OUT20/6406

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Dear Ms Hawkeswood

Bowden's Silver Project (SSD 5765)
Environmental Impact Statement

I refer to your email of 2 June 2020 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

DPIE Water and NRAR have identified a number of issues which require consideration. Detailed explanation can be found in Attachment A and B. In summary:

- DPIE Water and NRAR require further explanation from the proponent on their ability to meet water licensing requirements. This includes clarification of current entitlements and confirmation of water take predictions.
- The proponent should confirm whether a borefield is proposed as part of this project. This needs to be resolved before determination as impact assessment of the borefield to support a water access licence dealing is a separate process to SSD assessment.
- Additional information is required to confirm that the risk of contamination of aquifers will be effectively managed.
- The groundwater model is considered fit for purpose. However, omissions, errors, inconsistencies, and ambiguities have been identified in the report that should be addressed to ensure they are not symptomatic of serious model errors.

Any further referrals to DPIE – NRAR & Water can be sent by email to: landuse.enquiries@dpi.nsw.gov.au.

Yours sincerely

Mitchell Isaacs
Director, Office of the Deputy and Strategic Relations
Department of Planning, Industry and Environment: Water
31 August 2020

Attachment A

Bowden's Silver Project (SSD 5765)
EIS
Detailed Information

1.0 Water Take and Licensing

DPIE Water and NRAR require further explanation from the proponent on their ability to meet water licensing requirements. This includes clarification of current entitlements, confirmation of water take predictions and advice whether a borefield is proposed.

The project is predicted to result in water take from a number of water sources, including both surface water and groundwater. Some of this water take will require licensed entitlement to be held and other parts will be exempt via relevant exclusion provisions in the *Water Management (General) Regulation 2018*.

Groundwater take via inflows to the open cut pit during mining are predicted to range from a minimum of 469ML/year to a maximum of 1066ML/year. These inflows result in water take from connected water sources with a maximum of 907ML/year from the Lachlan Fold Belt Murray Darling Basin (MDB) Groundwater Source, a maximum of 194ML/year from the Sydney Basin MDB Groundwater Source and a maximum of 12.9ML/year from the Lawsons creek water source, noting the maximum water take for each water source does not occur in the same year. Entitlement must be held in each water source to account for the peak water take.

1.1 Groundwater Take

The EIS indicates 907 unit shares in the Lachlan Fold Belt MDB Groundwater Source and 194 unit shares in the Sydney Basin MDB Groundwater source have been sought via the Controlled Allocation Order process. The registration of interest information included in the EIS indicates sufficient entitlement has been applied for to address peak requirements prior to closure, however it is unclear whether this process has been completed and the entitlement registered in a Water Access Licence.

We also note that the secured entitlement in the Sydney Basin MDB Groundwater Source is 29 unit shares less than the post closure peak water take.

The water management zone details for the Water Access Licenses (WALs) RO12-18-111 and RO13-19-097 are unclear. These WALs have been secured in the Sydney Basin MDB Groundwater Source to offset the ongoing groundwater take for the project but the EIS does not document whether these water licences are in the appropriate Sydney Basin MDB (Other) Management Zone. We need this information to determine if adequate entitlement is secured in the Sydney Basin MDB (Other) Water Management Zone of the Sydney Basin MDB Groundwater Source.

Recommendations – Prior to Determination

- Confirm that the Controlled Allocation Order process has been completed, relevant WALs obtained and peak water take accounted for.
- Clarify the water management zone details for the Water Access Licenses (WALs) RO12-18-111 and RO13-19-097 and confirm the project has sufficient entitlement in the correct zone which is the Sydney Basin MDB (Other) Water Management Zone of the Sydney Basin MDB Groundwater Source.

1.2 Surface water Take

Surface water take is due to capture of rainfall either directly in storages or via runoff capture in storages. The project site has a number of third order and higher order watercourses which are to be modified either via diversions or storages that need to be considered for the requirement to hold licensed entitlement. They include the following:

