Lue Action Group
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ATTACHMENT 1

MSW Comments on Bowdens Response to Submissions and the Proposed Amendment (Michael White, March 2022)

MSW Comments on Bowden's Response To Submissions Report and the Proposed Amendment

Response To Submissions Report (RTS)

The overall tone of the Bowdens RTS Report to the valid technical risks raised in Submissions across a range of the proposed Project elements is one of dismissive arrogance and general themes of:

- *"The board and management of Silver Mines have substantial technical and operational experience in exploration, delineation, financing, development and management of minerals projects in Australia and abroad."*[1]
- Bowdens use consulting experts and we know what we are doing (See example 1)
- Predictive modelling and technical studies can be relied upon (See example 2)
- If our designs don't work we will use "adaptive management strategies" to fix it. (See example 2)

Example 1 Mining Equipment Capacities

Representative Comment(s)
The mine haul truck numbers used for noise modelling look to be unachievably low.
The EIS uses a maximum of four Cat 777 rear dump haul trucks in its mine plan. It also states it will only be running three trucks when operating the water cart. This is neither practical nor feasible.
Lue Action Group, NSW (Submission SE-8654995) – Attachment 1

Response
AMC Consultants Pty Ltd (AMC), a highly experienced and internationally recognised mining consultancy, were commissioned by Bowdens Silver to undertake the mining studies for the Project's Feasibility Study. During these studies, AMC conducted detailed analysis of the mining cycle times to the run-of-mine (ROM) pad and respective waste rock destinations TSF and WRE to establish mining fleet requirements. From this analysis, AMC identified an initial requirement
for three Cat 777 trucks, rising to four in the eighth year of operation and returning to three in the 14th year. The restriction of only operating three trucks when operating the water cart would only apply at night (10:00pm to 7:00am). Given the short distances to be watered during this period, the proportion of time required for water cart operations would be comparatively small. [2]

Representative Comment(s)
The Hitachi Ex 1900 excavator is capable of moving 6 million tonnes per annum if it is not waiting on trucks.
Lue Action Group, NSW (Submission SE-8654995) – Attachment 1

Response
As noted in the response above, AMC undertook the mining studies for the Project's Feasibility Study. AMC estimated the productivity of the Hitachi EX 1900 in combination with Cat 777 G trucks for handling both oxide and fresh

[1] Bowden Submissions Report,,s.5.8.2,p.120
[2] Bowden Submissions Report,,s.5.16.4, p.197

rock material. AMC determined annual productivity to be 4.37 million bank cubic metres (Mbcm) of oxide material (9.77 million tonnes (Mt)) and 4.05Mbcm (9.58Mt) of fresh rock. That is, the equipment would have the capacity to move 19.35Mt per annum.
Based on the Project's mining schedule, operations would require the maximum annual movement of 6Mt, meaning a Hitachi EX 1900 excavator (or similar) would have approximately 60% surplus capacity.[3]

Example 2 Encapsulation of Acid mine drainage forming material

5.3.3 Leachate Management Dam
Representative Comment(s)
A brief desk-top review by this author has not found any 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 for a TSF or WRE.
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.
Lue Action Group, NSW (Submission SE-8654995) – Attachment 1
Response
As noted in Section 3.1 of Advisian (2020b), one of the main objectives of placing a cover system over reactive waste material is to protect the downstream receiving environment following closure of the mine. This is achieved by reducing the net percolation of water into the reactive mine waste materials, thereby reducing effluent seepage volumes. In addition to limiting contaminant release via seepage, the aims of cover systems includes chemical stabilisation of the waste material by limiting the ingress of atmospheric oxygen, limiting the upward movement of process water into the cover, and provision of a suitable medium for the establishment of sustainable vegetation.
Whilst the author of this submission notes that a brief desktop review could not identify the use of the proposed cover system, attention is drawn to Section 5.3.1, which identifies numerous technical studies undertaken and that the cover system proposed by Bowdens Silver is considered "state of the art" when assessed against current industry practice (e.g. DFAT, 2016).
Predictive modelling is a valid and robust means to inform the preliminary design of the cover system to achieve long-term (modelled) performance. As the WRE would be progressively developed and rehabilitated, the effectiveness of the proposed closure and rehabilitation measures would be trialled and monitored during operations, with the performance of these measures evaluated via comparison with modelled results. This would provide Bowdens Silver with the opportunity to apply adaptive management strategies, if required, to improve the effectiveness of the proposed closure and rehabilitation measures. [4]

[3] Bowden Submissions Report, s.5.16.4, p.198
[4] Ibid s.5.3.3, p.70

MSW Comments on Bowden's Submissions Report

Mining Equipment Capacities (Example 1)

The statement that one Hitachi EX1900 has the capacity to move 19.35 million tonnes per annum is egregiously incorrect and this should be obvious to any person with technical competency.

One Hitachi Ex1900 excavator fully trucked would struggle to move even half this amount. This 190-tonne class excavator typically operates with a 12 cubic metre bucket.

Shown below is an extract from a paper published in 2012 by Dr Graeme Lumley [5] of GBI Mining Intelligence (now part of PwC) showing worldwide performance of excavators in tonnes per cubic metre of bucket capacity.

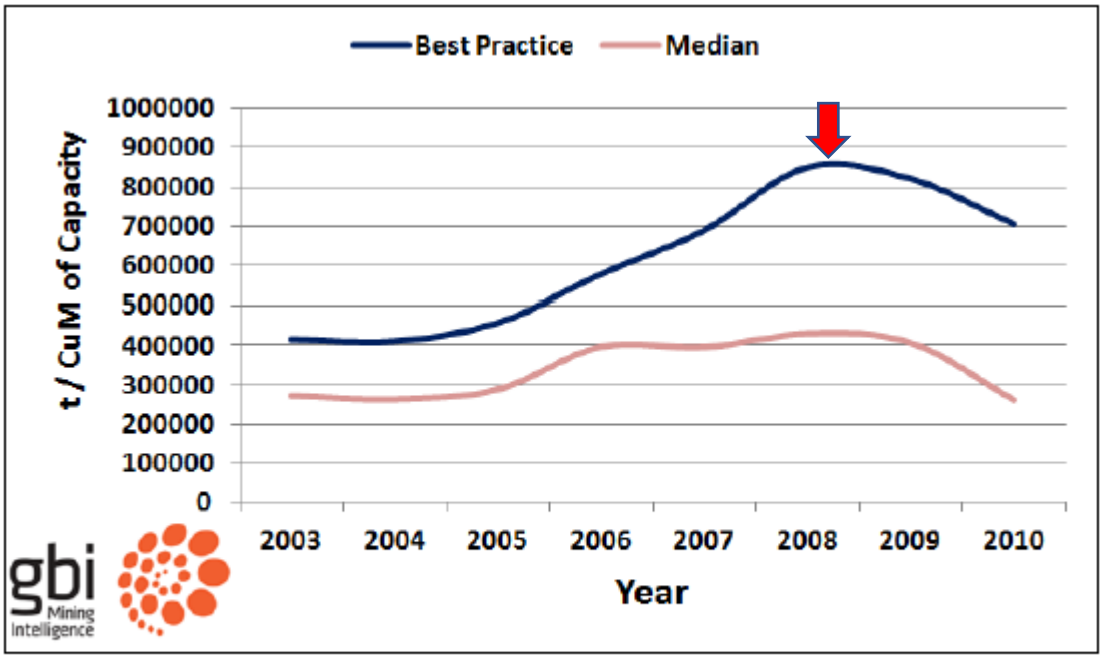

Figure 18. The median performance rises from Worldwide Hydraulic Excavator Annual Unit Production (t/CuM of Capacity) 2003-2010 by Performance

If one uses the 2008 world's best practice highest value of 850,000 tonnes per cubic metre and applies this to a 12 cubic metre bucket the annual capacity for the world's best 190 tonne excavator is **10.2 million tonnes per annum**.

Bowden's state 19.35 million tonnes per annum which is almost twice the output of the world's best performing excavators.

[5] Trends in Performance of Open Cut Mining Equipment, Dr Graeme Lumley, GBI Mining Intelligence, https://www.scribd.com/document/80604395/White-Paper-Trends-in-Performance-of-Open-Cut-Mining-Equipment

A Further Confirmation of Excavator Capacity

A Mine Operations Manager in the Hunter Valley currently runs Hitachi EX3600 excavators (360 tonne with 23 cubic metre bucket). Maximum annual production rates on these machines are:

Hitachi EX 3600: 1150 bcms/hr at 6500hrs X 2.4 tonnes/bcm = **17.9 million tonnes per annum**

This model is almost twice the size of the EX1900 in the Bowden's fleet. This clearly demonstrates that the stated Bowden's fleet capacity of 19.35 million tonnes per annum is greatly overstated

If this technical error is indicative of the level of technical rigour in this Project application overall, then the DPIE should refuse this application.

Encapsulation of acid mine drainage forming material – 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.

In a paper presented to a Mine Closure Conference in Perth in 2016, "Store and Release" cover trials were being conducted at the tailings dam at Century Zinc in north-west Qld. This mine closed in 2016 after a 16-year mine life. The potential for AMD generation at Century Zinc is described as several hundred years. These trials were conducted on three 0.56 hectare plots. [6] The tailings dam area for the Bowden's Silver Project is 117 hectares.

In 2016 the Australian Government published a mining Leading Practice Handbook titled "Preventing Acid and Metalliferous Drainage" which contains the following statement [7]:

> Because many AMD management technologies are still relatively new (less than 30 years old), there are few long-term cases that can demonstrate success in achieving stable and environmentally safe landforms. In the planning stages leading up to the design and implementation of the AMD closure strategy, the likelihood of success is indicated by results obtained from predictive modelling and from field trials.

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.

As identified in the Lue Action Group EIS submission 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.

On that basis the precautionary principle should apply and this Project Application should be refused.

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[6] https://papers.acg.uwa.edu.au/p/1608_20_Defferrard/, s2.1.2 TSF Chemistry,p.293
[7] https://www.industry.gov.au/sites/default/files/2019-04/lpsdp-preventing-acid-and-metalliferous-drainage-handbook-english.pdf, p.30

Tailings Storage Facility Lining of Impoundment Area

The Proponent now proposes to line the floor of the entire TSF impoundment area with a bituminous geomembrane liner (BGM). However, the wording used in the Assessment Report indicates this is not a binding commitment:

> It is considered that the assessment undertaken to date is sufficiently detailed and conservative to permit approval of the conceptual design of the TSF for the Project. Notwithstanding this, in the event Development Consent is granted for the Project, Bowdens Silver would further assess the effectiveness of these design elements aimed at seepage mitigation as part of detailed TSF design undertaken to the satisfaction of DPIE and/or EPA. This process would be used to confirm the optimal configuration for seepage mitigation (i.e. full or partial BGM with underdrainage) to achieve the TSF design intent and limit potential impacts to surface water and groundwater resources from seepage with regards to current and future beneficial uses, as defined by published water quality guidelines.[8]

This discretionary decision making should not be given to the proponent.

On the DPIE Major Projects web site a review of EPA advice [9] on Bowden's Response to Submissions shows the current EPA position on this matter is as follows:

> **EPA Recommended condition of consent**:
> All water storages containing non-potable water must have a liner that achieves a hydraulic conductivity of $1x10^{-9}$ m/s or less with a constructed clay liner of at least 1000mm or a geosynthetic liner providing equivalent or better protection.

The Bowdens Project Tailings Storage Facility has a footprint of approximately 112.5 hectares and the construction of a continuous geosynthetic impermeable liner base over this large area that will provide full impermeability for centuries seems to be an improbable and unachievable control.
Has a TSF base liner of this scale been successfully constructed and operated at other operations over an extended period?
The low permeability (hydraulic conductivity of $1x10^{-9}$ m/s or less) constructed clay liner with at least 1000mm thickness would be simpler to construct, and more robust and more forgiving to minor impacts and minor thickness variations.

This clay liner should be mandatory requirement as the Bowden's TSF impoundment base liner over the entire impoundment area.

[8] Bowden Submissions Report, s.3.3.7, p.31
[9] https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=PAE-24168116%2120210812T003829.070%20GMT

MSW Comments on the Application Amendment

Paste Thickening of Tailings

The proponent has now included the addition of a paste thickener plant to the tailings stream to increase water recovery. The amendment states that the paste thickener plant would thicken the tailings stream from the processing plant to produce tailings with a 63% w/w solids content.[10]

The solids content of tailings in the EIS was assumed to be 56% and this was one of the design parameters used in the design of the Tailings Storage Facility (TSF)[11].

7 TAILINGS TONNAGE AND DEPOSITION RATE

The preliminary design has been based on the deposition of 2 Mt of tailings per annum with a total of 30 Mt deposited over the 15-year LOM. A discharge solids content of 56 % for the tailings has been adopted on the basis of the thickener study carried out by mining equipment supplier Outotec on the CT tailings sample produced for testing in February 2017 [Ref. 5].

8 DENSITY

Based on the initial tailings testing [Ref. 3], the tailings parameters adopted for this study are presented in Table 1.

TABLE 1

TAILINGS DENSITY PARAMETERS ADOPTED FOR DESIGN

Discharge Solids Content (%)	Initial Settled Density (t/m³)	Final Settled Density for Start-up Deposition (t/m³)	Final Settled Density for after Start-up Deposition (t/m³)	Over-all Tailings Density at the End of LOM (t/m³)	Soil Particle Density (t/m³)
56	1.[illegible]4	1.35	1.6	1.5	2.7

The solids content of the tailings has increased from 56% to 63%. This 12.5% relative increase in solids content is significant. The impacts of this proposed change do not appear to have been assessed by the proponent.

There is no updated information provided regarding the materials handling characteristics, the tailings beach slope predictions, beach slope design or tailings emplacement methodology for the paste thickened tailings.

On that basis this application should be rejected.

[10] Bowdens Water Supply Amendment Report, p.15
[11] Bowdens EIS Specialist Studies Vol 5 Part 16A TSF Design Report, p.5

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ATTACHMENT 2

Independent Review of the Bowdens Silver Pty Limited Surface Water Assessment – Updated

(Shireen Baguley, March 2022)

Updated May 2022

Independent Review of the

Bowdens Silver Pty Limited

Surface Water Assessment – Updated

(WRM Water + Environment Pty Ltd

February 2022)

Table of Contents

Figures

Tables

Introduction

This analysis considers the data used in the Bowdens surface water assessment (WRM Water & Environment Pty Ltd) to do the modelling showing the viability of water use and reuse at the proposed mine site.

It considers the rainfall data used and compares it with the known local conditions.

Comparative rainfall data has been drawn from the BOM data from the two closest towns, Mudgee and Rylstone. Local Lue landholders also provided rainfall data to inform this review, which gave rainfall data for:

- Lue Village,
- a property 2.2 km from the eastern edge of the proposed pit,
- a property approximately 1.0 km from southern edge of pit, and
- Lue Station.

Lue Station has recorded monthly rainfall totals since 1887 while the other properties in the local area have records dating back to the 1980s.

It also discusses the interaction of surface water with groundwater and considers the reliability of predictions using of groundwater models in this location.

Monthly rainfall

Data

From Bowdens surface water assessment:

Figure 3.2 Average monthly rainfall and pan evaporation at the Mine Site - 1889 to 2018 (source: SILO point dataset - Qld Department of Environment and Science)

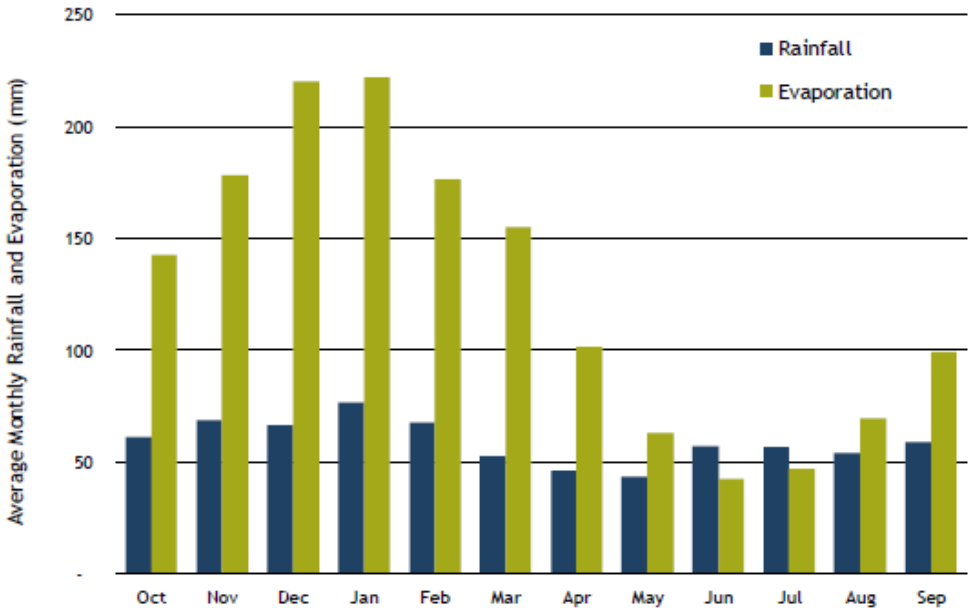

Figure 1 Average monthly rainfall data presented in Bowdens surface water assessment

From BOM site, for Mudgee Airport[1]

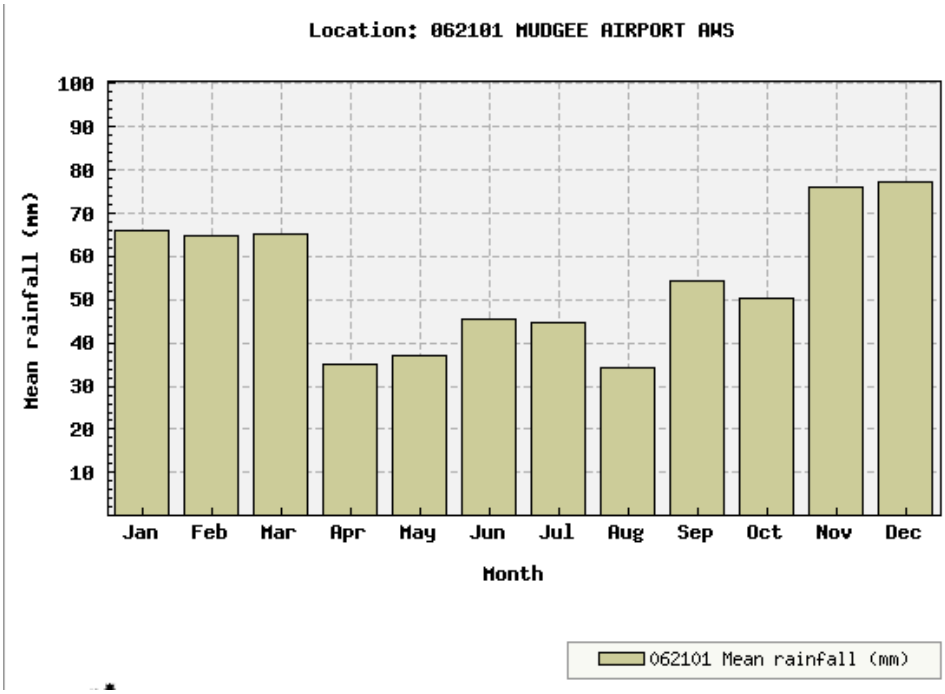

Figure 2 Average monthly rainfall data for Mudgee

1 http://www.bom.gov.au/jsp/ncc/cdio/cvg/av?p_stn_num=062101&p_prim_element_index=18&p_display_type=statGraph&period_of_avg=ALL&normals_years=allYearOfData&staticPage=

From BOM site, for Rylstone (062026[2]):

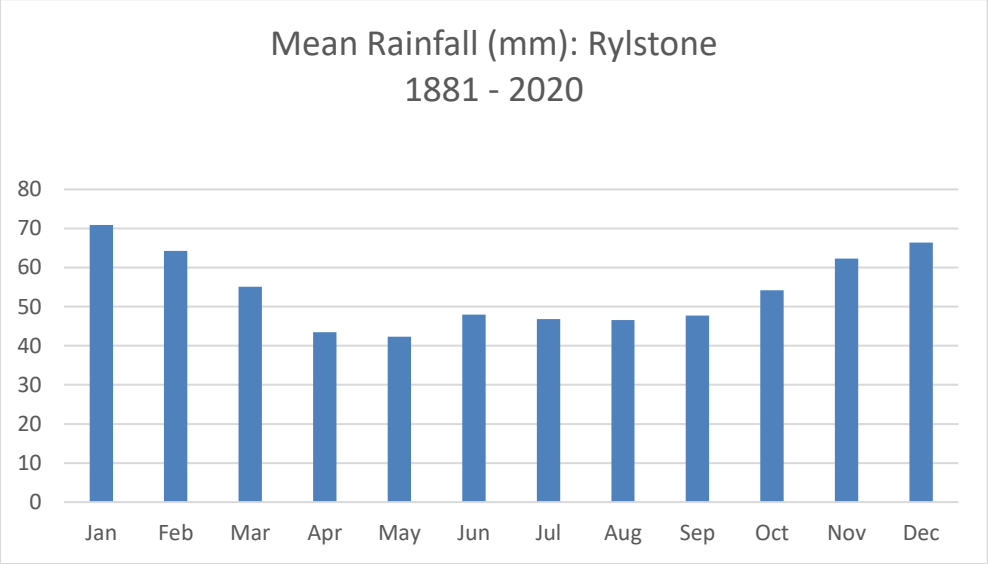

Figure 3 Average monthly rainfall data for Rylstone

From the Lue Station records:

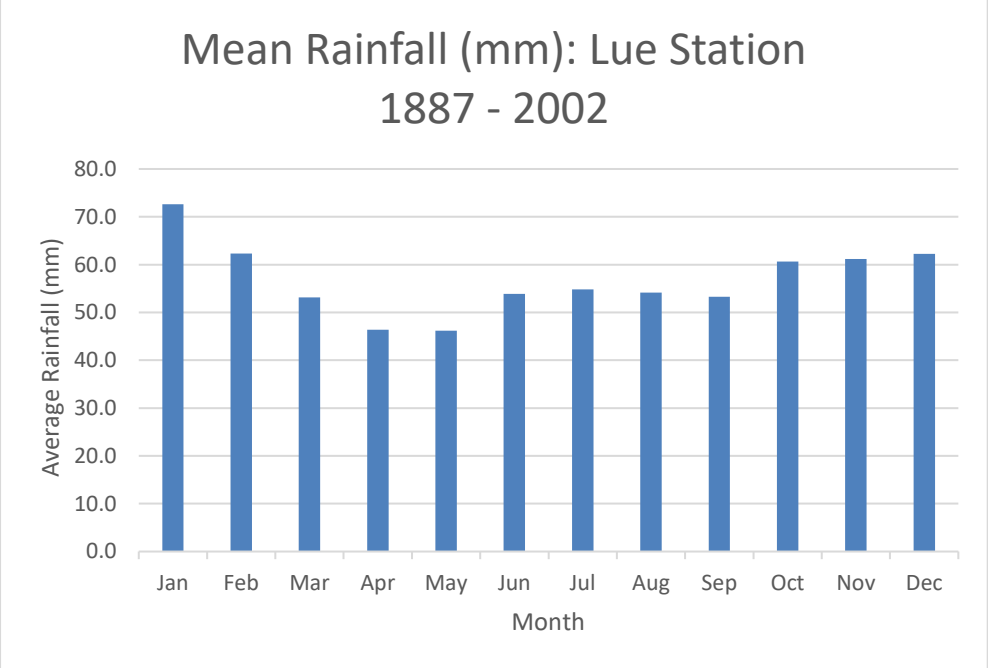

Figure 4 Average monthly rainfall data for Lue Station

Conclusion

The Bowdens surface water assessment data appears to show a monthly average that exceeds 75mm over summer. This is incorrect, as evidenced by the rainfall data from Mudgee (26km west of the mine site), Rylstone (22km south of the mine site) and Lue Station.

Many of the other months are also too high when compared to Mudgee, Rylstone and Lue rainfall statistics. The data should be reviewed and revised down so as to not incorrectly inflate the amount

[2] http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=062026

of rainfall which the region actually receives. The data for the Bowdens site needs to be presented numerically, so they can be clearly understood.

Annual rainfall

From Bowdens surface water assessment:

Figure 3.1 Annual rainfall at the Mine Site - 1889 to 2018 (source: SILO point dataset - Qld Department of Environment and Science)

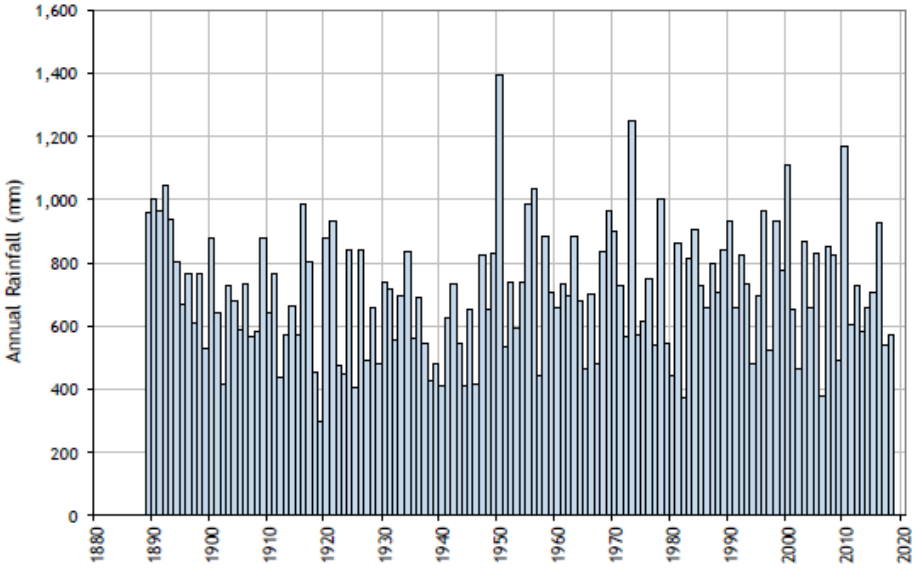

Figure 5 Annual monthly rainfall data presented in Bowdens surface water assessment

Average annual rainfall reported as 673 mm/a.

From BOM site, for Rylstone (062026[3]):

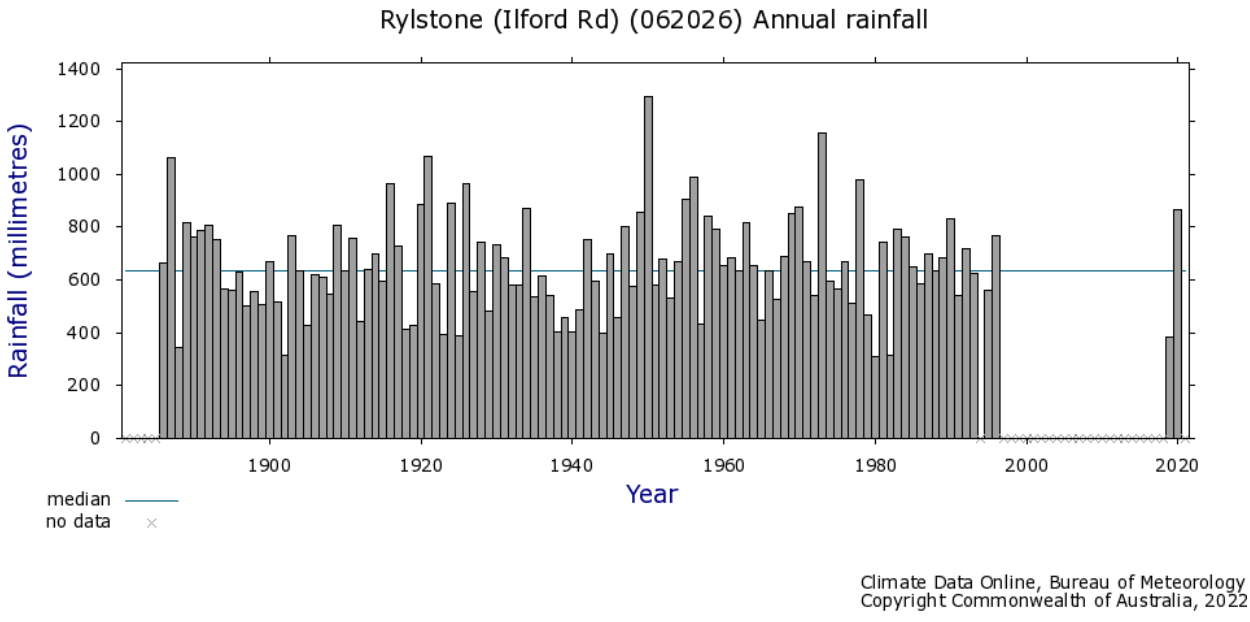

Figure 6 Annual monthly rainfall data for Rylstone

[3] http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=062026

Table 1 Rylstone Rainfall Statistics

Station 062026 Rainfall Statistic	Annual
Mean	654
Lowest	309.4
5th %ile	390.4
10th %ile	426.5
Median	635.4

From BOM site, for Mudgee (062021[4]):

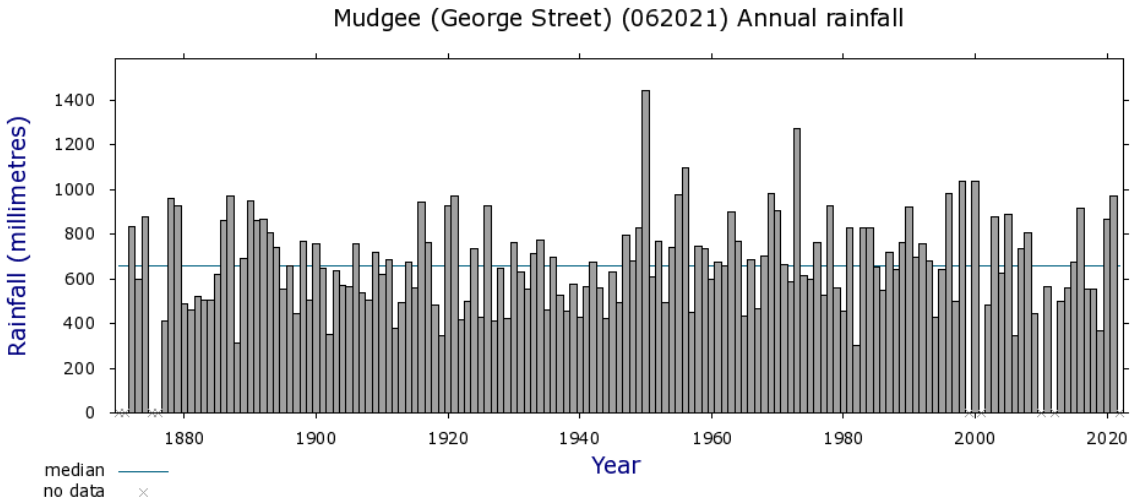

Figure 7 Annual monthly rainfall data for Mudgee

Table 2 Mudgee Rainfall Statistics

Station 062021 Rainfall Statistic	Annual
Mean	671.6
Lowest	302.4
5th %ile	411.4
10th %ile	431.4
Median	656.9

The following graph shows the recorded rainfall comparison with other properties within the Lue area. Good consistency can be seen, indicating that the records for Lue Station are indicative for other properties in the local area, and including for the Bowdens' site.

[4] http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_display_type=dataGraph&p_stn_num=062021&p_nccObsCode=139&p_month=13

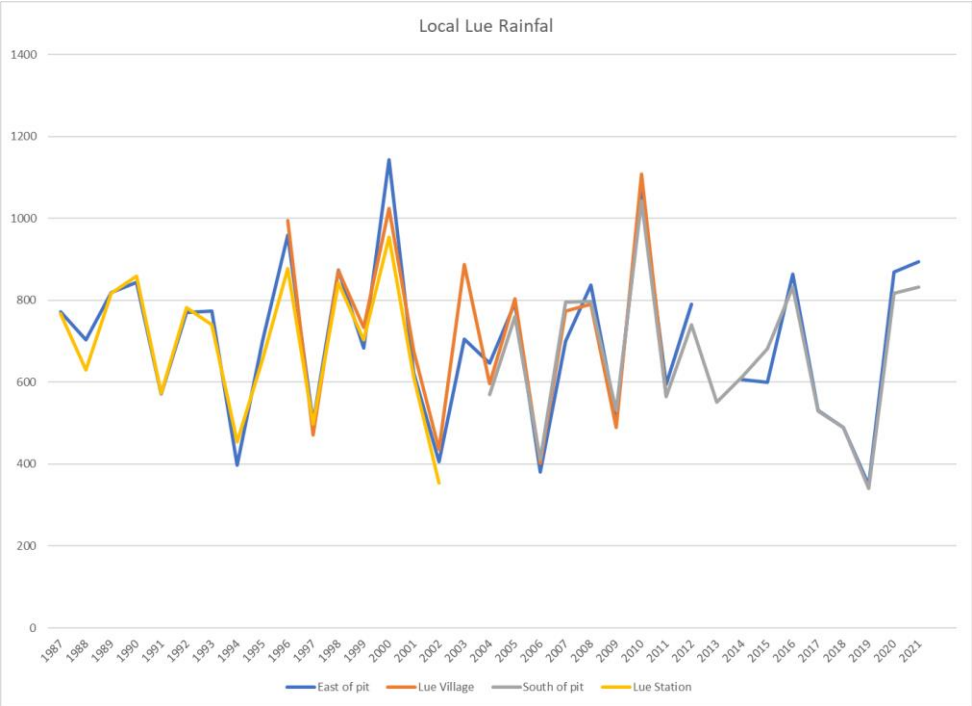

Figure 8 Comparison of rainfall recorded at properties adjacent to the Bowdens' proposed mine pit

The rainfall from Lue Station (1887-2002) and rainfall recorded at properties adjacent to the Bowdens' proposed mine pit (2003-2021) was combined to give a data set of precipitation for Lue for comparative purposes. . This is shown graphed in Figure 9. Statistics are in Table 3.

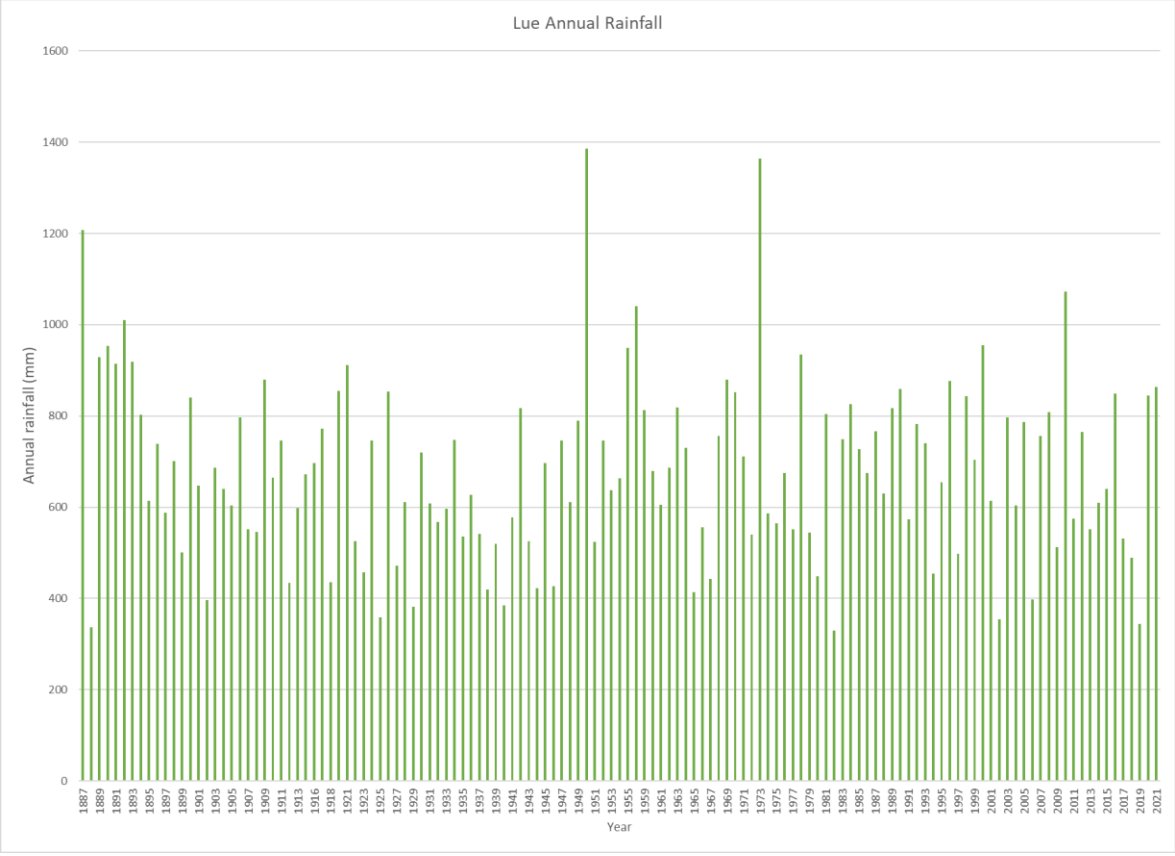

Figure 9 Annual monthly rainfall data for Lue Station (1887-2002) and sites surrounding Bowdens (2002-2021)

Table 3 Lue Rainfall Statistics

Statistic	Annual (mm)
Mean	671
Lowest	329
5th %ile	383
10th %ile	433
Median	672.8

The extract of years in which 500mm of rainfall or less than was received in Rylstone[5] and Mudgee[6] and Lue region is shown in Table 4. This region is a dry region.

[5] http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=062026

[6] http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_display_type=dataGraph&p_stn_num=062021&p_nccObsCode=139&p_month=13

Table 4 Lue, Rylstone and Mudgee Dry Years (annual rainfall, mm)

Lue Region		**Rylstone**		**Mudgee**	
Year	Annual	Year	Annual	Year	Annual
1982	329	1980	309.4	1982	302.4
1888	337	1902	314.9	1888	313.1
2019	345	1982	315.9	1919	345.9
2002	354	1888	346.2	2006	347
1925	359	2019	381.6	1902	349.1
1929	381	1925	388.1	2019	367.1
1940	385	1923	391.9	1912	377.2
1902	396	1944	397.7	1927	411
2006	398	1940	401.3	1877	413.6
1965	414	1938	402.6	1922	416.2
1938	419	1918	414.7	1929	421.6
1944	422	1919	426.1	1944	422.8
1946	426	1905	428.2	1994	426.9
1912	434	1957	435.3	1940	429.3
1918	436	1912	441.6	1925	430
1967	442	1965	449.2	1965	434.6
1980	449	1946	456.8	1897	445.1
1994	454	1939	458	2009	445.6
1923	457	1979	465.5	1957	451.7
1927	472	1929	482.3	1980	457.8
2018	490	1941	485.2	1938	457.9
1997	498			1881	463.6
1899	501			1935	463.9
				1967	468.8
				2002	482.6
				1918	484.7
				1880	487.2
				1913	492.8
				1953	494.6
				1946	494.7

The percentiles for Mudgee, Rylstone and Lue region have been calculated and are shown in Table5 and Figure 10. Based on the data from these three areas, in one in every five years the climatic conditions are akin to a semi-arid environment, receiving little more than 500mm per annum.

