

Supplementary Submission on SSD-5765 to the Independent Planning Commission by Michael White

Commissioners thank you for the opportunity to have spoken to you at the Public Hearing on Wednesday 15th February 2023. I was speaker #7 and I have already provided my PowerPoint presentation to the IPC.

I would like to summarise my key concerns relating to this Project:

1. The Acid Mine Drainage Risks has not been adequately assessed or controlled.

The Department's own independent expert review by Earth Systems has raised numerous significant concerns about this:

- **Lack of Accurate Classification of PAF and NAF Material.**
 - This is fundamental to the basic mine design and is critical to ensure that no PAF material is placed outside containment areas.
 - It is critical to ensure that PAF waste dumps have sufficient capacity to store all PAF material.
 - It is critical to ensure there is sufficient NAF material for construction and rehabilitation requirements.
- **An Unproven and Substantially Problematic Design of the Waste Rock Emplacement Area (WRE).**
 - In order for the community and government to be satisfied that such designs as contained in this Project proposal are effective, safe and successful in both the short and long term there would need to be evidence of this at similar scale elsewhere.
 - The Proponent has not identified any other mine sites where the use of this design and technology at this scale has been successfully employed in either the short term or the long term.
- The WRE and Tailings Storage Facility (TSF) AMD management strategy/closure design presents the post closure risk of **requiring water treatment in perpetuity**
- The Store and Release Cover System proposed for both the WRE and the TSF are **not suitable for AMD control**

2. The Final Void Water "Through Flow" Risk has not been resolved

The Department's own independent groundwater expert review by Hydrogeologic raised concerns that there was a greater than 50% probability of the through flow of contaminated water from the final void to the surrounding environment post closure.

Bowdens Proposed Final Void Mitigation option (which has not been assessed in the EIS) is to increase the surface area of the final void and the final void lake to increase evaporative losses.

While the DPE's independent water expert acknowledges that this would resolve the through flow risk this proposed solution would require an increase in the final void footprint of between 16.6 ha and 28 ha. The EIS final void design footprint is 53ha. An additional 28ha is an increase of 52% in final void footprint.

This 28ha increase would require moving an additional 16.3 million bank cubic metres of rock.

The total EIS volume of material (that is all the ore and all the waste rock for the entire project) to be removed from the currently proposed open cut pit is approximately 32.5 M cubic metres.

This “solution” would require Bowdens to move 50% more total material over the project life **for no additional revenue**. At \$3-\$4 /bank cubic metre (my conservative estimate) this is would be an **additional** closure cost of between \$49M and \$65M.

The Current EIS mine rehabilitation and Closure costs are \$39.4M. This would increase mine rehabilitation and closure costs to between \$88.4M and \$104.4M (an increase of 224% - 265%)

It is physically possible to move this very large amount of material but it is very unlikely to be economically practical.

Other impacts of this major change to the final landform have not been assessed in the EIS.

This is another example of a hastily cobbled together, improperly assessed, concept level idea put forward as if it is a mature, properly assessed and feasible technical solution. It is not.

3. These significant technical Deficiencies should not be “kicked down the road” for resolution in Conditions of Consent and management plans.

Major unresolved technical issues dealing with fundamental controls of agreed risks (AMD and water quality) do not belong for resolution in Conditions of Consent and future Management Plans. These critical issues must be addressed, broadly scrutinised and resolved in the EIS stage of a project. This has not occurred for this Project.

This project’s location is unsuitable as an experimental test site

Because robust and proven technical solutions to AMD and water quality are not included as part of the EIS then the IPC must refuse this project.

Michael White

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23 February 2023

ACID MINE DRAINAGE RISK

Bowdens Project SSD 5765

IPC Presentation

February 2023

Michael White BE Mining (Hons),
MBA, GAICD

Uncertainties around Acid Mine Drainage

- The majority of waste rock (greater than 50%) and the process tailings are classified as being potentially acid forming (PAF)
- This Project proposes to manage this risk by encapsulating PAF waste rock and tailings in impermeable material:
 - Underneath the Waste Rock Emplacement (WRE) using an HDPE (High density polyethylene) liner and underneath the Tailings Storage Facility (TSF) using clay and a BGM (bituminous geomembrane liner)
 - Above the PAF material using Store and Release covers including a GCL (Geosynthetic Clay Liner) for both the WRE and TSF

My EIS Review

AMD Management – Designs and Strategy

- There is No Track Record of Success

In order for the community and government to be satisfied that such designs as contained in this Project proposal are effective, safe and successful in both the short and long term there would need to be evidence of this at similar scale elsewhere.

The Proponent has not identified any other mine sites where the use of this design and technology at this scale has been successfully employed in either the short term or the long term.

My EIS Review

Concerns with Design, Construction and ongoing Management

This proposed Project is using predictive modelling and small area field trials to claim its containment designs will manage and prevent AMD impacts on the surrounding environment during the project lifespan and for generations to come. There is no certainty that it will be effective.

- There are many factors in these proposed designs which could compromise the integrity of encapsulation both during construction and in the longer term.
- The design is complex and difficult to construct and difficult to monitor for integrity until after leachate has escaped into the surrounding environment.
- Finding and repairing leak locations would also be problematic.

