



Bowdens Mine Proposal: Surface Water Issues

IPC Public Hearing: 15 February 2023
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Key issues

1. Secretary's Environmental Assessment Requirements (SEARs) not met
2. AWBM water balance model issues and uncertainties:
Calibration method and lack of Verification
Inputs:
 - Mine Site Catchment Area
 - Water demandLack of a sensitivity analysis
3. Significant and unacceptable impacts on the surface water
4. Regulatory irregularities
5. Water quality issues unaddressed
6. Potential impacts on groundwater dependent ecosystems

Secretary's Environmental Assessment Requirements (SEARs) not met

1. Water demand not clearly identified
2. Full impacts of drawing the water supply has not been assessed
3. Adequate and secure water supply is not available
4. Water balance modelling: not accurate and **no sensitivity assessment**
5. **No site water quality model, no water quality treatment methods**
6. **Two paragraph long “water quality monitoring program”**
7. No Trigger Action Response Plan

An assessment of potential water quality impacts associated with process chemicals has not been conducted, therefore it has not been possible to develop management measures. Impacts of TSF seepage on receiving surface water or groundwater remains a key concern.

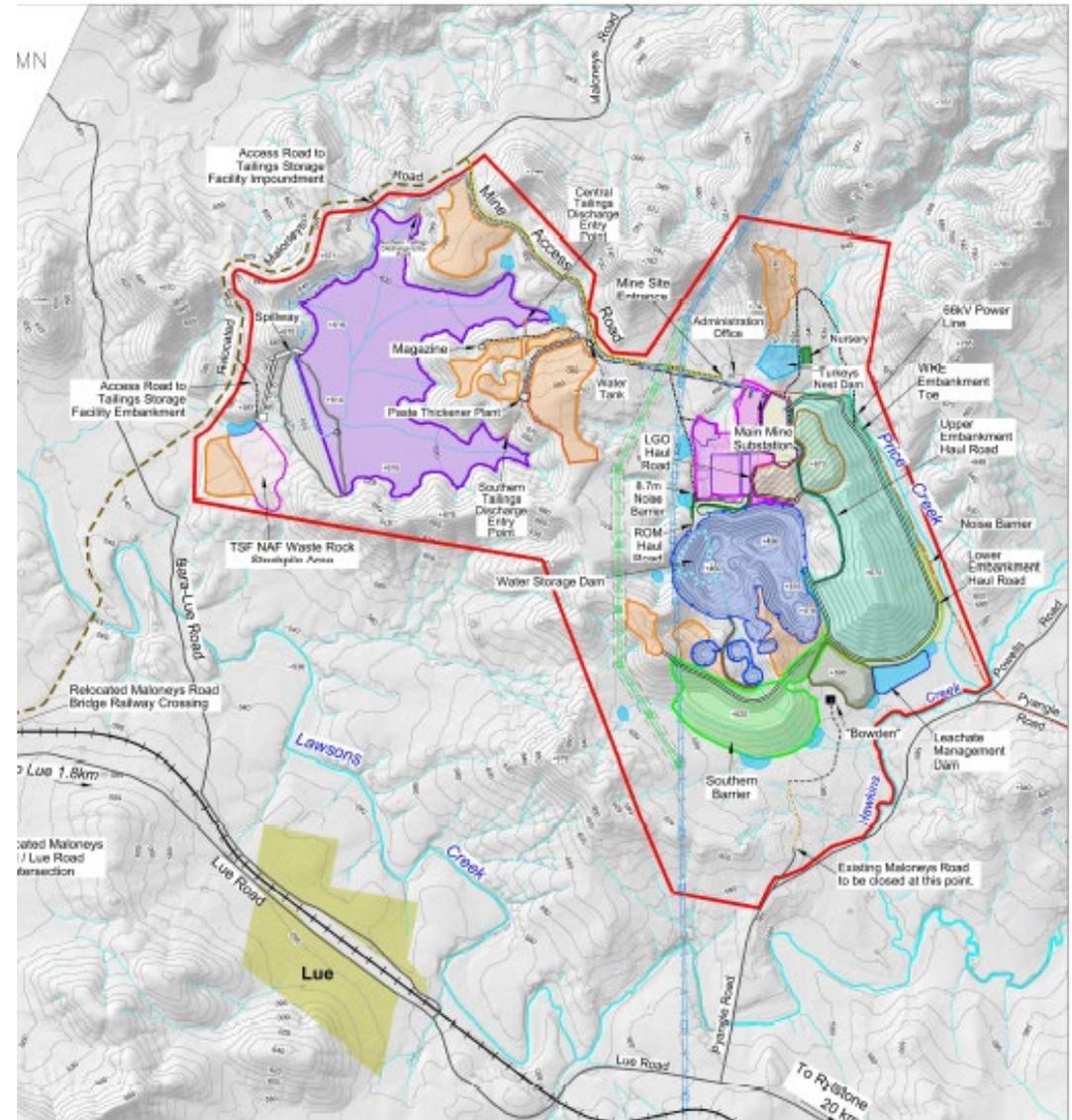
Earth-Systems, 2022¶

Mine Site area unclear

550 ha Mine Site catchment

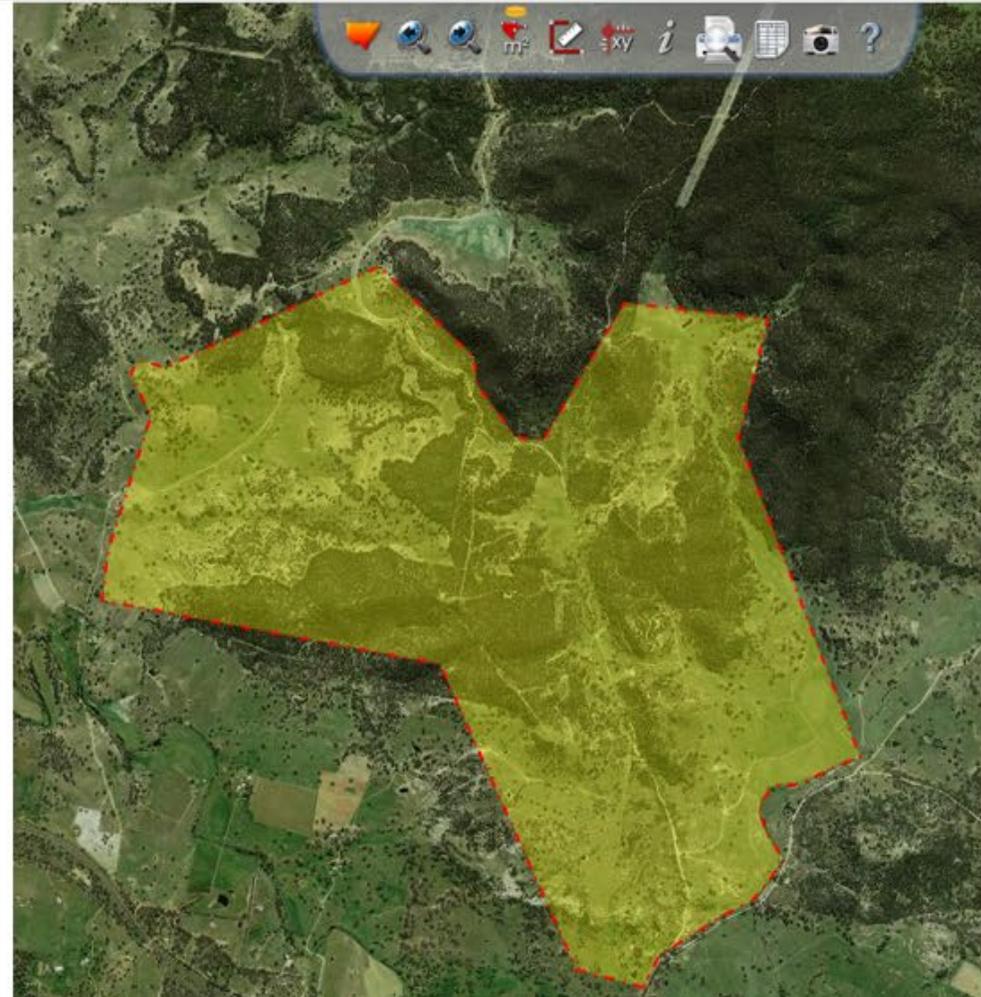
‘Removed’ in full to assessed the Project’s maximum impact on ‘cease to flow’ conditions

Proposed mining operations cover the majority of the Mine Site boundary (shown in red)