Table 5 Rylstone and Mudgee Average annual rainfall percentiles

	Rylstone	Mudgee	Lue region
Percentile	Average annual rainfall (mm)		
0	309	302	329
0.1	427	431	434
0.2	509	494	525
0.3	559	544	567
0.4	593	596	611
0.5	635	651	671
0.6	679	695	729
0.7	745	761	772
0.8	800	828	825
0.9	875	929	912
1	1293	1443	1385

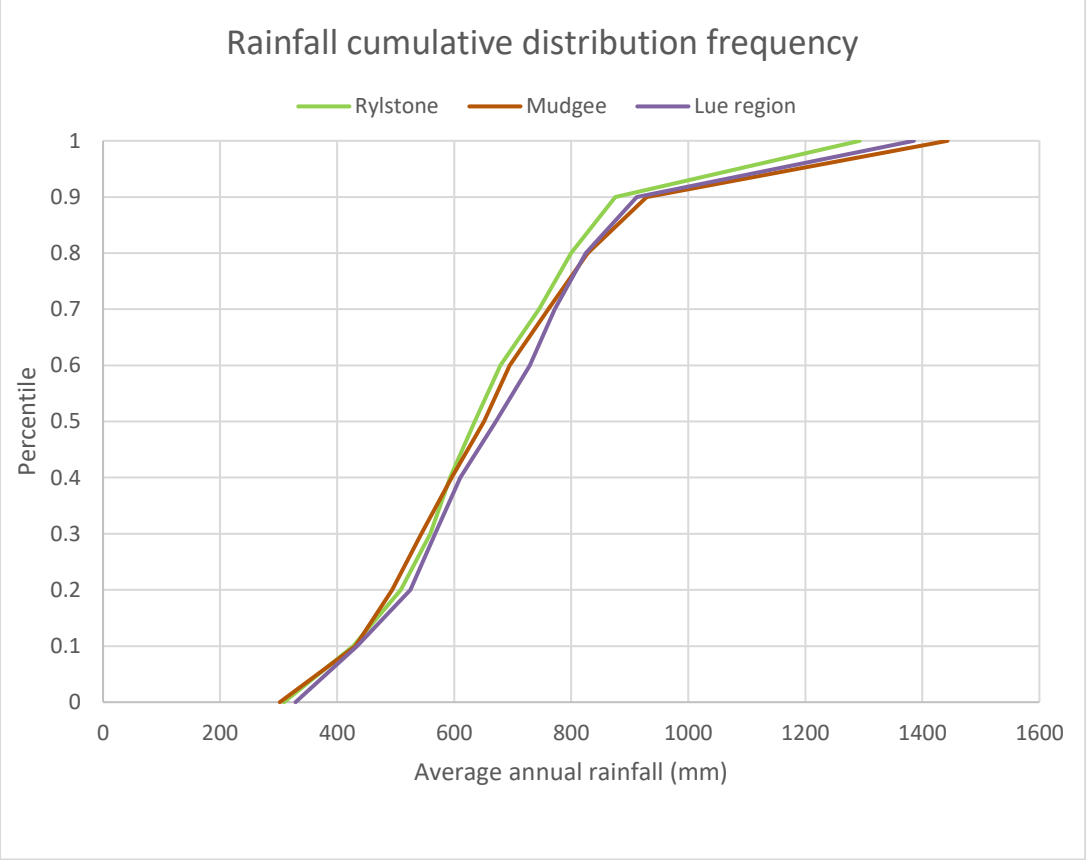

Figure 10 Rainfall cumulative distribution frequency

Conclusion

Exclusion of relevant data

The number of very low rainfall years is clearly not reflected in the Bowdens' surface water assessment annual rainfall data, which has only three years of less than 400mm. This in part seems to be a deliberate attempt to distort the data, as it has excluded 1888 and 2019, both of which are very dry years. Actual long term rainfall data recorded by landholders in the region show there has

been nine (9) years where rainfall of less than 400mm has been recorded between 1887 and 2021; and 23 years where rainfall of less than 500mm has been recorded in this period.

Given that the community that will be affected by this mine have recently lived through the crippling drought which culminated in the 2019/2020 Black Summer fires, this is viewed very poorly.

Impacts on water availability

It is also noteworthy that the 10th percentile is 427mm/a and 431mm/a respectively for Rylstone and Mudgee and 20th percentile is 509mm/a and 494 mm/a respectively. For the for Lue region the 10th percentile is 434mm/a and the 20th percentile is 525mm/a. In this area, one in every 10 years receives little over 400mm of rainfall and is very dry and one in every 20 years receives in the order of 500mm. The point of this is that in Australia, a semi-arid climate is one where average rainfall is between 250mm and 500mm per year[7]. **The analysis here shows that one in every five years, the climatic conditions for Rylstone, Mudgee and Lue are semi-arid.** This means that any loss of available water in these years severely impacts the land, and the people, plants and animals trying to survive on it.

The landholders who live in this area have adapted to these conditions, they store feed, destock, diversify, take off farm jobs or make other provisions to carry their properties through the dry times. In 2019, the groundwater resources were only just sufficient to supply the stock and domestic needs of the properties adjacent to the mine. This leaves two questions hanging:

- How does a mine 'get through the dry times'? Mothballing for years until the rains return? Diversification?
- **Where is the social licence if operating this mine makes all surrounding landholdings and business unviable because its left them with no water?**

Figure 11 Lawson Creek, 2019
(Credit T. Combes)

[7] https://www.environment.nsw.gov.au/threatenedspeciesapp/VegFormation.aspx?formationName=Semi-arid+woodlands+(shrubby+sub-formation)

Climate change impacts will increase the number and severity of the dry years experienced in this region. The surface water assessment acknowledges that there will be an impact on availability of water to downstream surface water users, and says:

> *The Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources states that water must not be taken under an access licence when there is no visible flow or where an access licence permits take from an in river pool, when the volume in that pool is less than its full capacity.*
>
> *The principal mechanism by which the Project would affect the quantity of water supplies available to other surface water users in the Lawsons Creek Water Source of the Macquarie Bogan Unregulated and Alluvial Water Sources is by reducing flows such that the frequency and duration of cease-to-flow periods is increased.*

The surface water assessment concludes:

> *The impact of the Project on the frequency of flows greater than 1 ML/d (approximately 12 L/s), which occur about 81.0% of the time downstream of the Walkers Creek confluence, is expected to be negligible. Therefore, the impact of the loss on the availability of water to downstream water users would be negligible.*

The conclusion drawn by WRM is incorrect. As is shown in the analysis in this paper, it is the other 19 percent of the time when extremely dry semi-arid conditions, are experienced in the affected catchment areas, when water is in desperately short supply. **Therefore, the impact of any loss of water is critical. It is also expected that in these conditions, one in every five years, that the conditions of the Macquarie Bogan Unregulated and Alluvial Water Sources Water Sharing Plan would be unable to be met.**

Further, the methodology used to calculate the loss of water downstream and the cease-to-flow predictions appears to be flawed. The assessment reports that:

> *The estimated impact of the Project on the frequency of flows at location C in Lawsons Creek that was conducted by comparing the outputs of the AWBM model of the premining catchment areas (described in Section 3.5.3) with the corresponding results of a model with the reduced catchment area* (pg 6 – 128)

This seems to indicate that the catchment area of the mine was subtracted from the AWBM model. However, what is not clear is what area was used. As noted elsewhere in the assessment, the catchment area of the containment system is expected to peak at 550 ha. This equates to an average annual loss of flow of 177 ML/a. From Table 8.1 of the assessment (Figure 12), it appears this is what is used, given the reduction in flows is 175.2 ML/a. **However, in actual fact, the reduction of flow must consider all water that is being extracted from the site – including the contiguous area of 2850ha** – and used in the proposed mining operations as this is what the downstream flows will be reduced by. As shown in Figure 5.3 of the surface water assessment, at peak requirement, the mean annual flow is 1,955 ML/a (p 6-86).

Table 8.1
Impact of Project on Mean Annual Streamflow in Downstream Waters

Reach Number	Unit	Operations			Post closure		
		1	2	3	1	2	3
Watercourse and reach		Hawkins Creek	Lawsons Creek	Lawsons Creek	Hawkins Creek	Lawsons Creek	Lawsons Creek
		P - A	B - C	C - D	P - A	B - C	C - D
Pre-mining catchment area	km²	61.0	222.3	272.1	61.0	222.3	272.1
Catchment area contained in WMS	km²	2.50	2.50	5.50	0.53	0.53	0.53
Mean annual flow							
Pre-mining	ML/a	1 958	7 136	8 735	1 958	7 136	8 735
Loss due to Mine Site WMS Capture*	ML/a	80.3	80.3	176.6	17.0	17.0	17.0
Potential baseflow reduction*	ML/a	9.5	5.1	14.0	11.2	8.0	19.3
Total change due to the Project	ML/a	-88.9	-84.9	-189.3	-27.2	-24.3	-34.6
Percent change due to the Project		-4.5%	-1.2%	-2.2%	-1.4%	-0.3%	-0.4%
Note that in low flow the reduction reduces to zero on zero flow days The baseflow losses from each creek would not coincide							

Figure 12 Impact of proposed mine on downstream catchments presented in the surface water assessment.

Even before there was a scheme to use all water from the Bowdens' lands for the proposed mine operations, there was a predicted increase in the cease-to-flow frequency during low flows, but this prediction is buried in the Environmental Impact Statement. It is also unclear where the 'Location C' is as presented in Figure 8.3 of the surface water assessment, which gives the effect of loss on Lawsons Creek streamflow frequency. This is important, as the impact appears to be greatest at Location D, as shown in Figure 12.

A review of the previous surface water assessment[8] found that the numbers in the table above are unchanged. **It is extraordinary, and simply unbelievable, that this has not changed under the revised proposal when such an increase in water use from the site it proposed.**

Groundwater

The Bowdens surface water assessment makes the following statements:

- *This advanced dewatering would occur via production bores that would provide up to 10L/s and supply between 376 ML/a to 408 ML/a. During mining operations, (after allowance for pit face evaporation) residual groundwater inflows to the main open cut pit are expected to range between approximately 174 ML/a and 662 ML/a.* (p6-13)
- *Due to the impact of drawdown on the local groundwater profile by the open cut pit. The groundwater assessment (Jacobs, 2022) predicts the reduction in baseflow would increase during operations such that at the conclusion of mining operations, the baseflow loss would be up to approximately 14.0 ML/a, increasing to up to 19.3 ML/a post mining. Bowdens Silver has obtained water access licencing to account for this loss*

These statements would seem to indicate:

[8] https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-5765%2120200514T074713.082%20GMT

- Much greater than 376 ML/a to 408 ML/a will be dewatered from the groundwater system, as this is exclusive of what is lost via evaporation once the water is in the pit
- Bowdens appears to be seeking a licence only for a small portion (14.0 ML/a) of the water proposed to be taken from the groundwater system, not the full amount of up to 662 ML/a.

Groundwater is a valuable resource for lands within the Lawson Creek catchment. The statements above relating to the value of surface water hold true for groundwater and its value in this region. It is not acceptable that such a significant loss will be experienced due to the proposed mine.

Groundwater modelling

Imrie[9] in her PhD investigated the use of numerical models in the prediction of surface and groundwater interactions as well as mining impacts on groundwater. Numerical models are used to provide a relatively transparent method to explore interactions between key variables influencing complex groundwater systems. Their role is to assess likelihood within uncertainty limits based on reliable data. Imrie makes that point those models using site-specific inputs and parameters are useful tools for exploring various scenarios and potential outcomes but should not be mistaken as a tool to predict the future:

> Groundwater modelling relies on a range of measured and assumed input parameters and boundary conditions. Parameters such as hydraulic conductivity can vary by several orders of magnitude due to the natural complexity of geological strata across a landscape and modeller preference. Numerical groundwater models are primarily calibrated by comparing modelled changes in hydraulic heads, with measured change over a specific time. Once verified using groundwater monitoring data they are used to predict further changes in hydraulic head over different time periods and management conditions. This necessitates a network of piezometers, accurate spatial and temporal data over sufficient length of time to incorporate long time lags inherent in the dynamic response of groundwater to development common in catchment-scale groundwater systems.
>
> The mining industry and governments rely on complex modelling to predict mining impacts on groundwater sources and stream baseflow at various spatial and temporal scales. Calibration of mining impact assessment models is considered by some modellers to be insensitive to changes in recharge values below 10% (Pearse Hawkins et al., 2015). However small changes can significantly alter recharge volumes for regional water sources. Herczeg and Love (2007) identified recharge rates as critical input to numerical models when developing groundwater management policies over time and space along with predicting the impact of groundwater extraction on head pressures and lagged discharge to streams. Herczeg and Love (2007) highlighted the many uncertainties in numerical modelling and warn against using it to predict recharge citing it as 'an inverse approach to back calculate recharge'.
>
> Mining drawdown and depressurisation of groundwater can change the natural groundwater flow pattern and discharge location. Figure 13 compares potential changes in groundwater flow between porous rock, alluvium and surface streams - pre-mining and during mining (Imrie, 2019; Ross and Webb, 2015).
>
> Numerical groundwater modelling simulating long term coal mining impacts in the Ulan Wollar area predicts that it will be over 300 years before regional groundwater level substantially rebound to pre-mining levels (MER, 2015; Middlemis and Fulton, 2011). These numerical models rely on a range of assumptions, boundary conditions and estimated hydraulic conductivities of the main hydrogeological units or strata layers. They involve the adjustment of strata hydraulic properties and regional rainfall recharge rates until a plausible

[9] Imrie, J, 2019. Changing land use in an uncertain climate: impacts on surface water and groundwater in the Goulburn River, NSW PhD thesis ANU https://openresearch-repository.anu.edu.au/handle/1885/172041

match is achieved between the observed groundwater levels and the predicted groundwater levels at the same location. The mining industry maintain their models can be validated over time by calibrating observed changes to groundwater levels with predicted depressurisation of the strata, and re-adjusting the model when necessary. It is also argued that groundwater modelling cannot be verified and is therefore of dubious value, alternatively it is also said that without some form of modelling it is impossible to foresee the future behaviour of groundwater systems (Barnett et al., 2012).

Numerical groundwater modelling has been undertaken for the proposed Bowdens' mining operations, however, as illustrated in the above discussion, to be of any value, the outputs of modelling methods are dependent on the availability of accurate and long term input. There is a paucity of data available in this instance, being limited to one off water levels and an average of measured groundwater levels measured for just over six years at the Bowdens' site[10]. Given the paucity of data, exacerbated by a high level of uncertainty, there cannot be any confidence in the predictions derived from the modelling which has been presented nor the impacts to springs and waterways assessed using the modelling.

[10] Jacob 2020 Groundwater Assessment Bowdens Silver Project Report No. 429/25

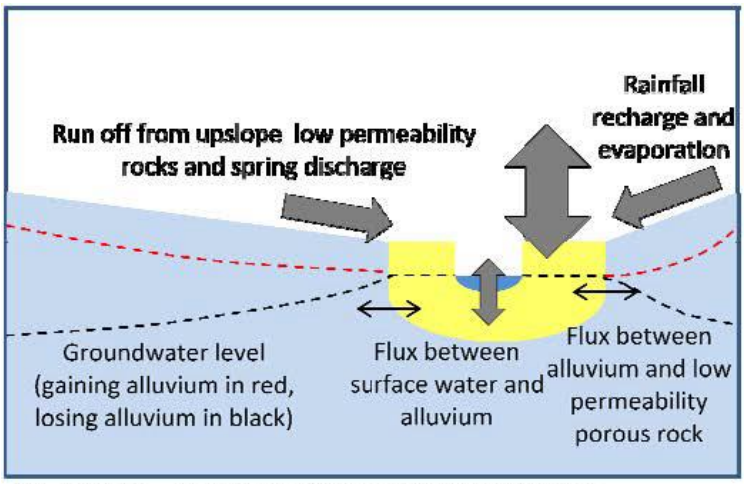

Figure 13 Potential groundwater induced leakage and interception due to mining[11]

[11] Imrie, J, 2019. Changing land use in an uncertain climate: impacts on surface water and groundwater in the Goulburn River, NSW PhD thesis ANU https://openresearch-repository.anu.edu.au/handle/1885/172041

Water Balance Modelling

The surface water assessment is based on a daily timestep water balance model which is used to assess the site water balance over the proposed mine site under "the range of historical rainfall and evaporation conditions" (p6-86). Figure 5.3 from the assessment presents the average annual main water source inflows. The most significant inflow is the runoff and rainfall. There is no information provided on how this inflow was derived. A sensitivity analysis has been presented, with 'low' and 'high' runoff scenarios. From Table 5.5 in the surface water assessment, average rainfall and runoff is 856ML/a; from Table 5.11, low rainfall and runoff is 740ML/a, and from Table 5.12, high rainfall and runoff is 1109ML/a. These values are summarised in Table 6 below. There is no information provided on what criteria is applied to determine the 'low' and 'high' conditions.

The high value is 30% greater than the average value, while the low value is only 14% lower than the average. **It would seem reasonable that a decrease of 30% from the average should also be considered to derive the low value for rainfall and runoff, but there are grounds for this to be greater than 30% given the implications of dry conditions on both the viability of the proposed mine operations as well as on downstream lands**.

Table 6 Rainfall and runoff

Scenario	ML/a	%
Low	740	14%
Average	856	-
High	1109	30%

A significant deficiency in the water balance is that it has not tested the proposed water strategy under climate change scenarios. The water assessment report does recognise that there will be greater variation in rainfall, and this will in fact impact the modelling it presents in its report - it considers climate change impacts in its modelling of the final void pit lake behaviour. It recognises that there could be decreases of nearly 50% in the rainfall (Table 7.2). However, **there is no sensitivity analysis of climate change impacts – which are already being felt in this region – in the site water balance model used to assess the feasibility of the mine being able to rely on water supplied by the surface and groundwater resources of the site. One could surmise that this is because it would show that the proposal is simply not viable.**

Conclusion

It is probable that the SILO data presented for historical rainfall data has been used in the water balance model. This will overestimate the water available for use across the site, in dust management and processing. It is highly questionable that 740 ML/a of rainfall and runoff would be available as an 'inflow' in a low rainfall scenario.

Given this question mark, there are concerns regarding the validity of the conclusions of the modelling and the assertions that water requirements for the site can be met.

Further, the sensitivity analysis appears to be fundamentally flawed, in that it considers only a 14% reduction in 'rainfall and runoff' to derive the low 'rainfall and runoff' value. There is also no sensitivity analysis of climate change impacts. It is considered that the reasons for this are that a true assessment of the low rainfall and runoff' would show there is insufficient water to meet the proposed mine's water demands for an unacceptable duration.

Harvestable Rights and Water Access Exemptions

The surface water assessment makes the following statements in regards to sediment dams:

- *Water captured in sediment dams would be released in accordance with best practice, and would therefore be exempt from licensing….In the event that (even after the addition of a flocculant) the quality of water captured in the Containment Zone was such that it could not be released it would be contained on site. No sediment dams would be constructed on a major stream. Therefore, these dams would be used "solely for the capture, containment and recirculation of drainage and/or effluent, consistent with best management practice or required by a public authority to prevent the contamination of a water source", and the captured runoff would be exempt from licensing*.(p6 – 123)

- *However, Bowdens Silver may choose to also utilise the water stored in one or more of the sediment dams. This water, and that collected for dust suppression, would be stored under the maximum harvestable rights provisions of the NSW Water Management Act, 2000*. (p 6-14)

Conclusion

The second statement appears to contradict the first one, indicating that the basins will form part of the water sources for the proposed mine site. Given this, **it appears unlikely that it is correct to assert that the water access licence exemptions will not apply.**

Water Access Licences, Transfers and Potential Impacts

Corkery (2022) reports that *Bowdens Silver holds the following volumetric entitlements to account for the predicted groundwater take from the relevant water sources.*

- *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources Order 2020 - Lachlan Fold Belt Groundwater Source (Other) Management Zone – 1 480ML.*
- *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources Order 2020 - Sydney Basin Groundwater Source – 194ML.*
- *Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012 - Lawsons Creek Water Source – 139ML.*

Bowdens Silver has also been notified of the successful purchase of an additional 200ML groundwater use entitlements within the Sydney Basin Groundwater Source of the Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources Order 2020.

The entitlement within the Lawsons Creek Water Source of the Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012 accounts for runoff interception by the TSF which is required as its embankment is situated on a third order watercourse.

What is notable in this list of Water Access Licences is the for each of the water sources, Bowdens' is seeking to transfer the licence from either the Sydney Basin catchment or further downstream within in Murray Darling catchment.

In relation to the transfer within an unregulated water source, there are clear environmental constraints, as the instream impacts can be significant in the upstream locations when this occurs. This is because, to state the obvious, the purchase of Water Access Licences from elsewhere is not the purchase of water from those areas. It is merely the right to take water and with all due respect, there is no endless supply of water suddenly available at the upstream location. The water must be found locally, and as discussed elsewhere, the rainfall – and consequential runoff – within the Lue area is highly variable. Further, in dry periods, Lue's rainfall is on par with that experienced in semi-

arid environments and the premise of extracting the quantity of water required by the mine out of the upper catchment of the Lawson Creek, is not feasible and certainly unsustainable. Given this impact on transfers from downstream to upstream locations, **the NSW government has historically shown a preference not to move licenses upstream as the water is less likely to be available there and will consequently disadvantage all reliant on that water. Climate change will only exacerbate this variability and is predicted to reduce rainfall.**

This applies regardless of if the water source is from a surface or groundwater source. With the latter, it is clear from the analysis presented by Imrie[12] that the ground and surface water systems are highly connected and impacted by mining operations. Cardno[13] presented mapping of springs within the Bowden's study area stated there were 29 springs present within an approximately 320ha area – just under one per every 10ha. These springs are the lifeblood for many (humans, plants, animals) in the area.

Additionally, the groundwater also provides the baseflows further downstream. The mining operations and groundwater interference will irrevocably alter this natural resource. Extracting high volumes of groundwater and surface water will only further stress the waterways and disadvantage all who rely on that water.

Presence of springs and peatland swamps EECs

As noted above, there is a high number of springs in the Bowden's study area. A preliminary examination of these springs has indicated these are likely to be part of a widespread system of upland swamps, bogs and montane mires in Upper Lawson Creek catchment.

The presence of springs, swamps, bogs and mires was also an issue highlighted in the RRCFC's aquatic ecology report submitted to the recent Preliminary Regional Issues Assessment for Hawkins Rumker[14] This analysis established that there are upland swamps presenting throughout the Upper Cudgegong and Upper Lawson Creek catchments. These are all an important part of the complex of endangered montane mire communities distributed across the tablelands and adjacent ranges of NSW and are referrable to the Montane Peatlands and Swamps Endangered Ecological Community (EEC) listing under the NSW Biodiversity Conservation Act 2016 and the Temperate Highland Peat Swamps on Sandstone EEC Commonwealth Environment Protection and Biodiversity Conservation Act 1999 listing. Information provided by landholders adjacent to the Bowdens site indicates that these areas are present within and adjacent to the Bowdens site (Figure 14) as well in adjacent valleys. Under the current mine proposal, these EECs are at risk of impact from the drawdown of groundwater and reduction in surface water from the proposed mine.

The environmental impact assessment for the Bowdens' project does not acknowledge the presence of these upland swamps within their own site nor in the adjacent areas. This is likely to be due to the fact that the peatland swamps within these areas are not well documented; nevertheless, the role of these wetlands is critically important in that they act as sponges in the landscape, supporting the surrounding and downstream areas in dry times. This is evidenced in (Figure 14), which shows the very parched areas in the background contrasted with the vibrant and verdant areas around the wetland area.

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[12] Imrie, J, 2019. Changing land use in an uncertain climate: impacts on surface water and groundwater in the Goulburn River, NSW PhD thesis ANU https://openresearch-repository.anu.edu.au/handle/1885/172041

13 Cardno (NSW/ACT) Pty Ltd (2020) Bowdens Silver Aquatic Ecology Assessment

[14] https://rylstonecfc.com/wp-content/uploads/2021/08/3.-RRCFC-submission-aquatic-ecology-FINAL-v3.pdf

Figure 14 Windmill Paddock Wetland January 2014
(Credit M. Boller)

The extent and the hydrology of these wetlands is not yet well understood. There is currently work underway to better document and understand these wetlands, but knowledge to date is preliminary.

What is well understood is that mining has a severe detrimental impact on these areas. In this case, this impact could reasonably be expected to encompass both the springs within the Bowdens' site as well as those in the adjacent areas will be affected by groundwater drawdown.

Any disturbance from mining activity would reduce the quantity and quality of water within the waterways and groundwater system supporting these wetlands. A mine would both damage any existing water resources within the affected footprint, as well as requiring a significant amount of water to operate. There will be severe and irreversible impacts on surface water including springs, creeks and rivers. These swamps are scarce and already face a rapidly changing climate; the dead swamps of the Newnes Plateau provide clear evidence of the impacts of mining[15]. Any mining will lead to the permanent loss of the meadows, sphagnum bogs, wetlands and associated ecosystems which includes a wide range of dependent threatened species, populations and communities. The meadows, sphagnum bogs, wetlands and associated ecosystems of the Upper Lawson Creek are unique, being at lower elevations and the western extents of these endangered ecological communities. The impact of mining cannot just be offset through the Biodiversity Offsets Scheme – these communities are not found anywhere else so cannot be offset

[15] . https://www.abc.net.au/news/2021-04-30/gardens-of-stone-conservation-proposal/100103246.

The impacts to the springs, creeks and rivers in this area and meadows, sphagnum bogs, wetlands and associated ecosystems as well as the wide range of threatened species, populations and communities that are dependent on these features is an unacceptable impact for a short-term mine project.

Loss of Water from The Landscape

The surface water assessment makes the following statements in regard to sediment dams:

> *The catchment area of this containment system would vary over the Project life, and is expected to peak at 550 ha (comprising 300 ha in the TSF catchment and 250 ha in the remainder of the water management system) or 2.0% of the Lawsons Creek catchment (of 272 km^2 downstream of the Walkers Creek confluence) would be removed over the Project life. Based on the estimated average undisturbed area runoff in the local catchment, this equates to an average annual loss of flow of 177 ML/a.* (p 6-14)

Conclusion

This assertion overlooks the fact that the water requirements for the whole project is being drawn from within Bowdens' land, both that within the 'containment system' as well as the Bowdens' contiguous land holdings. As shown in Figure 5.3 of the surface water assessment, at peak requirement, the mean annual flow is 1,955 ML/a (p 6-86), comprised of:

- Clean water harvesting: 48 ML/a
- Runoff and rainfall: 917 ML/a
- Additional groundwater extraction from the pit: 612 ML/a
- Advanced dewatering (bore water extraction): 378 ML/a

Putting aside the fact that a portion of the groundwater becomes baseflow for the creek downstream, and taking just the surface water flows, the surface water extraction by the proposed mine will be 965 ML/a. **This would equate to a loss of flow from 10.9% of the Lawsons Creek catchment.** It is an enormous and unsustainable impact on the water resources within this catchment and a significant impact on all land downstream of the proposed mine site. **The loss of baseflows must be considered in addition to this.**

Further, **it is not clear where the 917ML/a is going to come from, given the catchment area of this containment system is only going to yield 177 ML/a.** This is well short of the required water and its source has not been explained.

The Bowdens' site is in the upper part of the catchments. While mines use the term 'water make' to describe water that ends up in the mine, they do not in fact make water. Seepage into or from the mine is only water that would have become available at some other point in the catchment, either rising as a natural spring or as groundwater seeped into surface waterways further downstream in a catchment. It is not the mine's doing, but rather the mine is taking the water away from somewhere else it had naturally flowed.

The Australian climate is extreme, characterised by both short-term variability as well as medium to long-term wet/dry cycles. The extremity of these cycles will only be exacerbated as climate change continues influence weather patterns. In the past decade the region has seen both the wettest and driest periods in recorded history.

Lawson Creek is identified in the NSW Stressed Rivers Assessment to be in the most seriously stressed category – with the highest level of environmental stress as well as a high extraction rate[16]. As there has been no interventions to improve the water stress Lawson Creek was subject to in 1998, it is expected that the situation will have only deteriorated since this time.

Mines demonstrably use and destroy the existing water resources. In this upper catchment areas, there is no alternative water sources. There are rural properties, farms and small businesses throughout this area, as well as downstream through to the town of Mudgee. All of these residents and businesses are at risk from either a total loss of water or will suffer a marked reduction in the available water if mining operations are permitted.

A report by Hydrocology Consulting analysing the use of Water Access Licences and other water entitlements by mining companies and the risk this may present for sustainable water supply[17] stated:

> *Crucially, NSW planning processes do not require mining companies to demonstrate that there will be water available for their production needs, and our findings demonstrate that this is a major flaw in the assessment process.*

This is an unacceptable negative externality and to the author's knowledge has not been addressed.

Impact on Biophysical Strategic Agricultural Land (BSAL)

Downstream of the proposed mine site, there is BSAL present (Figure 15). The surface water assessment has not considered the impacts of using water from within Bowdens' holdings on this land.

DPIE's provided the following information on BSAL[18] (DPIE 2014):

> This land has the best quality soil and water resources and plays a sustaining role in the State's $12billion agricultural industry.
>
> Agricultural land across the state was assessed against specific scientific criteria-levels of soil fertility, land and soil capability classes and access to reliable water and rainfall levels.
>
> It is the inherent values of the land itself, rather than the agricultural activity it supports, which determine the BSAL classification.

Given the climate variability experienced in this country, the water resources are a critical part of this equation. As DPIE itself says (above), BSAL is that land which has the best quality soil and water resources and plays a sustaining role in the State's $12billion agricultural industry.

As has been demonstrated in the analysis in this paper, the catchment in which the mine site is proposed has a high variability in rainfall and frequently experiences dry years. The water that supports the BSAL land moves through the upstream catchment and then is available to support agriculture in the mapped areas. Any mining within the supporting catchments threatens the water resource in the BSAL areas. The proposed mine will interrupt both groundwater and surface water flows, and as such, the BSAL area is at risk of losing the critical water which underpins its inherent value.

[16] NSW Department of Land and Water Conservation, 1998. Stressed Rivers Assessment Report, NSW State Summary 1998

[17] Hydrocology Consulting July 2014 Unfair Shares: How Coal Mines Bought the Hunter River

[18] Department of Planning Industry and Environment 2014. Strategic Regional Land Use Policy. Frequently Asked Questions Biophysical strategic agricultural land mapping across NSW https://www.planning.nsw.gov.au/-/media/Files/DPE/Factsheets-and-faqs/faqs-biophysical-strategic-agricultural-land-mapping-across-nsw-2014-01.pdf?la=en

Figure 15 Regional Biophysical Strategic Agricultural Land (BSAL)

Summary

The Bowdens surface water assessment data appears to show a monthly average that exceeds 75mm over summer. This is incorrect, as evidenced by the rainfall data from Mudgee (26km west of the mine site) and Rylstone (22km south of the mine site).

Many of the other months are also too high when compared to Mudgee and Rylstone rainfall statistics from BOM.

The number of very low rainfall years that has been experienced in this region is not reflected in the Bowdens surface water assessment annual rainfall data, which has only three years of less than 400mm. This in part seems to be a deliberate attempt to distort the data, as it has excluded 1888 and 2019, both of which are very dry years. Given that the community that will be affected by this mine have recently lived through the crippling drought which culminated in the 2019/2020 black summer fires, this is viewed very poorly.

It is also noteworthy that in the Lue region the 10th percentile is 434mm/a and the 20th percentile is 525mm/a. In this area, one in every 10 years receives little over 400mm of rainfall and is very dry and one in every 20 years receives in the order of 500mm. The analysis here shows that one in every five years, the climatic conditions for Rylstone, Mudgee and Lue are semi-arid. Any loss of available water in these years severely impacts the land, and the people, plants and animals trying to survive on it.

A major flaw in the water assessment is that it has not tested the proposed water strategy under climate change scenarios. The report does consider climate change impacts in its modelling of the final void pit lake behaviour, where it recognises that there could be decreases of nearly 50% in the rainfall. However, sensitivity testing of the site water balance model used to assess the feasibility of the mine being able to rely on water supplied by the surface and groundwater resources of the site

has not been presented. One could surmise that this is because it would show that the proposal is simply not viable.

It is probable that the SILO data presented for historical rainfall data has been used in the water balance model. This will overestimate the water available for use across the site, in dust management and processing. It is highly questionable that 740 ML/a of rainfall and runoff would be available as an 'inflow' in a low rainfall scenario.

Given this, there are concerns regarding the validity of the conclusions of the modelling and the assertions that water requirements for the site can be met.

Further, the sensitivity analysis appears to be fundamentally flawed, in that it considers only a 14% reduction in 'rainfall and runoff' to derive the low 'rainfall and runoff' value. It is considered that the reasons for this are that a true assessment of the low rainfall and runoff' would show that there is insufficient water to meet the proposed mine's water demands for an unacceptable duration.

Climate change impacts will increase the number and severity of the dry years experienced in this region.

At one point, the assessment attempts to quantify the loss of water to the downstream catchment, stating there would be an average annual loss of flow of 177 ML/a. This assertion is misleading as it relates only to the estimated flow from within the 'containment system' and overlooks the fact that the water requirements for the whole project are being drawn from within Bowdens land, both that within the 'containment system' as well as the Bowdens' contiguous land holdings. The mean annual flow is 1,955 ML/a comprised of 965 ML/a surface water and 990 ML/a ground water.

Putting aside the fact that a portion of the groundwater becomes base flow for the creek downstream, and considering only the surface water flows, this would equate to a loss of flow from **10.9% of the Lawsons Creek catchment**. It is an enormous and unsustainable impact on the water resources within this catchment and a significant impact on all land downstream of the proposed mine site.

This flawed presentation of the data also means that the cease-to-flow estimates are also incorrect. These appear to be based on a reduction in flow of 175.2 ML/a, rather than up to 1,955 ML/a. Even before there was a scheme to use all water from the Bowdens' lands for the proposed mine operations, there was a predicted increase in the cease-to-flow frequency during low flows, but this fact is buried in the Environmental Impact Statement. A review of the previous surface water assessment has found that the numbers in the table above are unchanged. It is extraordinary, and simply unbelievable that this has not changed under the revised proposal when such an increase in water use from the site it proposed.

Further, it is not clear where the 'rainfall and runoff' component of the surface water inputs – a significant 917ML/a – is going to come from, given the catchment area of this 'containment system' is only estimated to yield 177 ML/a. This is well short of the required water and its source has not been explained.

Previous studies on the aquatic ecology of the Upper Lawson Creek have established the presence of springs, swamps, bogs and mires throughout the Upper Lawson Creek catchments and that these are an important part of the complex of endangered montane mire communities distributed across the tablelands and adjacent ranges of NSW. They are referrable to the Montane Peatlands and Swamps

Endangered Ecological Community (EEC) listing under the NSW Biodiversity Conservation Act 2016 and the Temperate Highland Peat Swamps on Sandstone Commonwealth Environment Protection and Biodiversity Conservation Act 1999 listing. Information provided by landholders adjacent to the Bowdens site indicates that these areas are present within and adjacent to the Bowdens site as well in adjacent valleys. Under the current mine proposal, these EECs are at risk of impact from the drawdown of groundwater and reduction in surface water from the proposed mine.

Bowdens' is seeking to transfer the licence from either the Sydney Basin catchment or further downstream within in Murray Darling catchment. In relation to the transfer within an unregulated water source, there are clear environmental constraints as the instream impacts can be significant in the upstream locations when this occurs. This is because the purchase of Water Access Licences from elsewhere is not the purchase of water from those areas. With all due respect, there is no endless supply of water suddenly available at the upstream location - the water must be found locally, and the rainfall and runoff within the Lue area is highly variable. Given this impact on transfers from downstream to upstream locations, the NSW government has historically shown a preference not to move licenses upstream as the water is less likely to be available there and will consequently disadvantage all reliant on that water. Climate change will only exacerbate this variability and is predicted to reduce rainfall.

It cannot be concluded that the impact of the loss on the availability of water to downstream water users would be negligible. The impact of **any** loss of water in the frequently experienced dry times is critical. Further, it is also expected that in these conditions, one in every five years, that the conditions of the Macquarie Bogan Unregulated and Alluvial Water Sources Water Sharing Plan would be unable to be met.

Numerical groundwater modelling has been undertaken for the proposed Bowdens' mining operations, however, the outputs of modelling methods are dependent on the availability of accurate and long term input and there is a paucity of data available to be used here. Given the paucity of data, exacerbated by a high level of uncertainty, there cannot be any confidence in the predictions derived from the modelling which has been presented nor the impacts to springs and waterways assessed using the modelling.

Groundwater is a valuable resource for lands within the Lawson Creek catchment. The statements above relating to the value of surface water hold true for groundwater and its value in this region. It is not acceptable that such a significant loss will be experienced due to the proposed mine.

In conclusion:

- there is limited data on which to base groundwater predictions on and a high risk that springs and waterways which are the lifeblood in this area will be permanently impacted.
- the surface water assessment has some serious shortcomings, as it does not rely on valid data, has not presented appropriate modelling, has not considered climate change impacts and contains a number of misleading statements
- the proposal to use water sources from within the Bowdens' land holdings to supply the water for the proposed mine is fundamentally flawed. Not only does the analysis within this document demonstrate this finding, but a cursory review of the extreme dry periods experienced by the landholders within the Lue region would show that the water is simply not available. To use what little there is, is not a viable option and, while the surface water

assessment has failed to properly consider a dry year scenario, the fact is mine will not be able to operate in dry periods.

- the proposal to transfer water licences for use in this location is unsustainable for Lawson Creek, an already highly stressed waterway. It will have a severe detrimental effect on the water resources in this area and all those who currently rely on it.
- there are a number of the statements made in the 'Summary of Assessment Outcomes - EIS and Amended Project' in relation to water impacts which are quite simply incorrect.

