



Bowdens Silver Project

State Significant Development Assessment
SSD 5765

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Executive Summary

Bowdens Silver Pty Limited (Bowdens Silver) proposes to develop the Bowdens Silver Mine (the project), an open cut silver, lead and zinc mine approximately 2 kilometres (km) north of the village of Lue in the Mid-Western Regional Council area.

The mine would extract and process around 30 million tonnes (t) of ore (up to 2 million tonnes per annum) to produce a silver/lead concentrate and a zinc concentrate.

The mine would comprise a main open cut pit, two satellite pits, and mine site infrastructure including a processing plant, waste rock emplacement, ore stockpiles, a tailings storage facility and ancillary infrastructure.

The project would also involve the relocation of an approximately 5 km section of a local road (Maloneys Road) and the realignment of part of a 500 kilovolt (kV) transmission line owned by TransGrid.

Strategic Context

The area around the proposed mine site is predominantly rural agricultural and the mine site itself is currently used for livestock grazing. However, mining is a key industry in the Central West and Orana region and contributes around 23 per cent to the regional economy.

The global demand for metals is growing, driven by an expanding world population, industrialisation and the needs of new and emerging high technology industries, particularly in the information, renewable energy and transport sectors.

The Bowdens silver deposit is the largest undeveloped silver deposit in Australia and one of the largest globally. Although silver is the metal with the highest economic value in the ore body, it occurs in association with other minerals, including lead and zinc, which are also valuable metals.

The project would target around 30% of the mineral resource, which is estimated to be 318 million ounces of silver equivalent (including 176 million ounces of silver plus zinc, lead and gold as by products). With improved silver pricing, greater resource definition, and refinements in processing, more of the resource may be economically extractable, including approximately 43 million ounces of silver equivalent resource below the proposed open cut pit.

Assessment Process

The project is classified as State significant development under the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the Independent Planning Commission of NSW (Commission) is the consent authority, as there were more than 50 unique public objections to the project during the 56 day exhibition of the project's Environmental Impact Statement (EIS) in June 2020 and July 2020.

The mine site component of the project was declared as a 'controlled action' under *the Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to its potential impacts on threatened species and communities and is assessed in accordance with the Bilateral Agreement between the Commonwealth and NSW Governments.

Bowdens Silver has amended the application two times: the first to include the realignment of the 500 kV transmission line; and the second to change the water supply and water management strategy, including removing a proposed water supply pipeline from the application.

The Department's assessment report and recommended conditions of consent are now referred to the Commission to make a determination on the project.

Engagement

The Department considers that its engagement process met the community participation requirements of the EP&A Act, associated EP&A Regulation and the State's obligations under the Bilateral Agreement with the Commonwealth Government.

During the exhibition period, the Department received 1,905 public submissions and advice from 14 government authorities and Mid-Western Regional Council. Of the 1,905 public submissions 1,835 came from individuals and 70 from special interest groups, including 1,503 submissions supporting, 384 objecting and 18 providing comments. Upon exhibition of the first amendment, an additional 130 submissions were received, of which 119 were objections. The second amendment then received an additional 302 submissions, of which 268 were objections.

Following the EIS exhibition period, the Department received additional representations on the project, mainly from the local landholders and their representative, the majority of which objected to the project. The Department's assessment has considered all the received submissions and representations.

During its detailed assessment of the project, the Department engaged with independent experts, inspected the proposed site and surrounds, met with the key stakeholders face-to-face or virtually, including the Lue Action Group and nearby residents, and attended the project's Community Consultative Committee meetings on a number of occasions.

Assessment

The Department considers the key assessment issues relate to impacts to water resources, amenity and health impacts, traffic, social impacts on the local community, and biodiversity, along with the economic benefits of the project to the local and regional economy. There are also other important impacts to consider, including impacts on Aboriginal cultural heritage and historic heritage, agriculture, along with hazards and risks and greenhouse gas emissions.

The Department's assessment has been informed by expert advice from Government agencies and five different independent experts in the fields of groundwater, surface water and acid mine drainage, health, social impacts, and economics.

Water Resources

The project is designed to maximise the reuse of water and minimise clean water take on site, and Bowdens Silver has sufficient entitlement under its harvestable rights and water access licences to account for the mine's water take.

Groundwater inflows into the open cut pit would cause drawdown of groundwater levels in the vicinity of the mine. There are no listed high priority groundwater dependent ecosystems (GDEs) that would be impacted. One privately owned bore could potentially experience drawdown of greater than 2m, although this is considered unlikely because the bore is in a shallow aquifer that is not hydraulically connected. Nevertheless, the Department has recommended a condition requiring Bowdens Silver to compensate the landowner if updated modelling indicates the bore will be impacted.

The mine has been designed to avoid offsite discharges except from sediment dams if the water quality is suitable. Key infrastructure has been designed to limit the risk of failure, overflow or seepage, and ongoing monitoring and adaptive design is proposed to minimise the risk of water pollution.

The extraction of mineral resources is often associated with sulphide ores, which means waste rock and tailings may contain potentially acid forming (PAF) material, and any potential acid mine drainage (AMD) must be effectively managed. In line with best practice AMD management, Bowdens Silver would separate the PAF material extracted during mining and encapsulate it within the waste rock emplacement, which has been designed to limit the ingress of water and oxygen and consequent formation of acid. The Department engaged independent experts Earth Systems to provide advice about AMD management for this project. Based on this advice, the Department has recommended a range of strict conditions, including a further verification process to confirm the volumes of PAF material, and the preparation of a detailed AMD management plan.

The main open cut pit would remain a void that would slowly fill with water after mining ends. While the void has been designed to remain a groundwater sink with water flowing towards the void in perpetuity, an uncertainty analysis indicated that a groundwater through flow system could develop in some sections of the void. Bowdens Silver considers that this is unlikely, however has committed to implementing mitigation options to prevent this, including increasing the evaporative surface to ensure groundwater levels remain below the throughflow level threshold. The Department's independent groundwater expert has confirmed that this option would be sufficient to ensure the void remains a sink.

The Department has recommended conditions requiring Bowdens Silver to update the groundwater model every three years and to provide a closure strategy for the final void that details measures to ensure the final void remains a groundwater sink in perpetuity or demonstrates that seepage from the void would not cause adverse impacts on the receiving environment.

Amenity Impacts

Air dispersion modelling of the project under different mining scenarios indicates that there would be no exceedances of any of the impact assessment criteria at any private residences for particulate matter, total suspended particulates, deposited dust, silica or gaseous pollutants.

Health impacts from lead was a particular concern expressed in submissions from local community members and the Department carefully considered the potential for the project to increase community exposure to lead and other metals. Metals are ubiquitous in the environment and people are commonly exposed to metals including lead in dust, soil, water and food. A human health risk assessment included in the environmental impact statement showed that the intake of any metal as a result of the project would be almost negligible.

The human health risk assessment also showed that total exposure to all metals except manganese would remain below the threshold values for adverse effects. Exposure to manganese, mainly from food such as cereal products, is already elevated, and the increase as a result of the project would be negligible.

The Department has recommended conditions requiring Bowdens Silver to monitor metal concentrations in deposited dust at representative residences and to develop a trigger action response plan and contingency measures for elevated metal concentrations. The Department has also recommended conditions requiring Bowdens Silver to develop a blood lead level monitoring program and describe contingency measures in the event of increasing blood lead level trends.

Traffic

The project involves relocating an approximately 5 km stretch of Maloneys Road, which currently traverses the mine site and joins Lue Road to the east of Lue, to the west of the mine site. The relocated road would join Lue Road to the west of Lue, which would reduce project traffic through the village of Lue, as most project traffic is expected to travel to and from the west.

Construction of the new section of the Maloneys Road would occur at the start of the project life and take around six months. During this period, light vehicle traffic in Lue would increase by around 10% and heavy vehicle traffic would increase by around 42% as a result of the project. Thereafter project traffic through Lue would substantially reduce. During the peak site establishment and construction phase heavy vehicle traffic in Lue would increase by around 22.5% over current levels for a relatively short period of time.

During normal operations, heavy vehicle movements through Lue would be limited to around one delivery truck per day and 6 shuttle buses per day for employee transport. Overall, during operations, apart from a 1.4 km stretch of the relocated Maloneys Road that would be used as a mine haulage route, the project would generate up to around 16 heavy vehicle trips per day (for deliveries and mineral concentrate transport), 28 shuttle bus trips each day, and 156 light vehicle trips per day, which would be distributed on the road network (not specifically Lue).

This would represent about 10% of total traffic and about 15% of heavy vehicle traffic on Lue Road west of Lue, and about 7% of total traffic and 10% if heavy traffic on Lue Road east of Lue.

The additional project traffic is not predicted to adversely impact intersection performance along the main routes, and the level of service on all roads is expected to remain acceptable with the addition of traffic generated by the project.

Bowdens Silver would fund the relocation of the Maloneys Road and has agreed to pay \$1,705,000 over the life of the project towards road maintenance as part of a voluntary planning agreement with Mid-Western Regional Council (Council).

The mine haulage route on the relocated Maloneys Road would be used to transport materials from the mine site to the tailings storage facility (TSF) for multiple stages of construction of the TSF embankment. Around 266 haulage vehicle movements would use that section of road.

The Department has recommended conditions requiring Bowdens Silver to construct the road to a suitable standard to the satisfaction of Council.

Social Impacts

The Department acknowledges that there would be both negative and positive social impacts of the project, with negative impacts focused on Lue and surrounding residents (mainly through amenity impacts, loss of sense of place and rural way of life), while positive impacts would be experienced by the wider community (particularly by increased employment and economic opportunities).

The Department considers that the impacts to the sense of place and rural way of life would be inevitable with the introduction of a mining development in the locality and notes that the mitigation measures proposed by Bowdens Silver are consistent with industry best practice to reduce the impacts as far as practicable.

The Department has recommended conditions requiring Bowdens Silver to prepare and implement a social impact management plan in consultation with Council and key stakeholders (including Lue

residents) to include a Stakeholder Engagement Framework, measures to enhance positive impacts and mitigate negative and cumulative impacts of the project, as well as a program to monitor, review and report on the effectiveness of these measures.

Biodiversity

The project has been designed to avoid and minimise the disturbance of native vegetation as much as practicable. Nevertheless, approximately 381.17 ha of native vegetation comprising seven plant community types would have to be cleared. 180.17 ha of this vegetation meets the definition under the BC Act for the critically endangered ecological community *White Box, Yellow Box, Blakely's Red Gum Woodland* (Box Gum Woodland). Approximately 48% of the 180 ha of Box Gum woodland that would be cleared is derived grassland, having had the trees and shrubs cleared by past agricultural activities.

The vegetation on and around the site also provides habitat for a variety of fauna species. 14 species that are listed as threatened under the BC Act and/or the EPBC Act were identified in field surveys for the project and a number of other threatened species are presumed to occur due to the presence of suitable habitat.

The Department has recommended conditions requiring the residual impacts to be offset. Bowdens Silver is proposing to satisfy the majority of the offset requirements through the establishment of offset sites secured by Biodiversity Stewardship Agreements and has identified some candidate offset sites already owned or secured by the company within or adjacent to the mine site.

Other Issues

The project would directly impact 25 Aboriginal cultural heritage sites comprising artefact scatters and isolated aboriginal items, two scarred trees and a rock shelter with potential archaeological deposits. Bowdens Silver is proposing to salvage the objects at all sites and store them on-site in a "keeping place" before eventually replacing them in rehabilitated areas.

The Department has recommended conditions to mitigate and manage impacts to Aboriginal cultural heritage, including provisions for a Heritage Management Plan, including Aboriginal cultural heritage (to be prepared in consultation with Heritage NSW and RAPs). The Department has also recommended a condition giving effect to Bowdens Silver's commitment to implement a mentorship program that would partner a project archaeologist and an elder in the community with Aboriginal youths interested in learning the process for recording, collecting, analysing and curating.

The Department has considered other impacts of the project, including rehabilitation and final landform, hazards and risks, blast and vibration, greenhouse gas emissions and historic heritage. The Department considers that these impacts have been sufficiently minimised and that residual impacts can be appropriately managed and/or offset and regulated through the recommended conditions.

The project would have economic benefits for Australia, NSW and the local community. Around 210 employees would be directly employed during operations and 131 people during construction. The project would invest in the order of \$310 million in capital, contribute company and payroll taxes and royalties to the Commonwealth and State governments, and make direct contributions towards local community infrastructure through the VPA. It would also generate a range of flow-on economic benefits.

Evaluation

The Department has carried out a detailed assessment of the merits of the project, in accordance with the relevant requirements of the EP&A Act, with a particular focus on issues raised in public submissions, representations, government agency advice and advice provided by the Department's

independent experts. The Department has carefully considered the objectives of the EP&A Act, including the ESD principles, and relevant considerations under section 4.15(1) of the EP&A Act.

The project is located near Lue and surrounding rural residential areas. The key issues associated with the project predominantly relate to amenity, health and social impacts on nearby rural residents due to development of a greenfield mine in what is currently primarily an agricultural area.

The Department acknowledges the high degree of public interest in the project and the broad range of community concerns, including but not limited to impacts on the health and amenity of the local community, water resources, biodiversity, agriculture, and Aboriginal cultural heritage. The Department also recognises that a prospect of a new mine in a long-established rural character area would cause other associated social impacts, such as fears, stress and anxiety due to the uncertainty and different perceptions of how the actual impacts may be experienced in the future.

In terms of the suitability of the site, the Department notes that the target mineral resource is physically fixed in location, which means there are fundamental limitations in avoiding impacts to the surrounding community. However, there is a series of ridges (including the prominent “Bingman Hill”) that lie between the mine site and the residences in Lue, which reduces many of the typical amenity impacts of mining operations. In that context, the Department considers the site to be generally well-suited for a greenfield mine aimed at accessing Australia’s largest undeveloped silver deposit.

The Department has carefully considered all the issues raised throughout its assessment process, Bowdens Silver’s responses to community concerns, and feedback from the government agencies.

Based on this assessment, the Department considers that Bowdens Silver has designed the project in a way that would achieve a practicable balance between maximising resource recovery and minimising associated impacts on the surrounding landholders and the environment through best practice contemporary practices and mitigation measures.

The Department has recommended a strict and precautionary set of conditions in consultation with the key NSW Government agencies and has taken their advice into account in finalising the recommended conditions. The recommended conditions of consent would ensure that the project complies with contemporary criteria and standards, and that residual impacts are effectively minimised, managed and/or offset to achieve an acceptable level of environmental and social performance.

The Department also notes significance of the project’s resource, the increasing focus on minerals mining with decreasing reliance on coal and fossil fuels in the mining and energy sector and the associated growing demand for raw metals (including silver and zinc) due to urbanisation, electrification, a range of technological development and transition to renewable energies. The Department considers that the project would result in considerable economic benefits to the region and to the State of NSW through employment (up to 131 construction and up to 210 operational jobs) and royalties.

On balance, the Department considers that the benefits of the project outweigh its residual costs and that the project is in the public interest and is approvable, subject to strict conditions of consent.

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1 Introduction

1. Bowdens Silver Pty Limited (Bowdens Silver) proposes to develop the Bowdens Silver Mine (the project), an open cut silver, lead and zinc mine located approximately 2 kilometres (km) north of the village of Lue in the Mid-Western Regional Council area (see **Figure 1**).

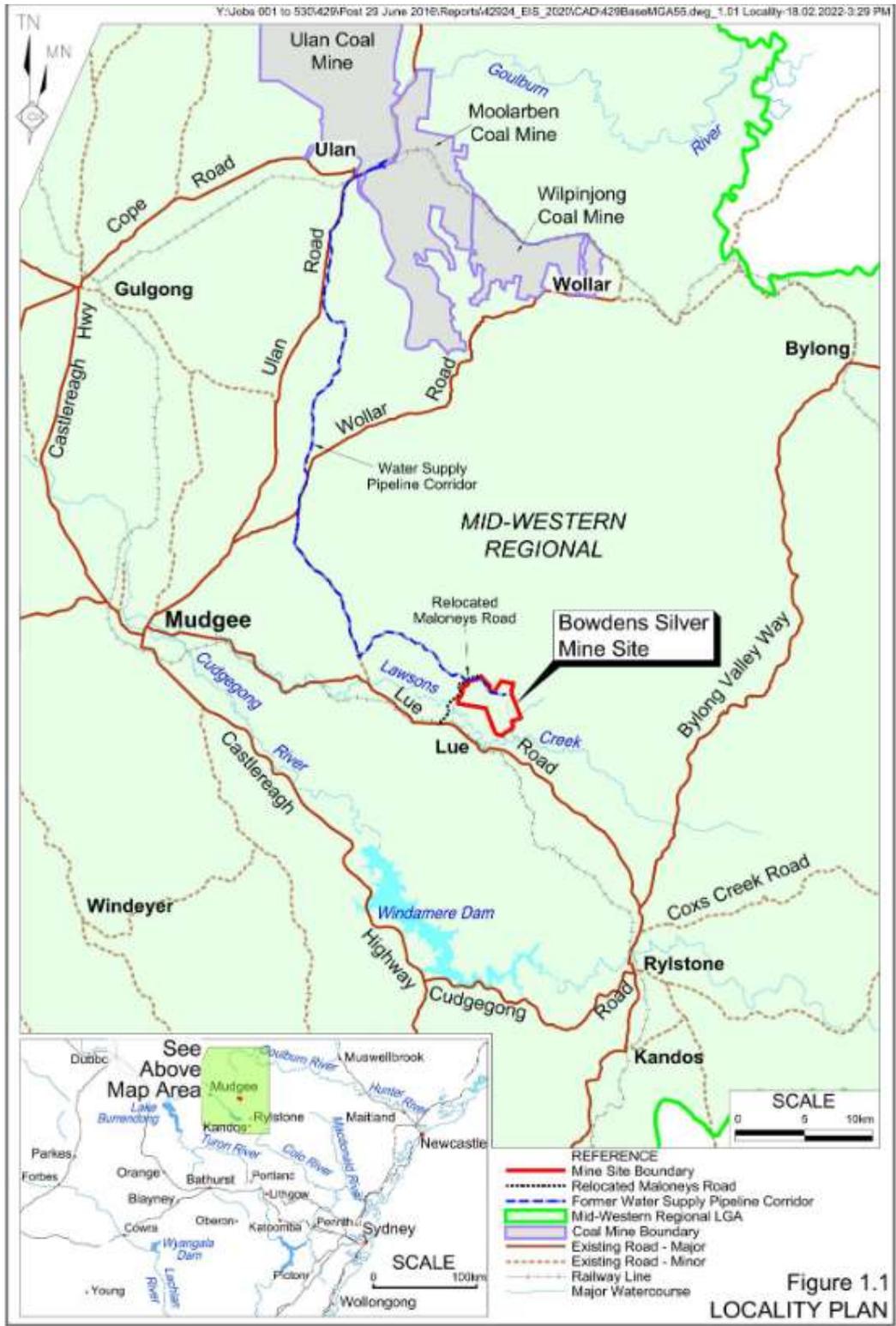


Figure 1 | Regional context

2 Project

2. The project components include:
 - an open cut mining operation to extract and process around 30 million tonnes (Mt) of ore, and up to 2 million tonnes per annum (Mtpa), to produce a silver/lead concentrate and a zinc concentrate;
 - the realignment of a TransGrid owned 500 kilovolt (kV) transmission line that traverses the site; and
 - the realignment of Maloneys Road, which runs through the middle of the proposed mine site.
3. The mine would comprise a main open cut pit and two satellite pits and mine site infrastructure including a processing plant, waste rock emplacement (WRE), ore stockpiles, a tailings storage facility (TSF) and ancillary infrastructure.
4. The key elements of the project as amended are summarised in **Table 1** below and shown in **Figure 2**.
5. Bowdens Silver amended its development application to incorporate the realignment of the 500 kV transmission line into the Part 4 application in July 2021 (first amendment) and again in March 2022 to remove a proposed water pipeline from the application (second amendment). **Table 2** provides a summary of these amendments.

Table 1 | Main components of the project

Aspect	Description
Project Area	The project area is around 1,000 hectares (ha), and would disturb around 488.5 ha of land including: <ul style="list-style-type: none"> • 457 ha within the mine site; • 19 ha for the relocated the Maloneys Road; and • 12.5 ha for the realignment of the 500 kV transmission line
Project Life	Approximately 23 years, including 18 months for site establishment and construction, 16.5 years of mining and processing and 7 years for final rehabilitation, with overlap between project stages
Processing	Up to 2 Mtpa of ore would be extracted and processed, including crushing, grinding, froth floatation and thickening processes
Product	Approximately 310,000 tonnes (t) of mineral concentrates would be produced over the project life comprising 60% zinc concentrate (with a small silver content) and 40% silver/lead concentrate. This equates to: <ul style="list-style-type: none"> • 66.3 million ounces of silver; • 130,000 t of zinc; and • 95,000 t of lead
Tailings / Waste Management	Around 30 Mt of waste residue (tailings) from ore processing would be stored in a tailings storage facility (TSF) which would be constructed in three stages. Approximately 46.3 Mt of waste rock would be transported to a waste rock emplacement (WRE). Potentially Acid Forming (PAF) material would be encapsulated by Non-Acid Forming (NAF) material. NAF waste rock would also be used for on-site construction.

Aspect	Description																		
Water Supply	Operational water supply would be sourced from the paste thickener reclaim plant, clean water collected under harvestable rights, recycled leachate management dam water, TSF return decant water, inflow into the open cut pit, sediment water collected in sediment dams, and advanced groundwater dewatering ahead of mining.																		
Water Management	The on-site water management system would comprise clean water diversions, clean water capture, sediment basins, mine water management facilities, and an on-site water treatment plant to produce potable water. Site water within the mine water management system would be captured and reused in processing and dust suppression activities.																		
Ancillary Infrastructure	Ancillary infrastructure to be constructed and operated includes a processing plant, internal road network, water management structures, water treatment plant, workshops, storages, substation, power/water reticulation, offices, amenities etc																		
Relocated Maloneys Road	5.2 km in length including bridge crossings of the railway line and Lawsons Creek. Construction of the new section of road would occur in the first six months of the project																		
Realignment of 500 kV transmission line	Would occur in around year 3 of the project life and take approximately six to ten months to complete																		
Construction Hours	<table border="1"> <thead> <tr> <th>Activity</th> <th>Mon - Fri</th> <th>Sat</th> </tr> </thead> <tbody> <tr> <td>Site earthworks</td> <td>7:00am – 10:00pm</td> <td>7:00am – 6:00pm</td> </tr> <tr> <td>Maloneys Road construction</td> <td>7:00am – 6:00pm</td> <td>8:00am – 6:00pm</td> </tr> <tr> <td colspan="3">Months 7 - 18</td> </tr> <tr> <td>Processing plant</td> <td>7:00am – 10:00pm</td> <td>7:00am – 6:00pm</td> </tr> <tr> <td>• TSF</td> <td>7:00am – 6:00pm</td> <td>8:00am – 1:00pm</td> </tr> </tbody> </table>	Activity	Mon - Fri	Sat	Site earthworks	7:00am – 10:00pm	7:00am – 6:00pm	Maloneys Road construction	7:00am – 6:00pm	8:00am – 6:00pm	Months 7 - 18			Processing plant	7:00am – 10:00pm	7:00am – 6:00pm	• TSF	7:00am – 6:00pm	8:00am – 1:00pm
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Mine Site Access	Pyangle Road and the existing Maloneys Road would be used until the new section of Maloneys Road is constructed (around six months). Thereafter, primary access would be via the relocated Maloneys Road and mine access road (a closed 2.2 km section of the former Maloneys Road).																		
Transport	Concentrate would be transported in containers to Newcastle, Port Botany or Port Pirie in South Australia.																		
Rehabilitation Strategy	The mine site would be progressively rehabilitated with pasture and woodland species to return the site to be suitable for a combination of grazing and biodiversity habitat. The two satellite pits would be completely backfilled. The main open cut pit would remain as a final void.																		
Employment	<p><i>Construction:</i> an average of 131 full time equivalent (FTE) jobs and a peak of 246 FTE jobs per year.</p> <p><i>Operations:</i> an average of 210 FTE and a peak of 230 FTE jobs per year</p>																		
Capital Investment Value	\$310.50 million																		

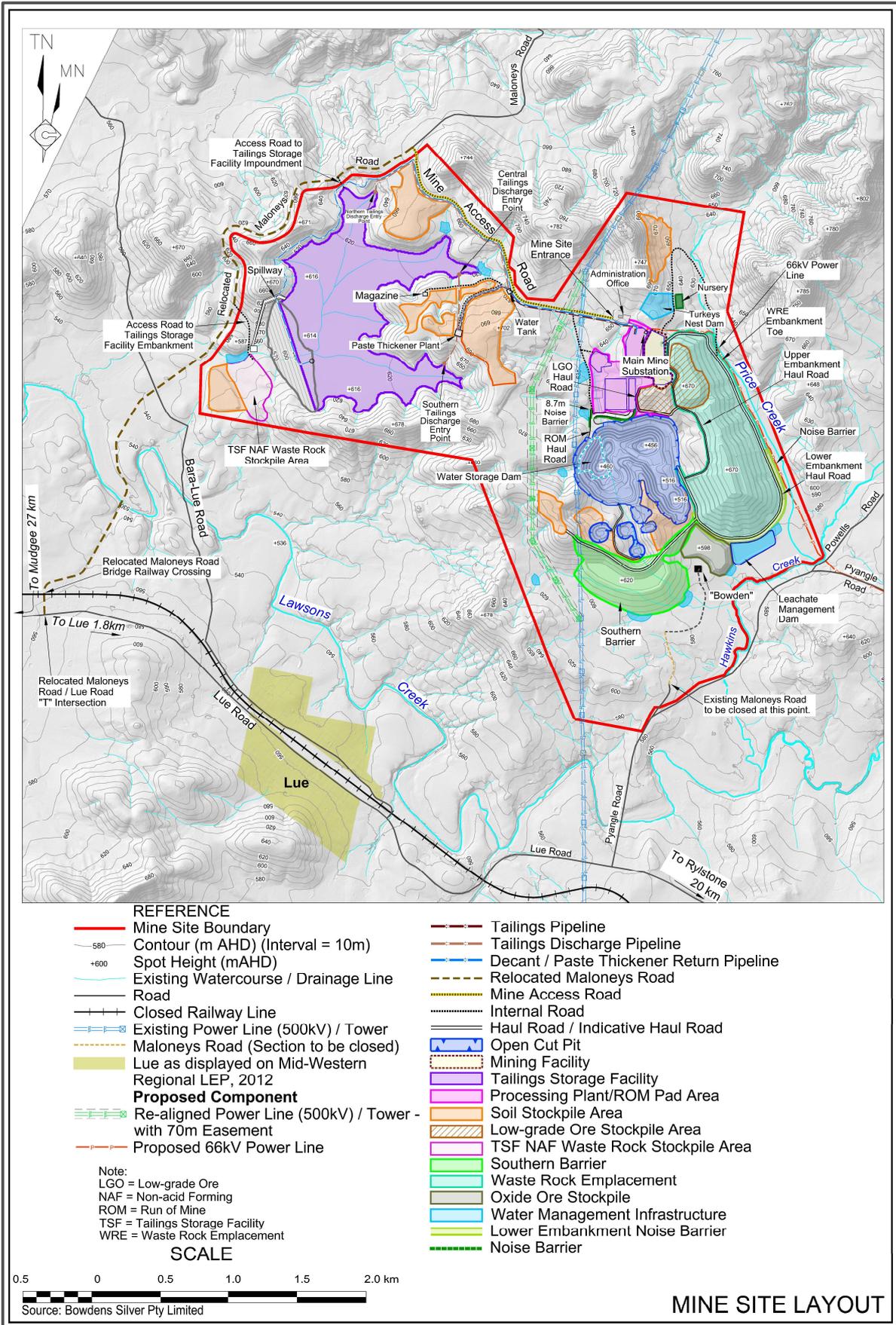


Figure 2 | Project layout

Table 2 | Summary of project amendments

Amendment	Details
First Amendment	<ul style="list-style-type: none">• Inclusion of the realignment of approximately 3.5km of the 500kV transmission line that traverses the western side of the proposed main open cut pit.
Second Amendment	<ul style="list-style-type: none">• Removal of a proposed water supply pipeline from the Ulan coalfields to the mine site. Update to the water management strategy and site layout, including:<ul style="list-style-type: none">- addition of a paste thickener plant and associated infrastructure (i.e. water transfer pipelines) to dewater and pump tailings;- changes to the size, location and number of dams on the mine site;- changes to the location of soil stockpiles; and- advanced dewatering of the open cut pit from onsite bores.• Amended the proposed alignment of the 500kV transmission line to address visual impact concerns raised by nearby residents.

2.1 Related Development

6. Bowdens Silver is proposing to power the site with electricity supplied via a new 66 kilovolt (kV) powerline connecting to an onsite substation. Although an alignment has not yet been selected, Bowdens Silver is investigating an option to connect the new powerline to the existing electricity network at Breakfast Creek, and is in discussions with Endeavour Energy, which would be responsible for the management and maintenance of the powerline. Endeavour Energy has indicated to Bowdens Silver that this option is feasible.
7. Although required for the project, this powerline does not form part of the development application for the project. Bowdens Silver is intending to seek separate approval under Part 5 of the EP&A Act for the 66 kV powerline.

3 Strategic Context

3.1 Project Setting

8. The majority of the project site (around 910 ha) is used for livestock grazing, with the surrounding area comprised of a combination of grazing, lifestyle rural residential lots and heavily vegetated areas.
9. There are 28 privately owned rural residences located within 3 km of the edge of the open cut pit (four of them within 2 km).
10. The village of Lue is located approximately 2 km to the south of the proposed mine site boundary. There are around 40 privately-owned residences within the village and another 30 dwellings on the outskirts of the village.
11. The residents in and around Lue have a strong connection to the agricultural industry, with the majority of people employed in agriculture, fishing or forestry. Around 12.3% are employed in the accommodation and food services industry.
12. Based on the findings of the social impact assessment undertaken for the project, the local community has a strong sense of community and values its historical buildings including the Lue school, Lue Hotel and Lue Hall. The community also values the peace and quiet of Lue and surrounds and identifies as being a cohesive and close-knit community.
13. Although cattle and sheep grazing are the predominant agricultural activities in the region, the area also has a long history of grape production and a growing olive production industry. Elephant Mountain Wines is the closest vineyard to the mine site, being located 3.8 km to the east. The Rylstone Olive Press and East Ridge Olives are both notable olive growers, which are located approximately 5.3 km southeast and 2.6 km east of the mine site, respectively.
14. The region is also popular for agri-tourism, with several guesthouses and B&Bs in the district. The numerous wineries and scenic nature of the area are the principal attractions for tourists.
15. The Louee Enduro and Motorcross Complex, located on a working sheep and cattle farm around 3 km south of the mine, is also a popular destination for off-road motorcyclists.
16. The proposed mine site itself is steeply undulating with three north/south oriented ridges in the central part of the site and northeast/southwest oriented ridges dominating the western side of the mine site. One of these ridges, known locally as “Bingman Hill” or “Bingman Ridge”, is a prominent local topographic feature between the mine site and Lue (see **Figure 3**).
17. The major regional waterway in the area to the south of the project site is Lawsons Creek, a tributary of the Cudgegong River. Hawkins Creek, Price Creek, Blackmans Gully and Walkers Creek as well as a number of unnamed gullies traverse the mine site and flow into Lawsons Creek.