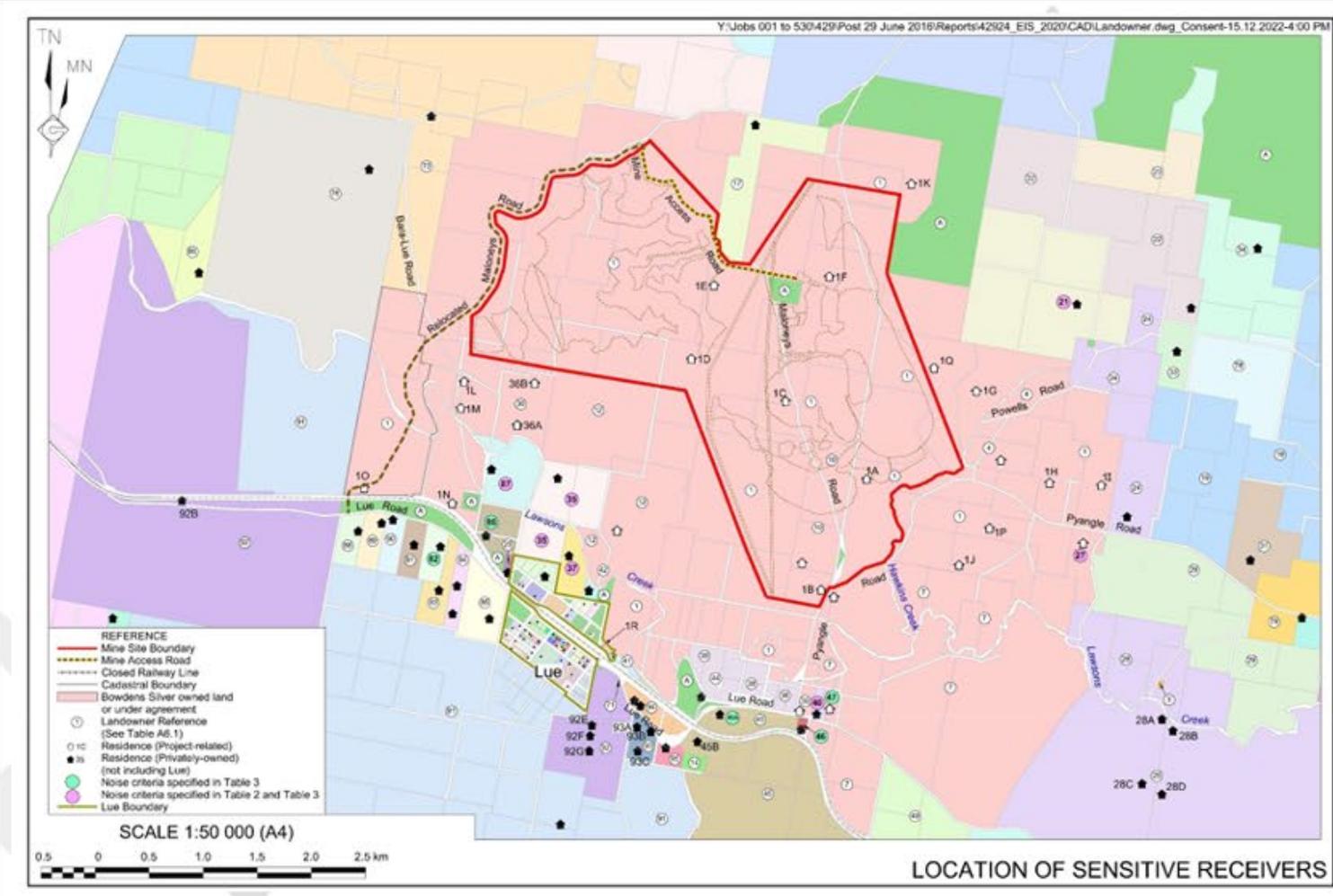


Mine Site area unclear

Mine-site-area—Six-Maps—1007-Ha



DPE-Recommended-Conditions



Water Demand Uncertainties

Two inputs:

- Potable water:
 - 14ML/year
 - missing from inputs

Dust suppression water:

- ?? ML/year

Table 5.5b
Average Annual Site Water Balance – Years 1 to 14 - Revised

Item	Inflow	Outflow
	ML/a	ML/a
Rainfall and runoff	924	
Net groundwater inflows to open cut pit	431	
Advanced dewatering	380	
Clean water harvesting	27	
Ore moisture	83	
Retained tailings moisture		1 143
Evaporation		477
Dust suppression demands supplied		128
Concentrate moisture		6
Other plant losses		19
Dam overflows		0
Annual increase in stored volume		72
Total	1 844	1 844

Water Demand Uncertainties

* Dust suppression: ?? ML/year

Findings & recommendations: Earth Systems to DPE

Seek clarification of the implications of under-estimating water requirements for dust suppression for project water supply reliability.