Shireen Baguley

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ATTACHMENT 3

40 queries relevant to water use

(Field Development Planning)

1-5. RIGHTS OF GROUNDWATER USERS

Concern:
Protected groundwater users, including significant dependent ecosystems and bore users, exist within 2 km of the site. The potable water quality sustaining two listed flora, five listed aquatic fauna, two licensed allocations and 15 Stock and Domestic bore users within the Lue Village is at risk.

Query response to the following SEARs for SSD 5765:

- A description of the existing environment likely to be affected by the development, using sufficient baseline data
- 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
- 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
- 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 robust baseline
    - a description of how groundwater and aquatic ecosystems will be monitored, Trigger Action Response Plan and trend identification

The rights of groundwater users around the proposed Project are protected by the *EPBC Act 2000*, the *EP&A Act 1979,* the *WM Act 2000*, and the *BC Act* 2016.

As groundwater yields can supply > 5L/s and salinity measured as total dissolved solids (TDS) is less than 1,500 mg/L in Lue Village bores, the Fractured Rock aquifer is classed as “highly productive” under the *Aquifer Interference Policy 2012*. The water availability (level) and groundwater quality are protected by legislation to sustain existing users.

QUALITY

The predictive model used to consider drawdown (MODFLOW-USG) is not designed to model the movement of contaminants in groundwater from the proposed activity. Contaminants can take decades to move through aquifers and reach groundwater users. Outside the model’s domain, the effect of lead dust washing into soil down-wind is poorly understood (Cardno, 2020, pp. 10-99). Predicting the movement of contaminants is important as, after evapo-concentration, the TDS predictions in (R. W. Corkery & Co. Pty. Limited, 2020) the pit lake rise above 1,500 mg/L over time. As the pit lake is proposed to be unlined, there is no barrier between the brackish water in the pit and the highly productive aquifer. The hydraulic gradient is used as justification of containment of pit lake water.

The risk of releasing potentially toxic silver/lead concentrate and changes in groundwater quality from potentially acid forming (PAF) material are raised in Cardno (2020), however, no mitigation measures are proposed to reduce the risk of contaminating groundwater (Cardno, 2020, pp. 10-95).

Principle 1 and 3 of the *Groundwater Quality Policy 1998* are designed to prevent a deterioration in groundwater quality. To be considered minimal impact, any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.

The monitoring bores reported in the EIS located within 1.5 km of Lue are shown in Table 1. The NSW *Aquifer Interference Policy 2012* requires baseline groundwater conditions to be established. It also requires quality impacts from licensed water users of connected groundwater to be established.

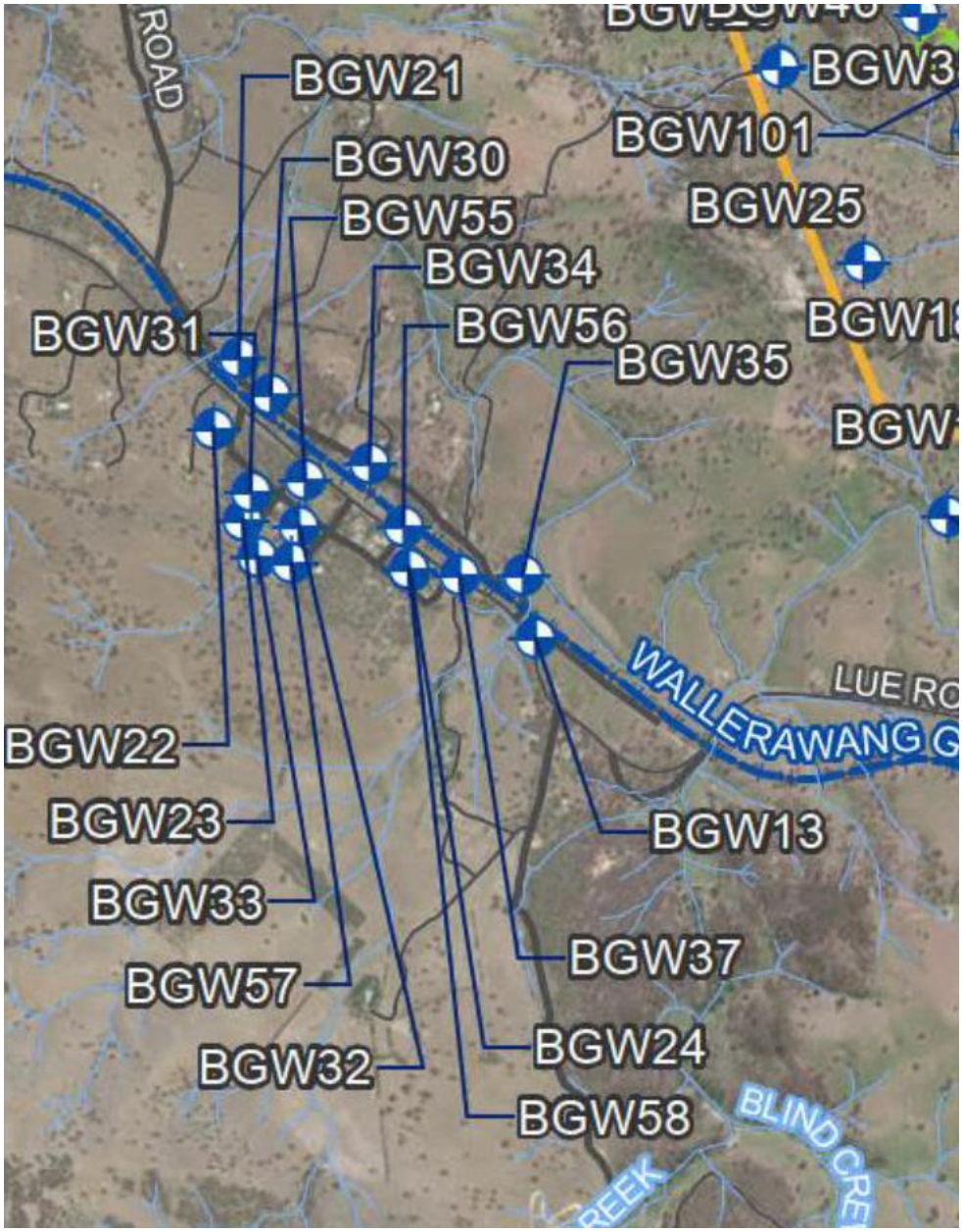

Figure 1: Location of monitoring wells (Jacobs (Australia), 2020)

Despite conclusions portrayed in Table 22 (Jacobs (Australia), 2020, pp. 5-110), there is no evidence of non-potable water quality in bores in Lue from the sampling undertaken (Table 1).

Table 1: Lue groundwater bore quality summary

Bore	Result	Bore	Result
BGW13	Not reported	**BGW33**	Misrepresented
BGW21	Misrepresented	**BGW34**	Not reported
BGW22	Not reported	**BGW35**	Misrepresented
BGW23	Not reported	**BGW37**	Misrepresented
BGW24	Potable quality	**BGW56**	Not reported
BGW30	Not reported	**BGW57**	Not reported
BGW31	Not reported	**BGW58**	Not reported
BGW32	Misrepresented		

Table 22 (Jacobs (Australia), 2020, pp. 5-110) indicates the following exceedances for ADWG, however, these appear to be errors requiring explanation as highlighted in Table 1 above:

- BGW21 manganese: 11 samples reported below 0.2 mg/L (average of 0.064 mg/L), well below the 0.5 mg/L ADWG limit. The 12th sample on 01 May 15 reported 31.1 mg/L
    - No comment provided on whether the single 31.1 mg/L reading led to the average being >0.05 mg/L, or whether it is simply an error
    - If the 01 May 15 reading is considered, the mean is 2.650 mg/L not 1.354 mg/L (greater than ADWG) as reported in the EIS
- Average arsenic concentrations for BGW32, 33, 35 and 37 are reported as >0.01 mg/L (above ADWG) in Table 22, however, no individual analyses >0.01 mg/L are reported:
    - BGW32: Arsenic <0.002 mg/L on 09 Jan 14 and 08 April 14
    - BGW33: Arsenic <0.002 mg/L on 09 Jan 14, 08 Jul 14 and 25 Feb 16
    - Similar analyses for BGW35 & 37

Of sixty reported samples, the physical or chemical (PC) toxicant exceeding the Australian Drinking Water Guidelines 6 (v3.5 updated August 2018) are:

- Manganese >0.5 mg/L in 18 samples (BGW05, 51, 54 in alluvium, BGW102, 106, 107, 108, 18, 19, 20, 27, 27A, 38, 40, 42, 43, 46, 21)
- pH <6.5 in 9 samples
- Arsenic >0.01 mg/L in 9 samples (BGW49 in alluvium, BGW102, 108, 10, 19, 20, 27A, 42, 46, 36)
    - Arsenic in BGW32, 33, 35 and 37 are misreported in Table 22 p5-110 when reviewing the raw data provided in the Annexure 6 Table (Jacobs (Australia), 2020, pp. 5-265).
- Lead >0.01 mg/L in 4 samples (BGW102, 107, 108 and 36)
- Cadmium >0.002 mg/L in 1 sample

These sampling sites are all located near the orebody.

WATER AVAILABILITY

A conclusion that impacts to groundwater dependent ecosystems during average rainfall years 'would be expected to be minor' is made (Cardno, 2020, pp. 10-97). It is unclear whether a 38% contribution of baseflow to mean daily discharge in Hawkins Creek from June 2013 to July 2016 reflects contribution during periods without rainfall, or year-round. The conclusion in Cardno (2020) that reduction in aquatic habitat due to a reduction in groundwater baseflow would be temporary is not justified (Cardno, 2020, pp. 10-98).

The *Water Management Act 2000* provides for the rights of domestic and stock users to take water for household use under their properties. The Water Sharing Plans and Aquifer Interference Policy protects these rights by ensuring all steps are taken to preserve the beneficial use of the aquifer. Under S.2.1 of the *Aquifer Interference Policy 2012*, the proposed 100-200 ML/year evaporation take from the mine pit lake after closure is not 'unavoidable' nor best practice. Contamination may travel towards Lue Village where the natural water level is ~550 mAHD once the pit lake fills to ~576 mAHD after 130 years. Alternatives such as treatment of the waste to non-toxic standards or use of managed aquifer recharge to maintain groundwater contamination in place are available options that have not been selected. Effective triggers, monitoring or contingency plans and environmental indicators have not been provided.

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5-37. RISKS TO SIGNIFICANT SPECIES IN SPRINGS AND WATER COURSES

Concern:
Potential groundwater dependent ecosystems (GDEs) are identified around the site. Protected Murray Cod, Silver Perch, Southern Purple Spotted Gudgeon, Trout Cod, Murray Crayfish and Eel Tailed Catfish may exist within the area, as well as species within springs (modified or not). The locations and risks to these protected species should be clearly shown and evaluated in the EIS

This concern responds to the following SEARs for SSD 5765:

- A description of the existing environment likely to be affected by the development, using sufficient baseline data;
- 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;
- A summary of commitments
- 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 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
  o) consideration of controls
- DRE/DPE requires a Water Management Strategy that considers
    - the existing surface and groundwater qualities
    - a robust baseline
    - a description of how groundwater and aquatic ecosystems will be monitored, Trigger Action Response Plan and trend identification

DISCUSSION

After significant sampling and analysis, Section 4.5.12.4 (Jacobs (Australia), 2020) does not clearly preclude groundwater support for the area's springs and potentially unique or significant ecosystems that may exist within these gaining wetlands. The EIS states that reductions in baseflow/pool depths in Hawkins and Lawsons Creeks occur 28-34 years after mining commences but does not list when and by how much spring water levels will drop. The sustainability of these waterbodies without groundwater support is not discussed. It is unclear whether there are several permeable zones in BGW38 which is an example of unclear hydrogeological

descriptions near the springs. After listing endemic species in the springs, their sustainability could be analysed by creating a local hydrogeological model including seasonal water levels and qualities. Such an analysis would also provide a line of evidence to support any suggestion that springs are not groundwater fed.

At least one spring (Battery Creek Spring) near BGW16 is inferred to be sourced from (deeper) groundwater (Jacobs (Australia), 2020, pp. 5-67). Biodiversity results from surveys of other springs are not included as they have been deemed to be modified. The influence of rainfall on the chemistry of gaining wetlands (springs) is expected, however, more detail on the contribution of groundwater to the sustainability of significant species is anticipated in the report before the springs can be impacted.

The degree of uncertainty of the modelled predictions is high considering the heterogeneity observed in the data gathered. The discussion below presents one such aspect for further investigation: the hydrostratigraphic interpretation between the proposed activity and Lue village.

Groundwater can flow through the pore spaces of geological units and fractures in brittle rock such as the volcanic rocks in the region. The geological units in the local area are shown in Table 1, including Geoscience Australia map codes used in Figure 1.

Table 1: Map codes and geological descriptions from (Colquhoun, et al., 1999)

Map Code	Name (youngest to oldest)	Geological Description
Qa	Cainozoic units	Alluvial silt, clay and sand
Ma	Mesozoic igneous	Fine grained, mid-grey phonolite
Rn	Sydney Basin - Narrabeen Group	Pebbly lithic-quartz sandstone, red-brown to green mudstone
Pi	Sydney Basin Illawarra coal measures	Lithic sandstone, mudstone, tuff
Ps	Sydney Basin - Shoalhaven Group	Conglomerate, sandstone, shale, siltstone
Pr	Sydney Basin - Rylstone Volcanics	Rhyolite, sandstone and tuff
Ccg	Pyangle Pass Granite	Biotite granite, aplite, pegmatite
Std	Dungeree Volcanics	Rhyolite to dacite lava
Stdt	Dungeree Volcanics	Volcanic conglomerate and lithic sandstone
Ocd	Coomber Formation	Volcanics, siliceous mudstone and limestone blocks
Oa	Adaminaby Group	Fine volcanics - quartz sandstone, slate and chert

The Coomber Formation and Adaminaby Group are from the Ordovician Period of the Palaeozoic Era, deposited 444-448 million years ago, and are assumed to form the basement in this area.

The principal rock type is fractured volcanic. While some weathering of shallower sequences may cause a decrease in fracture permeability, zones where groundwater can reasonably be expected to flow (aquifers) and those where groundwater is unlikely to flow (aquitards), are highly variable. No significant barriers to flow have been identified.

Based on review of the data, where conductive fractures are present, the majority of rock has low to moderate yield (0.5-3 L/s) with electrical conductivity of 150 to 800 µS/cm (potable water quality). Exceptions to this are GW802779 (20 L/s yield) and GW802778 which yielded 20 and 15 L/s respectively from fractured volcanics between 20 and 140 m below the natural surface (BNS). Despite being less than 1km apart, the electrical conductivities were 800 and 2000 µS/cm respectively in these bores which suggests they are not well connected. Both of these bores are located on the proposed mine site, with GW802779 shown in Figure 1.

The yields of overlying alluvial aquifers are generally reported as low (0.1-2 L/s). These porous aquifers include younger Cainozoic units which are primarily deposited along water courses.

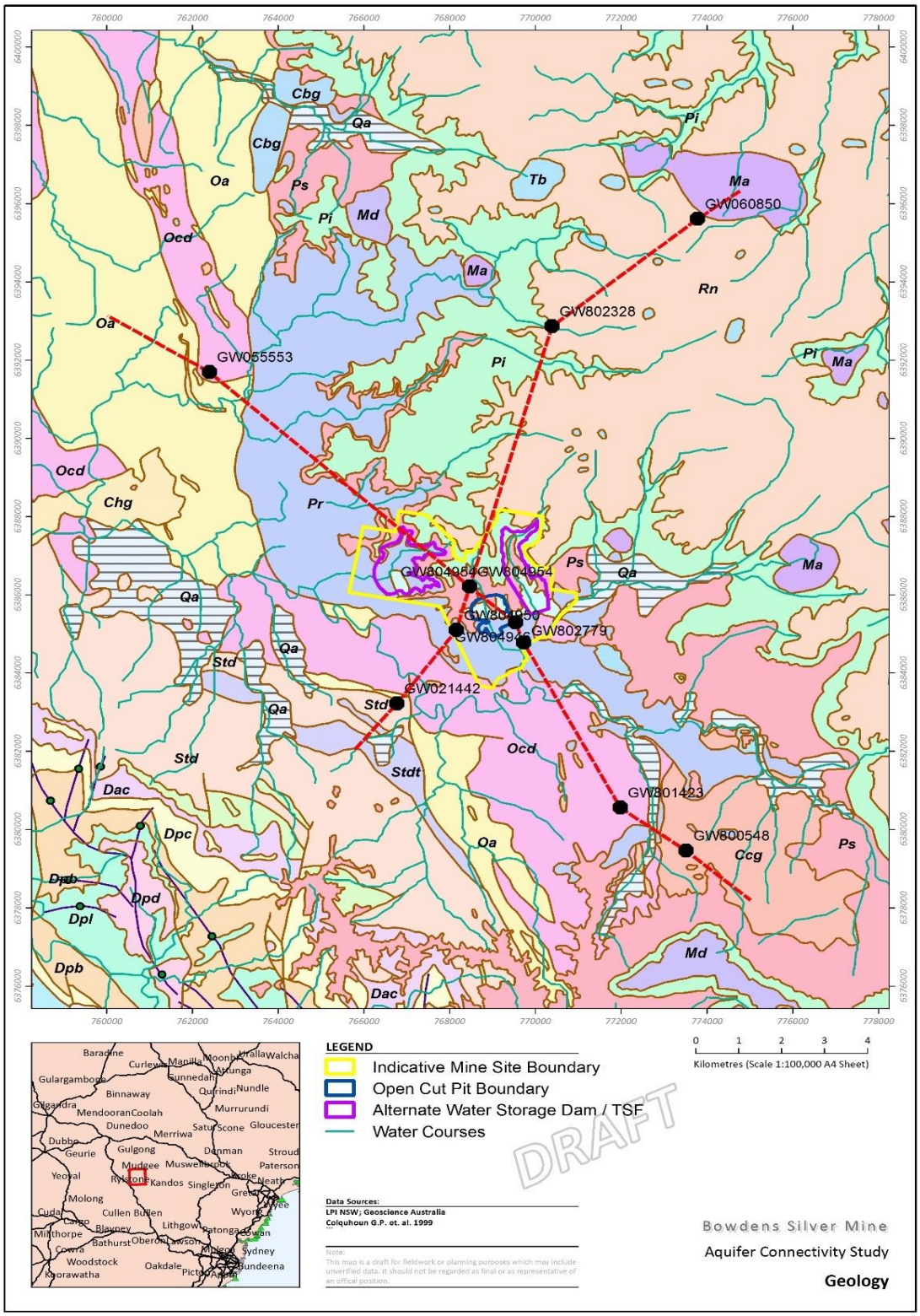

Figure 1: Suggested cross section transects for the EIS and surface geology (Source: Geoscience Australia)

When this information is compared to the EIS interpretation (Figure 2) and while faulting can be inferred, the mapped outcrop of Late Ordovician-Early Silurian age Ocd (Coomber Formation) near Lue village north west of GW021442 is not presented in the EIS. Suggested cross section transects are shown in Figure 1.

Figure 51 West-east Geological Cross-section through the Model

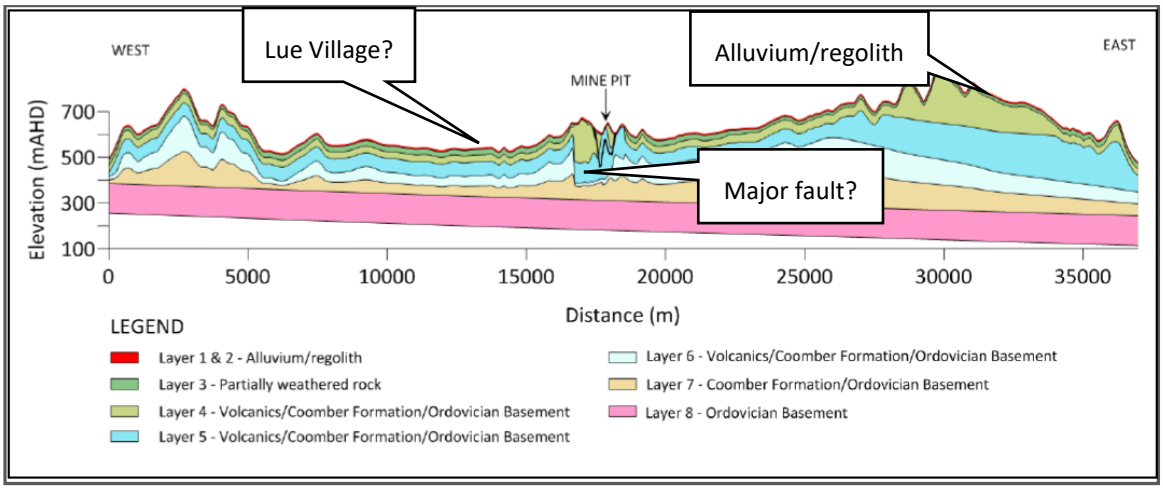

Figure 2: West-east modelled cross section. Source: Adapted from Figure 51 from (Jacobs (Australia), 2020, pp. 5-143)

This discrepancy (a lack of Ocd outcrop on Figure 2) highlights an area for future focus to adequately represent the hydrogeology in the alluvium near Lawsons Creek proximal to Lue Village bores and the associated significant species.

Without a good hydrogeological understanding, the assumptions used in the impact assessments regarding impacts to springs and watercourses in the EIS may be invalid. This is an example of how the significance of the assumptions underpinning the large-scale simulation modelling should be better explained in the EIS to make it effective if it is to be used at the local scale. In addition, studies of unique or endemic species of gaining wetlands (springs) should be undertaken to determine their significance.

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ATTACHMENT 4

Aquifer Connectivity Study

(AWE, 5 June 2018)

AQUIFER CONNECTIVITY STUDY

This report considers groundwater connectivity around the proposed Bowdens Silver (Bowdens) mine near Lue, NSW.

As part of the mining application, Bowdens is currently applying for an aquifer interference approval under the *Water Management Act 2000*. This report shares a preliminary understanding of current groundwater flows and the changes that may occur should approval be granted.

1.1 Aquifer Interference

Aquifer interference refers to changes to groundwater availability and groundwater quality. Regulators are principally concerned with activities that impact ecosystems or bore users. Bowdens may interfere with groundwater during mine dewatering, from spills of tailings to shallow aquifers, leaching after abandonment and while taking groundwater for processing ore. Taking and dewatering activities can redirect local groundwater flow towards the site, interfering with the current groundwater regime.

At the site, groundwater is expected to be discharged via

- Evaporation
- Surface water discharge
- Groundwater injection/inter-aquifer flow

Groundwater injection may be designed to control the impacts of dewatering and extraction. If treated water is to be reinjected, appropriate management of the waste stream will be required long after the mine is abandoned. This mitigatory approach has not yet been presented by Bowdens and as such, is not further considered in this report. Each form of groundwater management will impact surrounding groundwater users and the beneficial use of groundwater to varying degrees.

1.2 Regulation of Groundwater

Groundwater is listed as being Vulnerable under the Mid-Western Regional Local Environmental Plan (2012) (Figure 8). Vulnerability is designated by the susceptibility of the resource to contamination from a surface source, implying surface water/groundwater connectivity. A High Vulnerability status has been assigned to areas around the mine site (Figure 9). A demonstrated remedial action plan/prohibition requirement is placed upon developments in areas of High Vulnerability (DLWC, 2001).

Aquifer interference impacts the beneficial uses of groundwater. These uses are considered in published information including (DLWC, 2001), (DPI Water, 2017), (DPI Water, 2012) and (DPI Water, 2017) and discussed further in Section 1.4.

This report assumes that groundwater will be taken from NSW Murray Darling Basin (MDB) Fractured Rock and Porous Rock Groundwater Sources. These Plans require wetlands, lagoons, Aboriginal sites, irrigators and mining to be considered as beneficial uses. The scope of this report is limited to the beneficial uses of aquatic groundwater dependent ecosystems (found in surface water bodies), terrestrial groundwater dependent ecosystems (found without surface expression of water) and irrigators.

1.2.1 Lachlan Fold Belt MDB

The Lachlan Fold Belt MDB of the MDB Fractured Rock Groundwater Source is overlain by the younger Sydney Basin Groundwater Source. (DPI Water, 2012) expects a low-moderate connection between surface and groundwater from this Source. Groundwater Dependent Ecosystems (GDEs) are protected under the Plan, although no High Priority GDEs have been identified within the study area.

1.2.2 Sydney Basin MDB

The Sydney Basin MDB Porous Rock Groundwater Source includes all water contained in alluvium (excluding Macquarie Bogan Alluvium) or Permian/Triassic/Jurassic/Cretaceous or Tertiary age.

1.3 Geology and Local Aquifer Connectivity

Aquifers are geological units that can store and transmit water in reasonable amounts. Groundwater can flow through the pore spaces of geological units and fractures in brittle rock such as the volcanic rocks in the region. The geological units in the local area are shown in Table 1, including map codes used in **FIGURE 1**.

TABLE 1: MAP CODES AND GEOLOGICAL DESCRIPTIONS FROM (COLQUHOUN, ET AL., 1999)

Map Code	Name (youngest to oldest)	Geological Description
Qa	Cainozoic units	Alluvial silt, clay and sand
Ma	Mesozoic igneous	Fine grained, mid-grey phonolite
Rn	Sydney Basin - Narrabeen Group	Pebbly lithic-quartz sandstone, red-brown to green mudstone
Pi	Sydney Basin Illawarra coal measures	Lithic sandstone, mudstone, tuff
Ps	Sydney Basin - Shoalhaven Group	Conglomerate, sandstone, shale, siltstone
Pr	Sydney Basin - Rylstone Volcanics	Rhyolite, sandstone and tuff
Ccg	Pyangle Pass Granite	Biotite granite, aplite, pegmatite
Std	Dungeree Volcanics	Rhyolite to dacite lava
Stdt	Dungeree Volcanics	Volcanic conglomerate and lithic sandstone
Ocd	Coomber Formation	Volcanics, siliceous mudstone and limestone blocks
Oa	Adaminaby Group	Fine volcanics - quartz sandstone, slate and chert

Hydrogeological information obtained from the NSW Groundwater Database Pinneena CD 2009 v10.1 informed hydrogeological cross sections showing standing water levels, yields and electrical conductivities presented in Figure 2 and Figure 3.

There are no deep bores in the database which creates uncertainty regarding groundwater in deeper strata. The Coomber Formation and Adaminaby Group are from the Ordovician Period of the Palaeozoic Era, deposited 444-448 million years ago are assumed to form the basement in this area.

The principal rock type is fractured volcanics. Groundwater storage and flow within this type of rock is dictated by the fracturing caused as these extrusive rocks cooled and were subsequently folded. While some weathering of shallower sequences may cause a decrease in fracture permeability, zones where groundwater can reasonably be expected to flow (aquifers) and those where groundwater is unlikely to flow (aquitards) are highly variable. As such, no barriers to flow have been identified from inspection of the cross sections.

Where conductive fractures are present, the majority of rock has low-moderate yield (0.5-3 L/s) with electrical conductivity of 150-800 µS/cm (potable water quality). Exceptions to this are GW802779 (20 L/s yield) and GW802778 which yielded 20 and 15 L/s respectively from fractured volcanics between 20-140 m below natural surface (BNS). Despite being <1km apart, the conductivities were 800 and 2000 µS/cm in these bores which suggests they are not connected. Both of these bores are located on the proposed mine site, with GW802779 shown on **FIGURE 1**.

The yields of overlying alluvial aquifers are more predictable but are generally reported as low (0.1-2 L/s). These porous aquifers include younger Cainozoic units which are primarily deposited along water courses (Qa in **FIGURE 1**). These alluvium (Qa) are part of the Sydney Basin MDB to the northeast of NW-SE section line shown in **FIGURE 1**.

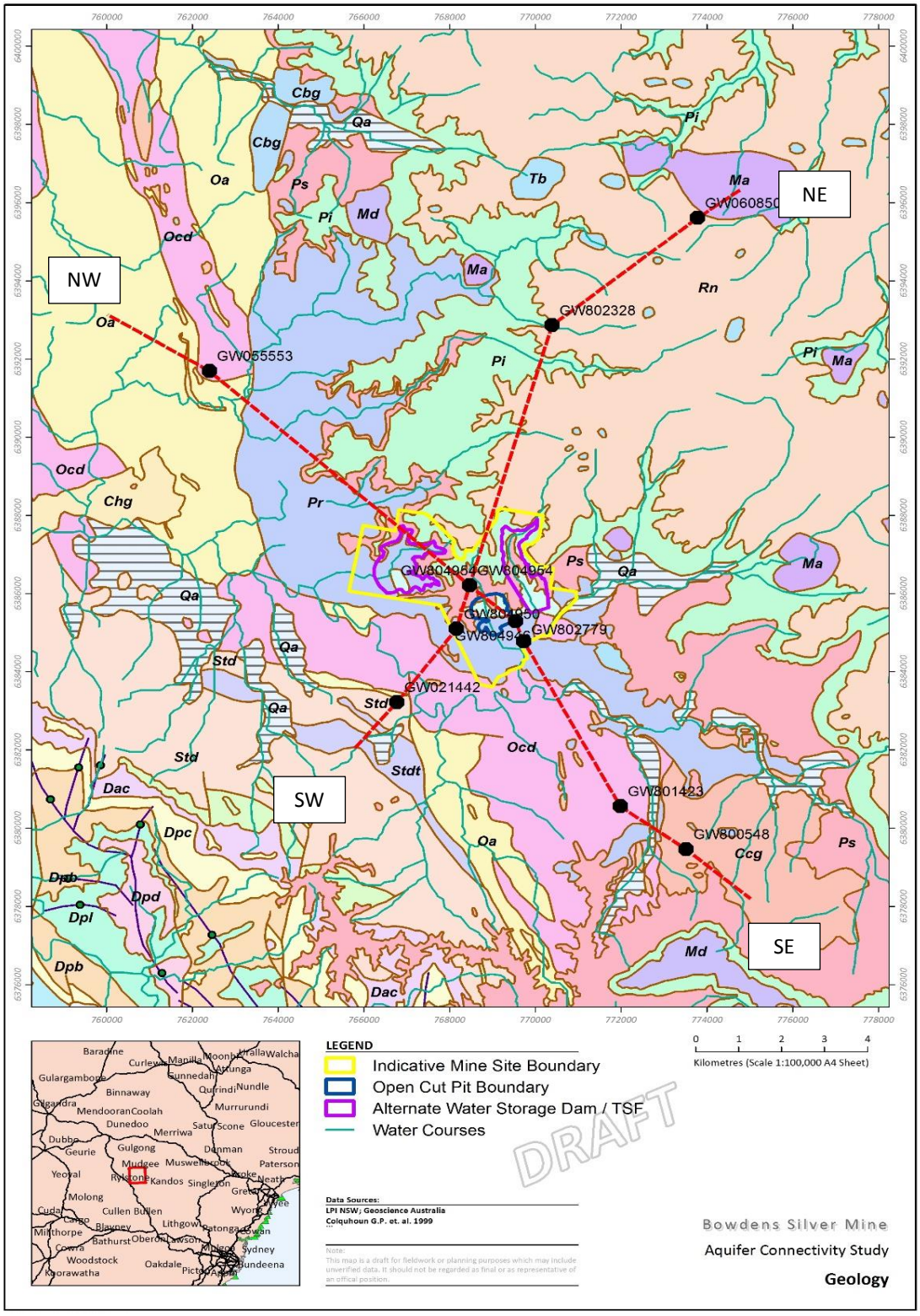

FIGURE 1: CROSS SECTIONS AND GEOLOGY

Using the hydrogeological bore data, the estimated groundwater flow and areas of surface expression are shown using blue arrows on the cross sections (Figure 2 and Figure 3). These infer that groundwater discharge is occurring to surface water courses in low-lying areas. Also shown in the sections are the potential groundwater dependent ecosystem zones (GDE Atlas, 2018) along tributaries of the Cudgegong river.

Figure 4 and Figure 5 indicate the possible change in groundwater flows should dewatering of the proposed excavation occur without controls in place.