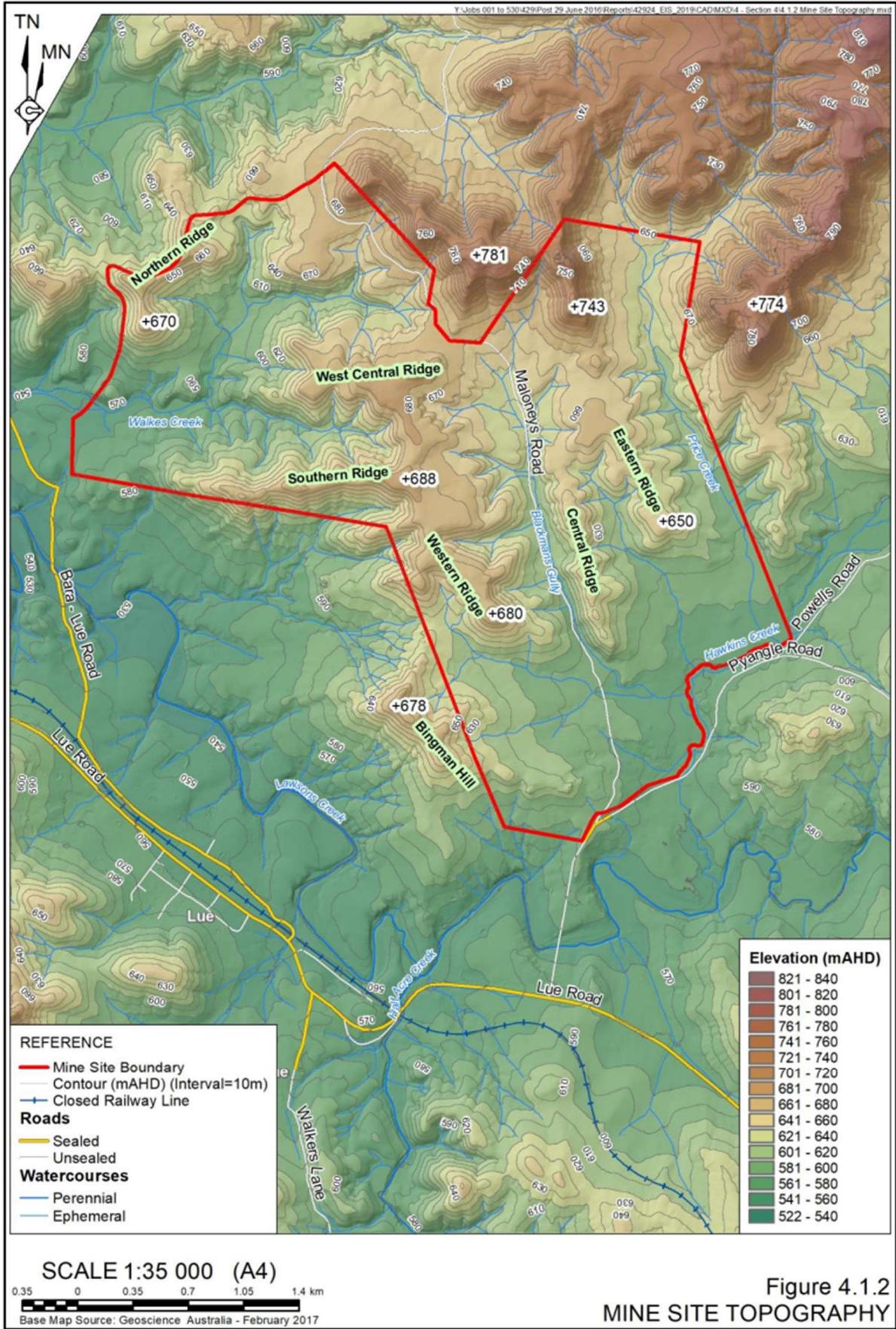


Figure 4.1.2
MINE SITE TOPOGRAPHY

Figure 3 | Mine site topography

3.2 Mineral Resources

18. Both the Federal and State Governments recognise the importance of investment in mineral mining and exploration industry and their economic benefits. These strategic policies are reflected in the following key documents:
 - *Australia's Global Resources Statement (2020)*: highlights the Australian Government's commitment to a technology-led approach to lowering Australia's greenhouse gas emissions, including a strong focus on minerals and high-tech metals within the mining sector and less reliance on coal and fossil fuels in the mining and energy sector.
 - *The NSW Minerals Strategy (February 2019)*: notes the world class mining industry and the significant and untapped resource for a range of minerals in NSW, which makes NSW well-placed to meet the increasing global demand mainly due to the growing industrialisation and advances in technologies to support development of renewable energy and transport sectors
 - *NSW Critical Minerals and High-Tech Metals Strategy*: outlines the NSW Government's vision and commitment to build on the State's potential to become a major global supplier and processor of critical minerals and high-tech metals. This strategy identifies silver and zinc as critical minerals for developing technologies and renewable energy.
19. The global demand for metals is growing, driven by an expanding world population, industrialisation and the needs of new and emerging high technology industries, particularly in the information, renewable energy and transport sectors.
20. Silver is historically an important investment metal and key constituent in jewellery. However, of all metals, pure silver has the whitest colour, the highest optical reflectivity and the highest thermal and electrical conductivity as well as being ductile and malleable. These properties mean silver also has many industrial applications and more than half of the silver produced is used in the fabrication of industrial products such as electrical and electronic products, photovoltaic cells, brazing alloys and solders.
21. Silver also has anti-bacterial properties which are being harnessed in a variety of ways, from impregnation in high technology clothing, anti-bacterial wound dressings, and water purification filters.
22. Global demand for silver is approximately 1,000 million ounces per year, varying within a narrow band since 2010. NSW hosts around 15% of Australia's demonstrated reserves and resources of silver, and the Bowdens silver deposit is the largest undeveloped silver deposit in Australia and one of the largest globally (ranking within the top 10% of silver deposits worldwide). Mining Exploration and Geoscience (MEG) also advises that although the silver grade in the deposit is relatively low, it would still rank among the top 50% of deposits globally.
23. Although silver is the metal with the highest economic value in the ore body, it occurs in association with other minerals, including lead and zinc, which are also valuable metals.
24. Zinc is the fourth most widely used metal in the world, being used principally for industrial and medical purposes. It is used as an alloy layer on steel to protect the steel from corrosion; it can be mixed with copper to form brass; and its low melting point means it can be mixed with aluminium to form a strong alloy that can be diecast to make a range of items such as carburettors, staples and zippers. Zinc is also used to make batteries, and zinc oxide is used in the production of rubber, skin products, paints, floor coverings, plastics and ceramic glazes.

25. Lead is a very corrosion resistant, dense and malleable metal that has been used for at least 6,400 years due to its softness and ease of working. However, since the negative health impacts of lead have been recognised, the range of uses have narrowed, and lead is now mainly used in batteries (lead acid batteries make up 82% of total lead use). Lead is also used in ammunition, pigments, lead crystal glass, solders, cable sheathing, extruded products, radiation protection, for lining containers and pipes used for corrosive chemicals, and in building materials to provide sound insulation.
26. The deposit being targeted occurs as a thick zone of mineralisation extending from the surface and near surface. The mineral resource in the deposit is estimated to be 318 million ounces of silver equivalent (including 176 million ounces of silver plus zinc, lead and gold as by products).
27. The project proposes to mine down to depths of 180 m to recover approximately 97 million silver-equivalent ounces (~30%) of this resource. However, improved silver pricing, greater resource definition, and refinements in processing indicate that more of the resource may be economically extractable, including approximately 43 million ounces of silver equivalent resource below the proposed open cut. This means that there may be opportunities for mining to continue beyond the project life currently proposed (subject to further approvals).
28. MEG has also advised that the deposit is unlike most deposits that have been mined to date in NSW, and that extensive sequences of analogous and prospective rocks occur at surface or beneath shallow cover along the margin of the Sydney-Bowen Basins which host numerous smaller silver deposits. Consequently, mining of the Bowdens deposit would not only be economically significant in its own right but could lead to further development of such deposits in NSW in the future.

3.3 Strategic Plans and Policies

Regional Plan

29. The project area is located within land covered by the Department's *Central West and Orana Regional Plan 2041* (Regional Plan), which sets out the vision for the region and expressly includes an objective (Objective 3) to "Sustainably manage extractive resource land and grow the critical minerals sector".
30. Mining is traditionally a key industry in the Central West and the Regional Plan notes that the region sits within the Lachlan Orogen geological province which hosts traditional metal resources such as gold, silver and base metals. The Regional Plan states that "the critical minerals and energy resource sectors make a significant economic contribution, with new extraction and processing opportunities emerging as the importance of the region's critical mineral resources to modern technology is realised." The Department has considered the objectives of the plan and provides further discussion of the environmental, social and economic costs and benefits in **sections 6 and 7**.

Strategic Land Use Plan

31. The *Strategic Regional Use Land Plan 2012* (SRLUP) was developed for the purpose of balancing economic growth while protecting agricultural land and ensuring the sustainable management of natural resources. This plan introduces the decision-making framework (known

as the Gateway process) for the identification and assessment of potential impacts to highly productive agricultural land.

32. The project's mining lease application (MLA) area is not located on mapped Biophysical Strategic Agricultural Land (BSAL) or Critical Industry Cluster (CIC) land. A Site Verification Certificate (SVC) was issued on 8 November 2017 in accordance with statutory requirements (see **section 4** below) which verifies that the MLA associated with the project is not located on BSAL.

4 Statutory Context

33. In line with the requirements of section 4.15 of the EP&A Act, the Department has given detailed consideration to a number of statutory requirements. These include the:
 - the objects of the EP&A Act identified in section 1.3 of that Act; and
 - the matters listed under section 4.15(1) of the EP&A Act, including applicable environmental planning instruments and regulations.
34. The Department has considered all these matters in its assessment of the project and has provided a summary of this consideration below. Further consideration of the objects and other relevant provisions of the EP&A Act and EPIs is found in **Appendix C**.

4.1 State Significant Development

35. The proposed development is classified as State significant development (SSD) under section 4.36 of the EP&A Act as it is a development for the purpose of mining and mining-related works with a capital investment value greater than \$30 million and thus triggers the criteria in clause 5 of Schedule 1 of *State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP)*
36. Under section 4.5 of the EP&A Act and clause 2.7(1) of the Planning Systems SEPP, the Independent Planning Commission of NSW (Commission) is the consent authority for the application because the Department received over 50 unique public objections during the exhibition period.

4.2 Permissibility

37. All project components are located wholly within the Mid-Western Regional LGA. Under the *Mid-Western Regional Local Environmental Plan 2012 (LEP)*, the mine site is on land zoned RU1 Primary Production. Development for the purpose of open cut mining is permitted with development consent in this zone.
38. The permissibility of mining developments is also controlled by *State Environmental Planning Policy (Resources and Energy) 2021 (Resources and Energy SEPP)*. Clause 2.9(1) of the Resources and Energy SEPP permits mining with development consent on land where agriculture or industry is also permitted.
39. Therefore, the Department considers that the project is permissible with development consent.

4.3 Mandatory Matters for Consideration

40. Under section 4.40 of the EP&A Act, the Commission is required to evaluate the merits of the project against the relevant matters for consideration set out in section 4.15 of the EP&A Act prior to making its determination. This includes:
- the provisions of any environmental planning instruments;
 - the terms of any planning agreement between Council and the proponent;
 - the prescribed matters for consideration in Division 8 of the EP&A Regulation, including consideration of the relevant matters in the Dark Sky Planning Guideline;
 - the likely impacts of the project, including the environmental impacts on both the natural and built environments, and social and economic impacts in the locality;
 - the suitability of the site for the project; and
 - the public interest, which includes considering the relevant objects of the EP&A Act and Ecologically Sustainable Development (ESD).

4.4 Site Verification Certificate

41. Under Clause 50A of the EP&A Act, a development application for mining or petroleum development must be accompanied by either a Gateway Certificate or a Site Verification Certificate (SVC) that certifies that the land on which the proposed development is to be carried out is not Biophysical Strategic Agricultural Land (BSAL).
42. A Site Verification Certificate (SVC) was issued on 8 November 2017 verifying that the proposed mine site is not located on BSAL. Consequently, a Gateway Certificate was not required for the proposed development.

4.5 Dark Sky Planning Guideline

43. The Siding Spring Observatory is located approximately 168 km away from the mine site. Clause 184 of the *Environmental Planning and Assessment Regulation* requires the consent authority to consider the requirements of the *Dark Sky Planning Guideline* for State significant development proposals located within 200 km of the observatory. The guideline provides guidance and technical information to ensure that lighting used in development does not impact on the effectiveness of the observatory. The visual impacts of the proposal, including lighting impacts, are **discussed in 6.6** below.

4.6 Other Approvals

44. Under section 4.41 of the EP&A Act, a number of approvals are integrated into the SSD assessment process and consequently are not required to be separately obtained for the project. These include:
- a permit under section 201, 205 and 219 of the *Fisheries Management Act 1994*;
 - various approvals relating to heritage required under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1997*;
 - a bush fire safety authority under section 100B of the *Rural Fires Act 1997*; and
 - a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interface approval) under section 91 of the *Water Management Act 2000*.

45. The Department has considered the matters covered by this legislation in consultation with the relevant agencies and has recommended conditions to mitigate and/or offset the potential impacts of the project on these matters.
46. Under section 4.42 of the EP&A Act, a number of additional approvals are required, but must be granted substantially consistent with any development consent granted for SSD. These include:
- a mining lease under the *Mining Act 1992*;
 - an environmental protection licence (EPL) under the *Protection of the Environment Operations Act 1997*; and
 - consent for road works under section 138 of the *Roads Act 1993*.
47. The Department has consulted with the authorities responsible for granting these approvals during the assessment process.

4.7 Biodiversity Assessment Report

48. The *Biodiversity Conservation Act 2016* (BC Act) replaced the *NSW Threatened Species Conservation Act 1995* in August 2017. At the time of the commencement of the BC Act, Bowdens Silver had already substantially completed its biodiversity assessment for the project and thus, pursuant to clause 27(1)(2) of Part 7 of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*, the project is classified as a “pending or interim planning application”.
49. Accordingly, the assessment of biodiversity values was completed under the Framework for Biodiversity Assessment (FBA) and documented in a Biodiversity Assessment Report.

4.8 Independent Planning Commission

50. Under section 2.9 (1) (d) of the EP&A Act the Independent Planning Commission (Commission) must hold a public hearing for any matter as requested by the Minister for Planning.
51. On 21 July 2022, the Minister for Planning requested that the Commission conduct a public hearing into the carrying out of the project prior to determining the development application. The terms of the Minister’s request are as follows (see **Appendix A**):
- Conduct a public hearing into the carrying out of the Bowdens Silver Project (SSD 5765) prior to determining the development application for the project under the EP&A Act, paying particular attention to:
 - the Department’s assessment report;
 - key issues raised in public submissions during the public hearing; and
 - any other documents or information relevant to the determination of the development application.
 - Complete the public hearing and make its determination of the development application within 12 weeks of receiving the Department’s assessment report in respect of the project, unless the Planning Secretary agrees otherwise.

4.9 Commonwealth Matters

52. On 5 April 2019, a delegate of the Commonwealth Minister for the Environment determined that the project (EPBC 2018/8372) is a 'controlled action' under the EPBC Act due to its potential impacts on listed threatened species and communities (sections 18 and 18A).
53. The assessment process under the EP&A Act has been accredited under a bilateral agreement with the Commonwealth Government to assess matters of national environmental significance (MNES). The Department's assessment on controlling provisions under the EPBC Act relating to biodiversity is provided in **section 6.5** and further information that the Commonwealth Minister must consider is provided in **Appendix D**.

5 Engagement

54. The Department publicly exhibited the EIS from 2 June 2020 until 27 July 2020 (56 days), at the Mid-Western Regional Council office and on the Department's website.
55. The exhibition was advertised in the Lithgow Mercury, the Mudgee Guardian, the Daily Telegraph, the Sydney Morning Herald and the Australian, and the Department wrote directly to landholders near the mine site notifying them of the proposal and exhibition dates.
56. The Department also publicly exhibited the amended application between 20 July 2021 and 16 August 2021 (the first amendment) and again from 25 March 2022 to 7 April 2022 (the second amendment).
57. The Department also consulted widely with the community and government agencies during its detailed assessment of the project. This included:
 - consulting with relevant government agencies on the assessment of key issues, including the Environment Protection Authority, Regional NSW, NSW Health, NSW Education, Transport for NSW, and other groups within the Department;
 - attending four Community Consultative Committee meetings since the application was lodged;
 - holding meetings with the Lue Action Group, a local community group established to oppose the mine; and
 - meeting landholders near the mine site.

5.1 Summary of Submissions

58. The Department received submissions during the exhibition of the original application and the first and second amendments. The submissions received during all three exhibitions are summarised in **Table 3** and a summary of the issues raised in the submissions is provided in **section 5.3**. All submissions are publicly available on the Department's major projects website (see **Appendix A**).

Table 3 | Summary of submissions

Application/ Amendment	Support	Object	Comment	Total Submissions
Original Application	1,503	384	18	1,905
First Amendment	10	119	1	130 (from 114 submitters)
Second Amendment	33	268	1	302 (from 256 submitters)

59. The majority (around 79%) of the submissions received during the original exhibition of the application support the project. However, as shown in **Table 4** below, submissions from people living within 5 km of the mine site were more evenly split, with approximately half (51%) opposing the project.

Table 4 | Breakdown of original submissions by distance

Distance from Mine Site	Submissions	Support	Object	Comment
Special Interest Groups	70	49	19	2
General Public	1,835	1,454	365	16
< 5km	85	39	44	2
5-100km	817	634	174	9
> 100km	933	781	147	5
Total	1,905	1,503	384	18

60. The majority of submissions received during the exhibition of the project amendments were opposed to the project. 92% of the 130 submissions received on the first amendment and 89% of the 302 submissions received on the second amendment objected to the project.

5.2 Agency Advice

61. The Department received advice from 14 public authorities on the original application, and additional advice was received on both amendments by relevant agencies. While none objected to the project, some raised issues or expressed concerns with specific aspects of the project and/or provided recommendations relating to their administrative and regulatory responsibilities.
62. A summary and overview of the key comments made by public authorities is provided below in **Table 5**. A full copy of all agency advice is available on the Department's major projects website (see **Appendix A**). Further consideration of agency advice is provided in **section 6**.

Table 5 | Agency Advice

Agency	Advice
Department of Planning and Environment	
Water Group (DPE Water)	<ul style="list-style-type: none"> Initially requested clarification and information about water licences, aspects of the groundwater model, and potential contamination of aquifers. DPE Water also

Agency	Advice
	<p>considered that the road crossing of Lawsons Creek should be a bridge structure rather than a box culvert crossing</p> <ul style="list-style-type: none"> • These matters were addressed in subsequent information provided by Bowdens Silver and the company has agreed to construct the Lawsons Creek crossing as a bridge crossing and provided preliminary designs for the crossing. • DPE Water did not raise further concerns subject to the imposition of recommended conditions. The Department has included these recommendations in the proposed conditions of consent. • The Department's consideration of the water impacts of the project is detailed in section 6.1
<p>Biodiversity and Conservation Division (BCD)</p>	<ul style="list-style-type: none"> • Initially requested clarification and further information about aspects of the biodiversity assessment report, the BioBanking calculations, and measures taken to avoid biodiversity impacts. BCD also requested further targeted surveys of koala be undertaken and noted that an updated Biodiversity Offset Strategy should be prepared once biodiversity credit liabilities have been finalised. • Bowdens Silver provided further information in its submissions report. In its final advice, BCD confirmed that the proposed staged offsetting for the project would be acceptable and recommended that credits for each stage be retired prior to impacts occurring. • The Department has included these requirements in the recommended conditions of consent.
<p>Crown Lands</p>	<ul style="list-style-type: none"> • Noted that Crown land within the mining lease or exploration is subject to a compensation agreement and access arrangement respectively.
<p>Environment Protection Authority</p>	<ul style="list-style-type: none"> • The EPA initially requested clarification and additional information on a range of matters relating to air emissions, the noise assessment and the design and operation of water storages and water quality. This was provided in the submissions reports. • The EPA recommended that targets and contingency measures for revegetation and land stabilisation to minimise windborne dust sources should be addressed in an air quality management plan and that Bowdens Silver should prepare and implement a blast management plan that includes consideration of <i>The Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting</i>. • The EPA also recommended that construction be limited to standard construction hours and that noise mitigation on the relocated Maloneys Road be implemented early to protect residents from construction impacts, and • In relation to regulating water quality, the EPA noted that any discharges from the site would require an assessment of the potential impacts on water quality, and recommended conditions relating to the design of the TSF and water storages and matters to be included in a surface water monitoring program.
<p>Department of Regional NSW</p>	
<p>Mining, Exploration & Geoscience (MEG)</p>	<ul style="list-style-type: none"> • Considers the project represents an efficient development and utilisation of mineral resources and that the mine design and mining method would adequately recover mineral resources and provide an appropriate return to the state. • Requested that Bowdens Silver engage with them in early consultation in relation to the proposed location of any biodiversity offset areas (both on and off site) or any supplementary biodiversity measures.
<p>Resources Regulator</p>	<ul style="list-style-type: none"> • Requested further information about the proposed post mining landuse and landform, including details about the vegetation proposed to be reinstated on disturbed areas, the appropriateness of rehabilitating the WRE and TSF as grazing

Agency	Advice
	<p>land, the potential for tree growth on the TSF and WRE, and consideration of geomorphic design for rehabilitation landforms.</p> <ul style="list-style-type: none"> • The Resources Regulator also requested further information in relation to void minimisation, expected water quality post-mining, and clarification about why vegetation screening is proposed only on the upper benches of the final void. • Noted that a rehabilitation management plan would be required to address consideration of mine closure and final void management including long-term stability, rehabilitation risks and identification of risk treatment controls
Department of Primary Industries	
Agriculture	<ul style="list-style-type: none"> • Was satisfied that the indicative topsoil and subsoil volumes would be sufficient soil to meet the rehabilitation objectives, acknowledged Bowdens Silver’s commitment to include biosecurity measures in a landscape management plan, and supported Bowdens Silver’s community engagement strategy and commitment to maintaining a positive relationship with the nearby agricultural industry. • Noted that agricultural production is not only influenced by land and soil values but also management actions, and recommended that the reinstatement of agricultural production is included as a rehabilitation goal, and that agricultural production data and land and soil capability assessments should be used to inform rehabilitation metrics.
Fisheries	<ul style="list-style-type: none"> • Generally concurred with the conclusions in the aquatic ecology assessment. • Recommended that toe of the WRE should be moved away from the Price Creek riparian buffer zone in order to maintain a 50 metre buffer zone, that the internal haul road crossing of Price Creek and Lawsons Creek should be constructed in accordance with <i>Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings, 2003</i>
Transport for NSW (TfNSW)	<ul style="list-style-type: none"> • Initially requested further information on the assumed capacity of haulage trucks, background traffic counts, and that consideration should be given to mitigating deficiencies identified in the road safety audit on Lue Road. • In its follow up advice, TfNSW advised that the project should be required to comply with the material haulage limits and heavy vehicles trips predicted in the traffic assessment and that Bowdens Silver should prepare a Traffic Management Plan including Driver Code of Conduct.
NSW Rural Fire Service (RFS)	<ul style="list-style-type: none"> • Recommended that a Fire Management Plan be prepared in consultation with NSW RFS Cudgegong Fire Control Centre; that a minimum 100 m Asset Protection Zone (APZ) should be established around occupied or hazardous materials storage buildings; and that a minimum 4 m wide vehicle access should be provided around the perimeter of any fixed infrastructure. • The recommended conditions include a requirement for Bowdens Silver to prepare a fire management plan in consultation with the RFS that addresses these matters
Heritage NSW (Heritage)	<ul style="list-style-type: none"> • Noted that the Aboriginal cultural heritage assessment and consultation was adequate. • Recommended that Bowdens Silver should develop an artefact research program to provide training opportunities for interested registered Aboriginal parties to developing skills in stone artefact analysis and management. • Bowdens Silver has committed to establishing an Indigenous Technical Heritage Monitorship Program and has outlined how this would work. The Department has recommended this be included as part of a broader heritage management plan, also required as condition of consent.
Dam Safety NSW (DS)	<ul style="list-style-type: none"> • Requests that daily inspections of the embankment take place and Bowdens Silver shall ensure that peak particle velocities will not exceed 50 mm/s at any point on the TSF Dam embankment. • Noted that Bowdens Silver should develop a program of seepage monitoring and implement a program of subsidence monitoring and piezometer monitoring of geotechnical drillholes within the dam embankment.

Agency	Advice
NSW Health	<ul style="list-style-type: none"> • Supports the summary of health risks and mitigation processes reported for water and noise emissions. • Notes that the health risk related to air emissions should be considered alongside the recommendations of the Environmental Protection Authority assessment of Air Quality Impacts.
NSW Education	<ul style="list-style-type: none"> • Requested that high impact works and activities be undertaken outside of school hours and that Lue Public School is notified in advance of activities that could cause high noise or vibration impacts on the school. • Supported Bowdens Silver's commitment to restrict heavy vehicle access on Lue Road during pick-up and drop-off times and requested heavy vehicles be restricted from using Swanston Street during school hours. • Requested that Bowdens Silver be required to undertake periodic soil surveys at Lue Public School prior to and following commencement of operations of the proposal.
Council	
Mid-Western Regional Council	<ul style="list-style-type: none"> • Raised concerns about water supply, water quality issues for other water users, lead dust impacts and noise impacts on Lue residents. • Supported the relocation of Maloneys Road but requested that all road upgrades are completed prior to the commencement of construction. • Recommended Bowdens Silver prepare a range of management plans, including for rehabilitation, the management of cyanide, a disaster management plan and an accommodation and workforce strategy.

5.3 Public Submissions

Submissions in Support

63. A large portion of the submissions received on the original application were in support of the project (approximately 78%), with further submissions of support received on both amendments. These submissions commented on the economic benefits the project would bring, including the creation of jobs, youth training opportunities, community sponsorships, and increased infrastructure and development in the local region.
64. A number of submissions received also highlighted the benefits the project would have on providing essential post-Covid recovery for the area.

Submissions in Objection

65. The key issues raised in the submissions of objection related to the potential impacts of the project on water resources, amenity (including noise, air quality, visual impacts and traffic impacts), human health (particularly from lead exposure), and biodiversity.
66. Submissions also raised concerns about social impacts, the potential effects of the project on the quality of life for people living near the mine, the mental health impacts caused by the project and the suitability of the site.
67. Concerns were also raised about legacy environmental impacts (e.g. pointing to examples of historical mining impacts in NSW), and submissions questioned the economic benefits and viability of the project and/or raised concerns about the possibility the project could become a stranded asset with insufficient funds to pay for rehabilitation.
68. Some submitters also questioned or criticised aspects of the modelling undertaken for the project and the adequacy of the baseline data.

69. Many of the same concerns were raised in submissions received during the exhibition of the two amendment reports. However, there was more focus on the visual impacts of the 500 kV transmission line and concerns about noise, EMF effects and construction impacts in submissions on the first amendment.
70. Submissions on the second amendment focused on water impacts and water security for other water users in the vicinity of the project.
71. 42 objecting submissions on the original application and amendments were from special interest groups. The Lue Action Group (LAG) also included reviews from technical experts on:
- biodiversity;
 - water resources, including groundwater, surface water and groundwater dependent ecosystems;
 - health and amenity, including air quality, lead exposure, noise and visual;
 - mining operations; and
 - social.
72. The Department has carefully considered the submissions provided by the community, including all expert reviews.
73. The key issues raised in public objections are summarised in **Figure 4**.

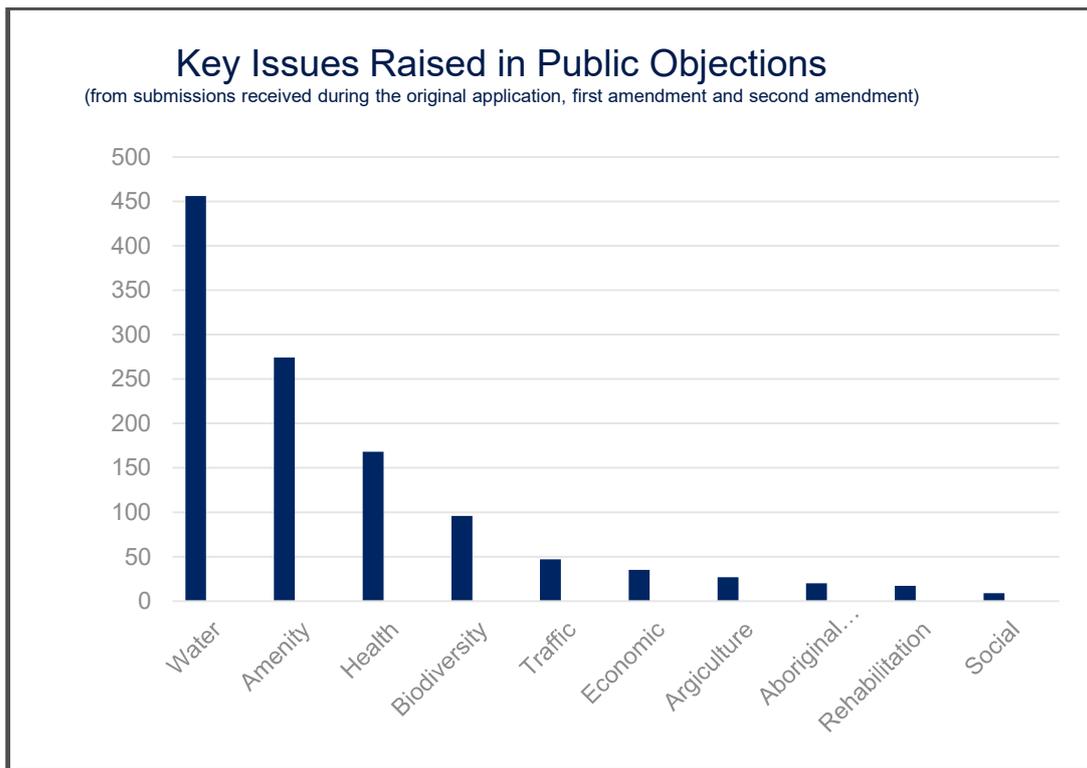


Figure 4 | Key issues raised in objections

74. Some submissions also raised concerns about the potential impacts of the proposed 66 kV powerline, including on biodiversity, property values, and existing conservation agreements. Some submissions also considered that this powerline should be included in the assessment of the project. Those impacts would be considered separately as part of any application to develop the powerline.

