Environmental Impact Statement

BOWDENS SILVER

"An Environmental Impact Statement (EIS) is an available document that provides information on a project, including its environmental impacts and mitigation measures, and is used to inform development consent conditions"

Source: DPE draft Environmental Impact Assessment Guidance Series (2017)

- Prepared to assess the environmental impacts of the Project
- Key environmental and social studies include:
  - Noise, Vibration and Blasting
  - Air Quality
  - Health
  - Social Impact
  - Surface Water
  - Groundwater
  - Traffic and Transport
  - Visibility
  - Terrestrial Ecology
  - Aquatic Ecology
  - Soils and Land Capability
  - Aboriginal and Cultural Heritage
  - Economic Impact
  - Agricultural Impact

Noise Assessment

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Undertaken in accordance with the Noise Policy for Industry:

- Daytime criteria over 15 minutes = 40 decibels dB(A)
- Evening/night-time criteria over 15 minutes = 35 dB(A)
- Criteria apply under all assessable weather conditions.
- Noise is modelled under standard and noise-enhancing weather conditions
- Four daytime and three evening/night-time scenarios have been modelled

Predicted Noise Levels

Predicted noise levels depend upon:

- The sound power levels from all of the fixed and mobile equipment operating concurrently
- The distance between the noise sources and residences
- The intervening topography
- Weather conditions, e.g. wind, temperature inversions
- The presence of intermediate barriers and other controls

Impact Assessment (based upon the Voluntary Land Acquisition and Mitigation Policy)

Predicted noise exceedances	Predicted impact	No. of residences	Bowdens Silver's approach
No exceedance	Acceptable (but not inaudible at all times)	112	No mitigation actions required at the residences
1-2dB(A)	Negligible	7	No mitigation actions required, however, Bowdens would offer mitigation measures comparable to those residences where the 3 - 5dB(A) exceedances are predicted.
3-5dB(A)	Marginal	4	Mitigation to the dwelling may include air conditioning, double window glazing, other façade and roof upgrades etc.
>5dB(A)	Moderate (day/evening) Significant (Night)	4	Flexibility in mine operation, in noise enhancing weather conditions. Offer acquisition or enter into an agreement with compensation.

Noise

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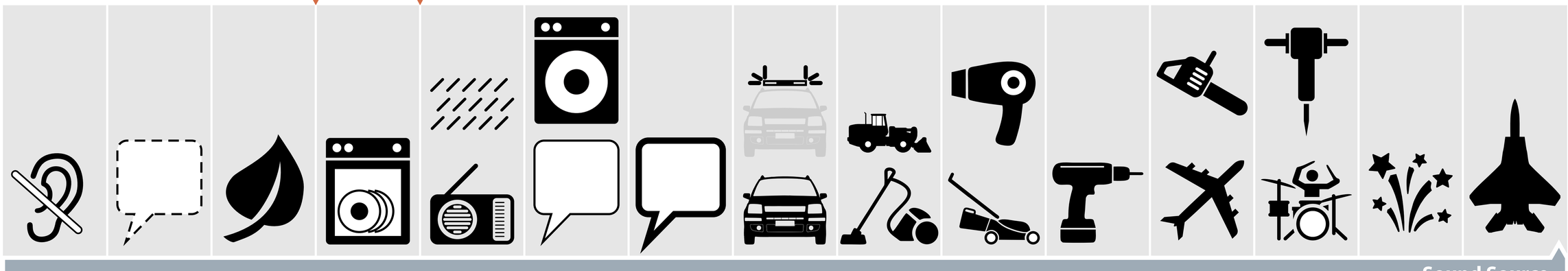
Bowdens Project typical maximum intrusive noise level between 30 - 40db(A)



Sound Source

Typical sound level in dB

0dB(A)	10dB(A)	20dB(A)	30dB(A)	40dB(A)	60dB(A)	70dB(A)	80dB(A)	85dB(A)	90dB(A)	100dB(A)	110dB(A)	120dB(A)	130dB(A)	140dB(A)
Hearing threshold	Whisper	Leaves Rustling	Running Dishwasher	Quiet radio music Quiet office Moderate Rainfall	Normal conversation Clothes Dryer	Loud conversation	Heavy Traffic Police Car Siren	Front-end loader Vacuum Cleaner Busy Restaurant	Lawn mower Hair Dryer	Power Tools	Chainsaw Airport	Car Horn at 1 metre Rock drill Rock concert	Rivet hammer Fireworks	Jet engine at 30 m

Hearing threshold of pain is 130db(A)

Source: Safework Australia (2018)

What noise level will the Project need to comply with during operation?

Day time: **LAeq 40bB(A)** over any 15 minute period

Evening/Night: **LAeq 35bB(A)** over any 15 minute period

Noise

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"Noise is what drives people out of communities"

"You can hear a cow sneeze at night it's so quiet"

What the community would like to see	What we propose
Development of noise bunds or barriers	Constructing a southern barrier to reduce noise to the south of the Mine Site Building barriers and bund walls at various locations throughout the Mine Site
Effective noise management	Adopting a number of noise controls including noise attenuation on plant, equipment and the mining fleet Movement of processing plant further north of the village and at a lower elevation
Truck curfews to limit trucks at night	Adjustment to our equipment fleet and mining schedule to reduce noise at night
Noise monitoring (especially at night)	Monitoring of noise in real-time (24/7)
Appropriate mitigation e.g. double glazing	Implementation of a suite of mitigation measures at closest residences to the Mine Site

Do you have any further strategies?

Use the sheet below to record any additional strategies for us to consider.

Predicted Intrusive Noise Levels
(under standard calm conditions and noise enhancing weather conditions)