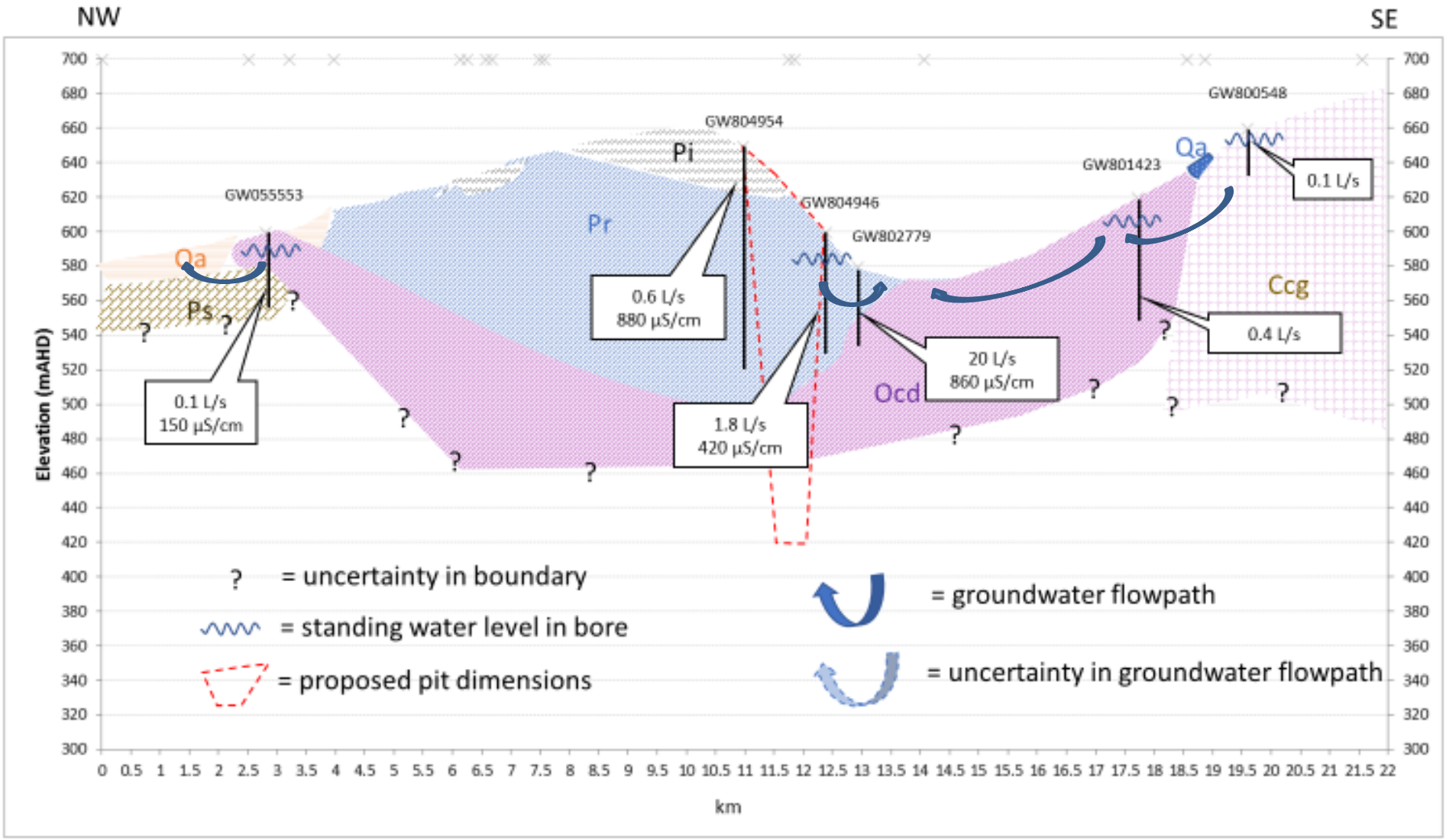

FIGURE 2: NW TO SE SECTION

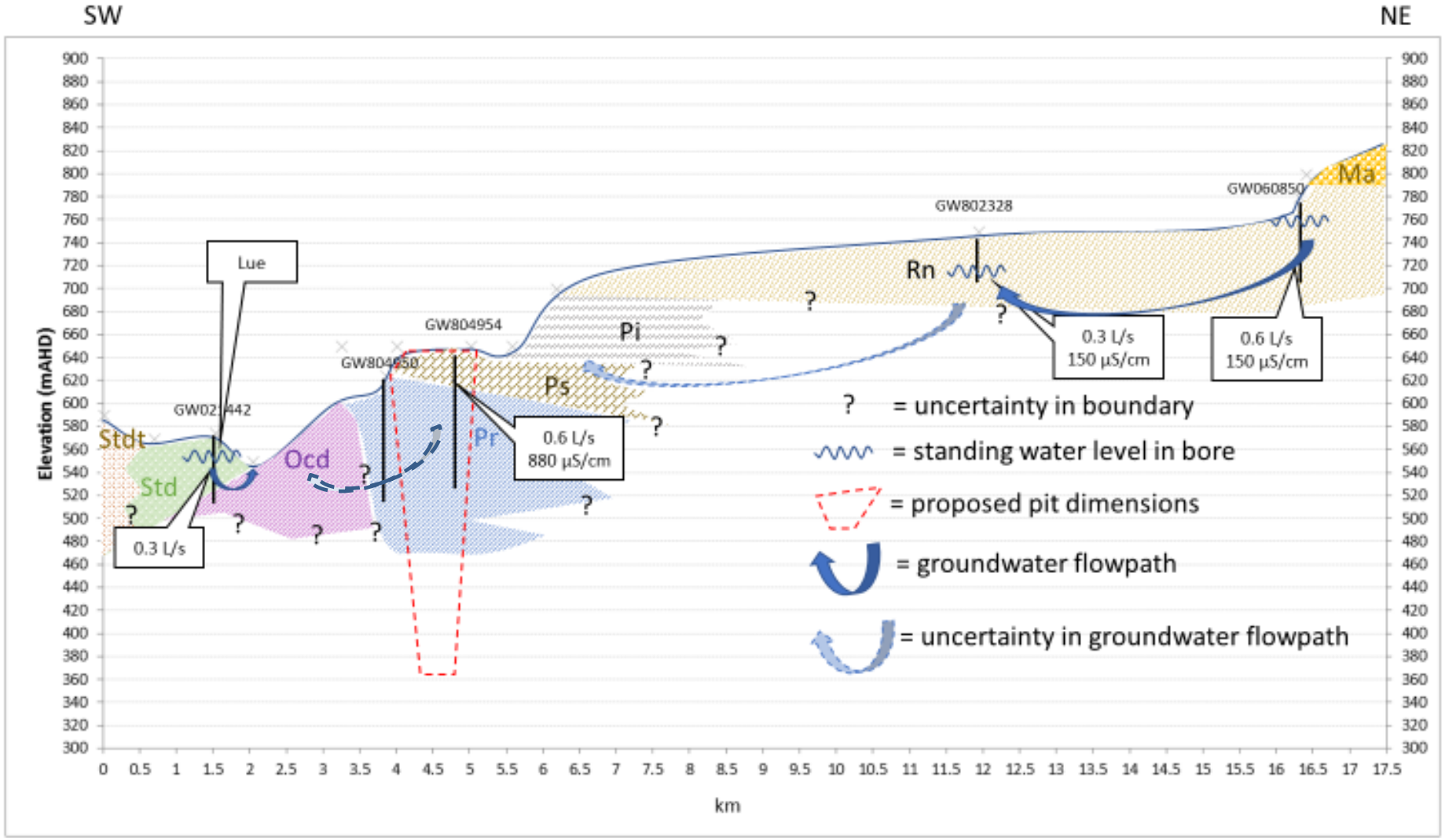

FIGURE 3: SW TO NW SECTION

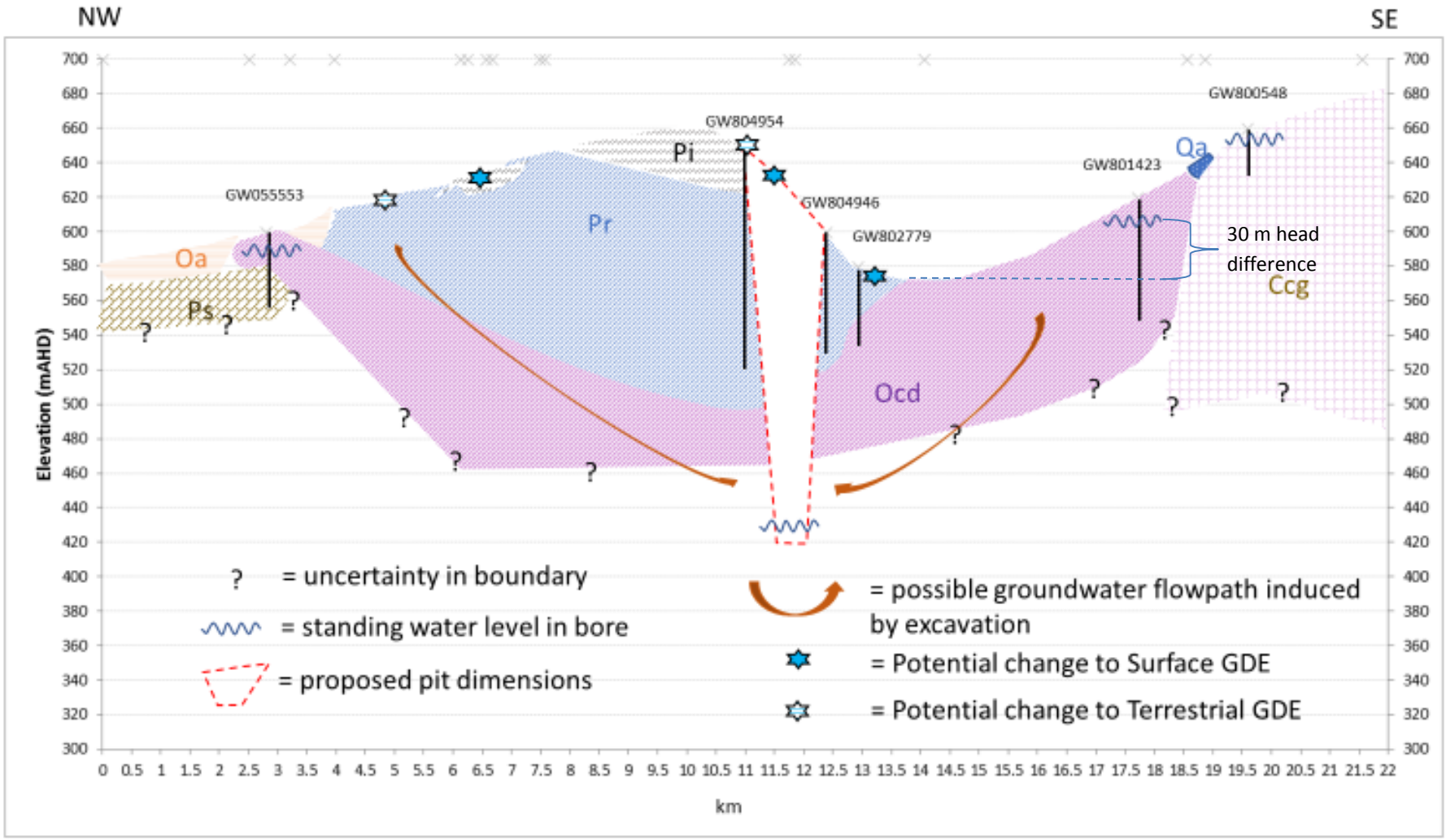

FIGURE 4: POTENTIAL CHANGES TO GROUNDWATER FLOW AND IMPACTS TO GDES

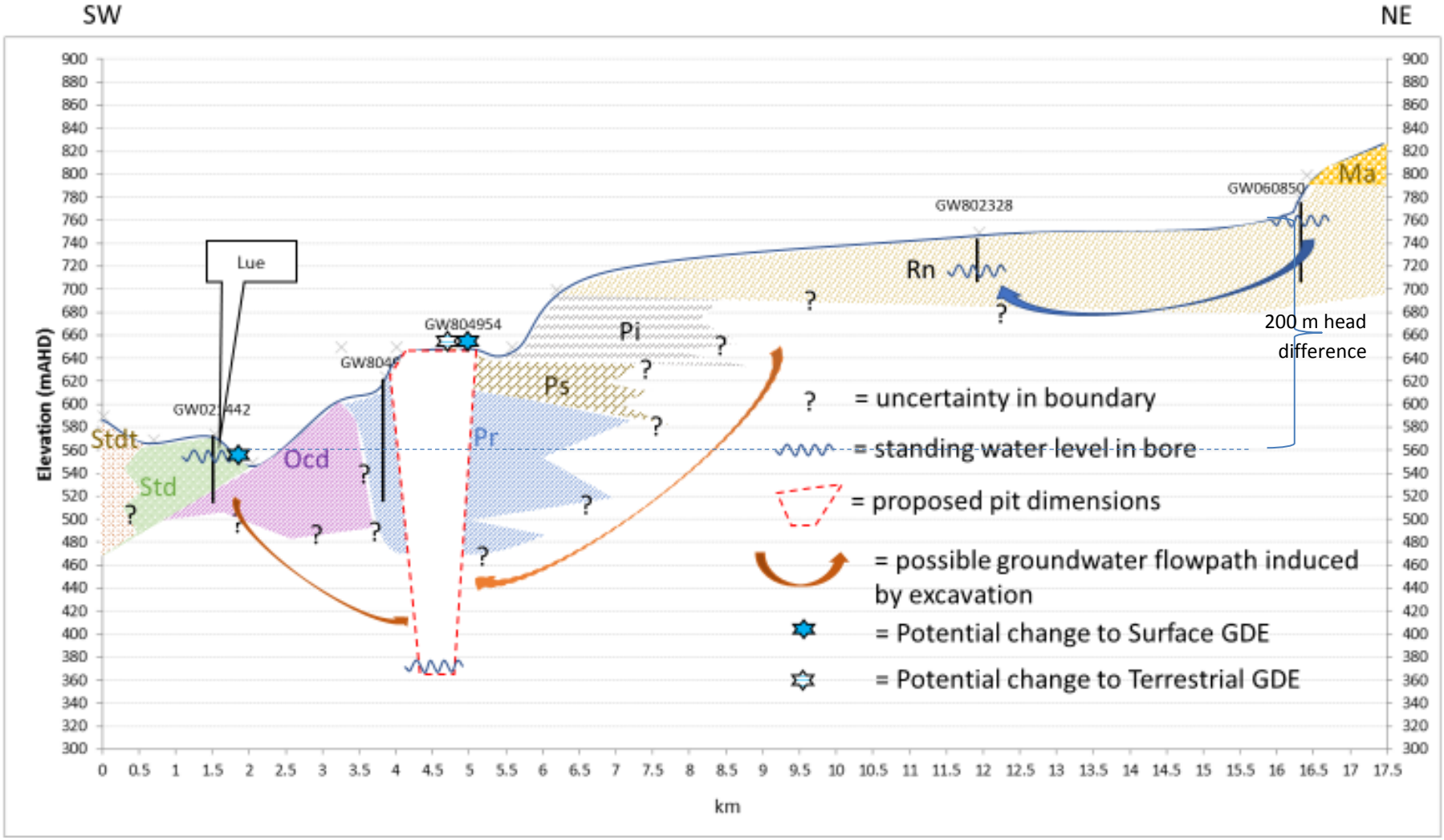

FIGURE 5: POTENTIAL CHANGE IN GROUNDWATER FLOW AND IMPACTS TO GDES

1.4 Impacted Beneficial Uses

The aquifer connectivity with beneficial uses of bore pumping and groundwater dependent ecosystems are discussed below.

1.4.1 Groundwater Users

Fractured breccia of the Rylstone Volcanics is present from 5-90 m BNS on the proposed mine site. Between the mine site and Lue lies the Coomber Formation and Quaternary alluvium. In accordance with the findings of (Noller, 2012), there is no evidence of a barrier to groundwater flows between the Rylstone Volcanics at the site and the downgradient Quaternary alluvium or surface water bodies.

Over the >20 year life of the mine, dewatering at rates up to 20 L/s could impact bores within a large area, depending on the connected fracture network. Groundwater controls on mine abandonment must be in place for a much longer period. More detailed geological analysis and modelling that considers the uncertainties in storage and permeability of fractured rock would be required to predict the impacts.

The standing water levels (SWLs) generally follow the ground elevation, with a 200 m head difference across the steeper SE-NW section compared to a 30 m head difference on the flatter NW-SE section to the point of likely surface discharge (Figure 4 and Figure 5). If the permeability and storage of the rock is constant, this would result in a greater impact to bores located in the NW-SE trend. This is relevant because of the high concentration of bores to the southwest of the mine near the township of Lue which indicates a productive groundwater zone.

With reference to the higher bore yields in the Quaternary alluvium and mapping conducted by the Bureau of Meteorology (GDE Atlas 2018) at Lawsons Creek (Figure 6), surface water/groundwater interaction is also likely occurring near Lue which can impact ecosystems reliant on groundwater.

1.4.2 Groundwater Dependent Ecosystems (GDEs)

The beneficial use of groundwater can contribute to the sustainable function of ecosystems. While there are no significant GDEs currently identified in the area (DPI Water, 2012), they must be protected if they are identified. (DPI Water, 2012) states that the fractured rock aquifer of the Lachlan Fold Belt MDB has low-moderate connection between surface and groundwater, with years to decades of travel time between surface and groundwater. As such, groundwater quality changes would be detected in neighbouring bores a significant time after pollution occurs.

1.5 Summary of Aquifer Interference

The local Groundwater Sources may experience:

- Decreased water supply due to mine dewatering which may impact surface water;
- Compaction of the aquifer caused by subsidence after de-watering, resulting in a lower long term water storage capacity;
- Contamination of water quality due to
    - mine waste discharge, including acid mine drainage
    - poorly sealed exploration bores
    - mine workings that enable inter-aquifer flow

  These may damage ecosystem health due to mine waste discharge.

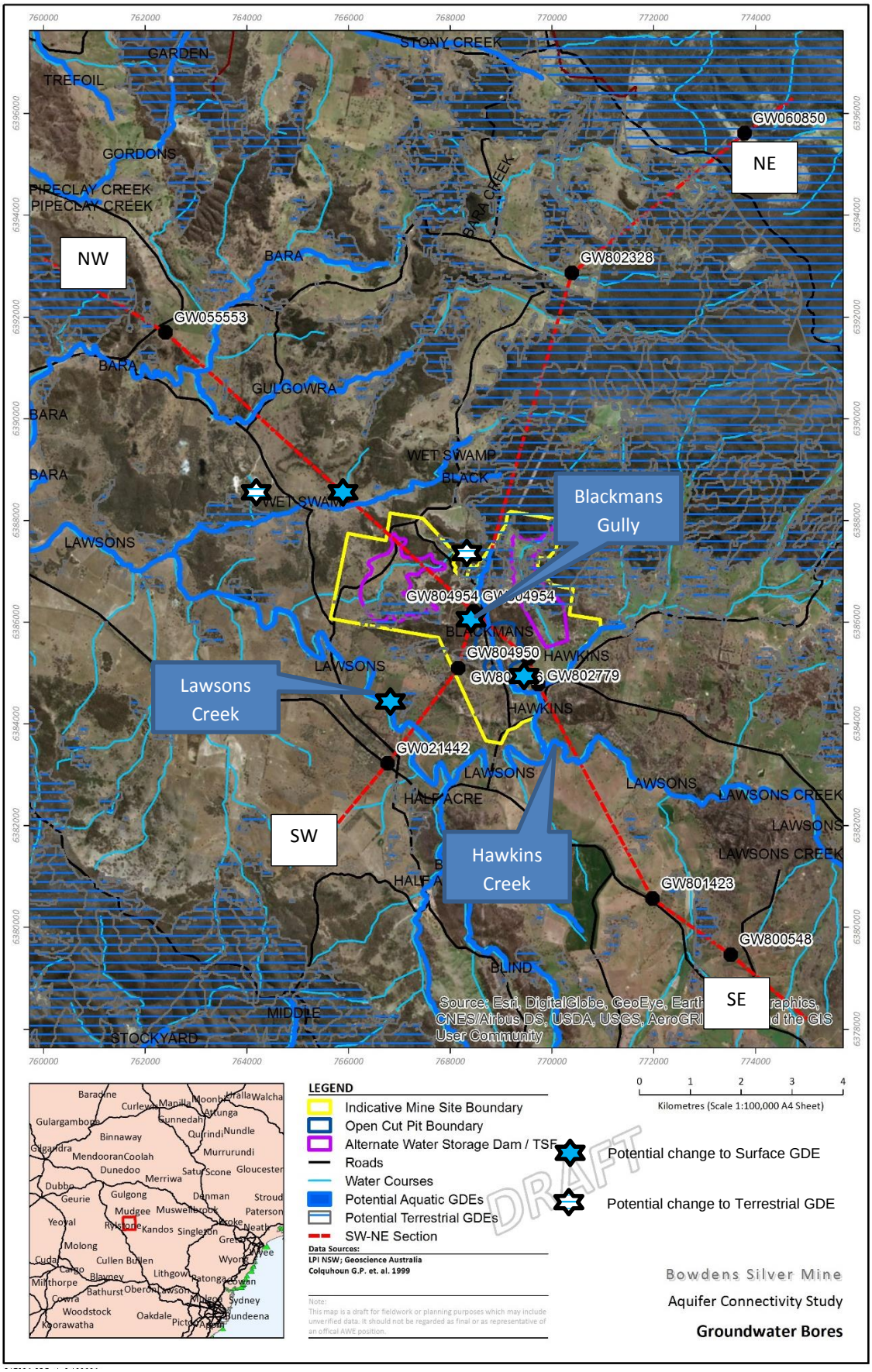

FIGURE 6: POTENTIAL TO IMPACT GDES

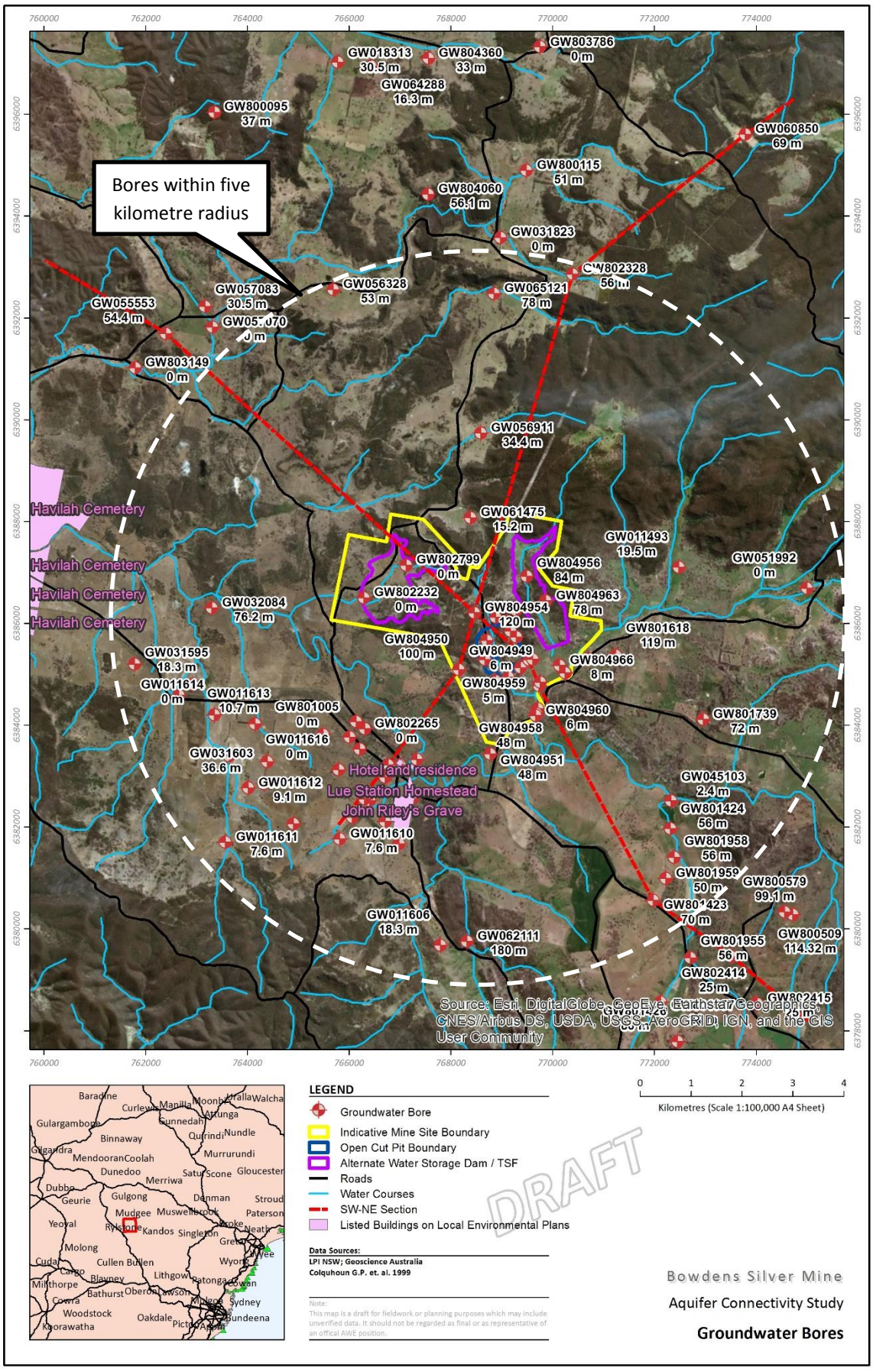

FIGURE 7: LISTED SITES AND REGISTERED BORES IN THE AREA SHOWING THEIR REPORTED DEPTHS

1.6 Conclusion

This aquifer connectivity study has concluded that:

- Groundwater in the area has been categorised as Vulnerable by State and Local government;
- The area is underlain by an extensive and well-connected fractured rock aquifer with variable yield from 0.1-20 L/s;
- Aquifers in shallow alluvium are likely connected to both the fractured rock aquifer and water courses;
- No continuous barriers to groundwater flow (aquitards) were identified; and
- Weathering of the extrusive rocks is likely to have created high variability in storage and permeability. This may result in unpredictable flowpaths which may result in interference to bores distant from the proposed mine.

If the proposed mine proceeds:

- Bores in a northwest to southeast trend from the proposed mine site are likely to be impacted to a greater extent due to the difference in groundwater head;
- There may be interference with aquatic groundwater dependent ecosystems in Lawsons Creek, Hawkins Creek and Blackmans Gully;
- The amount of interference to groundwater levels and quality will be related to the nature of the proposed development and the mitigations (such as water reinjection) used to mitigate interference; and
- Monitoring groundwater levels in bores and local ecosystems in the areas where GDEs may be impacted (Figure 6) can be used to create reference points to monitor change.

Impacted beneficial uses of lagoons, Aboriginal sites, wetlands and waterways (other than GDEs) are not considered in this report and should be considered separately.

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Appendix: Detail Maps

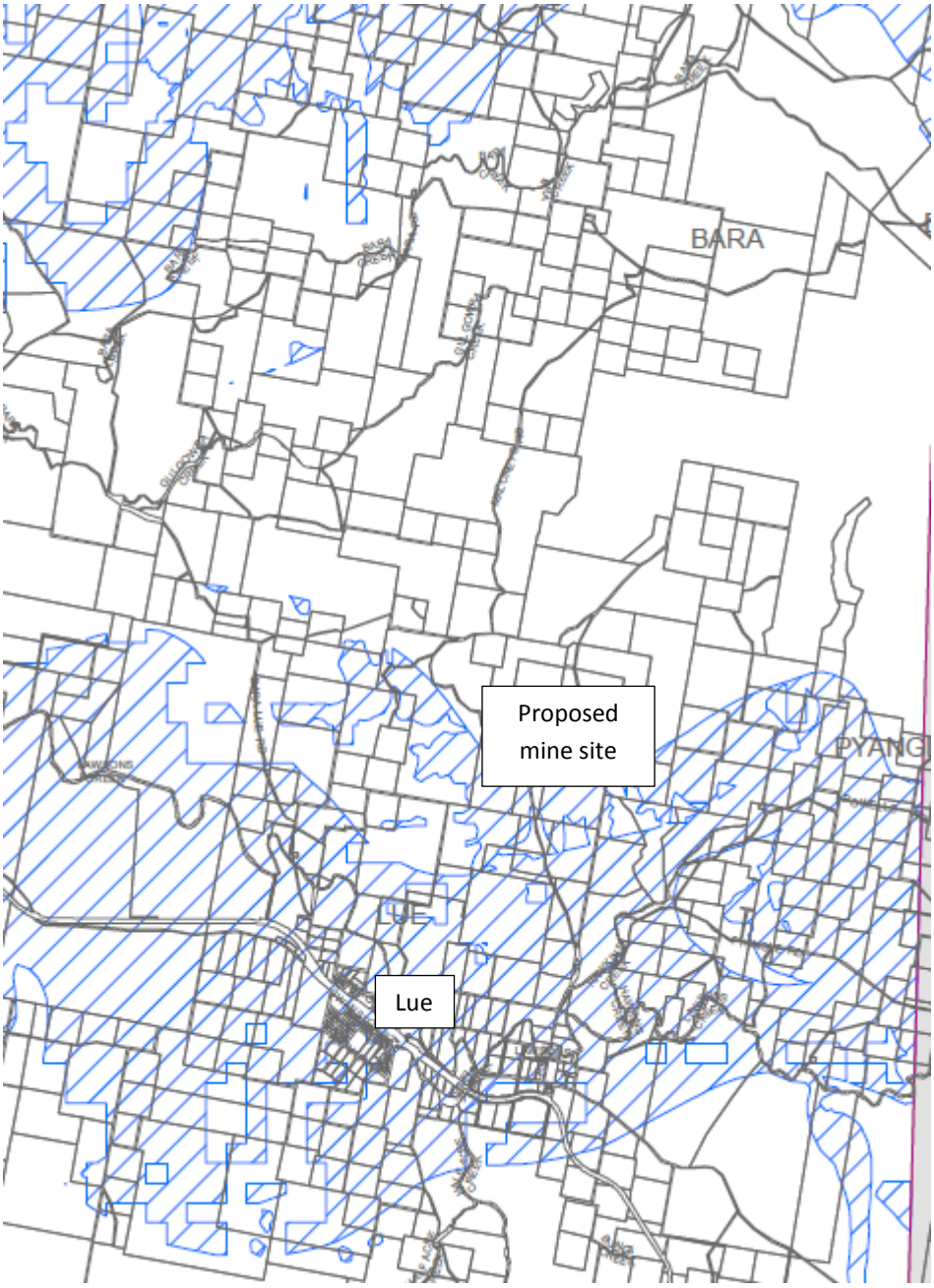

FIGURE 8: VULNERABLE GROUNDWATER ZONES (MID-WESTERN COUNCIL)

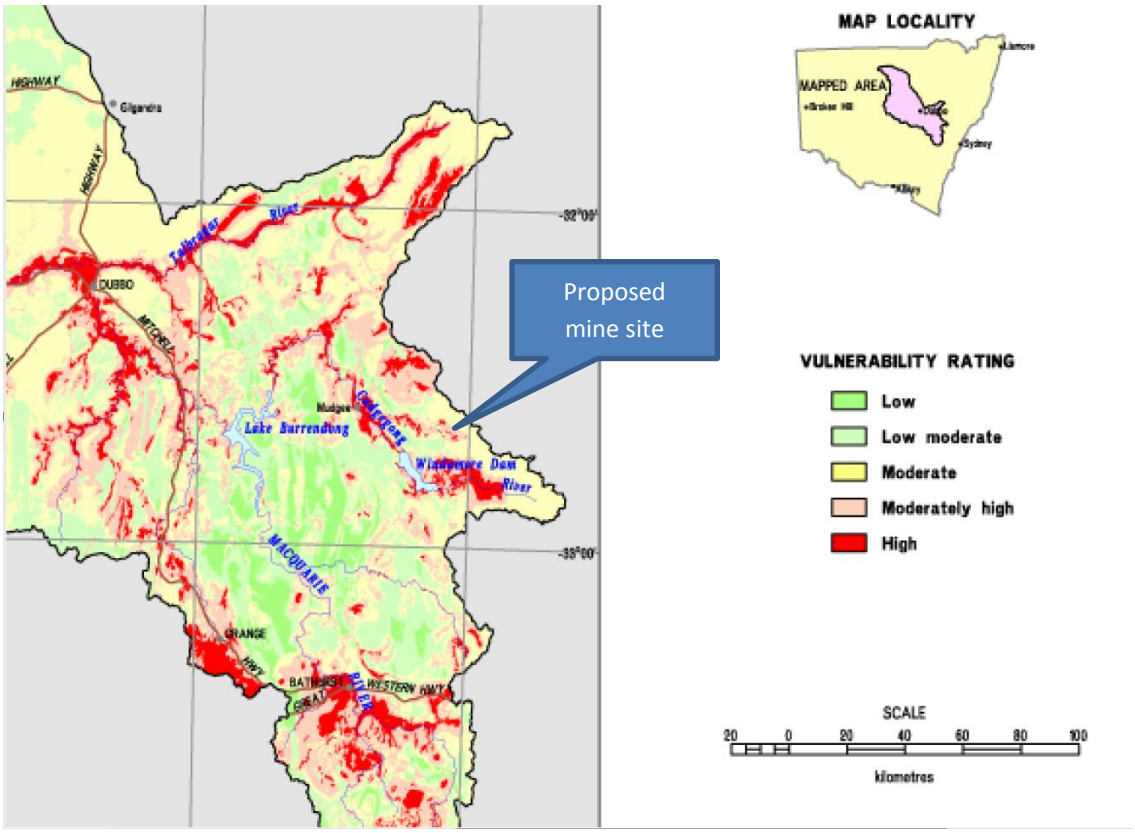

FIGURE 9: AREAS WITH HIGH VULNERABILITY RATING AROUND THE PROPOSED MINE SITE (MACQUARIE CATCHMENT) (DLWC, 2001)

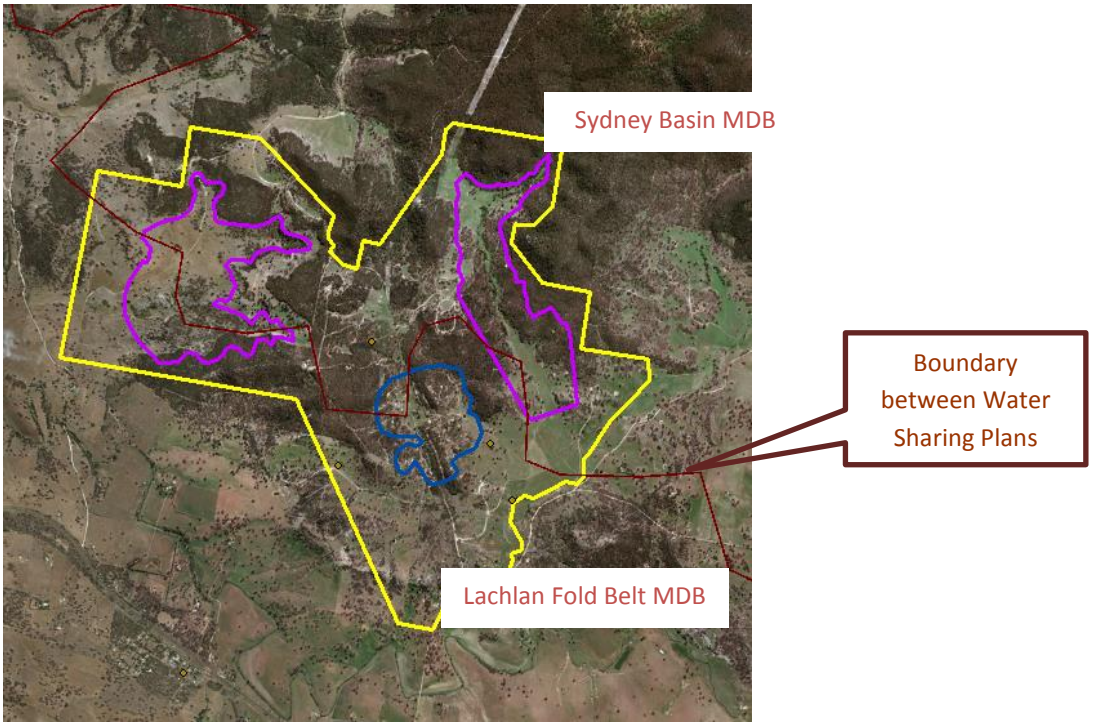

FIGURE 10: WATER SHARING PLAN BOUNDARY SHOWN IN MAROON

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ATTACHMENT 5

Review of Bowden's response to multi-agency feedback regarding groundwater in Bowden's July 2021 Amendment Report *(FDP 13 August 2021)*

FDP
Field Development Planning

Review of Bowden's response to multi-agency feedback regarding groundwater in Bowden's July 2021 Amendment Report

Version: 1.1

Release Date: 13 Aug 2021

Prepared By: Craig Flavel, Senior Hydrogeologist

Table of Contents

Glossary

Abbreviation	Term	Description
AIP	Aquifer Interference Policy framework	A regulatory approvals framework
MDB	Murray Darling Basin	
TSF	Tailings Storage Facility	Location for potentially acid forming material extracted during mining that may leach hazardous chemicals into the water table
WAL	Water Access Licence	A permit to take water from a specified water source
WRE	Waste Rock Emplacement	Location for potentially acid forming material extracted during mining that may leach hazardous chemicals into the water table

Introduction

Lue Action Group (LAG) engaged Field Development Planning (FDP) to review groundwater related matters in the Bowden's Silver Amendment Report and dated July 2021 (the Report). Groundwater related matters are presented in the Amendment and Updated Appendix 1, 2, 3, 7 and 8 dated June 2021 (Table 2).

Field Development Planning (FDP) is an organisation focussed on communicating technical groundwater-related matters. FDP's staff have previously reviewed technical matters surrounding the proposed Bowden's Silver Mine.

This high level review is constrained by time and budget, with less than one week available for submission. As instructed, specific matters include if, and how well, the Report responds to matters raised in Table 1. As per previous work, a review of groundwater modelling remains outside the scope.

Table 1: Agency Feedback

Agency	Date	Title
EPA (A. Helms)	19 Jul 2020	Bowdens Silver Project – Environmental Impact Statement State Significant Development 5765 – Section 3
DPIE and NRAR (M. Isaacs)	31 Aug 2020	Bowden's Silver Project (SSD 5765) Environmental Impact Statement
DPIE (M. Isaacs)	31 Aug 2020	Bowden's Silver Project (SSD 5765) Environmental Impact Statement Attachment B

Documents Reviewed

The revised documents relevant to groundwater that have been reviewed are shown in Table 2.

Table 2

2021 Report Document	Related 2020 Document	Key Changes
Amendment Report		Inclusion of powerline diversion, noting no new groundwater impacts to the EIS (2020)
Appendix 2	EIS Volume 5	Inclusion of Measure 18 – Seepage Management, one page
Appendix 3 – Groundwater (Jacobs 2021)	EIS Volume 2 Section 5	Inclusion of an additional 142 pages: Additional modelling and 29 pages of responses to DPIE/NRAR feedback
Appendix 7 – Health Risk (EnRiskS 2021)	EIS Volume 3 Part 7	No change
Appendix 8 – TSF Liner and Seepage Monitoring (ATC Williams 2021)	EIS Volume 5 Part 16A	No change

The following documents produced in 2020 for State Significant Development 5765 that are relevant to groundwater have also not been amended in response to the agencies' recommendations:

- Vol 2 Part 6 Surface Water Assessment 2020
- Volume 2 Part 6 Surface Water Assessment Annexures – May 2020
- Volume 3 Part 9A – Biodiversity Assessment
- Volume 3 Part 9B Biodiversity Offset Strategy
- Volume 4 Part 10 Aquatic Ecology May 2020
- Volume 5 Part 16 B Preliminary Design – WRE, Oxide Ore
- Volume 5 Part 16 C Closure Cover Design – May 2020

Review of responses to regulatory queries

Review of response to EPA feedback

The recommendations provided by the EPA under the referral are shown in Table 3. Subsequent columns discuss the nature and location of amendments presented by Bowdens in 2021, notes from FDP and which EPA recommendations are resolved or remaining outstanding.

Table 3

Recommendations – prior to Determination	*Amendment made*	*Location*	*Notes*	**Resolved**	**Outstanding**
The proposed liner is unsuitable: improve barriers to seepage from the TSF • use of in-situ material is unsuitable due to geological variability • consideration must be given to multi barrier seepage management, considering five guidelines	BGM liner over entire impoundment area, where feasible, but dimensions may be reduced if environmental impacts are not exacerbated Construct TSF in accordance with detailed design Consideration of seepage management will be made in a Water Management Plan and a TSF Operations and Maintenance Plan	Amendment 2-45 Appendix 2 A2-6 Amendment & Appendix 2 A2-15	Recommendations do not seem to be addressed the use of 'feasible' implies a return on investment rather than a commitment. Suggest a commitment to applying a bituminous liner to the entire area and monitoring its integrity The two Plans are not provided	• • Consideration has been given to multi barrier seepage management per the amendment note	• As per EPA recommendation
Install groundwater monitoring infrastructure and gather and analyse data before approvals • the additional monitoring bores downgradient of the TSF and between the Lawson Creek and associated alluvials should be drilled before works commence	Monitoring is proposed to be conducted as documented in a Water Management Plan	Appendix 2 A2-5	A detailed Water Management Plan that requires monitoring and analysis of aquifer connectivity between the Mine Site and Lue Village prior to a Determination would be helpful.	•	• Installation, analysis and monitoring of groundwater before Determination

FDP notes that the EPA requested dam infrastructure associated with the tailings storage facility (TSF) to be associated with the ANCOLD (2012) guideline, however, this guideline has been superseded by Revision 1 (ANCOLD 2019) which take into account lessons learnt from recent TSF dam wall failures.

Review of response to DPIE/NRAR feedback

The recommendations provided by the DPIE/NRAR under the referral are shown in Table 4. Subsequent columns discuss the nature and location of amendments presented by Bowdens in 2021, notes from FDP and which DPIE/NRAR recommendations are resolved or remaining outstanding.

Table 4

Recommendations – prior to Determination	*Amendment made*	*Location*	*Notes*	**Resolved**	**Outstanding**
Clarify whether entitlements (Water Access Licences) to the following Groundwater Sources have been secured: a. 907 ML/yr from Lachlan Fold Belt MDB b. 194 ML/yr from Sydney Basin MDB and 12.9 ML/yr from Lawsons Creek Water Source DPIE noted only 165 ML/yr of Sydney Basin MDB entitlements had been secured and that Licences RO12-18-111 and RO13-19-097 may not be within the Sydney Basin MDB (Other) Water Management Zone.	• Bowdens holds 59 ML/a of entitlements but intends to 'refine' licensing obligations once approved • Bowdens would secure necessary water licences prior to Determination of the application. Note that this report states that 136 ML/yr is required from Lawsons Creek (not 12.9 ML/yr) and that up to 2,000 ML/yr can be imported from Ulan Coalfield, with excess diverted to the TSF. • There is currently a moratorium on new WALs – where they are required they would be purchased on the market or via a controlled allocation order • Ulan Coalfield water treatment, including waste disposal, has been assessed and approved • Bowdens have 'access to' approximately 1,066 ML/yr of groundwater entitlements	Appendix 5 336-337 Amendment 2-62 Appendix 3 5-34 Amendment 2-63 Amendment 2-64	• No evidence that sufficient entitlements have been obtained prior to Determination • As Bowdens may be contracted to take 2,000 ML/yr of wastewater from Ulan Coalfields, confirm that the TSF has sufficient capacity to store up to 2,000 ML/yr of water from the Ulan Coalfield. Evidence of approval of Ulan Coalfields waste disposal from treatment is not provided • There is no guarantee of securing sufficient water allocation licences for the proposed development	• Bowdens does not have sufficient water entitlements at present	• Define Water Management Zone for RO12-18-111 and RO13-19-097
Confirm whether a borefield is required and conduct an impact assessment if so under the Water NSW/NRAR process (DPI 2018)	• Jacobs (2020) identified enhanced permeability within fractured rock aquifers near major geological structures • Significant porosity that has the potential to accommodate productive aquifers is present below 600 m • Any prospective borefield would be dependent on successful investigation results and subject to approvals	Amendment 2-64 Appendix 3 5-118	• Respond to Recommendation, including conducting an impact assessment on any proposed borefield • Discuss whether sustainable yields are achievable from the porosity below 600 m	•	• Per DPIE/NRAR Recommendation
Confirm whether the risk of aquifer contamination to receptors such as the down-gradient town water supply utility borefield will be effectively managed, including a. Provide supporting information including piezometric maps b. Substantiating claims that groundwater flow will be reversed from a westward to a south easterly direction, including discussion of	a. Long term post mining water level provided showing groundwater flow to the south b. None	a. Appendix 3 5-134 Fig 47	The post mining piezometric map shows that the Mine Site will not be a sink in all directions. Groundwater seepage will occur to the south from the pit void (lake) and west from the TSF (both down-gradient) a. Several additional piezometric maps would improve the understanding of the directions of seepage	a. A map of post mining groundwater levels is provided	a. Additional maps requested b. Per DPIE/NRAR Recommendation

vertical groundwater flow and inter-aquifer relationships c. Revising the assessment against the Aquifer Interference Policy (AIP) framework if an update is necessary d. Assessing and clearly expressing the groundwater quality impacts on the Sydney Basin MDB Groundwater Source and providing details on how the water quality impact falls within Level 1 minimal impact assessment criteria of the AIP	c. No AIP assessment update d. None	c. Appendix 3 Section 2, Section 7, Annexure 1 p. 5-160, 5-163	c. Unclear whether the allowed take 'secured' refer to peak groundwater entitlements, yet-to-be-confirmed rights to use Ulan Coalfield water or off-peak (staged) entitlements c. AIP 14: there is potential for causing and enhancing hydraulic connections that has not been assessed. c. AIP Table 4 – there are potential quality impacts on nearby licensed groundwater users		c. Per DPIE/NRAR Recommendation d. Per DPIE/NRAR Recommendation
Address model matters to ensure they are not symptomatic of serious model errors a. Structure and complete a standalone numerical groundwater model report according to Chapter 8 in the Australian Groundwater Modelling Guidelines (Barnett, et al. 2012)	• Report restructured and several matters addressed	Appendix 3 Annexure 9 5-263	• Model objectives not stated • Solute transport modules not used	• Report restructured and several matters addressed	• For specialist groundwater modeller review
Provide information on how 'make good' is proposed to be achieved at the impacted bores during operations and post closure as per the Aquifer Interference Policy	• Water table drawdown up to 1 m 1.5-2.2 km from the main open pit ○ GW061475 north of the mine site ○ GW802888 east of the mine site ○ Others within the mine site • 'acid forming water would be captured and processed to ensure any metals that are dissolved cannot percolate into the groundwater' • acceptable contingency measures will be put in place prior to operations intercepting the groundwater table. • a Final Void Management Plan will be put in place prior to completion of mining	Appendix 3 5-128 Appendix 7 7-85 Appendix 2 A 2-4 Appendix 2 A 2-4	• A Final Void Management plan, including make good conditions for impacted bores, would identify how long term risks would be managed prior to a Determination.	•	• Per DPIE/NRAR Recommendation

Review of response to DPIE Attachment B feedback (selected recommendations)

The recommendations provided by DPIE/NRAR's specialist reviewer (Attachment A) under the referral are shown in Table 4. Subsequent columns discuss the nature and location of amendments presented by Bowdens in 2021, notes from FDP and which DPIE/NRAR recommendations are resolved or remaining outstanding.