Supporting data were not provided, nor were uncertainties in dust suppression requirements considered in the sensitivity analysis of the water balance model.

Pending clarification of model sensitivity to uncertainty in water requirements for dust suppression, details on the proposed chemical composition, application rates and toxicity, and implications for the impact assessment.

Water Demand Uncertainties

Table 3

Average Annual Site Water Balance – Years 1 to 14 – Low Runoff Scenario
(correction to Table 5.11 of WRM [2022])

Item	Inflow	Outflow
	ML/a	ML/a
Rainfall and runoff	740	
Net groundwater inflows to open cut pit	431	
Advanced dewatering	380	
Clean water harvesting	22	
Ore moisture	82	
Retained tailings moisture		1,129
Evaporation		358
Dust suppression demands supplied		131
Concentrate moisture		6
Other plant losses		19
Dam overflows		0
Annual increase in stored volume		14
Total	1,655	1,655

Table 4

Average Annual Site Water Balance – Years 1 to 14 – High Runoff Scenario
(correction to Table 5.12 of WRM [2022])

Item	Inflow	Outflow
	ML/a	ML/a
Rainfall and runoff	1,109	
Net groundwater inflows to open cut pit	431	
Advanced dewatering	380	
Clean water harvesting	58	
Ore moisture	83	
Retained tailings moisture		1,146
Evaporation		614
Dust suppression demands supplied		132
Concentrate moisture		6
Other plant losses		20
Dam overflows		0
Annual increase in stored volume		143
Total	2,061	2,061

How could dust suppression water requirements be lower in dry periods?

AWBM water balance model issues

Uncertainties due to the issues already outlined

In addition

- Calibration at irrelevant location and “excludes recent very dry weather when instream losses appear to be most”. No verification
- Use of ‘average’ results – what happens in wet and dry periods?
- **No sensitivity analysis for evaporation, dust suppression water, etc:**
- No consideration of climate change

Not possible to understand likely impacts

Model not yet fit for purpose.

Unacceptable impacts on surface water

Dept of Planning has assessed the project on the basis of 177ML/yr being 'lost' to the catchment; however the true figure is at least 856ML/yr

480% more rainfall and runoff than has been assessed

significant impacts to downstream catchments

Earth systems has repeatedly recommended that the 856ML/yr loss be modelling.

It has been confirmed that 856 ML/year of surface runoff would be removed from the Lawsons Creek catchment. This is well in excess of losses presented elsewhere in the EIS (177 ML/year; which relates to surface water runoff losses only). A review of impacts on downstream surface water, baseflow and groundwater is therefore warranted.

This has not occurred.

This project be considered for approval when the assessment is flawed?

Unacceptable impacts on surface water

However, likely flows are higher:

951ML/year

Advice from Corkery:

The increase from 806ML/y (2020) to 856ML/y (2022) is attributed to the TSF liner and addition of clean water harvesting

However, clean water harvesting is a separate item, and is **also removed from the catchment.**

Must also be considered

**Table 5.5
Average Annual Site Water Balance – Years 1 to 14**

Item	Inflow	Outflow
	ML/a	ML/a
Rainfall and runoff	856	
Net groundwater inflows to open cut pit	431	
Advanced dewatering	380	
Clean water harvesting	40	
Ore moisture	83	
Retained tailings moisture		1 141
Evaporation		448
Dust suppression demands supplied		131
Concentrate moisture		18
Other plant losses		20
Dam overflows		0
Annual increase in stored volume		31
Total	1 789	1 789

Unacceptable impacts on surface water

Table 5.5 was updated late 2022.

Now inflows (catchment losses) are:

- 924 ML/year in rainfall and runoff
- 27 ML/year in clean water harvesting

951ML/year lost from the catchments...
year after year.