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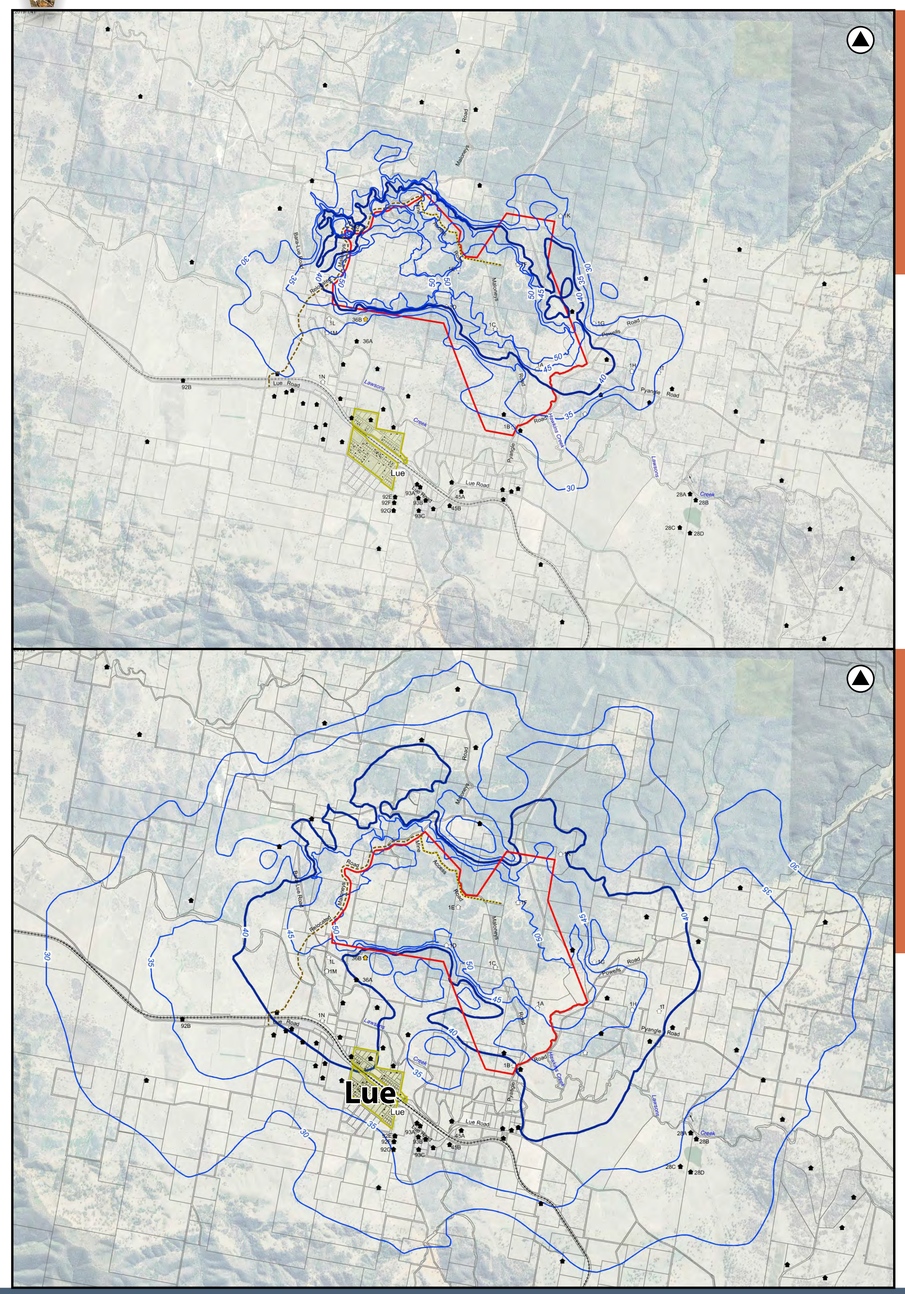
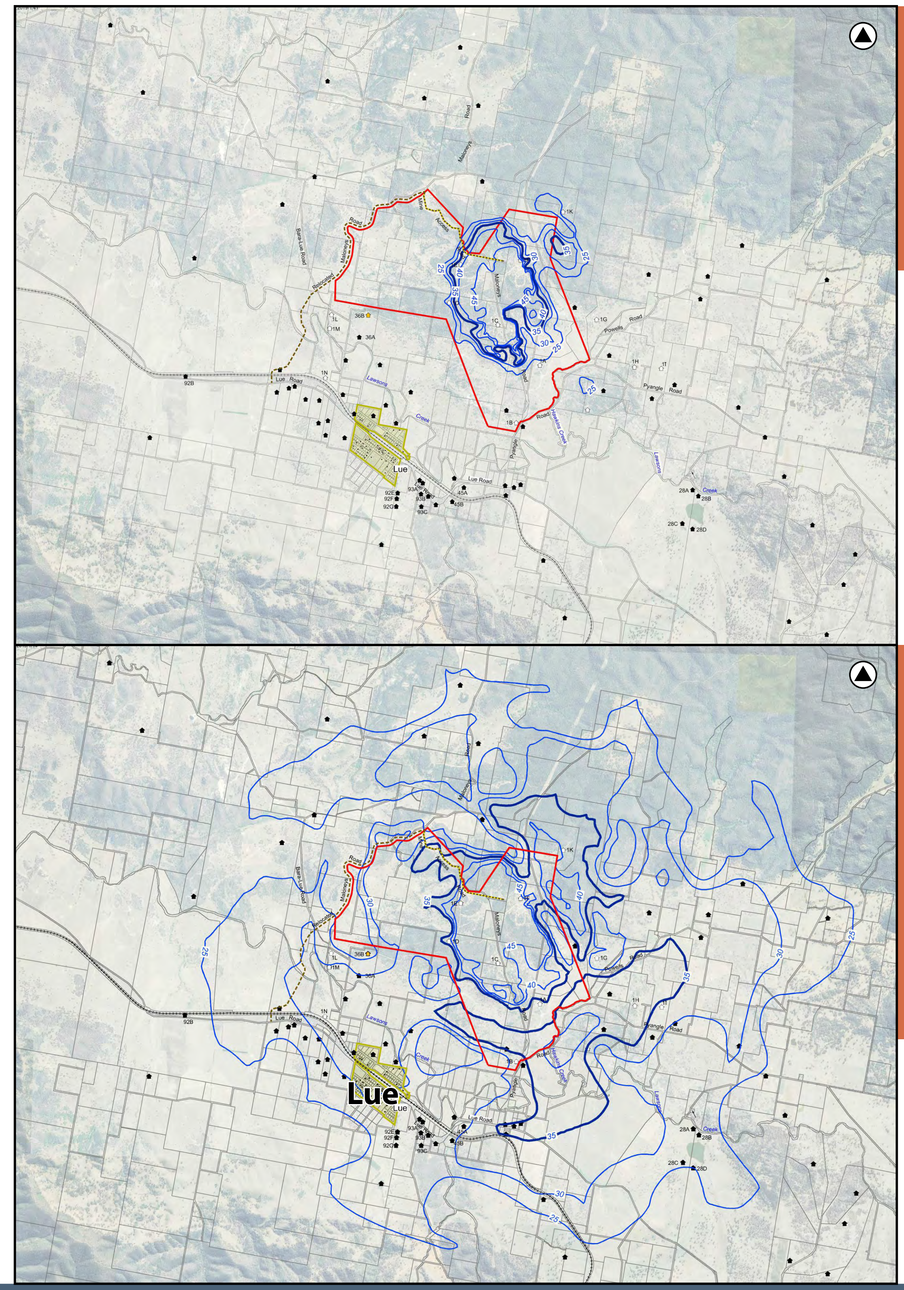