5.4 Submissions Reports and Amendment Reports

75. Bowdens Silver amended the project on two occasions. These amendments primarily involved the relocation of the transmission line and the removal of the water supply pipeline (see **section 2** and **Appendix A**).
76. Bowdens Silver provided submissions reports for the original application, the first amendment and the second amendment, addressing the issues raised in community submissions and agency advice (see **Appendix A**).
77. The Department made each submissions report publicly available on the Department's website and referred to applicable government agencies and council.

6 Assessment

78. The proposed project is a "greenfield" mine in what is currently a quiet rural location with a number of nearby rural residences, and the village of Lue around 2 km from the boundary of the proposed mine.
79. The Department considers that the key risks for the project are potential impacts on: water resources; amenity and health risks for the nearby community; traffic impacts; biodiversity impacts; and impacts on the social fabric of the local community.
80. These are also the potential impacts of greatest concern to members of community, particularly the immediate community near the proposed mine.
81. Due to the technical complexity of some of these assessment matters, the Department engaged a number of independent experts including:
 - Mr Hugh Middlemiss (HydroGeologic Pty Ltd) – groundwater modelling;
 - Ms Sophie Pape and Mr Jeff Tyler (Earth Systems) – surface water assessment, including water balance and acid mine drainage (AMD);
 - Dr Roger Drew (Drew Toxicology Consulting) – health risk assessment;
 - Ms Carla Martinez (WSP) – social impact assessment; and
 - Centre for International Economics (CIE) – economic evaluation.
82. The Department's consideration of these matters is addressed **sections 6.1 to 6.6** below. A summary of the Department's consideration of other issues is provided in **section 6.7**.

6.1 Water Resources

Introduction

83. Concerns about impacts on water resources were raised in the majority of submissions on the project from the local community. The Lue Action Group provided advice from various experts relating to water issues, including Craig Flavel from Water Technology Pty Ltd (groundwater), Susan Shield from Engeny Water Management (surface water), Shireen Baguley (surface water), Dr Peter Serov from Stygoecologia (groundwater dependent ecosystems) and Michael White (mining operations). The Department has considered their advice in its assessment.

84. Inflows to the open cut pits would reduce groundwater levels in the vicinity of the mine and construction of the TSF, open cut pits and other infrastructure would alter catchment characteristics. There is also potential for overflows or seepage of leachate or acidic water from the WRE, TSF, open cut pit or other water storages.
85. The EIS includes specialist groundwater and surface water assessments undertaken by Jacobs Group (Australia) Pty Ltd (Jacobs) and WRM Water & Environment Pty Ltd (WRM) respectively. The groundwater assessment was peer reviewed by Dr Noel Merrick of SLR Consulting (formerly of HydroSimulations), and the surface water assessment by was peer reviewed by Hydro Engineering and Consulting.
86. Mr Middlemis and DPE Water were generally satisfied that the groundwater model used for the assessment is fit for purpose, including sensitivity analysis to account for the range of potential water resource impacts. Nonetheless, Mr Middlemis did raise some residual concerns, particularly around the potential for long term groundwater flows out of the final void and potential water quality impacts if this were to occur. These and other impacts are discussed below.

Groundwater Context

87. The regional hydrogeology is dominated by three main aquifer groups: alluvial deposits associated with major drainages, the sedimentary rocks of the Sydney Basin, and the underlying basement of the Lachlan Fold Belt. In the vicinity of the mine site, groundwater flow is also influenced by significant fracture systems and the presence of the Permian aged volcanic rock units that host the silver mineralisation (the Rylstone Volcanics). **Figure 5** shows a conceptual cross section of these aquifers in the vicinity of the proposed open cut pit.

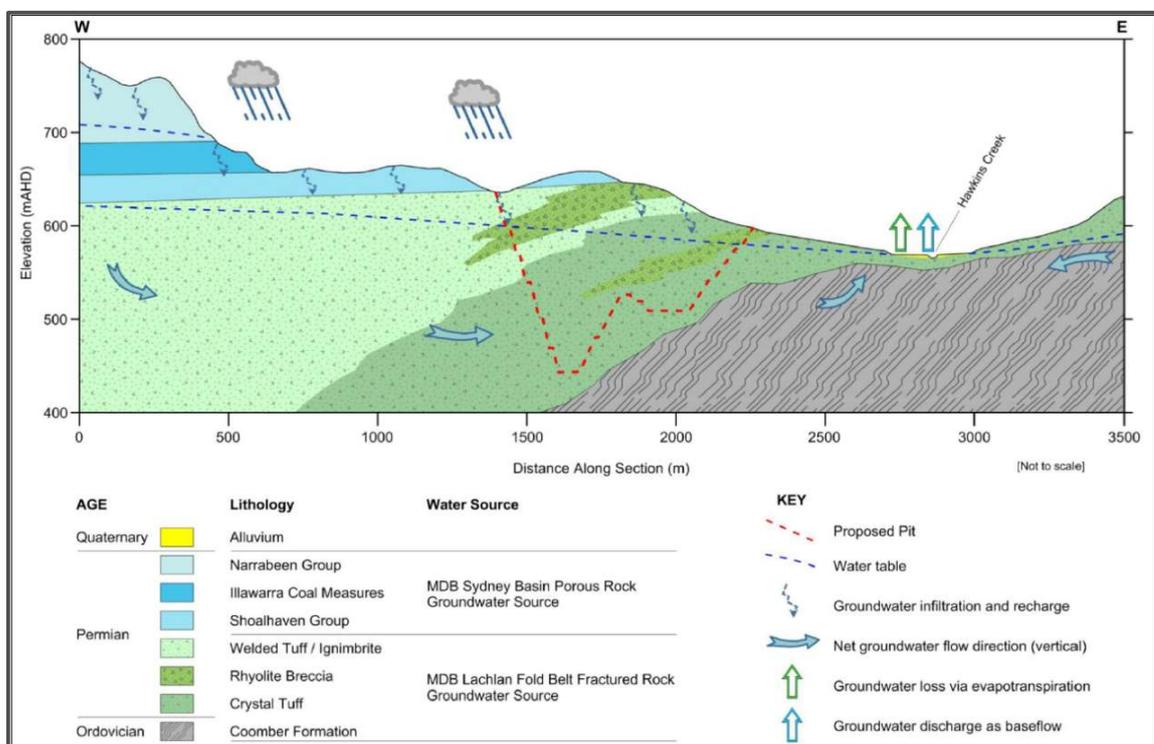


Figure 5 | Conceptual hydrogeological model pre mining (looking north)

88. The groundwater level in the vicinity of the mine site is variable, typically ranging from around 2 m below ground level (mbgl) at lower elevations to 60 mbgl beneath the elevated ridges in the

mine site. Within the proposed TSF area, groundwater levels range from 10 mbgl to 60 mbgl beneath the upper valley areas and near ground level in the middle of Walkers Creek valley.

89. The alluvium along Hawkins Creeks ranges in depth from 4 to 6 m. It has a moderate potential for local water supply and is used for domestic and stock watering purposes. Hydraulic conductivities in this unit are around 1 to 10 m/day.
90. Groundwater flow is inferred to generally reflect the topography, with flows from areas of higher elevation to areas of lower elevation. As a result, groundwater flow direction is variable across the site except in the vicinity of the TSF and main open cut pit where flows are in a south easterly direction.
91. Groundwater recharge is likely to be dominated by infiltration of rainfall runoff and ephemeral streamflow, with a small component of vertical leakage from the Sydney Basin sediments to underlying formations. The major surface water drainages are likely to alternate between being zones of groundwater recharge and groundwater discharge, depending on streamflow conditions and topography.
92. Groundwater monitoring since 2014 has consistently detected elevated levels of metals including dissolved copper, lithium, nickel and zinc, and frequently detected elevated levels of dissolved cadmium, lead and manganese. Groundwater also contains elevated levels of total nitrogen, total phosphorus, nitrates of nitrogen. Ammonia, nitrate, total nitrogen, and total phosphorous exceed the guideline values for the protection of aquatic ecosystems.
93. The regional alluvial groundwater is fresh, with electrical conductivity (EC) typically less than 1,000 $\mu\text{S}/\text{cm}$, while the regional hard rock aquifer groundwater salinity is typically slightly saline (in the 1,000-3,000 $\mu\text{S}/\text{cm}$ range). Within the mine site, the average EC in sampled water was 1,420 $\mu\text{S}/\text{cm}$, while spring water is considerably fresher with an EC averaging 150 $\mu\text{S}/\text{cm}$ suggesting that water is derived from rainfall.
94. There are 106 registered groundwater bores within 10 km of the mine site, including 24 monitoring bores managed by Bowdens. The majority of bores are used for stock, domestic and irrigation purposes, including 23 bores within 2 km of Lue at depths ranging from 3.65 to 60 m.

Surface Water Context

95. The mine site is located within the Lawsons Creek catchment in the eastern headwaters of the Macquarie River Basin. Lawsons Creek flows in a north-westerly direction and drains to the Cudgegong River near Mudgee.
96. Hawkins Creek, a tributary of Lawsons Creek, flows in a south-westerly direction near the south-eastern boundary of the mine site and joins Lawsons Creek just south of the mine site.
97. Hawkins Creek is ephemeral to semi-perennial in the vicinity of the mine site, with flows ranging from no flow to over 1 m in height. Lawsons Creek is an intermittent to ephemeral watercourse, with flows downstream of Hawkins Creek estimated to average approximately 19.5 ML/day.
98. Other named watercourses within the mine site include the southward flowing Price Creek to the east of the proposed WRE, Blackmans Gully that flows southwards through the centre of the mine site, and the westward flowing Walkers Creek. The TSF is proposed to be constructed within the upper sections of the Walkers Creek catchment.

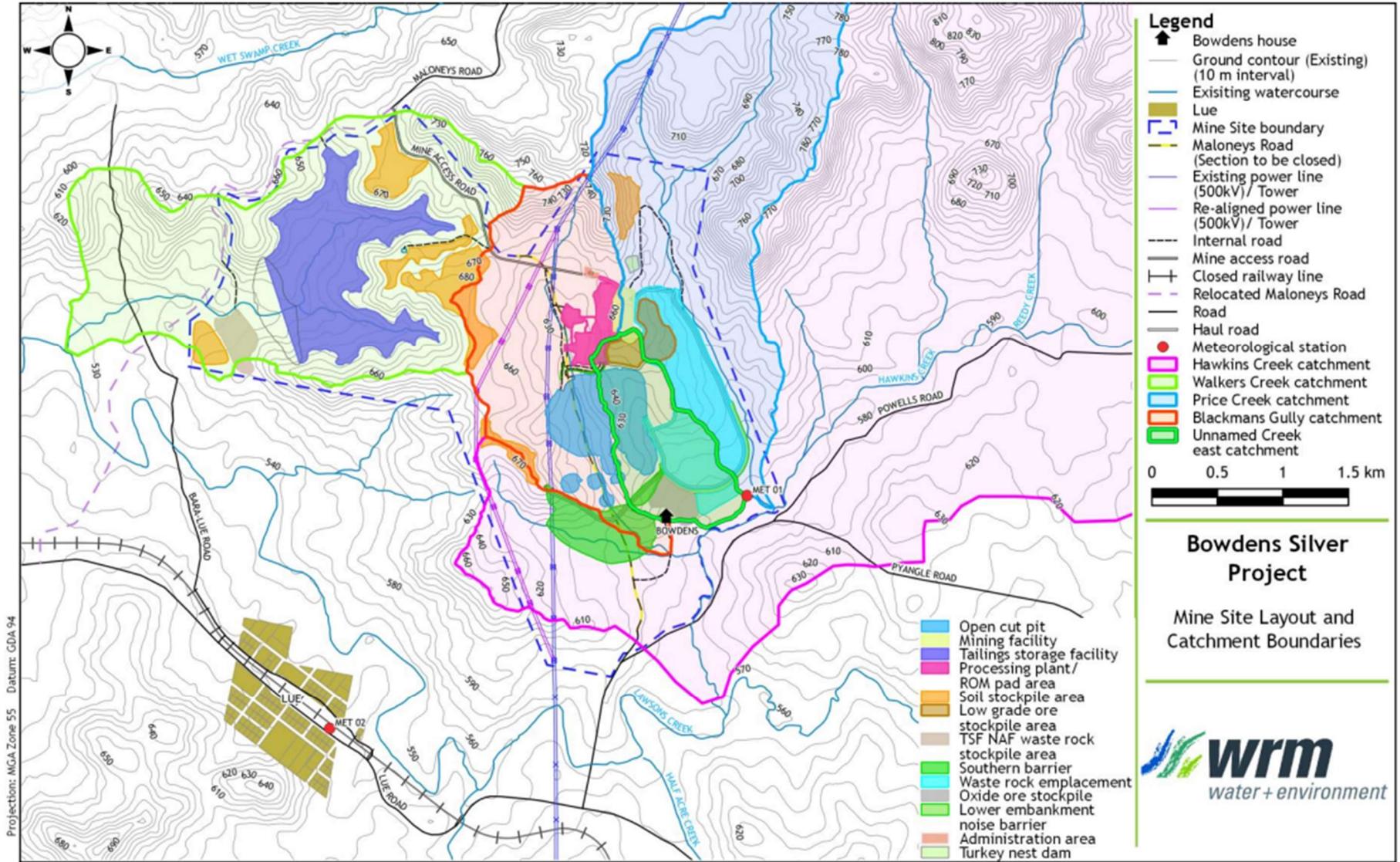


Figure 6 | Local catchments

99. Water quality in the creeks has been altered by agricultural activities and levels of ammonia, nitrate, total nitrogen, phosphorous and electrical conductivity exceed the guidelines values set out in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018). Zinc and copper concentrations also exceed the ANZG values (although copper concentrations do not exceed the hardness modified guideline value).
100. 48 water access licences have been granted for water from Lawsons Creek, and extraction is approved at 29 properties located downstream of the project.

Water Demand and Supply

101. Submissions raised concerns about the water balance modelling, and in particular about the estimates of rainfall and runoff. In this regard, the key concerns are that if rainfall is underestimated it would potentially mean water supplies are insufficient for the mine to operate (and more water would be drawn from the system with commensurately more impact on other water users). If rainfall is overestimated, it could mean water storages are inadequate and there would be a risk of polluted water overflowing into the surrounding waterways.
102. Demand for water during operations would principally be for the processing plant and dust suppression. Water balance modelling estimated that up to around 1,092 ML/yr would be needed for processing at the maximum processing rate of 2 Mtpa¹. Water demand for dust suppression would range from around 99 ML/yr to a maximum of 206 ML/yr.
103. Around 7.5 ML/yr would be needed for miscellaneous minor purposes and up to 14 ML/yr of potable water would be required for the workforce.
104. Total mine site water demand during operations would be between 1,092 ML/yr (in year 2) and 1,303ML/yr (in Year 9). Average water demand for each year of the mine life is shown in **Figure 7**.
105. The water balance model² predicts that around 1,844 ML/yr of water supply would be available on average from:
 - rainfall and runoff from the mine's disturbance areas, which is predicted to average of 924 ML/yr;
 - advanced dewatering of the open cut pit, which is predicted to yield around 380 ML/yr;
 - pit groundwater inflows, which are predicted to average around 431 ML/yr;
 - clean water harvesting, which is predicted to yield around 27 ML/ yr; and
 - ore moisture, which is predicted to average around 83 ML/yr.
106. Average water supply from each source for each year of the mine life is shown in **Figure 8**.

¹ Based on 390 ML/yr being reclaimed from the paste thickener plant

² As updated in September 2022

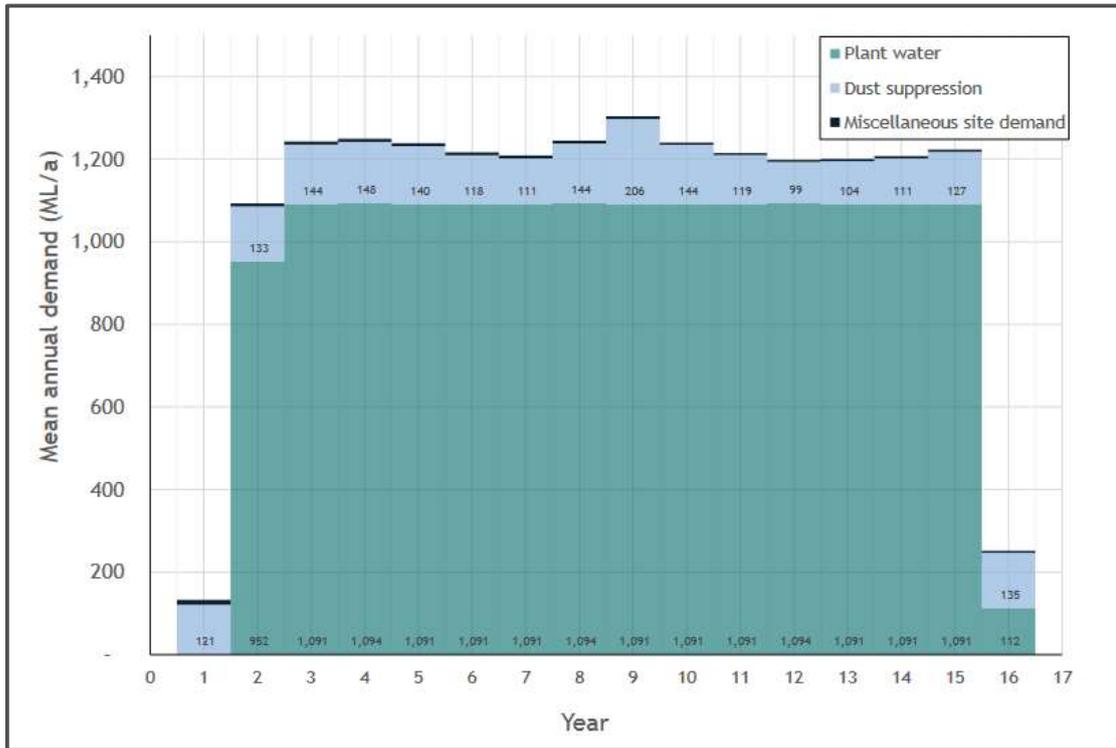


Figure 7 | Project Water Requirements

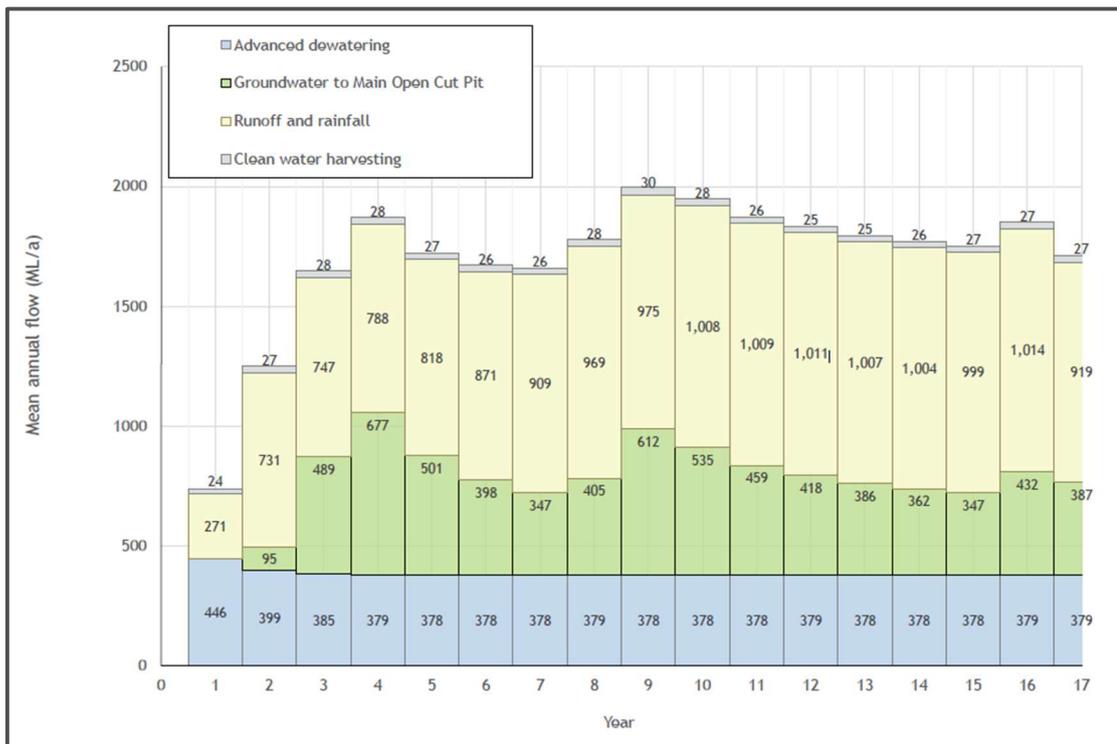


Figure 8 | Water Supply Sources

107. The water balance modelling for the mine indicates that, with the exception of extreme drought periods, there would be sufficient water to supply all site water demands. On average, water supply reliability for the processing plant demand would be 99.6% (96.3% under the worst-case model realisation) and water supply reliability for dust suppression would be 99.8% (99.5% under the worst-case model realisation).

108. Sensitivity testing of the model with lower rainfall and runoff and pit inflows indicates water reliability would reduce. However, the consequence if that were to occur is that Bowdens Silver would need to adjust its operations to match its available and licenced water supplies, which may mean scaling back processing for a period of time.
109. Bowdens Silver acknowledges this risk and the Department has recommended a condition requiring Bowdens Silver to match the scale of the development to the available water supply.

Impacts on Groundwater Levels and Users

110. Groundwater inflows into the pit would cause groundwater levels in the regional groundwater system to depressurise. The largest drawdown in groundwater levels would be within the mine site, with the cone of depression roughly centred around the open cut pit. The predicted 1 m drawdown contour extends around 1.7 km to the east and south and around 2.6 km to the north and west by the end of mining. Drawdown beneath Hawkins Creek would be in the order of 1 to 2 m over a 3 km section of the creek at the end of mining.
111. Drawdown would continue to propagate for around 50 years post mining, with the 1 m drawdown contour extending to less than 2 km east and south, up to 3 km to the west and 2.8 km to the north. Drawdown at Lawsons Creek would be 1 m and at Hawkins Creek less than 2 m.
112. The drawdown contours towards the end of mining and 50 years post mining are shown in **Figures 9 and 10**.
113. There is one privately-owned licensed bore that the modelling indicates could potentially experience drawdowns of close to or greater than 2 m (i.e. the minimal harm threshold in the *NSW Aquifer Interference Policy*) as drawdown propagates post mining. The bore could potentially experience 2 - 5 m by 50 years post mining.
114. However, the bore is located in the shallow Sydney Basin rock strata above the depth of the proposed open cut pit, and while the groundwater model conservatively assumed those strata would be hydraulically connected to the deeper Rylstone Volcanics and Coomber Formation, Jacobs considers in reality the vertical migration of groundwater is likely to be impeded by the presence of low permeability siltstone and shale rock units that would limit the drawdown effects in the shallower strata.
115. The Department accepts that the assessment indicates that the project is unlikely to result in any significant impact to groundwater users in the locality. Nevertheless, the Department has recommended conditions requiring Bowdens Silver to monitor impacts on surrounding groundwater users bores and to provide compensatory water supplies in the event that a user's water supplies are likely to be adversely affected by the project (including predicted long term post-mining impacts). The Department's conditions also require Bowdens Silver to periodically (every 3 years) review and validate the groundwater model based on the monitoring data.

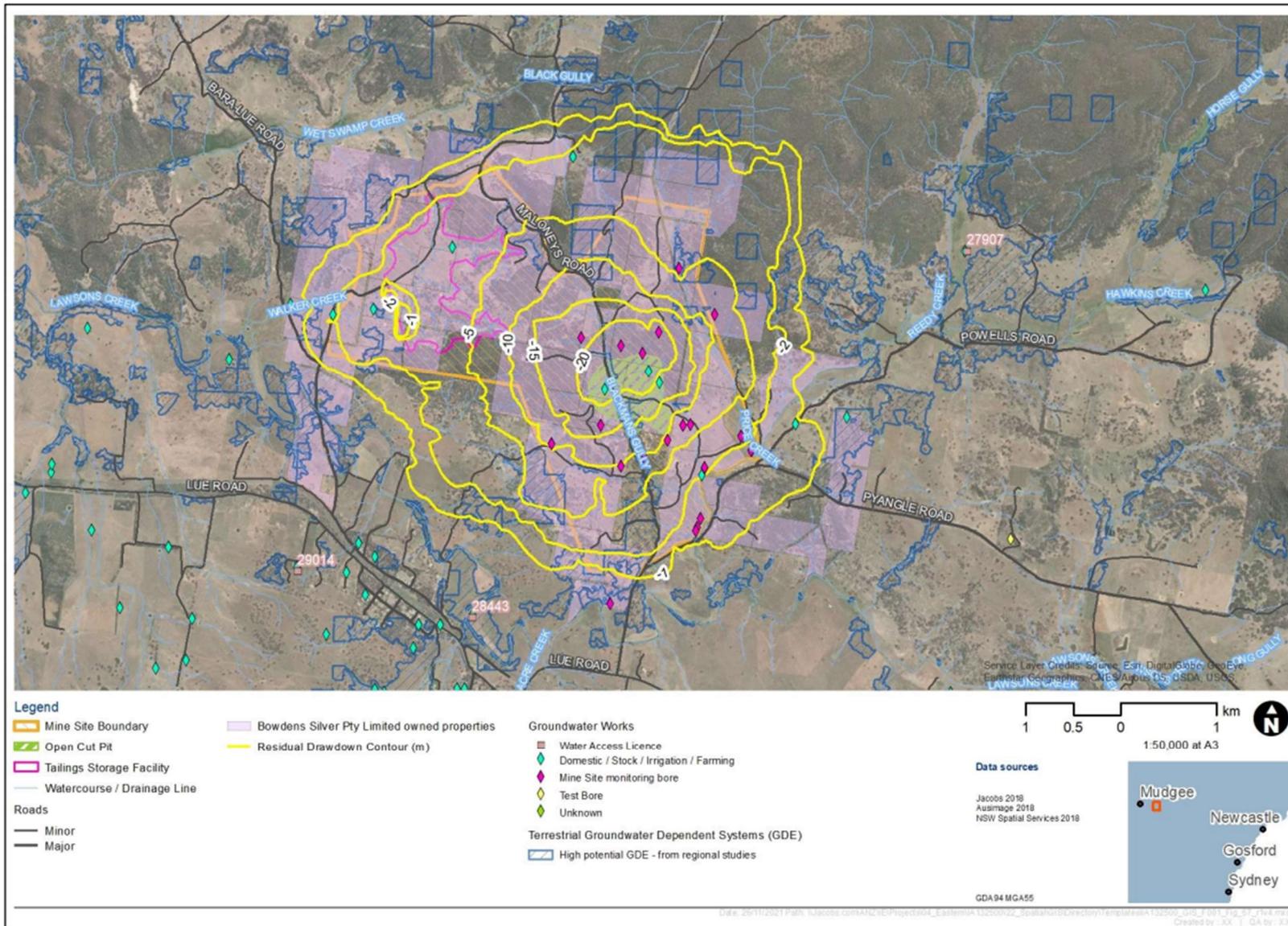


Figure 10 | Drawdown contours 50 years post mining

Impacts on Groundwater Dependent Ecosystems

116. There are no listed high priority groundwater dependent ecosystems (GDEs) within 10 km of the proposed mine, although a number of potential GDEs have been identified, including springs, seeps, terrestrial vegetation and river baseflow systems.
117. Ephemeral seeps and partial wetlands present on site are often developed as farm dams for stock water supply, and typical vegetation comprises grasses and sedges. The majority of these are inferred to be ephemeral expressions of a saturated soil profile and the result of flow through the soil profile rather than fed by groundwater.
118. However, at least one spring is inferred to be sourced from groundwater and may be affected by drawdown, and there is potential for terrestrial GDEs located within areas of higher drawdown to deteriorate due to reduced access to water.
119. In this regard, River Red Gums and two endangered ecological communities (Fuzzy Box Woodland and Swamp Oak Floodplain Forest) adjacent to or in the project area may have reduced access to water. These species are not considered to be wholly reliant on groundwater, relying primarily on rainfall infiltration stored as soil moisture. However, they may use groundwater during prolonged dry periods.
120. Drawdown would also potentially reduce the size of stygofauna habitat within the aquifer. However, the stygofauna identified on and around the mine site consists of relatively common and widespread taxa.
121. The Department considers that the project is unlikely to significantly affect any sensitive GDEs or important stygofauna, given the relatively small predicted regional groundwater impacts. Nevertheless, the Department has recommended conditions requiring Bowdens Silver to monitor and protect GDEs surrounding the project.

Impacts on Surface Water Flows

122. Groundwater drawdown is predicted to reduce baseflow contributions to Hawkins Creek and Lawsons Creek, with peak baseflow losses expected to be up to 9.5 ML/yr and 5.1 ML/yr respectively during operations and up to 11.4 ML/yr and 8.1 ML/yr for Hawkins Creek and Lawsons Creek respectively post mining (occurring around 12 to 16 years after the cessation of mining).
123. The project would also affect surface water flows directly by reducing the catchment size in areas where mine infrastructure is located. While the mine is operating, rainfall and runoff from within an approximately 250 ha area of the Hawkins Creek catchment and a 300 ha area of the Walkers Creek catchment would be intercepted by the water management system, which would result in around 177 ML/year less water on average reporting to the creeks.
124. In percentage terms, this means flows in Hawkins Creek would decrease by around 4.5% for a distance of 3.5 km from its confluence with Lawsons Creek, while flows in Lawsons Creek between the confluence of Hawkins and Walkers Creeks would decrease by around 1.2%. Downstream of Walkers Creek, flows in Lawsons Creek would decrease by 2.2%.

