

Groundwater monitoring results at Origin Kyalla and Velkerri well sites in the Beetaloo Sub-basin

Introduction

This report is a continuation of a series of quarterly public reports compiled by the Department of Environment and Natural Resources (DENR). The Code of Practice: Onshore Petroleum Activities in the Northern Territory (the Code) (2019) requires six months of baseline monitoring of groundwater at a well site prior to undertaking hydraulic fracturing activities. This report presents results of ongoing groundwater monitoring undertaken by Origin at its well sites in the Beetaloo sub-basin in compliance with the Code. The report includes updated ongoing groundwater monitoring data for the control monitoring bores (CMB) at the Kyalla petroleum well site on EP117 and Velkerri petroleum well site on EP76 and the newly constructed impact monitoring bores (IMB) at the Kyalla well site (Figure 1).

Groundwater Monitoring Program

Interest holders are required to submit groundwater monitoring data quarterly, in compliance with the the Code. DENR has committed to publishing the monitoring results from interest holders to increase the transparency of monitoring and reporting of groundwater potential impacts by the onshore gas industry in the Northern Territory.

The Origin groundwater monitoring program consists of:

- Control Monitoring Bore (CMB), which is located “upstream” and within 100 m of each planned or existing petroleum well pad, screened across the Gum Ridge aquifer and a separate CMB screened across the Anthony Lagoon aquifer in compliance with the Code; and
- Impact Monitoring Bore (IMB), which is located 20 m “downstream” of the location of the petroleum well(s).

These bores enable an ongoing comparison of the groundwater upstream and downstream of the petroleum well, to allow for an immediate identification of any variation in the groundwater that can be directly related to the petroleum activity.

Groundwater quality

At both the Kyalla and Velkerri petroleum well sites the regional Cambrian Limestone Aquifer (CLA) system consists of both the Anthony Lagoon aquifer and the deeper Gum Ridge aquifer. This karstic aquifer system is used as a source of groundwater by pastoralists and regional communities. A groundwater extraction licence (GRF10285) has been granted to Origin for extraction of up to a total of 175 ML per year from the Gum Ridge aquifer across its exploration permit areas in the Beetaloo sub-basin. At the Kyalla well site, the drilling of the approved Kyalla exploration petroleum well was completed in January 2020. IMB in both aquifers were then constructed 20 m “downstream” of the location of the Kyalla petroleum well in compliance with the the Code. Hydraulic fracturing of the Kyalla well had not yet occurred during the reporting period (December 2018 to March 2020). At the Velkerri well site the drilling of the approved Velkerri exploration petroleum well has not yet commenced.

Groundwater monitoring results at Origin Kyalla and Velkerri well sites in the Beetaloo Sub-basin