Scenario 1 **Daytime** (Standard calm conditions)

Scenario 1 **Daytime** (Noise enhancing wind toward all residences)



Scenario 4 **Night-time** (Standard calm conditions)

Scenario 4 **Night-time** (Noise enhancing temperature inversion + wind toward all residences)

REFERENCE
- Indicative Mine Site Boundary
- Mine Access Road
- Closed Railway Line
- Cadastral Boundary
- 1C Residence (Project Related)
- 36A Residence (Privately-owned) (not including Lue Village)
- Residence (Proposed)
- Lue Village Boundary
- 30 Noise Levels dB(A)

0 1.0 2.0 3.0km

Groundwater Drawdown Source: Jacobs 2019
Groundwater Bores Source: Water NSW

Predicted Intrusive Noise Levels
(under standard calm conditions and noise enhancing weather conditions)

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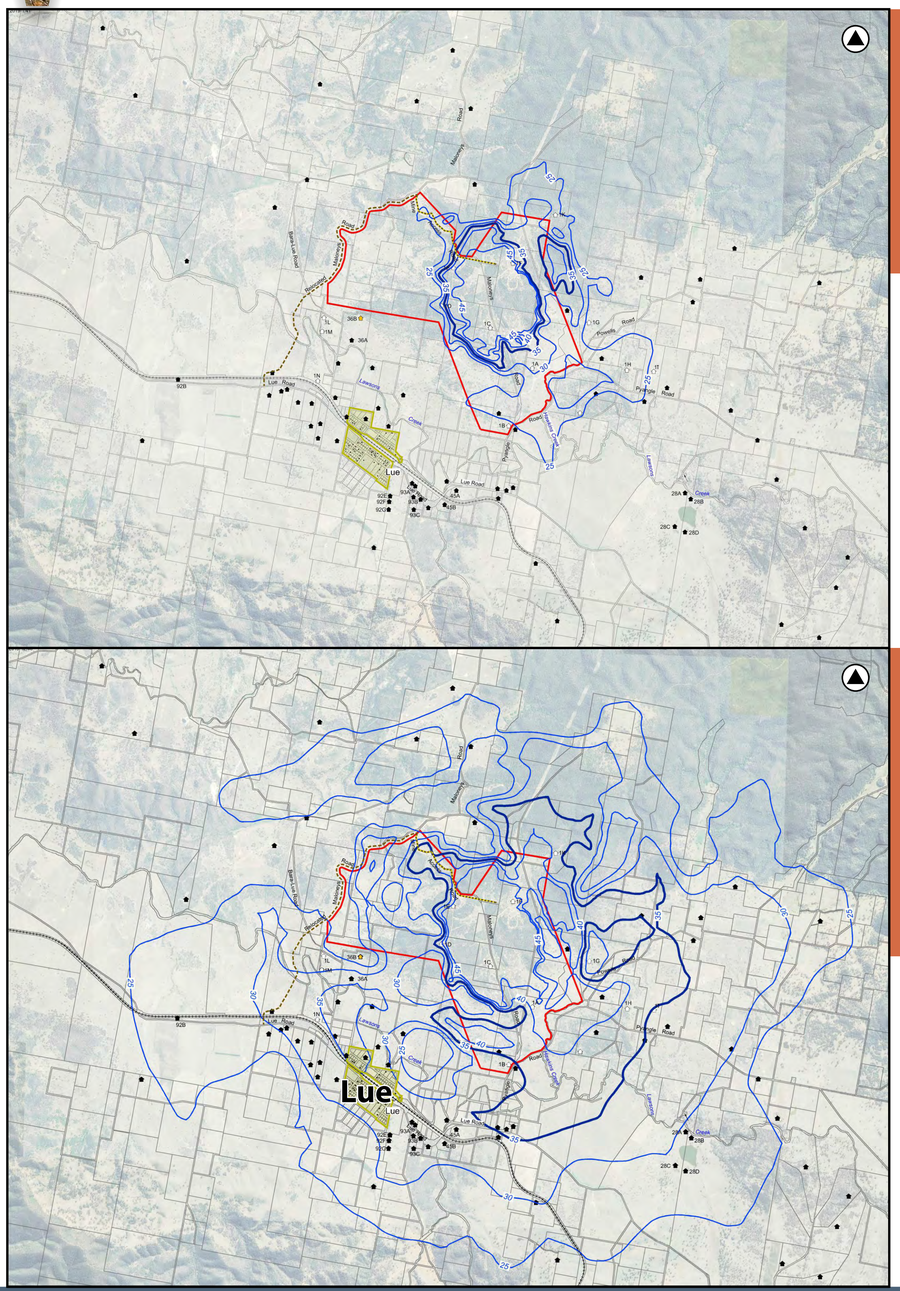
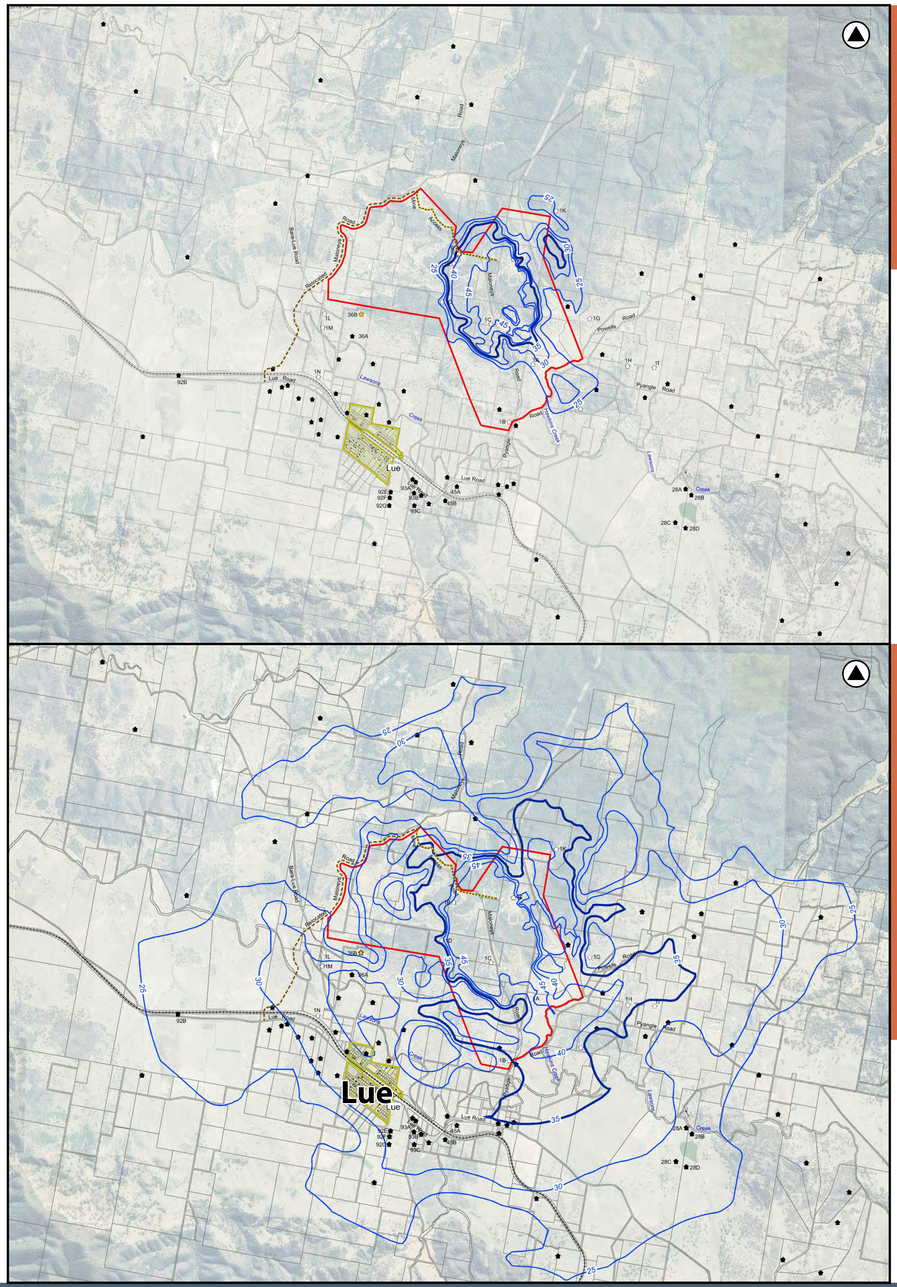


