12-14. WRE AND LEACHATE DAM

Concern:
57% of waste rock is potentially acid forming (PAF). No acid treatment plan has been presented. Leachate from the waste rock emplacement (WRE) is planned to be sent to a leachate management dam that has a design of 1 m of freeboard proximal to Price and Hawkins Creeks. Despite the presence of local faults, monitoring for leakage, triggers and a contingency plan to remediate leakage in the leachate management dam are not provided. The WRE and leachate dam do not minimise impacts to the greatest extent practicable using best practice.

This concern responds to the following SEARs for SSD 5765:

- 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
- An assessment of the likely impacts of all stages of the development, including any cumulative impacts, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice;
- 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
- Assessment of Lawsons Creek and Price Creek
- Assessment of likely impacts to aquifers; detailed site water balance, management of excess water and reliability
- 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 description of how groundwater and aquatic ecosystems will be monitored, Trigger Action Response Plan and trend identification

DISCUSSION

The waste rock production forecast plans to produce 26.6 million tonnes of potentially acid forming material (57%) over the life of the mine (Advisian, 2020, p. 8).

Significant proposed volumes of water 'stored' in the waste rock emplacement (WRE) can drain to the leachate management dam. In the EIS, 10% of leachate from each cell are planned to migrate downgradient and be transferred to the leachate management dam (Advisian, 2020, p. 18).

Figure 1 shows the relative size of the WRE next to the planned pit and its proximity to Price Creek. Figure 2 shows there is 1 m of planned freeboard to prevent overflow into Hawkins and Price Creeks. Figure 3 shows

the presence of faults around and under the WRE and leachate management dam that have not been considered in the designs.

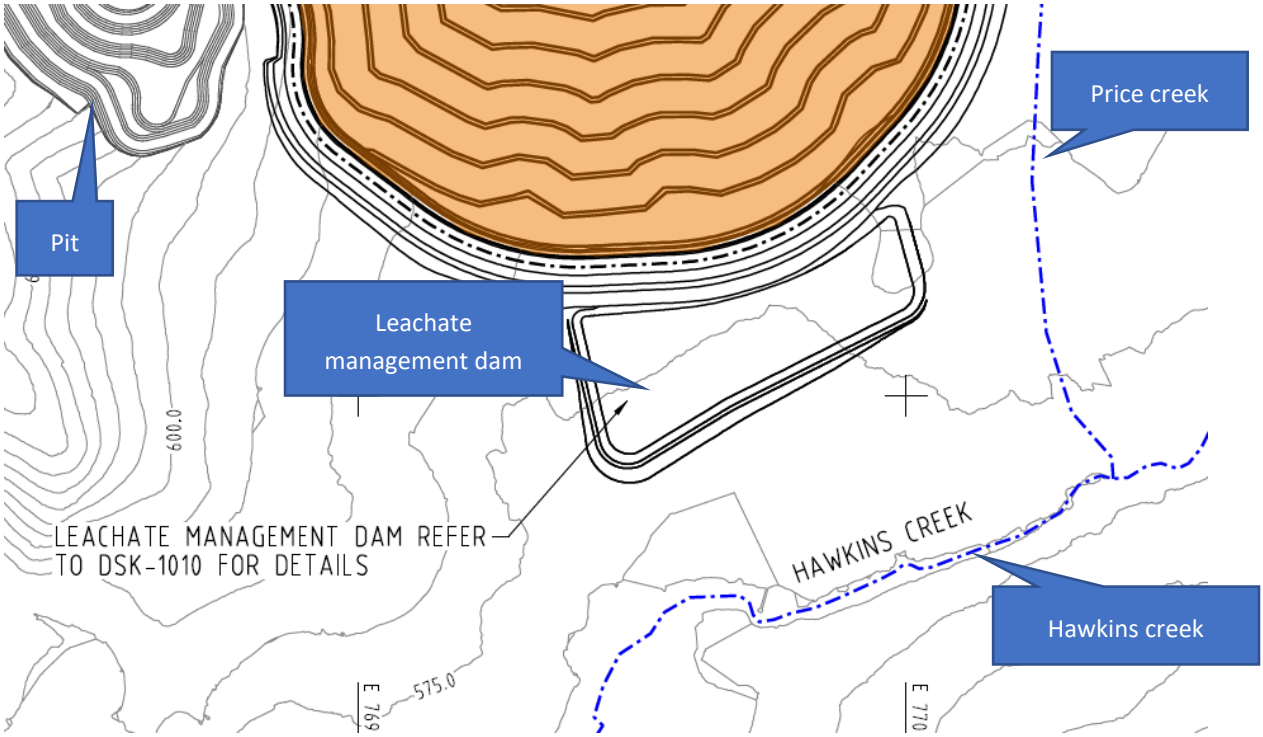

Figure 1: WRE plan showing 5 m elevation contours. Source – adapted from DSK-1002 (Advisian, 2020, p. 35)

