

## Minutes

<b>Meeting:</b>	<b>Bowdens Silver Project CCC - Meeting 3</b>
<b>Date:</b>	Tuesday, 10 April 2018
<b>Location:</b>	Mid-Western Regional Council, 86 Market Street, Mudgee
<b>Time:</b>	5.30 – 7.30 PM

Attendees	
Mr James Armitage (Member)	Ms Jane Munro (Bowdens Silver Pty Limited)
Mr Bradley Robert Bliss J.P. (Wellington Valley Wiradjuri Aboriginal Corporation)	Mr Keith Perrett (Silver Mines Ltd)
Mr Mick Boller (Lue Action Group)	Mr Darryl Watkins (Independent Chair)
Ms Sonia Christie (Member)	Mr Marc Snape (Minute Taker)
Mr Tom Combes (Member)	Mr Rob Corkery (EIS Project Manager)
Ms Sally Dryburgh (Member)	Dr Jackie Wright (Lead/Health Consultant)
Mr John Lydiard (Member)	Mr Paul Ryall (Hydrology Consultant)
Mr Anthony (Tony) McClure (Silver Mines Ltd)	
Apologies	
Cr John O'Neill (Mid-Western Regional Council)	

Subject	Actions
<b>1. Welcome &amp; Introduction</b> The Chair welcomed and thanked members for their attendance, and thanked Bowdens for arranging to have subject matter experts attend to the Committee. Bradley Bliss delivered Welcome to Country.	➤ No actions.
<b>2. Apologies</b> The Chair noted an apology from Cr John O'Neill.	➤ No actions.
<b>3. Pecuniary &amp; Other Interests</b> The Chair requested members of the Committee keep their Declarations of Interests up to date as any changes arise.	➤ No actions.
<b>4. Minutes and Actions of previous meeting (DW)</b> The Chair noted that most of the Questions on Notice from Meeting 2 would be answered in the presentations that will be given at this meeting.	➤ No actions.



<p>Following up on other actions, Tom Combes provided details of the dust sighting incident to Bowdens Silver for further investigation.</p> <p>Jane Munro reported that Blake Hjorth had spoken with Cr John O'Neill and been advised that the web address of the Committee minutes will be listed in community news. <b>Correction:</b> Councillor O'Neill has made inquiries regarding the possibility of the web address for the CCC Minutes being listed in the Mid-Western Regional Council Community News. No response has been received to date.</p> <p>The Lue Hotel has also agreed to have minutes available on its notice board. The Minutes can also be made available at the Rylstone Newsagency.</p> <p>Bowdens Silver determined that it was not appropriate to ask the Lue Public School to accept copies of the CCC Minutes. James Armitage noted that there would likely be conflict of interest issues around offering minutes in schools.</p> <p>It was also reported that Community Capers are happy to list the web address of minutes and take copies of the minutes as well in Rylstone.</p> <p>Mick Boller raised a Question on Notice around existing lead levels in Lue. The Chair noted that if the question is not answered in the Lead Health expert's presentation it can be revisited in the Q&amp;A.</p>	<p>➤ Cr O'Neill to confirm with MWRC.</p>
<p><b>5. Expert Presentations</b></p> <p>The Chair invited Rob Corkery to introduce the EIS process and his Company's role. Rob outlined that their role, and speciality is bringing together various specialist consultants and coordinating the EIS process. On this particular project there are 13 or 14 consultants working on various aspects. Rob then introduced Paul Ryall as the hydrologist expert, and Dr Jackie Wright as the lead/health expert to present to the committee.</p> <p>Paul Ryall presented to the group on hydrology, including techniques and methodologies. A copy of Paul Ryall's presentation is attached to these minutes. This was then followed by a Q&amp;A session.</p> <p><b>Q1.</b> Tom Combes asked how long ago the monitoring of rainfall and stream flow in Hawkins Creek commenced. There was a rain event in 2003 that was the largest rain event in memory that wouldn't be captured by this data.</p> <p><b>A1.</b> Paul advised that data collection commenced on the Bowdens Site around 6 years ago. There's no publicly available gauge data in the catchment, and that period is a reasonably sufficient timeframe to collect gauge data to inform the development and calibration of the hydrological model.</p> <p>The hydrological model is essentially a 1D model, developed to establish the relationship between rainfall and runoff in the catchment. We look at a range of information such as topographic surveys, imagery etc, to build the model. The results of applying rainfall to the model is then compared to the recorded gauge and rainfall data so as to calibrate the model to ensure that it reflects the actual system. The model is not used to generate a direct comparison from the 6 years of recorded data.</p>	



**Q2.** Tom Combes stated that the community has concerns about the tailings dam and dams that Bowdens are building. What's the worst case rain event that the dams are designed for?

**A2.** Paul clarified that whilst the specific layout or design for the mine was not yet available, there are very strict criteria that must be implemented for the design, construction and operation of the dam. These design criteria vary, dependent upon the "Consequence Category" of the dam. For instance, a High C tailings dam would be designed and operated to retain sufficient capacity to manage the 1 in 100 year 72 hour rainfall event. Oversight of these dams in NSW is undertaken by the NSW Dam Safety Committee, a statutory body. The NSW Dam Safety Committee have a lot of information and fact sheets available online, so recommend that as a resource for further reading [see <http://www.damsafety.nsw.gov.au/default.htm>].

**Q3.** Tom Combes asked in relation to groundwater, where the water from the pit goes. If a 300m deep hole is dug, it will attract water from fractured rock. Where does that go?

**A3.** Paul advised that in an open cut pit, there are sumps where some of the groundwater inflow would report to. A considerable proportion of the groundwater will invariably evaporate from the rock faces on the sides of the open cut pit, so it would be lost. The total volume of groundwater inflow to the open cut pit would need to be accounted for by BSPL and water access licences issued under the relevant Water Sharing Plan would need to be obtained by BSPL. The volume of groundwater inflow to the open cut pit would be determined from a calibrated groundwater model which is also required to be independently peer reviewed. Similar to the hydrological model, the groundwater model is calibrated to the data collected from BSPL's groundwater monitoring network. Any water that was collected in the sumps in the bottom of the open cut pit would be pumped out and introduced to the processing circuit to maximise the efficient use of water resources.

**Q4.** Tom Combes asked whether the data used for predicting groundwater inflow and the effect on water table comes from actual data testing or just modelling.

**A4.** Paul advised that the aquifer characteristics input into the groundwater model are derived from real world, site specific data. Paul then explained various methodologies of data collection and modelling. The model is then run over a known time period, and the model results are then compared to the observational data collected from the groundwater monitoring network to calibrate the model.

**Q5.** John Lydiard noted that Paul had commented that ideally, clean water is diverted around disturbed areas on site. If not, that quantity of water then has to be dealt with on site. The water also can't be discharged off site as it may have been exposed to sources of contamination on site. Has it been quantified yet how much water will be diverted, and how much water is not going to flow into Lawsons Creek?

**A5.** Paul advised that the quantity of water to be diverted has not yet been calculated. It will be calculated using a model. The Tailings Storage Facility (TSF) would hold any rainfall that falls on the surface of the TSF and any clean water that can be diverted away from that will be diverted. For the



TSF, an exemption under the Water Management Regulations would be sought as an excluded work. Such an exemption wouldn't be approved unless efforts are made to divert clean water away from the TSF.

Paul confirmed that the full footprint of the mine will be in the EIS, and clarified that generally it's not a matter of fully isolating and removing all runoff from the entire mine and that large parts of the mine site would remain as part of the contributing catchment for Hawkins Creek and Lawsons Creek.

**Q6.** Bradley Bliss enquired about the peer review process and noted that while this peer review process is done by one reviewer, he had been involved in other processes requiring up to three independent peer reviewers.

**A6.** Paul advised that the requirement stipulates the Applicant needs to have the groundwater model peer reviewed. It is Paul's understanding that the model is also subjected to further peer review by personnel appointed by the relevant Department.

**Q7.** Sonia Christie asked a question on pH testing and metals monitoring (ANZECC suite of metals). What sort of changes would be expected?

**A7.** Paul advised that they look at long term statistics to identify the median values of the test site, as well those collected upstream and downstream of the mine. In most watercourses in Australia, flow varies depending on rainfall, as does the concentration of various water quality parameters. The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC) nominates a 20th/80th percentile range as being suitable slightly to moderately disturbed aquatic ecosystems. If results start to approach the percentile range, that will trigger investigations.

Sonia asked if the monitoring results are self-reported or audited, and how many bores are being monitored?

Paul advised that exceedances of Environment Protection Licence conditions are mandatorily reported to the EPA within a specific timeframe whilst all monitoring results are required to be submitted annually. There are at least 40 bores being monitored.

**Q8.** Sonia Christie asked what the "make-good" provisions for privately owned/neighbouring bores are.

**A8.** Paul advised that a Company needs to make sure the water supply of an existing groundwater user isn't adversely impacted. If a bore is adversely impacted, the Company would be required to install another bore. If there is hypothetically no water that can be accessed by another bore, the Company would need to ensure the existing groundwater user has access to a water supply through other methods which would be agreed between the bore owner and the proponent.

**Q9.** Mick Boller asked where the VSW13 bore is located.

**A9.** Paul was unable to advise without details.

**Q10.** Mick Boller stated that previous proponents had said there would be no effect on sites over 500m away from the mine. Does that statement stand?

➤ Bowdens to respond.  
Question on notice.



**A10.** Paul responded that the distance and extent of likely groundwater drawdown will be known when the final mine site is designed and the groundwater assessment is completed, and that the information will be in EIS.

**Q11.** James Armitage asked whether the groundwater monitoring bores are only on site.

**A11.** Paul advised that they need to capture data from a broader area to appreciate the regional impacts, so no. Data collection points are located across a broader footprint than just the mine site.

**Q12.** Mick Boller asked how many private bores are being monitored.

**A12.** Question will be taken on notice.

Tony McClure commented that they are fortunate to have a considerable data set over a 6 year period, so the modelling that can be done is very good.

**Q13.** James Armitage asked whether the data is analysed independently.

**A13.** Tony McClure advised that the sampling is undertaken by Bowdens staff but analysed independently.

**Q14.** James Armitage noted that there are different sets of topography around the mine, and asked whether diverted water will be maintained within the same catchment, or will it transfer to another catchment?

**A14.** Paul advised all water would still remain in the same broader Hawkins and Lawsons Creek catchments.

The Chair thanked Paul for his presentation and invited Dr Jackie Wright to present. Dr Jackie Wright presented to the committee on lead and human health. A copy of a PowerPoint slide referred to is attached to these minutes.

Jackie outlined that when looking at lead, experts look at how it might be released, and then how we as people might be exposed to that lead and what effect it might have. Jackie noted that lead is already naturally in the environment in water, food, air and soils and that all people are already exposed to lead, albeit likely to be at comparatively low levels.

When looking at lead from mines or crustal materials, or other sources like smelting, it is important to understand the “type” of lead - not all lead from different sources is as bioavailable as others.

This particular project would not have smelting, so no lead production from a stack, hot lead fumes etc, so those exposures coming from smelting are not part of this project.

