1-5. RIGHTS OF GROUNDWATER USERS

Concern:
Protected groundwater users, including significant dependent ecosystems and bore users, exist within 2 km of the site. The potable water quality sustaining two listed flora, five listed aquatic fauna, two licensed allocations and 15 Stock and Domestic bore users within the Lue Village is at risk.

Query response to the following SEARs for SSD 5765:

- A description of the existing environment likely to be affected by the development, using sufficient baseline data
- A description of mitigations and
    - Whether these are best practice and represent a full range of measures
    - Whether they will be effective / key performance indicators
    - Contingency plans for residual risks / monitoring and reporting on environmental performance
- Part 3: Any interference with an aquifer caused by the development does not exceed the respective water table, water pressure and water quality requirements specified for item 1 in columns 2, 3 and 4 of Table 1 of the *Aquifer Interference Policy 2012* for each relevant water source listed in column 1 of that Table
- Part 3: impacts to significant water resources or threatened species are minimised to the greatest extent practicable
- DRG, Attachment 2A requires rehabilitation methods including
  e) monitoring for rehabilitation
  i) details of triggering intervention
  k) details of post rehabilitation management
  l) i) assessment of rehabilitation techniques against objectives
  l) ii) assessment of potential acid mine drainage
  l) iii) processes to identify and management geochemical risks throughout mine life
  m) iii) groundwater assessment for final water level in any tailing storage facility void
  o) consideration of controls
- DRE/DPE requires a Water Management Strategy that considers
    - the existing surface and groundwater qualities
    - a robust baseline
    - a description of how groundwater and aquatic ecosystems will be monitored, Trigger Action Response Plan and trend identification

The rights of groundwater users around the proposed Project are protected by the *EPBC Act 2000*, the *EP&A Act 1979,* the *WM Act 2000*, and the *BC Act* 2016.

As groundwater yields can supply > 5L/s and salinity measured as total dissolved solids (TDS) is less than 1,500 mg/L in Lue Village bores, the Fractured Rock aquifer is classed as “highly productive” under the *Aquifer Interference Policy 2012*. The water availability (level) and groundwater quality are protected by legislation to sustain existing users.

QUALITY

The predictive model used to consider drawdown (MODFLOW-USG) is not designed to model the movement of contaminants in groundwater from the proposed activity. Contaminants can take decades to move through aquifers and reach groundwater users. Outside the model’s domain, the effect of lead dust washing into soil down-wind is poorly understood (Cardno, 2020, pp. 10-99). Predicting the movement of contaminants is important as, after evapo-concentration, the TDS predictions in (R. W. Corkery & Co. Pty. Limited, 2020) the pit lake rise above 1,500 mg/L over time. As the pit lake is proposed to be unlined, there is no barrier between the brackish water in the pit and the highly productive aquifer. The hydraulic gradient is used as justification of containment of pit lake water.

The risk of releasing potentially toxic silver/lead concentrate and changes in groundwater quality from potentially acid forming (PAF) material are raised in Cardno (2020), however, no mitigation measures are proposed to reduce the risk of contaminating groundwater (Cardno, 2020, pp. 10-95).

Principle 1 and 3 of the *Groundwater Quality Policy 1998* are designed to prevent a deterioration in groundwater quality. To be considered minimal impact, any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.

The monitoring bores reported in the EIS located within 1.5 km of Lue are shown in Table 1. The NSW *Aquifer Interference Policy 2012* requires baseline groundwater conditions to be established. It also requires quality impacts from licensed water users of connected groundwater to be established.