Scenario 2
Evening
(Standard calm conditions)



Scenario 2
Night-time
(Standard calm conditions)

Scenario 2
Evening
(Noise enhancing wind toward all residences)

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Night-time
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Groundwater Drawdown Source: Jacobs 2019
Groundwater Bores Source: Water NSW

Predicted Noise Levels
(under noise-enhancing weather conditions)

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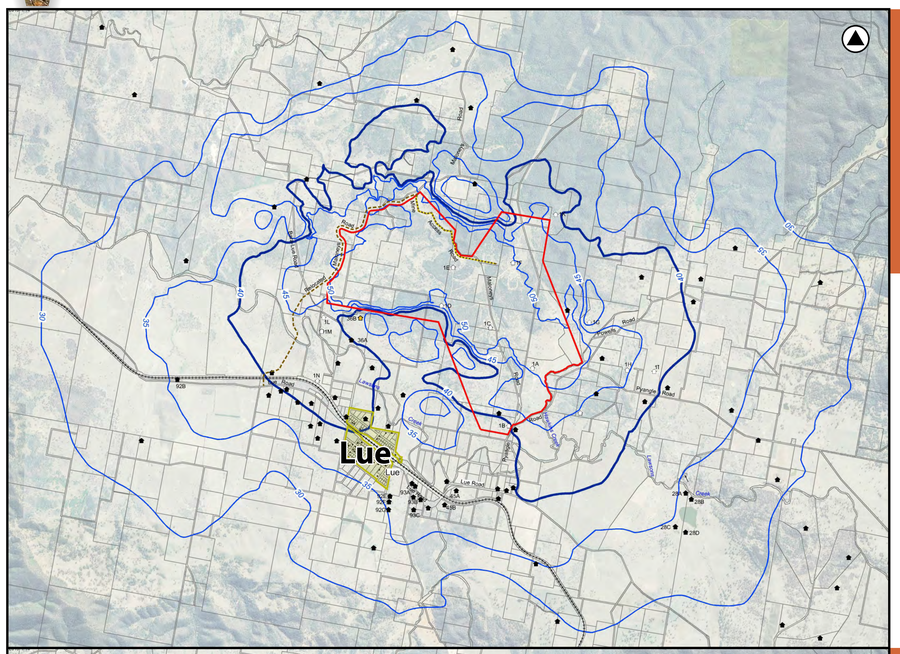
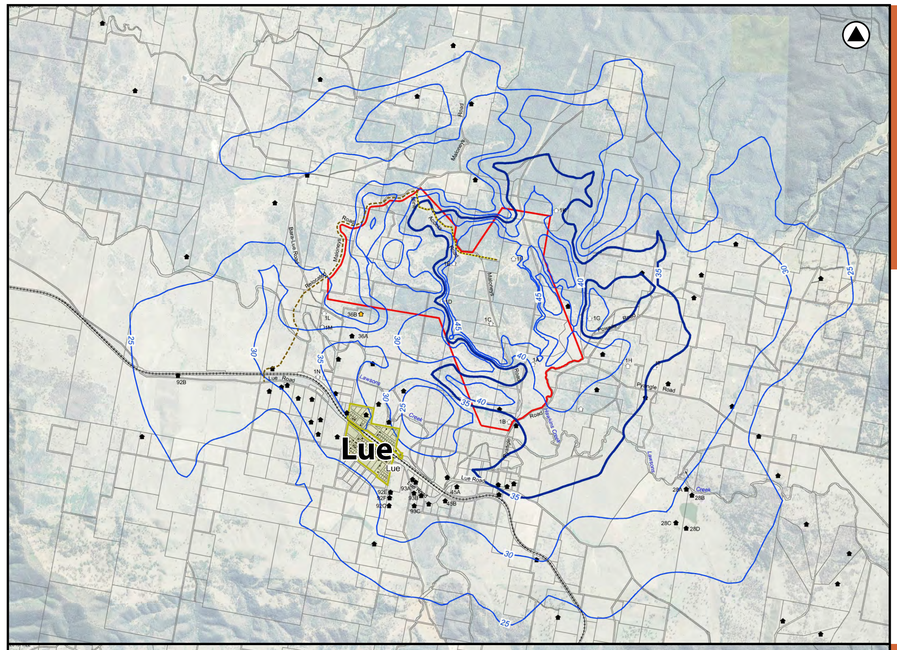
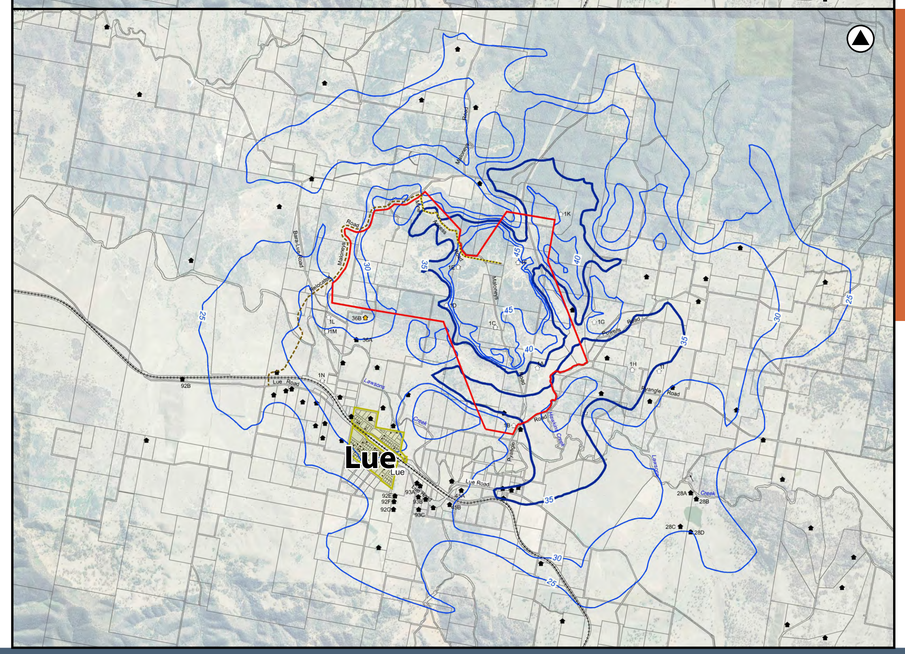