125. At the completion of mining, the flows to Hawkins Creek and Walkers Creek from the rehabilitated WRE and TSF would resume, although the final void would continue to capture runoff from the immediate surface catchment resulting in an annual average loss of flow of 17 ML/yr.
126. Post mining, flows within the creeks would be reduced by 1.4% (Hawkins Creek), 0.3% (Lawsons Creek between Hawkins and Walkers Creeks), and 0.4% (Lawsons Creek downstream of Walkers Creek).
127. Stream flows in both creeks have been characterised as ephemeral to semi-perennial, and the main impact to other surface water users would be to reduce the number of days when the creeks have sufficient water in them to allow water to be taken under a surface water license.
128. In that regard, the surface water assessment modelled the number of days that surface flows greater than 1 ML/day would be expected in the creeks without the project (81% of the time) and compared that to the number of days that would occur with the project (80.5%). In other words, the number of days of low flows would increase by around 2 days per year.
129. During periods of no flow there is potential for water levels in remnant pools to decline in the area of predicted drawdown. Several submissions identified that during severe droughts these pools, and some of the groundwater fed farm dams nearby, provide some of the only water available for farmers. They also likely provide some of the only water available for wildlife. Thus, while the impacts are predicted to be infrequent and only occur during dry periods, these are the very times that farmers rely on this water most.
130. In this regard, the water balance modelling indicates that without mining, cease to flow conditions (<0.1ML/day) in Lawsons Creek occurred 9.8% of the 130 year period that was modelled. The project would increase the frequency of these conditions occurring by approximately 0.6%.
131. The Department notes the model is conservative as it over-predicts the contribution of baseflows during periods of low or no flows and thus the actual baseflow reduction attributable to mining is likely to be less. Nevertheless, even if the baseflow reductions occur as predicted, the impacts on flows as a result of the project would be very minor and unlikely to materially affect the availability of water for downstream water users.
132. Nevertheless, the Department has recommended conditions requiring Bowdens Silver to include trigger levels for identifying and investigating any potentially adverse impacts (or trends) in downstream surface water flows and quality in the water management plan for the project.

Licensing

133. Based on its contiguous landholding of 2,589 ha, Bowdens Silver would be permitted to capture up to 180.6 ML of water under its harvestable rights. Water captured in sediment dams from first and second order streams would be exempt from licensing.
134. The remaining water take, including as a result of groundwater inflows, interception of runoff and the loss of streamflow due to baseflow reductions would need to be licensed.
135. Groundwater sources within the project area are regulated under the Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources Order 2020 (Sydney Basin porous rock groundwater source), and the Water Sharing Plan for the NSW Murray Darling

Fractured Rock Groundwater Sources Order 2020 (Lachlan Fold Belt fractured rock groundwater source).

136. Surface water is regulated under the Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources, 2012 (Lawsons Creek water source).
137. The groundwater assessment calculated that the project would extract an average of 171 ML/yr from the Sydney Basin Porous Rock Groundwater Source, with a maximum take of 232.5 ML occurring in year 16. Water take from the Lachlan Fold Belt fractured rock groundwater source would average 710.9 ML /yr, with a maximum take of 1,040 ML occurring in year 4.
138. Water take from the Lawsons Creek water source would average around 6.6 ML /yr during mining and would continue to increase post mining, peaking at 19.3 ML/yr 16 years after that cessation of mining.
139. The peak water take, and Bowden Silver’s existing water entitlements, are summarised in the following table. As indicated in the table, Bowdens Silver has secured water access licences (WALs) to account for the maximum predicted water take from each water source during and post mining.

Table 6 | Water licenses held by Bowdens Silver

Water Source	Purpose	Maximum Volume Required (ML)	Volume Secured (ML)
<i>NSW Murray Darling Basin Porous Rock Groundwater Sources Order 2020 - Sydney Basin Groundwater Source</i>	Pit dewatering	232.5	194 unit shares (equivalent to 194 ML /yr)
Controlled Allocation Order (Various groundwater sources)			38.5 (equivalent to 38.5 ML /yr)
<i>NSW Murray Darling Basin Fractured Rock Groundwater Sources Order 2020 - Lachlan Fold Belt - Groundwater Source – (Other) Management Zone</i>	Pit dewatering	1,040	1,480 unit shares (equivalent to 1,480 ML /yr)
<i>Macquarie Bogan Unregulated and Alluvial Water Sources 2012 – Lawsons Creek Water Source</i>	Water captured in TSF	123	139 unit shares
	Baseflow loss	14 (19.3 post mining)	

140. Ongoing water take would diminish post mining with a long term take of approximately 200 ML/yr anticipated. This is less than 0.08 % and 0.03% of the long term average annual extraction limit of the Sydney Basin and Lachlan Fold let groundwater sources respectively and is not expected to significantly affect future available water determinations.

Water Quality and Acid Mine Drainage

141. Community submissions raised concerns about potential contamination of groundwater and surface water from the project. Some of the key concerns expressed in submissions were about:
- the risk of failure or overtopping of the TSF or spills from contaminated water storages;
 - potential acid mine drainage (AMD) or seepage of contaminated water; and
 - health impacts from polluted water.
142. The proposed mine has been designed to avoid any off-site discharges of runoff from mine-affected areas, except from sediment dams servicing areas that do not contain acid forming materials or other contaminants. Water would only be released from sediment basins if water quality monitoring indicates the water is suitable for discharge. If the water is unsuitable for discharge it would be contained on site and used for mining operations.
143. Reagents, such as chemicals used for processing, would be stored in bunded areas, and mining affected water storages would be lined with a low permeability liner. Based on the preliminary design of contaminated and dirty water storages, the site water balance model indicates that all mine affected water could be contained without discharging through the project life under a range of meteorological conditions.
144. In the event of more significant rainfall events, excess water would be transferred to the TSF or to the open cut pits if the TSF decant pond is reaching capacity. While no discharge is proposed from the TSF, the facility has been designed with an emergency spillway, and the facility has been designed to contain all runoff for events up to the 1 in 100 year 72 hour storm event.
145. The Department considers the main risks to water quality is from the WRE, TSF and open cut pit. In principle the risks can be managed by appropriate design and management of these structures. This is discussed below.

Waste Rock Emplacement (WRE)

146. The extraction of mineral resources is often associated with sulphide ores, which when exposed to oxygen and water, can produce sulphuric acid and consequential solution of metals. Effective management of waste rock is therefore necessary to prevent acid mine drainage (AMD). The EIS identified that more than half the waste rock from the project would be PAF.
147. In line with best practice AMD management, Bowdens Silver is proposing to fully encapsulate the PAF within the WRE to limit opportunities for oxidation of the PAF. The WRE would be developed progressively as a series of cells. Each cell would be lined with a 1.5 millimetre low-permeability HDPE liner to limit seepage. Any seepage that is generated would be captured and used in mining operations.
148. Upon completion of each cell, the cell would be capped with a geosynthetic clay liner, a layer of NAF waste rock layer, and a store and release cover (comprising sub soil and topsoil) designed to minimise infiltration of rainfall and oxygen into the WRE³ and limit the potential for acid generation (see **Figure 11**).

³ Apart from the first three cells, which would be covered by the low grade ore stockpile. These would be covered by a geosynthetic clay liner to reduce rainfall infiltrations. If the stockpile is not processed, it would be capped, covered and incorporated into the final landform.

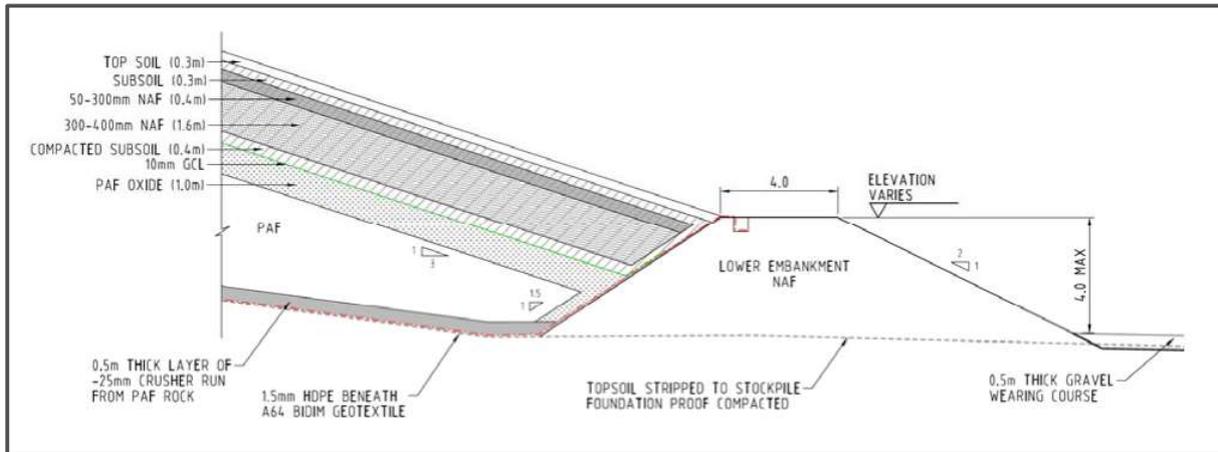


Figure 11 | Typical cross section of the lower perimeter embankment

149. Given the large volumes of PAF material and the potential risks of AMD both during and post mining, the Department engaged independent experts Earth Systems to provide advice about the proposed management and potential impacts of AMD.
150. Earth Systems raised some concerns about the reliability of the proposed NAF/PAF rock classification. In this regard, Earth Systems noted that some rock has been classified as NAF on the basis of minor sulphur content (0.1-0.2% total sulphur) and the presence of acid neutralising minerals. There is a possibility that this material could contain sulphate-bearing minerals that could represent another source of acidity. To address this, Earth Systems noted that, prior to any mining, further information should be provided to further verify the rate of acid generation processes, the lag time before acid conditions would develop, or the longevity of AMD generation.
151. Consequently, Earth Systems made a number of recommendations about additional test work and assessment that should be undertaken prior to the commencement of mining. Specifically, these recommendations include that Bowdens Silver:
- undertakes additional static geochemical test work for the northern section of the main open cut pit to better understand the AMD risk classification;
 - adopts a sulphur cutoff value of 0.2 wt.%S for the remainder of the open cut pit during the initial stages of mining, with transition to the adopted cutoff value (0.3wt.%S) if supported by more detailed static geochemical analysis during mining;
 - undertakes additional kinetic geochemical test work to better understand acid generation rates, lag time and longevity;
 - updates the waste rock dump design as required, based on the additional test work, to demonstrate that AMD and water quality objectives are achieved;
 - undertakes further assessment of potential seepage of NAF waste rock associated with the construction of the southern barrier in Blackmans Gully;
 - prepares and implements a comprehensive site-wide AMD Management Plan (by a suitably qualified geochemist).
152. Bowdens Silver's geochemical experts do not agree with some aspects of the Earth Systems review, and continue to have confidence in the NAF/PAF classification system they have used to assess AMD. Notwithstanding that, Bowden Silver largely accepts Earth Systems' recommendations, and has committed to undertaking the additional assessment and preparing the AMD management plan prior to the commencement of mining.

153. In the context of technical disagreements between experts, the Department considers that the most conservative approach is warranted and has recommended a range of strict conditions to ensure effective management of AMD, based on the recommendations from Earth Systems. Importantly, this includes a further verification process to confirm the proportion of NAF versus PAF rock, and the preparation of a detailed AMD management plan, before any mining can occur.

Tailings Storage Facility (TSF)

154. The conceptual design of the TSF presented in the EIS included a 0.45 m thick compacted clay liner below the maximum possible water level, a 40 m deep grout curtain below the embankment and a bituminous geomembrane (BGM) liner (permeability 1×10^{-13} m/s) overlying the clay on the upstream face of the TSF embankment.
155. During mining operations drains would direct seepage to a collection pond from where it would be pumped back to the decant pond. At the end of mining the TSF would be capped with a store-and-release cover designed to limit the percolation of water through the tailings.
156. DPE Water and the EPA initially raised concerns about the thickness of the liner and the potential for leakage, and requested further assessment of the potential impacts on downstream receivers.
157. Seepage analysis determined that seepage rates from the TSF based on this design would meet the objectives of the EPA's tailings dam liner policy (seepage rates were estimated at $6.0 \times 10^{-9} \text{m}^3/\text{s}/\text{m}^2$, which is lower than the seepage rate of $2.0 \times 10^{-8} \text{m}^3/\text{s}/\text{m}^2$ from a 1 m thick liner with a permeability standard of $1 \times 10^{-9} \text{m}/\text{s}$). However, to provide additional seepage mitigation Bowdens Silver has committed to extending the BGM liner over the entire TSF impoundment area or to cover the decant pond area (if justified by further seepage analysis).
158. Jacobs undertook refined modelling of the transport and fate of seepage from the TSF based on both designs to determine the potential impacts on the receiving environment from elevated metals concentrations or low pH.
159. After accounting for mixing and dilution, the modelling identified that during low or median creek flows the concentrations of some analytes would marginally exceed the value set out in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG) for 95% protection of freshwater aquatic ecosystem. Concentrations of all analytes would be below the ANZG threshold values for the protection of sheep, cattle and irrigation.
160. Jacobs noted that the concentrations of some of these metals already exceed the ANZG levels in downstream receiving waters and the additional contribution from the TSF would be very minor. Furthermore, the modelling was deliberately conservative in that it did not account for natural chemical reactions and attenuation within the TSF or along the flow path that is likely to reduce concentrations of pollutants from the TSF. For example, it is likely that some residual cyanide (possibly up to 90%) may be lost from the decant pond through volatilisation with further removal in the groundwater system via processes such as the formation of insoluble iron-cyanide precipitates or formic acid. Metals such as copper and zinc may adsorb to calcium and iron oxide and precipitate within the aquifer.
161. Given the above, and also given that the habitat within Lawsons Creek is already degraded with relatively low ecological values and water use from the creek is principally for agricultural purposes, Jacobs concluded that seepage from the TSF would not lower the beneficial use of

the creek. DPE Water and the EPA did not raise any significant concerns in relation to these conclusions, subject to implementation of best practice seepage management controls

162. In relation to community concerns about the risk of failure of the TSF, the Department notes the preliminary design of the TSF was prepared in accordance with the relevant guidelines and policies of Dams Safety NSW and the Australian National Committee on Large Dams (ANCOLD).
163. The design includes an emergency spillway on the TSF embankment that would provide for overflows in extreme events. It also includes allowance for storm storage, wave run-up and additional freeboard based on the ANCOLD guidelines.
164. The Dams Safety NSW noted that the TSF would likely be “Declared” under the *Dams Safety Act 2015* (DS Act) and require ongoing safety management and reporting in accordance with the DS Act and associated *Dams Safety Regulation 2019* (DS Regulation). Dams Safety NSW has advised of the TSF operational requirements to ensure the TSF integrity is maintained, including vibration limits and monitoring, and monitoring of seepage, subsidence and groundwater around the TSF.
165. The TSF would be subject to further detailed design and engineering before construction. The Department has recommended a condition requiring Bowdens Silver to prepare a report that details the design, construction, operation and rehabilitation of the TSF and a quality assurance/quality control program that demonstrates that the TSF is constructed to meet its design specifications.
166. Bowdens Silver would also need to undertake regular monitoring of water quality downgradient of the TSF and would refine the TSF seepage controls, management, mitigation and recovery measures.

Final Void

167. During mining, water accumulating in the open cut pit would be used for mining operations.
168. Once mining ends, the two smaller pits would be backfilled and rehabilitated. However, the main open cut pit would be left as a final void, which would slowly fill with water. Modelling of the long-term water level in the pit lake under two climate scenarios (a continuation of historical trends and a climate change scenario) predicts that from around 100 years after the cessation of mining, equilibrium levels would be reached, with rainfall and runoff balanced by evaporation and long-term groundwater flows towards the void.
169. Water levels are then predicted to fluctuate between around 567.3 m and 574.7 m AHD (assuming continuation of historical trends) or 564.7 and 571.9 m AHD (under a climate change scenario). This is approximately 18 to 28 m below the pre-mining water table and 25 m below the pit crest spill height.
170. To limit exposure of sulphide minerals in the pit walls, Bowdens Silver could expedite the formation of the pit lake by transferring excess water from the TSF prior to its decommissioning and by temporarily directing runoff from Blackmans Gully catchment into the pit until the water level reaches around 574 m AHD, at which point runoff from upstream catchments would be redirected to limit further inflows to the pit lake. Rapid filling of the pit is expected to reduce the generation of low pH contact waters and dissolved metals. Furthermore, it is expected that thermal density stratification would occur within the water column that could potentially create a

reducing environment at depth, which would attenuate dissolved metals, metalloids and sulphate concentrations.

171. Notwithstanding that, Bowdens Silver is proposing to monitor water quality and map zones of PAF material in the open cut pit faces to further understand potential pit lake water quality and inform management measures to ensure successful rehabilitation outcomes.
172. The water within the pit lake would also become increasingly saline over time due to evaporative concentration, reaching approximately 5,695 mg/L TDS after 500 years.
173. The modelling indicated that the final void would continue to act as a groundwater sink over time, which would prevent saline water and potential contaminants in the pit lake from migrating off-site. However, the level at which the pit lake would no longer act as a groundwater sink is calculated to be 579 m AHD.
174. Given the predicted pit lake levels are close to that figure, Mr Middlemiss recommended that Bowdens Silver undertake an uncertainty analysis to determine the probability of this occurring. The results of that analysis indicate that, if unmitigated, there would be a more than 50% chance that the water level could increase above the level required for the pit to become a throughflow system.
175. Bowdens Silver has also undertaken some high level modelling of the potential for long term water quality impacts on surrounding water sources, namely Lawsons Creek and Hawkins Creek, in the event of flow-through conditions eventuating. The modelling found that after 512 years, there is no adverse change to background water quality in the creeks.
176. Bowdens Silver is proposing to refine the modelling assumptions through periodic re-calibration and updates of the groundwater model based on monitoring data collected through the mine life. This would be used to develop an appropriate closure strategy. If the results of the uncertainty analysis are validated (i.e. the void has the potential to act as a flow-through rather than groundwater sink), Bowdens Silver has identified three potential mitigation options to prevent this flow-through system from developing. These are:
 - constructing an artificial wetland adjacent to the void that would recharge groundwater at key locations around the final void and reverse hydraulic gradients to prevent outflow from the final void;
 - changing the geometry of the final void to increase the evaporative surface, which would reduce lake levels and ensure the void remain a groundwater sink; or
 - grouting the edges of the final void walls to prevent seepage.
177. The constructed wetland option was accounted for in updated modelling, which demonstrated that this mitigation measure could be successful. Bowdens Silver has also confirmed that other options, such as increasing the evaporative surface of the void, could be undertaken within the existing proposed disturbance footprint for the mine and would be effective in keeping water levels below the level needed to ensure the void remain a sink.
178. Importantly, Mr Middlemiss accepts that mitigation measures are available to ensure that the final void remains a groundwater sink over the long term.

179. The Department has recommended conditions requiring Bowdens Silver to regularly (every 3 years) update and verify the groundwater model, and to ensure the final void is designed and managed to act as a long term groundwater sink.
180. The Department is also cognisant that additional resource exists below the resource that is proposed to be extracted, and that there is some likelihood that the ultimate final void will be different to that planned for the current mine. Any such proposal would be subject to a separate merit approval process.

Flooding

181. WRM modelled the existing and potential flood behaviour of the main creeks within and around the mine site as a result of the mine.
182. The tributaries of Hawkins Creek and Lawsons Creek are characterised by shallow overland flows. Flows within the tributaries are generally confined to narrow flood flow paths with relatively steep ground slopes, and breakouts don't occur except near the confluences of these tributaries with Hawkins and Lawsons Creeks.
183. Predicted peak flood depths along the overbank areas of the Hawkins Creek and Lawsons Creek tributaries are generally below 1 m for events up to the 1 in 500 year Annual Exceedance Probability (AEP), and up to 1.5 m for the probable maximum flood design event along some sections of the tributaries.
184. The project disturbance area is located outside the predicted Lawsons Creek flood extent for all events up to the probable maximum flood event.
185. The proposed open cut pits, WRE and leachate management dam are located outside of the predicted flood extent for Hawkins Creek for all design events.
186. The most significant flood level impacts associated with the development are constrained to within the mine site and land owned by Bowdens Silver. No impacts are predicted to other properties, assets or infrastructure. Increases in flood velocities would be largely confined to the vicinity of the WRE. Increases in flood velocities in Hawkins and Lawsons Creeks are predicted to be negligible and would not adversely impacts off-site properties or infrastructure.
187. The construction of the proposed road crossing over Lawsons Creek does have the potential to increase the magnitude of floods upstream of the crossing. Water levels over the road and upstream would increase by up to 1.2 m in a 1 in 10 AEP flood, although the impacts would decrease in magnitude further away from the road crossing, dissipating to less than 0.01 m by around 1.4 km upstream of the crossing.
188. The increase in peak water levels upstream of the crossing would cause flows in Lawsons Creek to overtop the northern creek bank and overland flows would drain northwest parallel to Lawsons Creek before re-joining the creek about 680 m downstream of the road crossing.
189. These water levels and flood extents would not affect any existing dwellings. Bowdens Silver owns or holds options to purchase all properties that are predicted to be affected by an increase in water levels as a result of the road crossing.

190. DPE Water raised concerns about the design proposed for the Lawsons Creek crossing on the relocated Maloneys Road due to potential impacts on the hydrology of Lawsons Creek. The design originally involved a floodway crossing constructed with a series of box culverts that would allow water up to the 1 in 10 Annual Exceedance Probability (AEP) flood event to pass through.
191. However, in response to DPE Water's concerns, Bowdens Silver has proposed an alternate bridge design with a road crest at least 1.3 m above the bankfull discharge water levels of the main Lawsons Creek channel. Hydraulic modelling by WRM identified that this generally corresponds to a 1 in 20 AEP rainfall event.
192. The northern approach to the crossing would be constructed with concrete culverts to allow flows on the floodplain from a rarer than 1 in 20 AEP event to pass.

Conclusion

193. The Department considers that Bowdens Silver has demonstrated there is likely to be sufficient water to meet the demands of the project except during very dry periods. Under those circumstances, the company would be required to adjust its operations to match its available water supply. This is consistent with any other large scale water users in the State, and is consistent with the water market established under the *Water Management Act 2000*.
194. The project would result in some water take from water sources in the region. However, with the possible exception of one privately-owned bore, the project is not predicted to exceed the minimal impact considerations of the *NSW Aquifer Interference Policy (AIP)* and is unlikely to significantly affect water resources and water sharing in the region.
195. The project would involve excavation of a considerable amount of PAF material, which would need to be carefully managed to minimise the potential for AMD and impacts on water quality both on and off-site. The final void would also need to be designed and managed to ensure that the void acts as a long term groundwater sink.
196. Based on the modelling and assessment, the Department considers that these and other potential impacts to water resources are able to be managed to meet levels acceptable under NSW government policy through the preparation of a suite of management plans, incorporation of best practice contemporary mitigation measures, and ongoing refinement and review of the predictions by Bowdens Silver.
197. In this regard, the Department has recommended conditions requiring Bowdens Silver to:
 - prepare and implement a Materials Classification Verification Program to verify AMD risk;
 - ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of mining operations on site to match its available water supply;
 - ensure that all necessary water licences are in place prior to water take occurring;
 - provide compensatory water supplies to any private landowner whose water supply is adversely affected by the project;
 - manage the mine on a nil discharge basis (for water that has come into contact with PAF and other potential contaminants), with no discharges from the site except in accordance with an EPL;

- comply with a range of water performance objectives and rehabilitation objectives, including designing and maintaining emplacements and the pit to prevent migration of PAF and other contaminants;
- prepare and implement a comprehensive Water Management Plan, including (amongst other things) a:
 - water balance;
 - surface water management plan and monitoring program;
 - groundwater management plan and monitoring program;
 - AMD management plan;
 - program to regularly (every 3 years) validate the water balance and groundwater model, including updated predictions on short and long term impacts to privately-owned bores and water supplies; and
 - protocol for minimising cumulative water-related impacts; and
- prepare and implement a detailed rehabilitation strategy and rehabilitation plan, including measures to minimise impacts associated with the final void and ensure that it provides a long term groundwater sink.

198. With the implementation of these and other measures, the Department considers the project would result in acceptable impacts on water resources.

6.2 Health and Amenity

199. Health and amenity related impacts were key issues raised in submissions on the project, particularly for residents of Lue and the rural areas surrounding the proposed mine, and particularly in relation to potential exposure to lead and other metals and contaminants.

200. The Lue Action Group provided advice from various experts relating to health and amenity issues, including Dr Barry Noller from the University of Queensland (air quality and health), Professor Mark Taylor from Macquarie University (lead exposure), John Wasserman from Wilkinson Murray (noise) and Rod Williams from Engeny Water Management (visual). The Department has considered their advice in its assessment.

201. Health and amenity risks in this section are primarily focused on impacts from air quality, noise and vibration and drinking water quality (via dust deposition to water supplies). Other health-related exposure pathways and impacts, such as hazards and broader impacts on water quality, are addressed in separate sections of this report.

202. The EIS includes a number of health and amenity related impact assessments and peer reviews; including:

- an air quality assessment undertaken by Ramboll Australia (Ramboll), peer reviewed by Ms Jane Barnett of ERM;
- a human health risk assessment (health risk assessment) undertaken by Environment Risk Sciences (EnRiskS), peer reviewed by Prof. Brian Priestly of Priestly Toxicology Consulting;
- a noise and vibration assessment undertaken by SLR Consulting Australia (SLR), peer reviewed by Mr Najah Ishac of EMM;
- a visual assessment undertaken by Richard Lamb and Associates (RLA); and
- a lighting and sky glow assessment undertaken by Lighting, Art and Science (LAS).

203. These assessments were either revised (in the case of the health risk assessment and air quality assessment) or supplemented in the submissions report to address issues raised in submissions.
204. The Department engaged an independent health risk expert, Dr Roger Drew of Drew Toxicology Consulting, to review the health risk assessment and the health-related impacts of the project (see **Appendix A**).
205. While raising some issues on the original health risk assessment, Dr Drew is satisfied that the revised health risk assessment follows standard process for conducting such assessments in Australia, and that it adequately documents the methodology and its assumptions are supported. Overall, Dr Drew accepts that the assessment indicates that the health risks of the proposed mine are very low.
206. The applicable government agencies, including NSW Health and the EPA did not raise concerns about health or amenity impacts from the project.
207. A summary of the findings of the assessments is provided below.

Particulates

208. The air quality assessment was prepared in accordance with applicable guidelines, including the EPA's *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW* (Approved Methods). The air quality criteria adopted in the Approved Methods is based on the *National Environmental Protection (Ambient Air Quality) Measure* (NEPM) which sets national standards for the protection of human health and well-being.
209. The assessment modelled air emissions from the mine during four representative mining years, including the dispersion of dust and total suspended particulate matter (TSP) (which are associated with amenity impacts) and the dispersion of fine and very fine particulate matter (PM₁₀ and PM_{2.5}) (which are associated with human health impacts).
210. The modelling indicates that there would be no exceedances of any of the impact assessment criteria for PM₁₀, PM_{2.5}, TSP or deposited dust at any private residences.
211. The annual average concentration and 24-hour average concentration of PM₁₀ and PM_{2.5} would be below the limits established in the Approved Methods, and the cumulative and incremental TSP and deposited dust would be less than 50% of the impact assessment criteria established in the Approved Methods at all privately owned residences.
212. Ramboll also calculated the incremental 1-hour average metal dust concentrations at residences located near the mine site based on the metal composition of the ore and waste rock material. The predicted maximum incremental increases in metal dust concentrations are well below the applicable impact assessment criteria in the Approved Methods for all pollutants at all residences.
213. EnRiskS also considered the potential health risk of PM_{2.5} based on the size of the particulates. As outlined above, the air dispersion modelling indicates there would be no privately owned residences where the cumulative concentrations of PM_{2.5} or PM₁₀ would exceed the Approved Methods particulate air quality criteria.
214. The maximum predicted cumulative PM_{2.5} annual concentration is 4.7 µg/m³, which is well below the criterion of 8 µg/m³ and also below the NEPM goal of 7 µg/m³ that is due to commence in

2025. The maximum predicted PM_{2.5} 24 hour concentration is 16.2 µg/m³, below the current criterion of 25 µg/m³ and proposed NEPM goal of 20 µg/m³.

215. One of the issues raised by Dr Drew and in some submissions was that the health risk assessment focused on risks from PM_{2.5} rather than PM₁₀, and should also consider health impacts other than death. EnRiskS notes that while there is a relationship between health and exposure to PM₁₀ sized particles, and all health endpoints for both particle sizes were evaluated, the most sensitive relationship is the one for all causes of mortality related to PM_{2.5}. If exposure to the latter is acceptable, then exposure to the former would also be acceptable. The Department is satisfied that PM_{2.5} is the more relevant and limiting indicator of health-related air quality impacts, and that the assessments indicate that air emissions would comply with the applicable NSW air quality impact assessment criteria at all privately-owned receivers for both PM_{2.5} and PM₁₀.
216. Bowdens Silver has proposed a range of mitigation and management measures to minimise and manage air emissions, including the use of water or dust suppressants over exposed surfaces, visual monitoring and deployment of a real-time meteorological and air quality monitoring system (i.e. use of weather forecasts and dust alerts) so that dust can be proactively managed by changing the location and intensity of activities as necessary.
217. The Department has recommended conditions requiring Bowdens Silver to detail these measures in a comprehensive air quality management plan that must be approved before they can proceed.
218. Although the air quality assessment considers total dust fallout, it does not account for all ingestion pathways for exposure to heavy metals. To address this, the health risk assessment considered the health risk to humans from heavy metals in dust from a range of exposure pathways as outlined below.

Exposure to Heavy Metals

219. The health risk assessment (and revised health risk assessment) was undertaken in accordance with relevant guidelines including *enHealth Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards*. The assessment calculates the likely community exposure to lead and other heavy metals from mining activities.
220. EnRiskS identified that the key exposure pathways for the population in the project area are acute⁴ and chronic inhalation exposure to metals in air, and exposure to metals deposited onto soil and surfaces that could result in intake via ingestion and dermal contact with soils and/or water in rainwater tanks and ingestion through homegrown produce.
221. Metals are ubiquitous in the environment and people are commonly exposed to metals including lead in dust, soil, water and food. Adverse health effects can occur if metal exposure is sufficiently elevated.

