Lue Action Group
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ATTACHMENT 6

Technical Review – Surface Water Assessment (SSD-5765)

(Shields, Engeny, July 2020)

TECHNICAL REVIEW - SURFACE WATER ASSESSMENT (SSD-5765)

Project:	N1221_001 Bowdens Silver Surface Water Review	**Date:**	27 July 2020
To:	Lue Action Group	**From:**	Susan Shield
ATT:	Phil English	**CC:**	Jack White
Subject:	Surface Water Review – Technical Comments		

Introduction

Bowdens Silver Pty Limited (Bowdens Silver) is seeking approval to develop and operate an open cut silver mine near Lue, NSW (the Project) (Application SSD-5765). As part of the Environmental Impact Statement for the Project, prepared by R.W Corkery & Co. Pty Limited (R.W. Corkery & Co) on behalf of Bpwdens Silver, WRM Water & Environment Pty Ltd (WRM) was commissioned to undertake the Surface Water Assessment (SWA).

Engeny Water Management (Engeny) was commissioned by the Lue Action Group to undertake a technical review of the SWA. This review was undertaken by Susan Shield, Principal Water Engineer at Engeny and Dr Adam Wyatt, Principal Water Resources Engineer at Engeny. Both staff have undertaken numerous projects related to assessment and review of development impacts on surface water resources in NSW.

Documents Reviewed

This review was based on the information below:

- ANZG, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines
- Department of Environment and Climate Change (DECC), 2008. Managing Urban Stormwater – Soils and Construction, Volume 2E – Mines and Quarries
- WaterNSW Maximum Harvestable Rights Calculator. https://www.waternsw.com.au/customer-service/water-licensing/basic-landholder-rights/harvestable-rights-dams/maximum-harvestable-right-calculator
- WRM, 2020. Surface Water Assessment State Significant Development No. 5765, prepared for R.W. Corkery & Co on behalf of Bowdens Silver

General Comments

WATERCOURSE IMPACTS

Only streamflow gauging data from the Cudgegong River at Rylstone gauge was considered. It is unclear why some of the local gauge data, that could provide data for the analysis, was not used in the assessment. The outcomes from the assessment provides average runoff rates that are 60% of the average regional runoff rates published by WaterNSW.

The expectation of minimal impacts on baseflows needs to be quantified for all the mapped 3rd order watercourses. Streamflow duration curves have only been provided for Lawsons Creek. In addition, the analysis of potential flow sequencing changes that might occur with the mine is limited to average flows. This does not provide an indication of the potential impacts to baseflow conditions. The analysis should consider other metrics, such as the number of "dry days" per year.

FLOODING IMPACTS

The flood impact assessment predicts both increases in flood depths and velocities. The assessment states that the predicted impacts occur on land that is either owned by Bowden Silver or that Bowden Silver has options on to purchase. The assessment does not consider or discuss any crown or public lands and does not detail potential impacts on the creek crossings that are listed in the report. In addition, there is no landownership mapping associated with the flood modelling outcomes to confirm the landownership/options that might be present.

The modelled increases in velocities are predicted for both during operations and post closure. The creek systems described in Annexure A appear to be relatively mobile and erodible. No specific details of scour protection measures and their required maintenance are described in the assessment.

The assessment of flood risk for existing Maloneys Road crossing is not included in the assessment and as such there is no ability to compare the proposed crossing to the existing crossing. The modelling indicates that the proposed crossing will result in increases in flood depths of 1 to 2 m upstream of the new crossing in the 10% Annual Exceedance Probability (AEP) event, as well as a breakout occurring that is not present in the existing conditions. More information on the acceptability of the potential impacts of the flood risk and the breakout should be provided.

WATER QUALITY

There is no clearly defined trigger to use containment dams rather than sediment dams for Waste Rock Emplacement (WRE). The assessment should commit to initially use containment dams for the WRE and only use sediment dams if it can be demonstrated to the regulators that the water is of suitable quality.

There is no consideration of the water quality within the water management system. There is a potential for build-up of both salts and metals which is not considered in the assessment.

WATER MANAGEMENT SYSTEM

There are no stated design criteria for the clean water diversions, either during operations or in the final landform. These need to be clearly defined.

There are no details in the assessment of how Bowdens Silver propose to manage the leachate dam post closure and the leachate that this dam collects.

The assessment states that the freeboard on Tailings Storage Facility (TSF) will be 0.75 m. No detail on what level of containment volume this provides. A preliminary review suggests that this is insufficient freeboard. In addition, the assessment includes no information on how potential seepage from the TSF will be managed. The TSF should be lined to protect surface

water and groundwater systems from tailings seepage and potential contamination. It is expected that the lining would be designed by a qualified geotechnical engineer and be suitable to contain potential tailings waters post closure.

FINAL VOID

The water quality analysis for the final void is limited to salinity with no discussion of the potential long-term build-up of metals in the void lake.