Table 5

Recommendations – prior to Determination	*Amendment made*	*Location*	*Notes*	**Resolved**	**Outstanding**
Implement Dr Merrick's recommendations	•		Dr Merrick appears to have reviewed Jacobs (2019). Note that the WAL summary (Annexure 3, 2019) has not been provided in 2021. Dr Merrick noted that model calibration had not yet been finalised, including a check of observed/interpolated water table contours (p5-375)	•	• Per DPIE/NRAR Recommendation
Conduct rigorous proofreading and review to avoid degrading confidence in the model and groundwater assessment	• Within 2 years of extraction intercepting the regional groundwater table • Review groundwater model within 2 years of extraction intercepting the regional groundwater table	Amendment A2-6 Appendix 2 A2-6	Clarify whether dewatering bores will interfere with the proposed review.	• Review may occur within 2 years	• Per DPIE/NRAR Recommendation
Discuss whether the guiding principles for the conceptualisation of groundwater systems (Barnett, et al. 2012) have been met, how, and if not, why.	• Considering regional matters are the objective of the model	Appendix 3 5-441	Alternative conceptual models have not been considered nor is there evidence of iterative refinement of the model Modelling objectives unclear / receptors not marked	• Matters such as hydrogeological complexity are presented	• A concise summary of responses to guiding principles
Show conceptual groundwater mounding beneath the Tailing Storage Facility (TSF) and Waste Rock Emplacement (WRE)	•		The TSF clay liner seepage is modelled assuming zero head below the liner (i.e. it is free draining to a lower water table)	•	• Per DPIE/NRAR Recommendation
The conceptual model should include third-party and mine dewatering bores	• The locations of two bores are labelled			• The locations of two bores are labelled	• Per DPIE/NRAR Recommendation
Consider vertical anisotropy and describe the basis for vertical discretisation in layers such as the Shoalhaven Group aquitard	• Discretisation is not required	Appendix 3 5-443	In heterogenous rock, high permeability features may significantly alter the migration of contaminant plumes The modeller notes that insufficient data is available for modelling these matters with acceptable certainty levels	•	• Per DPIE/NRAR Recommendation
Special diagrams are required to show the pre-mining, mining and post-mining hydrological situations in alluvium	•		This matter is important to regional impacts	•	• Per DPIE/NRAR Recommendation

Recommendations – prior to Determination	*Amendment made*	*Location*	*Notes*	Resolved	Outstanding
Shallower groundwater flow direction/s must be discussed further and presented more clearly, including the possibility of perched water tables above the regional groundwater table. Page 67 notes that *'Within the Mine Site, a number of potential GDEs have been identified including springs and seeps, terrestrial vegetation, and river baseflow systems.'* However, the conceptual and numerical models fail to represent these features. The proponent should justify the exclusion of such features or include them in the conceptual and numerical models	• Resolution of cross sections are too coarse to show receptors. Sydney Basin springs unlikely to be impacted by drawdown	Appendix 3 5-439 5-441	Identifying the locations and the relationship between users (including listed species) and water interfering activities should be the objective of an assessment per the AIP. The stated objective is to 'assess regional impacts'.	• Some notes have been made	• Per DPIE/NRAR Recommendation
Enhanced conceptual and numerical modelling of surface water is recommended, especially as Section 5.3.3.3 notes that 'The water balance indicates that, on average, the modelled groundwater system predominantly losses' water to water courses.' Hence, surface water is considered an essential and integral constituent in the modelled hydrogeological system. Varying depths of surface water stage and bottom below the surrounding land level should be considered. Sensitivity analysis of these parameters are also required to be undertaken followed by uncertainty analysis if found necessary.	• This would increase the modelling complexity and is not required	Appendix 3 5-445	Surface water/groundwater interaction is likely to be a key polluting factor	•	• Per DPIE/NRAR Recommendation
Section 5.1.3: drilling results suggest that relatively high groundwater yields can be obtained in the vicinity of the structures. However, these structures are apparently not represented in the numerical model. Explanation or correction is recommended.	• The groundwater model could not be calibrated using these high permeability features	Appendix 3 5-454	The high permeability features (faults/fractures) likely in the variable geology may be the first noted source of pollution. The nature of fluid flow through features between the Mine Site and nearby creeks is particularly relevant.	•	• Per DPIE/NRAR Recommendation
The report argues that unreported earlier versions of the groundwater model showed that the numerical groundwater model is insensitive to evapotranspiration. The proponent is requested to explain the reasoning behind including evapotranspiration in the model where it is not affecting the model. To simplify the model and reduce uncertainty, could evapotranspiration have been left out and compensated for implicitly in the recharge values? If there is evidence that evapotranspiration is not an important process in the Bowdens Silver Mine hydrogeological system, it should be clarified on the conceptual diagrams (Figures 40 and 41).	• ET was retained in the model so as not to have to further modify rainfall recharge and introduce additional calibration runs. ET is also utilised in the recovery model and mine void equilibration.	Appendix 5 5-451	For the mine water mass balance, discharge will be inter-aquifer flow, surface water run-off or ET. Third party groundwater use is also considered on p5-121. As all processes besides ET may be polluting, gathering actual ET / recharge volumes for modelling is critical	• Explanation included	• Use of recharge modifications not adopted

Summary

Of the seven documents associated with groundwater in Bowden's 2021 Amendment, only the Amendment Report (R.W. Corkery & Co. 2021a), Appendix 2 (R.W. Corkery & Co. 2021b) and the Groundwater report (Jacobs 2021) have been updated.

FDPs high level review, that has been constrained by time and budget, indicates that few of the Recommendations provided by EPA and DPIE/NRAR have been resolved, with the majority remaining outstanding.

The water mass balance, including rainfall recharge/evapotranspiration losses and the fate of a possible 2,000 ML/yr from the Ulan Coalfields remains a key uncertainty. Neither entitlements to the maximum required water supply from Groundwater Sources, nor alternatives to the possible Ulan Coalfields water supply, have been obtained.

The mass/year of contaminants within this possible water supply that may be concentrated by reverse osmosis treatment and sent to the TSF is not provided.

Amendments considering the Recommendations for seepage management from the TSF appear to concern plans that would be developed should a positive Determination be received. A predicted groundwater level map inferring groundwater flows 100 years after mining is presented. Modelling of the nature, mass or attenuation of contaminants leaching from the TSF or WRE to the south and west of the Mine Site after 100 years has not been presented.

The clearest responses regard the groundwater modelling and are located at the end of Appendix 3 (Jacobs 2021). A key matter presented is that the objective of the numerical groundwater simulation model was not to consider contamination of local springs or dependent ecosystem health. Regional groundwater level changes are the objective rather than changes to groundwater quality. This review does not consider DPIE's modelling recommendations any rigour, however, at a high level the modelling recommendations remain largely unresolved but the report is significantly restructured to better align with the Australian Groundwater Modelling Guidelines (Barnett, et al. 2012).

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ANCOLD. 2019. *Guidelines on tailings dams - planning, design, construction, operation and closure - Revision 1.* Hobart: The Australian National Committee on Large Dams Incorporated.

ATC Williams. 2021. *Appendix 8 - TSF liner and seepage monitoring.* Sydney: Bowdens Silver Pty Limited.

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DPI. 2018. *Water resource plans fact sheet - Assessing groundwater applications.* Sydney: NSW Department of Industry.

EnRiskS. 2021. *Part 7 - Human health risk assessment - updated.* Sydney: Bowdens Silver Pty Limited.

Jacobs. 2021. *Groundwater Assessment - Updated.* Sydney: Bowdens Silver Pty Limited.

R.W. Corkery & Co. 2021a. *Amendment Report for the Bowdens Silver Project.* Sydney: Bowdens Silver Pty Limited.

R.W. Corkery & Co. 2021b. *Appendix 2 - Updated summary of environmental management and monitoring measures.* Sydney: Bowdens Silver Pty Limited.

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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.

Lue Action Group
www.lueactiongroup.org

ATTACHMENT 6

Comments on Bowdens Response to Submissions Report (RTS)

(LAG April 2022)

Updated May 2022

Lue Action Group
www.lueactiongroup.org

Director Resource Assessments, Planning and Assessment
Department of Planning and Environment
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PARRAMATTA NSW 2124

Lue Action Group Comments on the 500kV Transmission Line Amendment Submissions Response

Applicant – Bowdens Silver Pty Limited
Application Number - SSD-5765
Application – Bowdens Silver Mine

Contents:

Bowdens Amendments and Submission Responses

LAG notes that Bowdens overestimate, underestimate and generally make exaggerated statements in material available to the public and the Department of Planning and Environment (DPE).

LAG must assume that this is because if Bowdens were more accurate in their statements they could expect the following results

1. Shareholders and other stakeholders would not support the project
2. Supporters in Rylstone and Kandos would realise that there will be no jobs for them
3. Landowners in Lue would know that they would be adversely affected in many ways
4. There would be no town water provided to residents of Lue
5. Environmentalists would know that the threatened and endangered native flora and fauna, the air and water quality and the soils would be permanently and irreversibly adversely impacted.
6. Supporters would be aware that this project is not environmentally sound.
7. All Australians would know that the important Aboriginal Heritage sites near the mine site will be irreversibly adversely impacted.
8. No compensation has been offered for those adversely affected by this project and it has been stated in a public meeting that no one will be compensated.
9. A local councillor would be forced to resign and attend court facing corruption charges
10. Landowners downstream of the project would know that they most certainly face severe losses to their water quantity and quality.

Why are many submission responses from Bowdens shallow and without facts, highlighting minor grammatical or typographical errors rather than responding to genuine questions and comments?

There were 3 main components of this project listed in the EIS.

1. **An open cut silver lead and zinc mine**
2. **Associated infrastructure**
3. **Water Supply Pipeline**

Surely if a major component of a project is removed, whether this component is unpopular or not, the Department of Planning and Environment must call for a new SEARs and EIS. Please see below an extract from the SEARs issued in 2019 which clearly states the development includes a water supply pipeline. The SEARs also clearly states that the EIS must include all surface infrastructure required for the project. The EIS does not include plans or costings or assessment of the power supply source for the project being the 66kv transmission line from Bylong Valley Way to Lue or rehabilitation of the site.

The SEARs states:

Application Number	SSD 5765
Development	The Bowdens Silver Project, which includes: • developing an open cut silver, lead and zinc mine and associated infrastructure, including a water supply pipeline; • extracting and processing up to 2 million tonnes of ore a year for up to 17 years; • transporting the processed ore from the mine via road; and • rehabilitating the site.
Location	2.5 km northeast of Lue, in the Mid-Western Regional LGA
Applicant	Bowdens Silver Pty Limited

Date of Issue	21 June 2019
General Requirements	The Environmental Impact Statement (EIS) for the development must comply with the requirements in Clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. In particular, the EIS must include: • a stand-alone executive summary; • a full description of the development, including: - the resource to be extracted, demonstrating efficient resource recovery within environmental constraints, and having regard to DRG/DRE's requirements (see Attachment 2A and 2B); - the mine layout and scheduling; - minerals processing; - surface infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process); - a waste (overburden, tailings, etc.) management strategy; - a water management strategy, having regard to the EPA's and DPI's requirements (see Attachment 2A and 2B); - a rehabilitation strategy, having regard to DRG/DRE's requirements (see Attachment 2A and 2B); and - the likely interactions between the development and any other existing, approved or proposed mining related development in the vicinity of the site;

The component the proponent removed from the project is the external Water Supply Pipeline, a vital item of infrastructure for this project. Without an external water source the project as it stands cannot proceed. An excuse such as "other metalliferous mines do not have external water sources" is not a reason for this mine to go ahead in a valley with limited water resources.

In a recent CCC meeting an employee of RW Corkery and representative of Bowdens insisted that the mine would be relying on the water collected as allowed under "harvestable rights". He argued that Bowdens could construct dams up to 180.6 MLs in size and Bowdens would catch 180.6 MLs every time it rained. This means that an SSD project will be relying on rainfall to proceed. Even if it were a farm that was being developed this means of supplying water would not be acceptable. It is noted that RW Corkery also provided the sub-standard Agricultural Impact Statement as part of the EIS with no reference to existing agricultural property landowners and agricultural water users.

Bowdens do not have sufficient Water Access Licences in the Lachlan Fold Belt nor the Sydney Basin to provide water for this project. And even if they did the taking of this water would cause severe water losses to all surrounding users.

Bowdens propose to provide water for their operations entirely from their site and their surrounding landholding totalling 2580 ha. Bowdens do not own all the land in the 2580 ha area.

They intend to catch all the water that falls on their mine site, as well as all the water available under their harvestable right and prevent and stop this water from entering Lawsons Creek and being available to downstream users.

This project has a high risk of adversely affecting and impacting groundwater and surface water and Bowdens have not attempted to reduce or mitigate that risk.

Bowdens do not have a secure water source.

EIS Submission Response

Generally Bowdens have not responded in to the questions and comments about the following matters put to it in submissions following the EIS submission period or the Amendment submission period.

The following matters require proper analysis and an in depth responses rather than direction to non-existent or unclear sections of the EIS. LAG is aware that Bowdens will not be the operator of the mine at Lue therefore will be unable to respond in many cases.

- Actual plans and costings of the relocation of the 500kV Transmission Line
- Actual plans and costings of 66kV Transmission Line supplying electricity to the mine and processing plant
- Actual plans and costings of the Tailings Storage Facility complying with EPA recommendations and guidelines
- Actual traffic numbers on the road
- Accurate numbers of employees
- Evidence of Water Access Licences
- Evidence of a secure water source
- Completion of the 16 management plans promised in the amendment
- An Earthquake Management Plan
- An Acid Mine Drainage Management Plan
- A Flood Mitigation Plan
- A Drought Mitigation Plan
- A Koala Management Plan
- Telecommunications Management Plan
- Proper reasons why Bowdens has not communicated in meetings with the Community Consultative Committee in matters relating the issuing and timing of the EIS and its Amendments, the removal of a secure water source from the EIS, the agreement with MWRC and other matters that the CCC had the right to know prior to them being public knowledge
- Proper analysis of the reduction in telecommunications availability once an additional 320 or more people commence using the tower and a Plan for the reinstatement of telecommunications for individuals and businesses when coverage and availability is reduced or not available
- Proper response to water users in Lawsons Creek regarding reduced flows in Lawsons Creek due to the mining and processing operation
- Proper response to submissions referring to the removal of waste
- Proper response to submissions referring to the odour of the tailings dam
- Proper and respectful response to landowner R81 regarding her loss of views
- Proper and unique responses to submissions referring to corruption and bad behaviour by Bowdens employees
- Proper respectful responses to comments and queries from neighbouring landowners and businesses and others who have lived and worked in Lue for many years.
- Proper in this context should be taken to mean accurate, truthful, thoughtful, respectful and unique

Bowdens have not responded or acknowledged in any way the fact that many submissions in response to the EIS were fake or copied. Bowdens continue to use false numbers in material available to the public and others.

LAG formally requests that Bowdens respond and correct material on their website, in newsletters

and in other places that contains fraudulent material. Even their Chairman Keith Perrett knowingly and fraudulently submitted 2 submissions.

1. **Unique Submissions in response to EIS**

The Amendment Report on page 10 states "Finally, the overwhelming support demonstrated in submissions on the EIS supports the strategic context for the Project. 1 504 submissions or 79% of all submissions received provided support for the Project. A similar level of support exists within the Mid-Western Regional LGA with 682 submissions or 74% of all submissions from this area supporting the Project."

It should be noted that Bowdens state that they have received 1504 submissions in support of the project but these include duplicates, even two from the Chairman of the board, many from people as far afield as Western Australia, who might or might not be stakeholders, many on forms written in the same handwriting and unsigned, with a one word comment such as "jobs", several from employees and over 900 submissions supporting the project with the comment "jobs" or similar as well as submissions from people from all over Australia and at least 12 submissions with no name, no address and not signed.

All these submissions were counted by the DPE (formally DPIE) and these incorrect numbers have been used in amended submissions, on the Bowdens website, in material left in local letter boxes and in Media Releases. The DPE states they are not responsible for these submissions. Who then is responsible?

From Lue there are less than 40 supporters, many supporting submissions are unsigned, written in the same handwriting and with only a few words. See below five separate examples downloaded from the DPE (DPIE) Public Submissions with a Lue address with similar messages and handwriting. (Search conducted by searching Name Withheld and then checking for a Lue, NSW address. (In order to prevent access to submissions this feature is no longer available with the DPE claiming the IT department is at fault)

Bowdens Silver

Application Number: SSD-5765

☒ Support ☐ Object or ☐ Comment only

Reason / Comment:

BRING WORK TO LUE

Bowdens Silver

Application Number: SSD-5765

☑ Support ☐ Object or ☐ Comment only

Reason / Comment:

IT WILL BRING WORK & MONEY TO THE AREA

Bowdens Silver

Application Number: SSD-5765

☒ Support ☐ Object or ☐ Comment only

Reason / Comment:

MINING BRINGS JOBS & MONEY TO THE TOWN

Bowdens Silver

Application Number: SSD-5765

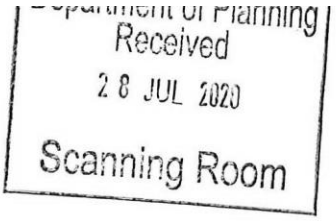
☑ Support ☐ Object or ☐ Comment only

Reason / Comment:

Create Local Jobs

Bowdens Silver

Application Number: SSD-5765



☑ Support ☐ Object or ☐ Comment only

Reason / Comment:

Create local Jobs

The EIS was submitted during the COVID lockdown in June 2020 when many people lost their jobs and were suffering extreme hardship. In any event many submissions including those from Rylstone and Mudgee are not from "stakeholders". A submission from a person in Kandos whose comment is "jobs" cannot compare to the submission from a mother of young children living nearby, within sight and downwind of a lead mine site and having to share her narrow dusty gravel road with heavy vehicles and workers vehicles. No amount of sponsorship to Lue Public School is going to compensate for her loss of amenity or prevent her children from ingesting lead.

What is the consequence if Bowdens does not create the jobs it promises?

LAG would hope Bowdens supporters are unaware how close the project is to Lue, the population of Lue, or how environmentally dangerous this project is. Appendix 5 of the Submission Report, for example, does not mention Lue or its proximity to the mine site in its description of the project. It is doubtful that a person from MacMasters Beach, or Bellevue Hill, or someone living in an apartment in Darling Point has read the entire 2000 plus pages of the EIS and its attachments and has gained enough knowledge of the district to be able to state that this project is environmentally sound and will have no social impact on Lue.

The supporting submission below submitted by Peter Shelley, a resident of Rylstone, an Australia Post licensee, a MWRC councillor and an employee of Bowdens supports the view that many in the community are misinformed about the disastrous environmental consequences of this project. There would not be many that would agree with Mr Shelley's assertion that this is a low impact environmental project. Mr Shelley lives and runs his business in Rylstone, about 20 kms from Lue.

Rylstone, far from struggling, is booming, it is on the tourist drive from Mudgee to Ilford, with the Bylong Valley Way passing through Rylstone taking travellers from the Hunter Valley to Bathurst, the Central West and further South. It is a busy little town, with restaurants, cafes, pubs and boutiques. With its delightful avenues of Plane Trees shading historical stone buildings it is a pretty town. For one reason or another many residents travel to Kandos to post their mail which may offer some understanding as to why Mr Shelley thinks his town is struggling.

Mr Shelley was also employed by Kepco, the Korean company involved in the failed coal mine proposal in the Bylong Valley and Mr Shelley was also a strong supporter of Coal Exploration in the environmentally sensitive Hawkins Rumker areas which was also refused. Mr Shelley has been accused of corruption and Rylstone residents have been on the receiving end of his "difference of opinion" which could also be characterised as intimidation or rudeness. As an Australia Post employee Mr Shelley is also subject to that organisations Code of Conduct which he has contravened on at least one occasion.

It should be noted that Mr Shelley failed to disclose in his submission that he is a Bowdens employee.

Peter Shelley

Support

RYLSTONE , New South Wales

Message

This project is environmentally sound, it is essentially to the survival of our towns by providing employment opportunities and for increased business in our struggling local economy. The amendments to the project decreases risk to an already low impact environmental project. The support this company gives to our community is to be congratulated, due to the business already closed down in our community, Bowdens is one of the few that provides educational support and financial support to much need volunteer organisations and community projects.

What is the consequence if an individual or company or organisation knowingly makes a statement or comment that will endanger the health and wellbeing of another individual?

The Bowdens website https://bowdenssilver.com.au/ does not show a map indicating the proximity of the project to the homes and properties in Lue. It is very likely many supporters of the project would be unaware that they are supporting a project that will result in an enormous negative social impact to those people who live and work in and near Lue. What is the consequence if Bowdens does not fulfil all its promises?

There were 84 submissions in response to the EIS which gave their address as Lue and of those, 44 are opposed to the mine. They are unique, thoughtful and concerned about the impact of the project on Lue and their properties, their friends and neighbours. Of the supporting submissions some had a one word comment, several were written in the same handwriting and unsigned, and the CEO of Bowdens who resides in Sydney's eastern suburbs listed his address as Lue. He is a very large shareholder (and recently received 10,000,000 shares as a bonus) and has an interest in the Lue Hotel. The Lue Hotel used to be a place of special interest in Lue prior to its purchase by people associated with the project. Now it is not included in the maps and is a place that caters for employees and other mine associates and according to the manager will soon be turned over to FIFO or mine workers. Bowdens shareholders are most likely the only individuals who might gain financial benefit from the project. While the CEOs annual remuneration and package of 10,000,000 shares and million dollar bonuses are not unrealistic for a mining CEO it is a significantly greater income than a small business or tourism operator or a farmer or a resident in Lue would expect to receive. An amount of approximately $108 million is allocated for employment in the Economic Assessment over the life of the mine (or 16.5 years) to the 200 – 320 predicted employees and contractors employed by Bowdens.

This analysis of submissions from the Lue area also includes the localities of Havilah, Bara, Hayes Gap, Monivae, Pyangle, Camboon, and Breakfast Creek as well as some residents and properties outside these areas that will be affected by the now defunct contaminated water pipeline from the coalfields, the new transmission line (not in EIS), the increased traffic on the Lue Rd, the AMD and the contamination of Lawsons Creek. 131 submissions from the wider affected area opposed the project while only 73 submissions supported the project. Many local supporters of this project stand to gain financially or have received some sort of sponsorship or are hopeful of a job or are already employed or contracted to the project.

Many individuals opposing this project are opposed to the project because their homes and properties, lifestyles, health, surroundings and businesses will be damaged and changed in a way that is out of proportion with the minor benefits of this project for a few.

The DPE (DPIE) has stated on more than one occasion that they are only interested in the first 50 opposing submissions that will trigger the IPC. Unfortunately Bowdens have used all the submissions, whether unique or not, duplicated or not, genuine or not, to promote the project in the Amendment Report, the Submission Report and in a Media Release, and Newsletters to encourage investment in the company based on the assumption that this project has a majority of community support. Not only is this kind of reporting disheartening for Lue residents and those adversely affected by the project, but shareholders and others are being misled in a way that may lead to the loss of their investment when the project is refused or has conditions placed on it that will prevent the project from going ahead. Even the Lue Hotel manager is under the impression that he will be welcoming mine workers to his establishment in the immediate future. The press release in the Mudgee Guardian states "…that a peer reviewed DPIE report shows the silver mine will 'present no health risk of concern to the local community'". Surely the DPE (DPIE) has not made this statement when it has access to numerous reports and documents showing evidence of the dangers of noise and lead and lead dust, amongst other things, to the health and wellbeing of Lue residents.

The Minister has a duty of care to the residents and landowners and others who live and work in Lue to protect them from the adverse consequences resulting from mining and associated activities at or near Lue.

See below examples of submissions downloaded from the DPIE website. (The submissions are cropped to save space and the originals can be found on the DPIE website)

Bowdens Silver

Application Number: SSD-5765

☑ Support ☐ Object or ☐ Comment only

Reason / Comment:

Good for the community

Submission from a supporter in Lue whose partner works for Bowdens

Bowdens Silver

Application Number: SSD-5765

☒ Support ☐ Object or ☐ Comment only

Reason / Comment:

Jobs & Money

Another submission from a supporter in Lue

In the areas that will be directly affected by the mine and the mine components, such as the increased traffic, and those living and relying on Lawsons Creek most submissions are opposed and against the project.

See the below submission comment from a supporter in the wider area who it seems is undecided as to the importance of the environment versus financial gain.

Bowdens Silver

Application Number: SSD-5765

☑ Support ☐ Object or ☐ Comment only

Reason / Comment:

The impact on the environment far outweighs the economic benefit I support the application for the jobs and the business it will bring to the community

Supporting Submission example (Name was supplied but submission not signed)

The Transmission line Amendment received 115 public submissions. 105 are opposed to the rebuilding of the 500Kv Transmission. While this overwhelming response against this amendment has resulted in another amendment to the rebuilding of the transmission but the amendment states the Transmission Line is moved only 200ms to the east. There is not one site line or visibility assessment from any home or property to the east or south of the mine site. We are informed in the submission report that it is unreasonable to expect any home or property in this area to be assessed.

The following comment was made in the Amendment Submissions Report on page xv. This is a justification for the lack of support for the project and the proponent is reminded that many supporting submissions were duplicates or fraudulent and can therefore not be relied upon to give an accurate picture of the support for the project. The reader is reminded that the Transmission Line is not listed as a major component of the project even though the project cannot go ahead without its removal.

"The proposed re-alignment may also be considered in light of the intended purpose, that is, to provide access to a strategically significant resource. This in turn would enable the efficient development of a mine that would provide substantial royalties to the NSW Government and would support and enhance local employment and business for the life of the Project and most likely beyond. The benefits of the Project are clearly demonstrated in the support that has been provided from many groups in the past. This in turn supports the re-alignment of the 500kV power transmission line as a component of the Project."

2. Strategic Context

The Amendment Report states on page 10 "In terms of the strategic context for the re-alignment of the 500kV transmission line, the western limit of the main open cut pit would be constrained until the transmission line is moved. Therefore, it is considered essential to the successful development of the main open cut pit and access to the identified Mineral Resource. While alternatives were considered that proposed refined development of the main open cut pit in order to avoid re-alignment and impacts to existing towers, these were rejected as it would risk interrupting power supplies throughout NSW."

The map Figure 1.2 on page 4 of the Amendment Report indicates (poorly) that the "re-aligned" Transmission Line and towers will be within 500m of the Mine Pit and adjacent to the south western boundary of the mine site . I remind the reader that the Transmission Line is not being realigned but re-constructed followed by the demolition of the existing power line. Power supply in NSW cannot be interrupted. There are other unidentified lines adjacent to the Transmission line on Figure 1.2 and when another map of the Mine Site Layout is inspected it can be seen that these lines indicate a soil stockpile area.

Maps could not be located in the EIS, the Amendment Report, the Submissions Report or the EIS Summary that showing the finished vegetated height of the soil stockpiles adjacent to the Transmission Line and what is the height of rehabilitated landforms?

How is it intended that the Transmission Line will be protected from mining operations, blasting and vibration, low level noise, construction traffic, acid damage and other operational hazards. As is stated in the Amended Report there is a risk of "interrupting power supplies throughout NSW". To respond by stating that there is no risk of damage is not an adequate response if no study has been undertaken.

The Amendment Report on page 10 also states there is a need for environmentally and socially sound projects to support the local economy.

The Bowdens Silver Project is neither environmentally nor socially sound. Every aspect of the environment will be harmed. This project provides no benefit to the environment whatsoever. The social fabric of Lue will be changed and harmed. There is no benefit to the way of life in Lue. The proponents have already provided an example of this by purchasing the Lue Hotel and closing it down most of the time.

3. Visibility

At the time of the construction of the Bayswater to Mt Piper Transmission Line there was a great deal of concern and discussion and debate in the district about the effect the powerline would have on the beautiful landscape at Lue and the existing land use and every attempt was made to avoid Lue and as many homes as was possible. A compromise was reached ensuring that the transmission line is not visible from Lue Village and only one tower can be seen from further west

of Lue. The transmission line currently goes through Dungeree which is the original settlement to the east of Lue and now has about 8 or 9 homes. As you know a photograph of these 60m towers does not really indicate how enormous they are and how much they dominate the landscape.

The existing transmission line crosses the Lue Rd at Dungeree and can be seen, from all land and homes in this area, heading north behind a hill and out of view. At this point it is proposed that the new transmission line will be constructed on the ridge to the west and to east of Lue. It will then be seen clearly by all the homes on the east of Lue (please advise location of the map in the Amendment Report showing homes in this area) and the homes in Dungeree will see many more of these towers than at present. The homes on Pyangle and Maloneys Rds will also see the relocated towers. Most likely 6 or more additional towers will be visible from Dungeree along the ridge.

There are many homes and thousands of acres of beautiful countryside, farmland and bushland that will have a view of the towers and powerlines. They will overwhelm the village and be visible from almost every home and property. The properties adjacent to the mine site and along the western boundary and to the north of Lue are very badly affected and while there may be no homes on this land, this land is still a place to be enjoyed by its owners and occupiers. Thisland may be built upon in the future. The nearby residences are much more than a residence and the owners enjoy a rural lifestyle spending time outside with animals, gardening, growing vegetables and doing all the other things that people who live in the bush enjoy doing.

According to Figure 1, Mine Site, on Page 4 of the Amendment Report the Transmission Line will be constructed along the western boundary. The construction of the Transmission Line will require clearing of up to 70m x 3500m of bushland or more and the cleared and bare hill will be visible from neighbouring land and the wooded skyline will be bare of trees and be replaced by 60m towers and bundles of cables that are easily seen in the sun. The Transmission Line is simply a drawing on a map, it has not been surveyed or planned or costed or been discussed in depth with Transgrid. What would the result be if Transgrid surveyed the proposed route and found that it was an unsuitable location for a transmission line?

Bowdens must supply plans and costings and construction times to the DOPE and the residents of Lue so that they are able to provide an informed opinion on the construction of the new 500kV Transmission Line and also the required 66kV Transmission Line.

Bowdens stated in the Submissions Report on page 378 “However, no exceedances of relevant criteria are predicted for any properties within Lue nor would any components of the Mine Site be visible from within Lue”.

At best this statement is wishful thinking.

Bowdens must provide accurate maps and photomontages that show the relocated Transmission Line from every direction, not just from the Lue Rd to the east of Lue. There are many properties in Lue which will be unaware of the changes to their views.

Bowdens must provide a shaded map that will accurately indicate which lands will view the new Transmission Line. Lines on a map from one point to another do not accurately describe the visual impact of these enormous towers and the cabling.

Properties as far away as Havilah will see the new towers and wires on the skyline. Bowdens must provide accurate photomontages from the south, east, west and from the north showing the new Transmission Line from various distances. Lines on a map from various residences do not accurately show the view a landowner will have from their entire property. Provide a shaded map. Landowners have the right to be properly and accurately informed in a way that is easily accessible

and easy to understand.

Bowdens must also provide accurate maps and photomontages that show the new Transmission Line from all the homes on the western side of Lue on the southern side of the Lue Rd. The photomontage in the Submission report showing the view from one property on Lue Road does not use a wide angle lens and therefore the eastern view from this home is not included. Due to the lack of information provided to the landowners of this property they will not be informed of the changes to the extraordinary panoramic views of the district from this property.

Bowdens should also provide a photomontage with both eastern and northern views from the home north of the railway line immediately west of the village. The resident of this home has supported the project but is most certainly unaware of the impact on his views. Please also provide for this resident a photomontage from his property facing west so that he can be informed of the impact of the new Maloneys Road and the new 2 lane Railway Bridge. Most maps and photomontages are hidden in the pages of Appendices, tables and figures and not easily accessible to the general public or any other reader.

Bowdens has responded to requests for additional visual assessment stating that requesting these basic studies is "unrealistic". RLA has carefully photographed each home in the village and also has carefully taken photographs and presented a photomontage from property R81 that excludes the Waste Rock Embankment, the Transmission Line, Maloneys Road and other infrastructure. Property R81 will be adversely affected by this project and to submit a report in the way RLA have is dishonest and unprofessional. These reports are relied on by many people to make decisions and to deliberately exclude properties with views and selectively include properties with little or no views is unacceptable. To state that the landowner will only have a view like this below for 9 years is insulting and disrespectful particularly when RLA has deliberately excluded vital information.

Plate 5.3 Photomontage R81 – Year 8

View of the Mine Site from Property 91

View overlooking Lue indicating its close proximity to the mine site to the right of the photograph. No visual assessments or any other assessments have been conducted on property 91.

A metalliferous mine site

4. Cost

It is noted on Page 5 of the Amendment Report that the re-aligned transmission line would be constructed during Year 3 of operations and will take 6-10 months to complete.

In the Bowdens Silver Project Environmental Impact Statement Summary Booklet on page 10 the new Transmission Line is clearly marked on the diagram showing the End of Site Establishment.

This same booklet lists the Project Components and Summary of the Project on Page 7. The new 500Kv Transmission Line is not listed as a Project Component.

And yet the Amendment Report on Page 9 states that the "500kV transmission line was a component of the Project as described in the EIS and the amendment is largely administrative as it amends only the process for seeking development consent for the works."

The Amendment Report on Page 10 states the need for environmentally and socially sound projects. They are correct but unfortunately this project is not environmentally or socially sound.

The following queries were not responded to or the response cannot be located

1. Why is the relocation of the Transmission Line not listed as a Project Component?
2. Why is the Transmission Line shown on a diagram of the components constructed at the End of Site Establishment?
3. Why is the construction of the new Transmission Line and demolition of the existing Transmission Line not included in capital costs?
4. Why is the construction of the Transmission Line not listed as a component in Appendix 5 of the Submissions Report.

The Amendment Report page 8 states …avoiding the re-alignment would provide a significant cost saving to Bowdens….

Describing the construction of 10-14 new 60m towers and the removal of 10 or more existing 60m

towers as realigning the transmission line is an understatement. The reader is given the impression that the Transmission Line can simply be moved to the new location with very little effort. The new 500kV Transmission Line with its 10-14 towers 60m high and the associated clearing and roadworks must be constructed and connected live to the existing 500kV Transmission Line before the existing Transmission Line can be removed. Without the necessary surveys, plans, costings and an accurate time line the construction of a new Transmission Line must be refused.

Bowdens made the following statement but neglected to consider the cost of the feasible engineering required to construct underground or in a different location or any other construction design that Transgrid may require. LAG suggests the Transmission Line be constructed underground.

> During consultation undertaken in preparation of the Project Feasibility Study detailed in Section 1.5.6 of the EIS, TransGrid advised Bowdens Silver in written correspondence dated 23 August 2017 that "*there is no engineering reason for the line realignment to be unfeasible and that network outages, constructability and design can all be managed*". This advice was reiterated in Section 2.1 of the *Amendment Report*.

Any project that needs to use the excuse of "the substantial economic benefits of this section of the main open cut pit including royalties to the State of NSW" is surely grasping at straws. The unbudgeted costs of constructing the project components including a new 2 lane railway bridge and the relocation of a public road, a new creek crossing which will most likely require a two lane bridge, the relocation of 10-14 60m towers in a 3.5 km section of a 500kV Transmission Line and the redesigned Tailings Dam constructed on a fault line over existing watercourses. In addition there are the important components that are not components of the project including the power supply needing to come 20kms through hostile properties, road widening and repairs to Lue Road the bond payable to Mid-Western Regional Council to cover roadworks but not the failure of the tailings dam amongst other things.

5. Construction and Dismantling Activities

The dismantling of the existing transmission line is a huge task. Dealt with in a 12 line paragraph. The existing towers are 60m high, constructed of steel and concrete with 3.5 km of cable bundles. This is a huge amount of material to remove from the site. None will be able to be reused because the new towers will be constructed and connected live before the existing towers and cable can be disconnected and removed. It is doubtful that only minor earthworks will be required as articulated semi-trailers and Franna Cranes are listed as equipment involved in the re-alignment works and removal of the redundant towers and will not be able to travel on minor access tracks. The list does not include concrete trucks that will be required to deliver the concrete needed for the footings. The ridge where the proposed new Transmission Line is to be constructed is very steep and rugged. Concrete trucks have since been added but will struggle to reach the site due to the poor access. The number of fully laden vehicles travelling through Lue to the Pyangle Road turnoff and then proceeding to the side of Bingman Hill has not been accounted for.