- The tailings storage facility is to be located on Walkers Creek, a third order watercourse. This watercourse is not being diverted and as no flow is to be maintained downstream, entitlement needs to be held for the total volume captured within this storage catchment of 301ha. Based on a calculation using the 80th percentile of annual runoff, an entitlement requirement of 123ML has been proposed. No specific policy position exists for calculating this volume, however we consider this reasonable. Clean water dams may be constructed upslope of the Tailings Storage Facility (TSF) on minor streams under harvestable rights which would reduce the entitlement requirements, however this has not been confirmed by the proponent.
- The open cut pit is to be located on Blackmans Gully, a third order watercourse. As this watercourse is to be diverted permanently to retain the flow downstream, the pit itself is not considered to be on a third order and can be considered within the relevant excluded work provision of Schedule 1(3) of the *Water Management (General) Regulation 2018*.
- A temporary clean water diversion in the upper catchment of Blackmans Gully on minor streams is proposed into Price Creek to maintain flows downstream. These flows will re-enter Hawkins Creek upstream of the current confluence of Blackmans Gully. This diversion is to be removed on completion of mining. This diversion does not require licensed entitlement.
- The Southern Barrier is to be constructed temporarily across Blackmans Gully, a third order watercourse for the project life. A pipe/culvert is proposed to be constructed under the barrier to maintain the flow of Blackmans Gully. Based on the ability of this pipe/culvert to adequately convey the flows through the barrier no licensed entitlement will be required.
- The total volume of water take from surface water storages that requires licensed entitlement during mining is 123ML which is in the Lawsons Creek Water Source. This combined with the 12.9ML of connected water take due to the pit results in a total licensed entitlement requirement from the Lawsons creek water source during mining of 136ML. This needs to be acquired by the proponent. The proponent currently holds 72 units of entitlement in this water source, therefore an additional 64 units is required. The Lawsons Creek water source has a total of 1780 units of entitlement of which there are 13 WALs in excess of 50 units and 11 WALs between 20 and 50 units. Hence we require confirmation that the proponent is able to acquire this entitlement.

Surface water to be captured within storages that is to be exempt from a WAL requirement due to the excluded work provisions in Schedule 1 of the *Water Management (General) Regulation 2018* includes rainfall/runoff capture within the containment zone (mine affected contaminated water) and the disturbance area (sediment laden water). An average reduction in downstream flows due to this water take is predicted at 177ML/yr.

The impacts to downstream users and the environment due to reduced surface water flows is predicted to be negligible with a 0.5% reduction (81% down to 80.5%) in the time that flows greater than 1ML/d occur, and a 0.3% reduction (90.2 down to 89.8%) in the time that flows greater than 0.1ML/d occur. There is the potential for remnant pools to decline during low or no flow periods due to the project. The EIS does not quantify this. This should be monitored during the project appropriate trigger levels and contingency measures developed.

The project proposes to increase the rate of fill of the final void by redirecting water from the TSF or via catchment runoff into the void. We require further detail on this proposal in terms of the catchment runoff sources to confirm whether licensed entitlement must be held.

The agreements from Ulan Coal Mine and Moolarben Coal Mine to ensure adequate water supply is available when required is a critical element to the viability of the project hence we recommend that agreement be obtained prior to project determination. We recommend this include consideration of options if the project approvals for these mines lapse during the project life.

Recommendations – Prior to Determination

- Confirm that the proponent can acquire 64 units of entitlement within the Lawsons Creek water source.
- Provide further detail on the proposal to increase the rate of fill of the final void by redirecting water from the TSF or via catchment runoff into the void.
- Obtain agreements from Ulan Coal Mine and Moolarben Coal Mine to ensure adequate water supply can be made available when required.

1.3 Site Water Balance Low Runoff Scenario

The site water balance assessment for the available water supply from rainfall and runoff predicts a reduction of 41ML between the average scenario of 806ML and the low runoff scenario of 765ML. This appears to be a minor reduction. We recommend the low runoff value be clarified given recent drought conditions. This is a critical element for the site water balance as rainfall runoff is the most significant water source in terms of volume for the three climate scenarios modelled. A significant reduction is likely to have implications to the projects water supply which may result in increased reliance on external water supplies.

Recommendation – Prior to Determination

- Confirm the low runoff value and ensure adequate water is available at the site during low runoff periods from the proposed sources.

1.4 Borefield assessment

The EIS describes an intention to access groundwater with production bores. However, neither the estimation of proposed extraction from the mine site bores nor water licence and water approval requirements to account for the groundwater extraction under the *Water Management Act 2000* are provided in the EIS. If a borefield is proposed as part of the project, the extraction of groundwater from the borefield is subject to trade criteria described in the Water Resource Plans Factsheet 'Assessing groundwater applications (refer to https://www.industry.nsw.gov.au/__data/assets/pdf_file/0008/175931/Assessing-groundwater-applications-fact-sheet.pdf). This is a process outside of the SSD approval process and should be completed prior to determination to ensure the borefield is feasible.

Recommendation – Prior to Determination

- The proponent should clarify whether a borefield is part of this application and provide details of the proposed borefield review and approval.

