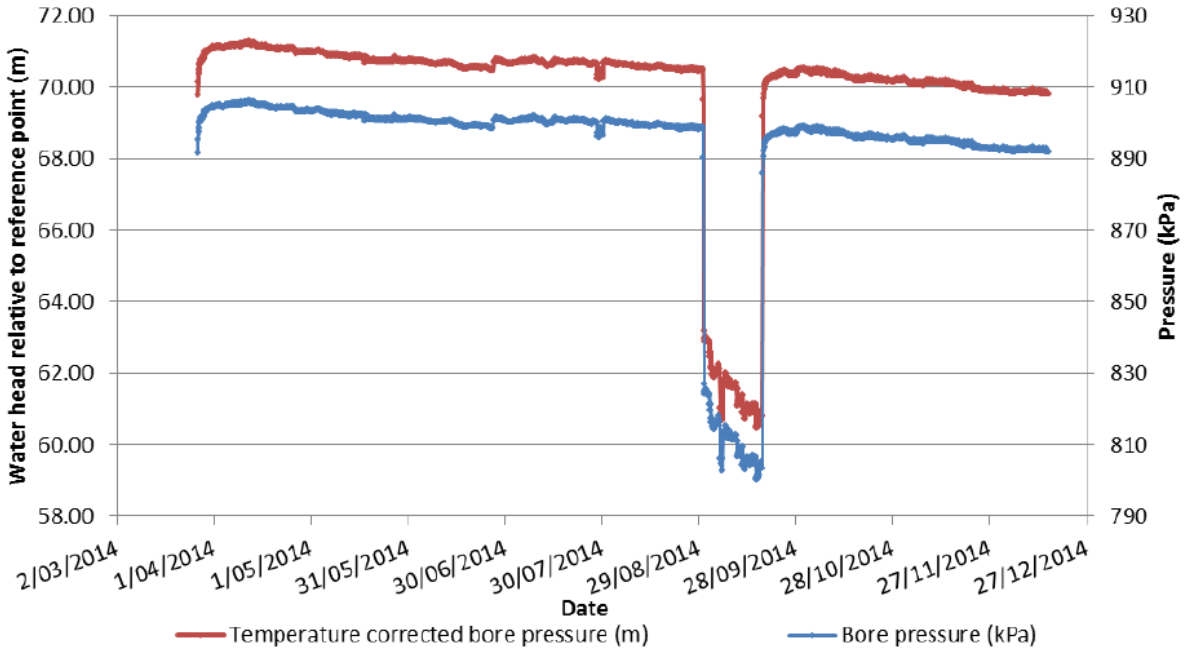

Figure C-2. Bore 5033 – 2014 Pressure Data

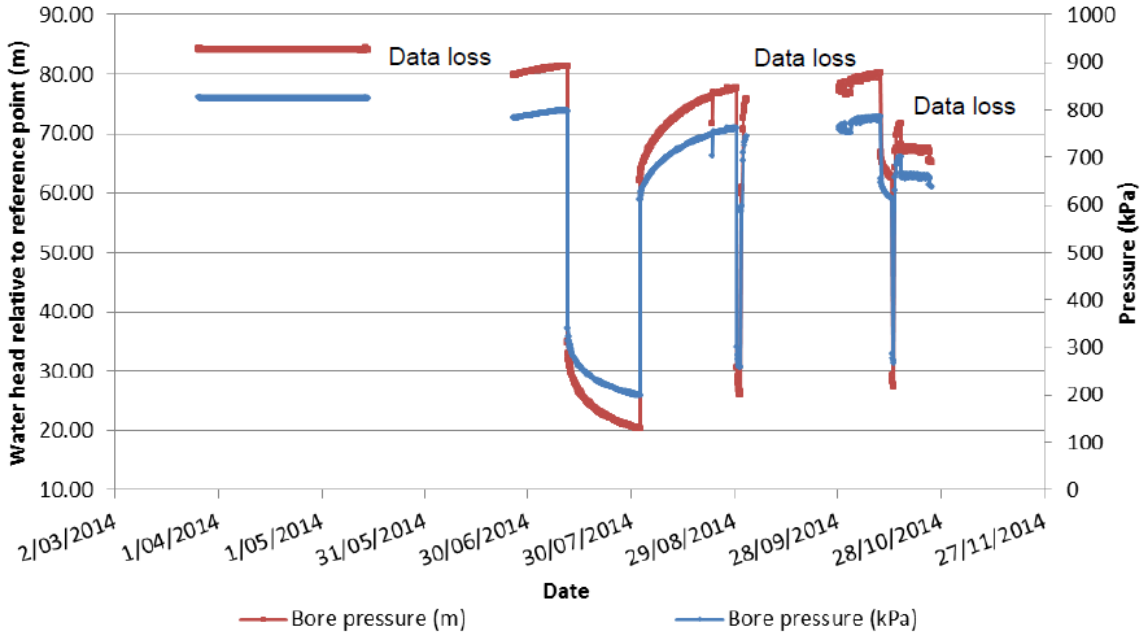

Figure C-3. Bore 5229 – 2014 Pressure Data

Monitoring Bore 5028

- Formation water pressure remained relatively constant throughout monitoring except for one apparent shut-in period identified in late September 2014.
- Based on monitoring data measured, the bore drawdown trigger threshold for consolidated aquifers was not exceeded.
- However after the brief shut-in period when flow commenced, the pressure was significantly less than the pressures recorded prior to shut-in.
- The reason for the drop in pressure was attributed to changes in water and nearby formation temperatures as a result of the shut-in.
- Pre shut-in the pressure/water head remained constant, whilst post shut-in, a gradual increase in pressure/water head can be observed, suggesting minimal influence to groundwater pressure from oil and gas production.

Monitoring Bore 5033

- The general trend in formation water pressure during 2014 appears to have a gradual reduction of ~1m of water head (from 71m to 70m).
- The pattern of drawdown and subsequent recovery of pressure levels was considered indicative of pumping either bore 5033 or a nearby bore (August-September).
- After the drawdown event, pressure levels recovered to near previous levels.
- A gradual downward trend in pressure/water levels appears to have been maintained after the August-September drawdown event.
- Based on monitoring data measured the bore drawdown trigger threshold for consolidated aquifers was not exceeded.

Monitoring Bore 5229

- Multiple data gaps exist in the data collected, considered a result of tampering with the pressure gauge.
- Variations in the water level data indicate that the bore had been in use intermittently form May 2014, with pressure recovering gradually after pumping.
- Water pressure generally recovered to pre-pumping levels following pumping events, however the gradual increase in water pressure indicates slow recovery.
- Pre-pumping pressure/water head remained constant suggesting minimal influence to groundwater pressure from oil and gas production, however it was not possibly to conclusively determine if the drawdown trigger threshold for consolidated aquifers was exceeded.

Pressure data, obtained at two sub-artesian bores (RN5094 and RN5076) during each 2014 groundwater monitoring event is provided in Figure C-4 and Figure C-5 respectively.

Bore 5017 was observed to be dry during each monitoring event.

Monitoring bore F1 (KIHGWU1) was used as a replacement bore for 5002 and 5043. The bore was not located during the Q2 monitoring event.