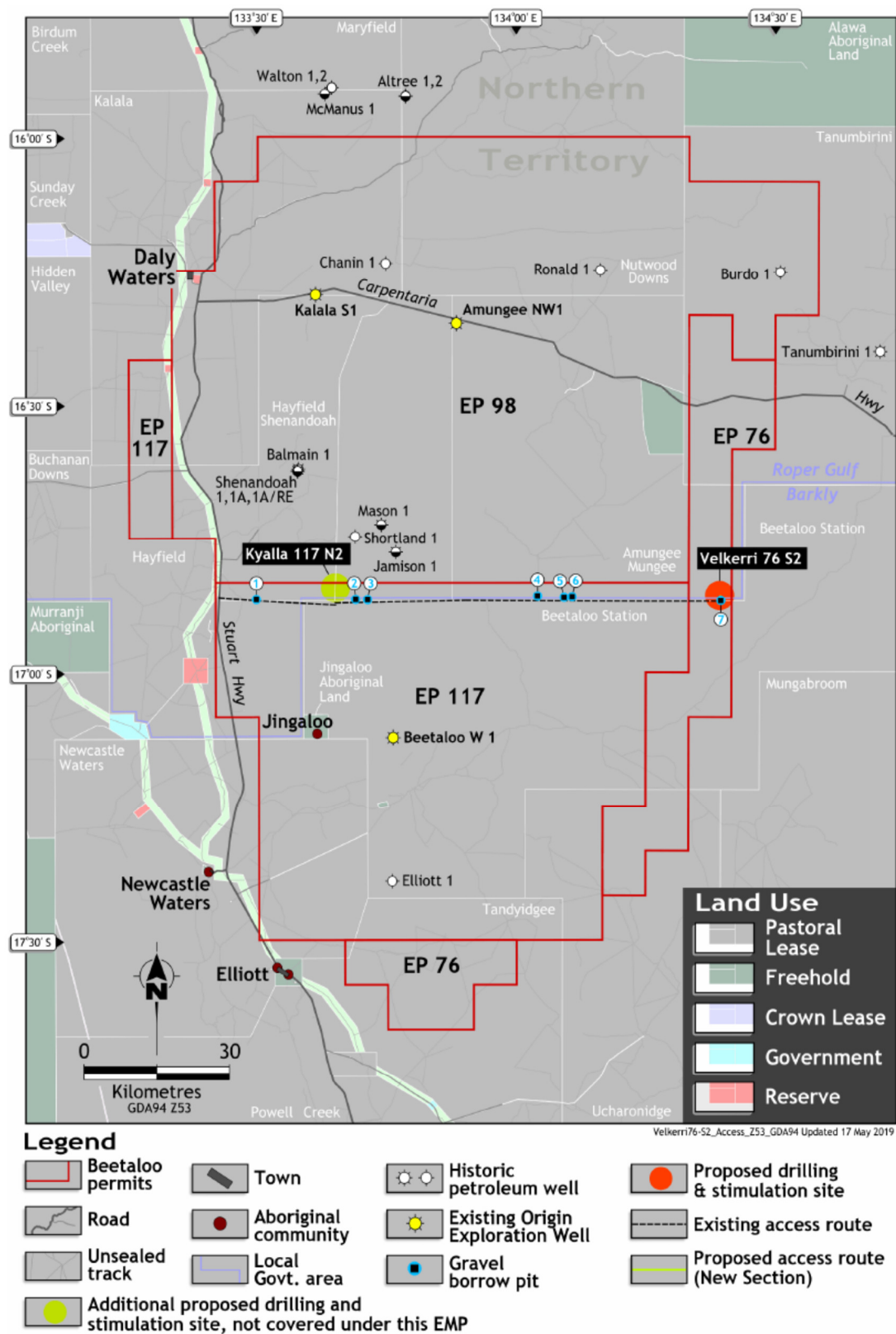


Figure 1: Origin Exploration Permit (EP) areas and associated well sites in the Beetaloo sub-basin (courtesy: Origin)

Groundwater monitoring results at Origin Kyalla and Velkerri well sites in the Beetaloo Sub-basin