2.0 Water Quality

We are concerned that the project risks contaminating the aquifer systems. The proponent should better assess the risks associated with leakage of contaminants into the aquifer systems underneath the TSF and impacts on receptors. There is a town water supply utility borefield further down the valley that could be impacted. More information is needed to understand the potential water quality impacts of the project.

To understand the likely migration of groundwater contaminants, we require a better understanding of groundwater flow dynamics. For example, the EIS states that a groundwater mound under the TSF will dissipate within the drawdown cone of depression. We require further supporting information about this including piezometric maps (groundwater level maps) and flow direction rather than referring to drawdown maps. Prior to mining, the groundwater flow under the TSF site is towards the west (Figure 3, Appendix). The reversal of the flow towards the open pit in a south east direction needs to be substantiated with reliable information. More generally, there are inconsistencies across the submission with regards to horizontal groundwater flow direction and there is no discussion of vertical groundwater flow and inter-aquifer relationships.

The thickness of the basal layer and appropriateness against best practices needs to be confirmed as we understand it is currently planned to be 0.5 metres, while we would expect one metre.

Recommendation – Prior to Determination

- Supply more information to better address the risks to water quality impacts on the receptors downstream of the tailing storage facility (TSF) (including the water utility borefield) as a result of migration of contaminants associated with the groundwater mound underneath the TSF including:
    - Confirmation of standards used for the design of the lining of the TSF as it appears the design allows for 0.5 metre of lining rather than 1.0 metre thickness.
    - Ensuring that the predictions are substantiated with pre and post mining piezometric (groundwater level) maps with groundwater flow directions rather than referring to drawdown maps.
    - Revising the assessment against the Aquifer Interference Policy (AIP) framework if an update is necessary.
    - Assessing and expressing clearly the groundwater quality impacts on the Sydney Basin MDB Groundwater Source and provide details how the water quality impact falls within Level 1 minimal impact assessment criteria of AIP.

3.0 Groundwater Model

The objectives of DPIE Water's model review are as follows:

1. To ascertain the model's suitability to inform decisions by the proponent and various stakeholders, including relevant government departments; and
2. To provide useful feedback to the proponent to help them improve the quality and reliability of the current and future versions of the model and the Groundwater Assessment.

The model has been prepared generally according to best practice as described in the above-mentioned guidelines and subsequent explanatory notes. We believe that the model is fit for the purposes of (a) predicting groundwater level drawdown in space and time, and (b) estimating direct groundwater and incidental surface take that relate to the required mine pit dewatering.

However, omissions, errors, inconsistencies, and ambiguities have been identified in the report that should be addressed to ensure they are not symptomatic of serious model errors.

Examples of likely reporting errors include the incorrectly drawn 'Ideal Fit' line in Figure 57, which if left uncorrected can be understood by the reader as a sign of poor model calibration (average of c. 40 m overestimation). Correction of such errors will give the report readers confidence in the reported modelling work. It will also provide better basis for the future versions of the modelling report and Groundwater Assessment.

Errors were also identified in the report that may reflect 'real' modelling errors. For example, the temporal (monthly) distribution of pumping rate for Basic Landowner Rights (BLR) bores and other works [that have WAL entitlement] presented in Table 28 is contradictory to the discussion presented at the bottom of page 137 and top of page 138. If the information presented in Table 28 is reflective of the model design, then there is an error in the model that must be corrected, particularly to correct groundwater level drawdown predictions near both types of water works. If Table 28 is unrepresentative of the model, it must be revised.

Attachment B 'Groundwater Model Assessment' provides a detailed assessment of the model. We would like the proponent to address and respond to our comments prior to determination. Should any of the issues identified requires model revision, we recommend that the model is corrected and re-run and the model report updated accordingly.

In addition, we recommend that a standalone numerical groundwater model report be produced rather than referring to the modelling work in a chapter in the Groundwater Assessment. The report should be structured and completed according to Chapter 8 in the Australian Groundwater Modelling Guidelines (2012).

The EIS states that the groundwater model will be validated after two years of mining below the groundwater table (i.e. after 3rd year of mining). DPIE Water encourages the proponent to prepare a model updating plan in consultation with the Department and to follow the staged reporting approach described in the Australian Groundwater Modelling Guidelines (2012).

Recommendation – Prior to Determination

- Address and respond to the detailed comments regarding the groundwater modelling reporting presented in Attachment B.
- Present the information in a standalone groundwater model report structure and completed according to Chapter 8 in the Australian Groundwater Modelling Guidelines (2012). If any of the issues identified requires model revision, the model should be corrected and re-run. The model report should be updated accordingly.

4.0 Aquifer Interference Policy

The proponent has satisfactorily considered most matters identified in the Aquifer Interference Policy.