The DPE Assessment

“In line with best practice AMD management, Bowdens Silver would separate the PAF material extracted during mining and encapsulate it within the waste rock emplacement, which has been designed to limit the ingress of water and oxygen and consequent formation of acid.”

“The Department engaged independent experts Earth Systems to provide advice about AMD management for this project. Based on this advice, the Department has recommended a range of strict conditions, including a further verification process to confirm volumes of PAF material, and the preparation of a detailed AMD management plan”

DPE Assessment Report, Executive Summary, page v

Earth Systems: Key Conclusions and Recommendations(Draft)

The AMD risk classification system is considered inappropriate for this Project, resulting in inaccurate predictions of PAF and NAF material tonnages. This will affect waste rock dump design and the availability of non acid forming (NAF) materials for construction / rehabilitation requirements.

Earth Systems has little confidence in the current AMD management strategy for waste rock and tailings. For example:

- The waste rock dump design is unproven and appears substantially problematic, with initial indications that the site could be establishing the need for water treatment in perpetuity.

More detailed assessment of potential AMD impacts from tailings during operations and post-closure is warranted. AMD from the tailings (surface water and seepage) could become a particularly significant issue post-closure as the tailings are progressively drained. Kinetic test work and a strategy for management of PAF tailings is required.

Store-and-release covers are used widely, but almost never in recent years for the purposes of AMD control. The proposed store-and-release cover systems are not considered an appropriate strategy for PAF waste rock or PAF tailings management.

Earth Systems:Final Advice November and December 2022

“No changes have been made to the proposed waste rock dump design since the EIS.....”

“....Considering the limited design life of any GCL, long term control of air entry and AMD generation from PAF waste rock (or tailings) remains a key concern”

Earth Systems Technical Memorandum to DPE 23/11/22
Update on Independent Review page 6/13

“Residual concerns of Earth Systems (2022a) documented on 23 November 2022, primarily relate to the need for a reliable method for classifying and segregating mine wastes as potentially acid forming (PAF) or non acid forming (NAF), and the need to modify the waste rock dump (and TSF) AMD management strategy / closure design to avoid the post closure risk of water treatment in perpetuity.”

Earth Systems Technical Memorandum to DPE 16/12/22
Independent Review Outcomes page 1

Earth Systems: Final Advice November and December 2022

“Regarding management of long term AMD risk from the PAF waste rock dump and TSF, it remains our advice that the design of these facilities will need to be updated, noting that GCL liners have a limited design life, store-and-release covers are not suitable for AMD control, and the longevity of AMD generation from PAF waste rock is unknown but may continue for hundreds of years. These factors will need to be considered in future test work.”

Earth Systems Technical Memorandum to DPE 16/12/22
Independent Review Outcomes page 1

Summary

Classification of NAF and PAF volumes are fundamental building blocks for mine design and volumetric fit – the accuracy of this basic classification is in doubt according to Earth Systems

The Departments own independent expert says the Projects Waste Rock Emplacement and Tailings Storage Facility designs won't work to control acid mine drainage

The Departments own independent expert says GCL (Geosynthetic Clay Liner) store and release covers are NOT SUITABLE for Acid Mine Drainage control

The DPE proposes to resolve all these fatal flaws post approval through application of the recommended conditions of consent

Summary

Following the final Earth Systems Independent Review document Bowdens wrote to the Department in December regarding the AMD Independent Review outcomes stating:

“Importantly it is noted that the matters raised by Earth Systems do not include issues that present risks that are fundamental to the development of the Project”

Letter 1 December 2022 RW Corkery and Co to Director Resource Assessments DPE

Fatal Flaws

Major unresolved technical issues dealing with fundamental controls of agreed risks (AMD) do not belong in Conditions of Consent Management Plans.

This Projects location is unsuitable as an experimental test site

Because robust and proven technical solutions to AMD are not included as part of the EIS then the IPC must refuse this project

Uncertainties around Final Void Water Through Flow:

an uncertainty analysis indicated that a groundwater through flow system could develop in some sections of the void. Bowdens Silver considers that this is unlikely, however has committed to implementing mitigation options to prevent this, including increasing the evaporative surface to ensure groundwater levels remain below the throughflow level threshold. The Department's independent groundwater expert has confirmed that this option would be sufficient to ensure the void remains a sink.

Departments Assessment Report Exec. Summary, page v

The DPE surface water expert acknowledges this would resolve the through flow risk but what other risks or issues would this “mitigation option” cause?

Bowdens Proposed Final Void Solution (Not assessed in the EIS)

- Increase final void footprint by up to 28 ha
(The EIS design footprint is 53ha. **A 52% increase**)
 - Moving an additional 16.3 million cubic metres (bcms) of rock
(**a 50% increase**)
 - The EIS total Project volume of material (ore and waste rock) to be removed from the currently proposed open cut pit is approximately 32.5 M cubic metres.
 - **At \$3-\$4 /cubic metre this is would be an additional closure cost of \$49M-\$65M . A closure cost increase of 224% and 265%**
- EIS Current mine rehabilitation and Closure costs are \$39.4M.

It is physically possible but is it practical? Is it economically real?