The analysis of the final void does not appear to consider a seepage catchment area which could have the potential to increase inflows into the void. Further, there is no discussion in the assessment of the post closure status of the satellite pits in regard to water recovery levels and potential to interact with other surface water and groundwater systems.

PIPELINE / WATER TRANSFERS

The Surface Water Assessment does not mention any construction or operational controls for the pipeline. The design aspects adopted to minimise risk of pollution, the erosion and sediment controls during construction, and the operational controls to be adopted should be clearly discussed in the assessment.

Bowden Silver proposes to import water to meet the water demands of the proposed operations from Ulan Coal Mine and/or Moolarben Coal Mine. The water supply requirements of the proposed silver mine cannot be met without these water transfers. It is understood that neither of these mines have approval to transfer water to Bowden Silver: Ulan Coal Mine has approval to transfer water to Moolarben Coal Mine and Willpinjong Coal Mine; and Moolarben Coal Mine does not have approval to transfer water off site. The assessment of these transfers would need to consider the movement of water from surface water and groundwater systems associated with the Hunter region (Hunter River catchment and the North Coast groundwater systems) to the Macquarie – Castlereagh region in the Murray Darling Basin (i.e. Macquarie surface water and groundwater systems).

LICENSING

The runoff rate used to consider water take for licensing is considerably lower than the average regional runoff rate published by NSWWater.

The calculations for licensing for the final landform do not appear to account for final void take.

Specific Questions/Considerations

Table 1: Specific Questions/Considerations

Section	Aspect
Surface Water Impact Assessment	
Section 3.5.1 Streamflow	Data from only one of the two Hawkins Creek flow gauges data used in the assessment. This data was subsequently not used nor compared to in runoff estimates. No explanation as to why only one gauge is reviewed.
Section 3.5.2 Characterisation of Streamflow	No clear method for analysis of flows in each creek system and how these have been estimated – no reference to the local gauging. No recorded or modelled flow duration curves. No estimate of “dry days” for each creek system provided.
Section 3.5.3 Simulated Catchment Runoff and Streamflow	Does the Cudgegong River Upstream of Rylstone gauge (station 421184) have a similar catchment area, geology, and soils as the local catchments to the site? Not clear why this gauge provides suitable data to be used at the site.

Section	Aspect
Section 4.4.1.2 NAF Waste Rock	Geochem NAF water quality exceeds creek 80th percentile and ANZECC guidelines. How is this to be managed? Where is Corkery review Section 4.4.1.2 (page 6-56) – on what basis was this made?
Section 4.4.2.2 PAF Waste Rock	How is PAF to be managed during and post closure? How will the leachate dam and the leachate it receives be managed post closure?
4.6.2 Erosion and Sediment Control (ESC) Zone	If water is considered not suitable for discharged the SWA states that the design will be 20% AEP 72 hrs containment (with 0.75 volumetric runoff coefficient, 50% sediment storage zone and pump out in 5 days). It is considered that stronger controls should be in place for determining containment criteria (sediment or containment) for sediment water. Initial dams should be built for containment volumes and if the water quality testing then is considered by the EPA to be suitable for release sediment dams could be used. The proposed capacity for sediment dams in Year 0 of operation (and max) do not appear to be consistent with the methods stated in the text.
4.6.3 Clean Water Zone	What is conveyance capacity of clean water drain (i.e. diversion channel)? It is considered that this should be 1% AEP as a minimum.
4.7.9 Tailings Storage Facility	Unclear the source of the proposed 0.75 m freeboard for the TSF Transfer Level. Expectation is that required freeboard = Max Extreme Storage: 1:100 AEP 72hr + 0.5 m contingency + 1:10 AEP wave run-up = ~2.9 m
Figure 5.2 Land use types - WRE	Figure shows no established rehabilitation throughout the project life. Contrary to project aims of releasing water to downstream when of suitable water quality It is unclear if this the same approach as for the modelled water balance calculations. Does this mean there are longer period of impacts? Does this mean there will be higher external water demands if rehabilitated and discharged offsite (if suitable water quality is achieved)?
Table 5.4 Adopted AWBM Parameters – Base Case Scenario	Average regional runoff plotted for the region by WaterNSW is 0.7 ML/ha/year. This is considerably higher than the table analysis which presents 0.30 ML/ha/yr for natural/undisturbed lands.
Section 5.4 Total Project Water Balance	Table 4.5 lists 0 ML/a dam overflows. Does this include sediment dams? Type F (Blue Book, Landcom 2004) sediment dams typically have a forecast spill of 1 to 2 times per year (5-day 95th percentile design capacity). Is this included in the data presented?
Section 5.7 Sensitivity Analysis	Why is average annual increase in stored volume 40 ML/yr for low runoff and 41 ML/yr for baseline runoff. Data predicts that the site is unable to maintain neutral balance over the life of the mine water balance scenario for the average conditions. How is the surplus water storage proposed to be managed?
Section 6 Flood Impact Assessment	Predicted increases in depths – not clear whether this is land owned (or option to own) by Bowden Silver. Changes in flood depth upstream of new crossing and associated new downstream breakout zone have no clear comparison to the existing crossing accessibility and floodplain capability. Increase in velocities predicted in some locations requiring permanent stabilisation. Insufficient detail on where these are and the required stabilisation methods. Uncertain if the stabilisation can be established, considering the mobile creek systems described in Annexure A. These aspects need to be considered in more detailed in both the operational and post closure scenarios. No afflux mapping or analysis for smaller events.