⁴ Short term exposure to the maximum 1-hour average concentration of metals attached to PM_{2.5} particulates

222. To assess the potential human health risks from the project, EnRiskS calculated the intake for each metal⁵ from existing exposures (i.e. exposures that occur without the project)⁶ and the incremental increase in intake as a result of exposures due to the project⁷.
223. The intake of each metal was compared with threshold values⁸ representing a tolerable intake or concentration of that metal (i.e. the level below which adverse health effects are unlikely to occur).
224. EnRiskS expressed the total health risk from each metal as a Risk Index (RI), which is the estimated total intake of the metal expressed as a proportion of the threshold intake. An RI of less than or equal to one (≤ 1) means that the calculated intake of metal is below the threshold value for human health impact. The $RI < 1$ criterion is a well-accepted benchmark for judging health impact acceptability from exposures to substances released into the environment.
225. In relation to lead, although there is no established safe level of exposure, widespread use has resulted in contamination of natural and human environments. Blood lead levels have been found to be a good indicator of exposure to lead, and the current National Environment Protection Measures Health Investigation Level for lead in soil is based on a blood lead goal of 10 micrograms per decilitre ($\mu\text{g}/\text{dL}$).
226. However, according to the Australian National Health and Medical Research Council the average Australian blood lead level is $< 5 \mu\text{g}/\text{dL}$, and therefore that organisation recommends that blood lead levels $> 5 \mu\text{g}/\text{dL}$ warrant further investigation (reflecting the fact that $5 \mu\text{g}/\text{dL}$ is representative of background levels).
227. EnRiskS based the assessment of lead exposure risk on a threshold intake of lead ($1.4 \mu\text{g}/\text{kg}/\text{day}$) that equates to a blood lead level of $3.5 \mu\text{g}/\text{dL}$.
228. EnRiskS calculated that the RI for existing exposures to metals in the environment (i.e. exposures that already occur without the project) (see **Figure 12**). The RI is < 1 for all metals except manganese (which is 1.1 for young children, largely sourced from cereal products including breads and vegetables).
229. The RI for exposure to metals from the project alone under a range of mining scenarios at nearby sensitive receivers (including project-related residences) would be:
- 0.0049 – 0.015 (depending on the mining scenario) for acute inhalation exposure to all metals in air (0.00044 - 0.0014 from lead alone); and
 - 0.022 – 0.029 (depending on the mining scenario) for chronic inhalation exposure to metals in air (0.012– 0.015 for lead alone).
230. Exposure via deposited dust generated by the mine would vary for different exposure pathways (being ingestion and dermal contact with soil or rainwater tanks or ingestion of homegrown produce) and under different mining scenarios. However, the highest RI for exposure for young children via any one exposure pathway at the most impacted privately-owned residence would be 0.0080 for all metals and 0.0030 for lead. For adults the RI would be 0.0014 for all metals and 0.00075 for lead.

⁵ Based on an elemental analysis of the ore to be mined, the metals considered were lead, silver, arsenic, cadmium, copper manganese, zinc, cobalt, chromium, mercury, lithium and nickel.

⁶ Based on existing concentrations of dust and metals from analysis of soils, water from rainwater tanks and air quality in the local area.

⁷ Based on predicted air emissions from the project during different mining scenarios as modelled by Ramboll.

⁸ Established from a range of NSW and national guidelines with additional guidance from international guidelines such as the US EPA and the World Health organisation.

231. **Figures 12 and 13** show the calculated RI at residence R4⁹ for existing exposures and exposures caused by the project (from all exposure pathways) from a representative year of mining.

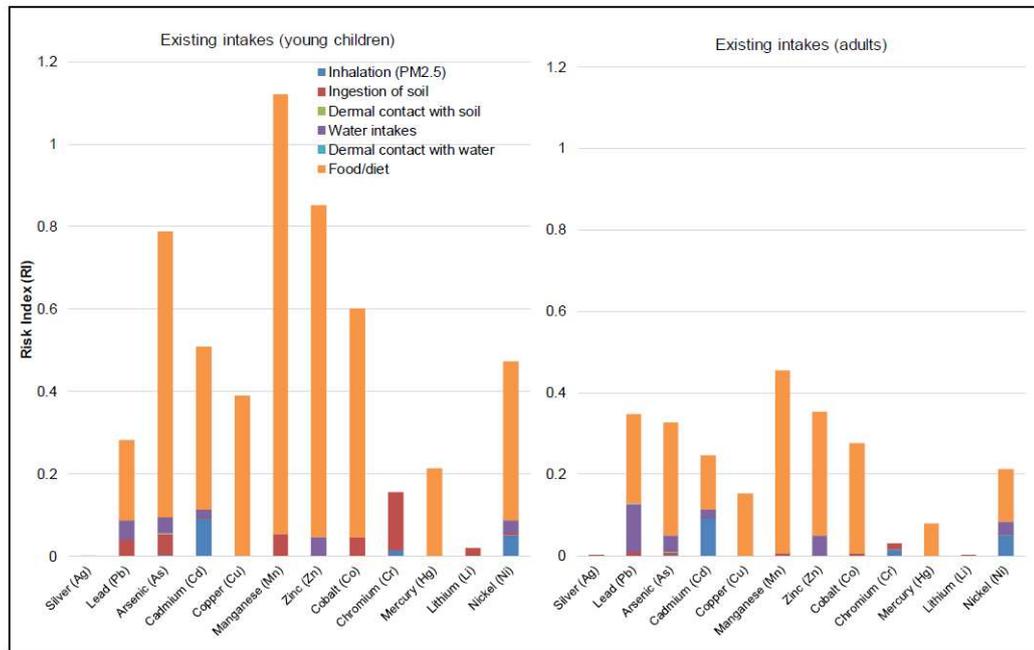


Figure 12 | Existing exposure to metals without contributions from the project

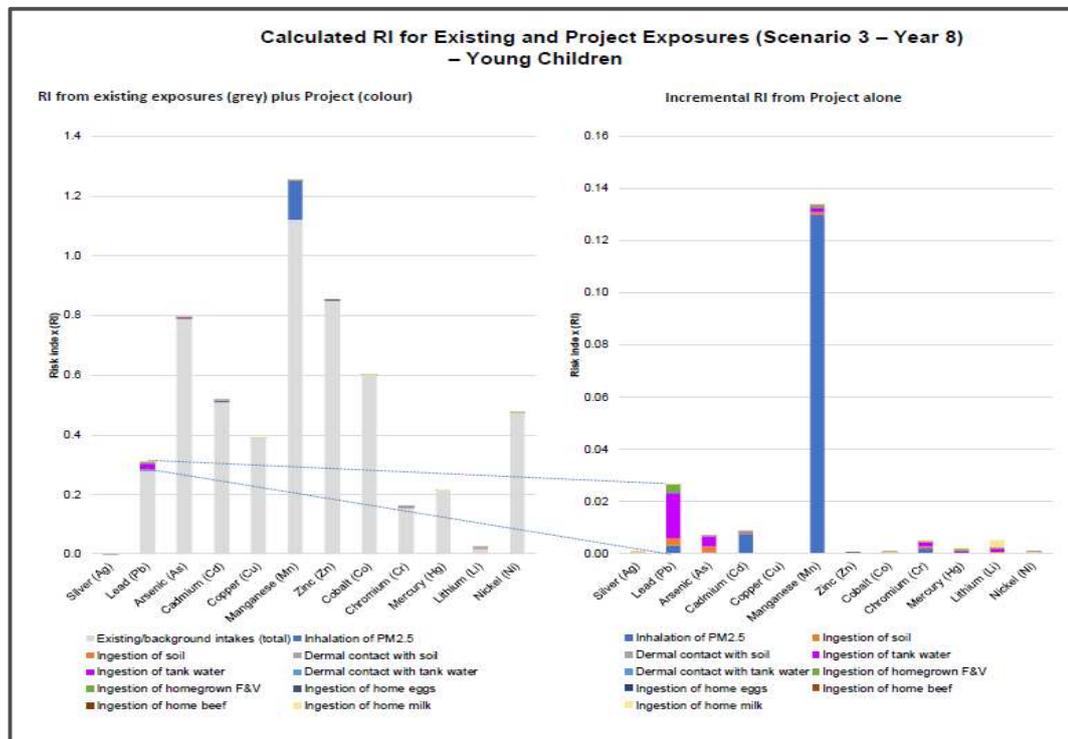


Figure 13 | Calculated RI for existing and project exposures for young children at closest private residence (Scenario 3 - Year 8)

⁹ At the time of writing R4 was the closest privately-owned residence to the mine. This property has subsequently been purchased by Bowdens Silver. However, it has been included in this consideration for the purpose of illustrating the impacts.

232. As can be seen from the above figure, the incremental increase in RI for exposure to metals caused by mining at the closest residence would be very small and would not increase the RI above one for any metals except manganese (because it is already >1 due largely to exposure from cereal products including breads and vegetables).
233. To put it another way, the existing intake for lead is around 35% of the threshold value for adults and around 28% for young children. The project would increase that to 40% for adults and 30% for young children at the closest residence (now mine owned).
234. **Figures 14 and 15** show the calculated exposure to lead for adults from all privately-owned residences¹⁰. As can be seen from the figure, the highest exposure to lead would be at property R4 (now owned by the mine) and would be around 0.395. For project-related residences, the highest exposure would be around 0.56.

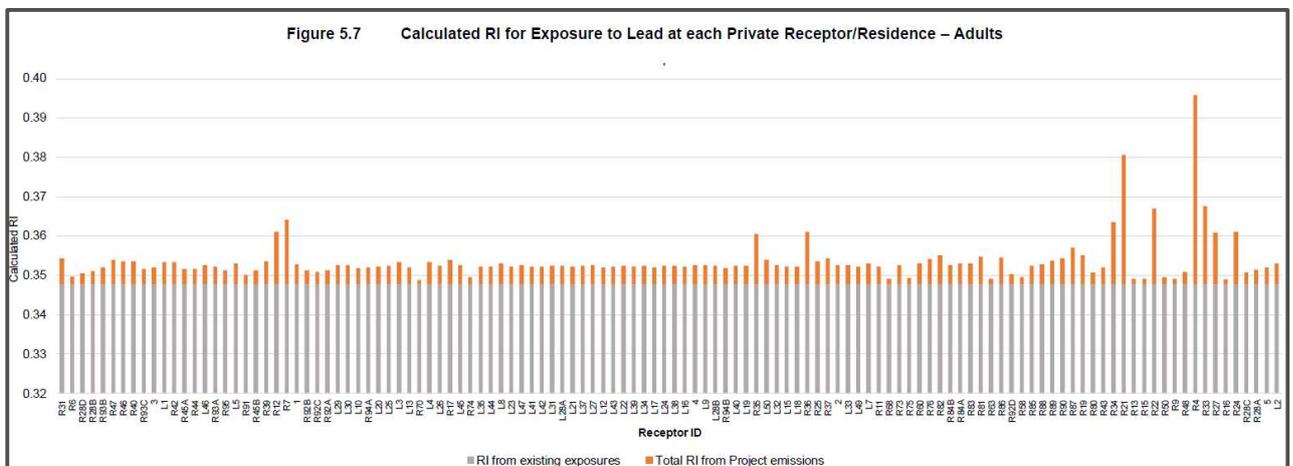


Figure 14 | Lead exposure to adults at privately-owned residences

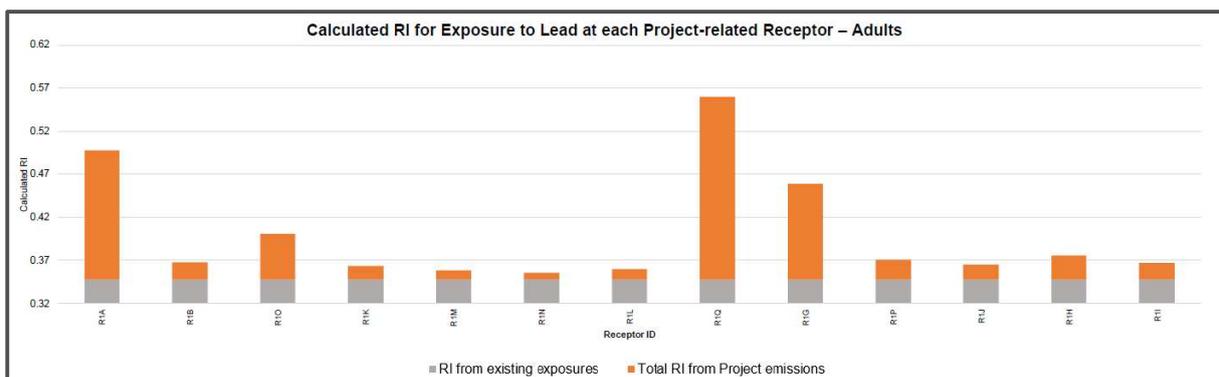


Figure 15 | Lead exposure to adults at project-related residences

235. Given predicted incremental increase in dust levels as a result of the project are lower at other privately owned residences compared to R4, the calculated RIs for all other privately owned residences near the mine site are also lower than for property R4.
236. For Lue Public School, exposures to lead from the project would be much lower than at residences near the mine site. The calculated RI at the school for exposures to lead from the project is 0.001. This is 1,000 times lower than the acceptable RI.

¹⁰ Total lead exposure to adults is higher than exposure to children in all cases.

237. Some submissions raised concerns about the baseline lead levels used for assessing cumulative impacts. Concentrations of lead in dust samples from Lue School presented in the EIS differed from other reported concentrations of lead at the school, and average lead concentrations in soil and water tank samples analysed by Professor Mark Taylor on behalf of the Lue Action Group in 2012 were much lower than the background lead concentrations presented in the EIS.
238. The difference in reported lead in the school is from dust within the ceiling space and is likely due to a difference in the sampling locations (noting that lead paint was used in the school).
239. The soil lead concentrations reported by Prof. Taylor are within the range reported in the EIS, and the proponent argues that the selection of high background levels is a conservative approach because there is less remaining “buffer” to the applicable health standards.
240. Notwithstanding that, EnRiskS undertook a sensitivity analysis using the mean lead soil and water tank concentrations reported by Prof. Taylor to determine the effect this would have on the RI. This demonstrated that total RI from existing exposures do not change by much, largely because existing exposures are dominated by dietary intake (lead in food).
241. Submissions also raised concerns about the accumulation of lead and other metals over time. In this regard, the health risk assessment factored in the accumulation of dust in soil and produce by assuming that:
- dust deposition to soil would occur for 70 years, and the value at the end of the 70 years was used for calculating exposures;
 - for inhalation, it was assumed people would be in the maximum affected locations 24 hours per day, 365 days per year for 35 years; and
 - deposition onto above ground produce would occur for 70 days (the time it takes for vegetable crops to grow), and below ground produce would be exposed to 70 years-worth of lead deposition.
242. Prof Taylor recommended that trigger values for concentrations for lead in dust and air should be imposed, similar to that imposed on the operators of Mount Isa Mine in Queensland (which requires an investigation if lead in deposited dust exceeds $100\mu\text{g}/\text{m}^2/\text{day}$). Based on his work for the EPA’s Environmental Lead Program, he recommended lead in dust should be below $90\mu\text{g}/\text{m}^2/\text{day}$ to keep children’s blood lead below $5\mu\text{g}/\text{dL}$. Prof Taylor also recommended that blood lead level monitoring of the community should be undertaken.
243. The health risk assessment was based on a lead in dust deposition rate of just $2.1\mu\text{g}/\text{m}^2/\text{day}$, which is well below the figure recommended by Prof Taylor. The Department notes that metals are generally regulated in NSW through the imposition of limits on TSP concentrations rather than limits on concentrations of the metal itself.
244. Notwithstanding that, in addition to standard conditions limiting TSP concentrations, the Department has recommended limits on deposited dust at residences and at Lue School and has also recommended Bowdens Silver be required to monitor metal concentrations in deposited dust and to develop a trigger-action-response protocol and contingency measures for elevated metal concentrations as part of the Air Quality and Greenhouse Gas Management Plan.
245. Bowdens Silver has also agreed to provide blood lead level monitoring for any members of the community that request it before mining operations commence and again at ongoing intervals

during operation. The Department has recommended a condition requiring the company to detail how blood lead level monitoring would be tracked over time.

Silica

246. The air quality assessment also considered the potential impacts from respirable crystalline silica. Silica occurs naturally in many rocks and, if inhaled in crystalline form, can cause damage to the lungs.
247. There are no national or NSW limits for safe levels of crystalline silica in the ambient air. However, the EPA Victoria has adopted an annual average assessment criterion of $3 \mu\text{g}/\text{m}^3$ (applied to the $\text{PM}_{2.5}$ fraction size) for mining and extractive industries.
248. The results of the air dispersion modelling indicate that the maximum concentration of silica dust at any private residence would be much lower than this at $0.21 \mu\text{g}/\text{m}^3$.

Gaseous Pollutants

249. Sodium cyanide is proposed to be used as a reagent in the processing plant, which has the potential to lead to fugitive emissions of hydrogen cyanide (HCN) through volatilization from storage tanks and the TSF. HCN is considered a principal toxic air pollutant.
250. The air dispersion modelling indicates that the maximum incremental 1-hour average concentration at any private residence would not exceed $0.21 \mu\text{g}/\text{m}^3$, which is two orders of magnitude below the criterion of $200 \mu\text{g}/\text{m}^3$ in the Approved Methods.
251. Nitrous oxide (NO_x) emissions can occur during blasting operations if blasting conditions are sub-optimal (e.g water mixing with explosive in the hole, poor quality explosives, or contamination of explosives).
252. The Department has recommended conditions requiring Bowdens Silver to undertake blasting in accordance with Australian Standard AS 2187.2 2006 *Storage and use of Explosives*, and to prepare a Noise and Blast Management Plan that includes measures to minimise the risk of blast fumes and NO_x emissions, including consideration of the *Code of Good Practice: Prevention and Management of Blast Generated Nox Gases in Surface Blasting* (Australian Explosives Industry and Safety Group Inc, 2011), which outlines management measures to control blast fumes.

Noise

253. The noise and blasting assessment included assessment of construction noise during the first six months of site establishment (when the new section of Maloneys Road would be constructed) in accordance with the *Interim Construction Noise Guideline (ICNG)*.
254. Operational noise was assessed in accordance with the *Noise Policy for Industry (NPfI)*. Given the long site establishment and construction phase (18 months) and the fact that pre-stripping of the open cut pit, which is essentially indistinguishable from mining, would commence during this period (at around month 7), all activities from month seven were conservatively considered to be operational noise activities for the purposes of the noise assessment. The realignment of the transmission line, which would occur in about year 3, was also assessed as operational noise.

255. The operational noise assessment also considered the Department's *Voluntary Land Acquisition and Mitigation Policy - For State Significant Mining, Petroleum and Extractive Industry Developments* (VLAMP).

Construction Noise

256. Noise during the first six months of site establishment and construction (which includes the construction of the new section of Maloneys Road and clearing and soil removal on the mine site and initial earthworks in the processing plant area) was assessed in accordance with the ICNG.
257. Noise from months 7-18 of the site establishment and construction phase was conservatively assessed in accordance with the NPfl and the impacts have been considered and discussed in the following section of this report.
258. Noise from onsite activities during the first six months of construction would not exceed the recommended noise management levels (NMLs) set in the ICNG at any time. However, construction of the new section of Maloneys Road would result in five residences located near the intersection of Lue Road and the relocated Maloneys Road (properties R81, R82, R88, R89 and R90 in **Figure 16**) to experiencing noise levels above the 45 dB(A) LAeq(15min) criterion set for standard construction hours, ranging from 47-57 dB(A) at these receivers.
259. Impacts would be relatively short duration (1 to 2 months) while construction occurs nearby, and noise is not predicted to exceed the 'highly noise affected' level of 75 dB(A) at any privately-owned residences near the mine site or roadworks.
260. Bowdens Silver is seeking approval to undertake some construction activities outside of standard construction hours¹¹. However, the combined noise of road construction and on-site earthworks is predicted to cause exceedances of the out-of-hours noise criterion at 18 residences, including exceedances of >5 dB(A) at five residences. The EPA was not satisfied that sufficient justification for the out-of-hours work was provided and recommended that construction be limited to standard construction hours. The Department agrees and has recommended a condition to limit construction to standard operating hours, except where activities would not exceed the out of hours noise criteria.
261. Bowdens Silver is proposing to prepare a Construction Noise Management Plan based on the requirements of the ICNG to limit the construction noise impacts.

Operational Noise

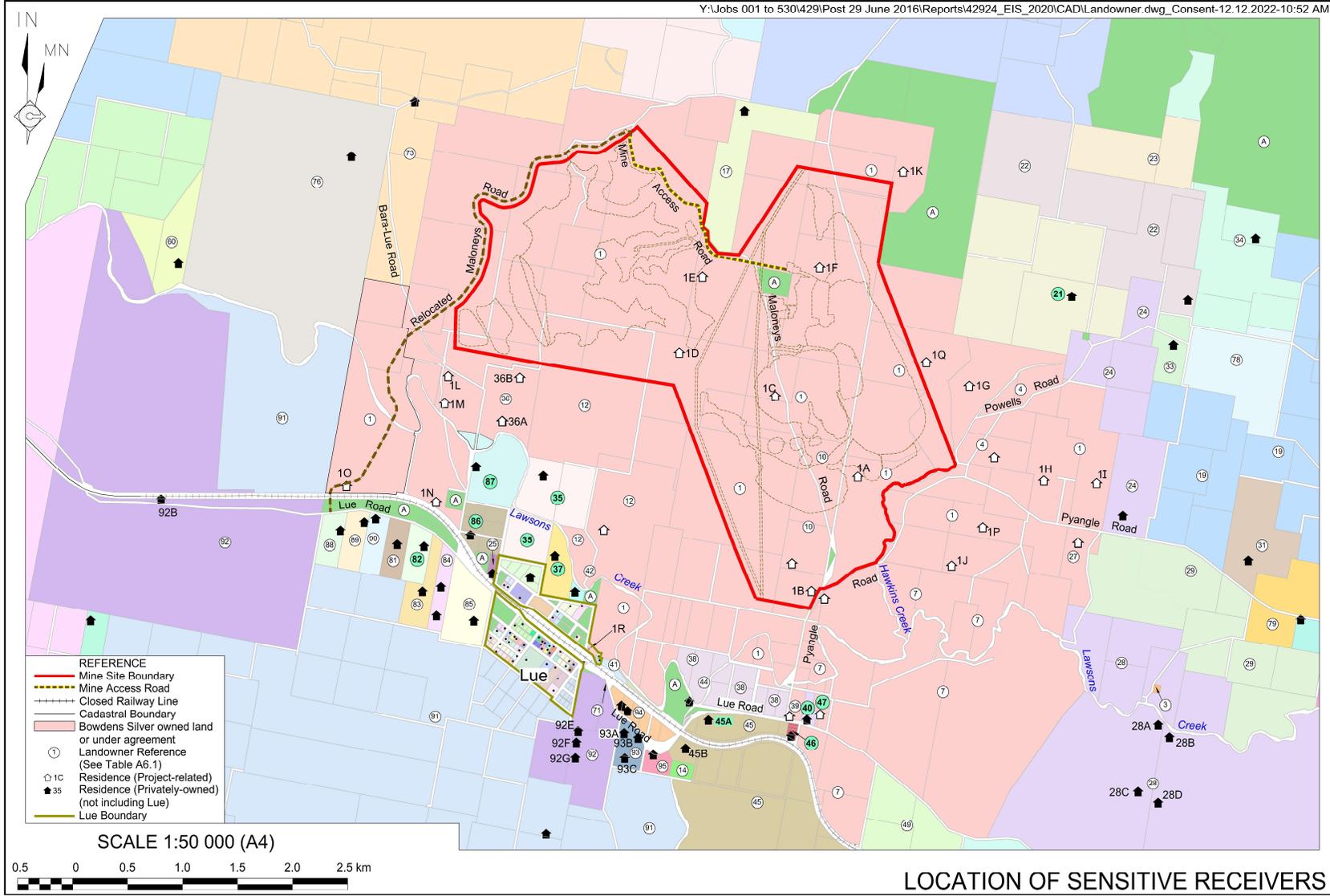
262. Bowdens Silver proposes a range of noise controls and management measures to reduce project noise levels and ensure noise at sensitive receivers complies with the criteria. These include:
- construction of temporary and long-term noise barriers, including a southern barrier to the south of the open cut pits to attenuate noise from the open cut mining and processing areas;
 - full or partial enclosures of noisy fixed plant;
 - the use of noise attenuated mobile equipment;
 - restricting the number and location of mobile equipment;

¹¹ Standard construction hours are defined in the ICNG as Monday to Friday 7 am to 6 pm, Saturday 8 am to 1 pm and no work on Sundays or public holidays

- scheduling intrusive mining activities to less sensitive times of the day, including limiting construction of TSF lifts and waste rock emplacement on the southern barrier to daytime only, reducing mining operations in the evening to within restricted areas of the WRE, and further reducing mining operations at night with only ore delivery to the ROM pad; and
 - use of predictive meteorological forecasting and implementation of real-time noise monitoring and adaptive site management.
263. SLR modelled noise under four scenarios representing different stages of the mine development and incorporating the implementation of the above noise mitigation and management measures.
264. Despite the noise mitigation and management measures proposed, the noise modelling predicts that under some operating scenarios the project would exceed the project noise trigger level criteria (PNTLs) by 1-2 dB(A) at five privately-owned residences and by 3-5 dB(A) at two residences.
265. During year three, the relocation of the 500 kV power transmission line would increase noise by 1-2 db(A) above the PNTLs at an additional eight privately-owned residences, three of them in Lue.
266. **Table 7** shows predicted worst case noise level exceedances over the life of the project. The table also includes residences that would experience exceedances of the PNTLs as a result of the realignment of the 500 kV transmission line.
267. **Figure 16** shows the locations of residences around the mine site. Residences predicted to be impacted by operational noise are shown in green.

Table 7 | Predicted noise exceedances

Activity	Exceedance	Day-time	Evening/ Night-time
Noise from mining operations	1 to 2 dB(A) above PNTL	R21; R37; R27	R21; R27; R35; R37; R40; R87
	3 to 5 dB(A) above PNTL	R35; R87 (during site establishment and construction)	--
Noise from the relocation of 500 kV transmission line	1 to 2 dB(A) above PNTL	R21; R25; R27; R37; R40; R45A; R46; R82; R86; R87; L3; L4; L50	Works associated with the relocation of the transmission line would only be undertaken during the day
	3 to 5 dB(A) above PNTL	R35	



268. There would be no exceedances of > 5 dB(A) at any privately-owned residence and there would be no exceedances of the night-time maximum sleep disturbance noise level of 52 dB(A) at any rural residence¹².
269. Apart from the three residences predicted to experience noise exceedances during the relocation of the transmission line, noise levels at residential properties in Lue are expected to comply with the applicable noise criteria, including intrusive and maximum sleep disturbance noise criteria, at all times.
270. Noise levels at other sensitive places such as Lue School, and other places of interest within Lue (such as the Rural Fire Brigade, Lue Pottery, the Lue Hall and Lue Railway Station) are also predicted to comply with the applicable noise criteria.
271. Project amenity noise levels are also predicted to be below the day, evening and night-time criteria over more than 25% of the nearest privately owned rural land under all scenarios.
272. Noise exceedances from the relocation of the transmission line would only occur intermittently, only during the day, and for a relatively brief period (1 to 2 months) while the relocation works are nearby.
273. Although the noise impacts of the transmission line relocation were assessed against the more stringent criteria of the NPfl, for comparison purposes it is worth noting that noise would not exceed the daytime construction noise criterion in the ICNG at any residences.
274. It is also worth noting that the two properties that are predicted to experience noise levels that exceed the PNTLs by 3-5 dB as a result of mining operations would not experience these higher noise levels all the time. Moderate exceedances of the PNTLs would only occur at properties R35 and R87 during the 18 months of site establishment and construction, and R35 may experience moderate exceedances again for a 1 to 2 month period during the relocation of the 500 kV transmission line.
275. During the rest of the project life until around year eight, exceedances at both properties would be 1-2 dB(A) above the PNTLs, and after year eight noise at both properties would comply with the PNTLs.
276. Receiver R40 is also only predicted to exceed the criteria for 1 to 2 months during the relocation of the 500 kV transmission line and under Scenario 4, which would occur from around year 10 of the project life.
277. Noise exceedances are also only predicted to occur during noise enhancing weather conditions (although it should be noted that these conditions are fairly typical in the area and may occur up to 50-60% of the time in the evenings and nights).
278. Under the NPfl, exceedances of 1-2 dB(A) are deemed to be 'negligible' because most people cannot readily discern such differences in noise levels.

¹² The EIS identified a number of other privately owned properties that would experience noise levels above the PNTLs, including noise >5 dB(A) above the PNTLs. However, Bowdens Silver has since purchased, or has entered into an option to purchase, those properties (with both parties having the right to exercise the option). Accordingly, noise impacts at those properties have not been considered.

279. Exceedances of 3-5 dB(A) are categorised as 'marginal' in the NPfl, and the VLAMP requires that such receivers are offered architectural or similar treatments that reduce the expected exceedances if the project is approved. The Department has included a condition requiring Bowdens Silver to provide mitigation at these two residences, consistent with the VLAMP.
280. Bowdens Silver has offered at-residence mitigation to all impacted receivers (including those predicted to experience negligible impacts).

Road Noise

281. Traffic noise was assessed in accordance with the *NSW Road Noise Policy* (RNP).
282. The RNP establishes noise criteria for total traffic noise (i.e. noise from all traffic sources including project traffic) for different road types. These criteria aim to maintain an acceptable level of amenity for residents.
283. For new local roads or redevelopment of existing local roads, the RNP sets a noise limit at existing residences of 55 dB(A) during the day and 50 dB(A) during the night, and a noise limit of 50 dB(A) for school classrooms.
284. For new traffic generating development on existing roads, if the existing traffic noise is lower than the criterion, then the relative increase in traffic noise from the addition of project-related traffic should be no more than 12 dB(A) to protect quiet areas from excessive changes in amenity. If existing traffic noise already exceeds the criterion, then increases of up to 2 dB(A) are acceptable because this incremental increase would be barely perceptible compared to background noise levels
285. The primary access route to the mine site would be via Lue Road from Mudgee and the relocated Maloneys Road.
286. Existing traffic noise levels comply with the day-time and evening assessment criteria at residential locations on Lue Road, the existing Maloneys Road and Pyangle Road. The increase in traffic noise as a result of the project during construction and operations is predicted to be <2 dB(A). Traffic on the relocated Maloneys Road is also predicted to increase traffic noise at residences located on Lue Road but near to the relocated Maloneys Road by <3dB(A). These increases are well below the 12 dB(A) relative increase criterion under the RNP.
287. Traffic noise without the project at other locations around the mine site are below the RNP criteria. Increases as a result of project traffic are predicted to be very minor at all locations (ranging from about < 1 dB(A) to around 3 dB(A) at different locations and times).
288. Existing traffic noise at Lue School is marginally (1-2 dB(A)) above the RNP noise criterion for school classrooms. During the first six months of construction (before the Maloneys Road is relocated), project traffic is predicted to increase day time traffic noise outside the school by 1-2 dB(A), which is considered barely perceptible and does not warrant mitigation measures in accordance with the RNP. Once the new Maloneys Road has been constructed, traffic noise would increase by < 1 dB(A) outside the school during the remainder of project life.
289. The RNP criteria for new local roads is 55 LA_{eq(15hour)} during the day and 50 LA_{eq(9hour)} during the night. Based on peak traffic flows along the relocated Maloneys Road of 42 light vehicles and 5 heavy vehicles during the day and 34 light and 5 heavy vehicles during the night, noise at the

nearest residential receiver (R88) is predicted to be 43 dB(A) during the day and 42 dB(A) at night¹³.