With this project, focus would be on the breaking up of rocks, and emitting crustal dust. Chunkier parts of dust tend to fall out of the air fairly quickly. Smaller dust may travel further distances, which then may settle onto surfaces, be caught up in rain water etc., and be inhaled.

Crustal lead from ore bodies tend to be very much less bioavailable. It’s important to understand how it might get into our bodies, then from the mine what the levels of lead might be.

There is conclusive evidence that blood lead levels of 10 micrograms per decilitre or higher have numerous negative effects in adults and children. Recent studies and reviews by NHMRC have looked at health effects and

➤ Bowdens to respond.  
Question on notice.



blood lead levels of 5-10 micrograms per decilitre range (5 is considered background levels). The studies found a statistical association behind blood lead levels and IQ and behavioural problems in children, however can't say that lead was the cause of those effects as studies were problematic.

These types of projects where there are a lot of mitigation measures put in place, we look at those measures and ensure there are minimised impacts. No project would be approved if adverse health impacts are predicted.

Jackie's presentation was then followed by a Q&A session.

**Q15.** Mick Boller advised that at a previous meeting, a question was asked whether it was safe to eat vegetables grown in Lue.

**A15.** The answer is yes. Lead is one of the least phytoavailable metals. It doesn't get into the edible parts of plants. If there's dust, then maybe from the surface, but lead can't move within the plant itself.

Mick also asked about whether rain water would be safe. As of March 2018, is it safe for the people of Lue to drink the water here? What are the background levels?

Jackie advised that any dust that settles on roofs etc can be washed into rain water tanks. We have collected some data about what's existing in rain water tanks in both the water and the sediment at the bottom of tanks. There's also lead flashing in roof materials, and some older roof metals have lead in them that dissolve with rain water. Jackie advised that as per the information available to her at the moment, yes it's safe. There was a graph with background levels at a previous community information session that can be circulated to the committee.

➤ Bowdens to provide graph of background lead levels.

**Q16.** James Armitage asked what manufacturing processes make lead more bioavailable.

**A16.** Jackie advised that many processes make lead more bioavailable. If you have lead paint flakes in soil for example, very bioavailable. Some mineral forms of lead that tend to come from manufacturing are more bioavailable than natural. The EIS will look at these different exposures.

**Q17.** James Armitage sought confirmation that water doesn't make lead more bioavailable?

**A17.** No. Some forms of lead are more soluble than others. Lead is generally not soluble when well bound to soil/sediment.

**Q18.** Tom Combes referred to a lead expert Prof Barry Noller and advised that he has recently received a lot of information from him on this mine. Professor Noller believes there will be an impact, and that there will be an impact for up to 5km from the mine, with quite a high impact within 2km of this mine.

**A18.** Jackie Wright advised that she hasn't conducted studies for this mine yet and doesn't have the results of the studies yet to be able to establish what the air quality and dust moving from the site will be. Jackie noted from experience with other mine sites, air quality mitigation measures are included as part of licence requirements to keep at low levels and ensure they are managed properly. Jackie noted that she has previously not seen dust impacts any great distance away from a mine, certainly not 5km or 2km away, and certainly not levels that would have a health impact. The



detailed studies for this mine haven't been concluded, so it is uncertain what Professor Noller is basing his reporting on.

Tom Combes remarked that he hasn't been able to find any other mines this close to communities and asked for advice on other mines that Jackie refers to that have been assessed.

Jackie referred to Broken Hill and Mt Isa in relation to new operations to do with new stockpiles and placement of new operations in different parts of mines. The mitigation measures to reduce impacts on the community have certainly been considered closely, noting those towns are very close to the mines. Jackie also mentioned coal mines in the Hunter Valley, power stations in relation to what comes out of those and where dust and particles go and what the health impacts are. A lot of work has been done and all those mitigations get factored in. If the mitigations aren't sufficient, the feedback will be that the design is not good enough. Jackie stated that she would never provide an assessment that supported a project that has a health impact.

**Q19.** Sonia Christie asked whether baseline blood testing would be recommended.

**A19.** Certainly would be a useful reference. The testing could be best if coordinated with NSW Health.

**Q20.** Sonia Christie enquired about the capacity for silica to have health impacts including silicosis.

**A20.** Jackie advised that would be considering this as part of the EIS. There are ways of assessing silica exposure to the community.

**Q21.** Tom Combes commented that Professor Barry Noller also mentioned wind speeds and said that the maximum wind speed and wind currents are critical to accurately measure dust movement. Professor Noller criticised previous wind data in a Kingsgate report. We had an inspection at the mine a couple of months ago, and we noted that the data being collected by Kingsgate is also being used by BSPL and same locations, and we also noted there's no wind monitoring at higher points.

**A21.** Jackie advised that she isn't responsible for the air quality monitoring but does have a good understanding. There is quite a lot of wind and meteorological data in Lue village and on site. There are also rules as to where those monitoring stations can be placed and they have to be placed within those rules. When air modelling is done, they incorporate that information, plus all the information around the terrain. The model creates a meteorological data file - how the wind moves and how it is influenced by valleys, higher hills etc. It then uses all that information to create a net data processing file, to then confirm with the monitoring data. It's a standard approach approved by the EPA. We can't measure every single location, so the modelling process and data has to be correct for consultants to use it.

**Q22.** James Armitage noted that Jackie had mentioned a range of minerals and asked whether there are any other minerals of concern.

**A22.** Jackie advised that in relation to other metals also present in the Bowdens Site, there is some zinc. Will consider all the metals that are



present in the rocks as part of the EIS including silver, lead, zinc and so forth, but zinc is not particularly toxic to humans.

James also sought clarification that mitigation measures are to keep exposure below background levels?

Jackie advised that mitigation measures are designed to keep any impact to health as negligible – to levels so low that we wouldn't be able to measure the impact on human health.

James asked about studies previously mentioned looking at lead exposure of 5-10 micrograms lead/blood levels.

Jackie advised that the studies were mostly out of USA, but some were from Australia, and of varying quality. The National Health and Medical Research Centre has carefully reviewed each study.

**Q23.** James Armitage asked whether there is an accumulative effect of lead from a health perspective.

**A23.** Jackie advised that once lead gets in your body it accumulates in your bones. What is measured in blood is probably actually 1-2% of what's in your body. Lead deposited in bones stays for quite a long time, and more lead can move into blood when the body is under stress such as when pregnant, significant weight loss et. That is also part of what we look at during the EIS.

James asked whether the expectation from mitigation is that there won't be any increase beyond existing levels?

Jackie advised that is correct for measurable increases.

**Q24.** John Lydiard asked about lead in batteries and what makes it so highly bioavailable.

**A24.** Jackie advised that it's the form of lead. The lead oxides are very bioavailable. It is lead oxide that is in old paints, lead batteries etc. Lead is lead, there's no bad lead or good lead, just depends what form it comes in that then impacts how bioavailable it is. If it's bonded in minerals then it can't get out of that bind so if it is ingested, it just passes through your body.

John asked what the results were from the soil on this mine's site and whether the lead was bonded with minerals.

Jackie advised that she doesn't have data for this site, but for many mineralised areas, it tends to be low bioavailability.

**Q25.** Mick Boller noted that there was a westerly wind blowing during the site visit, and asked what monitoring is being undertaken to the East of the site.

**A25.** Question taken on notice for Rob Corkery to respond.

**Q26.** Sonia Christie asked whether dust suppression chemicals are being looked into.

**A26.** Jackie advised that if Bowdens proposes to use chemicals, then certainly that will be looked at as part of the EIS, but usually it's just water used. Chemicals wouldn't be able to be used unless it's approved by the various regulatory bodies.





**Q27.** Sonia Christie asked whether they are also considering noise fatigue.

**A27.** In NSW noise guidelines are set by WHO Noise Guidelines.

Sonia commented that WHO set a baseline on 30-35 dB(A), but that Lue sits at a level of 10 dB(A) on a normal day.

**Q28.** Tom Combes noted that Jackie had stated no government would allow anything to happen that caused adverse health risks, but clarified that that's provided that you accurately assess what form the lead is, what the risk is, mitigation techniques etc.

**A28.** Jackie advised that that is correct. Usually what is produced identifies what the exposures are, and what the mitigation measures are, and provides recommendations on what more needs to be done.

**Q29.** Sonia Christie asked what health impacts are for older people (40+).

**A29.** Jackie advised that the most sensitive health effects for adults is on blood pressure, which occurs not far above 10 micrograms/decilitre. Exposures higher than that can lead to kidney problems and neurological problems. Blood pressure is a chronic effect, so may be noticed within 1 year of exposure where blood lead levels are over 10 micrograms/decilitre.

The Chair thanked Jackie for her presentation, then invited Rob Corkery to speak to the Committee on the overall EIS process and answer general questions.

Rob Corkery circulated a hand out addressing questions on notice from Meeting 2. He advised that wind monitoring locations marked on the slide have been collecting data since 2012, and that emphasis on the wind is paramount.

➤ Hand out to be circulated.

Rob advised that as a result of questions from the last CCC meeting, the air quality consultant actually went back to the data file, and was able to tell us that at the time of the previous meeting, the wind speed on the Bowdens site was about 27km/h, whereas in Lue village was about 23km/h. The air quality consultant has developed a Meteorological Data File and determined the wind speed at the top of Bingham Hill would've been about 50-55 km/h, which matches to what was experienced on the day. Hence, we are confident that data file is accurate.

Rob advised the committee that information and questions from the CCC are/will be provided to specialist consulting team, as are all questions from community consultation days, and they are all captured in the EIS process, if they are relevant.

Referring to Mick Boller's question on monitoring locations east of the Bowdens site (Q25), Rob advised that one site is located on the Stekhoven property (BDG06), the property previously owned by Ken Watson and Virginia King (property now owned by SVL) (BDG02) and the property owned by Gary Price (BDG09). Each of these dust monitoring locations are displayed on Figure 3 in the handout.

**Q30.** Tom Combes asked about the noise monitoring data and that no noise monitoring had been done on his property.

**A30.** Rob noted that the amount of noise monitoring that has been done for this project is substantial. There's been monitoring done for a large amount of time which provides a large amount of information. Rob noted



that noise monitoring on Tom Combes' property is not appropriate given the noise generated on the property.

**Q31.** The Chair asked Rob to run through the EIS process.

**A31.** Rob stated that there is a need to understand the environment that the mine is proposed within. We've coordinated many studies on noise, air quality, visibility, wind, transport, etc. All those studies create a series of constraints, which are considered in the design of the project. Within a matter of weeks, we'll have a draft mine design, which will then allow us to review the design. It is likely that when reviewing the detail of the design, there may be certain aspects that need to be tweaked with additional mitigation measures included.

Once the project description is finalised, we will circulate that to the DPE, and the council. We endeavour to keep them informed about what's included in the design and what's changed.

Specialist consultants will then undertake their studies, which will take anywhere between 5-14 weeks as they go through each of their components. A number of the studies will involve assessments at various stages throughout the life of the mine. For example, equipment on the surface is much louder than equipment 100m down. We will be able to predict impacts at all these various stages. In any case, even when the noise is predicted at its worst, it still needs to be within the standards.