The following queries were not responded to or the responses cannot be located -

1. It is possible that unusable materials would be disposed of at the Mudgee Waste Management Facility.
2. Where else would the unused materials go? After these 60m towers are delivered to the Mudgee Tip then where would they go?
3. How many towers would be removed? (The map indicates 10.)
4. Is the Mudgee Waste Management Facility capable of handling 9 or 10 x 60m towers,

bundles of cable, concrete footings, and other waste.

5. Is the Lue Road capable of handling the trucks needed to transport this huge amount of waste. The equipment list states that 5 semi-trailers will be used for this job. Bowdens predicts 6 laden heavy vehicles every day would be used for this task.

6. Employment

The Amended Report states "An estimated three light vehicles would originate from the east and travel through Lue and the relocated Maloneys Road".

1. LAG requests clarification of this figure, is it accurate that during 8-10 months only 3 people from Lue, Rylstone and Kandos will be employed by Bowdens. The numbers in the Amendment Report (on Page 7) regarding employment, travel to and from the work site vary.
2. **LAG requests confirmation of the number of people to be employed at this mine site and what is the consequence to Bowdens if those stated jobs do not eventuate.**
3. What is the definition of a FIFO worker? Are the senior management, and the board of this company FIFO workers?
4. Why does the CEO of Bowdens continue to list his address at Lue when he resides in Bellevue Hill in Sydney's Eastern Suburbs.

7. Property Management and Tourism

Bowdens associates own and manage the historic Lue Hotel and adjacent buildings. The tenant has been removed from one building. These buildings are in a very dilapidated state and bookings are accepted and patrons are served while having limited working bathroom facilities.

The fences on their properties are in a poor condition and are not stock proof.

In the Submission Report Bowdens have expressed a desire to welcome tourists to their site. Are they aware that these visitors and all workers on the site would be required to wear PPE.

8. Agricultural Land Capability

The Agricultural Impact Statement was prepared by RW Corkery and has not considered any surrounding farmland whether BSAL or not. It has not considered the immediate neighbours, nor has it considered how the taking of over 1700 megalitres from the valley will affect other water users.

An updated Agricultural Impact Statement is required to indicate the impacts the project will have on surrounding agricultural operations due to increased water use.

9. Bushfire Impact

Submission Report Appendix 5 is a very good example of the approach by Bowdens in presenting information to the public.

This assessment of the Bushfire Impact Assessment of Matters of National Environmental Significance is very nicely formatted, pretty colours and nice font but is lacking in facts.
A paragraph from Appendix 5 is copied below and it is noted that the location does not include the proximity to Lue. The project is 2 kms from Lue.

" 2. Description of the project

2.1 Project overview The Project is located approximately 26 kilometres (km) east of Mudgee, New South Wales (Figure 1).
The Project comprises seven principal components:
1. A main open cut pit and two satellite open cut pits collectively covering up to approximately 52 hectares.
2. A processing plant and related infrastructure covering approximately 22 hectares.
3. A waste rock emplacement (WRE) covering approximately 77 hectares.
4. A low-grade ore stockpile covering approximately 14 hectares (9 hectares of which overlaps the WRE). 5. An oxide ore stockpile covering 8 hectares.
6. A tailings storage facility (TSF) covering approximately 117 hectares.
7. A southern barrier to provide visual and acoustic protection to properties south of the Mine Site covering approximately 32 hectares.

The above components would be supported by a range of on-site and off-site infrastructure. The on-site infrastructure comprises haul roads, water management structures, power/water reticulation, workshops, stores, compounds and offices/amenities. The off-site infrastructure comprises a relocated section of Maloneys Road (including a new railway bridge crossing and new crossing of Lawsons Creek) and a water supply pipeline for the delivery of water from the Ulan coalfields area.

The total impact area (subject land) of the Project would be approximately 495.67 hectares of which approximately 381.84 hectares is native vegetation. Of this native vegetation, 147.82 ha qualifies as EPBC listed Box gum woodland TEC (EnviroKey 2021)."

The relocation of the Transmission Line is not listed as a component of the project even though Bowdens have stated that its relocation is vital to the viability of the project.

This Bushfire Assessment fails to consider in its assessment

1. The proximity to Lue
2. The location and presence of a 500kV Transmission Line
3. The location of the new power supply line (not in EIS)
4. The amounts of explosives on site and their proximity to the items being assessed
5. The amounts of fuel on site and their proximity to the items of national significance
6. The amounts of inflammable materials on site and their proximity to the items being assessed.
7. The amounts of Sulphuric Acid on site and its extremely corrosive nature.

Please provide an updated Bushfire Assessment for the project as well as an updated list of machinery that includes vehicles required for bushfire protection and control.

10. Environment

The Amendment Report (page 17) states

"No threatened flora and fauna or listed migratory species were identified in vegetation within the proposed easement for the 500kV transmission line, despite comprehensive surveys. The outcomes of field surveys for flora and fauna for the Project are presented in Figure 6.2." Figure 6.2 can be found in the Amendment Report (page 18).

It is the responsibility of the DOPE to determine the accuracy of this statement but it should be noted that the Transmission Line Corridor is 70 metres wide and 3.5 km long. There is no cleared land identified in Figure 6.2 and the new Transmission Line route is heavily wooded and very rugged. Even when driving along Maloneys Road adjacent to the Transmission Line large numbers

of kangaroos can be seen. It is unrealistic to expect that no koalas or other threatened species are found in the easement corridor as they have been found adjacent to the Transmission Line.

It is stated by Bowdens in the Submission Report that 2 years is not long enough to amend and update information provided in the EIS, the Amendment Report and the Submission Report. Individuals opposed to this project have 14 days to provide a submission to the DPIE and in documents so full of contradictions, omissions, typographical errors, suspected fraudulent material and over 2000 pages (not including the EIS) of exaggerated, overstated or understated comments and statements, as well as 1504 supporting submissions, Bowdens are correct 2 years would not be sufficient.

This is not an environmentally sound project.

Bowdens are formally requested to provide the following queries -

Please see highlighted questions that have not been responded to.

1. reissue the Submission report with a proper analysis of unique submissions
2. Provide accurate maps of the project location showing its proximity to Lue in order to avoid a legal action from shareholders and other investors
3. Provide evidence of payments made to any employees who are also local councillors
4. Provide accurate plans, costings and construction time of the following components
    a. Transmission Line
    b. Maloneys Road construction,
    c. Maloneys Road railway overbridge construction
    d. Maloneys Road Lawsons creek crossing
    e. Tailings Dam
5. Provide evidence that all required water entitlements and licences are held by Bowdens
6. Provide a list of all sponsorships and amounts donated to each sporting group and event and organisation and person
7. Provide evidence that all land within the mine-site is owned by Bowdens
8. Provide proper responses to all submissions
9. Respond to all EPA, NRAR and DPIE submissions
10. Respond respectfully to all submissions from Aboriginal elders and others concerned about Aboriginal sites
11. Respond respectfully to all submissions from landowners and residents in the Lue area. Accusing a group or individual opposing an environmentally dangerous project that will have a great adverse effect on all land, properties and residences of providing misinformation and bullying is disrespectful and untrue. It is a very poor attempt to discredit reports and material provided by very well regarded professionals.
12. Ensure Bowdens website is up to date with an accurate map of the mine site and its location and its proximity to homes and properties in order to avoid legal action by shareholders and investors
13. Ensure fencing and other farm management tasks are performed as they are advertised on the Bowdens website
14. Correct all false or misleading statements found in the Amendment Report and the Submission Report, the EIS Summary Booklet and Media Releases.
15. Please publish a full page retraction of the Media Release published 23 July 2021 in the Mudgee Guardian

16. Provide a written apology to the person in Rylstone who felt intimidated by the Rylstone newsagent, Australia Post representative and Bowdens employee. (I'm sure the councillor in question knows who he has intimidated)
17. Please provide a high level report on the Cadia Tailings Dam failure and its effects on the people, land, water and environment around Cadia with reference to the Bowdens Tailings Storage Facility.
18. Please provide a disaster management plan should the tailings dam fail or overflow or spill with particular reference to the road that will be used should Maloneys Road be blocked with debris, how many vehicles will pass through Lue, how much contaminated dust will be released into air, how much contaminated material will be released into the surrounding land and any other relevant information for nearby and downstream residents.
19. Provide a Water Management Plan
20. Provide a Compensation Plan in the event of spill or depletion of the water table to a level below which other licence holders are able to pump

11. Koalas

Lue Action Group considers that the proponent SVL has only made the most minimal and cursory attempts to accurately record the true number of an Endangered Species (Koala) within the footprint of the proposed project and the surrounding area.
A perusal of the EIS put on public display in 2020 indicates that there were several references to Koalas, specifically conservation and management of natural vegetation that provides habitat for Koalas. (SEPP KOALA HABITAT PROTECTION 2019).
7.7 The EIS states that "Local Councils listed under Schedule 1 of the SEPP must consider the APPROVED KOALA MANAGEMENT PLAN for the land. The BAR footprint is located within the North West Slopes Koala Management Area {KMA} and currently (***in June 2020 when the EIS went on public display- our words)*** no Koala Management Plan is present for the KMA.
(reference 9a-115. 117/3)
Lue Action Group considers this to be a serious failure to properly consider the serious nature of the threat to this endangered species on several levels.

- The MWRC area has been included within an irrelevant geographical grouping called the North West Slopes. Clearly, Lue and Mudgee are geographically located within the Central Tablelands. Lue Action Group questions why an area with significant Koala populations is not even seen as important enough to be considered its own unique environment containing critical Koala habitat.
- No Koala Management Plan exists for the North West Slopes KMA.
- MWRC (as of May 2022) has still not fulfilled its obligation to develop and implement a Koala Management Plan.
- A SVL representative at a recent Bowdens CCC (during 2021) stated that "SVL is not compelled to produce a Koala Management Plan".

The 2020 EIS further stated that "consideration of the Koala SEPP is required" and that SVL research had "confirmed the presence of Koalas based on two recent records". However, the document then went on to say "In exercising any functions of the previous Koala SEPP (SEPP 44,now repealed) a Council must take into consideration, given that SEPP is of potential relevance to the Bowdens Silver Project. However, it is understood the SEPP 44 **does not apply to SSD projects (**our emphasis) under the FBA. It is unclear if the KOALA SEPP applies to SSD projects under the FBA".
Lue Action group desires clarification on these questions

- What SEPP, if any, applies to Koala Management on the Bowdens SSD?

- Is Bowdens Silver now required to develop a Koala Management Plan, given that the number of documented Koala sightings within the proposed development area has now risen to 6 with a further 3 sightings adjacent to or within SVL holdings and reported by members of the public?
  (Bowdens CCC Presentation, Aden, Mudgee. 4th May, 2022.
- Community Koala Sightings. Point 2 should also include official recognition that there have been 20 recorded, documented and in most cases, photographed Koala sightings within 20 kilometres of the proposed mine site. Several of these occurred prior to the release of the EIS but their existence is not recorded in the EIS.

Further to the above, the EIS states that "Koala has been recorded twice within the Study Area (Page 8 of 12). The species has also been previously recorded in the locality. (Vol 3_Part 9a_Bio). Two Koala records are known from the Study Area, both of which are either within or directly adjacent to the BAR footprint.
1st sighting Envirokey Field Survey Dec 2016 (8.12.2006). Additional searches were made of the immediate and wider area for both further individuals and for scats **without success (**our emphasis).
2nd Single Koala Pyangle Road 2.11.2017. This record was accepted as part of the BAR.

12. Ground and Surface Water

With the removal of the Water Supply Pipeline from Ulan to Lue there is no secure and reliable water supply for mining operations and processing. Without a secure water supply this mine is not viable and is unlikely to be successful. Presumable the EPA and DPE- Water will ensure fines for breaching the licencing rules will be a deterrent to the theft of water taking place. Most mines do not take this theft seriously, simply calling it dewatering, but it is particularly important in the Lue because landowners and license holders are reliant on groundwater. During very dry times the creek is not a reliable source of water and many farmers and graziers rely on springs and bores.

Bowdens plan to pump 10 l/sec (litres per second) from their dewatering bores but Jacobs have tested bores in and near the mine site and their findings indicate that 5.4 l/sec or 5.0 l/sec would be more accurate. (See Jacobs p 5-77) In other words there is no evidence that Bowdens bores will sustain the pumping rates required.

A spring at a neighbouring property indicating the drought conditions on the hilly country

Lawsons Creek, on a neighbouring property downstream of the mine site, in dry times

13. Telecommunications

The response below is another example of avoiding an important issue. Bowdens have not responded adequately to any of Mr Combes's queries below. I would remind the reader that the towers have been relocated only 200m to the east, and in fact are still right above Lue. In any case Bowdens have not responded to the real problem in the area of the lack of telephone service. Will the existing Optus and Telstra towers handle the additional phone traffic of 320 phone users?

It should also be noted that Mr Shelley the MWRC Councillor and Bowdens employee lives and runs his business in Rylstone. Rylstone has one of the worst telephone services in the district with little or no service at least 20% of the time. If there is limited and inadequate telephone and internet service in Rylstone what hope is there for Lue's vital telephone service.

Bowdens must respond to this important question regarding a vital service that will most likely be affected by this project and the additional telephone and internet uses who will be at Lue.

Another impact that I notice is absent is impacts on telecommunications. I could not find any studies on impacts to telecommunication signals. The towers will rise above 700m and will be right above the village of Lue. There has not been any assessment made on impacts to UHF, VHF, TV, Radio, Phone coverage etc. These communications form an integral part of Emergency Services in Lue. They are also important for normal living in Lue. Radio, TV and phone coverage is already quite poor.

Tom Combes of Lue, NSW (Submission SE-26255508)

Response

During consultation undertaken in preparation of the Project Feasibility Study detailed in Section 1.5.6 of the EIS, TransGrid advised Bowdens Silver in written correspondence dated 23 August 2017 that "*there is no engineering reason for the line realignment to be unfeasible and that network outages, constructability and design can all be managed*". This advice was reiterated in Section 2.1 of the *Amendment Report*.

Regardless, there is no evidence that the transmission towers would influence communications whether they be UHF, VHF, TV, radio or phone coverage as they are lattice structures and not solid in the same way that placing a high rise building in these locations may influence telecommunications. The towers would not be right above Lue as expected in the submission. Review of the tower locations indicates they would be largely hidden by existing vegetation and building and would be difficult to see within Lue.

14. Tailings dam failures in NSW, Orange and other places

These photographs of tailings dam failures are a reminder to Bowdens and others of the kind of environmental disaster they are knowingly being a party to. Bowdens plan to construct a tailings dam, not a coal mine tailings dam but a silver & lead mine tailings dam, that will contain acid, cyanide, arsenic, lead, zinc, and many other poisons and hazardous chemicals dangerous to humans and animals over a watercourse and a fault line just metres from Lawsons Creek. The dam will most certainly fail because Lue is in an earthquake hazard zone, like Cadia (2018) and Newcastle (1994), and there is no back up wall or back up plan. When this dam fails it will block the access road to the mine site, poison Lawsons Creek and the aquifer (remember it is constructed on a fault line), spew its sludge and muck all over the land and the dust that remains will cause asthma and other respiratory diseases in neighbouring landowners, visitors and workers.

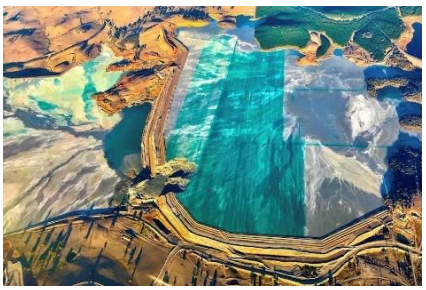
Bowdens have stated that any pollution in Lawsons Creek will be quickly diluted and therefore not cause any problems.

Will this still be the case now over 1700 megalites will be prevented from flowing into Lawsons Creek each year?

No responsible person or organisation can knowingly approve a tailings dam of this size and type in the Lawsons Creek Valley, upstream from homes and farms and Mudgee's water supply.

The Minister has a duty of care to all people who live and work in Lue and in this valley, and those who rely on the water in the valley as well as the people of Mudgee whose water supply may be poisoned.

Cadia at Orange tailings dam failure photographs below.



15. Social Impact

The comment below in response to a submission from a very concerned land owner is another example of statements made by Bowdens. Bowdens are proposing a 24 hour a day open cut mining operation less than 2 kms from Mr and Mrs Camerons beautiful property and one thing is certain…. there will be significant impacts and those impacts will not be enhancing Lue or the Cameron's property.

The SIA has demonstrated an understanding of the nature of the communities in which the Project is located and has identified potential impacts of the Project on sense of community, cohesion, character, and sense of place (refer to Section 7.4.2 of the SIA). The existing Community Investment Program would be expanded during mine development and would provide opportunities to work with local community members to identify projects which may assist in facilitating a stronger sense of community throughout the life of the Project and beyond.
The expectations of Mr Cameron and other community members are well known to Bowdens Silver through its comprehensive consultation program. However, it is anticipated that the environmental outcomes of the Project would not be as predicted by Mr Cameron and some others in the community, but more closely reflect the outcomes of technical assessment. In fact, it is considered that rather than being "disastrous", the Project will revitalise and enhance opportunities for the permanent residents of Lue and surrounding communities.

16. Community Consultation and Representation

The comment from Bowdens below refers to the fact that a MWRC councillor is employed by Bowdens. Bowdens have made this comment previously and it should be noted that there are nine councillors on the MWRC and they vote in groups. Mr Shelley, the Bowdens employee and councillor in question is in the same voting group as the Mayor, Mr Des Kennedy. One councillor out of 9, more than 10%, can make a difference particularly when councillors vote in blocs. It is extremely concerning that MWRC accepted a figure of $4.7 million in compensation for a project that will cause damage to the road network from Lue to Ilford, Gulgong, Rylstone, Kandos and all the district roads in between including the streets of Mudgee. There is no allocation for any damage to Lawsons Creek or the Mudgee borefield.

"It is to be reiterated that MWRC is not the consent authority for the Project and therefore the input of a single Councillor on assessment matters and Project outcomes is negligible. Responsibility for decisions relating to the grant of development consent for the Project rests with the Independent Planning Commission with assessment and recommendations provided by the NSW Department of Planning, Industry and Environment."

Recently Bowdens distributed a Newsletter regarding the Water Supply Amendment via Australia Post. The newsletter was received in many cases on the closing day submissions were to be submitted to the DOPE or after that day. Many residences did not receive a copy. Members of LAG were informed at the CCC meeting held in May 2022 that the newsletter was to be distributed via the Australia Post Office in Rylstone and it was the fault of the Rylstone Post Office that this newsletter was not delivered. The Australia Post licensee in Rylstone is also an employee of Bowdens. Please find a copy of the Water Supply Amendment Newsletter attached.

LAG requests that Bowdens provide a proper explanation for the reason their employee prevented a document with key information regarding the Water Supply Amendment from being delivered to individuals and businesses who may be directly affected by the Water Supply Amendment.

17. Lue Action Group Queries and Comments

The following Lue Action Queries were not responded to adequately

Failure to demonstrate a legally permissible methodology for supplying water to support its operations.

As identified in Section 5.31.2 of the *Submissions Report*, Bowdens Silver has secured water licence entitlements that account for peak groundwater take during mining operations. In addition to its basic landholder (harvestable) rights entitlement of 180.6ML, Bowdens Silver holds the following volumetric entitlements under water access licences.

• 194ML from the Sydney Basin Murray Darling Basin Groundwater Source that is managed under the Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources Order, 2020.

There is no evidence that Bowdens hold this Water Access Licence.

• 1 480ML from the Lachlan Fold Belt Murray Darling Basin Groundwater Source - (Other) Management Zone Source that is managed under the Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources Order, 2020.

There is no evidence that Bowdens hold these Water Access Licences

• 137ML from the Lawsons Creek Water Source - (Other) Management Zone that is managed under the Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Source 2012.

The 2 Water Access Licenses referred to are for Irrigation and not for the purpose Bowdens intend. In any event this irrigation water is rarely available under the conditions of the licence.

Bowdens have failed to demonstrate legally permissible methodology for supplying water to support its operations. It should also be noted that if Bowdens use the 180.6 ML under their supposed harvestable rights entitlement they will not have access to any water for their farming operation. Bowdens do not hold any approvals to take the water they claim they have entitlements for.

Comment(s)

Council requests confirmation as to the long term impacts to the Region's water supply, and impacts downstream resulting from the open cut pit lake, which will require 133ML/year to fill over 200 years, post mining.

Response

As described in Section 5.24.18 of the *Submissions Report*, all inflow volumes to the open cut pit lake post closure would be licensed in accordance with the NSW Aquifer Interference Policy and therefore, would not impact the availability of water (water supply) to the region.
It is acknowledged that groundwater and some surface water would flow to the open cut pit lake post closure. However, this is unlikely to be 133ML per year as noted by MWRC. Once a groundwater equilibrium level is established in the lake (mostly achieved 16 years after the end of mining but up to 50 years post-mining with minor fluctuations after that time), the change in flows would be negligible and not noticeable at any private water supply.

Bowdens do not hold the Water Access Licenses that they claim they have and groundwater licences rarely become available. In another example of Bowdens avoiding a question they take up the issue of 133 ML / year rather than the issue of licencing or availability of the water.

It is time Bowdens answer truthfully questions on the issue of water. They have for many years stated that their water dealings are confidential but it is now revealed that they have not and do not hold the Water Access Licences they claim they hold. It is fairly obvious that they never intended to build a pipeline from Ulan to Lue as they had not held any meaningful discussions with either coal mine or properly investigated the proposed route to Ulan.

Water has always been and will always be one of the major stumbling blocks for this ill-conceived and poorly planned project. There is simply not enough water in the Lawson Creek Valley to sustain a project such as this.

18. Road Use

The statement from Bowdens below is in response to a submission from J Bentivoglio, a very well respected person in the community.

Ms Bentivoglio's claim of "B double trucks lining the road" is exaggerated and incorrect. It is also noted that the majority of additional traffic would be light vehicles rather than trucks. Unlike bulk commodity operations such as coal mines and quarries, the ore concentrate that would be produced represents a low volume of material. During operations, it is expected that the Project would generate approximately 10 heavy vehicle (truck) movements and 16 bus movements per day on Lue Road west of Lue. Based on traffic surveys in 2017, Lue Road west of Lue currently has a total daily traffic level of 877 vehicles of which 125 are heavy vehicles (trucks). Based on these survey results, an additional 10 trucks per day is not considered a significant increase and would therefore not "remove the aesthetics of the landscape". Considering the above, Bowdens Silver considers that the Project would not substantially change the nature of the traffic environment on Lue Road and therefore the drive from Mudgee to Monivae.

It is easy to determine that Bowdens and Mrs Bentivoglio do not see eye to eye. It would be preferable, from a community consultation perspective, and as basic good manners, if Bowdens addressed the fact that there will be an increase of at least 10 trucks per day or more on an already challenged road and responded respectfully to an important tourist operator and producer of world renowned organic olive oil. Bowdens are unable to predict where or when a truck driver will stop or wait or whether or not one driver or more might like to park on the side of the road. It is clear that Bowdens have little or no respect for existing residents and businesses in the area and have no intention of modifying their own behaviour or plans to reduce the impact on others.

Significant is a word Bowdens have used on many occasions in contexts where the impacts would be only slightly less than significant. Any impact greater than no impact is more than the community should tolerate. An almost significant increase in any traffic is far more than other road users should tolerate.

All heavy vehicles including B-double trucks transporting concentrated ore to Newcastle, Port Botany, Bathurst or Port Pirie will travel through Mudgee. The poisonous ore will be contained at all times. All materials for the construction of the 500kV Transmission Line, the 66kV powerline, 2 bridges, the tailings storage facility, the processing plant and other construction at the Bowdens site will be transported through Mudgee. All materials including explosives, cyanide, arsenic and other materials required to mine and process lead, zinc and silver will be transported through Mudgee. During construction there will be up to 22 truck movements per hour.

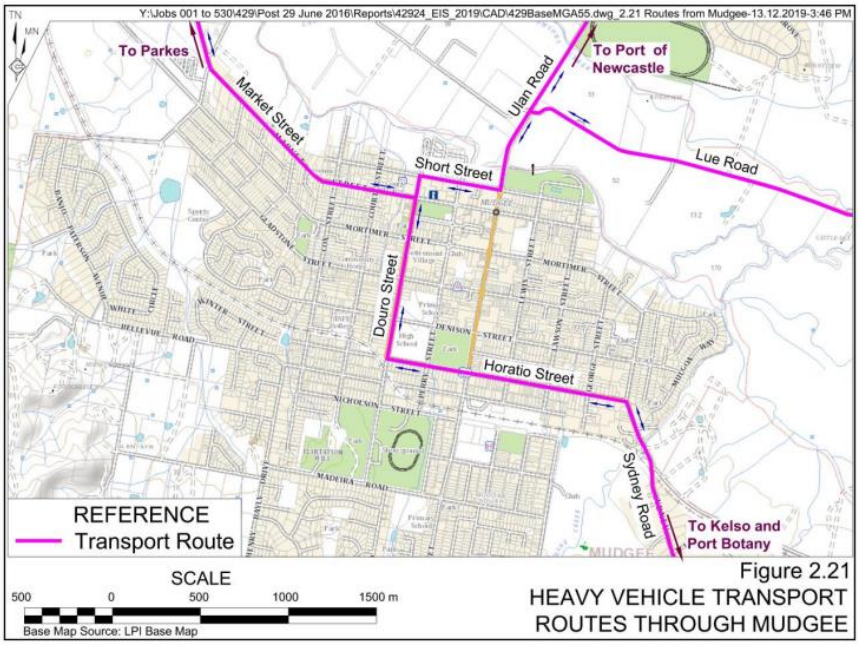


Figure 2.21
HEAVY VEHICLE TRANSPORT ROUTES THROUGH MUDGEE

19. Landowners

According to Table A6.3 there are over 50 privately owned residences in Lue, and according to Table A6.1 there are 95 landholdings surrounding Lue, a total of 145 landowners in Lue.

Please see the following figures, A1-4 and A1-5, rarely seen in material available to the public.

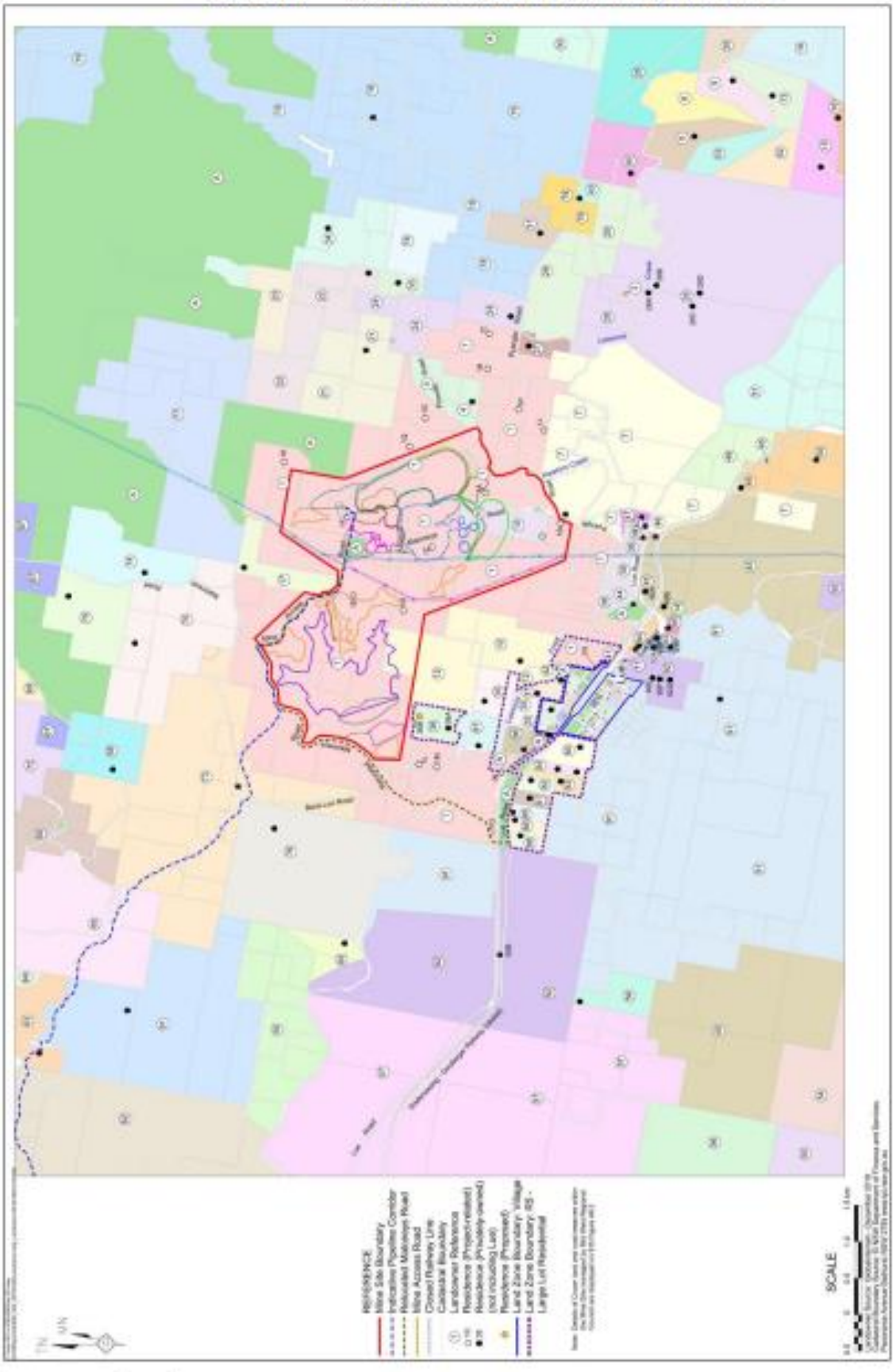
LAG respectfully requests that all these properties are assessed and considered in all assessments and reports included in the EIS and its amendments.

It should also be noted that properties outside the areas shown on these maps are also affected by this project, particularly those to the west and downstream of the mine site. Please see in the photograph below the rural views from that will be spoilt by the mine site.

LAG also respectfully requests that all submissions from landowners and residents in Lue and surrounds are responded to fully and properly. A carefully selected paragraph in a submission used as a representative comment is not always representative of all comments or queries.

Figure A1-5 Land Ownership (Lue)

Figure A1-4 Land Ownership and Surrounding Residences



20. Water Supply Amendment Submissions

The period for making a submission in response to the Water Supply Amendment closed on 7 April 2022 after being on exhibition for 14 days.

During that period 261 submissions were received, 33 supporting the project and 217 opposing the project. Of those 217 opposing submissions 24 were from Lue and 49 were local. 2 Lue residents made supporting submissions.

The table below lists the most recent 68 supporting submissions on the DPE website as it is not possible for LAG to determine which were received during the submission period. As some submissions mention the amendment it is assumed they refer to either the Transmission Line Amendment or the Water Supply Amendment and have been included on that basis.
Those submissions with an * are from known Bowdens employees or family members who are employed by Bowdens.

	Name	Address	Comment	
1	Lue Hotel	Lue	Retail, high unemployment	*
2	Name Withheld	Pyangle		
3	Name Withheld	Pyangle		
4	Name withheld	Rylstone		
5	Paul Brydon	Narromine		
6	Kiah Mallender	Mudgee		
7	Adam Rovella	Elanora		
8	Name withheld	Glen Alice		
9	Kaleb Pitt	Gulgong		
10	Name withheld	Carcalgong		
11	Mick Monro	Lue		
12	Madison Hayes	Mudgee		
13	Nic Brownhill	Cottesloe WA		
14	Andrew Todd	Claremont WA		
15	Barry Muir	East Warburton VIC		
16	Esperanza Muir	East Warburton VIC		
17	Ian Lowe	Glenvale QLD		
18	Damien Koerber	North Avoca NSW		
19	Naomi Turner	Mudgee		
20	Name withheld	Scarborough WA		
21	Name withheld	Mount Claremont WA		
22	Name withheld	Bayswater WA		
23	Name withheld	Bayswater WA		
24	Name withheld	East Victoria Park WA		
25	Name withheld	Claremont WA		
26	Name withheld	Burradoo NSW		
27	Name withheld	Middle Ridge QLD		
28	Name withheld	Rylstone		
29	Name withheld	Cremorne NSW	Existing mines 25-45 mins from Mudgee	
30	Name withheld	South Perth WA		
31	Jeong Lee	East Perth WA		
32	Name withheld	Figtree		
33	Name withheld	Figtree		
34	Name withheld	Castle Hill NSW		
35	Name withheld	Port Kembla		

36	Name withheld	Home Rule		
37	Marlene Gleeson	Kandos		
38	Name withheld	Mudgee		
39	Anna Yeates	Mudgee		*
40	Thomas Purcell	Mudgee		*
41	Name withheld	Mudgee		
42	Name withheld	Mudgee		
43	Matthew Butterworth	Grattai		
44	Simon Parmiter	Mudgee		
45	Lucy Stuart	Mudgee		
46	Anthony McClure	Lue / Bellevue Hill		*
47	Sophia Louison	Mudgee		
48	Christina Granger	Wembley WA		
49	Mathew Gouldstone	Mudgee		
50	Aaron Gleeson	Kandos		
51	Joel Leonard	Cudgegong		*
52	David Biggs	Leura NSW		*
53	Darren Holden	Fremantle NSW		
54	Liam Robinson	Lue		
56	Name withheld	Camboon		
57	Leonard Leary	Oakville NSW		
58	Peter Shelley	Rylstone		*
59	Doreen Shelley	Rylstone		*
60	Joaquim Cardoso	Yangeup WA		
61	Michelle Cardoso	Yangeup WA		
62	Name withheld	Kudla WA		
63	Name withheld	Kudla WA		
64	Name withheld	Rylstone		
65	Name withheld	Charbon		
66	Name withheld	Clandulla		
67	Name withheld	Figtree NSW		
68	Name withheld	St Ives NSW		

LAG cannot disagree with those supporting submissions from mining enthusiasts from WA and other places as our country and especially WA has received great benefits from mining, although not silver mining.

When investors purchased this project from Kingsgate in 2016 they neglected to consider the location of the silver deposit, less than 4 hours from Sydney, without adequate road infrastructure, no secure water supply and no power supply, near the Wollomi National Park and 2 kms from Lue. The investors were led to believe that Lue was declining and they could easily remove all opposition to the mine. Even though those same investors personally knew Lue residents, landowners and visitors to Lue and had inside knowledge about the district they neglected to investigate.

LAG would like to respectfully respond to all Bowdens supporters. The main themes and concerns of supporting Water Supply Amendment submissions were employment and the proposed jobs provided by the project, the environmental soundness of the mine, royalties available to the state, that silver is used manufacturing solar panels, medical equipment and other vital products.

a. Lue

According to the 2006 census the population of Lue was 815. Tables A1.4 and A1.5 found in the Landowners section of this document and in the EIS indicate the locations of homes and properties in Lue. There are 95 properties near Lue and 45 properties in Lue (not including Bowdens properties). A total of 150 landowners in an area impacted physically or visually by Bowdens operations. Not all properties are built upon but under MWRC zoning most are able to be built upon. Most summaries, newsletters and other information available to the public contain little information regarding the location of homes and properties in relation to the mine site. It is not until Page 75 of the Water Supply Amendment Report that a map can be found showing homes. Even the most ardent Bowdens supporter must surely respect other landowners and their properties.

Lue is 26 kilometres from Mudgee and Mudgee will suffer few ill-effects from this project other than increased traffic through the town and the possibility of an impact on its bore field and town water supply.

Lue is located on the Lue Road between Mudgee and Rylstone. Currently the region is experiencing a tourism boom. Visitors mainly come to Lue to experience its unspoilt beauty and to visit the popular Lue Pottery, amongst other things. The submission from the Manager of the Lue Hotel states the hotel is the only retail business in Lue. While a hotel is more usually called a hospitality business it is not the only retail business or hospitality business in Lue.
The Lue Hotel Manager makes many other claims including “unemployment is very high in the area”.

Many Lue residents no longer frequent the Lue Hotel due to the ongoing conflict with Bowdens and while the Lue Hotel used to be the “hub” of the community it was never the heart of the community, being a hotel and selling alcohol, and certainly is neither the hub nor the heart at the present time.

It is unfortunate the Lue Hotel has not reaped the rewards of the current tourism boom and puzzling given the number of visitors who come to Lue each week. The other tourism businesses in Lue are extremely busy and operating at maximum capacity. Most tourism businesses in Lue are opposed to the proposed mine due to impacts from noise, visual pollution, traffic, excessive water use and environmental as well as Aboriginal cultural concerns and its close proximity to businesses, homes and rural properties. Current activities in Lue are incompatible with mining.

b. Unemployment

LAG understands how important jobs are in the bush and particularly in Rylstone and Kandos. While Bowdens promises up to 320 jobs there is no guarantee that they will provide these jobs or where the employees will come from. Currently the region is in the midst of a tourism boom with large numbers of visitors to all the towns in the region. Unemployment is low with job vacancies in retail, tourism, aged care, agriculture and other industries. Businesses and private individuals in Lue have positions available but are unable to fill those positions.

c. Economic Benefits

In NSW the net economic benefit of the project (see paragraph 7.6.3.3 of Water Supply Amendment Report) is $44M and $146M including employment benefits. For the purposes of this analysis LAG has assumed a workforce of 200. With an employment benefit of $102M over the life of the project, 16.5 years, the employment benefit per year would be about $6.2M. Employees could expect to receive $30,909 each.
The Net Economic Benefit of $44M to NSW is calculated to be $2.7M per year.

d. Environmental Impacts

This photograph taken from a property overlooking Lue and the mine site shows the heavily wooded area to the north of the cleared farmland that will be cleared. 381 hectares of bushland and forest will be cleared resulting in impacts to native flora and fauna, including endangered Box Woodland as well as Koalas, Squirrel Gliders, Regent Honeyeater, Silky Swainsonia Pea, Small Purple Pea and Large-eared Pied Bat. Not only are these endangered and threatened species impacted but other native animals such as echidnas, lyre birds, wallabies and Eastern Grey Kangaroos are found in large numbers in the area.