290. The RNP states traffic vibration impacts are likely to be negligible for receivers located more than 20 m from the road. SLR notes all residences adjacent to the primary access route along Lue Road from Mudgee and the relocated Maloneys Road are located at least 20 m from the road and therefore are unlikely to be impacted by transport-related vibration.
291. One residence in Lue (L10) is located <20 m from the road and may experience some annoyance from traffic vibration during the early construction phase before project trucks are diverted to the relocated Maloneys Road. It is likely this property is already affected by vibration from existing heavy vehicles traffic.
292. Bowdens Silver is also proposing to prepare a Drivers' Code of Conduct that sets out safety and operating procedures relating to hours of travel on Lue Road, minimal use or avoidance of exhaust brakes and adherence to nominated speed limits.

Blast Noise and Vibration

293. Blasting would be required to extract the ore and occur on a regular basis with blasts proposed to be undertaken 3 to 5 days per week, Monday to Saturday. Potential blast impacts to residences and infrastructure result from airblast overpressure, ground vibration, flyrock and fumes.
294. The EPA currently applies the criteria for human comfort or annoyance established in the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* for assessing blasting impacts at privately-owned residences and other sensitive receptors. These criteria require that:
 - overpressure due to blasting not exceed 115 dB (Lpk) for more than 5% of blasts in any periods of 12 months at any occupied residence, and not exceed 120 dB (Lpk) for any blast; and
 - maximum peak particle ground velocity (PPV) not exceed 5 millimetres per second (mm/s) for more than 5% of blasts in any periods of 12 months at any occupied residence and not exceed 10 mm/s for any blast.
295. *Australian Standard AS 2187- 2006: Part 2- Use of Explosives* Appendix J sets standard values for building vibration to minimise risk of vibration induced damage. These values are higher than the criteria for human comfort, and therefore compliance with the human comfort criteria would generally ensure that risks to structural damage would be negligible.
296. SLR calculated the ground vibration and airblast overpressure levels that would occur 50%, 5% and 0.1% of the time at the closest blast to each residence based on a *nominal* blast design that includes a maximum instantaneous charge (MIC) of 216 kg in waste rock and 117 kg in ore. Based on that assessment, no exceedances of the ground vibration and/or airblast overpressure are predicted at privately owned residences¹⁴.

¹³ Bowdens Silver is intending to apply to Council for the relocated Maloneys Road to be designated as a principal haulage route. Under the RNP, the traffic noise criteria for roads that are designated as principal haulage routes are 60 dB(A) and 55 dB(A) during the day and night respectively. However, Bowdens has demonstrated that it would comply with the lower criteria.

¹⁴ Exceedances were predicted at two properties. However, Bowdens Silver has since purchased one property and has entered into an option to purchase the other (with both parties having the right to exercise the option).

297. SLR also calculated the distances at which other buildings; archaeological and geological structures; linear infrastructure (applicable to the 500 kV powerline, railway line, roadway and culvert); and stockyards would be safe from airblast overpressure and vibration impact (i.e. the distance at which the relevant criteria would be met for human health, structural damage and livestock disturbance). SLR determined that:
- livestock disturbance is unlikely to occur beyond 630 m from the blast;
 - roadway culverts and railway lines more than 150 m and 130 m away from the blast respectively would be unlikely to be damaged; and
 - archaeological or geological structures are unlikely to be damaged at distances greater than 73 m from the blast.
298. There is no privately-owned land with stock within 1 km from the proposed blasting. The only public infrastructure in the mine site is the 500 kV transmission line, which would be at least 340 m from the closest blast (increasing to at least 500 m after the realignment of the power line). The safe distance calculated by SLR is 201 m, and hence the transmission line is not predicted to be impacted.
299. Blasting would not occur within 500 m of any public road or privately-owned land without the agreement of the landowner, and the in-situ blasting proposed for the project is expected to result in a blast envelope much less than 500 m. Consequently, flyrock is also not likely to be an issue.
300. Bowdens Silver is proposing to prepare a comprehensive blast management plan that includes management of residents and livestock safety to avoid flyrock impacts and has committed to establishing a protocol to inform interested surrounding landowners and residents about the blasting timetable.

Visual Impacts

301. A series of ridges occur to the southwest and south of the proposed open cut pits and obstruct views of the mine site from Lue and much of its surrounds. However, three private rural residences would have direct, close or medium distance views of sections of the mine site from living rooms or outdoor recreational spaces.
302. Residence R81 is elevated and would have views of the relocated Maloneys Road, TSF embankment and waste rock stockpiles on the western side of the site. This residence is located around 2.2 km away and there is some intervening topography and vegetation that would likely screen up to 30 m of the TSF embankment. However, the upper section of the embankment would be exposed with limited opportunities to rehabilitate until after the final lift in about year 8.
303. Residence R19, is around 4.5 km to the east of the closest part of the mine site and would have limited views of early site establishment and construction activities in the open cut pit area that would later be obscured by the WRE.
304. A cluster of residences located to the south of the open cut pit area (R39, R40, R47) would also have views of parts of the mine (initially of the open cut pit and processing area and then of the southern barrier from about year 5 of the project). These residences are located approximately 1.9 km away and views would be partially shielded by intervening vegetation and topography. Bowdens Silver has now purchased two of these residences.

305. The realignment of the 500 kV powerline 300 m to the west of its current position would bring it closer to residences on that side of the mine and five residences on the west and south-west side of the mine would have expanded or more prominent views of the powerline and/or towers.
306. There would be no expansive views of the mine site at close or medium range from high usage roads, reserves or lookouts. The highest visibility of the eastern section of the mine site would be from short sections of Pyangle and Powells Road, which are less than 0.5 km from the mine site, and from Lue Road approximately 2-5 km to the south and southeast. The transmission line and its easement would also be visible from short sections of Lue Road and other local roads.
307. At the cessation of mining, landforms would be constructed to attain a less geometric and more natural appearance. However, the WRE and ore stockpiles would still retain an engineered appearance and the steeper more geometric slopes of the TSF would also remain a noticeable landform.
308. Bowdens Silver is proposing to mitigate the visual impacts by progressively revegetating the outer slopes of the Southern Barrier, the WRE and the outer face of the TSF embankment (after the final raise), and by enhancing the existing planted visual screen on the northern side of Pyangle Road and planting trees and shrubs on the upper terminal benches of the open cut pit.
309. The Department considers further mitigation for the residences identified above could be achieved by at-residence vegetation screening and has recommended a condition requiring Bowdens Silver to provide this at the request of any of these landowners.

Lighting Impacts

310. The mine site is located 168 km from the Siding Spring Observatory within the Dark Sky Region of NSW. There are also two amateur observatories within 45 km and 35 km respectively of the mine site, and one site within 10km of a site where astronomical observations are made using mobile telescopes.
311. Submissions raised concerns about the impacts of the mine on these observatories. Submissions and discussions with local community members also made it clear that some community members and tourists visiting the area also deeply value the beauty of the very clear night sky and are concerned about sky glow from the mine.
312. AS/NSW 4282:2019 – *Control of Obtrusive Effects of Outdoor Lighting* (AS4282) sets limits for lighting to control the adverse effects of outdoor lighting on residences and astronomical observations. Lighting would be installed in accordance with the requirements of AS4282 for dark rural environments.
313. The EIS includes a calculation of the vertical illuminance (the amount of light falling on the vertical plane) that would occur at the mine site boundary based on typical mine site lighting and determined that it would be about 25% of the limit recommended in AS4282. As illuminance reduces by a factor of 4 with a doubling of distance, vertical illuminance would be substantially lower at private residences beyond the boundary.
314. Sky glow occurs when light reflects off clouds and atmospheric particles such as dust and water vapour causing a scattering effect. Although the AS2482 standard limits the direct emission of light into the sky, there would still be some light reflected upwards. During cloudy evenings, reflectance off water vapour particles would produce a faint glow above the mine site that would

potentially be visible at nearby rural residences. Illuminance at Lue would increase too, however this increase would only represent an increase in natural illuminance of around 0.5%, which would be imperceptible.

315. On a clear night sky glow from the mine is unlikely to occur as there would be fewer reflective surfaces to scatter the light. Dust generated by the project at ground level is expected to be no more than 75 ug/m³ per hour after dusk, and concentrations at 100 m above the mine site are predicted to be around 2% of ground level concentrations, decreasing with increasing elevation.
316. The EIS included calculations of particle luminance (i.e. light reflected off individual particles) at varying levels above the mine site and determined that particle luminance caused by light reflected from the mine would be less than the natural background particle luminance at heights 30 degrees above the horizon¹⁵ when viewed from Siding Spring Observatory or Wiruna observatories. Consequently, it is unlikely the lighting from the mine would impact either of these observatories.
317. The EIS includes a letter from Siding Springs Observatory agreeing that the night sky brightness above the observatory would be negligible.
318. It is unlikely the mine would have a discernible impact on the Mudgee observatory as the upwards light from the mine would be much less than that of Mudgee, and the mine is three times as far from the observatory.
319. While elements of the mine would be visible during the day and mine lighting would be visible at times during the evening and night, the Department considers the visual impacts would not be significant. The Department has recommended conditions of consent to minimise the impacts, including requiring Bowdens Silver to:
 - plant and maintain supplementary screening trees and shrubs in the mine site adjacent to Pyangle Road/ Powells Road and around the outer southern perimeter of the southern barrier and TSF;
 - ensure that all external lighting complies with AS4282; and
 - ensure that the visual appearance of all new buildings and structures blends far as possible with the surrounding landscape.

Conclusion

320. The air quality assessment indicates that the project can be managed in a manner that would comply with relevant criteria for particulate matter, silica and gaseous pollutants.
321. Incremental exposure to heavy metals, which would largely be the result of metals in airborne particulate matter, is predicted to be very small and total exposure to all metals (except manganese) would remain well below (less than half of) the level at which adverse health effects would be expected to occur.
322. Noise and vibration related impacts are also predicted to generally comply with applicable criteria, with the exception of up to 4 residences predicted to experience negligible exceedances, and 2 residences predicted to experience moderate exceedances during some operating scenarios.

• ¹⁵ The reference angle set out in the Dark Sky Planning Guideline for determining impacts on observing conditions at the Siding Spring Observatory.

323. For a period of a few months when the 500 kV transmission line is relocated, an additional 8 residences would experience negligible exceedances and one residence would experience moderate exceedances of operating noise criteria. Noise at these residences would be below the construction noise criteria.
324. The Department has recommended a comprehensive suite of conditions to minimise and manage health and amenity related impacts, including requiring Bowdens Silver to:
- undertake additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at residences which are predicted to be moderately affected, if requested by the landowner;
 - comply with contemporary applicable air quality (including deposited dust), noise and blasting limits;
 - ensure that all external lighting complies with AS4282;
 - monitor metal concentrations in deposited dust and develop appropriate contingency measures in the event of elevated metal concentrations;
 - include a blood lead level monitoring as a components of a social impact management plan (the plan is discussed further in **section 6.4** below);
 - develop a comprehensive Air Quality Management Plan, Blast Management Plan and Noise Management Plan, including real-time monitoring and active management systems which include early warning alert systems to identify and manage potential exceedances;
 - independently investigate complaints and undertake applicable management measures; and
 - communicate mining operations with the community, including publicly reporting all monitoring results, and effectively responding to enquiries and complaints.

6.3 Traffic and Transport Impacts

325. Lue Road is the main road linking Mudgee and Rylstone and the main road through Lue. The project is located roughly halfway between these towns and access to the mine site is currently via Lue Road, Pyangle Road and the existing Maloneys Road.
326. Most project traffic is expected to approach the mine site from Mudgee in the west and accessing the mine site would mean travelling through Lue. To ameliorate the impacts of traffic on Lue, Bowdens Silver is proposing to relocate the existing Maloneys Road, which currently joins Lue Road to the east of the mine site, to the west of the mine site so that vehicles can access the site without travelling through Lue. The existing and proposed access routes are shown in **Figure 17**.

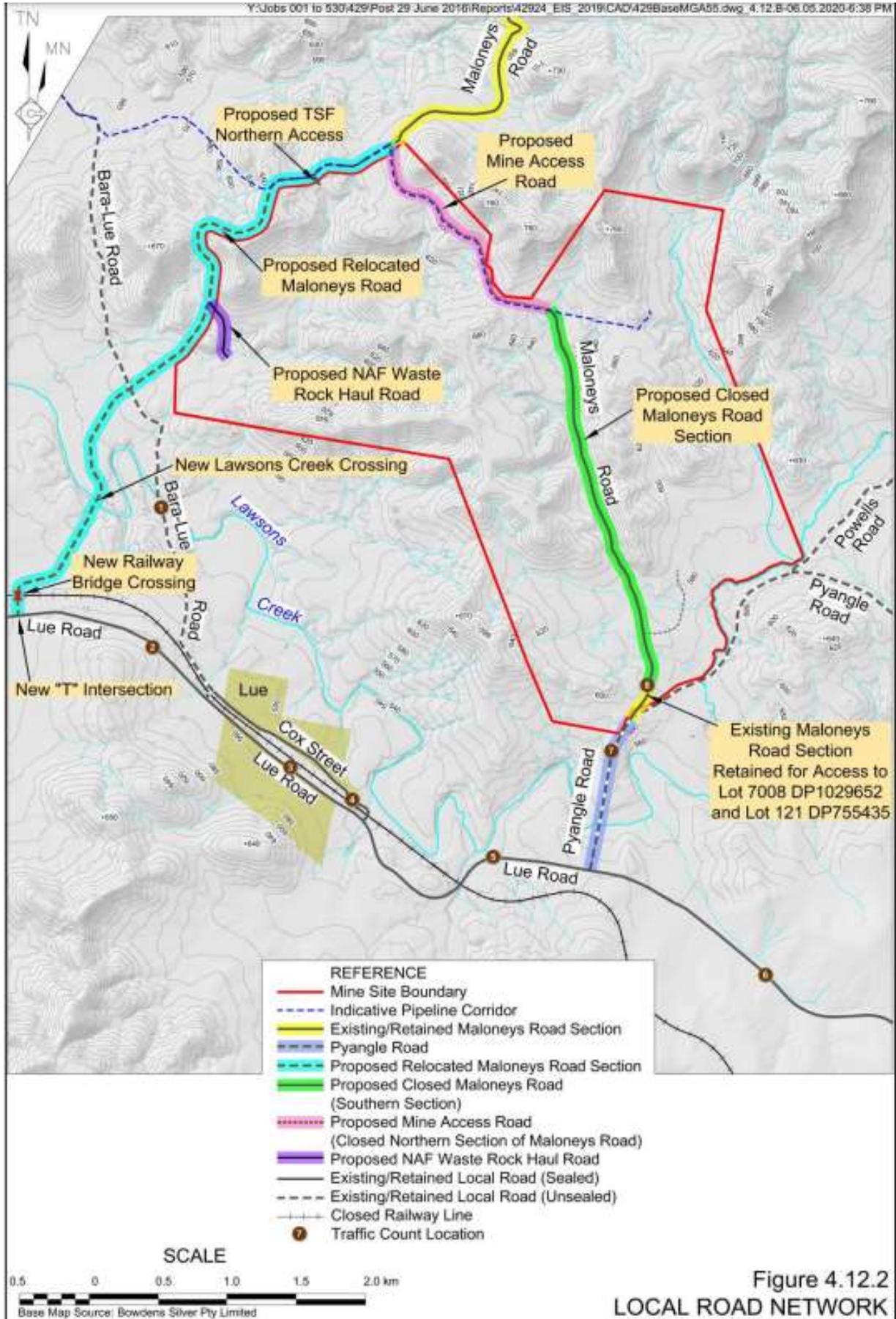


Figure 4.12.2
LOCAL ROAD NETWORK

Figure 17 | Mine access roads

327. Until the relocated Maloneys Road is constructed (which would take approximately six months at the start of the project) traffic would continue to access the site via Pyangle Road and the existing Maloneys Road. Once the new section of Maloneys Road is constructed, primary access to the mine would be via the relocated Maloneys Road, although exploration staff would continue to access the site via Pyangle Road.
328. Traffic surveys undertaken in 2017 for the EIS determined that around 840 vehicles currently travel on Lue Road in Lue each day during the week, of which around 7% are heavy vehicles.
329. The local roads around Lue typically carry fewer than 110 vehicles per day.
330. Community submissions raised concerns about the safety risks and amenity impacts from traffic. Submitters were particularly concerned about trucks travelling on Lue Road, which is narrow and winding in places, and through Lue itself, which has a school on the main road. Concerns were also raised about the transport of hazardous materials such as cyanide and explosives.

Construction Traffic

331. The construction and site establishment phase during the first 18 months of the mine life would generate the bulk of the heavy vehicle traffic on the surrounding roads.
332. Construction of the relocated Maloneys Road would occur in the first six months of the project life and during that period there would be up to 50 heavy vehicle movements per day (including up to 8 oversize/overmass vehicle movements per day), 8 shuttle bus movements (Bowdens Silver is proposing to transport around 65% of the workforce by bus), and up to 120 light vehicle movements (staff and visitors). Of these, approximately 78 light and 36 heavy vehicle movements per day would go through Lue.
333. The addition of project traffic during construction of the relocated Maloneys Road would represent a roughly 10% increase in light vehicle traffic and 42% increase in heavy vehicle traffic.
334. Council has requested that the relocation of Maloneys Road should be completed before other site construction works commence. However, the Department considers there is no strong justification to delay on-site construction until the roadworks are completed given the relatively modest increase in total traffic movements and short duration of this impact. Furthermore, a safety audit did not identify safety issues of concern and there is sufficient road capacity to accommodate this increase. Accordingly, the Department has not recommended this as a condition of consent.
335. Once construction of the relocated Maloneys Road is complete (around six months), traffic in Lue is expected to reduce as Bowdens Silver expects most vehicles to travel from the west and access the mine from the relocated Maloneys Road.
336. During the peak site establishment and construction phase (around month 13), the project would add around 200 light vehicle movements and 62 heavy vehicle movements to the surrounding road network daily. In addition to an occasional oversize/overmass vehicle, around 82 light vehicle movements and up to around 14 heavy vehicle movements (including 4 bus movements) would travel through Lue each day.

337. This is an increase in heavy vehicle traffic in Lue of around 22.5% over current levels. However, it should be noted that this represents the worst case during the peak of construction activities and would occur for a limited time.
338. The realignment of the 500kV transmission line in year 3 would also add up to 12 heavy vehicle and 30 light vehicle movements on the roads per day. These are expected to mostly travel from the west and enter the mine via the relocated Maloneys Road (i.e. not travel through Lue).
339. The highest concentration of project related traffic would be on the relocated Maloneys Road. An approximately 1.4 km stretch of this road between the mine access road and the entrance to the TSF embankment area would be used as a haulage route to transport materials from the mine site to the TSF for construction of the TSF embankment. That haulage would add up to around 266 heavy vehicle movements per day on that short section of road, in addition to the project traffic numbers described above.
340. Bowdens Silver is proposing to construct the road to a suitable standard for the predicted traffic types (this is discussed further below) and to progressively seal the relocated Maloneys Road, with the short section of road between the mine site and the TSF proposed to be sealed after initial transportation activities are completed (in around month 18) on the basis that this would enhance road compaction.
341. Although there would not be a significant number of other road users on that section of road (currently around 90 vehicles per day use the existing Maloneys Road north of Pyangle Road, and many of these are vehicles associated with the mine), the Department considers that wheel generated dust could pose a safety risk to other road users and that this risk is highest during the site establishment and construction phase when truck numbers are highest. Consequently, the Department has recommended a condition requiring the full length of the relocated Maloneys Road to be sealed when the relocated Maloneys Road is constructed.

Traffic During Operations

342. The relocated Maloneys Road between the mine access road and the entrance to the TSF embankment area would continue to be used as a mine haulage route during the first 8 years of operation. There would be around 102 truck movements per day along this section of road in years 1-3 and around 86 truck movements during years 4-8 (primarily for hauling materials for the TSF lifts).
343. Aside from this, during normal operations, the project would generate up to around 16 heavy vehicle trips per day (for deliveries and mineral concentrate transport), 28 shuttle bus trips each day, and 156 light vehicle trips per day. It would also generate up to 102 heavy vehicles movements per day on the section of the relocated Maloneys Road between the mine access road and the entrance to the TSF embankment area.
344. Most of this traffic would access the mine along the relocated Maloneys Road, and a larger proportion of these would travel from the west and would thus not have to travel through Lue. Heavy vehicles movements through Lue would be limited to around one delivery truck per day through the village (2 movements), 6 shuttle buses per day (12 movements) for employee transport and 70 light vehicles movements.

345. The Lue Public School is located directly adjacent to Lue Road, which at that location is called Swanston Street. NSW Education requested that all heavy vehicles are restricted from using Swanston Street during school periods. The Department does not consider this would be reasonable or feasible as Lue Road is the main road through town, is already approved for B-Double vehicles and, as discussed above, the number of project-related trucks is a relatively small proportion of the total number of trucks using the road.
346. B-Double vehicles are, however, restricted from using Lue Road during school bus operation times and that restriction would apply equally to traffic associated with the project. Bowdens Silver is also proposing to stagger mine shifts, which would mean the majority of mine employee trips would not coincide with standard school drop off and pick up times. Consequently, it is not likely that project traffic would represent a significant safety risk to children at Lue school.
347. In relation to safety on other existing roads, although there would be a slight increase in traffic the road safety audit provided as part of the EIS did not identify any particular accident patterns or causation factors that may be exacerbated by increased use of the road system and the roads proposed to be used by trucks associated with the project are already approved for B-Double use indicating that the transport route is suitable for that purpose.
348. Some submitters raised concerns about traffic on other local roads. While some private vehicles would potentially travel on local roads, these are not proposed to be used for project trucks or shuttle buses.
349. The EIS includes a Preliminary Hazard Analysis that concluded the transport of explosives and reagents are unlikely to present a significant risk. Sodium cyanide would be delivered to site in solid form in sealed isocontainers, and Bowdens Silver would transport ammonium nitrate base blasting agents in accordance with *AS 2187.1 Explosives - Storage, transport and use*. Transport would be undertaken by drivers and vehicles licensed to transport dangerous good.

Impacts on Roads and Intersections

350. The traffic assessment considered the impacts on the intersections and levels of service for the main routes that would be used by the project (from Lue Road east of Pyangle Road to Castlereagh Highway west of Mudgee and Ulan Road north of Mudgee).
351. The project is not predicted to adversely impact intersection performance, and the level of service on all roads is expected to remain acceptable with the addition of traffic generated by the project.
352. Bowdens Silver has entered into a planning agreement with Council which includes, amongst other things, contributions towards local roads maintenance. In this regard, the terms of the agreement include \$110,000 per year (\$1,705,000 over the life of the project) in contributions to Council for the maintenance of public roads.
353. Heavy vehicle usage on the relocated Maloneys Road would be high, particularly along the section used for haulage during TSF construction. Bowdens Silver proposes to construct the 5.2 km long section of road to Austroads standards for B-double vehicles, and to construct the following intersections, also designed in accordance with Austroads standards:
- channelised left and right turn lanes in Lue Road at its intersection with the relocated Maloneys Road.

- a right turn treatment in the relocated Maloneys Road at its intersection with the mine access road.
 - a left turn treatment in the relocated Maloneys Road at its intersection with the TSF embankment access road.
354. These auxiliary treatments allow for widened shoulders, which allow vehicles travelling straight to pass the turning vehicles.
355. The intersection of Pyangle Road and Lue Road is currently not to standard and Bowdens Silver proposes to widen the shoulder on the southern side of Lue Road at its intersection with Pyangle Road to achieve a BAR treatment. The Department has recommended a condition requiring this upgrade to be completed prior to the commencement of construction.
356. Bowdens Silver is proposing to progressively seal the relocated Maloneys Road, with the sealing of the section between the mine site and the TSF proposed to occur after site establishment. Given the large number of trucks that would be using that road during the construction of the TSF embankment (which occurs during site establishment), the Department considers it should be sealed earlier to reduce safety risks associated with dust and has recommended a condition to this effect.
357. Bowdens Silver would be fully responsible for the cost of intersection upgrades and relocating Maloneys Road.

Conclusion

358. The traffic assessment indicates that the project is unlikely to result in significant road network capacity or safety impacts, subject to the proposed roadworks including the relocation of Maloneys Road.
359. In this regard, the Department acknowledges that the Maloneys Road relocation would significantly decrease project-related traffic through Lue during the peak construction and operational phases of the project, with the project representing a relatively modest proportion of traffic through Lue during these phases. Whilst the project would represent a higher proportion of total traffic through Lue during the first 6 months of construction prior to the road relocation, the absolute traffic volumes would remain relatively modest and are not expected to result in any significant traffic or amenity impacts.
360. To ensure that traffic-related impacts are appropriately mitigated and managed, the Department has recommended conditions requiring Bowdens Silver to:
- upgrade the intersection of Pyangle Road and Lue Road prior to any construction works on site;
 - relocate Maloneys Road (including sealing the full length of the relocated road, and appropriate creek and railway crossings) to the satisfaction of Council prior to undertaking mining operations;
 - pay road maintenance contributions to Council over the life of the project (\$110,000 per year); and
 - prepare and implement a detailed Traffic Management Plan.

6.4 Social Impacts

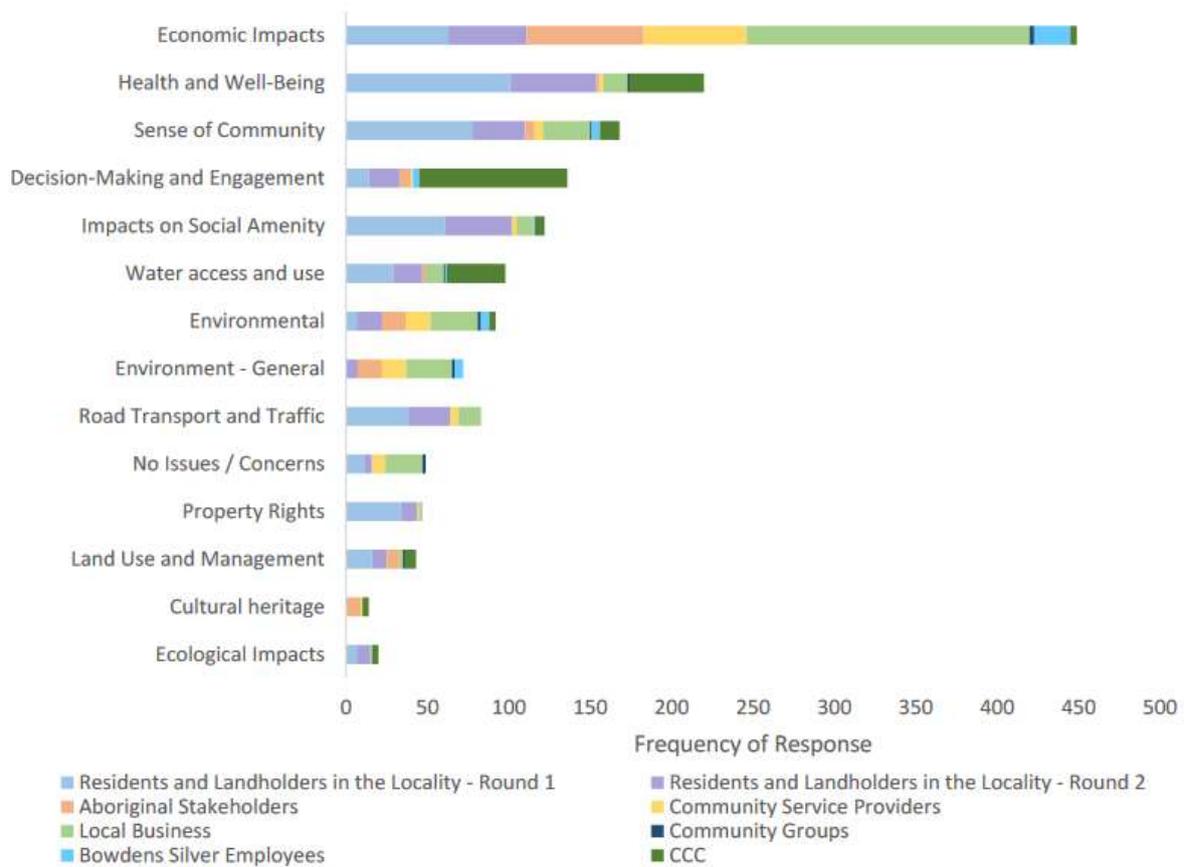
Introduction

361. The project would generate a range of positive social impacts in the local community through job creation and economic opportunities. Nevertheless, it also has the potential to have negative social impacts by putting pressure on local services and facilities and affecting the nature and social dynamics of the community.
362. The Lue Action Group provided advice on the social impact assessment from Dr Alison Ziller, which the Department has considered in its assessment.
363. The Department notes that during the exhibition of the EIS the submissions from people living within 5 km of the mine site were split relatively evenly, with approximately half (51%) opposing the project and 46% supporting the project.

Assessment approach and findings

364. The EIS includes a detailed social impact assessment (SIA) undertaken by Umwelt. The Department engaged an independent social impact expert, Ms Carla Martinez of WSP, to provide advice on the adequacy of the SIA.
365. The SIA was prepared in accordance with the Department's Social Impact Assessment Guidelines for State Significant Mining, Petroleum Production and Extractive Industry Development 2017¹⁶ and considered the social impacts of the project on the surrounding locality of the mine, Lue and surrounds and the broader region.
366. Ms Martinez identified areas where there was insufficient information in the SIA and recommended Bowdens Silver provide further information on these matters. The Department notes that some of the technical matters were not addressed in the SIA but were addressed in other sections of the EIS.
367. The assessment included extensive engagement with various community groups to understand the opportunities and threats from the community perspective.
368. The SIA found that the level of concern about the project varies across stakeholder groups and geographic locations. However, consistent themes were identified across stakeholder groups, with some themes more prominent for particular stakeholder groups than others.
369. The most commonly identified impact across all stakeholder groups were those related to the economy and economic aspects of the project. This was followed by health and well-being, changes to sense of community, concerns relating to decision making processes and engagement, and impacts on social amenity. **Figure 18** summarises the perceived impacts across all stakeholder groups.