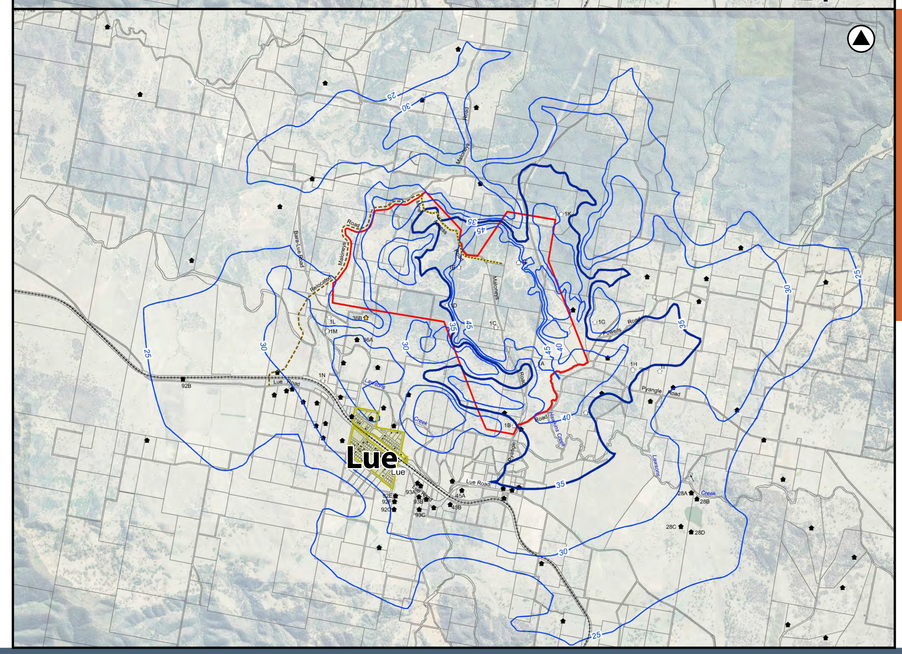
Scenario 1
Daytime
(noise enhancing wind)



Scenario 2
Evening
(noise enhancing wind)



Scenario 4
Night-time
(noise enhancing inversion + wind)



Scenario 2
Night-time
(noise enhancing inversion + wind)

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- 30 Noise Levels dB(A)

0 1.0 2.0 3.0km

Groundwater Drawdown Source: Jacobs 2019
Groundwater Bores Source: Water NSW

Blasting

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Blasting is proposed generally on a daily basis, Monday to Friday to fragment an average of 25,000 tonnes of ore and/or waste rock during each blast.

All blasts would be designed to satisfy ground vibration and airblast limits specified by the EPA.

Blasting limits are set out at levels to avoid human discomfort with negligible potential to cause building damage.

Blast events may occasionally be heard in Lue as a distant rumble but rarely felt.

What the community would like to see	What we propose
No blasting in unfavourable conditions	Scheduling of blasts to avoid adverse weather
No damage from blasts	Designing blasts to satisfy ground vibration, airblast limits and monitoring everyblast to verify the blast design.
Blast alerts	Provision of blast notifications to local residents and notification board in Lue
Publish blast monitoring data	Development of a regular newsletter summarising environmental monitoring outcomes – uploaded to Bowdens Website

Air Quality Assessment

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- Undertaken in accordance with the EPA's Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW
- Modelling has been undertaken over the mine life
- Cumulative impacts have been assessed, taking into account the combined effect of existing baseline air quality and emissions from the Project
- Assessment focuses on dust and particulate matter, as well as metals and respirable crystalline silica
- Completed an extensive background dust monitoring program, including analyses of metals.
- Collected extensive local meteorological data for use in dispersion modelling

Particulate Sizes

- TSP – total suspended particulate matter - all suspended particles in the air. The upper size range is typically 30µm – 50µm.
- PM_{10} –particles with equivalent aerodynamic diameters of less than 10µm.
- $PM_{2.5}$ –particles with equivalent aerodynamic diameters of less than 2.5µm diameter (a subset of PM_{10}). Often referred to as the fine particles.
- We also consider dust deposition – the dust that may fall on an area and cause nuisance impacts.