All assessments from the specialist consultants will be provided to R W Corkery & Co. P/L, as there's often interrelationships that need to be taken into account. We might find there are inconsistencies. For example, a noise barrier put in a location that from a visual standard may be a problem.

From that stage, we will proceed to complete the EIS for Bowdens to review. Bowdens also proposes that the EIS will also be subject to a legal review.

We know the community is very keen to have feedback prior to EIS being lodged. It's an extra step, but we realise that it's important to have trust that what is been done is robust. Once the key specialist reports are finalised to their draft stage, the intent is that there will be a number of presentations to the local community, including from Jackie with lead results. [It is envisaged an open forum would be convened over a couple of days with the key consultants – similar to the forum held on 7 May 2017.] The intention is to give people the opportunity to quiz specialists and essentially play devil's advocate and really interrogate the draft assessments, as there may be more things that perhaps local knowledge makes us aware that has not been taken into account.

We would then finalise EIS, send it back to the Department of Planning, for the Department to confirm it is suitable for exhibition.

**Q32.** Sonia Christie asked about power supply to the site.

**A32.** Rob advised this won't be considered as part of the EIS. It will be subject to a separate application to the relevant energy provider for a separate assessment under Part 5 of the EP&A Act.

**Q33.** Mick Boller asked when presentations to the community are expected to occur.



<p><b>A33.</b> Rob advised that they will probably commence around July/August at this stage. Blake will liaise with the local community and advise with plenty of notice. It will be intended as a 2 way process.</p> <p>Tony McClure advised that the Feasibility Study will be a matter of weeks away, which is the technical and economic assessment. This then feeds into the Project Description for the EIS. Currently we're in iteration 11 or 12 of the optimisation process, which has dictated the design of the mine. The Project Description will then be reviewed by the various specialist consultants to assess the potential impacts of the Project and identify if there are any other mitigation measures required to achieve acceptable environmental outcomes.</p> <p>John Lydiard asked whether by those timeframes the EIS will be reviewed and submitted by August.</p> <p>Rob advised it will be after August. The technical studies will hopefully be completed by August 2018. One of the longest studies is the social impact study, which will take longer and take into account all the technical assessments. We're definitely talking later than August.</p> <p><b>Q34.</b> Tom Combes asked whether the feedback from specialists will change the mine plan and economic feasibility.</p> <p><b>A34.</b> Tony McClure advised that the belief is that any changes will be minimal given how much work has been done already. Keith Perrett stated the changes are expected to be more tweaks than major.</p> <p><b>Q35.</b> Bradley Bliss asked whether the water supply has been confirmed yet.</p> <p><b>A35.</b> Rob advised that no it hasn't been finalised.</p> <p>Tom Combes asked whether a decision on water supply would impact the economic feasibility.</p> <p>Tony McClure commented that they have modelled for the top of the cost bracket.</p>	
<p><b>6. Meeting Dates for the rest of 2018</b></p> <p>Tony McClure suggested waiting for further details around EIS timeframe before locking in future meeting dates.</p> <p>The Chair advised that he would be calling or meeting with members in the coming months to discuss future meetings.</p>	<p>➤ Chair to contact all members.</p>
<p><b>7. Agenda Items for Meeting 4</b></p> <p>The Chair advised that he would be calling or meeting with members in the coming months to discuss future meetings.</p>	<p>➤ Chair to contact all members.</p>
<p><b>8. Feedback from the Community</b></p> <p>The Chair suggested that committee membership be listed on Bowdens Silver website, and the Committee agreed.</p> <p>Tony McClure gave a presentation outlining some of the community programs Bowdens Silver have in place, including education and training. A copy of the presentation is attached to these minutes.</p> <p>Bowdens Silver provides a lot of initiatives with local schools and outside of that, our site is an educational learning centre. We have a PhD student,</p>	<p>➤ Bowdens to update website.</p>



<p>master students, and undergrad students using the site, primarily out of UNSW, with some initiatives with Macquarie University.</p> <p>Bowdens are looking to expand on that investment and will have a community investment fund in place.</p> <p>Bowdens are seeking ideas and seeking feedback from the CCC to prioritise relevant community based ideas.</p> <p>It was agreed that copies of all presentations would be circulated and attached to minutes.</p>	<p>➤ CCC members to provide feedback to Bowdens.</p>
<p><b>9. CLOSE MEETING</b></p> <p>The Chair thanked Committee members for attending and their positive participation and contributions.</p>	

# Visual Aids for Presentation to Bowdens Silver Project CCC Meeting

10 April 2018

Surface Water, Groundwater, Lead/Health



R.W. CORKERY & CO. PTY. LIMITED

**BOWDENS**  
SILVER

## Bowdens Silver – Surface Water 1 / 6

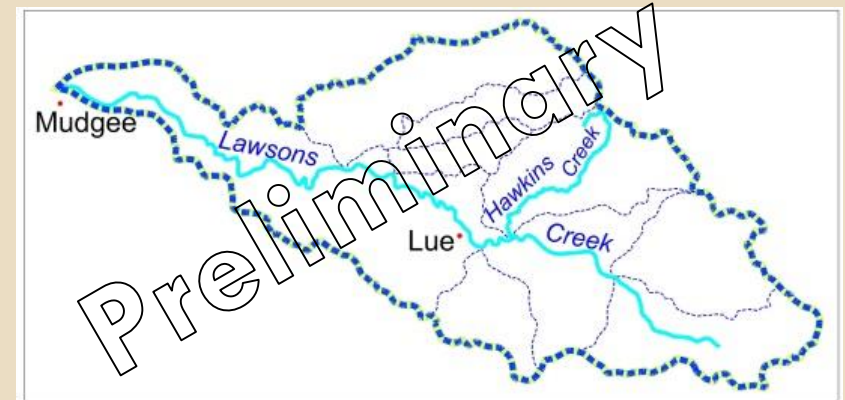
### Understanding Surface Water Impacts

The SEARs for the Bowdens Silver Project require a detailed assessment of the Project's impacts on the surface water resources within and surrounding the Mine Site.

**Phase 1:** Identify the catchments within and surrounding the Mine Site – both regionally and locally, collect relevant stream flow, rainfall and water quality data to understand the variables influencing the surface water environment.

### Catchments and watercourses

- Walker Creek, Price Creek and Blackmans Gully, minor watercourses, non – permanent.
- Hawkins Creek, local watercourse, perennial.
- Lawsons Creek, regional watercourse, perennial



## Bowdens Silver – Surface Water 2 / 6

### Understanding Surface Water Impacts

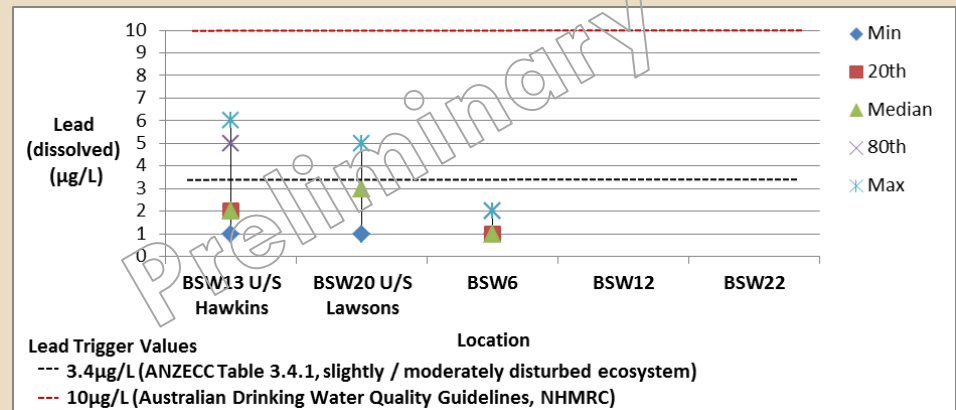
**Phase 2:** Identify existing surface water environment including surface water users, environmental values and water quality together with stream flow behaviour, including flooding.

### Surface water monitoring program: Water Quality

- Monitoring of local and regional watercourses commenced in 2012 at locations within, upstream and downstream of the proposed Mine Site .

#### Lead (dissolved)

- Maximum values for Lead upstream of proposed Mine Site exceed ANZECC trigger value for aquatic ecosystem protection
- No exceedance of drinking water quality guidelines recorded
- Locations downstream of proposed Mine Site below analytical limits



R.W. CORKERY & CO. PTY. LIMITED

**BOWDENS**  
SILVER

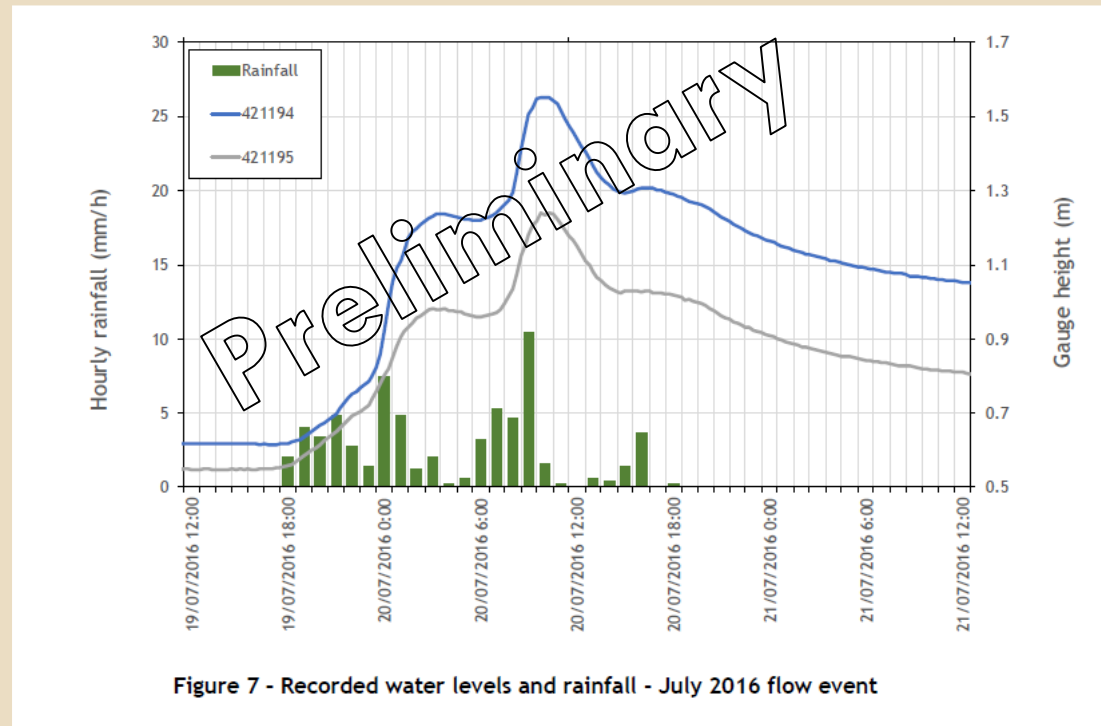
## Bowdens Silver – Surface Water 3 / 6

### Understanding Surface Water Impacts

**Phase 2:** Identify existing surface water environment including surface water users, environmental values and water quality together with stream flow behaviour, including flooding.

### Surface water monitoring program: Rainfall and Flow Data

- Continuous collection of flow and rainfall data.