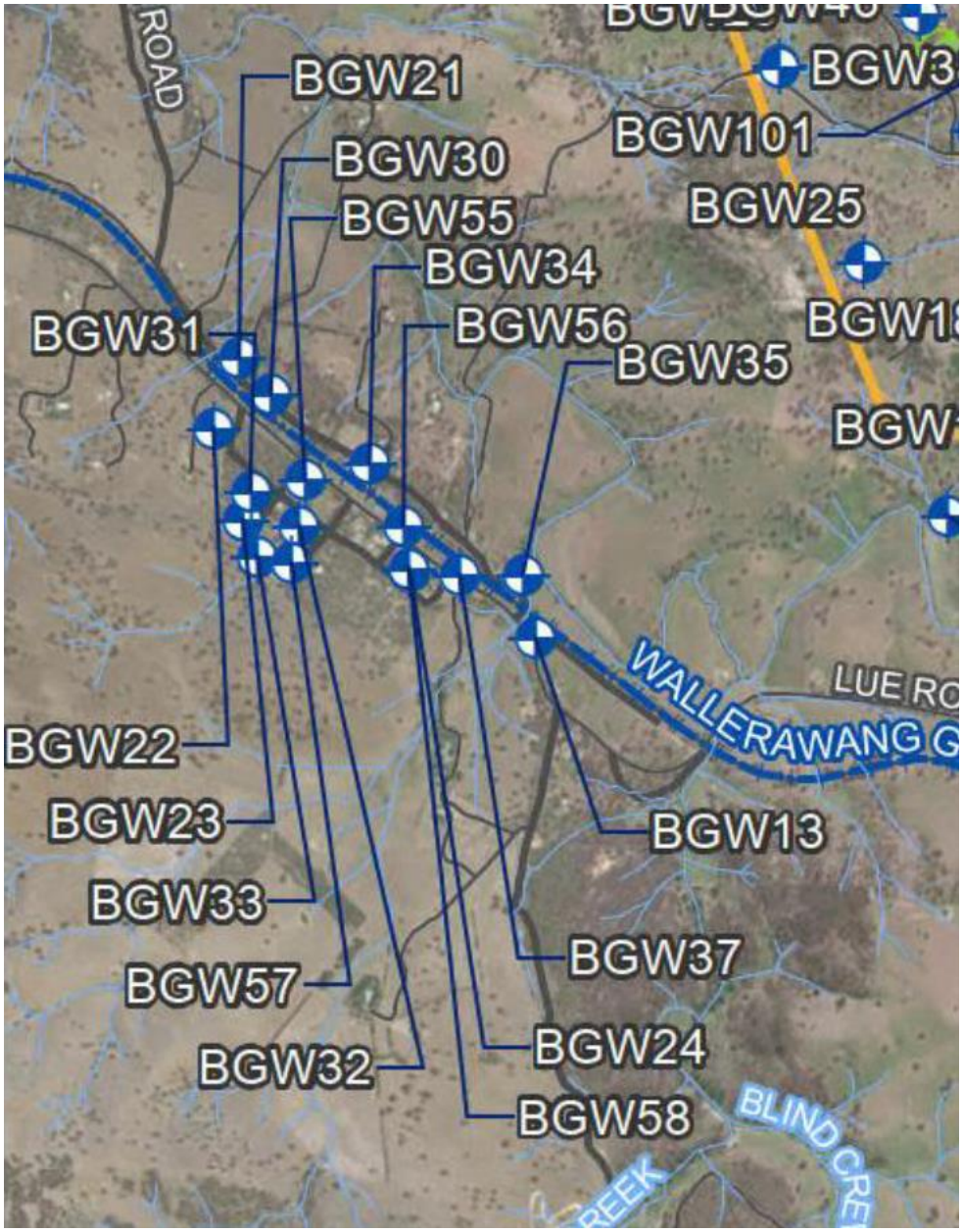

Figure 1: Location of monitoring wells (Jacobs (Australia), 2020)

Despite conclusions portrayed in Table 22 (Jacobs (Australia), 2020, pp. 5-110), there is no evidence of non-potable water quality in bores in Lue from the sampling undertaken (Table 1).

Table 1: Lue groundwater bore quality summary

Bore	Result	Bore	Result
BGW13	Not reported	**BGW33**	Misrepresented
BGW21	Misrepresented	**BGW34**	Not reported
BGW22	Not reported	**BGW35**	Misrepresented
BGW23	Not reported	**BGW37**	Misrepresented
BGW24	Potable quality	**BGW56**	Not reported
BGW30	Not reported	**BGW57**	Not reported
BGW31	Not reported	**BGW58**	Not reported
BGW32	Misrepresented		

Table 22 (Jacobs (Australia), 2020, pp. 5-110) indicates the following exceedances for ADWG, however, these appear to be errors requiring explanation as highlighted in Table 1 above:

- BGW21 manganese: 11 samples reported below 0.2 mg/L (average of 0.064 mg/L), well below the 0.5 mg/L ADWG limit. The 12th sample on 01 May 15 reported 31.1 mg/L
    - No comment provided on whether the single 31.1 mg/L reading led to the average being >0.05 mg/L, or whether it is simply an error
    - If the 01 May 15 reading is considered, the mean is 2.650 mg/L not 1.354 mg/L (greater than ADWG) as reported in the EIS
- Average arsenic concentrations for BGW32, 33, 35 and 37 are reported as >0.01 mg/L (above ADWG) in Table 22, however, no individual analyses >0.01 mg/L are reported:
    - BGW32: Arsenic <0.002 mg/L on 09 Jan 14 and 08 April 14
    - BGW33: Arsenic <0.002 mg/L on 09 Jan 14, 08 Jul 14 and 25 Feb 16
    - Similar analyses for BGW35 & 37

Of sixty reported samples, the physical or chemical (PC) toxicant exceeding the Australian Drinking Water Guidelines 6 (v3.5 updated August 2018) are:

- Manganese >0.5 mg/L in 18 samples (BGW05, 51, 54 in alluvium, BGW102, 106, 107, 108, 18, 19, 20, 27, 27A, 38, 40, 42, 43, 46, 21)
- pH <6.5 in 9 samples
- Arsenic >0.01 mg/L in 9 samples (BGW49 in alluvium, BGW102, 108, 10, 19, 20, 27A, 42, 46, 36)
    - Arsenic in BGW32, 33, 35 and 37 are misreported in Table 22 p5-110 when reviewing the raw data provided in the Annexure 6 Table (Jacobs (Australia), 2020, pp. 5-265).
- Lead >0.01 mg/L in 4 samples (BGW102, 107, 108 and 36)
- Cadmium >0.002 mg/L in 1 sample

These sampling sites are all located near the orebody.

WATER AVAILABILITY

A conclusion that impacts to groundwater dependent ecosystems during average rainfall years 'would be expected to be minor' is made (Cardno, 2020, pp. 10-97). It is unclear whether a 38% contribution of baseflow to mean daily discharge in Hawkins Creek from June 2013 to July 2016 reflects contribution during periods without rainfall, or year-round. The conclusion in Cardno (2020) that reduction in aquatic habitat due to a reduction in groundwater baseflow would be temporary is not justified (Cardno, 2020, pp. 10-98).

The *Water Management Act 2000* provides for the rights of domestic and stock users to take water for household use under their properties. The Water Sharing Plans and Aquifer Interference Policy protects these rights by ensuring all steps are taken to preserve the beneficial use of the aquifer. Under S.2.1 of the *Aquifer Interference Policy 2012*, the proposed 100-200 ML/year evaporation take from the mine pit lake after closure is not 'unavoidable' nor best practice. Contamination may travel towards Lue Village where the natural water level is ~550 mAHD once the pit lake fills to ~576 mAHD after 130 years. Alternatives such as treatment of the waste to non-toxic standards or use of managed aquifer recharge to maintain groundwater contamination in place are available options that have not been selected. Effective triggers, monitoring or contingency plans and environmental indicators have not been provided.

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