Water table decline is within Level 1 minimal impact consideration category for both Lachlan Fold Belt MDB Groundwater and Sydney Basin MDB Groundwater Sources and there are no high priority Groundwater Dependent Ecosystems or high priority culturally significant sites found in the impacted area.

The impact in one bore in each of the groundwater sources is predicted to be greater than the allowed minimum impact threshold of 2 m. Make good provision would apply to these bores as may be required. While make good may be feasible during mine operation, we require further information on how this will be addressed particularly after mine closure.

Water quality impact falls within the Level 1 minimal impact consideration category for both groundwater sources. However, the proponent has not addressed explicitly the potential water quality impact on the Sydney Basin MDB Groundwater Source. This issue is discussed above in Section 2.

Recommendation – Prior to Determination

- The proponent should provide information on how make good is proposed to be achieved at the impacted bores during operations and post closure.

5.0 Watercourses

An alternate bridge design is recommended for the proposed crossing of Lawsons Creek by the relocated Maloneys Road due to significant impacts to the hydrology of Lawsons Creek. This is due to the crossing design which includes culverts that accommodate little more than half of the channel capacity below the proposed crossing height of 5m above the creek bed level. The reduced capacity is predicted to result in an increase in flood heights by 1.4m for the 1 in 10 year flood event at the crossing and cause flows to enter the floodplain and re-enter the creek 680m downstream which does not occur under current conditions.

These impacts are not consistent with the requirements of the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018) to maintain existing hydraulic, hydrologic, geomorphic and ecological functions of the watercourse. Further to this the proposal is diverting flows on to the floodplain at smaller flood levels than would currently occur, with potential additional erosion impacts on the floodplain and the creek banks and potential floodplain harvesting and loss of water downstream. To address the impacts both within the channel and the floodplain due to the proposed culvert crossing we recommend a bridge design be adopted.

A number of watercourses on the site are to be relocated, temporarily diverted or completely removed. Based on the watercourse assessment the ephemeral drainage lines have limited aquatic habitat and their disturbance is predicted to result in minor to negligible impacts. Based on a site assessment this is supported. The main watercourse areas with ephemeral habitat

value are in the mid to upper reaches of Price Creek which is not to be disturbed and in the lower reaches of Walkers Creek near the TSF dam wall and further downstream.

The relocation of watercourses will need to ensure adequate design and rehabilitation measures are implemented to ensure channel stability and long term ecological functioning are achieved.

The temporary Southern Barrier will be constructed over Blackmans Gully which is a third order watercourse. The discharge capacity of the proposed pipe/culvert under the barrier has not been quantified, hence it is not clear of its adequacy to convey the catchment runoff volumes downstream and any potential impacts to flow.

The following documents should be consulted as references for watercourse diversions on mine sites:

- Department of Natural Resources and Mines 2014. Guideline: Works that interfere with water in a watercourse—watercourse diversions. State of Queensland
- Hardie, R and Lucas, R. 2002. Bowen Basin River Diversions Design and Rehabilitation Criteria. Project C9068 Report for Australian Coal Association Research Program (ACARP). Fisher Stewart Ltd, July 2002.
- Ian D. Rutherfurd, Kathryn Jerieand Nicholas Marsh 2000. A Rehabilitation Manual for Australian Streams. Cooperative Research Centre for Catchment Hydrology, Land & Water Resources Research and Development Corporation, Canberra.

Recommendation – Prior to Determination

- Provide a bridge design for the proposed crossing of Lawsons Creek to meet the requirements of the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).
- Clarify the discharge capacity of the proposed pipe/culvert under the Southern Barrier and any potential impacts to the flow regime.

6.0 General

6.1 Flooding

Flood velocities are predicted to increase along the Price Creek floodplain by up to 1.8m/s for the 1 in 10yr flow event. This is due to the Waste Rock Emplacement (WRE) encroaching on the floodplain and restricting the available floodplain to dissipate the flows. A velocity increase of 3.1% for the 1 in 10 yr flow event is predicted at the northeastern corner of the WRE embankment haul road flood bund. Increases in flood velocities of a lesser extent are predicted along Hawkins creek with a maximum increase of 0.14m/s for the 1 in 10 yr flow event.

Mitigating measures or alternate design options will be required to address potential erosion impact due to increased channel and floodplain velocities both within the site and any impacts extending downstream.

6.2 Water Supply Pipeline

The 58km water pipeline requires watercourse crossings at 6 perennial watercourses and numerous ephemeral watercourses. Potential impacts to waterfront land will need to be addressed in the management plans to meet the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).