## Bowdens Silver – Surface Water 4 / 6

### Understanding Surface Water Impacts

**Phase 3:** Understand the NSW Government's requirements through reference to the Water Sharing Plans and policies. Bowdens Silver will need to obtain a series of licences to harvest water from within the Mine Site.



**Lawsons Creek Water Source:  
Water Sharing Plan:  
Macquarie Bogan  
Unregulated and Alluvial Water  
Sources 2012**



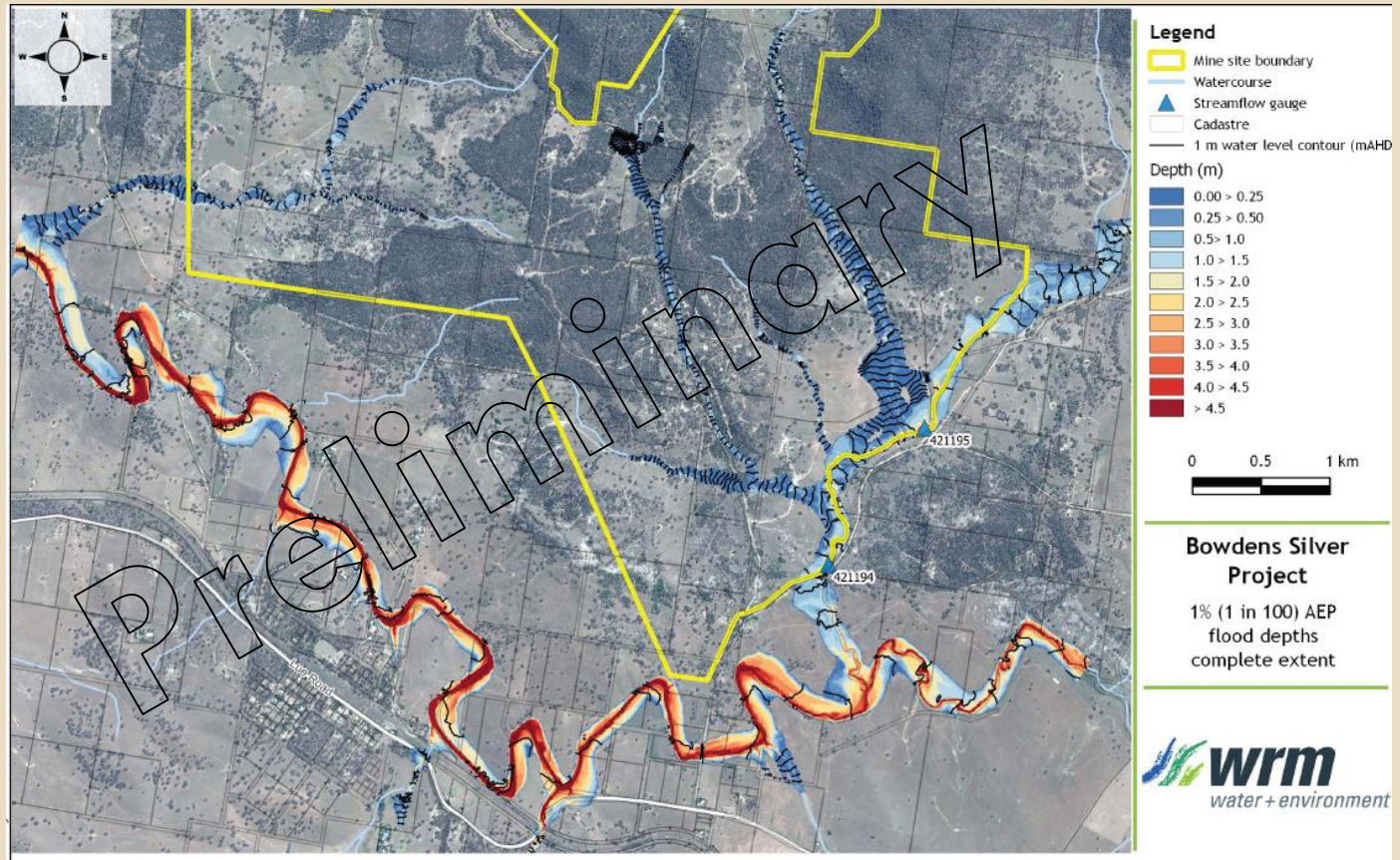
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## Bowdens Silver – Surface Water 5/ 6

### Understanding Surface Water Impacts

**Phase 4:** Undertake computer modelling to identify flow behaviour of watercourses





## **Understanding Surface Water Impacts**

### **Next Phases: Developed Case**

**Phase 5:** Identify the range of water management measures and strategies required to manage the:

- capture, storage, treatment and release of runoff containing sediment;
- capture, storage and reuse of runoff containing pollutants; and
- diversion of 'clean' runoff away from areas disturbed by mining activity.

**Phase 6:** Predict the changes to stream flows downstream of the Mine Site (including flooding) and potential changes in water quality as a result of Mine development.



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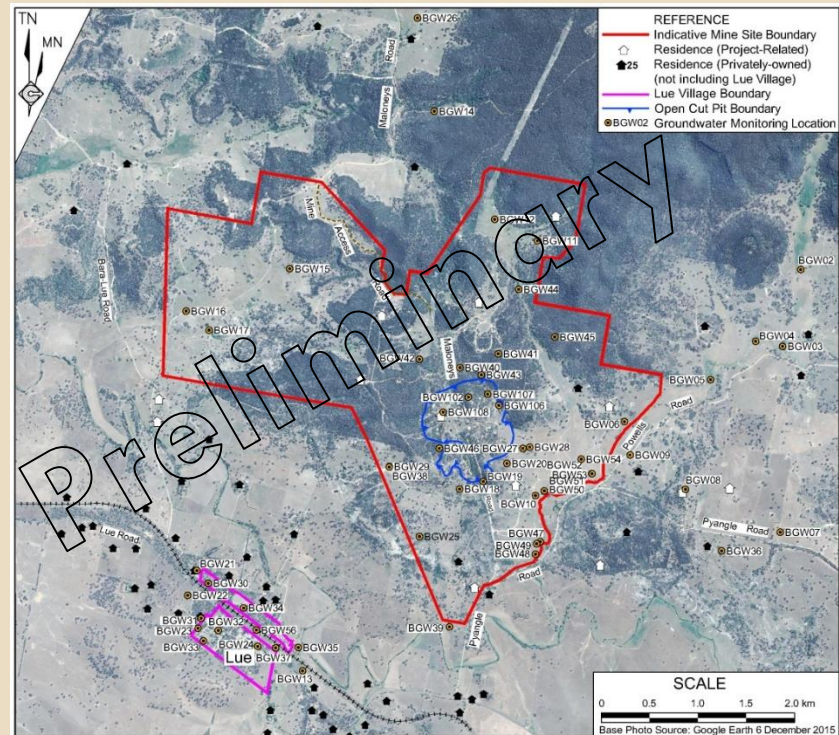
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## Bowdens Silver – Groundwater 1 / 4

### Understanding Groundwater Impacts

The SEARs for the Bowdens Silver Project require a detailed assessment of the Project's impacts on the local and regional groundwater resources surrounding the proposed open cut pit. In addition, the extent of drawdown of the regional groundwater table around the Mine Site will need to be established in accordance with the NSW Aquifer Interference Policy (2012).

**Phase 1:** Establish the characteristics of the local and regional groundwater system, including groundwater quality. This information is collected via a monitoring program of existing bores within the Mine Site and the local area.



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## Bowdens Silver – Groundwater 2 / 4

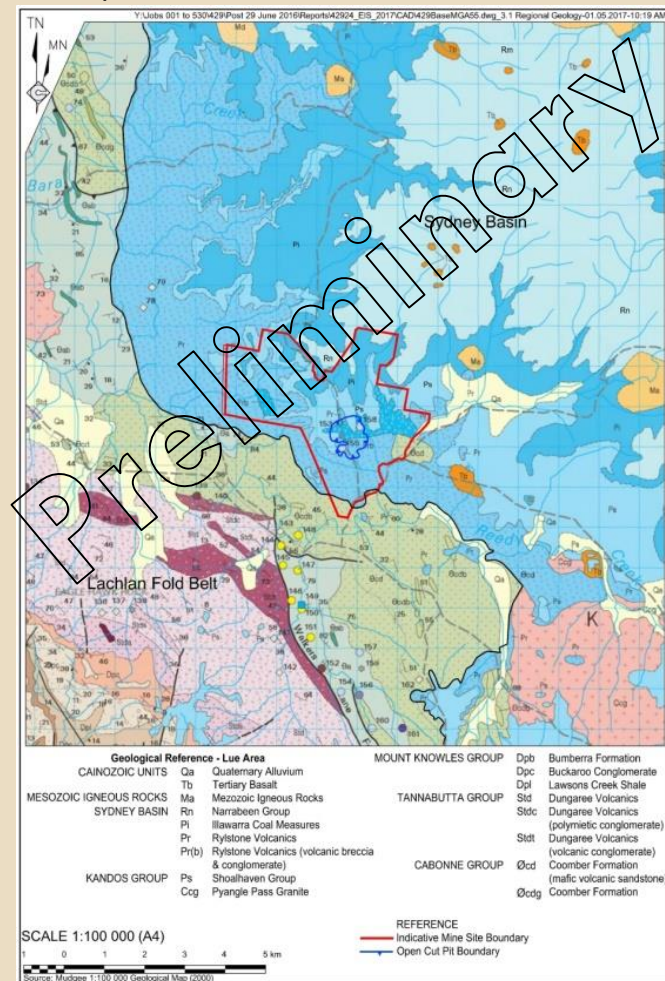
### Understanding Groundwater Impacts

**Phase 1:** Establish the characteristics of the local and regional groundwater system.

#### Regional hydrogeology

- Fractured rock system with alluvial sediments along drainage lines.
- Groundwater flow primarily through fractures and faults in rocks.
- Highest hydraulic conductivities in shallow regions of aquifer.