¹⁶ The Department's recent 2021 SIA Guideline that applies to all State significant development does not apply to the project under transitional arrangements.



Residents and landholders Round 1 n=69; Residents and landholders Round 2 n=60; Aboriginal stakeholders n=8; Community service providers n=37; Local business n=87; Community groups n=4; Bowdens Silver employees n=16; CCC n=13. Note: Multiple responses

Figure 18 | Perceived impacts across all stakeholders

- 370. For residents and landholders in the Lue area, health and well-being impacts associated with lead dispersion, contamination and stress and anxiety was most frequently identified as the issue of concern, with social amenity impacts also identified frequently by stakeholders.
- 371. The potential impacts on sense of community and social cohesion were also identified as key issues by stakeholders living near the mine, with some people fearing an influx of people with different values would adversely affect the sense of community, and others thinking new people moving to the area and improvements to infrastructure would strengthen the sense of community.
- 372. Aboriginal stakeholders identified economic impacts as a positive impact, and key concerns centred around the protection of cultural heritage and land management, particularly in relation to rehabilitation. Aboriginal stakeholders were also concerned about existing divisions between the Aboriginal and non-Aboriginal community, with some stakeholders believing that the project could increase social cohesion by providing employment for Aboriginal people, and other Aboriginal stakeholders suggesting the project may cause more conflict due to different opinions about mining.
- 373. For people living near to the project, traffic impacts, property rights and land use conflicts were also issues of greater concern.
- 374. The SIA identified the most important social impacts based on stakeholder perception and social impact rating (based on a risk analysis of consequence and likelihood of impacts to occur) to be:

- economic impacts pertaining to local employment and use of local business and services – with a high risk rating (positive impact);
- health and well-being, including community perceptions of the risk of lead exposure and fears of contamination of air, soil and water;
- sense of community, including concerns about loss of community members and population change and subsequent impacts on community cohesion and sense of place; and
- impacts on social amenity relating to dust/air quality, visual impacts and noise.

375. The Department has considered the economic impacts of the project in **Section 6.6** below. Impacts on amenity and health have been assessed in **section 6.2**. Other key social impacts of the project are discussed below.

Health and Wellbeing

376. As discussed in **sections 6.1** and **6.2**, community exposure to metals as a result of the project would be negligible, the project has been designed to avoid or minimise adverse impacts on water resources and amenity, including in relation to traffic, and the Department considers the residual impacts can be managed.

377. Nevertheless, the perceived risks are high and the SIA recommends that it would be important for Bowdens Silver to engage with the community about these concerns and to communicate the results of ongoing monitoring.

378. The SIA also identified, and the Department acknowledges, that the project is already contributing to mental health issues for some residents and landholders near the mine, with some community members already feeling increased levels of stress and anxiety about the project and how it could impact on their quality of life.

379. To mitigate these risks, Bowdens Silver proposes to keep the community informed of monitoring results relating to lead in air and water, to offer blood lead testing for members of the community that request it, maintain an open-door policy and implement a “Good Neighbour Program” facilitated by a dedicated community liaison officer.

380. The company is also proposing to support health service programs through a community investment program, which is discussed in more detail below.

Sense of Community

381. Community members near the mine fear the potential impacts of the project on sense of community and social cohesion. The SIA identified population changes as a key factor that may impact on these values. To understand these impacts, the SIA considered the likely population change in the Lue area and the broader LGA due to acquisition of properties for the mine and/or due to an influx of mine workers.

382. Between 1989 and 2016, the previous owners of the project acquired 13 properties around the mine site. The SIA estimates that the project may have reduced the local population by around 21 people over a this period.

383. Since Bowdens Silver acquired the project in 2016, the company has purchased (or has an option to purchase) three more properties. These properties remain either occupied full time or used as

temporary (weekend/holiday) accommodation. The company is committed to leasing or utilising acquired properties wherever possible to maintain population in the area.

384. Based on the above, the SIA classified the social risk rating as a result of population change in Lue due to property acquisitions as low.
385. In relation to the potential impacts of an influx of workers on sense of community during construction, the SIA concluded that the construction workforce would be unlikely to stay in Lue itself due to limited accommodation options and consequently classified the social risk rating to the community of Lue as low. However, the construction workforce would represent around a 1% increase in the population of the Mid Western LGA – see further discussion below about impacts associated with workforce accommodation.
386. During operations it is likely more of the workforce would migrate permanently to the region due to the longer-term nature of the work. The SIA assessed three different scenarios and based on regional employment statistics, the most likely scenario would result in 40% of workers relocating to the region accompanied by family members and a population increase of around 219 people. This would represent an increase of around 0.9% in the population of the Mid Western LGA, which is less than the average annual population growth rate in the LGA of 1.2% during the period 2007 to 2018.
387. It is expected that most of the operational workforce would choose to reside in Mudgee, Kandos and Rylstone because these towns that are well serviced and near the mine. Consequently, any impacts would be more likely to affect these towns than Lue.

Accommodation and Community Services

388. People moving into the LGA would increase demand for accommodation, health and community services.
389. The SIA identified that there is likely to be sufficient accommodation available for workers during the construction and operational phases although rental accommodation is tight and the additional demand for rental properties would put additional pressure on the market and potentially impact pricing. The Department also acknowledges that the COVID pandemic has also placed greater pressure on housing availability and affordability with movement of people to country areas, including into Mid Western LGA to take advantage of flexible working arrangements.
390. The SIA identified that average room availability in temporary and tourist accommodation in the LGA averaged around 35%. Although the accommodation is focused on tourism and may be more limited during peak tourist periods, the SIA identified that at least some accommodation providers in Mudgee, Kandos, Rylstone, Gulgong and Lue that had capacity to offer their services to construction workers and contractors.
391. The SIA considered the influx of workers and their families migrating into the region for operational jobs could be accommodated by the existing housing stock and new houses likely to be constructed in existing housing estates.
392. Council raised concerns about pressure on accommodation, particularly for the construction workforce and particularly if construction overlaps with construction on other large projects in the

LGA. Consequently, Council requested that a condition of consent is included that would require Bowdens Silver to prepare a workforce accommodation strategy in consultation with Council. The Department has recommended a condition to that effect.

393. An increase in the population due to the project workforce could also place additional strain on health services, including emergency departments and emergency response units and general practitioners and mental health and allied health services in the region.
394. The SIA also considered the availability and capacity of childcare services, youth services, education and training services, and access to public utilities. While no significant impacts are predicted to any of these services, the SIA identified that some services are more stretched than others and service providers would potentially need to adopt strategies such as increasing staffing levels if demand for the services increases.
395. Bowdens Silver has committed to a range of mitigation and enhancement strategies to reduce the impacts on community services. This includes sponsoring and supporting community and youth events, providing company owned properties for community rental, and providing local training and employment opportunities.

Impacts on Surroundings and Social Amenity

396. Residents and landholders in the locality value the agricultural, rural residential and tourism uses of the area and these are important to the locality's sense of place. Some people feel the project is not compatible with these land uses, that there would be amenity impacts and that the project would negatively impact on property values.
397. Bowdens Silver also owns and operates a farming operation comprising approximately 1'609 ha of land, of which 951 ha is within the mine site. The farm would continue to be operated during the life of the project and would be progressively rehabilitated and, apart from the final void, would be restored to agricultural use at the end of the project life.
398. Bowdens Silver has attempted to minimise some of the amenity impacts identified by the community through changes to the project design, including relocating the processing plant to the north of the mine site away from Lue, to reduce amenity impacts and relocating Maloneys Road to reduce traffic through Lue.
399. The company has also committed to providing additional property enhancements/treatments to landholders around the mine site that may experience minor noise impacts (i.e properties that would not otherwise qualify for mitigation under the VLAMP). This would include treatments such as acoustic treatments to reduce noise, installation of first flush systems on rainwater tanks and cleaning of rainwater tanks to remove dust, and tree planting as visual screening.

Distributive and Intergenerational Equity

400. The SIA highlighted the fact that the benefits and costs from the project would not necessarily be evenly distributed across individuals and stakeholder groups and negative impacts would primarily be borne by residents and landholders surrounding the mine site and within Lue.

401. Bowdens Silver has proposed a range of mitigation measures to address the social impacts of the project and to ensure that some of the economic benefits of the project are distributed to the Lue community and other nearby localities within the LGA.
402. A key proposed measure is to establish and fund a community investment program (CIP) that would invest in local projects and programs in education, community (e.g. social facilities, land use enhancements etc); sport and recreation, safety (e.g. rescue services, health services), and arts and culture.
403. The intention is for the CIP to be run by a committee; that programs would be selected in consultation with the local community; and that the investments deliver long-term community outcomes in the Lue, Rylstone and Kandos area.
404. Bowdens Silver has also entered into a planning agreement with Mid-Western Regional Council to provide \$3 million over the life of the project towards community infrastructure projects.
405. Additional mitigation measures include a local employment and procurement strategy aimed at maximising local training and employment, and a “Good Neighbour Program” involving regular and effective communication with the community managed by a dedicated community liaison officer.
406. The company is also proposing to prepare a Social Impact Management Plan (SIMP) that defines and guides the monitoring and evaluation of the social impacts of the project and details the management and mitigation strategies that would be employed to address those impacts.
407. The Department has recommended conditions that give effect to this commitment.
408. The Department also notes that the diversification of local industry may provide a measure of resilience to the community during drought periods, as workers may be able to supplement their income with additional employment. Furthermore, there may be sufficient additional mineral resources in the deposit to support a future expansion of mining and sustain ongoing employment and community investment.

Conclusion

409. The Department’s assessment of the project indicates that it would generally meet all relevant health and amenity criteria, and result in major socio-economic benefits for the locality, region, and the State (these economic benefits are summarised in **Section 6.5** below).
410. Nevertheless, as with other contemporary mining projects, the project does have the potential to result in some negative social impacts, particularly at the local level.
411. The Department considers that these residual impacts can be appropriately minimised and managed. The Department has recommended a number of conditions to ensure this occurs, including requiring Bowdens Silver to:
 - establish and maintain a Community Consultative Committee (CCC) to ensure that the views and concerns of the community through its representatives are considered during the life of the project;
 - implement the planning agreement with Council, which includes \$3 million in community contributions;

- prepare a detailed SIMP in consultation with Council, the CCC, affected communities and other relevant stakeholders that includes:
 - measures to mitigate negative social impacts (including a workforce accommodation and local businesses and services procurement strategy and blood lead monitoring), and;
 - a program to monitor, review and report on the effectiveness of these measures;
- performance indicators, a trigger action response plan and adaptive strategies to address social impacts;
- maintain complaints and incident management and reporting systems; and
- make a range of project-related information publicly available, including:
 - the EIS and related information;
 - management plans;
 - monitoring results, annual reviews and audit reports; and
 - complaints and incidents.

6.5 Biodiversity

412. A number of submissions raised concerns about potential impacts of the project on fauna and flora, including from direct clearing of vegetation, fragmentation and edge effects, noise and lighting impacts, and impacts on water resources potentially used by fauna (including the TSF and water within the final void). Some submitters noted various species, including Regent Honeyeater, koala and platypus have been seen in the area, and some submissions were concerned about the additional stress on fauna habitat as a result of the 2019/2020 bushfires.
413. Submissions from some special interest groups also pointed out the mine site is located near areas of high conservation value, including the Greater Blue Mountains Key Biodiversity Area¹⁷ (Wollemi National Park), which is located approximately 20 km to the east of the site, the Capertree Valley Key Biodiversity Area, which is around 30 km to the south, and the Mudgee-Wollar Key Biodiversity Area, which is around 20 km to the north.
414. The Lue Action Group provided advice on biodiversity from Dr Michael Aberton from ABSolution Ecology and Dr Peter Serov from Stygoecologia (groundwater dependent ecosystems), which the Department has considered in its assessment.
415. The Mudgee-Wollar area and the Capertree Valley are two of only a handful of breeding sites for the critically endangered Regent Honeyeater, and other significant, rare or endangered birds have also been recorded in these three Key Biodiversity Areas.
416. The EIS includes a biodiversity assessment report (BAR), which was updated to reflect the amended project application. The BAR identifies that, after the implementation of measures to avoid or mitigate vegetation clearing, the project would disturb approximately 381.17 ha of native vegetation comprising seven plant community types (PCTs).

¹⁷ According to the International Union for Conservation of Nature, Key Biodiversity Areas are “sites contributing significantly to the global persistence of biodiversity”

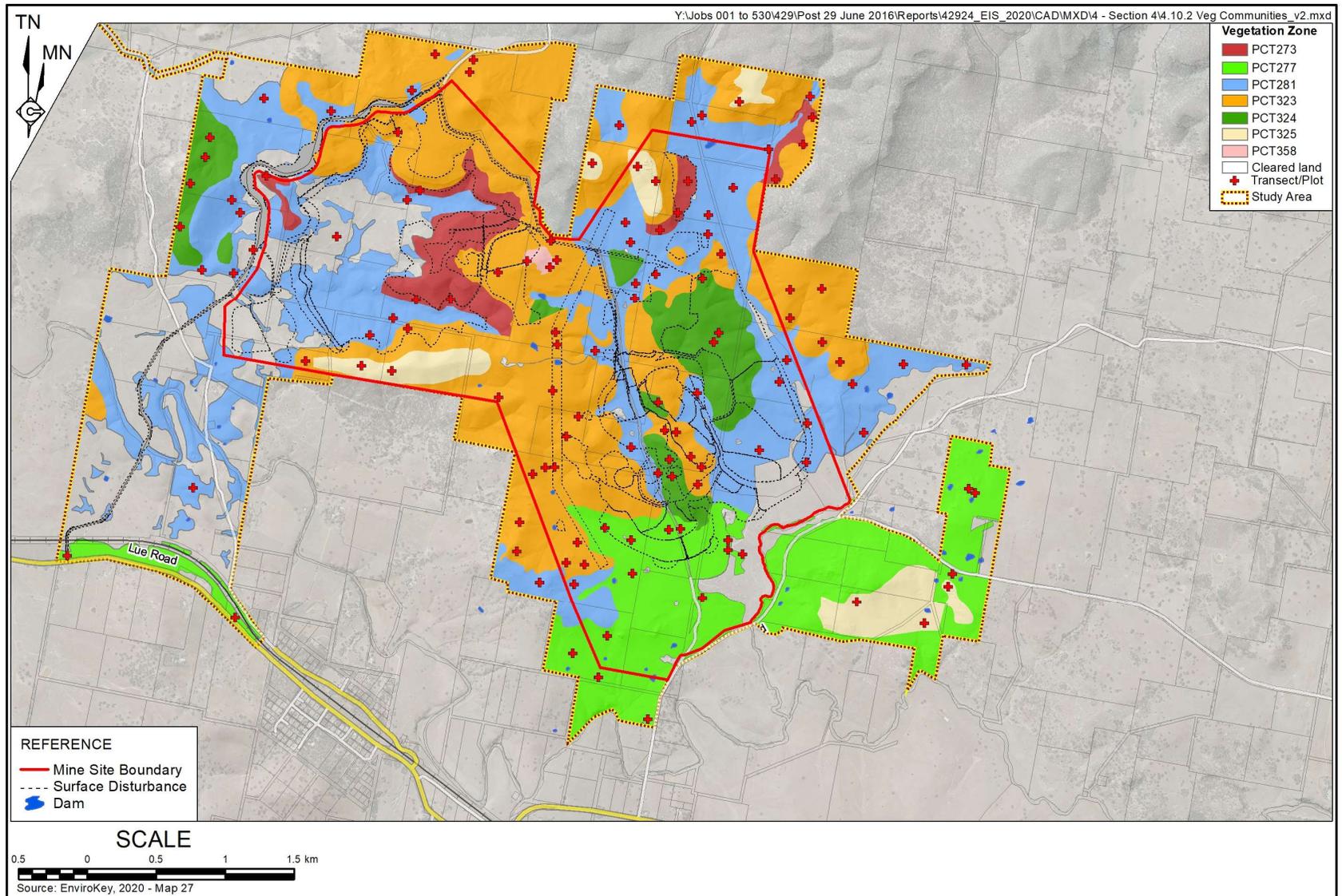


Figure 19 | Vegetation mapping

417. 180.17 ha of this vegetation meets the definition under the BC Act for the critically endangered ecological community (CEEC) *White Box, Yellow Box, Blakely's Red Gum Woodland* (Box Gum Woodland). 146.72 ha of this community also meets the definition of a CEEC under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
418. Field surveys identified 267 native flora species, including two threatened species listed under the BC Act (Silky Swainson-pea and Small Purple-pea). The Small Purple-pea is also listed as endangered under the EPBC Act. Four of the Small Purple-pea plants and around 54 Swainson-pea plants within three discrete populations would be disturbed by the project.
419. The vegetation on and around the site also provides habitat for a variety of fauna species. Fauna surveys undertaken in and around the mine site identified 168 fauna species, 14 of which are listed as threatened under the BC Act and/or the EPBC Act. A number of other threatened species that were not detected during the surveys have been previously recorded near the mine site.
420. The BAR includes an assessment of the potential impacts on all these species, including an assessment in accordance with the EPBC Act requirements. This assessment identified that the project could impact 13 threatened species that are listed as ecosystem credit species¹⁸ and six threatened species that are listed as species credit species¹⁹, including Koala, Silky Swainson-pea, Small Purple-pea, Large-eared Pied Bat, Squirrel Glider and Regent Honeyeater.
421. The latter two species were not detected in surveys but are presumed to occur due to the presence of suitable habitat and previous records of the species in the locality.
422. The submissions report also included further consideration of the impacts of the severe bushfires in 2019/2020, which concluded that the loss of some species could increase reliance on the habitat within the mine site for a while. However, this is unlikely to affect the outcomes of the assessment presented in the BAR as vegetation is expected to largely recover in areas impacted by the bush fires by the time the project commences, and reliance on habitation within the project area would reduce.
423. Bowdens Silver has designed the project to avoid or minimise the clearing of the native vegetation where possible, including reducing the size of the open cut pits and soil stockpiles. However, as Box Gum Woodland is distributed across the site, the Department accepts that there are limited opportunities to further avoid the woodland.
424. The Department also notes that approximately 48% of the 180.17 ha of Box Gum woodland that would be cleared is derived grassland only, having had the trees and shrubs cleared by past agricultural activities.
425. Under the *NSW Framework for Biodiversity Assessment (FBA)*, Bowdens Silver may offset the residual biodiversity impacts by purchasing and retiring biodiversity credits. To this end, the BAR includes a calculation of the biodiversity credits generated by the impacts, which amounts to a total of 23,880 ecosystem credits and 53,113 species credits. The Department has included a recommended condition of consent requiring these credits to be retired²⁰.

¹⁸ Species that can be reliably predicted to occur within the PCTs on the site

¹⁹ Species that cannot reliably be predicted to occur within the identified ecological communities on the site and that require specific surveys

²⁰ As the credits were calculated under the FBA, the recommended conditions require Bowdens Silver to convert them to reasonably equivalent 'biodiversity credits' within the meaning of the *Biodiversity Conservation Act 2016*

426. As the vegetation clearing would occur over approximately 12 years, the company is proposing a three-stage approach to offsetting the impacts whereby credits required for clearing that would occur in years 0-1 would be retired within 12 months of the project commencement, and the remaining credits would be retired separately to offset the clearing that would occur in years 3-4 and in years 6-12 respectively.
427. Bowdens Silver is proposing to satisfy the majority of the offset requirements through the establishment of offset sites secured by Biodiversity Stewardship Agreements. The draft offset strategy provided as part of the EIS indicates that a large proportion (65%) of the stage 1 credit liability (41% of the total credit liability) could be satisfied by proposed offset sites already owned or secured by the company within or adjacent to the mine site.
428. The company has also commenced discussions with a number of landowners of other properties that have large areas of Box Gum Woodland that could potentially be managed as biodiversity offset sites.
429. BCD did not raise concerns about the proposed staging of the offsets or about the availability of offsets. The Department is satisfied that there are suitable mechanisms available for Bowdens Silver to offset the biodiversity impacts, including payment into the NSW Biodiversity Conservation Trust fund if the land-based offsets cannot be found or secured. The Department also considers that offsetting the impacts in stages over the project life is reasonable, provided the offsets occur prior to any clearing occurring within each stage and has recommended conditions to that effect.
430. The Department also notes that Bowdens Silver is proposing to revegetate around 344 ha of the site with species consistent with the existing plant communities. This is likely to further reduce the impacts to biodiversity, and although the FBA allows impacts to be offset by rehabilitation in principle, the company is not seeking to fulfil its credit obligation with this rehabilitation.

Commonwealth Biodiversity Matters

431. The Commonwealth determined that the project is a “controlled action” based on there being likely significant impacts on Box Gum Woodland, Regent Honeyeater, Swift Parrot, Koala, and Spotted tailed Quoll.
432. The Commonwealth also considered 14 other species would possibly be at risk of being impacted.
433. The Department has considered the direct and indirect impacts of the project on threatened species, populations or ecological communities, or their habitats – both on the site and the broader study area, as defined under the threatened species assessment guidelines.
434. The project footprint contains Box Gum Woodland and Small Purple-pea, and has known habitat for Koala, Large-eared Pied Bat and Spotted-tailed Quoll. Regent Honeyeater and Swift Parrot also have the potential to be impacted. The BAR concluded that other species identified in the controlled action decision were unlikely to be significantly impacted given the absence of the species/communities in the project footprint.
435. Apart from the Box Gum Woodland and Regent Honeyeater, the significance assessments concluded that there would not be a significant impact on any threatened species listed under

the EPBC Act, as the habitat being removed would not be at a scale that would isolate or fragment populations.

436. The BCD's advice on Commonwealth matters (**Appendix A**) notes that all entities requiring assessment of significance were assessed, except for Corben's Long-eared Bat (the likelihood of occurrence was not addressed, however the species has been retained as an ecosystem credit species requiring offset). The BCD also notes that ecosystem credit obligations for the Box Gum Woodland and species credit obligations for Regent Honeyeater, Koala, Large-eared Pied Bat and Small Purple-pea have been identified.
437. The BCD notes that offset requirements have been calculated in accordance with the FBA and would need to be converted to BAM credits and offset in accordance with the BC Act.
438. For the Box Gum Woodland and Regent Honeyeater, considered likely to be significantly impacted, the Department has undertaken a detailed consideration of the assessments of significance, BCD's advice, relevant approved conservation advice, recovery plans and threat abatement plans (TAPs). A summary of this assessment is provided in **Appendix D**.
439. The Department has also considered the significance assessments for the remaining threatened species identified in the biodiversity assessment and accepts that there is unlikely to be a significant impact on these species. Further review of these EPBC listed threatened species is provided in **Appendix D**.
440. With the proposed avoidance and mitigation measures in place, the Department considers that, for Box Gum Woodland and Regent Honeyeater, where the project is considered likely to have a significant impact, these impacts would be acceptable with the implementation of the proposed biodiversity offset strategy.

Impacts on Fauna from Water Storages

441. A reduction in surface water flows and standing water levels in nearby streams would reduce access to water for fauna. However, Lawsons and Hawkins Creeks are already ephemeral and, as discussed in **section 6.1**, the project would increase the number of no flow days by two days per year on average. This is unlikely to have a significant impact on fauna.
442. Animals may attempt to drink from dirty water storages, including the TSF. Cyanide concentrations in the tailings discharge would average approximately 6.5 parts per million (ppm) of WAD cyanide. This is below the concentration identified in the Commonwealth *Priority Existing Chemical Assessment Report No. 31 Sodium Cyanide* for acute fauna mortalities and minimal sublethal effects to occur (<10 milligrams per litre of weak acid dissociable (WAD²¹) cyanide). Nevertheless, the TSF would be constructed to minimise the formation of shallow ponds and avoid island formation to discourage animals from drinking from it.
443. Bowdens Silver is also proposing to erect a fence or bund around the perimeter of the final void to limit stock and wildlife access. In the longer term as the void fills, water is predicted to increase in salinity, reaching around 8,375 µS/cm after around 500 years. Although this would not be suitable for human consumption, most livestock can tolerate levels of up to 10,000 µS/cm and therefore this is unlikely to have significant adverse impacts on fauna.

²¹ Weak Acid Dissociable (WAD) cyanide refer to cyanide species that are liberated at a moderate pH of between 4.5 to 6. WAD cyanide is moderately reactive.

Aquatic Ecology

444. Watercourses within and adjacent to the site are ephemeral, including Walkers Creek and Blackmans Gully (both third order streams under the Strahler stream order classification system) and Prices Creek (fourth order) and support very limited aquatic ecology. Riparian vegetation along these watercourses is largely dominated by introduced grasses with little or no native vegetation.
445. Some of these watercourses and some more permanent farm dams and pools would be directly displaced by the various components of the project (open cut pit, TSF, WRE, southern barrier etc). However, given the poor quality of the habitat, impacts would likely be minor. Furthermore, constructed diversion channels and water supply dams would also likely provide similar habitat, and comparable watercourse habitat exists in abundance in the broader area.
446. Aquatic ecology in the project area is primarily provided by Hawkins and Lawsons Creeks. These streams flow intermittently, traverse predominantly pasture/farmland, and support disturbed habitat with relatively low ecological values.
447. Apart from the relocated Maloneys Road crossing of the Lawsons Creek, there would be no direct displacement of Hawkins Creek, Lawsons Creek, and activities have been set back from these watercourses to avoid any direct impacts.
448. The proposed crossing of the Lawsons Creek would modify an approximately 2.7 m by 2.4 m section of the creek. However, the creek habitat in this section of the watercourse comprises disconnected pools with disturbed riparian vegetation and given the low abundance and quality of riparian vegetation, further degradation from local disturbance would be minimal.
449. Several native and introduced fish species were identified during surveys in Hawkins and Lawsons Creek, including three invasive species. None of identified species is listed as threatened although one, the river blackfish, has experienced a reduction in abundance across its range due to anthropogenic habitat disturbance and the creeks could provide important habitat for this species.
450. Two threatened species have the potential to occur in the area – Southern Purple Spotted Gudgeon, listed as endangered under the *Fisheries Management Act 1994* (FM Act) and Murray Cod, listed as vulnerable under the EPBC Act. A population of Murray-Darling Basin eel tailed catfish, listed as endangered under the FM Act could also possibly be present.
451. As discussed in **section 6.1**, the interception of runoff and groundwater drawdown would reduce streamflows in Hawkins and Lawsons Creeks and increase the number of no flow days during periods of sustained drought. However, given existing aquatic biota are adapted to naturally intermittent flows in these watercourses, it is not expected that this is likely to have a big impact on the aquatic habitats and biota, including fish.
452. DPI Fisheries requested that the toe of the WRE should be moved to maintain a 50 m buffer zone from Price Creek, and that internal haul roads should be redesigned to avoid crossing Prices Creek twice, or to be upgraded in accordance with the requirements of the guideline *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*.
453. Bowdens Silver noted that one of the Price Creek crossings already has a culvert in place and has committed to upgrading the other crossing in accordance with that guideline. However, the

company has argued that there would be no benefit in moving the WRE to protect the riparian vegetation as this has already been removed or altered by past agricultural activity, the aquatic ecology is very limited, and the flow path of the watercourses has also been altered such that there is no continuous channel connecting the creek to Hawkins Creek.

454. The Department agrees that there is little environmental benefit in redesigning the WRE and has not recommended this be a requirement of consent.

Conclusion

455. Overall, the Department considers that the project has been designed to avoid, mitigate and manage biodiversity impacts where practicable, and that the required ecosystem credits can be obtained and that the retirement of these credits would sufficiently compensate for residual biodiversity impacts.
456. The Department considers that biodiversity impacts could be effectively managed under a Biodiversity Management Plan.
457. The Department considers that, subject to conditions, the project could be undertaken in a manner that would result in acceptable short-term impacts on biodiversity values and the proposed offsets would result in improved biodiversity outcomes in the medium to long term.

6.6 Economics

458. The project would directly employ on average around 210 employees during operations and 131 people during construction and would contribute company and payroll taxes and royalties to the Commonwealth and NSW State. The project would also generate ongoing and initial capital investment in the order of \$310 million and generate a range of flow-on economic benefits.
459. The EIS includes an economics assessment undertaken by Gillespie Economics (Gillespie) that includes a cost benefit analysis (CBA) of the project. The CBA indicates that the project would have a net production benefit to the Australian economy of \$89 million (net present value²²) and to the NSW economy of around \$44 million.
460. If the full range of employment benefits are calculated, the net social benefits to NSW would be higher. In this regard, Gillespie calculated that wage premiums (i.e. higher wages paid to workers in a mining job compared to the wages that would be earned in another job) could be as high as \$25 million (depending on how many jobs come from the unemployment pool and if job chain effects are considered), and that 'non-market' employment benefits (the value attributed by the community to things such as a reduction in crime and community dislocation due to employment) could amount to in the order of \$78 million.
461. The Department engaged The Centre for International Economics (CIE) to review and provide advice on the economics assessment. The CIE noted uncertainties around some of the assumptions used in the CBA analysis, including future commodity prices, actual tax that would be paid, and the carbon cost of greenhouse gas emissions.
462. The CIE also considered that some of the assumptions underpinning the calculations of employment benefits may be inflated and that the costs of greenhouse gas emissions should be

²² All values quoted hereafter in this section of the report refer to NPV

fully attributed to the project and NSW, rather than apportioning the costs based on the size of the NSW population relative to the global population. Nevertheless, the CIE still concluded that, even with a range of more conservative assumptions and all GHG emissions costs attributed to the project, it would still have a net benefit to NSW of \$32.4 million to \$38.3 million²³. CIE's advice is available in **Appendix A**.