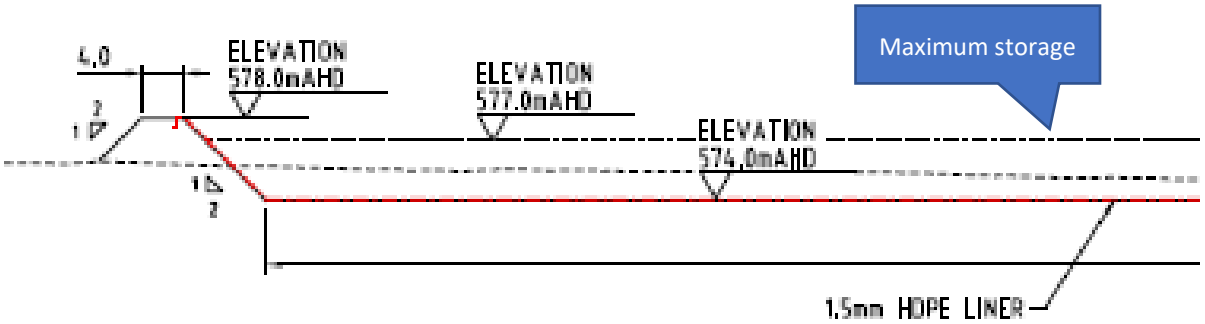

Figure 2: Maximum storage level and freeboard at the south of the leachate management dam. Source – adapted from DSK-1010 (Advisian, 2020, p. 43)

Leachate from the dam is planned to be pumped to the 'in-pit dewatering sump' or 'dewatering pond' if water levels reach 577 mAHD (R.W. Corkery and Co. Pty Limited, 2020). The design pumping capacity is not stated and it is unclear whether this infrastructure will exist post mine closure as leachate continues to enter the dam. Furthermore, no evidence is presented that HDPE 1.5 mm lining can withstand low pH leachate for hundreds of years beneath the PAF WREs. No detailed contingency plans for remediation post mine closure are described in the EIS and no 'success criteria' refer to a lack of leakage into the aquifer (R.W. Corkery and Co. Pty Limited, 2020, pp. A5-67).

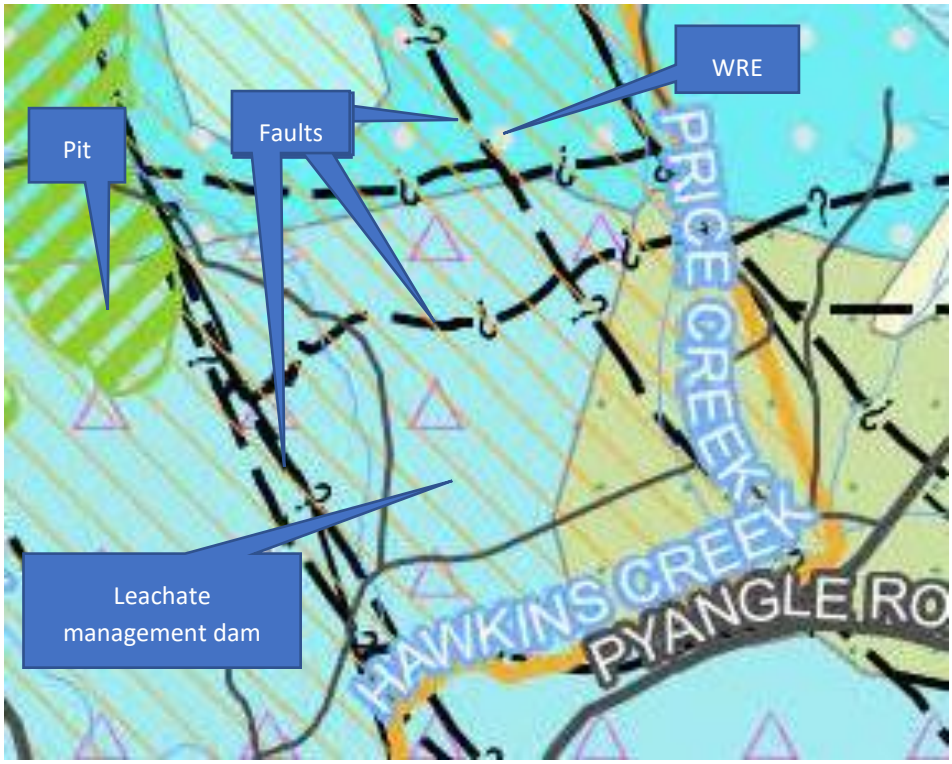

Figure 3: Mapped faults in the area of the planned WRE and leachate management dam. Source – adapted from Figure 11 of (Jacobs (Australia), 2020, pp. 5-57)

REFERENCES

Advisian, 2020. *Preliminary design of PAF waste rock emplacement, oxide ore stockpile and the southern barrier,* Perth: Bowdens Silver Pty Limited.

Allen, R. G., Pereira, L. S., Raes, D. & Smith, M., 1998. *FAO irrigation and drainage Paper 56.* [Online]
Available at:
http://www.fao.org/3/x0490e/x0490e04.htm#chapter%201%20%20%20introduction%20to%20evapotranspiration
[Accessed 17 June 2020].

Bowdens Silver, 2020. *Monitoring.* [Online]
Available at: https://bowdenssilver.com.au/monitoring/
[Accessed 21 June 2020].

Jacobs (Australia), 2020. *Part 5 - Groundwater Assessment,* Sydney: Silver Mines Pty. Limited.

R. W. Corkery & Co. Pty. Limited, 2020. *EIS Bowdens Silver Project,* Sydney: Bowdens Silver Pty Limited.