Geologic Province	Stratigraphic Unit	Groundwater Source and Water Sharing Plan
-	Mapped alluvium (Primary aquifer)	Lawsons Creek Water Source of the Macquarie Bogan Unregulated and Alluvial Water Sources
-	Undifferentiated alluvium & colluvium (unmapped)	Subject to the provisions of the groundwater source on which they overlie
Sydney Basin	Narrabeen	Sydney Basin Groundwater Source of the NSW Murray Darling Basin Porous Rock Groundwater Sources
	Illawarra Coal Measures	
	Shoalhaven Group	
Sydney Basin	Rylstone Volcanics (Primary aquifer)	Lachlan Foldbelt Groundwater Source of the NSW Murray Darling Basin Fractured Rock Groundwater Sources
Lachlan Orogen	Coomber Formation	
	Adaminaby Group	



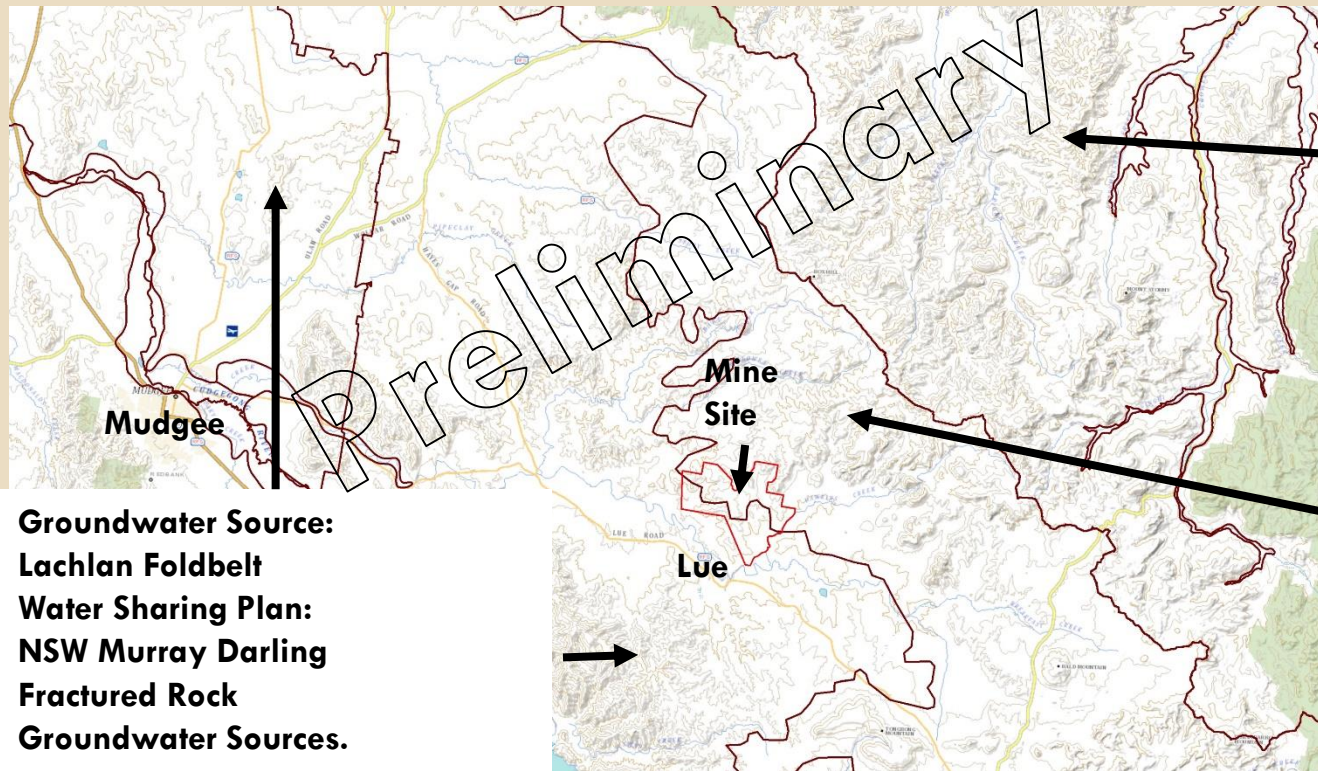
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## Understanding Groundwater Impacts

**Phase 2:** Understand the NSW Government's requirements and rules for intersecting the regional groundwater table – through reference to Water Sharing Plans and policies. Bowdens Silver will need to obtain a series of water access licences.



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## Bowdens Silver – Groundwater 4 / 4

### Understanding Groundwater Impacts

#### Next Phases:

**Phase 4:** Undertake computer modelling taking into account, and calibrated to, the results of the monitoring program (including aquifer characteristics).

**Stage 5:** Predict how much groundwater would be produced as a result of mining activity and available for use on site. Establish the extent of drawdown, if any, in groundwater bores on privately-owned land surrounding the Mine Site.



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The potential pathways of lead into the human body are:



Ingestion through the mouth and, subsequently, the digestive system



Inhalation through the mouth and nose into the lungs



Absorption through the skin (absorption through the skin is considered to be insignificant)

Not all lead is absorbed into the body



Bioavailable lead



Non-bioavailable lead (lead not absorbed and leaves the body)



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# COMMUNITY CONSULTATIVE COMMITTEE RESPONSES

Prepared by Heather Wardlaw (ATC Williams)

**Tailings dam and what mitigations are being undertaken to minimise impact to Lawsons Creek and Mudgee.**

**In the risk assessments completed so far what is the foreseeable risk ranking in regards to a wall collapse at Bowdens?**

**Should the risk be seen as low thus the need for a back up wall not be required, what system will SVL put in place to prevent ANY contaminants from escaping the site thus reaching the Lawson creek and beyond?**

The long-term integrity of any tailings storage facility (TSF) to reduce the risk of failure or loss of containment to levels accepted by industry and regulators relies on the consideration and implementation of all appropriate design, operation and closure measures for the TSF.

In terms of design, the guidelines of the Australian National Committee of Large Dams (ANCOLD) for Tailings Dams provide specific design and performance criteria, which will be adopted for the Bowdens Silver Project TSF. In particular, factors of safety are applied for embankment stability, with a range of loading conditions being considered, including maximum anticipated seismic events. At this stage of design published data for the area will be used for the seismic design events and a site specific seismic study will be undertaken for detailed design. These recommended design conditions will be met or exceeded for the Bowdens Silver Project.

The long-term production outlook for the operation is also important to enable careful planning for all stages of development over the life of the operation, with these design conditions being maintained through each of these stages. In this sense, the style of embankment development or expansion is particularly important, with the approach proposed for the Bowdens Silver Project TSF being fundamentally robust.

A number of operational matters are also significant to maintaining long-term integrity of the TSF. These include effective tailings deposition and management of water within the storage, to ensure containment. While all appropriate means are proposed for the Bowdens Silver Project TSF to effectively manage rainfall events within the TSF, the very low residual risk of release will be managed by an emergency spillway, which is an engineered structure forming part of the TSF to enable controlled release under the extreme conditions that may contribute to such an event.

The mitigation of seepage from the TSF is a critical design element. Seepage may occur through the embankment and/or embankment foundation, however for the Bowdens Silver Project TSF, the use of manufactured lining systems across the face of the embankment coupled with a deep foundation cut off wall (grout curtain) will substantially reduce the risk of seepage migration beyond the footprint of the TSF. Environmental monitoring instrumentation will be installed in close proximity to the TSF, with this system regularly monitored for early detection of any seepage. Early detection will enable and inform improvements to the seepage management system and operational conditions for the TSF, to not only reduce seepage risk but to facilitate seepage recovery and return to the TSF for management.

Closure of a TSF is as important as any other phase of development. Beyond the operating life of the facility, effective closure enables all tailings to be contained and for a final landform to be developed that is geotechnically stable, environmentally sustainable and able to support an appropriate end land use that is sympathetic with the surrounding landscape and land capability. The current closure concept allows for free drainage off all surfaces as well as surfaces that are able to be revegetated using endemic plant species.

## COMMUNITY CONSULTATIVE COMMITTEE RESPONSES

### Wind and Air Quality East of the Mine Site Prepared by Rob Corkery (RW Corkery & Co) & reviewed by Scott Fishwick (Ramboll Australia Pty Ltd)

#### **Q11: What wind and dust monitoring is undertaken to the east of the site and down Powells Road?**

BSPL maintains two meteorological stations for the collection of a range of meteorological data including wind speed and direction. One station (BME01) is located within the southeastern corner of the Mine Site approximately 0.6km from the closest point of Powells Road and the second station (BME02) is located within Lue village. **Figure 1** displays the location of both stations together with the air quality monitoring stations established historically and currently around the Mine Site.

**Figure 2** displays the recorded seasonal wind roses for Stations BME01 and BME02 for 2016 whilst **Figure 3** displays the annualised wind roses for both stations superimposed on the local topographic map.

**Figure 4** displays the day-time and night-time wind roses for Stations BME01 and BME02 for the period 2013 to 2016.

The key information drawn from **Figures 2 to 4** that will be relied upon in the air quality assessment (and noise assessment) are as follows.

#### **BME01**

- Annually, the dominant light winds are from the northeastern quadrant whereas the stronger winds are from the western quadrant (i.e. consistent with the observations by Mr Boller).
- Seasonally, light winds from the northeastern quadrant dominate in all seasons whereas the stronger winds from the west are more common during winter and spring and from the southeastern quadrant in summer.
- Diurnally, the dominant light winds are from the northeast at night-time and stronger winds occur from the west during day-time hours.

#### **BME02**

- Annually, the dominant light winds are from the southeastern quadrant whereas the stronger winds occur predominantly from the northwestern quadrant.
- Seasonally, the bulk of the winds blow from the southeastern quadrant with the bulk of the stronger winds occurring in winter and spring.
- Diurnally, the bulk of the winds occur at night-time from the southeastern quadrant whereas during the day time, winds are dominant from the northwestern quadrant and to a lesser frequency from the southwestern quadrant.

It is noted that the wind direction profile differs between BME01 and BME02. This is attributed to the influence of local topographic features, including Bingman Hill.

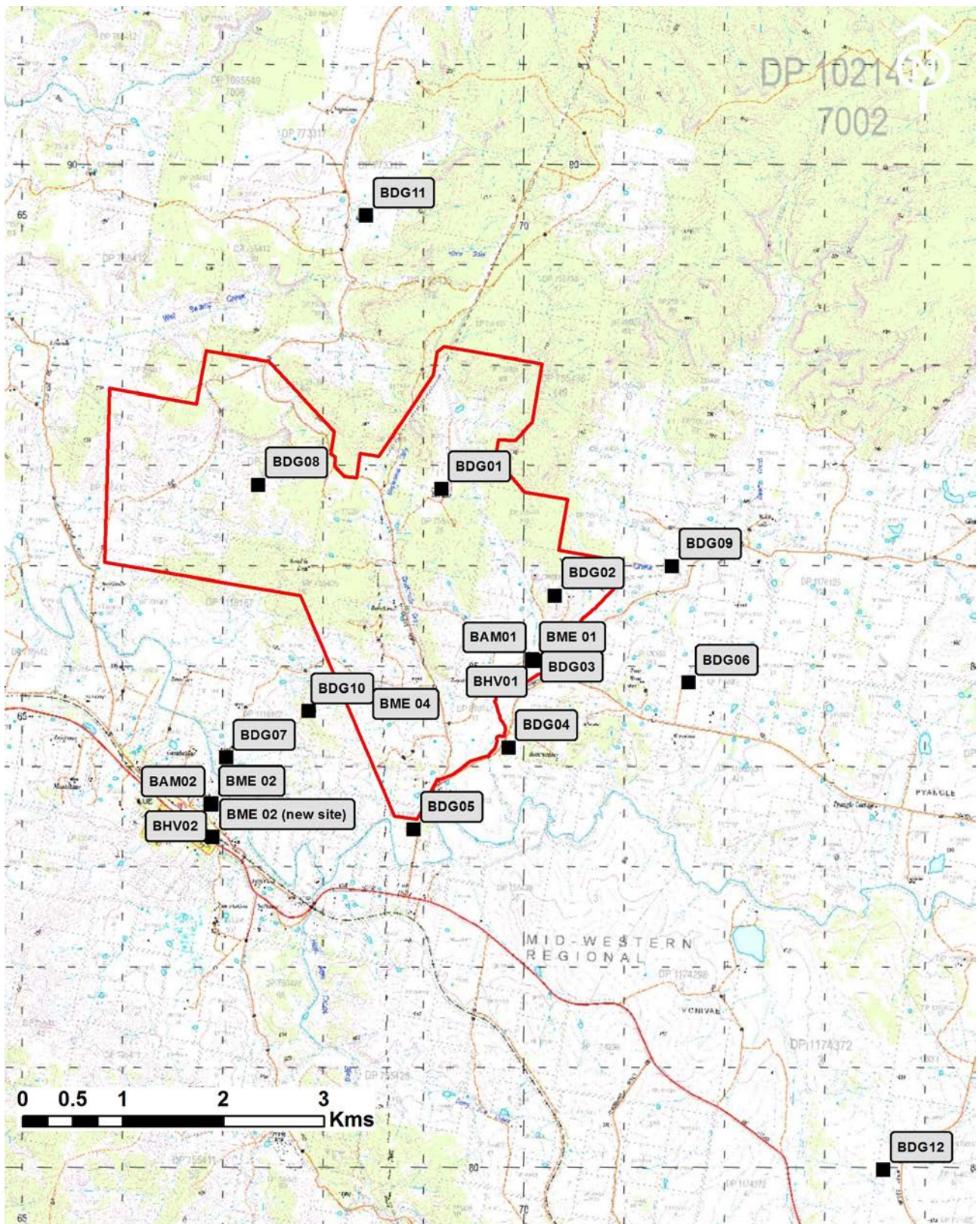
For the air quality impact assessment, all the data from the most complete and recent monitoring year (anticipated to be 2017 at this time) recorded by both BME01 and BME02 will be relied upon in predicting the concentration of all potential air contaminants originating from the Project.