Predicted Air Quality Impacts

- No exceedances of the impact assessment criteria are predicted at private residences for cumulative annual average PM_{10} concentrations, $PM_{2.5}$ concentrations, total suspended particles (TSP) concentrations and dust deposition levels
- No exceedances of the impact assessment criteria are predicted at private residences for metal dust concentrations and respirable crystalline silica
- Resultant health risks from the proposed operations are predicted to be negligible
- The predicted 24-hour average PM_{10} concentrations would exceed the impact assessment criteria at 3 residences within or close to the Mine Site
- The predicted 24-hour average $PM_{2.5}$ concentrations would not exceed the impact assessment criteria at any residences

Air Quality Assessment

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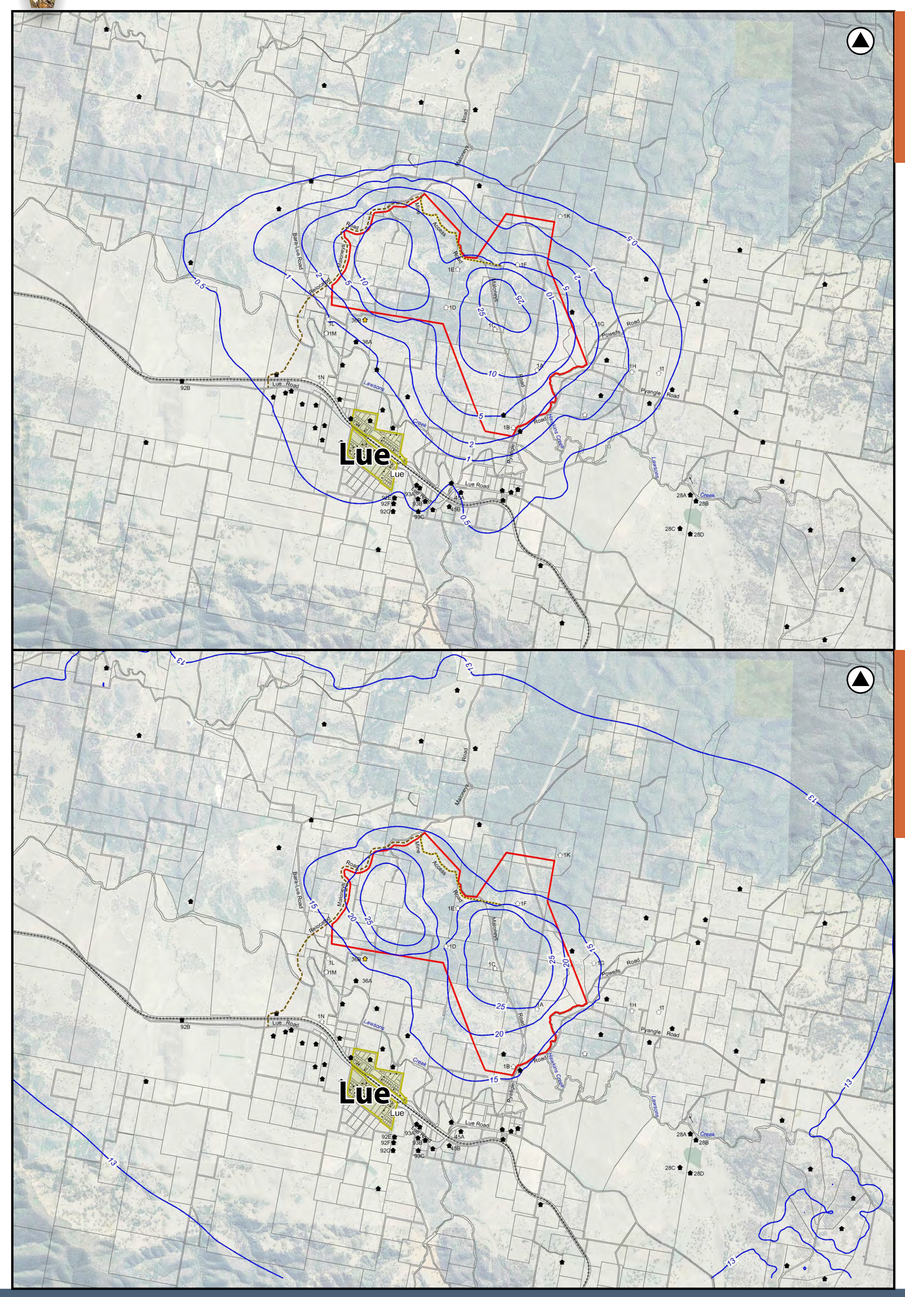
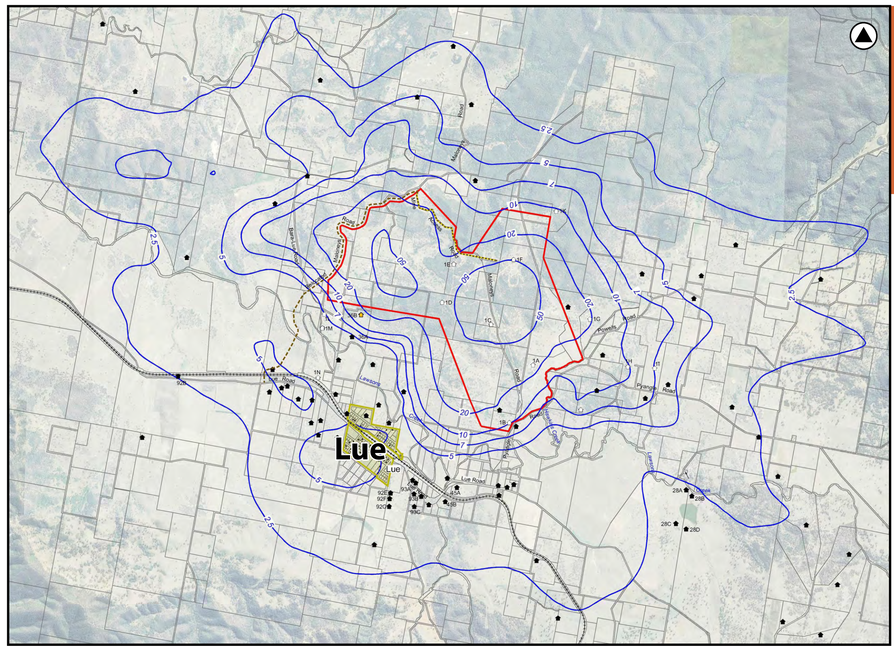
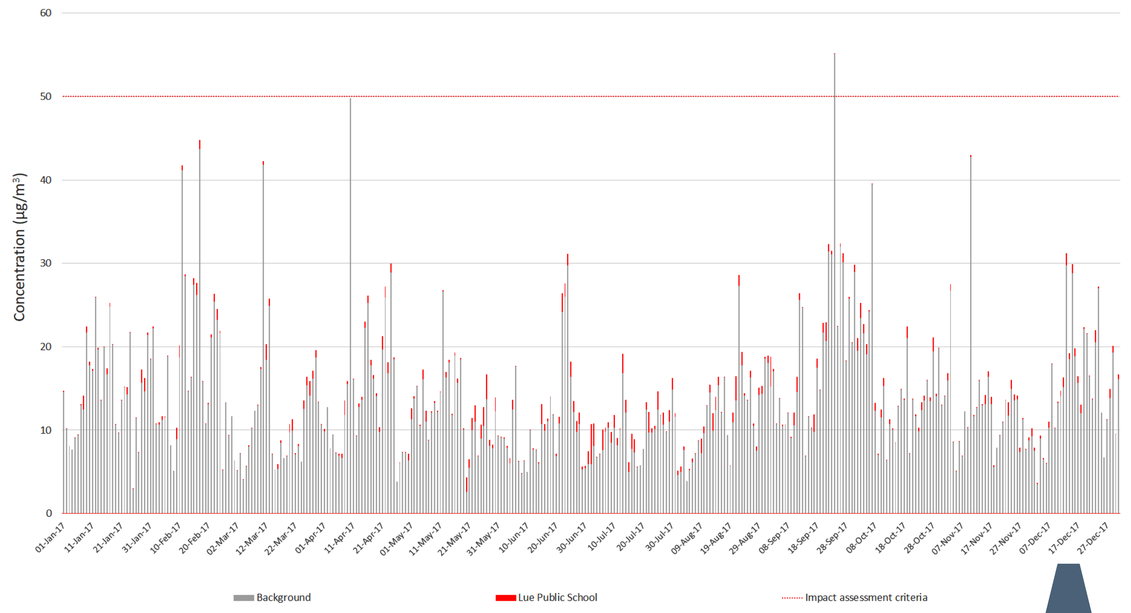