Bowdens intend for the water supply for the mine site to come entirely from the site. Lawsons Creek flows from the east (right of the photo) to the west and is fed by rainfall, ground water and springs. Some farms and homes pump from the creek but most properties use a combination of bore water and rainwater as Lue does not have town water. The EIS states that groundwater has a high risk of being impacted by the project. While the Water Supply Amendment Report has reported the removal of the pipeline from Ulan to Lue from the project and thus prevented damage caused by the construction of the pipeline it means the mine site will be entirely reliant on groundwater. There will be times when there will be sufficient rainfall to fill dams and supplement groundwater but to rely on surface water in an important project such as this leaves Bowdens at risk of shutdown. All other water users at Lue and on Lawsons Creek will be impacted. Bowdens state that they have the Water Access Licences to enable them to take 1040 megalitres (million litres) of groundwater each year but local water users have found that these amounts of water are not available to be pumped. Impacts to the water supply in the area have been calculated using computer modelling but it has been found that Bowdens have used rainfall data from Mudgee and Nullo Mountain rather than Lue. Farmers in the area have rainfall records for at least a hundred years that does not match with the data Bowdens have used. The reason this is a problem is that the modelling of the impacts in Lawsons Creek will be inaccurate and understated.

Farmers and landowners downstream who use creek water for stock and domestic uses as well as irrigation are very concerned that the creek will be impacted. The report states that Lawsons Creek will decrease by 2.2% or lose 189ML per year.

The submission from Anthony McClure the CEO of Bowdens and resident of Bellevue Hill not Lue states

"We are very pleased that the latest technical updates confirm that less water will be required for our operations. The water pipeline, which was to bring water from the Ulan area, has now been removed from the application and greater water recycling onsite together with other modifications

means the project will be self-sufficient. All of our water requirements are fully licenced. Our objective of limited affects to environmental flows and not competing with agriculture for water resources continues."

Although Mr McClure is the CEO of Bowdens he may not be aware that evidence provided by landowners and water users indicates that the groundwater and surface water required for the project is most likely not available and agricultural and other users will be impacted. The EIS does not provide a Water Management Plan or any mitigating measures to prevent affects and impacts to environmental or any other flows in Lawsons Creek. While Mr McClure states the water requirements are fully licenced there is no evidence to support this claim or that the conditions of those licenses will be complied with.

LAG would like to remind Mr McClure that any member of LAG is available to discuss any and all matters including updates to the data that has been used in the EIS or any amendments to the project prior to their public exhibition. The Community Consultative Committee has not been an open or consultative forum as regards water, water licenses, water use or water supply. The minutes available on the Bowdens website show that Mr McClure failed to advise the CCC in matters regarding water, gave incorrect information to the CCC in response to questions about the water supply pipeline and intended water sources and failed to head any advice given freely by members of the CCC as regards the water supply pipeline, groundwater and surface water availability and rainfall at Lue. The Bowdens website, which Mr McClure mentions in his submission is not up to date, contains inaccurate or is missing information and makes claims that have not been fulfilled. The "community" link or tab has two photographs of the main street of Mudgee and no photographs of Lue.

The Bowdens website does not provide a copy of the EIS or the amendments but rather has Newsletters and other material that are not accurate.

Mr McClure states there are 25 local people employed while the Bowdens website states there 20 employees while only listing 8.

In response to a question from a community member of the CCC enquiring about water sources the following response has been received from Bowdens. See the link below for responses to outstanding questions from members of the CCC.

"The Lawsons Creek Valley is for the purpose of this response considered to cover the Lawsons Creek Catchment. It is important to recognise that the Project would not directly source any water from Lawsons Creek. In fact, arrangements have been made to construct a water supply pipeline to avoid the need to use water from local sources in this manner."
201120_BSPCCC-Questions-on-Notice-Register.pdf (bowdenssilver.com.au)

Mr McClure in his submission below fails to acknowledge that this project will adversely impact and area of 2850 hectares, with much of it unable to be used for farmland due to lack of water, much of it not rehabilitated being the mine pit, the Tailings Storage Facility, the Waste Rock Embankment, polluting and contaminating with Acid Mine Drainage and lead poisoning forever.

For a distance of 2 – 5 kms from the mine site groundwater users will be impacted and every water user in the Lawson Creek valley will be impacted one way or another for at least 30 kms.

Over 150 landowners will be physically and visually impacted with their health and the health of their livestock at risk, their water at risk of being contaminated and unavailable and their land polluted. Noise, water, dust, light and visual pollution, lead dust, dust from the Tailings Dam, dust from the site, dust from trucks and vehicles and not only will water be contaminated but the water

table will also be reduced and less water will be available.

This project does not offer any benefits or enhancements to the environment. This project does not offer any benefits to the social and physical wellbeing of any resident or visitor or any land in or around Lue. This lack of benefits or enhancements is guaranteed. What is not guaranteed is employment for 200 – 320 workers, royalties to the NSW Government or any other economic benefit to shareholders or anyone else or any other claims and promises made by Bowdens, SVL or anyone associated with these companies as regards economic benefits. LAG challenges the concept of an "environmentally sound silver mine", particularly when lead is being mined in a much greater percentage than silver, and lead is dangerous to health. See paragraph f. Mining. Approximately 130,000 tonnes of zinc, (57.73%) 95,000 tonnes of lead (42.19%) and 178.6 tonnes of silver (0.08%) are proposed to be mined. The lack of rehabilitation, impacts on endangered and threatened species, clearing of bushland and impacts on water are further reasons why this project is not environmentally sound.

"Anthony McClure

Support

LUE , New South Wales

Message

I am honoured to be part of the team presenting the Bowdens Silver Project for development.

Since the submission of our Environmental Impact Statement, our work has continued to enhance this State Significant development. The quality of work completed by the Bowdens Silver team along with many independent professionals has conclusively demonstrated a robust, responsible and environmentally sound silver mine."

e. Rehabilitation

Following the mine closure the site will not be fully rehabilitated. In other words it will not be returned to bushland. The following components will remain after mine closure (see EIS page 2-91)

- Waste Rock Embankment – 77 ha, 100m high and taller than surrounding hills and containing Potentially Acid Bearing Rock
- Leachate Dam
- Oxide Ore Pile – 8 ha
- Tailings Storage Facility – 117 ha with a 50 m wall, any water falling on the surface would drain off into the creek
- Mine – Pit – 53 ha will remain and filled with water unable to be used for recreation and although the water will evaporate it will refill.
- There is no plan for rehabilitation of roads or dams

Submissions from Bowdens employees including Thomas Purcell and Anna Yeates supporting the project while praising Bowdens for reducing their environmental impact must be aware of the environmental impacts of the mine site.

f. Mining

Zinc, Lead and Silver will be mined at Lue. Approximately 130,000 tonnes of zinc, 95,000 tonnes of lead and 6.3 million ounces or 178.6 tonnes of silver. Obviously this project is a lead or zinc mine rather than a silver mine. A small percentage of silver not a small percentage of lead and zinc as stated in the Scoping Report for the Water Supply Pipeline on page v "Bowdens Silver Pty Ltd (Bowdens Silver) proposes to construct and operate an open cut mine to extract and process ore containing silver and small percentages of zinc and lead." The price of silver is volatile, and

although silver is used in solar panels and some technologies, it can easily be replaced with copper which has only 5% less conductivity than silver and is significantly cheaper and more environmentally friendly to mine.

Lead is dangerous to health and particularly children's health.

The submission below from David Biggs from Leura highlights the need for mining and silver mining. This submission has failed to consider more than 150 landowners in and near Lue who will be impacted visually and physically by this mine. It also fails to consider threatened and endangered native species that will be impacted and Aboriginal Heritage impacts. While Bowdens may be acting in good faith, reports provided to them contain outdated and other data that varies considerably from the data available from Lue landowners and others. In fact the Lawson Creek flow data used is collected from the Cudgegong River in a different catchment area. Mr Biggs is quite right not mentioning solar panels in his submission because 20% of world silver production is used in solar panels. Should the price of silver rise manufacturers of solar panels will replace silver with copper which is only 5% less conductive, much cheaper, more abundant and safer to mine. The Australian Renewable Energy Agency is funding Australian solar panels that use copper instead of silver. Analysts predict the demand for silver will decline not increase in the future.

"David Biggs

Support

LEURA , New South Wales

Message

As a community member, employee and shareholder, the amendments to the project could only be viewed in a positive light.

Clearly the company is acting in good faith with interlocuters removing and adjusting visual and physical impacts, while also continuing to optimise outcomes related to water. In short removal of infrastructure has reduced the impacts under assessment. Asides from the changes proposed in the amendment the changing and uncertain geopolitical climate has highlighted that dependence on global supply chains is fraught with risk. Globally there is an accelerating shift from fossil fuels to renewables that will require additional silver production to electrify all parts of our and other societies. For example two ounces of silver are in every Tesla, of which it is proposed to produced multiple millions in the coming years and globally some 55 million ounces is currently used in electric vehicle production, not to mention that consumed in solar panels. This material should be sourced from a first world jurisdiction where corruption is minimal and proper environmental controls are enforced; not approving such projects merely shifts the responsibility from the nations and states who consume it. Surely a state and a nation wishing to persist and thrive locally or globally, should look to build a functioning society over the short and long term. In the longer term Mudgee and the surrounding LGA undoubtably draw great benefit from coal mining and there looms the end of an industry, as more efficient methods of energy production and reducing agents in steel production are utilised. Regional economic drivers such as mining unless approved by the state today will be absent tomorrow."

The Amendments

The Transmission Line Amendment (164 pages) was required because Transgrid who owns the infrastructure requested that the removal and rebuilding of the transmission line be included in the EIS thus giving the community and others the opportunity to make comments.

The Water Supply Amendment (132 pages plus 10 Appendixes) was required because Bowdens removed the external water supply from the project due to licencing, environmental, planning and construction concerns and the water supply pipeline was one of three main components of this project.

The amendments should be read in conjunction with the EIS (764 pages plus 434 pages of Appendices)

Mr Leary's submission below is an example of a supporting submission. Mr Leary comments on protecting the environment, employment opportunities and NSW revenue. Mr Leary failed to mention the impacts on landowners in Lue, impacts on the environment or the lack of rehabilitation of the site.

"Leonard Leary

Support

OAKVILLE , New South Wales

Message

I have read and understand the amendments proposed. It is my opinion the amendments that have been proposed by Bowden Silver Pty Limited are positive and constructive in their content in further protecting the land and the environment.This action displays an attitude by Borden's Silver Pty.Limited in seriously endeavouring to work with the NSW government and the Mudgee district in both protecting the land whilst creating badly needed employment in the district which in turn will stimulate and benefit the economy in both the Mudgee area and as revenue provider for NSW. I support these proposals as a plan that if approved will be meritorious for all concerned."

Conclusion

This project presents so many problems that a thoughtful, respectful and truthful response by Bowdens or RW Corkery to any submission from a member of the community who has made a genuine query or comment is challenging. Many important concerns are not responded to.

Bowdens have failed to respond to or consider the costs or wider impacts associated with the Transgrid statement "*there is no engineering reason for the line realignment to be unfeasible and that network outages, constructability and design can all be managed*".

Bowdens have failed to respond to submissions concerned about the lack of a secure water source for this mining and processing project.

Bowdens have failed to respond to submissions concerned about the visual impacts both local and farranging.

Bowdens have failed to respond to submissions concerned about and the incompatibility of mining with existing landuse.

Bowdens have failed to respond to concerns about the provision of power to the project, the location of the powerline, engineering feasibility and the ability to access existing powerlines.

Supporting submissions have failed to provide evidence to substantiate their support of the project. Employment is the most common reason for supporting the project but there is no guarantee that these jobs will be provided, the salaries and wages predicted for those jobs are low and there is no penalty for not providing the promised jobs.

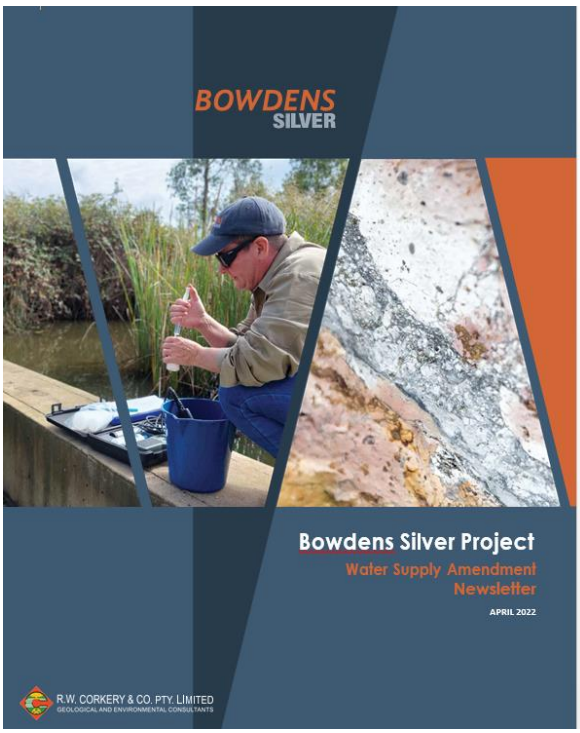
Bowdens have failed to adequately respond to concerns regarding the mitigation of impacts on health, the environment, threatened and endangered species, other water users, road users, visual, light and noise pollution, as a result of Acid Mine Drainage, climate change other businesses and land uses and existing infrastructure. Bowdens have not proven they have a social licence to undertake this project nor is this project in the public interest.

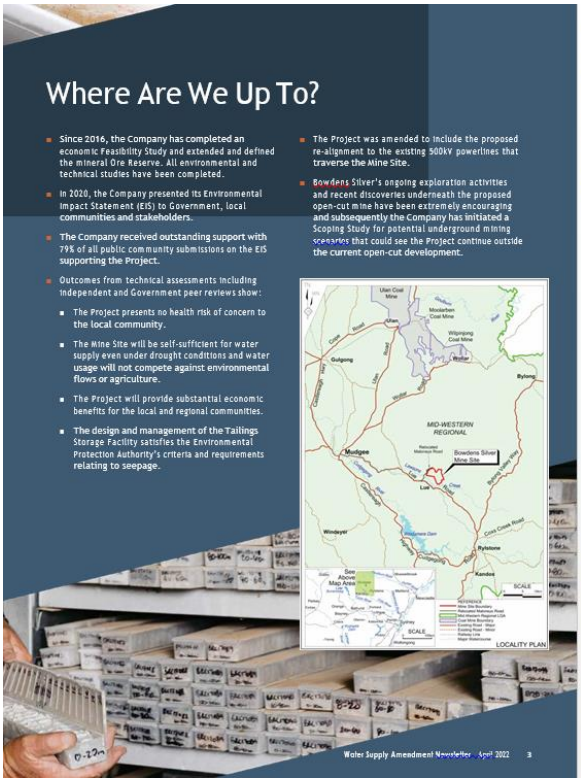
The Department of Planning and Environment is reminded that the economic benefit as outlined in the EPI - Economic Assessment is small and the number of jobs to be expected from this project is minimal with no guarantee nor any penalties for the lack of provision of those jobs. There will most likely be few jobs for unemployed people and in many cases some existing jobs won't exist in the future.

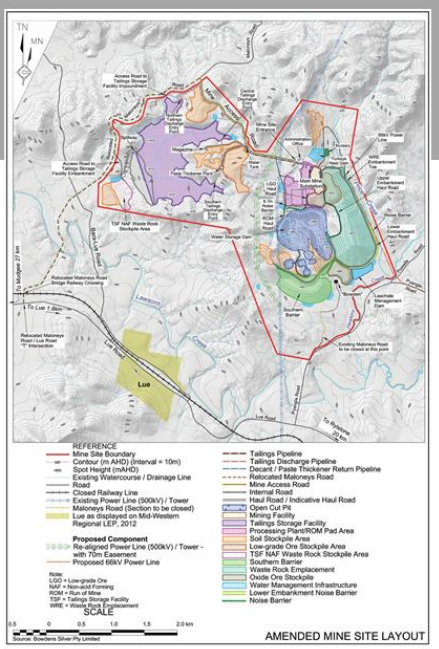
The Department of Planning and Environment has no alternative other than to recommend the refusal of the Bowdens Silver Project. With no road infrastructure, no secure water supply and no power supply this project cannot be successful.

Lue Action Group
www.lueactiongroup.org

Bowdens Water Supply Amendment Newsletter dated April 2022 (8 pages)







Voluntary Planning Agreement with Mid-Western Regional Council

The Bowdens Silver Project has reached another significant milestone with the signing of a Voluntary Planning Agreement with Mid-Western Regional Council (MWRC).

The Voluntary Planning Agreement allows for Bowdens Silver to make contributions over the duration of its proposed 16.5 year mining operations including:

- $3.0 million in contributions towards community infrastructure to support the region.
- $1.7 million in road maintenance contributions to be applied towards the maintenance of Lue Road and ancillary roads.

Total contributions to MWRC would exceed $4.7 million over the duration of mining operations.

These contributions represent only one component of Bowdens Silver's commitment as a major participant in the Mid-Western region and the local community. In particular, Bowdens Silver will continue to expand its investment in local communities through its ongoing Community Investment Program. This program provides support and funding for a range of community-led initiatives in Lue, Rylstone, Kandos and surrounding areas within the Mid-Western region.

Brad Cam, General Manager, MWRC and Anthony McClure, Managing Director, Bowdens Silver at the signing of the VPA

Next Steps

Following public exhibition of the Water Supply Amendment, Bowdens Silver will review and provide responses to public and Government agency submissions received that relate to the integrated water management and supply strategy.

A Submissions Report will be provided to the NSW Department of Planning and Environment who will complete its assessment of the Project which will then be referred to the IPC for Project determination.

Bowdens Silver is committed to continuing to share information on the Project throughout this process and encourages interested community members to get in touch with us directly or seek information on the company website **www.bowdenssilver.com.au**

500kV Powerline Realignment

After assessing community comments, we have amended the Project to include a realignment of the existing 500kV power transmission line that traverses the Mine Site. Following a public exhibition period, a new alignment has been determined including:

- Moving the realignment of the 500kV powerlines eastwards closer to the Mine Site.
- Improving visual amenity outcomes for landowners to the west and southwest of the Mine Site by locating it at a greater distance and in some cases behind ridgelines.
- Reduces the number of towers that would need to be relocated and/or constructed.

What Is Silver Used For?

Silver is a precious metal which historically was recognised as a store of wealth for its value and aesthetic appeal and was used in jewellery, tableware and figurines. Today, silver is a highly-valued industrial metal due to it being the best electrical conductor of all metals. Some of silver's most exciting current and future uses include:

- Extensive use in solar panels for the production of renewable electricity.
- Critical componentry in everyday items such as mobile phones, TVs and most other electrical appliances.
- As a key element in the expanding electric vehicle (EV) industry - more silver is used in an EV compared to a regular combustion engine vehicle.
- It has a wide range of uses within the medical field including bacteria control, water purification and more recently in COVID-19 Rapid Antigen Testing kits.
- Wide ranging applications in high-tech fields such as computing, nano technologies, aviation, aerospace and many others.

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Review of Bowden's Response to Groundwater Questions:

Bowdens' March 2022 Amendment Report

Version: 4.0

Release Date: 04 July 2022

Prepared By: Craig Flavel, Senior Hydrogeologist

TABLE OF CONTENTS

GLOSSARY

Abbreviation	Term	Description
AIP	Aquifer Interference Policy framework	A regulatory approvals framework
MDB	Murray Darling Basin	
TSF	Tailings Storage Facility	Location for potentially acid forming material extracted during mining that may leach hazardous chemicals into the water table
WAL	Water Access Licence	A permit to take water from a specified water source
WRE	Waste Rock Emplacement	Location for potentially acid forming material extracted during mining that may leach hazardous chemicals into the water table

1 Introduction

Lue Station Pty Ltd engaged Field Development Planning (FDP) to review groundwater related matters in the (second) Bowden's Silver Amendment Report dated March 2022.

Field Development Planning (FDP) is an organisation that interprets and communicates technical groundwater-related matters. FDP staff have reviewed issues with the information presented to support proposals for a mine near Lue since 2018. Two key matters have been raised:

1. If and how information provided up until 2021 met the multi-agency SEARs requirements (FDP, Aug 2021)

2. Questions from local people relating to groundwater (40 Questions)

While some information is provided on the first matter in this report (Appendix Table 5), Lue Station Pty Ltd requested FDP to consider the 40 Questions. The intended audience should have a basic understanding of groundwater and the proposed operation.

1.1 Overview of previous work

People living near the proposed development, including the Lue Action Group (LAG) have considered suggestions by several companies over the past decade to construct an open-cut lead-silver mine within two kilometres of the Lue village school. Most recently, work undertaken by 19 subconsultants in 2020 under head consultants R.W. Corkery & Co. for Bowdens Silver has been updated (R.W. Corkery & Co., March 2022).

Significant changes related to groundwater since the previous amendment include:

- Retraction of a water supply from the Ulan Coalfields and a proposed reliance on local surface and groundwater supplies to meet all project demands
- Introduction of the Environmental Planning and Assessment Regulations (2021)
- Additional groundwater modelling work, which includes the proposed tailings storage facility (TSF).

Within this context, the specific objectives of this project are to:

1. Provide an overview of previous work
2. Summarise the questions previously raised for response as part of the Submissions process
3. Consider whether Bowdens' March 2022 reports have provided sufficient information to determine that adequate water will be available to meet the requirements of the proposed mine and associated infrastructure.
4. Noting that the project now proposes to use local rather than external water resources, review any initial questions about the local impact to water resources

As per previous work, a review of groundwater modelling is outside the project scope. As a locally supported project, this high level review is constrained by budget.

2 Key matters in previous work

Key matters within work presented by R.W. Corkery & Co. for Bowdens Silver (Table 1) include:

- 57% of waste rock is potentially acid forming (PAF). Waste rock to ore ratio 1.6:1. Data on the potential for acid mine drainage within the proposal is sparse.
- Acid leachate from waste rock emplacement (WRE) is designed to flow to a Leachate Dam located north of Lue
- Acid leachate from the tailings storage facility (TSF) is located to the west above a Lawsons Creek tributary.
- Water features including springs, Hawkins Creek and Lawsons Creek (that passes through Lue village and Mudgee) are hydraulically connected to water harvested for or draining from the proposed mine site.
- The aquifer is unconfined and groundwater is within highly heterogenous fractured rock. This means that:
    - Predictions of groundwater movement are highly uncertain without significant baseline monitoring data. No groundwater data has been gathered between the edge of the proposed site and Lue village bores.
    - The proposed TSF lies on mapped faults. One fault trends southeast through Lawsons Creek.
- Groundwater quality data in the 2020 EIS was misreported / misrepresented as non-potable.
- Bowdens identified 106 groundwater bores within 10 km of the site, however, impacts on unregistered bores have not been considered either in the initial or revised EIS.

2.1 Status of groundwater documents

The status of documents relevant to groundwater are shown in Table 1.

Table 1: Documents reviewed and key changes

2022 Report Document	2021 Report Document	Related 2020 Document	Key Changes from previous work
Water Supply Amendment report (R.W. Corkery & Co., March 2022) & Appendix 1 – Updated Project Description (R.W. Corkery & Co., March 2022c)	Amendment Report	EIS	Inclusion of powerline diversion and change in water supply, noting no new groundwater impacts to the EIS (2020)
Appendix 2 - Updated Summary of Environmental Management and Monitoring Measures	Appendix 2	EIS Volume 5	Inclusion of Measure 18 – Seepage Management, one page
Appendix 4 – Groundwater (R. W. Corkery & Co., 2022d)	Appendix 3 – Groundwater (Jacobs, 2021)	EIS Volume 2 Section 5	Additional modelling and consideration of local water sourcing
	Appendix 7 – Health Risk (EnRiskS, 2021)	EIS Volume 3 Part 7	No change
	Appendix 8 – TSF Liner and Seepage Monitoring (ATC Williams, 2021)	EIS Volume 5 Part 16A	No change

The following 2020 documents have not been amended in response to the agencies' recommendations:

- Volume 2 Part 6 Surface Water Assessment Annexures – May 2020
- Volume 4 Part 10 Aquatic Ecology May 2020
- Volume 5 Part 16 B Preliminary Design – WRE, Oxide Ore
- Volume 5 Part 16 C Closure Cover Design – May 2020

2.2 Key groundwater changes in the 2021-22 proposal

An "integrated water management and supply strategy" is presented to manage the loss of the Ulan Coalfield water pipeline which involves:

- Increase in water storage of 65 ML to 130 ML
- Six "harvestable rights" dams within the Mine Site boundary

- Increased utilisation of groundwater bores. Groundwater bores must be located away from the open cut pit area (R. W. Corkery & Co., 2022d, pp. 5-117). Specification of the location of these productive areas would enable extended aquifer pumping tests to consider groundwater impacts. Jacobs notes that additional investigation is required to confirm a sufficient water supply exists. This sentiment is echoed in other reports (DPE Water, 2022).

Bowdens asserts that they are not moving 'Water Licences up or downstream' (CCC Meeting 14, May 2022, p. 24). FDP notes that Bowdens must still prove that water extraction is acceptable to other significant water users in the proposed location. As development consent grants Bowdens the right to take the water, the EIS must contain all information for this decision to be made. Some referral agencies may not be aware that a reduction of baseflow in surrounding creeks is likely under the integrated water management and supply strategy.

Bowdens must also demonstrate to the regulator's satisfaction how they will protect surface and groundwater from acid mine drainage during and after the proposed 16 year project is decommissioned.

Access to water and water contamination are the two key matters of concern within the proposal.

2.2.1 Access to water

Over 1,000 ML/a of groundwater is expected to be harvested in Year 4. Figure 1 indicates that groundwater yields are not expected to change as open cut pit inflow rates change.

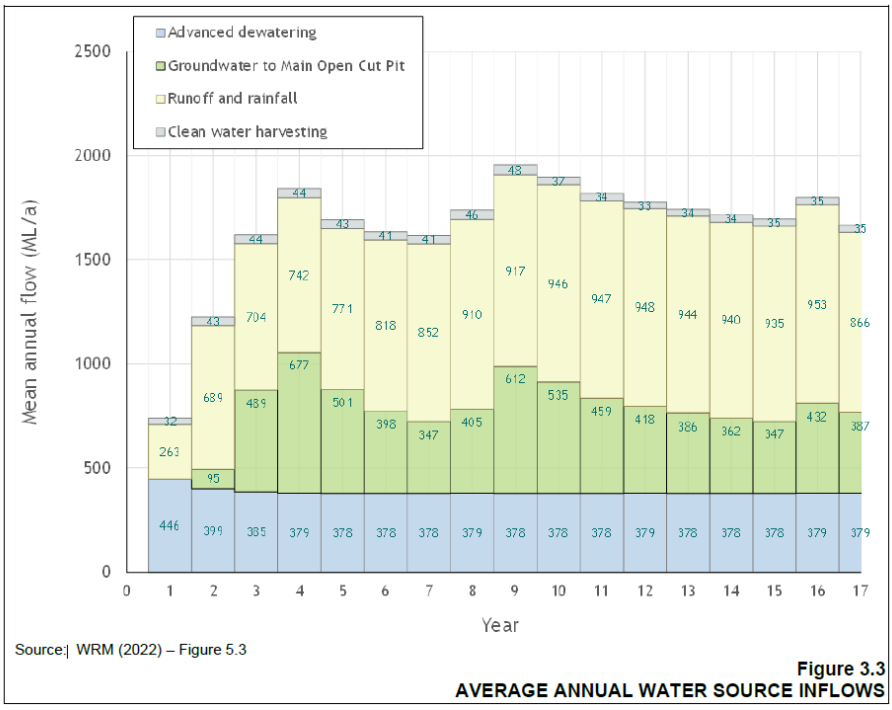

Figure 1: Water source inflows (R. W. Corkery & Co., March 2022b, p. 20)

If no hydraulic barrier is modelled between the production bores and the pit, this implies capture and drainage of groundwater recharge over a large area such as the Cudgegong catchment - Figure 3 – or upstream in the Lawsons Creek Catchment. This water would otherwise report to other groundwater users. An updated water model balance (Table 2) provides useful data on where water enters and leaves the groundwater model (bounded by the red polygon in Figure 3). Production from “well” cells in the model is 1,816 ML/a and more work is required to determine how much is from bores within the site water balance.

Table 2: Groundwater model water balance (R. W. Corkery & Co., 2022d)

Table 16
Water Balance for Transient Calibrated Model

Component (Cell Package)	Inflow (m^3/day)	Outflow (m^3/day)
Storage	18,389	32,111
Well (WEL)	0	4,975
River (RIV)	2,881	24,693
Drain (DRN)	0	74,363
Recharge (RCH)	212,132	0
Evapotranspiration (EVT)	0	97,260
Total	233,402	233,402

There is a risk that the impact of the integrated water management and supply strategy matters has not been effectively communicated amongst the 19 subconsultants. Only some of the reports have been updated in 2022

Volume 3 Part 9A – Biodiversity Assessment was updated in March 2022, however, EnviroKey were not advised that proposed disturbances might extend beyond previously surveyed areas due to the increased groundwater extraction proposed. In other reports, a permanent reduction in streamflows around the site due to reduction of rainfall run-off and a reduction in baseflow from groundwater is predicted (R.W. Corkery & Co., March 2022c, pp. ES-24). The disturbance is thus beyond the Study Area EnviroKey has been directed to consider (Figure 2).

An effective risk assessment follows an activity-pathway-likelihood-consequence process. The pathway linking activities to consequences is clearly defined, aligned to the activity and clearly communicated to share understanding and demonstrate acceptable risks.

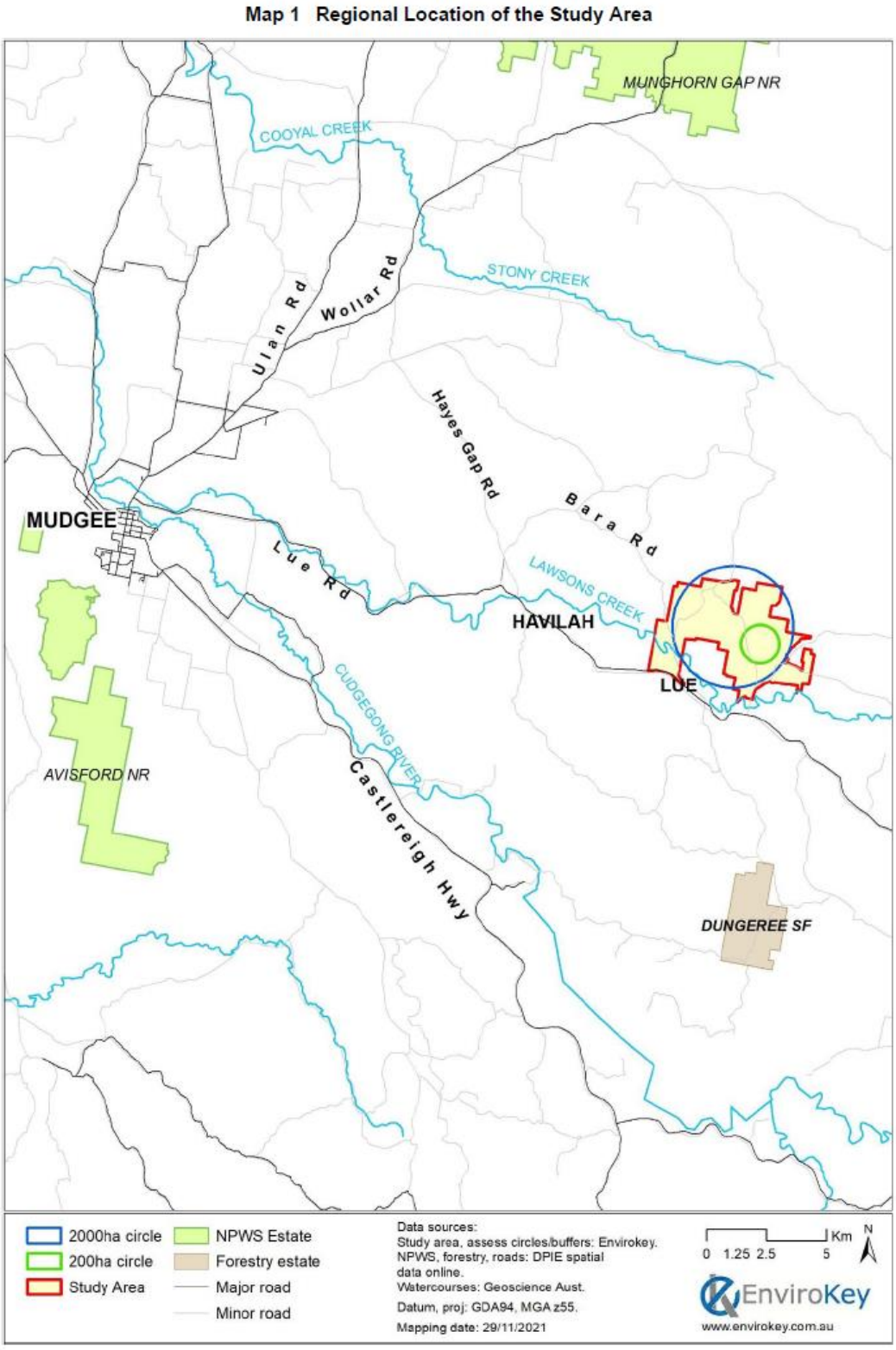

Figure 2: Biodiversity Study Area - does not extend to Lawsons Creek south of the site in R.W. Corkery & Co. 2022 Appendix 5 (EnviroKey) March 2022.

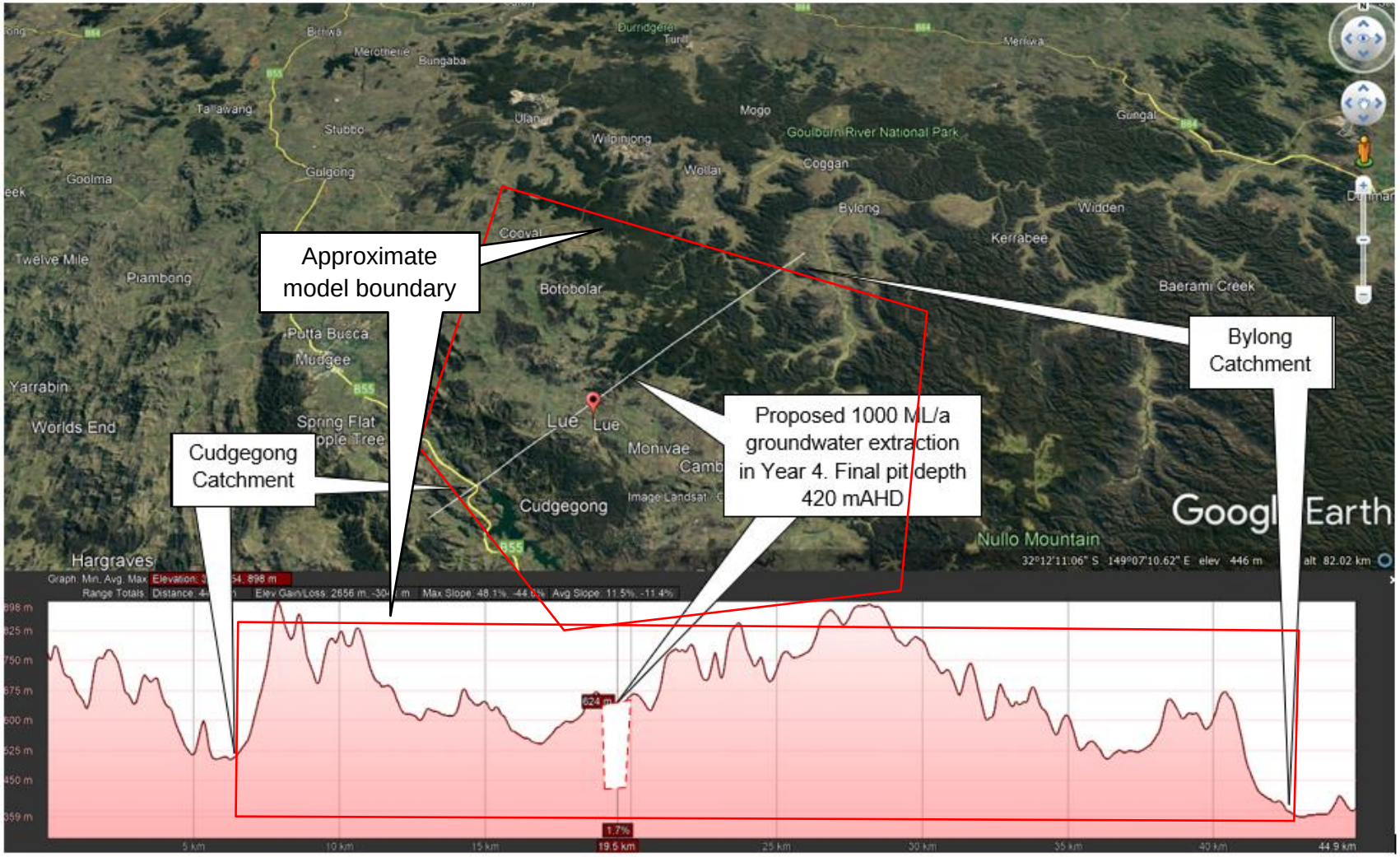

Figure 3: SW-NE Cross Section Source: GoogleEarth 2022

2.2.2 Water contamination

The concentration of contaminants and groundwater flows inform where contamination may occur over time. The Bowdens Regional Groundwater Flow Model (RGFM) assumes no-flow boundaries occur outside the mine site and does not simulate surface water processes. The validity of these assumptions was not verified by Jacobs (Dec-2021) before they were used. The RGFM was regarded as a fit-for-purpose Class 2 model (excluding contamination impacts). Once the model objective is clearly stated, a Class 2 or 3 model may be suitable for high-risk modelling of the tailings storage facility over a fault in a fractured rock environment. As no formal risk assessment has been undertaken, the risk profile of the proposed development is not clear.