For the purposes of predicting air quality from the Project at residences east of the Mine Site, the air quality consultants (Ramboll Australia Pty Ltd) consider the wind speed and direction data from site BME01 will be appropriate. It is noted that time-varying data from both meteorological monitoring stations will be combined with local terrain and land cover data to develop a three-dimensional wind field for the Lue area for use in the prediction of potential air contaminant dispersion.

Air quality data, specifically deposited dust levels have been collected at two locations east of the Mine Site, i.e. at BDG06 and BDG09. The comprehensive air quality monitoring equipment positioned adjacent to meteorological station BME01 has been recording PM<sub>10</sub>, total suspended particulates and deposited dust.

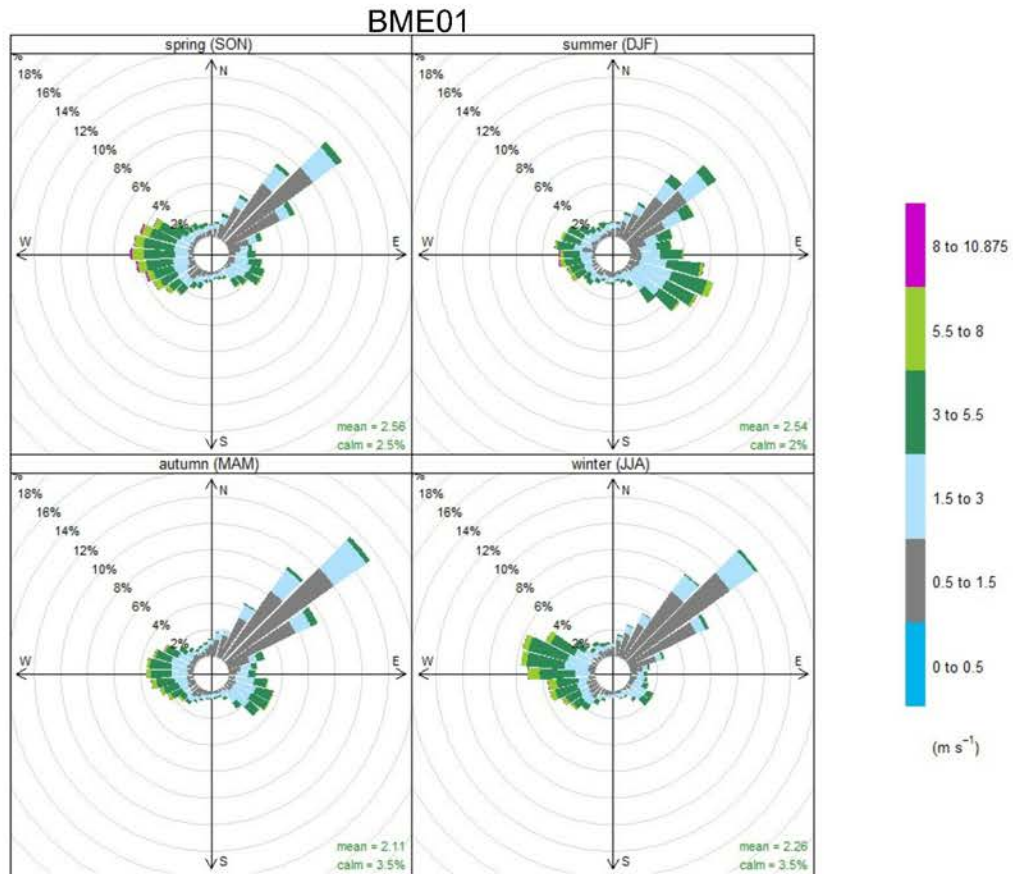
**Figure 5** displays the results of the monitoring undertaken for both PM<sub>10</sub>, PM<sub>2.5</sub> and deposited dust. These results will be updated in the EIS.



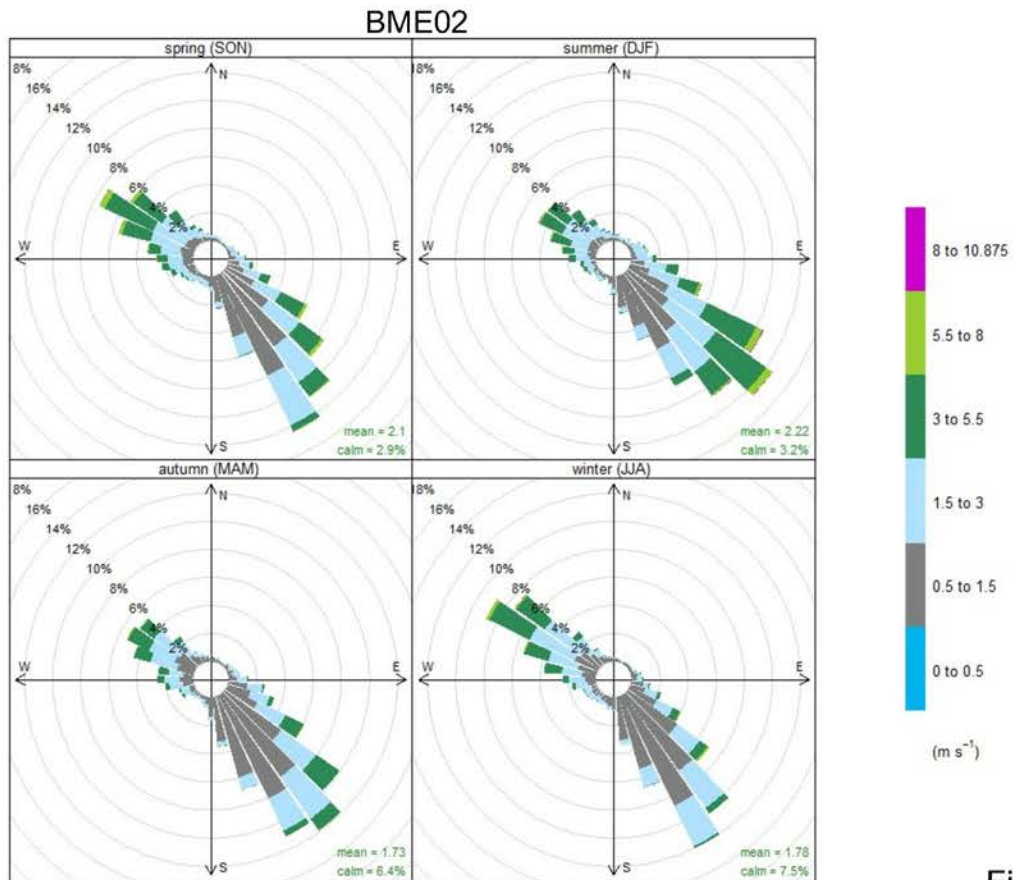


**Figure 1**  
**HISTORIC AND CURRENT AIR QUALITY AND METEOROLOGICAL MONITORING STATIONS**





Frequency of counts by wind direction (%)



Frequency of counts by wind direction (%)