Annual average PM_{10} – Project increment



24-hour average PM_{10} – Project increment

Annual average PM10 – Project increment plus existing



24-hour average PM_{10} – Project increment plus existing at Lue Public School

Air Quality and Dust

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"Dust after you blast is my only concern from a health point of view"

"We're concerned about prevailing winds and potential for lead contaminated dust in soil and tank waters"

What the community would like to see	What we propose
Dust suppression e.g. use water carts or seal the road	Watering of all actively used internal haul roads Committed to sealing section of the relocated Maloneys Road
Dust modelling and monitoring	Implement a proactive air quality management system utilising • meteorological forecasts • real time meteorological and air quality monitoring • proactive response based on alerts Continue to sample and monitor air quality and build on our robust dataset. Dataset based on regular monitoring since 2011/12 at Mine Site and Lue Village of groundwater, surface water, air quality and meteorological data
No blasting in unfavourable conditions	Scheduling of blasts to avoid adverse weather
Blast alerts	Provision of blast notifications to local residents
Publish environmental data	Development of a regular newsletter summarising environmental monitoring outcomes – uploaded to Bowdens Website

Human Health Risk Assessment

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The human health risk assessment is being prepared in accordance with the enHealth "Guidelines for assessing Human Health Risks from Environmental Hazards" (2012) as required by the DPE's assessment requirements.

Assessment involved:

- A comprehensive air, soil and water monitoring program, including analyses of metals
- Detailed testing of soil material to determine how much lead may come off the soil and be available to be absorbed by humans, where exposure occurs
- Consideration and assessment of:
  - Emissions to air of dust which includes lead and other metals
  - Noise emissions
  - Any impacts on water quality

Health Impacts

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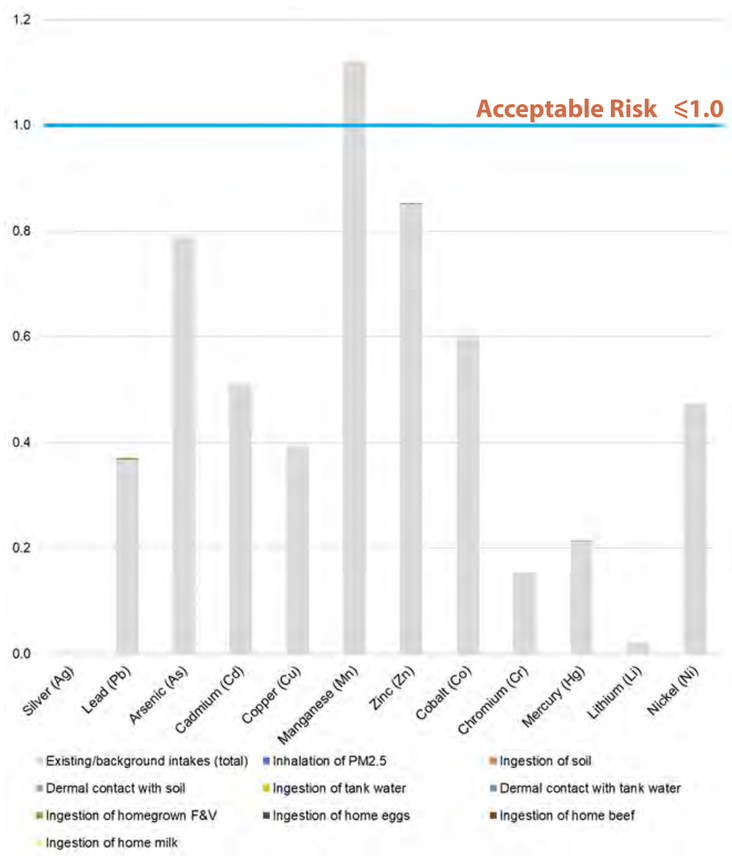
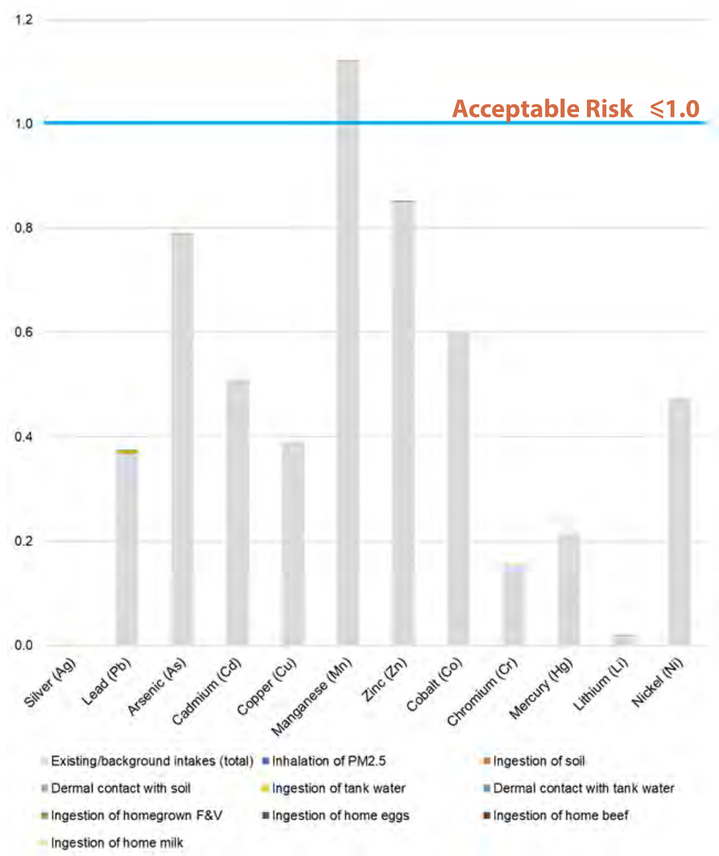
Preliminary Health Assessment Outcomes – Air Emissions