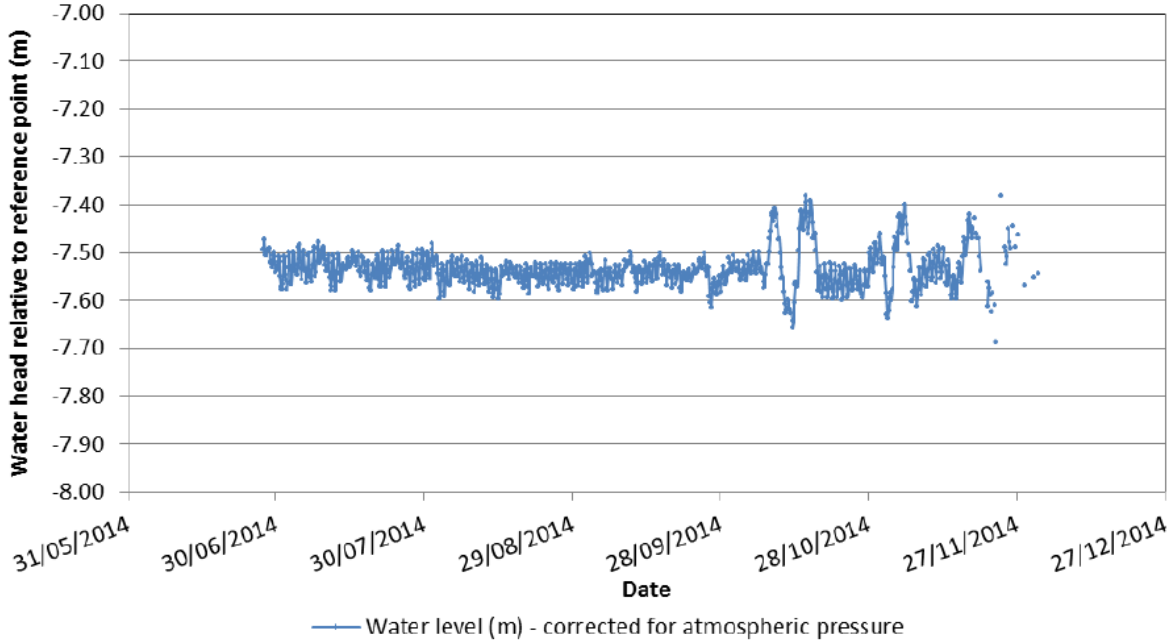

Figure C-4. Bore 5094 – 2014 Pressure Data

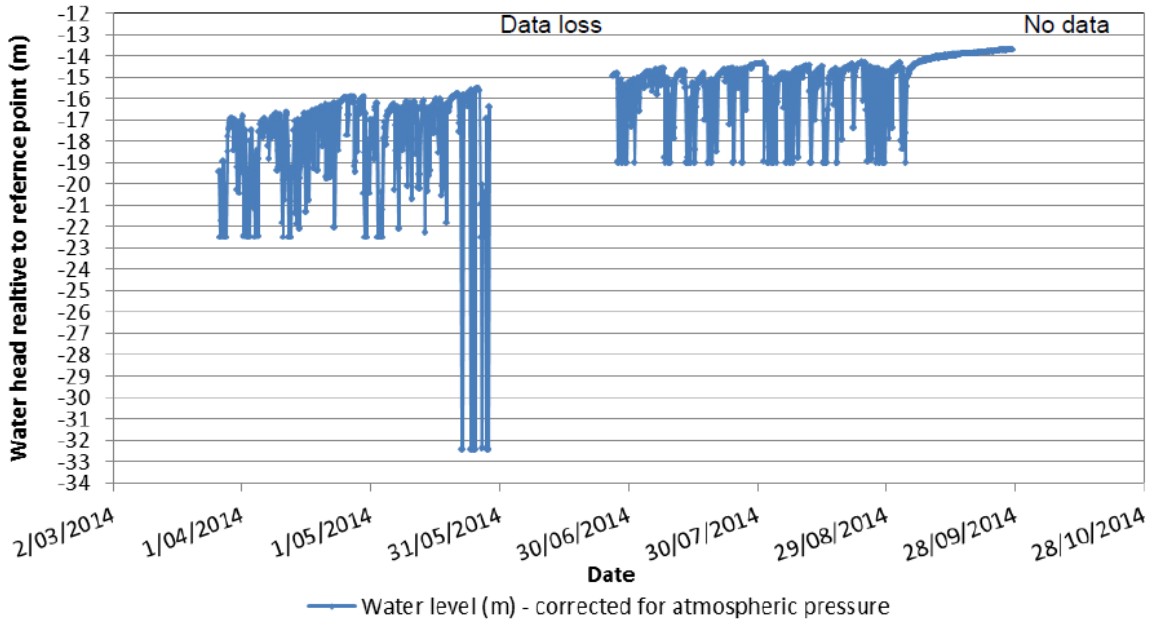

Figure C-5. Bore 5076 – 2014 Pressure Data

Monitoring Bore 5094

- The groundwater level remained relatively constant throughout the duration of monitoring
- Water level fluctuation up to 0.15m were observed from October to November 2014
- The bore drawdown trigger thresholds for unconsolidated aquifers was not exceeded.

Monitoring Bore 5076

- Monitoring data showed very frequent pumping influences, however showed an overall increasing trend of approximately 3.3m.
- The bore drawdown trigger thresholds for unconsolidated aquifers was not exceeded.

Additional manual groundwater level measurements were recorded during each monitoring vent and are provided in Table 2 of Attachment B.

The 2014 annual groundwater monitoring report concluded:

- There is no evidence of decline in groundwater levels in monitoring bores completed in shallow unconsolidated aquifers which exceeded the bore trigger threshold of 2m.
- There is no evidence of decline in groundwater level in monitoring bores completed in deep consolidated aquifers which exceed the bore trigger value of 5m.
- Shallow unconsolidated aquifer water quality at the monitoring bores locations show no impacts related to oil and gas production.
- Deep consolidated aquifer water quality at the monitoring bore locations shows no impacts related to oil and gas production.