Figure 2  
SEASONAL WIND ROSES



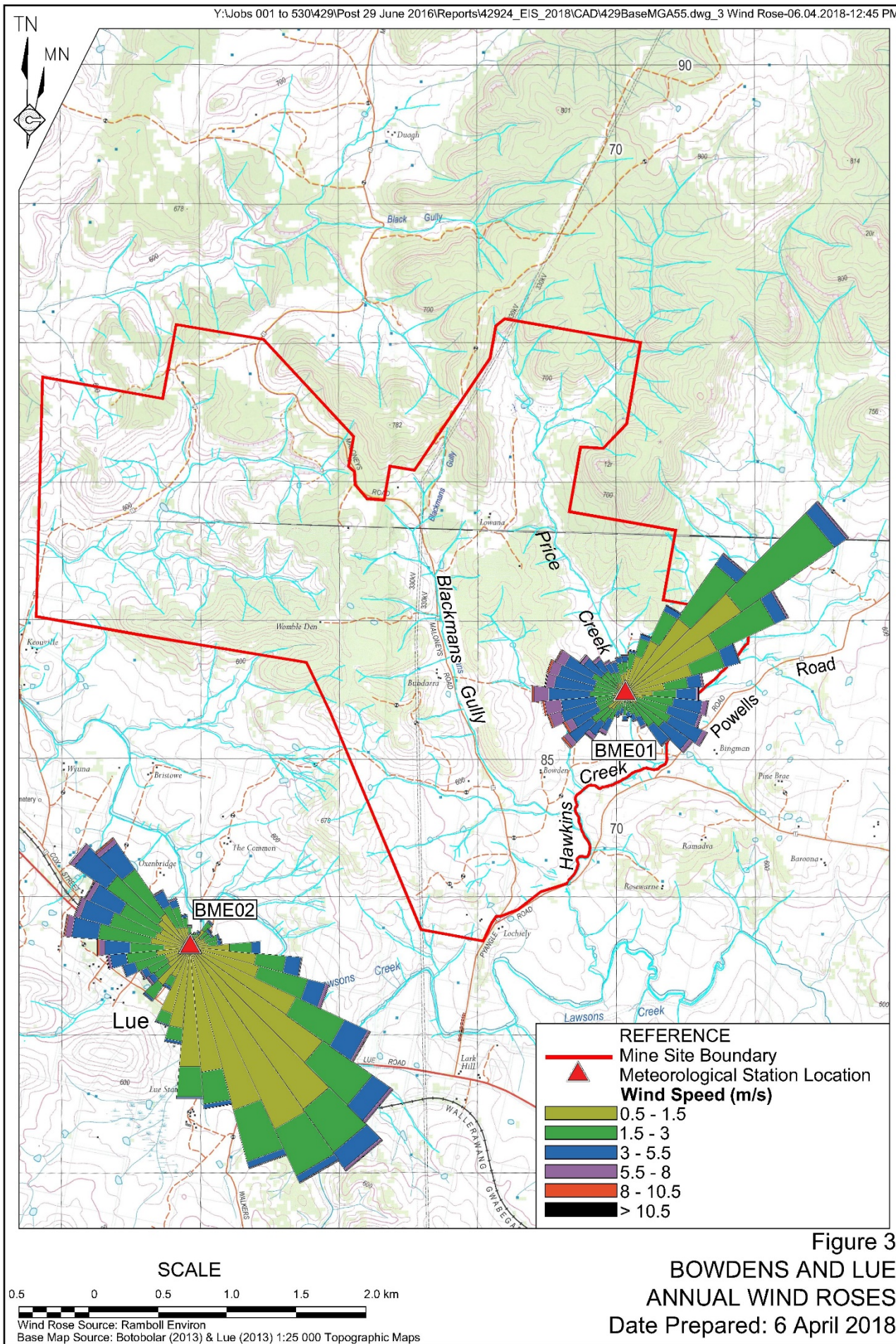
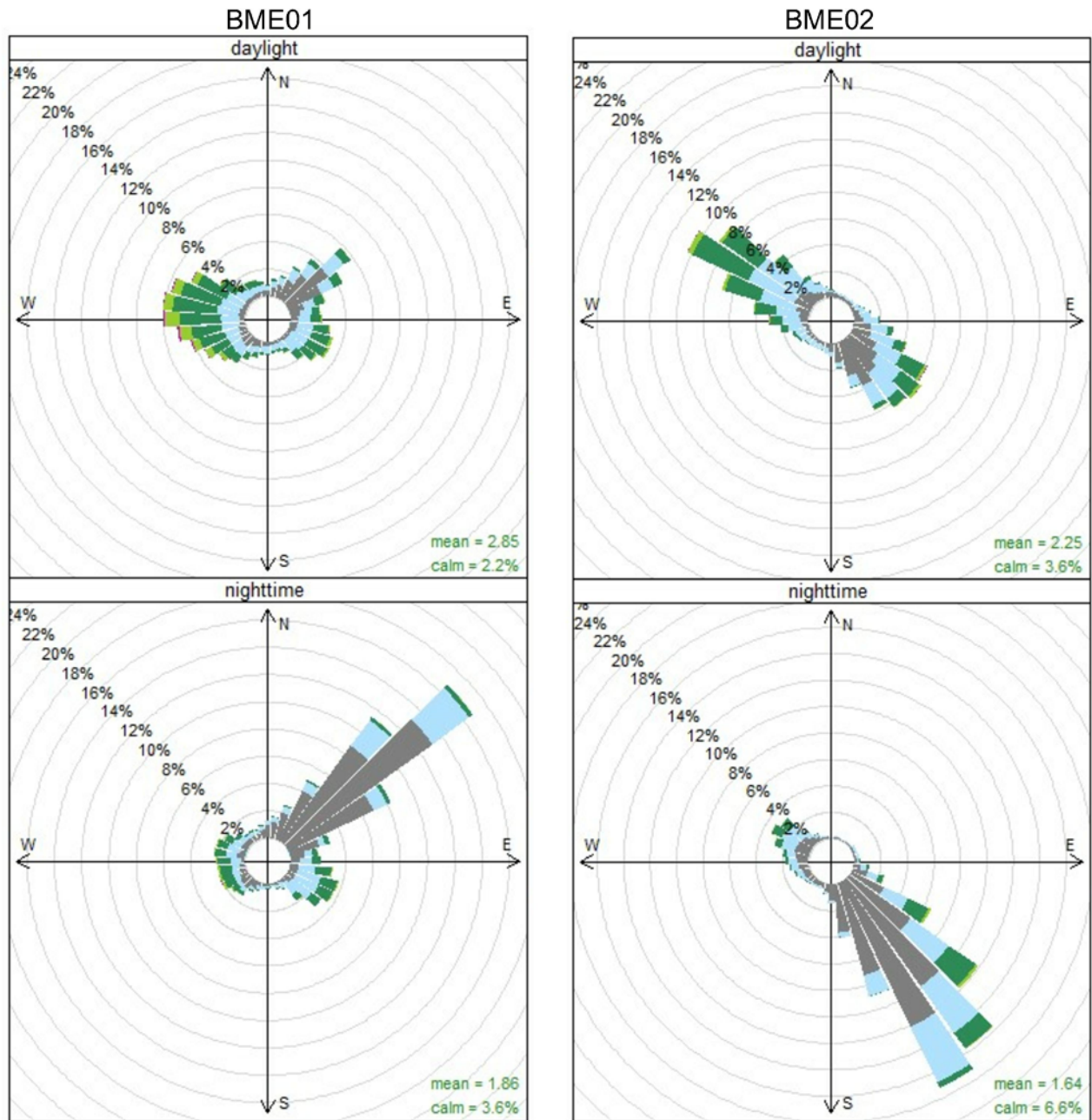


Figure 3  
BOWDENS AND LUE  
ANNUAL WIND ROSES  
Date Prepared: 6 April 2018





Frequency of counts by wind direction (%)

Frequency of counts by wind direction (%)

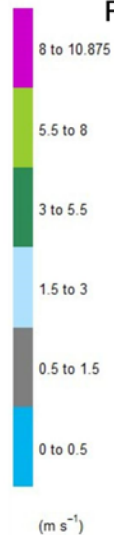
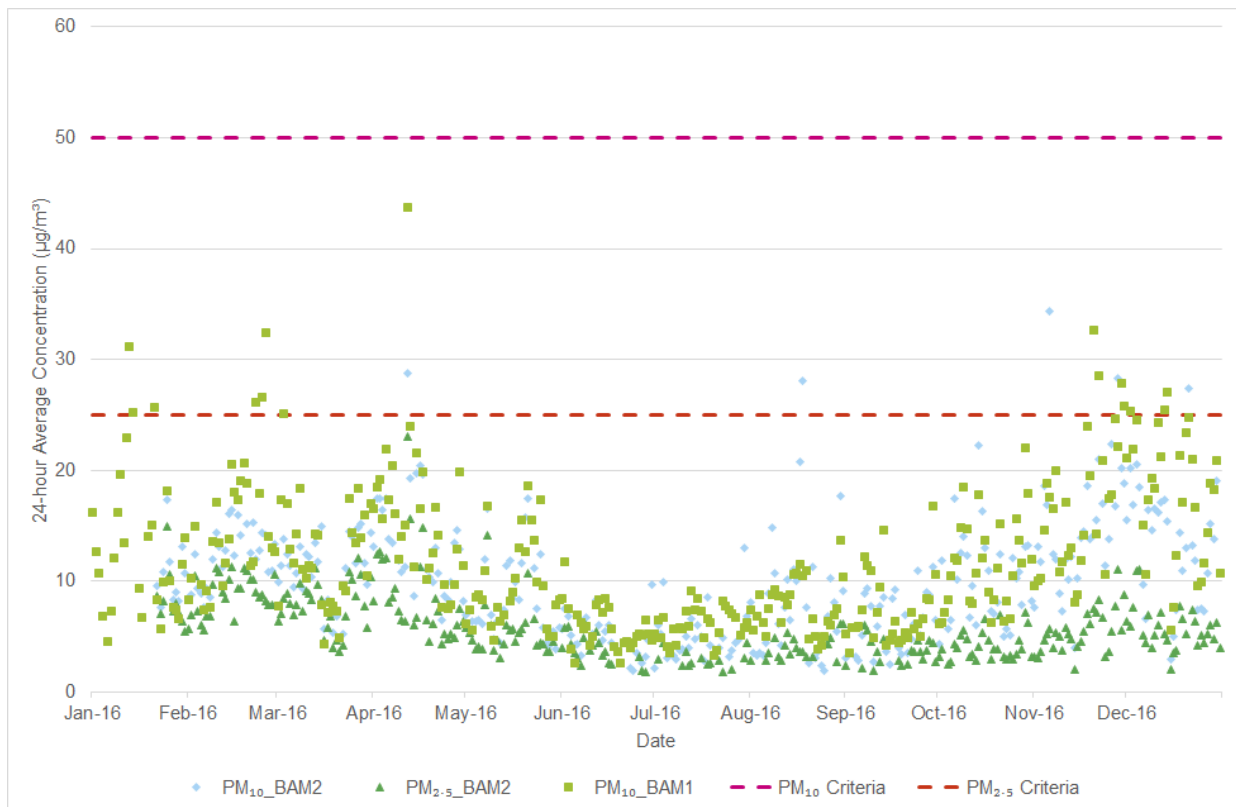
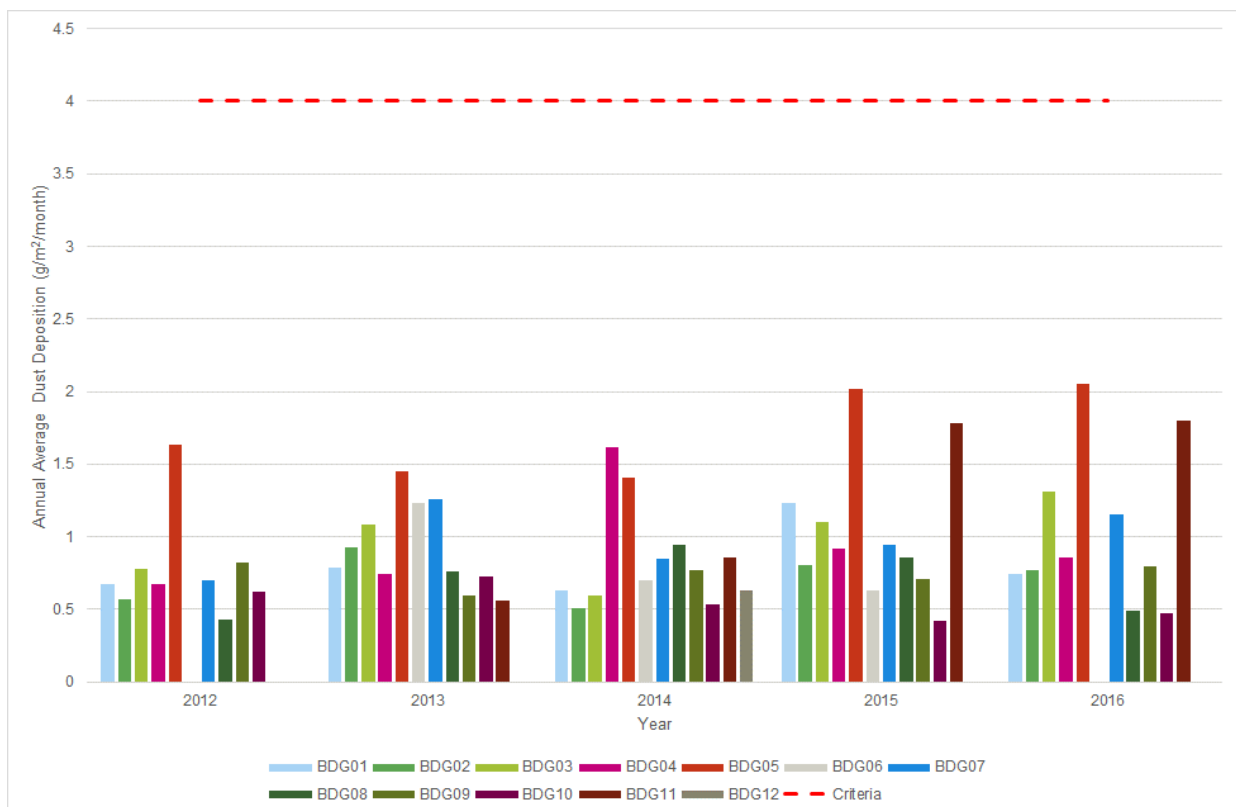


Figure 4  
DIURNAL WIND ROSES



**Figure 5A** 24-hour average PM<sub>10</sub> and PM<sub>2.5</sub> concentrations - 2016



**Figure 5B** Annual average dust deposition



# **COMMUNITY CONSULTATIVE COMMITTEE RESPONSES**

**Prepared by Jackie Wright (EnRiskS)**

## **What are the impacts of lead on young people and relation to smelting process?**

There will be no smelting activities at the Mine Site, hence there is no way that lead vapour/fume will be generated. The following information regarding smelting is provided to assist CCC members.