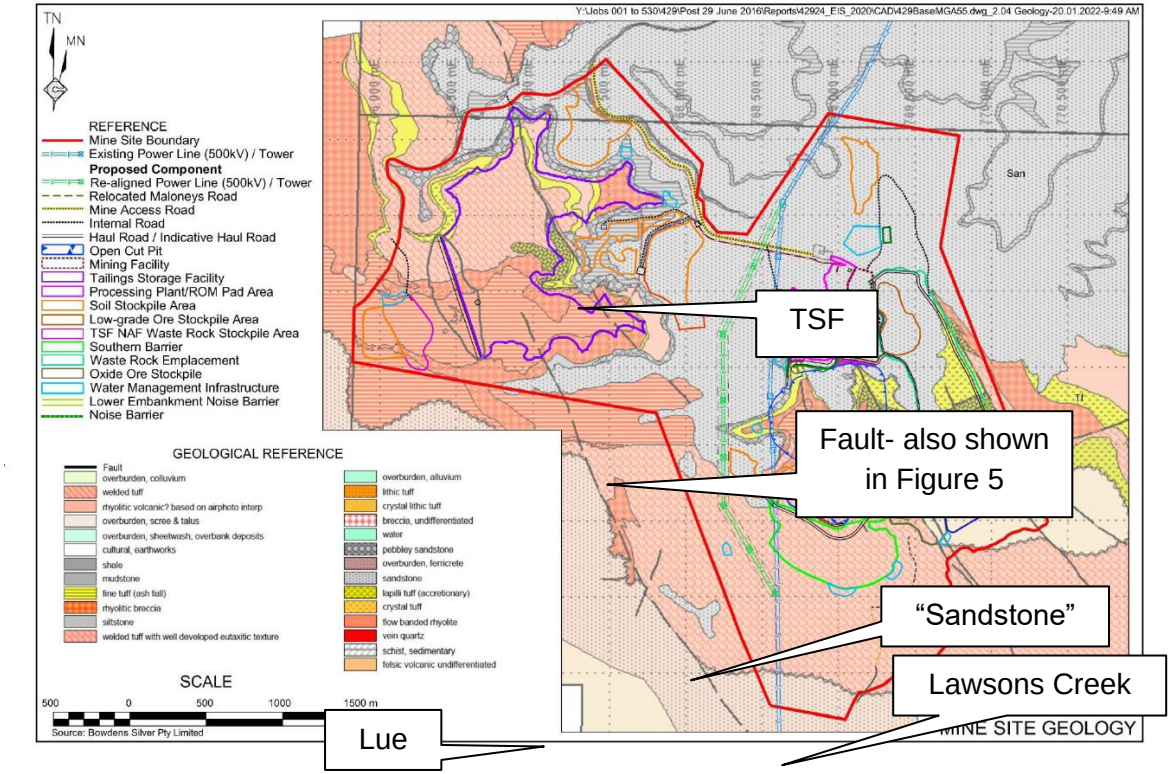

Figure 4: Site Geology, adapted from (R.W. Corkery & Co., March 2022c, pp. 2-10)

The lack of bores to inform (hydro)geological interpretation outside the site reduces confidence in the model outputs. The following figures show recent amendments to the groundwater model and compares these to the data that is presently available to inform these interpretations.

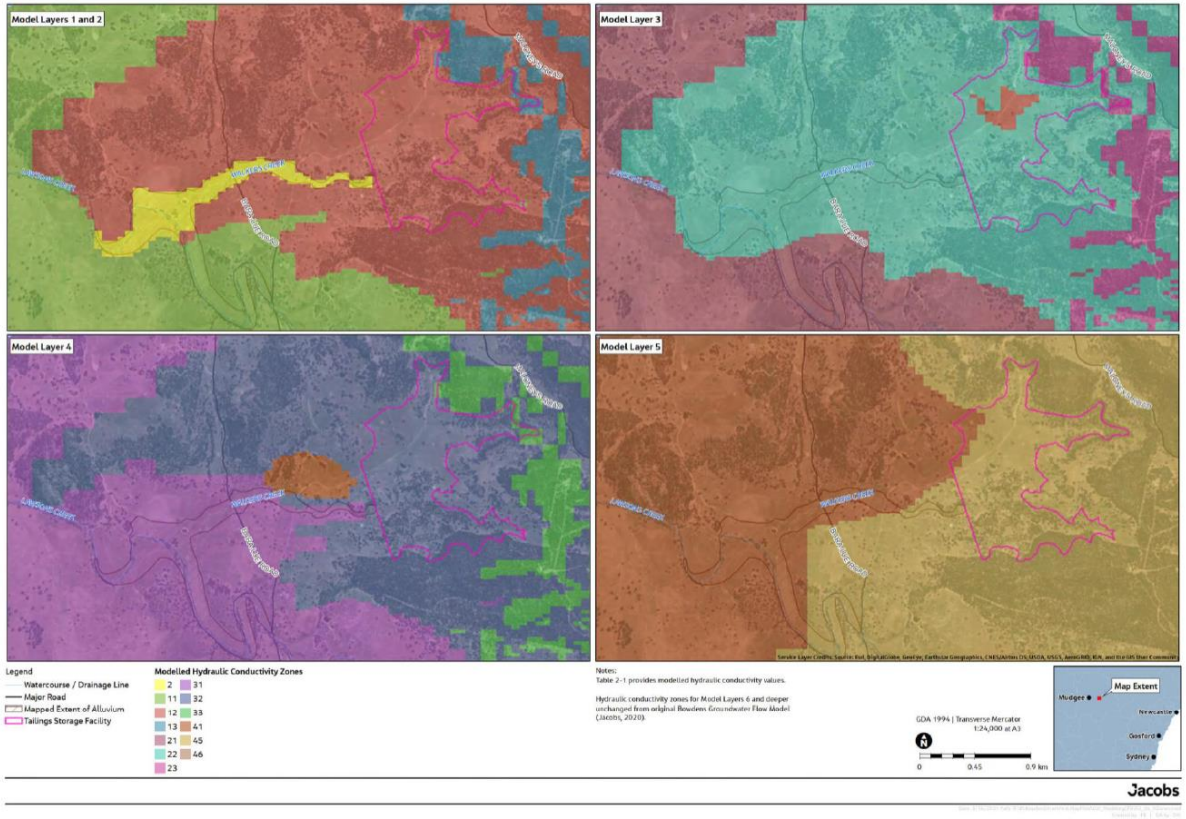

Figure 6 Modelled Hydraulic Conductivity Zones

Figure 11 Surface Geology

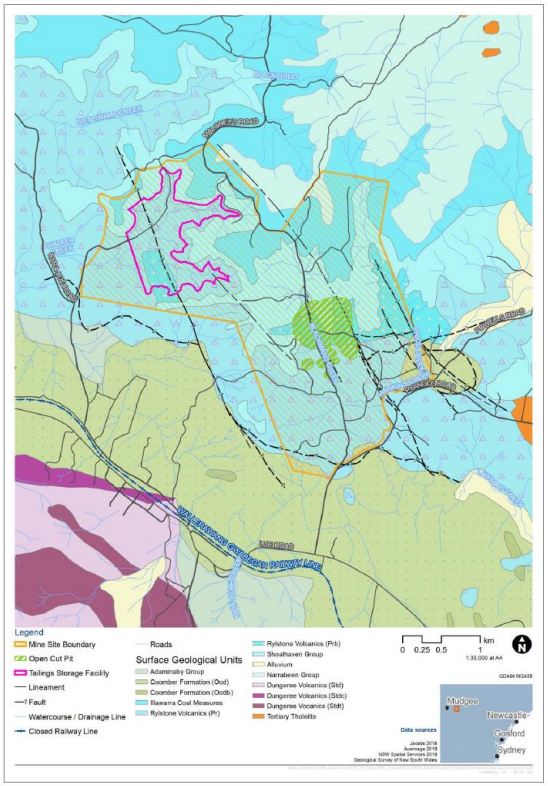

Figure 5: Changes in hydraulic conductivity (R. W. Corkery & Co., 2022d, pp. 5-400) and surface geology (R. W. Corkery & Co., 2022d, pp. 5-56). Codes for modelled hydraulic units are shown on page 5-398. The modelled hydraulic conductivity of the alluvium is truncated by Zone 31 (higher hydraulic conductivity based on Bowdens' regional groundwater flow model). Any aquifer pumping test data undertaken has not been provided to support the interpreted hydraulic conductivity/zone boundaries.

Figure 6 shows the modelled thickness of the upper two layers, but does not provide any guidance regarding the assumptions (e.g. geological logs) supporting this hydrogeological interpretation. Figure 7 and Figure 8 show the impact of the altered hydrogeology on modelled groundwater drawdown impacts; acid leachate is modelled to report to the pit in the outputs provided, not the creeks.

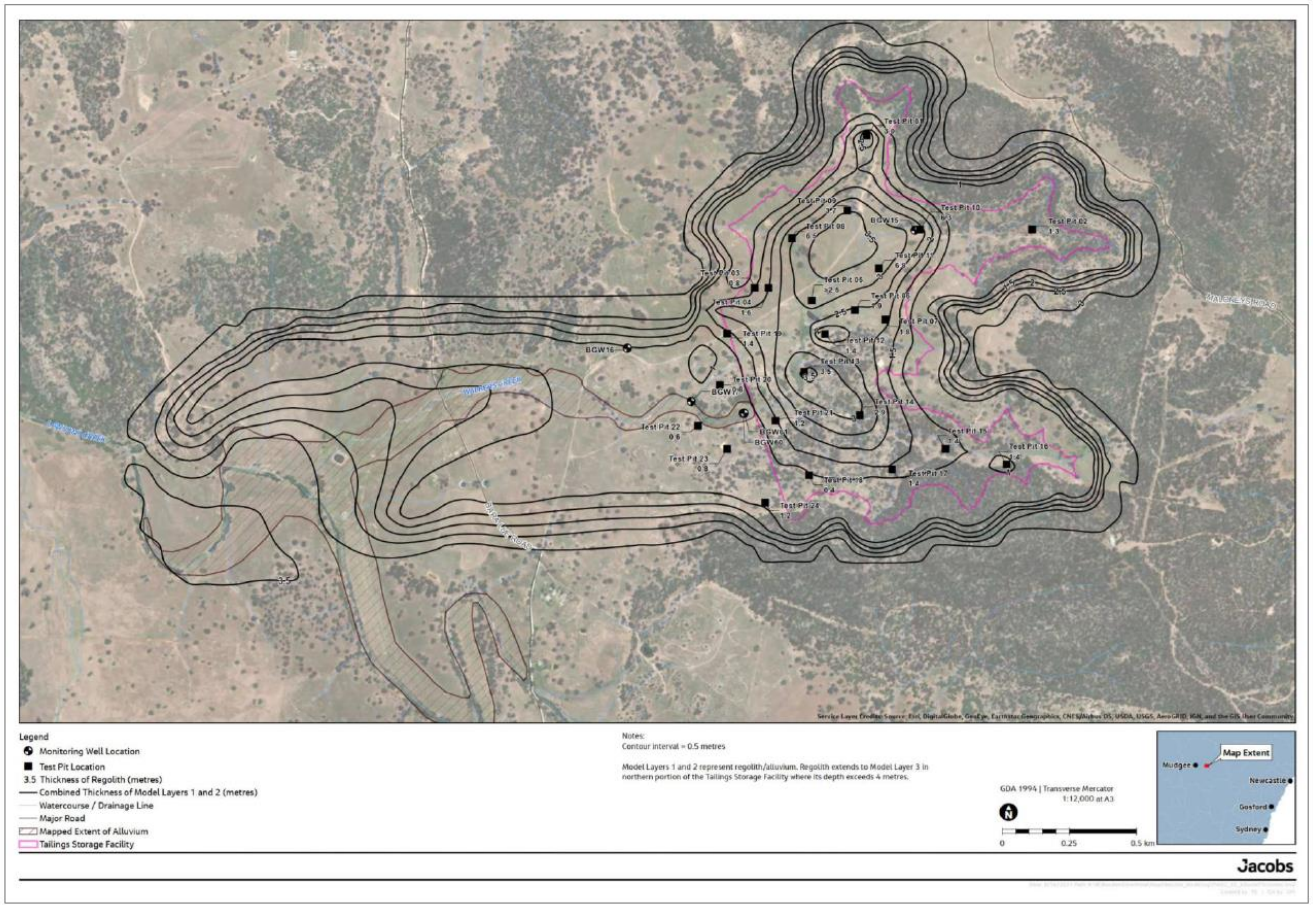

Figure 5 Combined Thickness of Model Layers 1 and 2

Figure 6: Modelled thickness of combined Layers 1 and 2 (R. W. Corkery & Co., 2022d, pp. 5-397)

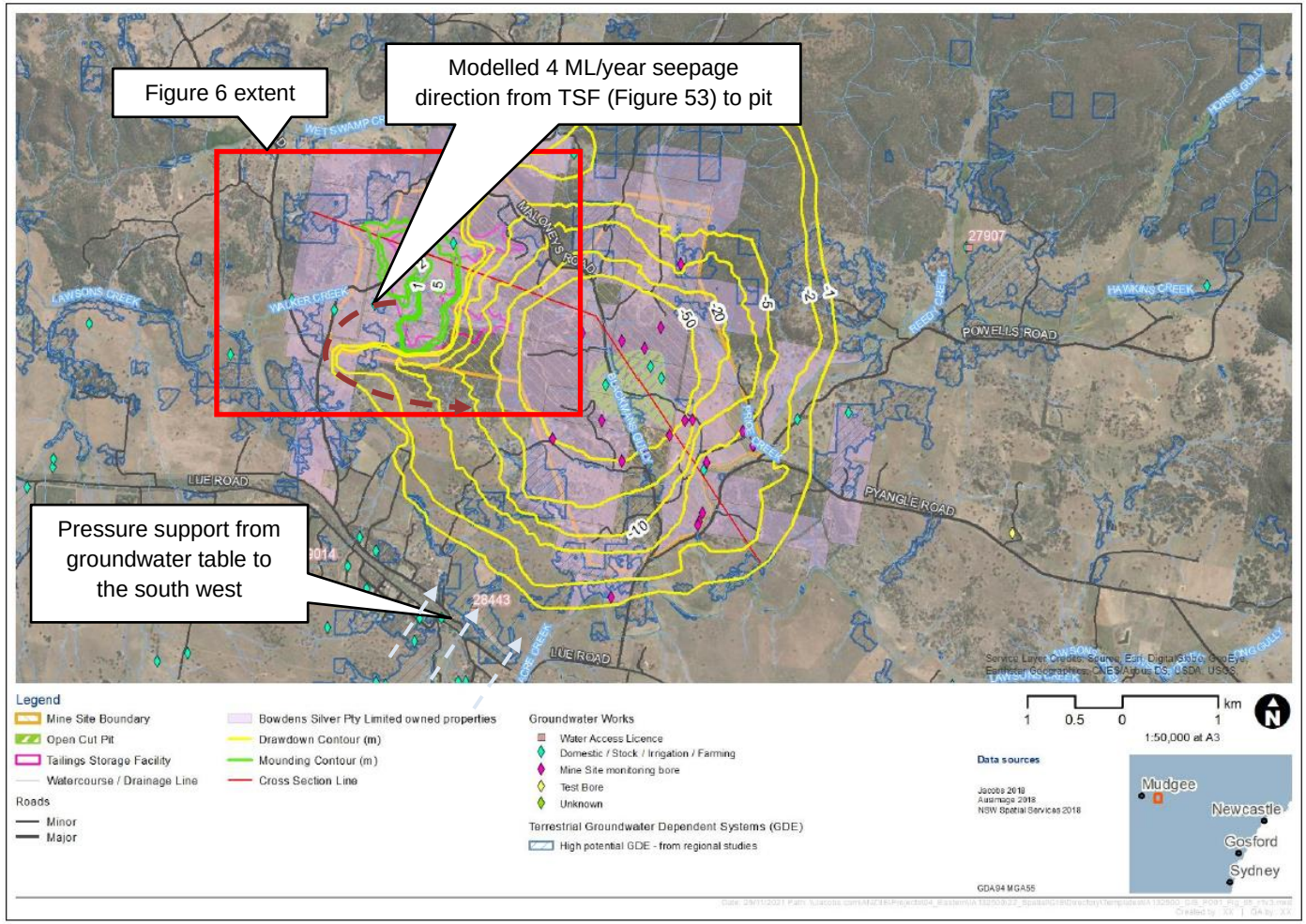

Figure 7: <u>2022</u> Year 9 modelled drawdown, influenced by zone/layer distribution, modified from (R. W. Corkery & Co., 2022d, pp. 5-127), showing hydraulic communication between the TSF and the pit, indicating leakage / pressure support from the TSF reporting to the pit as well as groundwater pressure support from the south west. NB. Figure 53 appears to mislabel Option 1 and Option 2 with BGM.

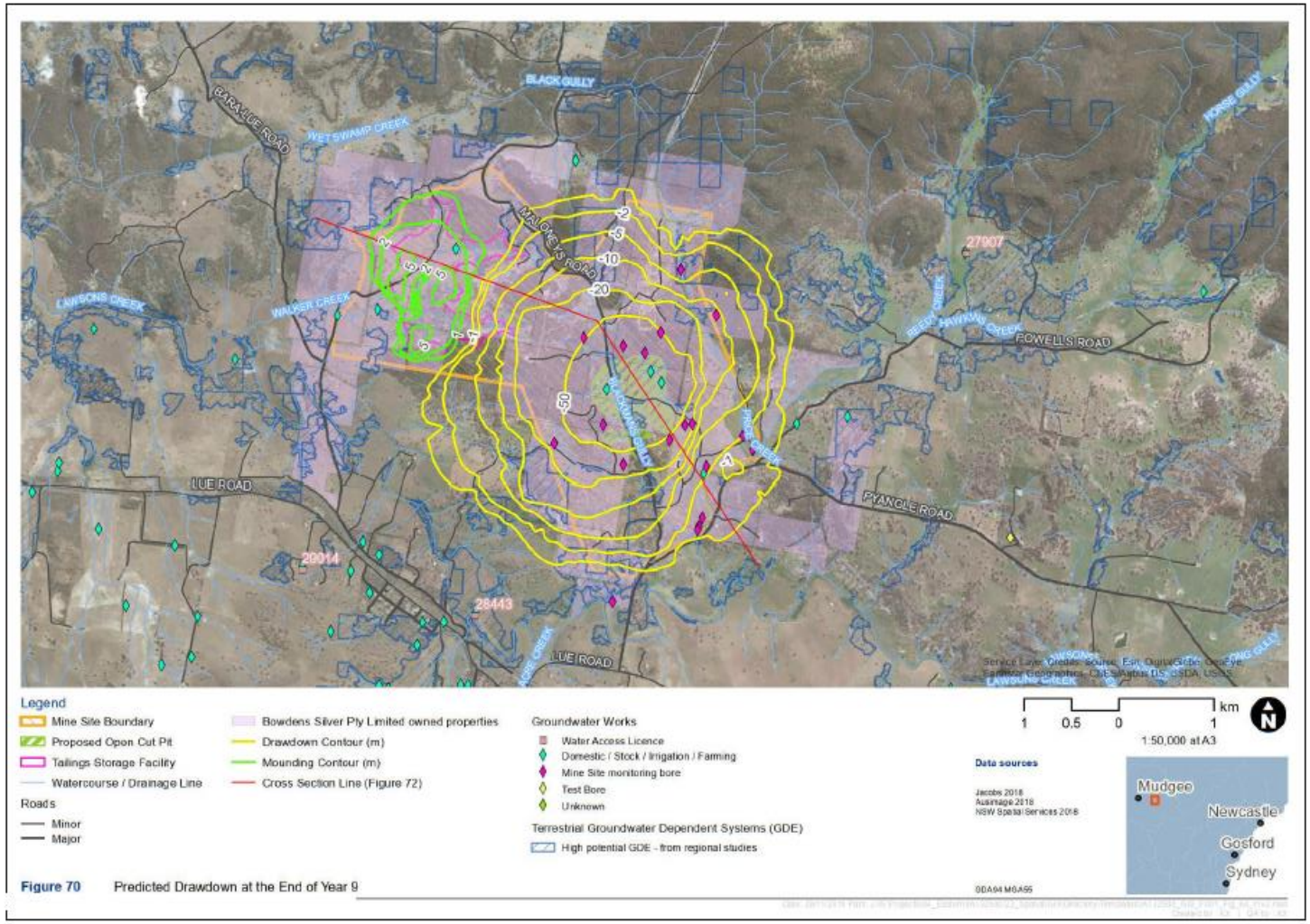

Figure 8: 2020 Year 9 modelled drawdown (R. W. Corkery & Co., 2020, pp. 5-169)

3 Summary of 19 questions raised 27 July 2020

The Lue Action Group (LAG) raised 40 matters of concern after comparing the SEARS to the EIS and supporting documentation. Funds were available for 19 questions to be pursued. These are attached to one of three of LAG's Objection submissions to the proposed development on (NSW Government, 2022) with additional detail beyond the summary extracted for this report. The other 21 questions are listed in Appendix Table 4.

FDP considers the 19 questions raised in 2020 in light of the information provided in 2022 in Table 3.

Table 3: Responses to 19 Questions

Query	Query Summary	2022 Update?	Comment
4.1. Rights of Groundwater Users	The potable water quality sustaining two listed flora, five listed aquatic fauna, two licensed allocations and 15 Stock and Domestic bore users within the Lue Village appears to be at risk	Availability of freshwater in the alluvial groundwater is confirmed (p5-98). 70% of water strikes occur shallower than 60 m within the site, however, drilling >600 m for water is planned.	Extended aquifer pump testing and modelling of acidic leachate would inform the application.
4.2. Risks to licenced bores	No formal risk assessment (with standard risk assessment framework) has been presented.	No	
4.3. Dependence of species on groundwater	No substantive evidence has been provided to conclude that the significant species will not be permanently affected.	Stygofauna are mentioned, however, the rigour applied to identifying unique species is unclear. Figure 32 (and Figure 37 / Table 22) show fresher water in the springs, implying local rainfall recharge, however, long term water levels and associated endemic species dependence is not provided.	Independent studies on significant species and their relationship to the springs, aquifer and creeks would inform the application.
4.4. Impact on Box Gum Woodland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland is listed as critically endangered. The EIS does not clearly explain how groundwater drawdown from the proposed Project will impact these protected woodlands outside the mine site	EnviroKey (2022) noted that there would be a significant impact on Box-Gum Woodland and that a Biodiversity Management Plan (BMP) is required to mitigate impacts (R.W. Corkery & Co., March 2022). In Section 6, such a plan might include seed collection and weeding (EnviroKey, March 2022).	If implemented, would seed collection and weeding is sufficient to protect a Critically Endangered species?
4.5. Risks to significant species in springs & watercourses	Protected Murray Cod, Silver Perch, Southern Purple Spotted Gudgeon, Trout Cod, Murray Crayfish and Eel Tailed Catfish may exist within the area, as well as species within springs (modified or not). The locations and risks to these protected species should be clearly shown and evaluated in the EIS	95th percentile aquatic ecosystem ANZG values are presented for selected analytes (pH impact not modelled).	
4.6. Relationship between alluvium, fractured rock	There is sparse information on the relationship between hydraulic changes in the fractured rock aquifer and the alluvial aquifers connected to Lawsons Creek/Lue village	Alluvium may be, or may not be, highly productive in the model (R. W. Corkery & Co., 2022d, pp. 5-38). The nature of fractures varies widely.	Extended aquifer pump testing and logging of bores between the site and Lue would inform the application.
4.7. Monitoring wells between Lue and Mine	Investigation wells enable an understanding of the geology between activities and neighbouring beneficial users of groundwater. No investigation bores have been drilled between the site and the Lue Village.	Some monitoring bores planned ‘downgradient of the WRE and TSF’ (R. W. Corkery & Co., 2022d, pp. 5-149), however, no locations, quantities, controls or triggers are set.	Extended aquifer pump testing and logging of bores between the site and Lue would inform the application.
4.8. Paired wells	There are no paired monitoring wells within 1.5 km of Lawson’s Creek near Lue village so the degree of impact on riverine ecosystems and shallow bore users is poorly defined.	No	
4.9. TSF leachate	The native groundwater flow direction from the TSF is misreported; existing groundwater contouring is not well explained; evidence of leachate migrating from the TSF is presented, however, the fate of leachate if it reaches the water table has not been demonstrated.	TSF advection and dispersion modelling conducted, however, the acidic dissolution of minerals, the change in pH at the creeks and release of heavy metals has not been modelled, reviewed or presented (R. W. Corkery & Co., 2022d, p. Table 26).	
4.10. Groundwater flow direction	The baseline groundwater flow direction is not well understood. This raises a concern regarding the prediction of impacts from groundwater contamination during and after mining.	Figure 40 (conceptual E-W model) provided, however, no model linking proposed site with Lue. This may be due to a lack of hydrogeological information in that area. WRM adjusted evaporation rates to make the terminal pit void a sink (increasing permanent groundwater take).	A N-S hydrogeological conceptual model may show flow from the south west (beneath Lue) travelling to the proposed site in Year 9. Seasonal changes to groundwater flow are not presented. Improved evaporation data would clarify whether the final pit void might be a sink or leak*.

4.11. TSF leakage risk	Treatment of contaminants in the TSF is not presented in the EIS. The TSF is planned to be constructed on a fault. 1.6 ML/day of TSF leakage is planned without considering the fault movement risk. The planned monitoring places few controls on compliance with the design and there is no contingency plan to remediate leakage. No peer review of contamination risks has been presented.	Total TSF leakage planned at 11 kL/d (4 ML/year) with 3% of this (0.1 ML/year) reporting to a single area of Lawsons Creek[1]. Some additional modelling has been done with two figures on sensitivity analysis, however, work is unreviewed.	
4.12. WRE and Leachate Dam	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.	Some monitoring bores planned 'downgradient of the WRE and TSF' (R. W. Corkery & Co., 2022d, pp. 5-149), however, no locations, quantities, controls or triggers are set.	
4.13. Cyanide containment	Different assumptions regarding volume of cyanide used and whether leakage will occur raise concerns about the projects stated ability to contain cyanide	No	
4.14. Link between TSF and Groundwater Assessment	The groundwater assessment (Jacobs 2020) considers groundwater availability around the site. No peer review has been conducted on groundwater contamination risks.	Leakage considered, however, changes to the MODFLOW model which redirects TSF flow to the proposed pit require review e.g. assumed dispersivity, soil partitioning coefficient, grid changes etc.	
4.15. Hydrogeology around TSF	The geology and hydrogeology around the TSF lacks detail.	Figure 37 / Table 22 show highly variable groundwater quality, implying highly variable groundwater movement and aquifer compartmentalisation. Uniform permeabilities assumed in the model that ignore pumping test data (R. W. Corkery & Co., 2022d, pp. 5-347). The impact of including a new 0.1 - 0.45 m thick clay layer across the entire model is unclear (R. W. Corkery & Co., 2022d, pp. 5-394). Cumulative rainfall is used as a proxy for 'pumping at BGW108' (R. W. Corkery & Co., 2022d, p. 436).	Extended aquifer testing would inform hydraulic conductivity assumptions in key areas. Updating last review of model calibration (2017) and reviewing the TSF modelling would provide confidence in the findings.
4.16. Monitoring - trigger - WMP	A Water Management Strategy and details of a Trigger Action Response Plan are required in the SEARs. Impacts to significant water resources and threatened species must be minimised to the greatest extent practicable. There is no inference of where new monitoring wells will be drilled, nor which locations will be used to monitor what during and post mining. Identifying the dependence of groundwater users, including ecosystems, on the native groundwater system would enable an effective monitoring plan, including trigger levels against analytes or water levels (availability), to be determined.	Some monitoring bores planned 'downgradient of the WRE and TSF' (R. W. Corkery & Co., 2022d, pp. 5-149), however, no locations, quantities, controls or triggers are set.	
4.17. Review against SEARs	See Appendix Table 5		
4.18. General question responses[2]	In general, the EIS does not clearly identify the locations of groundwater users at risk, hence plans to monitor and control risks are premature and vague. The development of a robust Water Management Strategy under a best practice risk management framework should be undertaken before any regulatory approval to enable consideration of a proposal to mine near Lue.	Improved map of two licenced users.	Information on how long the 'outflow' of 1,151 ML/a of water in tailings voids will remain in place during compaction would be helpful.

[1] Bituminous liner TSF Design Option 1, Figure 53 (assumed mislabel) Figure 18, and Figure 16 for planned volumes reaching Lawsons Creek at certain locations (R. W. Corkery & Co., 2022d)

[2] Further questions, such as "Section 4.7.5.5 (R. W. Corkery & Co. Pty. Limited, 2020, pp. 4-161) quotes long term evaporation from the pit lake of 309 ML/a and groundwater inflow of 102 ML/year, yet the Aquifer Interference Assessment submission (Q11 of Jacobs (2020) p 5-197) anticipates a long term take of 200 ML/a." can be found in the 19 Questions submitted on the DPE Planning Portal by the Lue Action Group.

4 Review of initial questions considering change of proposed water source

The initial proposal involved taking water from the Ulan Coalfields. As such, feedback did not consider the possibility of sourcing the required water locally. Local water is used by the environment, providing habitat for listed species, as well as bore users.

FDP considered several of the initial questions raised by stakeholders that are published on the NSW Planning Portal. FDP concludes that the matters relating to water in these submissions cannot be separated from the change in proposed water source because of the significant modification of the site water balance. For example, general feedback relevant to local water sourcing include matters raised by the Gallanggabang Aboriginal Corporation (July 2020) intrinsically linked to the site water balance:

- Impact on local endemic flora and fauna
- Drop in groundwater levels for bore users
- Tailings, waste rock and ore leachate contaminating the aquifers

Information regarding the local groundwater response is uncertain with or without external supplies. The impact of seasonal changes to groundwater level (and associated groundwater flow changes) is not presented and the uncertainty in the fractured rock hydrogeology is not shown using a full range of possible outcomes. The 2014 extended aquifer pumping test on BGW10 and BGW108 highlighted the influence of no-flow boundaries/lineaments within 100 m. Groundwater levels did not fully recover after 10 days. Pumping tests over 30 days and dewatering test pits would better reflect the sustainable yield of bores and better inform the hydraulic conductivity and storage of the dual porosity model and inform the new 'horizontal flow barriers / HFBs' used in the model (Figure 5) (R. W. Corkery & Co., 2022d, pp. 5-408).

Deep rooted vegetation, local creek ecosystems and springs depend on shallow groundwater (R. W. Corkery & Co., 2022d, pp. 5-122). The cumulative rainfall distribution analysis contains significant uncertainties. The impact of draining the tight matrix porosity is unclear without extended aquifer pumping test information at locations away from the planned pit.

5 Summary

FDPs high level review, that has been constrained by budget, indicates that changes to selected sections of the proposal does not provide confidence that groundwater related risks would be acceptably managed. The majority of the Recommendations provided by EPA and DPIE/NRAR appear to be unresolved. Linking the TSF to the regional model provides some much needed detail, however, the unreviewed modifications to the model raise further questions both during and post mining. Without gathering hydrogeological data, the information in the proposal to source water locally raises more questions than answers.

R. W. Corkery & Co. state that the impacts to groundwater due to the altered water supply are within the bounds of the impacts assessed. There is no formal activity risk assessment for this statement to be verified. Extended aquifer pumping tests at the locations earmarked

for highly productive bores beyond the inconclusive 2014 results from BGW10 and BGW108 would better determine whether proposed water extraction is sustainable. Extended aquifer pumping tests between the site and the alluvial creek environment would also better quantify the predicted drop in creek water levels seasonally, validate the assumption of uniform hydraulic units in the groundwater model and 'HFBs'.

The presence of significant species and their reliance on site water resources remains unclear, especially within springs. A key matter is that the objective of the numerical groundwater simulation model reviewed by Dr Noel Merrick in 2019 was not to explicitly consider contamination of local springs or dependent ecosystem health. Updated objectives and an independent review of the updated model against the Australian Groundwater Modelling Guidelines would provide confidence in the findings. Information available to populate hydrogeological facies and leachate action (acidic dissolution, not just solute transport), would help verify the information in the application.

The water mass balance, including rainfall recharge/evapotranspiration losses remains a key uncertainty. Neither secure rights to the maximum required water supply from Groundwater Sources at the proposed site, nor alternatives to the possible Ulan Coalfields water supply, have been obtained.

Long term evapo-salinisation at the site and seasonal site releases could be better represented to enable a Determination to be made. Amendments considering the Recommendations for seepage management from the TSF appear to concern plans that would be developed should a positive Determination be received. FDP suggests that development of a robust Water Management Strategy, Risk Assessment and Monitoring Program would enable the public and regulators while facilitating investment planning for Bowdens.

References

ANCOLD. (2019). *Guidelines on tailings dams - planning, design, construction, operation and closure - Revision 1.* Hobart: The Australian National Committee on Large Dams Incorporated.

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Appendix

The 21 additional questions (from 2020) are provided in Table 4.

Table 4: Questions

#	Question (not pursued due to lack of budget)
1	Analyse cause of groundwater drawdown reported at the site in 2013-2017
2	Discuss uncertainties around the impacts to specific listed aquatic GDEs (Murray Cod, Murray Crayfish etc.)
3	Consider the available data and the validity of the assumption of unlimited recharge around creeks in the model and drawdown boundary (Corkery 4-121)
4	Review proposed monitoring of evaporation rates from pit lake/ 'groundwater sink' considering seasonal and inter-seasonal groundwater level changes (and impact to 95th percentile aquatic GDE protection)
5	Review conclusion that springs are 'rainfall fed sub-flow and therefore are not groundwater dependent' (Corkery 2020, 4-125) and consider absence of discussion regarding spring-dependent species
6	Review core logs and bore completion depths to check whether 'deep' groundwater levels are representative of local or subregional levels
7	Seek references/understanding for unqualified conclusions drawn in the EIS such as (Corkery 2020, 4-195): 'no adverse impacts upon water quality are anticipated'
8	Discuss that the proposed pit lake will increase salinity by evapo-concentration and consider whether this will alter the beneficial use of the aquifer over time
9	Consider the lack of discussion of how acid forming material will be neutralised after 100 years and whether p3, s.17 of the SEARs requests a rehabilitation plan under the Act (1997).
10	Noting that background water quality indicators are higher than in other areas, better understand the proposed trigger values for aquatic species and terrestrial fauna.
11	EnviroKey 2020 9a-153 note that vegetation is not likely to be a GDE. A risk assessment could be prepared to highlight likelihoods and consequences to understand and communicate acceptable risks.
12	Consider creek drainage during low-flow/no-flow (p. 4-256) and drainage of regional alluvium through channels.

13	Analyse the likelihood of obtaining groundwater access rights.
14	Consider the uncertainty around the ‘maximum drawdown’ values in Lawson and Hawkins Creeks and provenance of hydraulic properties applied
15	Raise questions evident from the interpreted cross sections presented
16	Check evaporation calculation range and mine water balance
17	Highlight/query missing details in the abandonment plan (including economic and rehabilitation plan), including the continued creation and migration of sulfuric acid leachate from the site via groundwater. Consider the impact of acid on grout curtains and dissolution of fracture/fault infill material (representative elementary volume permeability).
18	Review the hydraulic parameters for rock units; especially the alluvium.
19	Review the site water balance and the Jacobs quotation from Corkery 2020 (4-126) that ‘any potential water quality impacts are not expected beyond 40 m from the Mine Site boundary’ that is not found in Jacobs 2020.
20	Investigate winter evaporation rates, how this relates to the presentation of the final pit void as an unchanging groundwater sink and confirm that leakage will not travel to Lawson’s Creek.
21	Consider if any effective (groundwater) monitoring plan has been provided, including Corkery 2020 (4-196)

Table 5: Reproduced from FDP (2021) - Excerpt quotes from SEARs and recommendations for amendments

Excerpt Quotes from SEARs	Recommendation
A description of the existing environment likely to be affected by the development, using sufficient baseline data;	More baseline data is required to identify and protect significant groundwater receptors. Groundwater contamination is predicted, however, there are few controls on contamination spreading 40 m from the site boundary as prescribed under the Aquifer Interference Policy.
A description of mitigations	Mitigations for potential problems such as TSF or leachate dam leakage are not provided.
Whether these are best practice and represent a full range of measures	Best practice and full range of methods not discussed – examples from Cloudbreak, Renison Bell and Bruckunga's treatment of contaminants should be considered.
Whether they will be effective / key performance indicators	More definitive and robust key performance indicators would instil confidence in the planned management.
Contingency plans for residual risks / monitoring and reporting on environmental performance	A risk framework, including maximal and residual risk assessments should be included within the EIS; before mining starts. Defining community management values and goals needs to be done well in advance. Contingency plans to remediate impacts when the assessment is incorrect should be prepared and ready for approval.
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;	The 2019 ANCOLD dam management guidelines, as well as groundwater management around dams should be implemented. The definition of groundwater dependent ecosystem (GDE) should be updated throughout the EIS.
A summary of commitments	More definitive and robust key performance indicators would instil confidence in the planned management.
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.	Significant species, especially fauna in springs and water courses, should be surveyed and identified. More confidence that contamination will not breach the 40 m distance from the site boundary is sought.
Part 3: impacts to significant water resources or threatened species are	The impacts to five listed aquatic fauna and two listed terrestrial fauna (outside the mine footprint) should be identified and minimised

minimised to the greatest extent practicable	to the greatest extent practicable. The same applies for the potable water quality available to the people of Lue village.
Assessment of Lawsons Creek and Price Creek	The groundwater analysis should consider the relationship of groundwater, including leakage from the leachate management dam, the TSF and pit lake after 130 years, with each creek separately. The value of Lawsons Creek should be better assessed.
Assessment of likely impacts to aquifers; detailed site water balance, management of excess water and reliability	Stating that the majority of 'outflow' is stored in tailings in the *average* mine water balance should be clarified. The reliability of HDPE and clay liners for the designed operation (~500 years) should be discussed and the likely impacts to aquifers should be more accurately presented.
DRG, Attachment 2A requires rehabilitation methods including	
e) monitoring for rehabilitation	A more detailed and comprehensive monitoring plan is recommended.
i) details of triggering intervention	Quantitative details triggering intervention should be included prior to any regulatory approvals.
k) details of post-rehabilitation management	Details of post-rehabilitation management should be provided prior to any regulatory approvals later.
l)i) assessment of rehabilitation techniques against objectives	Objectives should be clearly stated and assessment indicators agreed prior to any regulatory approvals.
l) ii) assessment of potential acid mine drainage	An assessment of the impact of acid mine drainage seeping from the TSF and pit lake (once full) should be included. The influence of faults should be considered.
l) iii) processes to identify and management geochemical risks throughout mine life	Any proposed treatment should be mentioned and the processes to identify (and remediate) geochemical risks should be included.
m) iii) groundwater assessment for final water level in any tailing storage facility void	The final water level is predicted to stabilise 130 years after mining. Site groundwater contour maps, including maps around the TSF and pit lake, should be included for assessment.
o) consideration of controls	The monitoring network should be improved and detailed. Triggers for action should be agreed with the community now and approved.
DRE/DPE requires a Water Management Strategy that considers:	

the existing surface and groundwater qualities	The existing groundwater quality should be accurately reported around the Lue Village.
a robust baseline	The baseline of ecological receptors and native groundwater flow paths should be made robust.
a description of how groundwater and aquatic ecosystems will be monitored, Trigger Action Response Plan and trend identification	The locations of significant ecosystems should be identified to enable maximal and residual risk assessments and development of a monitoring plan along with triggers and planned remediations that will be effective.