Section	Aspect
Section 6.3.1 Proposed Configuration	Why designing to existing 10% AEP level, why not the new 10% AEP level? No comparison to existing crossing accessibility and safety during flood events. Is the same flood immunity (flood hazard and duration) provided for the new crossing compared to the old crossing? Modelling predicts 1 to 2 m increases in depth upstream of proposed crossing during 10% AEP event (Figure 6.10). Should the design include a high flow conveyance path as well as the low flow culverts, this may assist in reducing the breakout and predicted impacts.
Figure 7.1 – Final Landform and Final Void Catchment	Does the analysis consider the potential seepage catchment of the final void? What are the design criteria for proposed final landform clean water diversion channels? What is the predicted water recovery within the voids of the satellite pits? Is there potential for seepage from these pits in the final landform?
Section 7.10 – Model Results	What are metal concentrations in final void? No assessment of these or potential likely increases in metal concentration over time in either the water management system or the final void. Is it suitable to use the leachate salinity of 130 µS/cm in the early years of the recovery/seepage?
Section 8.1.3.4 Tailings Storage Facility	Using modelled versus published average annual runoff rates (WaterNSW), that is, 0.41 ML/ha/yr versus 0.7 ML/ha/yr reduces the volume of WALs required from 211 ML to 123 ML.
Section 8.1.3.6 Total WAL Required	Post closure licensing needs to consider final void take as well as baseflows. Final void surface catchment of 51.3 ha at 0.7 ML/ha/yr is equivalent to 37 ML – i.e. total of 59 ML required when considering predicted baseflow losses as well. Is the TSF fully rehabilitated in the final landform, i.e. is there any future potential water take that needs to be considered?
Figure 8.3 Effects of Loss on Lawsons Creek Streamflow Frequency – Location C	No analysis of effects on Hawkins Creek streamflow or other tributaries. No discussion of potential impact of the project on dry days in the creek systems or impacts on cease to pump triggers.
Where is proposed pipeline route?	What design / operational controls are proposed for the pipeline to protect environment during both construction and operation?
Annexure A - Watercourse Assessment	
Section 1.5.2 Temperature and Humidity	Meteorology analysis does not consider how the Mudgee rainfall over the period of analysis compares to same period of Lue Mine site data. Is there a more local station with long term records closer to Lue? Can the same gauge be used as used for the Cudgegong streamflow data? Should the long-term data for Rylstone (Ilford Street, Station 062026) be considered? Similarly, how does the SILO evaporation data compare to the long-term data recorded at Mudgee?
Section 2.5.2 Surface Water	Historical water quality data appears to be influenced by, for some analytes, most readings being below the LOR. The LOR exacerbates this, in some analytes, being set not low enough. Hence a lot of historical data has had to be discarded from the analysis. This produces water quality ranges in the local creeks and samples that are statistically higher than they would be if either a lower LOR was selected or samples at <LOR were included using the LOR value.
Annexure B - Flooding Assessment	
Section 6.2.5 Hydraulic Structures	What impacts are predicted at the four crossings of Lawsons Creek. These are not discussed in the SWIA.

Section	Aspect
Figure 6.9 1% (1in 100) AEP peak flood velocities – existing conditions – Lawsons Creek extent	Figure shows depths not velocities for the Lawsons Creek extent 1% AEP event
Section 6.4.1 Developed Conditions Tuflow Model Configuration - Overview	The report states that the model was run for three scenarios – maximum disturbance, final landform, and Lawsons Creek crossing. Main SWIA states 2 scenarios. Which landform is the Lawsons Creek crossing scenario using? This should consider analysis for both landform scenarios listed above (i.e. maximum disturbance and final landform)
Model Results and Mapping	Existing conditions only mapped for 1% AEP. Developed – with Lawsons Road crossing only mapped for 10% AEP. Break out zone downstream of new crossing increases flood extent for 10% and 2%. Increases in velocities. What are the likely impacts to the floodplain of the increased frequency of inundation? No discussion on impacts to other crossings (see above). No mapping of the land parcels impacted – unclear of what is owned by Bowdens Silver, or that Bowdens Silver has options on.