When considering exposures to lead, it is important to understand where the lead is present (food, water, soil or in the air) and the form/mineralisation of the lead that is present. Smelting involves a number of very hot processes that cause lead to be present as a fume (i.e. a lead vapour) and adhered to fine dust, most commonly as sulfates. When released to air from a smelter, only very fine dust (which gets through the dust filters) and fume/vapour are present. These are very fine particles that may remain in air for a long time, and can be inhaled by the community. The lead dust can also settle onto surfaces indoors or outdoors (where it may also enter rainwater tanks). When lead vapour/fume is inhaled almost 100% of the lead can get into the body. When lead on fine particles is inhaled or ingested (following contact with surfaces) the amount that is absorbed by the body is less than 100% (typically in the range of 40% to 95%). As there tends to be a lot of vapour/fume emitted from smelters, and all the lead can be absorbed into the body if inhaled, the potential for elevated exposures is high.

The operation of the Project has the potential to result in the generation of crustal dust of varying different sizes from the different types of mining activities. Large dust particles will settle out of the air very quickly, close to the activity. Smaller dust particles will travel in air and may be inhaled (depending on the particle size). They may also settle onto surfaces indoors or outdoors (where they may also enter rainwater tanks). Young people are likely to be more exposed to lead in dust that has settled out onto surfaces as they put hands and objects into their mouths and may not regularly wash before eating. Small amounts of lead are naturally present in all soil and dust (regardless of where you live), and dust generated from the Project will also contain relatively small amounts of lead which is present in the soil and rock materials. When people may be exposed to dust generated from the Project through inhalation or ingestion, not all of the lead present within the dust can be absorbed into the body. Lead from mineralised areas such as the Mine Site is not very bioavailable, meaning that typically around <10% to 30% of the lead within the dust particles or soil may be absorbed into the body.

How bioavailable lead is when people are exposed, is important, as it determines how much of the lead that is present within the soil or dust can be absorbed into the body. To be able to be absorbed by the body, lead within the soil or dust first needs to be dissolved into solution (i.e. into various bodily fluids such as stomach or intestinal fluids) (termed bioaccessibility), after which the dissolved lead may then be absorbed into the blood system (i.e. within the systemic circulation of the body) (termed absorption). If the lead cannot move into solution anywhere within the body it will not be able to be absorbed and is eliminated. Not all the lead in solution, particularly in the stomach or intestinal fluids, is absorbed into the body.

When dust is inhaled, it is deposited within different regions of the respiratory system, with only fine particles reaching deep into the pulmonary or alveolar region. When deposited in the respiratory system the particles interact with various lung fluids where the lead that can move from the dust particle into solution can be absorbed or the dust particle can be transported to the GI tract.

When ingested soil or dust interacts with the various stomach and intestinal fluids, the lead that can move into solution in these systems has the potential to be absorbed. Depending on the source of the lead, the ability of the lead to move from soil/dust into solution in different areas of the body varies. Lead from sources such as lead paint and lead acid batteries have been found to be very bioaccessible (i.e. almost all of it can move from soil/dust into solution in the body), while lead in soil/dust from

mineralised areas have been found to be much less bioaccessible (i.e. much less than 100% can move into solution) with the bioaccessibility dependant on the lead mineral type.

The health effects from exposure to lead depend on how much lead is in the body, measured as a blood lead level. There is well established evidence that blood lead levels greater than 10 micrograms per decilitre causes increased blood pressure, abnormally low haemoglobin, abnormal kidney function, long term kidney damage and abnormal brain function in adults and children. Evidence of health effects occurring at blood lead levels less than 10 micrograms per decilitre is less clear. There is an association between blood lead levels less than 10 micrograms per decilitre with reduction in IQ and academic achievement in children and behavioural problems, however whether these effects are caused by exposure to lead has not been clearly established. Regardless of the issues with the studies, blood lead levels greater than 5 micrograms per decilitre are considered to be higher than background and the source investigated and exposure reduced (NHMRC 2015). The current NHMRC policy is to minimise unnecessary exposures to lead.

It should be noted that everyone is exposed to lead, as it is naturally present in soil/dust/water and food, and it is these exposures that result in the background blood lead level (noted to be around 2.6 micrograms per decilitre for pre-school children in Sydney in areas away from specific lead sources, NHMRC 2015). It is important to understand what additional exposures and intakes may occur as a result of the Project, and the mitigation measures used to minimise the generation of dust and the exposures that may occur.

A decorative graphic at the top of the slide featuring a topographic map with contour lines and two shaded areas representing peaks or depressions.

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# ***BOWDENS*** **SILVER**

## *Community Programs*



# COMMUNITY INVESTMENT

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A range of community projects have been supported or contributed by Bowdens Silver within the local Mid-Western local government area.

Areas include:

## Education & Training:

- Lue Public School – IT sponsorship, water bore installation, educational support and excursion, garden maintenance and event support.
- Kandos & Rylstone Public Schools – playground and learning infrastructure sponsorship and offer of educational support.
- Kandos High School – staff engagement visit and offer of educational support, event sponsorship, work experience.
- Partnering with University of NSW - PhD, Masters and Undergraduate students.

# COMMUNITY INVESTMENT

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## Local Sponsorships:

- Mudgee Rugby
- Rylstone Kandos Show
- Mudgee Show
- Kandos CWA
- Rylstone Street Feast
- Mudgee Reader's Festival
- Gulgong Gold & Mining Festival
- Mudgee Rugby 7's Competition
- Mudgee District Netball Association
- Lue Darts
- Mudgee Endurance Riders
- Kandos PCYC Youth Moto Workshop
- Defibrillator for Kandos community
- Kandos Garden Fair
- Rotary
- Waratahs v Brumbies Rugby in conjunction with MWRC

# COMMUNITY – THE FUTURE

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**Prior to mine development, support of local initiatives will continue and expand, based on the following core areas:**

- **Education** - support across the range of educational institutions; local public schools, local high schools, TAFE, Universities and other higher education. Development of industry relevant local training and skills.
- **Community** - support to improve social facilities and areas of greater benefit for local communities such as; infrastructure enhancements, land use enhancement and improved amenity and environment.
- **Sport** - support sporting organisations promoting team work, health and the wider social function to local communities;
- **Safety** - support for organisations that provide rescue services and emergency and health and services and the promotion of safety and wellbeing in the community; and
- **Arts and culture** – support for projects in areas such as indigenous cultural heritage, local history and community arts and cultural programs.

# COMMUNITY – THE FUTURE

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- Our aim of long term success of the Bowdens Silver Project will rely on good corporate citizenship to become a valued member of the regional community.
- Meaningful and effective community projects will involve and require input from not only from the Bowdens Silver team but a range of stakeholders including local partners.
- We will continue to expand upon our current community projects program and sourcing new opportunities.
- It is envisaged that a formal Community Investment Fund will be implemented during project development.

# COMMUNITY IDEAS

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- The CCC members are in a unique position to help guide future community projects.
- Opportunities lie in providing community ideas for Bowdens Silver and the community to consider and agree.
- Bowdens Silver is seeking input from the CCC to prioritise relevant community based ideas.
- The following is collated from company and community ideas.



# EDUCATION & TRAINING IDEAS

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- **Employment Readiness Program – Secondary Students**
  - Job seeker tools – digital platforms & personal branding, job sites & alternatives, jobs in our “sphere of influence”, how to answer a job advertisement.
  - Practice interviews & feedback
  - Involvement of a labour and skills provider/TAFE to ensure relevancy
- **Scholarships or opportunities for the “middle ground”**
  - Educational resource allowances or sponsorship
  - Training opportunities – for the present and the future
  - Selection criteria and recipients driven by teacher and community members
  - Mentoring opportunities
- **Excursions & learning opportunities**
  - Primary, secondary and tertiary opportunities – on site and at schools
  - Work experience
  - Land & resource availability for agricultural and environmental study

# LOCAL OPPORTUNITIES & LAND USE IDEAS

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- Lue Community Hall revitalisation
- Local history - capture, preserve and display
- Local tourism
- Relocation of Lue Waste Transfer with MWRC consultation, safety priority
- A local Lue shop – overwhelmingly popular during SIA interviews
- Co-ordinated pest and weed or farm centric programs
- Sponsorship programs for local activities, events and groups
- Environmental conservation programs (in addition to Company biodiversity offset programs)
- Lue local development group
- VPA (Voluntary Planning Agreement) with MWRC and fund allocation

# HEALTH & WELLBEING IDEAS

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- **Youth health programs**
  - **Mental & physical health programs**
  - **Social media impacts**
- **Local health care priorities and programs**
- **First aid training for community members – potentially delivered by Bowdens Silver trained staff in the future**
- **Bowdens Silver emergency facilities available locally**
- **Bowdens Silver fire fighting assets available locally with bushfire management planning and volunteering opportunities.**
- **Support for sporting teams**
- **Volunteering within the community**
- **Joint community initiatives with our partners (Bowdens Silver partners with over 110 local businesses and local contractors).**

# YOUR IDEAS

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- What ideas do you have?
- Further ideas from members of the community.
- We will collate ideas and submissions received by Friday 11<sup>th</sup> May 2018 for further discussion and feedback locally.
- For discussion with the CCC.

## PLEASE SEND YOUR IDEAS OR SUBMISSIONS TO:

Blake Hjorth

Community Liaison Officer

T: (02) 6373 6420

[blakehjorth@bowdenssilver.com.au](mailto:blakehjorth@bowdenssilver.com.au)

Site: 68 Maloneys Road, Lue NSW 2850 | Post: PO Box 1115, Mudgee NSW 2850

Or submit through our website at [www.bowdenssilver.com.au](http://www.bowdenssilver.com.au)



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