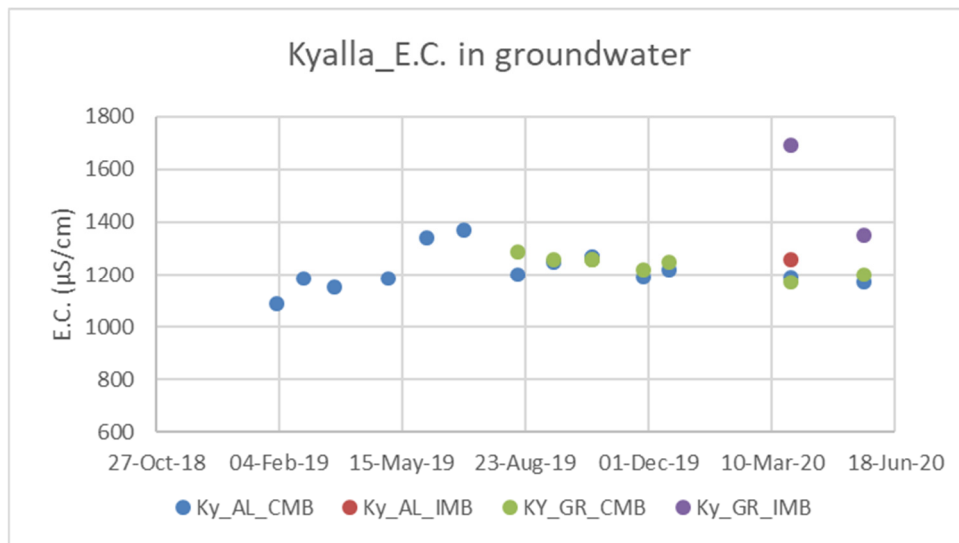


Figure 2 Kyalla electrical conductivity

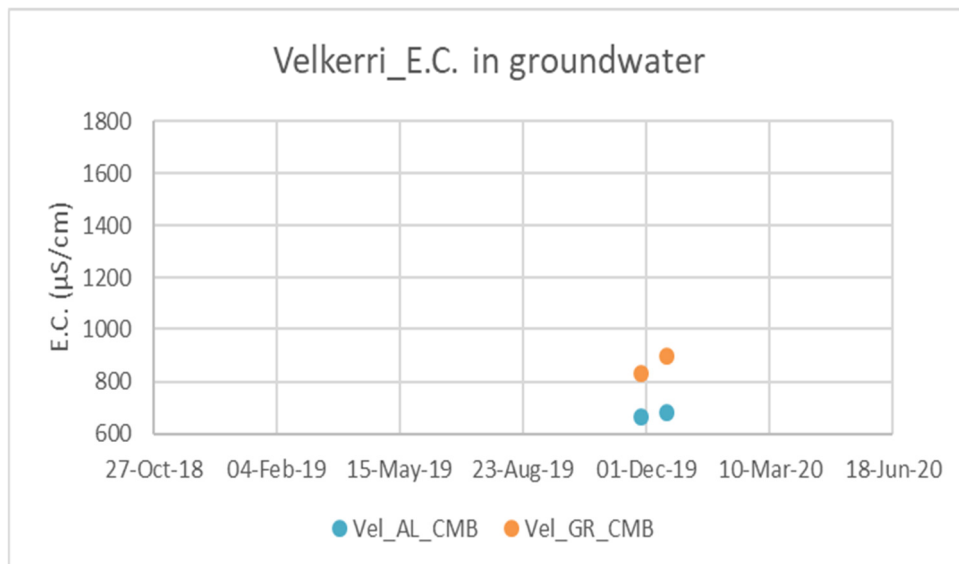


Figure 3 Velkerri electrical conductivity

Summary and Interpretation of Results

The charts (Figure 2 and Figure 3) provide a time series of ongoing monitoring results for electrical conductivity (E.C.) and water level logger data for Kyalla well site from Dec 2018 to May 2020 and Velkerri well site at end of 2019 dry season when monitoring bores were constructed at the well site.

E.C. in the newly installed IMB at the Kyalla well site in the Anthony Lagoon aquifer is similar to baseline E.C. in the CMB indicating that groundwater quality has not been impacted by project attributable activities at this wellsite location. However, E.C. in the newly installed IMB at the Kyalla well site in the Gum Ridge aquifer (Ky_GR_IMB) was elevated on first sampling of the monitoring bore in March 2020. DENR sought clarification from Origin regarding this result. Origin completed a review of the elevated result, and found

Groundwater monitoring results at Origin Kyalla and Velkerri well sites in the Beetaloo Sub-basin

this result was attributed to the process of the bore hole drilling and construction. Subsequent testing in May, following flushing of the monitoring bore shows E.C. returning to more stabilised values (Figure 2).

Conclusion

In accordance with the Code and Ministerial condition of approval of the EMP, results of ongoing groundwater monitoring must be provided by Origin every quarter for three years from the approval date of the EMP (13 September 2019 and 23 December 2019 for Kyalla and Velkerri EMP respectively). This data will be reported and published on the DENR website as they become available.