The proposal to underbore the perennial watercourses (Bara Creek, Pipeclay Ck, Stony Ck, Cooyal Ck, Ryan Ck and Moolarben Ck) is supported. This is an appropriate method to minimise potential for impacts to bed and bank stability, aquatic habitats and for the maintenance of downstream water needs.

Trenching is proposed for the ephemeral watercourses and is to be completed within a day to minimise potential impacts. This concept is generally supported, however adequate design and rehabilitation to ensure stability can be achieved and to minimise impacts to existing aquatic habitat will be required. The maintenance of flow downstream if present will be critical with a preference for underboring where this cannot be achieved.

Recommendation – Prior to Determination

- Underboring should be considered at other locations where existing water presence or potential channel instability issues represent a potential risk that cannot be adequately mitigated for both short and long term impacts.

6.3 Water storages

The project proposes:

- two storages to store water for site use (8ML and 65ML) within the processing plant area.
- a 1ML dam for dewatering in the open cut and sediment dams (100ML).
- The WRE to include a leachate dam (80ML) and a number of sediment dams to be constructed around it.
- The TSF will have a decant pond within the TSF which will vary in size. Water sourced from this pond will be returned to the processing plant for reuse.
- Numerous other sediment dams will be required around the site where disturbance is proposed such as the haul road construction, southern barrier construction and TSF embankment construction.

Sediment dams are to be sized in accordance with the relevant sizing requirements in the Managing Urban Stormwater: Soils and Construction, Vol 2E Mines and Quarries (DECC 2008).

Of the existing 76 dams on the site 25 dams are to be removed, leaving 51 dams totalling 33.3ML. Based on a Maximum Harvestable Right Dam Capacity of 141.1ML from a 2016ha landholding 107.8ML of dam capacity will remain. Additional dams can therefore be constructed where appropriate.

7.0 Post Approval Recommendations

- A Water Management Plan should be developed to address construction and operation stages of the project in consultation with DPIE Water and NRAR. Key elements will include a Sediment and Erosion Control Plan, Site Water Balance, Monitoring and Reporting and a Trigger Action Response Plan as recommended in the EIS. (Please Ensure the form As of all bores proposed for monitoring in the WMP be provided to DPIE Water for registration and WMP refers the relevant registered bore (GW######) numbers in it. Please provide annual reports on WMP with reference to the registered bore numbers and data in plotted and digital form (excel or text files).)

- Ensure the groundwater model plan includes additional groundwater level monitoring to enable improved model calibration across the model area and depth range. The plan should also consider the need for additional site testing to fill any identified gaps in the mine's hydraulic properties dataset. Prepare a groundwater model validation after two years of mining and update the plan in consultation with DPIE Water. Provide a peer reviewed report on the revised groundwater model to DPIE Water before the end of 5th calendar year of mining operation.

- The ability to accurately meter and monitor water take from surface and groundwater sources will need to be developed with ongoing review of actual versus modelled predictions. This will be a key component to confirm impact predictions, the adequacy of mitigating measures and compliance for water take.

- Numerous dams are proposed to be constructed on minor streams to capture runoff from contaminated and sediment laden sources. These dams should be designed in accordance with relevant industry standards including the guideline Managing Urban Stormwater: Soils and Construction, Vol 2E Mines and Quarries (DECC 2008). These must be solely used for the purpose of managing runoff to prevent contamination. This is necessary to meet the relevant exclusion for dams under Schedule 1(3) of the Water Management Regulation 2018 which are exempt from the requirement for consideration under Harvestable Rights and water licensing.

- The project requires significant disturbance to first, second and third order watercourses due to proposed temporary and permanent watercourse relocations and diversions, and for some watercourses their complete removal. The assessment in the EIS indicated the habitat value of the relevant watercourses to be impacted was limited and the impacts would be minor. Comprehensive design and rehabilitation to meet natural stream design criteria is recommended to ensure the watercourse modifications achieve channel stability and long term ecological functioning.
- The proponent must ensure sufficient water entitlement is held in a water access licence/s to account for the maximum predicted take for each water source prior to take occurring.
- The proponent must obtain relevant authorisations to change the Water Access Licences proposed to account for water take by the project to nominate the project site prior to the water take occurring.
- The design, construction and management of works within waterfront land need to be in accordance with the “Guidelines for Controlled Activities on Waterfront Land (NRAR 2018)”. Vegetated buffers to third order and higher watercourses are to be a minimum of 40m from the high bank
- The proponent must comply with the rules of the relevant water sharing plans.
- Undertake watercourse diversion activities following established best-practice guidelines.

END Attachment A