Table 5.5b
Average Annual Site Water Balance – Years 1 to 14 - Revised

Item	Inflow	Outflow
	ML/a	ML/a
Rainfall and runoff	924	
Net groundwater inflows to open cut pit	431	
Advanced dewatering	380	
Clean water harvesting	27	
Ore moisture	83	
Retained tailings moisture		1 143
Evaporation		477
Dust suppression demands supplied		128
Concentrate moisture		6
Other plant losses		19
Dam overflows		0
Annual increase in stored volume		72
Total	1 844	1 844

Unacceptable impacts on surface water

Table 8.1[^]: Revised with greater catchment and consideration of lower flows

Impact of Project on Mean Annual Streamflow in Downstream Waters					
Reach Number	Unit	Operations			Comment
		1	2	3	
Watercourse and reach		Hawkins Creek	Lawsons Creek	Lawsons Creek	
		P - A	B - C	C - D	
Mean annual flow					
Pre-mining ML/a	ML/a	1958	7136	8735	not altered from Table 8.1
q60 (flows are less than this 40% of the time)	(ML/d)	not available		4	From Figure 8.3 of amendment report
q70 (flows are less than this 30% of the time)	(ML/d)	not available		2.4	From Figure 8.3 of amendment report
Loss due to Mine Site WMS	ML/a	854.7	854.7	951	Have added 774.4ML/y, the amount over 176.6, to all operations catchments.
Loss due to Mine Site WMS (ML/a)	(ML/d)	2.3	2.3	2.6	
Potential baseflow reduction*	ML/a	9.5	5.1	14	not altered from Table 8.1
	(ML/d)	0.03	0.01	0.04	
Total change due to the Project	ML/a	-864.2	-859.8	-965	Assumed to be sum of losses above. Note, numbers in original Table 8.1 didn't add up
	(ML/d)	-2.4	-2.4	-2.6	
Comparison with Mean annual flow					
Percent change due to the Project	%	-44.1	-12.0	-11.0	
Comparison with					
q60 (flows are less than this 40% of the time)	(ML/d)	not available		-66.1	
q70 (flows are less than this 30% of the time)	(ML/d)	not available		-110.2	

**The likely impacts of the mining
operations on water are unacceptable**

The project should not be approved

**Lawson Creek, Lue
2019**



Regulatory irregularities

Context: Project relies on its harvestable water rights of 186.1ML – Permissible based on 2580 ha contiguous land holding

Volume of the sediment dams (150ML) and clean water dams (145ML) = **295ML**

Exceeds theoretical harvestable water rights **by 109ML**

186.1ML is the maximum volume of dams allowed, however already 59 dams across the 2580ha property. Assumed average of 1.5m = 72ML.