Year 8 Operations – Total Risk for Young Children
Representative Worst Case Lue Village Residence



Year 8 Operations – Total Risk for Young Children
Representative Worst Case Rural Residence



Risk from Existing Exposures + **Risk from Additional Exposures from the Project** = **Total Risk**

$$\textbf{Risk} = \frac{\text{Exposure or intake from sources}}{\text{Acceptable intake (no health effects)}}$$

Acceptable Risk ⩽1.0

Health Impacts

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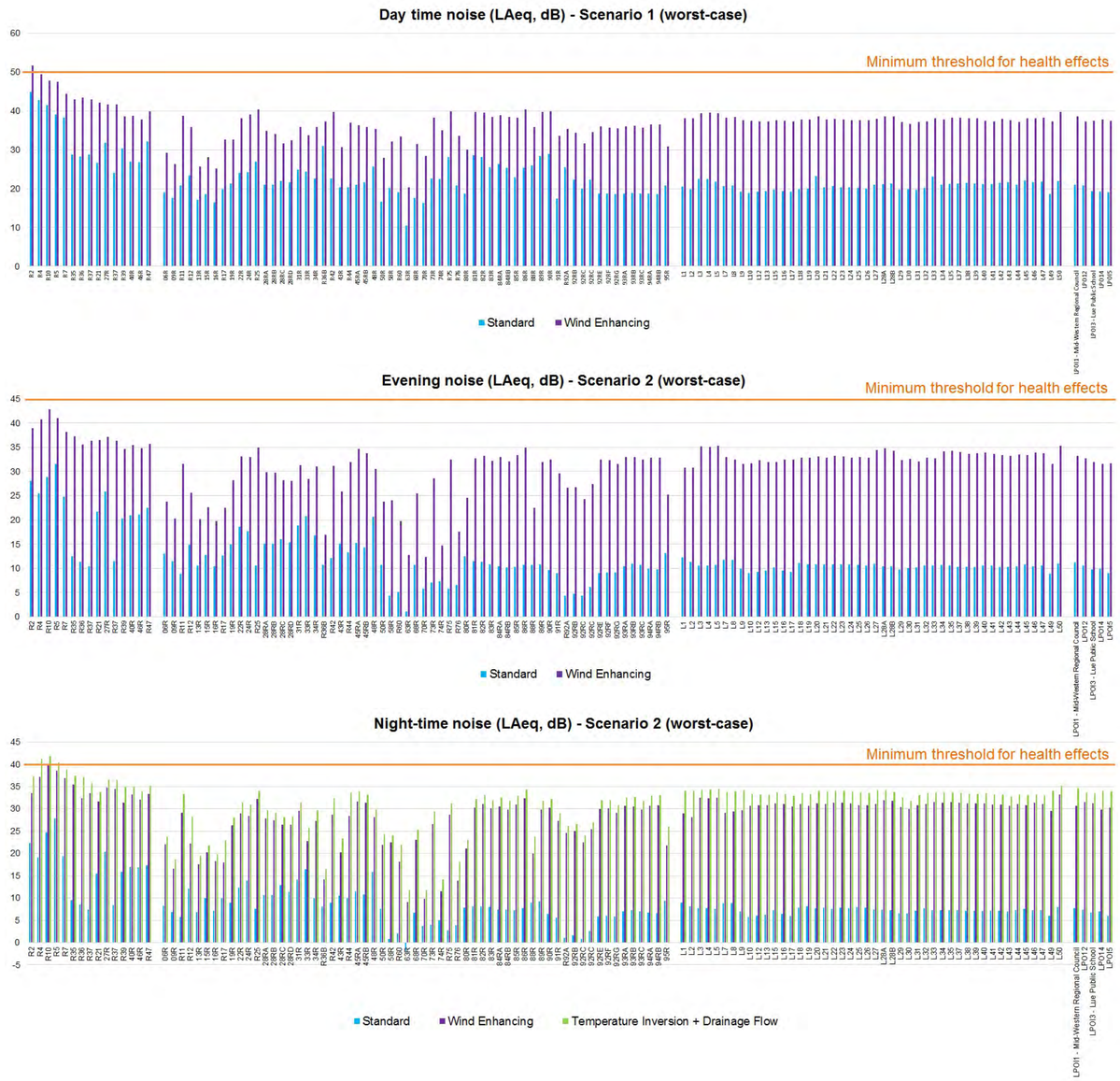
Preliminary Assessment Outcomes - Noise



What does this mean?

- Almost all noise levels during the day, evening and night are below health based thresholds for any adverse health effects.
- Some minor exceedances during worst-case meteorological conditions for a few properties.
- These are properties where acquisition or agreements are required
- Mitigation measures at the residences would achieve reductions of noise levels to be below the health thresholds for day, evening and nights.

Health Impacts

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"There is no safe level of exposure to lead"

Local comment...

"If I had a child at a school with a mine 2.5km away I would have serious concerns"

"The health and welfare of the entire community surrounding the proposed mine site will be irrevocably affected by long term exposure to lead particles released into the atmosphere by the mining process"

What the community would like to see	What we propose
Publish accurate and consistent information regarding lead levels	Development of regular newsletter summarising soil, water and air quality monitoring outcomes
Don't blast in unfavourable weather conditions	Scheduling of blasts to avoid adverse weather
Dust control and suppression	Watering of all internal haul roads Committed to sealing section of the relocated Maloneys Road
Lead risk management	Implement a comprehensive air, soil and water monitoring program, including analyses of metals

Do you have any further strategies?

Use the sheet below to record any additional strategies for us to consider.