Remaining harvestable right of only **114ML**

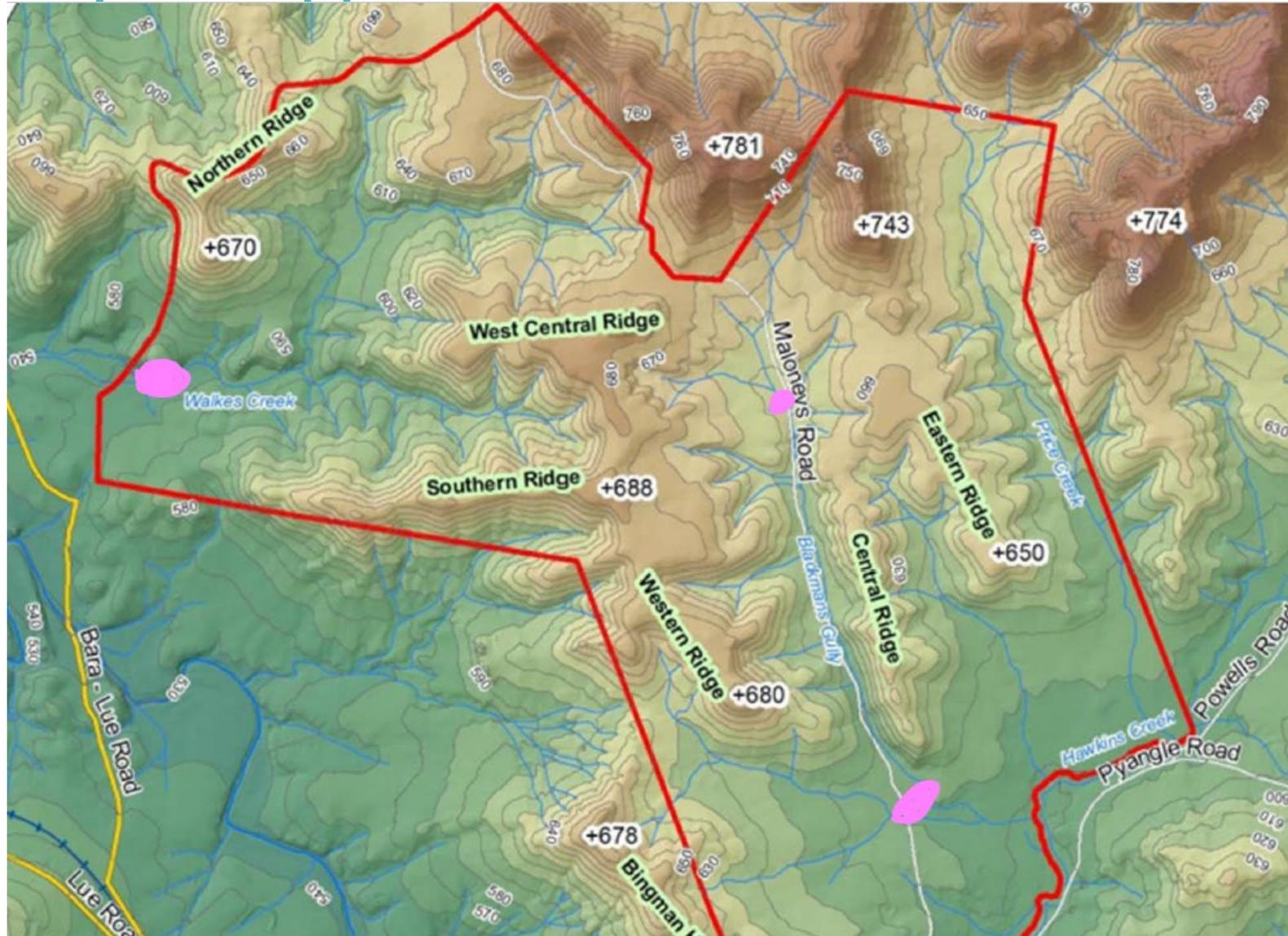
Bowdens intends to harvest more twice its entitlements

Exemptions being relied on for these dams require these to be on minor streams

Violated in a number of instances: affects 70ML of the dam capacity

The EIS and associated documentation does not present a factual assessment and is not fit for purpose in this regard.

Regulatory irregularities



The EIS and associated documentation does not present a factual assessment and is not fit for purpose in this regard.

Water quality

Failure to adequately address key points in the SEARs:

- No water quality model
- No water quality management plan with appropriate triggers for action.
- 2 paragraph water quality monitoring plan

Uncertainties around final void water throughflow- potential for contamination

All these issues have been raised by DPE's experts but remain unrectified.

In addition, the latest proposal by Bowdens is to increase the surface area of the final void and lake to increase evaporative losses

No impact assessment of this yet

This will only exacerbate all the water issues outlined here.

Conduct pit water quality modelling (taking into account acid, metals, salinity and any other contaminants) and solute transport modelling to assess potential water quality impacts in Hawkins Creek associated with throughflow from the final pit void, with and without implementation of mitigation measures.

Impact on groundwater dependent ecosystems

High number of springs in and adjacent to the proposed mine site.

Widespread system of upland swamps and mires in Upper Lawson catchment.

Likely referable to the Montane Peatlands and Swamps Endangered Ecological Community (EEC) and the Temperate Highland Peat Swamps on Sandstone EEC

These peatland swamps in the Mid-Western LGA are not yet well documented

Likely endangered groundwater dependent ecosystems.

The role of these wetlands is critically important. They act as sponges in the landscape, supporting the surrounding and downstream areas in dry times.

The risk of losing these permanently is very high and the loss is irreversible.

Conclusion

1. Water balance model issues and uncertainties:
Inputs:
 - Mine Site Catchment
 - Water demandCalibration and Verification
Sensitivity assessment
2. Significant and unacceptable impacts on the surface water
3. Regulatory irregularities
4. Water quality issues remain unaddressed.
5. Secretary's Environmental Assessment Requirements (SEARs) not met

Conclusion

The failure of the EIS and associated documentation to meet the SEARs in multiple instances means:

- The IPC does not have sufficient information to make an informed decision
- There is a failure of due process
- The standard required to assess the impacts of a project have been lowered
- Determinative issues are being pushed into post-approval stage
- The community confidence in the decision-making process has been undermined.
- No confidence from the local community means = no social license for this mine.

The IPC should refuse this project.