463. This estimate does not include “non-market” employment benefits, which the CIE notes are not recognised in the NSW Government *Guideline for the Economic Assessment of Mining and Coal Seam Gas Proposals*. However, Gillespie argues that these employment benefits have a solid foundation in theoretical and applied economics and should be included in any evaluation of the project.
464. The economics assessment also includes a local effects analysis (LEA) which estimates that the project would lead to an increase in disposable income of \$1.8 million in the region during construction and \$6.8 million per annum during operations, assuming employees are already employed elsewhere. This would be even higher if employees are drawn from the pool of unemployed people. In addition to incremental direct regional employment and wages, the non-labour expenditure would be in the order of \$51 million/year, of which around \$30 million per annum would be spent in the local area.
465. If flow on effects are considered, the LEA estimates disposable income would increase to \$2.5 million/yr during construction and \$10.3 million/yr during operations, and additional 31 jobs would be created during construction and 147 jobs during operations.
466. The local community would also benefit from the \$3 million of contributions towards local community infrastructure that Bowdens Silver has agreed to in its VPA with Council.
467. While these direct financial benefits are not as large as many other mining projects and are significantly lower than a typical coal mine would generate, the Department notes the strategic importance of the mine to the NSW economy. In this regard the NSW Government is committed to building on the State's potential to become a major global supplier and processor of critical minerals and high-tech metals, including silver and zinc, and to reducing its reliance on the coal and fossil fuels mining sector. The Bowdens silver deposit is the largest undeveloped silver deposit in Australia and one of the largest globally, and development of the project would be consistent with the NSW Government's vision and commitment. Development of the project would also potentially encourage further investment and development of similar silver deposits, which in turns would generate more jobs and income for the State.
468. Some submitters raised concerns that market or cost changes could result in early mine closure with inadequate environmental management. The CBA includes a sensitivity analysis to test the results of the CBA under a range of different costs, revenues and discount rates. The sensitivity analysis indicates that a sustained increase in operating costs (by 16%) or reduction in silver price in AUD (by 14%) (i.e. reduction in commodity prices or drop in the value of AUD against USD) could reduce the benefits.
469. However, the Department notes that a significant portion of the costs of mitigation would be incurred before the project can proceed. This includes up-front payment of a rehabilitation bond

²³ This figure includes a number of other changes to the assumptions, including an allowance for supplier and wage premium benefits in the production benefits, which were treated separately by Gillespie.

to cover the financial liability associated with rehabilitation in the event of an unexpected mine closure and ensuring biodiversity impacts are offset before any disturbance occurs. Furthermore, the costs of mitigation are largely included in the capital cost evaluation, and the sensitivity analysis indicates the project is less sensitive to changes in capital costs. For example, the EIS states that a 50% increase in offset costs would be equivalent to just a 3% increase in the estimated capital costs.

470. Thus, while there is some risk that the overall benefits would reduce if commodity prices deteriorate significantly or operating costs increase significantly, the Department considers the financial viability of the project is a risk for the owner of the project rather than for the community of NSW. Notwithstanding, it is worth noting that based on further drilling and resource definition, Bowdens Silver has indicated that more of the resource may be economically extractable and, if anything, the economic position is likely to be improved.
471. It is also worth noting that the CBA only focuses on production benefits and costs and, as discussed above, does not account for the full range of employment benefits, which are a major way in which mining projects contribute to the local economy.

6.7 Other Issues

Issue	Findings
Aboriginal Cultural Heritage	<ul style="list-style-type: none"> • The EIS included an Aboriginal and historical cultural heritage assessment undertaken by Landskape Natural and Cultural heritage Management (Landskape). • Landskape undertook archaeological field surveys over 17 days between 2011 and 2019 with the assistance of Aboriginal community representatives and identified 58 Aboriginal objects/sites within the mine site. These are a combination of stone artefact scatters, isolated finds of stone artefacts, two scarred trees and a rock shelter with potential archaeological deposits and stone artefacts. • Although all sites are considered by the Aboriginal parties to be of high cultural significance, the majority of the identified sites are considered by Landskape to be of low scientific, educational and aesthetic archaeological significance. However, six sites are considered to be of low-moderate scientific significance, and one site (the rock shelter) is considered to be of moderate scientific significance. • 25 of these sites, including the rock shelter, would be directly impacted. Bowdens Silver is proposing to salvage the objects at all sites to be disturbed²⁴, including salvaging subsurface artefacts found during test excavations at the rock shelter site. The artefacts would be stored on-site in a “keeping place” and eventually replaced in rehabilitated areas. • Bowdens Silver has also committed to implementing a mentorship program that would partner a project archaeologist and an elder in the community with Aboriginal youths interested in learning the process for recording, collecting, analysing and curating. • The remaining sites would not be directly impacted. Bowdens Silver is proposing to erect protective barriers around the sites to protect them from accidental disturbance from peripheral activities. • Some submissions from Aboriginal groups raised concerns about impacts to a particular rock shelter site with human hand stencil art. The site is registered on the Aboriginal Heritage Information Management System as being on Bingman Ridge in the vicinity of the proposed new alignment for the 500 kV transmission line. It was not located during field surveys. However, the record is from a literature reference from 1899, which describes the site as occurring “half way between Mudgee and Rylstone” and the site coordinates are listed as “guessed, very general location”. Notwithstanding that, Bowdens Silver has committed to an unexpected finds protocol in the event that that or any other Aboriginal objects are found during works. That protocol would involve stopping work immediately in the vicinity of the site until BCD confirms that appropriate management and consultation with Aboriginal stakeholders has been undertaken. • Submissions from some Aboriginal groups also raised concerns about the assessment method, primarily in relation to the procedures followed to consult with Aboriginal parties following the site surveys. • In this regard, Bowdens Silver undertook consultation in accordance with the <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i>, including distributing a draft Aboriginal cultural heritage management plan to the RAPs for feedback, and Heritage NSW has indicated it is satisfied with the adequacy of the process. • Nevertheless, the Department has included a recommended condition requiring Bowdens Silver to prepare a final Aboriginal cultural heritage management plan in consultation with the registered Aboriginal parties.

²⁴ Objects from two sites have already been salvaged under an Aboriginal Heritage Impact Permit

Issue	Findings
Historic Heritage	<ul style="list-style-type: none"> • There are no historical cultural heritage sites in the mine site or along the proposed relocated Maloneys Road that have been previously registered in the LEP or the NSW State Heritage Register. The closest registered site is Lue Railway Station located approximately 2 km away from the mine site. • However, archaeological surveys discovered three sites thought to be associated with nineteenth century gold mining located within the mine site: the ruins of a hut containing sandstone blocks, fragments of a cast iron stove, sheet iron, broken glass bottles and broken ceramic vessels; and two shallow pits thought to be the beginnings of abandoned attempts to dig mine shafts. • Landskape considered the historical significance of the site against the criteria detailed in <i>Assessing Significance for Historical Archaeological Sites and Relics</i> (NSW Heritage Branch, 2009) and determined that the hut ruins would have low-moderate archaeological significance, and the pits would have low significance. • The sites are located within the proposed disturbance area of the mine (between the main open cut pit and satellite pits). Bowdens Silver argues it would not be possible to avoid the sites, but has committed to salvaging the relics from the hut ruins and curating and archiving them. • The Department accepts that the significance of the items does not warrant in-situ retention, but has recommended conditions requiring Bowdens Silver to prepare an historic heritage management plan detailing how these items would be managed, and the procedures that would be followed in the event of any other unexpected heritage finds.
Hazards and Risks	<ul style="list-style-type: none"> • A number of chemicals would be used for the project, primarily in the processing plant. The quantities of most of these would be minor and do not trigger the need for a hazard and risk assessment under <i>State Environmental Planning (Resilience and Hazards) 2021</i> (Hazards SEPP). • However, Sherpa Consulting Pty Ltd (Sherpa) prepared a Preliminary Hazard Analysis (PHA) in accordance with the Department's <i>Hazardous Industry Planning Advisory Paper No. 6</i> and <i>Hazard Analysis and Multi-Level Risk Assessment</i> for the storage and use of sodium cyanide and ammonium nitrate-based blasting agents (Ammonium Nitrate Fuel Oil (ANFO) and/or Ammonium Nitrate Emulsions (ANE)). • The sodium cyanide would be delivered to the mine site by truck in a purpose-built sparge isotainer, which would be unloaded and stored in a bunded area adjacent to the reagent store. Water would be circulated through the container to dissolve the sodium cyanide, and from there the solution would be fed into the floatation circuit. • The concentration of cyanide in the slurry at the point of addition in the processing plant would be approximately 66 parts per million (ppm), which is much lower than the typical concentrations used in gold processing plant slurries (which are in the order of 400-500 ppm). Cyanide concentrations in the tailings discharge would average approximately 6.5 ppm of weak acid dissociable (WAD)²⁵ cyanide. • Sherpa concluded there would be limited risk of off-site spills given the large separation distances (>300m) from the storage areas to the mine site boundary, and any potential spills are likely to be contained onsite. Given the dilute concentrations used for processing and in the tailings, Sherpa also concluded that the risks to the biophysical environment would be low. • Around five to 16 tonnes per day of blasting agent would be brought to the mine site by truck, mixed on site, and transferred to pre-drilled holes. • Overnight storage of ANFO/ANE is not proposed except on rare emergency situations. Nevertheless, Sherpa modelled the blast from a 16 tonne inventory of either ANFO or ANE to determine the distance at which impacts would occur and concluded that any blasts from the magazine area would largely be contained within the mine site and even low pressure shock waves caused by the blast would not extend to the nearest privately-owned residences. • Bush fire protection zones would be maintained in the area adjacent to the processing plant area to minimise the risk of any bush fires impinging on these areas, particularly the stored sodium and explosive magazine. • The Department has recommended conditions requiring the company to prepare a fire management plan that includes an emergency evacuation plan

²⁵ Weak Acid Dissociable (WAD) cyanide refer to cyanide species that are liberated at a moderate pH of between 4.5 to 6. WAD cyanide is moderately reactive.

Issue	Findings
	<p>prepared in accordance with <i>Development Planning: A Guide to Developing a Bushfire Emergency Management and Evacuation Plan</i> (RFS, 2014) and <i>Australian Standard AS3745 Planning for Emergencies in Facilities</i>.</p>
Agricultural Impacts	<ul style="list-style-type: none"> • During the project life, around 1,498 ha of land currently used for agriculture in the area in and around the mine site would be removed from agricultural production. Around 865 ha of this would be permanently removed from agricultural production (including land set aside for onsite and off-site biodiversity offsets). Nearly half of land within the mine site is heavily vegetated and/or steeply sloping with low agricultural capability, and just over half has low to moderate agricultural capability. • Submissions raised concerns about impacts on water supplies for other agricultural businesses, impacts on biophysical strategic agricultural land (BSAL), and impacts on stock and crops, particularly from lead exposure. Submissions from nearby olive growers noted there are strict certification standards for extra virgin olive oil, which includes limits on trace metal concentrations. For lead, this limit is zero. • No BSAL would be impacted. Around 80% of the soils within the proposed disturbance areas on the mine site and for the relocated Maloneys Road are classified as land soil capability (LSC) Class 6, with the remaining disturbance areas having LSC Class 3 - 5 soils. Impacts on water resources that could indirectly affect agricultural land nearby has been considered in section 6.1 • Progressive rehabilitation would emphasise re-establishing soil profiles and vegetation, with the goal of rehabilitation to return the land (apart from the final landform features such as the final void and TSF) to its original land and soil capability and land uses. • Impacts on soils and agricultural production would be managed and mitigated by selective stripping and storing of topsoils, the addition of lime and/or gypsum as required to address acidity/sodicity and maintain soil structure, avoiding excessive compaction, and sowing soil stockpiles with cover crop to promote microbial activity. • Bowdens Silver proposes to develop a landscape management plan that addresses biosecurity risks including pest and weed management. • In relation to potential impacts on farm animals and agricultural produce from lead, EnRisks calculated the level of lead that might accumulate in cattle and therefore be present in meat and milk and determined that the levels would be more than 5,000 times lower than the maximum levels of metal contaminants for produce in the Australia New Zealand Food Standards Code. • EnRisks also determined that contributions of lead to soil and water would be negligible, with the incremental increase in lead in agricultural soil at the maximum impacted receptor as a result of the project predicted to be below the detection limit for lead in soil (and deposition decreasing with increasing distance from the mine site). EnRisks also noted that lead is poorly taken up into plants, so impacts on crops are unlikely. • The Department has recommended conditions requiring Bowdens Silver to achieve land and soil capabilities that are equivalent to, or better than, pre-mining and to establish/restore grassland areas to support sustainable agricultural production.
Rehabilitation and Final Landform	<ul style="list-style-type: none"> • At the end of mining the processing plant would be decommissioned and the area recontoured to create an undulating landform. The area occupied by the southern barrier would also be recontoured to a landform similar in form to the pre-project landform. • The key final landform features would include the final void left by the main open cut pit, the TSF and the WRE. The TSF and WRE would be covered and vegetated and the two satellite pits would be fully backfilled. Surface water would be diverted around the final void and the remaining landforms would be shaped for surface water management, with water on the TSF directed to the closure spillway. • The Resources Regulator requested further consideration of geomorphic design for the WRE. While this was not directly addressed, Bowdens Silver has outlined that the WRE would be designed to generally follow a similar profile to the underlying natural surface, thereby avoiding straight sides with drainage lines and depressions. The Resources Regulator did not raise concerns about the design but noted that an analysis of the long-term stability of the landform would be required post approval. • The final land use across the majority of the rehabilitated area (excluding the final void) would be a combination of agriculture and biodiversity offsets. The overarching goal would be to restore the land back to its original land and soil capability, with around 699 ha of land within the mine site returned

Issue	Findings
	<p>to agricultural production (largely with grass cover for grazing), and around 199 ha set aside for biodiversity offsets.</p> <ul style="list-style-type: none"> • The Resources Regulator and some submitters raised concerns about whether the capping on the TSF and WRE would support tree and shrub species and grazing. Bowdens Silver has clarified that it would initially stabilise the surface of the TSF with grasses and would trial appropriate tree and shrub species prior to planting, targeting shallow rooted shrubs or trees with delicate root systems that are unlikely to penetrate the cover. The company has committed to detailing the plant species for each rehabilitation domain in the rehabilitation management plan. • A number of submissions raised concerns about rehabilitation including that the mine would be abandoned without rehabilitation. In this regard, the Department notes that under the <i>Mining Act 1992</i> Bowdens Silver would be required to develop a rehabilitation management plan that describes the rehabilitation objectives, strategies and actions necessary in completed mine areas to address progressive final rehabilitation, and to provide an annual report and forward program to the Resources Regulator. The company would also be required to lodge a security bond to cover the costs of rehabilitation. • Some submitters also raised concerns about the design of the WRE and TSF and long-term risks of seepage or failure and the risk of seepage from the final void. The Department has considered these matters in section 6. • Some submissions questioned the need for a final void. In this regard, one of the key reasons for maintaining the void would be to avoid sterilising the resource below the open cut pit, which may be a target for future mining. • The Department considers that the project area can be rehabilitated to achieve a sustainable final landform to be used for agricultural purposes and enhanced biodiversity values in the area while delivering appropriate rehabilitation outcomes. • The recommended conditions include rehabilitation objectives including that the final landform must be stable and sustainable, that the final void must be designed as a long-term groundwater sink, and that the WRE must have capping layers designed to minimise oxygen ingress and water infiltration
Greenhouse Gas Emissions	<ul style="list-style-type: none"> • The project would produce over its life around: <ul style="list-style-type: none"> - 444,442 t CO₂-e of scope 1 greenhouse gas (GHG) emissions; - 812,319 t CO₂-e of scope 2 GHG emissions; and - 166,055 t CO₂-e of scope 3 GHG emissions. • This is a conservative estimate as it accounts for vegetation clearing but not the return of vegetative biomass through rehabilitation, and it does not consider the use of silver in photovoltaic cells that produce green power generation (and displace fossil fuel generated power). • The assessment also does not consider decarbonisation of the electricity network as part the NSW Government's commitment to net zero by 2050. In its response to submissions on the second amendment, Bowdens Silver noted that this decarbonisation is expected to reduce the project's scope 2 emissions by up to 54%. • Bowdens Silver is also actively investigating options for further reducing the GHG emissions and has undertaken an initial feasibility study for the development of a 12.4 MW solar farm on a property owned by the company to supply power to the mine. Although not proposed as part of this application, if developed the solar farm could reduce scope 2 emissions by around 72%, roughly the equivalent of purchasing 35% of its power from a certified green power source. • In comparison to other metal ore mining projects, the project's scope 1 emissions would be less than half the average and would be much lower than the average scope 1 emissions from a coal mining operation. • The Department considers that the project's GHG emissions are reasonably low, and that the mine's products would assist in society's decarbonisation over the coming decades. The Department has recommended conditions requiring Bowdens Silver to take all reasonable steps to minimise the energy efficiency of the development and to describe the measures to be implemented to ensure the greenhouse gas emissions are minimised in an air quality and greenhouse gas management plan.

7 Evaluation

472. The Department has carried out a detailed assessment of the merits of the Bowdens Silver project in accordance with the relevant requirements of the EP&A Act, with a particular focus on issues raised in public submissions, representations, government agency advice and advice provided by the Department's independent experts.
473. The Department has carefully considered the objectives of the EP&A Act, including the ESD principles, and relevant considerations under section 4.15(1) of the EP&A Act. The Department has given particular consideration to the EIS's Section 6, which seeks to evaluate the project's merits against applicable statutory and strategic planning requirements.
474. The Department acknowledges the high degree of public interest in the project and the broad range of community concerns, including but not limited to impacts on water resources (including potential downstream impacts on users and the aquatic environment), health and amenity, biodiversity, traffic, agriculture, Aboriginal cultural heritage, social and economic impacts.
475. The mine would be a 'greenfield' development in what is currently a predominantly rural and agricultural area with a growing tourist industry, and the Department recognises the particular concerns of the local community.
476. The Department has carefully considered all the issues raised throughout its assessment process, public submissions, Bowdens Silver's responses to community concerns and feedback from the government agencies and independent expert engaged by the Department. During the exhibition of the EIS, the submissions from people living within 5 km of the mine site were split relatively evenly, with approximately half (51%) opposing the project and 46% supporting the project.
477. Critically, the Department has found that the project is unlikely to result in adverse health impacts from lead or other heavy metals as the project would contribute an almost negligible amount to the community's total exposure to these metals. The project would also be predicted to comply with relevant criteria for silica, gaseous pollutants, and particulate matter.
478. Although there would be some exceedances of the noise criteria at some residences, these are mostly classified as negligible under the VLAMP. Moderate noise exceedances would occur at two residences, but only during the construction and site establishment phase and briefly again at one of those residences during the relocation of the transmission line.
479. There would be some views of parts of the mine and/or the relocated transmission line from some residences and public vantage points, however visual impacts would be limited as the project components would largely be hidden by local topography and vegetation.
480. The main traffic impacts in Lue would be during the 18-month site establishment and construction period, with the worst impacts limited to the first six months while the relocated Maloneys Road is constructed. During operations, apart from light vehicles, typically only one project-related heavy vehicle and three shuttle buses would travel through Lue per day (and return). The road network is able to safely accommodate project-related traffic during all project stages.
481. The project is not likely to affect water resources relied upon by the local community. There would be sufficient water to meet the demands of the project under all but the driest years (during which the mine would have to reduce operations to match the available water supply), and the project

is not predicted to exceed the minimal impact considerations of the AIP, except possibly at one privately owned bore (and this is considered unlikely). If the bore is impacted Bowdens Silver would have to compensate the landowner.

482. The mine infrastructure has been designed to contain dirty water without discharging, including during severe storm events, and with minimal seepage (which would be monitored and collected during mining). Rehabilitation of the WRE and TSF would include final capping designed to limit oxygen and water ingress, to prevent potential acid mine drainage. The open cut pit would be left as a final void with appropriate design to ensure it remains a terminal groundwater sink.
483. The Department notes there is some residual technical disagreements between the company's expert and the Department's independent expert about the process of determining the volume of PAF material. The Department acknowledges that the company has done a substantial amount of test work and its experts are confident that the classification and estimation of PAF material is appropriate. Nevertheless, in the context of disagreements between experts, the Department considers that the most conservative approach is warranted and has adopted the independent expert's recommendations, including a verification process and preparation of an AMD management plan, before any mining commences.
484. Subject to demonstrating satisfactorily that the rock classification system is robust and fit for purpose, and subject also to the implementation of a range of other conditions including water quality performance standards and operating conditions, the Department considers the risks of water pollution can be appropriately managed.
485. Bowdens Silver would also minimise and manage other impacts on surrounding landholders and the environment through the following key mitigation measures and best practice contemporary practices:
- **Social** – key measures to enhance the positive social impacts of the project and/or mitigate the impacts include agreements to purchase moderately noise impacted residences and provide noise mitigation treatment for residences predicted to experience 1-2 dB(A) over the PNTLs, contributions to community infrastructure via the VPA, a community investment program, developing a local procurement and employment strategy, undertaking on-going engagement with local community and key stakeholders, and establishing a SIMP with a focus on potential impacts on local residents;
 - **Biodiversity and agriculture** – avoiding and minimising land clearing and impacts on native vegetation as far as practicable, including minimising clearing of Box Gum Woodland and habitat for threatened species, and offsetting any disturbance that can't be avoided;
 - **Aboriginal cultural heritage** - avoiding and minimising disturbance to surface areas and impacts on Aboriginal heritage items, and salvaging those sites that can't be avoided.
486. The Department has assessed other impacts of the project, including rehabilitation and final landform, agriculture impacts, hazards and risks, blast and vibration, greenhouse gas emissions, and historic heritage and considers that these and other impacts have been minimised to the greatest extent practicable and that residual impacts can be appropriately managed and/or offset and regulated.
487. The Department has recommended a stringent and precautionary set of conditions in consultation with the key NSW Government agencies and has taken their advice into account in finalising the conditions. The recommended conditions of consent reflect current best practice for

regulating mining projects and would ensure that the project complies with contemporary criteria and standards, and that residual impacts are effectively minimised, managed and/or offset to achieve an acceptable level of environmental and social performance.

488. The Department also notes the economic benefits that project would generate locally and for the State. The project would directly employ an average of around 210 employees during operations and 131 people during construction, invest in the order of \$310 million to establish the project, contribute royalties and company and payroll taxes to the State and Commonwealth Governments, and contribute \$3 million towards local infrastructure through the VPA. The project would also generate a range of flow-on economic benefits, many of which would occur in the local region.
489. The Department also notes the significance of the project's resource and the strategic importance of the development in view of the increasing focus on minerals mining and decreasing reliance on coal and fossil fuels in the mining and energy sector.
490. The global demand for metals is growing and the NSW Government's vision and commitment is for the State to become a major global supplier and processor of critical minerals and high-tech metals. Silver and zinc have both been identified as critical minerals for developing technologies and renewable energy and the Bowdens silver deposit is the largest undeveloped silver deposit in Australia.
491. Development of the project would be consistent with the Government's vision and commitment. Development of the project would also potentially encourage further investment and development of similar silver deposits in the region, which in turn would generate more jobs and income for the State.
492. While mining is already a key industry in the Central West & Orana region that contributes approximately 23% to the regional economy, a large part of the industry currently involves coal mining, with the western coal field located around 80 km from the proposed project. As NSW phases-out thermal coal mining, the development of minerals mining and the project specifically would support diversification of the mining industry and the transition away from reliance on coal mining.
493. In terms of the suitability of the site, the Department notes that the target mineral resource is physically fixed in location, which means there are fundamental limitations in avoiding impacts to the surrounding community. However, there is a series of ridges (including the prominent "Bingman Hill") that lie between the mine site and the residences in Lue, which reduces many of the typical amenity impacts of mining operations. In that context, the Department considers the site to be generally well-suited for a greenfield mine aimed at accessing Australia's largest undeveloped silver deposit.
494. Furthermore, the Department's assessment has found that the project has been designed to avoid significant impacts and that residual impacts can be minimised and managed to an acceptable standard.
495. Overall, the Department considers that the project achieves a balance between maximising resource recovery and minimising impacts, and the benefits of the project outweigh its residual costs. The Department also considers that the project is in the public interest and is approvable, subject to the strict conditions of consent.

496. This assessment report is hereby presented to the Commission to determine the application. Recommended conditions of consent are included in **Appendix E** of this report.

Prepared by:
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Recommended by:



22/12/2022

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Director
Resource Assessments

Recommended by:



22/12/2022

Clay Preshaw
Executive Director
Energy, Resources and Industry

Appendices

Appendix A – List of referenced documents

A1 – Environmental Impact Statement: Refer to the ‘EIS’ folder under the ‘Assessment’ tab on the Department’s website at: <https://www.planningportal.nsw.gov.au/major-projects/projects/bowdens-silver-temp>

A2 – Submissions: Refer to the ‘Submissions’ tab on the Department’s website at: <https://www.planningportal.nsw.gov.au/major-projects/projects/bowdens-silver-temp>

A3 – Submissions Report: Refer to the ‘Response to Submissions’ folder under the ‘Assessment’ tab on the Department’s website at: <https://www.planningportal.nsw.gov.au/major-projects/projects/bowdens-silver-temp>

A4 – Agency Advice: Summarised in **Table A4.1**. Refer to the ‘Agency Advice’ folder under the ‘Assessment’ tab on the Department’s website at: <https://www.planningportal.nsw.gov.au/major-projects/projects/bowdens-silver-temp>

Table A4.1 | Agency advice

Agency	Advice
Department of Planning and Environment	
Biodiversity Conservation and Science Directorate	<ul style="list-style-type: none"> • BCD - Advice on EIS • BCD - Advice on RTS • BCD - Advice on Water Pipeline Amendment • BCD - Advice on Commonwealth Matters
Crown Lands	<ul style="list-style-type: none"> • Crown Lands - Advice on EIS
Heritage NSW	<ul style="list-style-type: none"> • Heritage NSW - Advice on EIS • Heritage NSW - Advice on RTS • Heritage NSW - Advice on Transmission Line Amendment • Heritage NSW - Final Advice
Water Group	<ul style="list-style-type: none"> • DPE Water - Advice on EIS • DPE Water - Advice on EIS (Attach B) • DPE Water - Advice on RTS • DPE Water - Advice on Water Pipeline Amendment
Environment Protection Authority	<ul style="list-style-type: none"> • EPA - Advice on EIS • EPA - Advice on RTS • EPA - Advice on Water Pipeline Amendment
Department of Regional NSW	

Agency	Advice
Mining, Exploration and Geoscience	<ul style="list-style-type: none"> • MEG - Advice on EIS • MEG - Advice on EIS (Attach A) • MEG - Advice on EIS (Attach B) • MEG - Advice on EIS (Attach C) • MEG - Advice on Water Pipeline Amendment • MEG - Advice on Mineral Resource
Resources Regulator	<ul style="list-style-type: none"> • Resources Regulator - Advice on EIS • Resources Regulator - Advice on RTS • Resources Regulator - Advice on Transmissions Line Amendment • Resources Regulator - Advice on Water Pipeline Amendment • Resources Regulator - Final Advice
Department of Primary Industries	
Agriculture	<ul style="list-style-type: none"> • DPI Agriculture - Advice on EIS • DPI Agriculture - Advice on RTS
Fisheries	<ul style="list-style-type: none"> • DPI Fisheries - Advice on EIS
Dams Safety NSW	<ul style="list-style-type: none"> • Dams Safety - Advice on EIS
NSW Education	<ul style="list-style-type: none"> • NSW Education - Advice on EIS
NSW Rural Fire Service	<ul style="list-style-type: none"> • RFS - Advice on EIS
Transport for NSW	<ul style="list-style-type: none"> • TfNSW - Advice on EIS • TfNSW - Advice on EIS (Attachment) • TfNSW - Advice on RTS • TfNSW - Advice on Water Pipeline Amendment
Western NSW Local Health District	<ul style="list-style-type: none"> • Western NSW Local Health District - Advice on EIS
Mid-Western Regional Council	<ul style="list-style-type: none"> • Mid-Western Regional Council - Comments on EIS • Mid-Western Regional Council - Comments on RTS • Mid-Western Regional Council - Comments on Water Pipeline Amendment

A5 – Additional Information: Summarised in Tables A5.1 and A5.2 Refer to the ‘Additional Information’ folder under the ‘Assessment’ tab on the Department’s website at:

<https://www.planningportal.nsw.gov.au/major-projects/projects/bowdens-silver-temp>

Table A5.1 | Expert advice and responses to expert advice

Subject Area	Date
Groundwater	
Groundwater Expert Review – Final Consolidated Report	19 December 2022
Bowdens Silver Response - Groundwater Review	2 June 2021
Bowdens Silver Response - Groundwater Review	15 December 2021
Bowdens Silver Response - Climate Models	24 September 2021
Bowdens Silver Response - Uncertainty Analysis	Oct 2022
Bowdens Silver Response - Open Cut Pit Extension Feasibility	16 December 2022
Surface Water	
Surface Water Expert Review	20 December 2022

Subject Area	Date
Bowdens Response - Surface Water Expert Review	October 2022
Bowdens Response - Surface Water Expert Review	15 December 2022
AMD	
AMD Expert Review	31 May 2022
AMD Expert Review	9 September 2022
Bowdens Response - AMD Expert Review	October 2022
AMD Expert Review	23 November 2022
Bowdens Response - AMD Expert Review	1 December 2022
AMD Expert Review	16 December 2022
Additional Information – Geochemistry Peer Review	16 December 2022
Human Health Risk	
Human Health Risk Assessment Expert Review	11 September 2020
Bowdens Response - Human Health Risk Assessment Expert Review	12 April 2021
Human Health Risk Assessment Expert Review	23 August 2021* * Incorrectly dated in report as 23 August 2020
Bowdens Response - Human Health Risk Assessment Expert Review	16 November 2021
Human Health Risk Assessment Expert Review - Lue Public School	24 August 2021
Economics	
Economics Expert Review	10 February 2021* * Incorrectly dated in report as 10 February 2020
Bowdens Response - Economics Expert Review	9 March 2021
Bowdens Response - Economics Expert Review	31 May 2021
Economics Expert Review	10 January 2022
Social Impact Assessment	
SIA Expert Review	17 November 2022
Bowdens Response - SIA Expert Review	6 December 2022

Table A5.2 | Additional information

Additional information	Date
Impact of Harvestable Rights Order	28 September 2022
Traffic	5 October 2022
Economic Implications of Reducing GHGs	6 October 2022
Noise Modelling & Operating Hours	2 November 2022
Lead at Lue School	16 November 2021

Appendix B – Project Amendments

B1 – Amendment Report (Transmission Line Amendment): Refer to “Amendments” folder on the Department’s website at: <https://www.planningportal.nsw.gov.au/major-projects/projects/bowdens-silver-temp>

Table B1.1 | Key project amendments – first amendment

Aspect	Project Description (EIS)	Amended Project (First Amendment)	Key Changes
Project Description	<ul style="list-style-type: none"> Development of open cut silver mine Relocation of Maloneys Road Water supply pipeline from the Ulan coal mine to the mine site Relocation of 500 kV transmission line described but explicitly excluded from the application 	<ul style="list-style-type: none"> Development of open cut silver mine Relocation of Maloneys Road Water supply pipeline from the Ulan to the mine site Relocation of 500 kV transmission line formally included in the application 	<ul style="list-style-type: none"> Relocation of a portion of the 500 kV transmission line traversing through the proposed mine site formally included in the application (see Figure B1-1)
Disturbance Area	<ul style="list-style-type: none"> 457 ha mine site disturbance footprint 19 ha Maloneys Road disturbance footprint 	<ul style="list-style-type: none"> 457 ha mine site disturbance footprint 19 ha Maloneys Road disturbance footprint 12.5 ha transmission line disturbance 	<ul style="list-style-type: none"> Additional disturbance of 12.5 ha

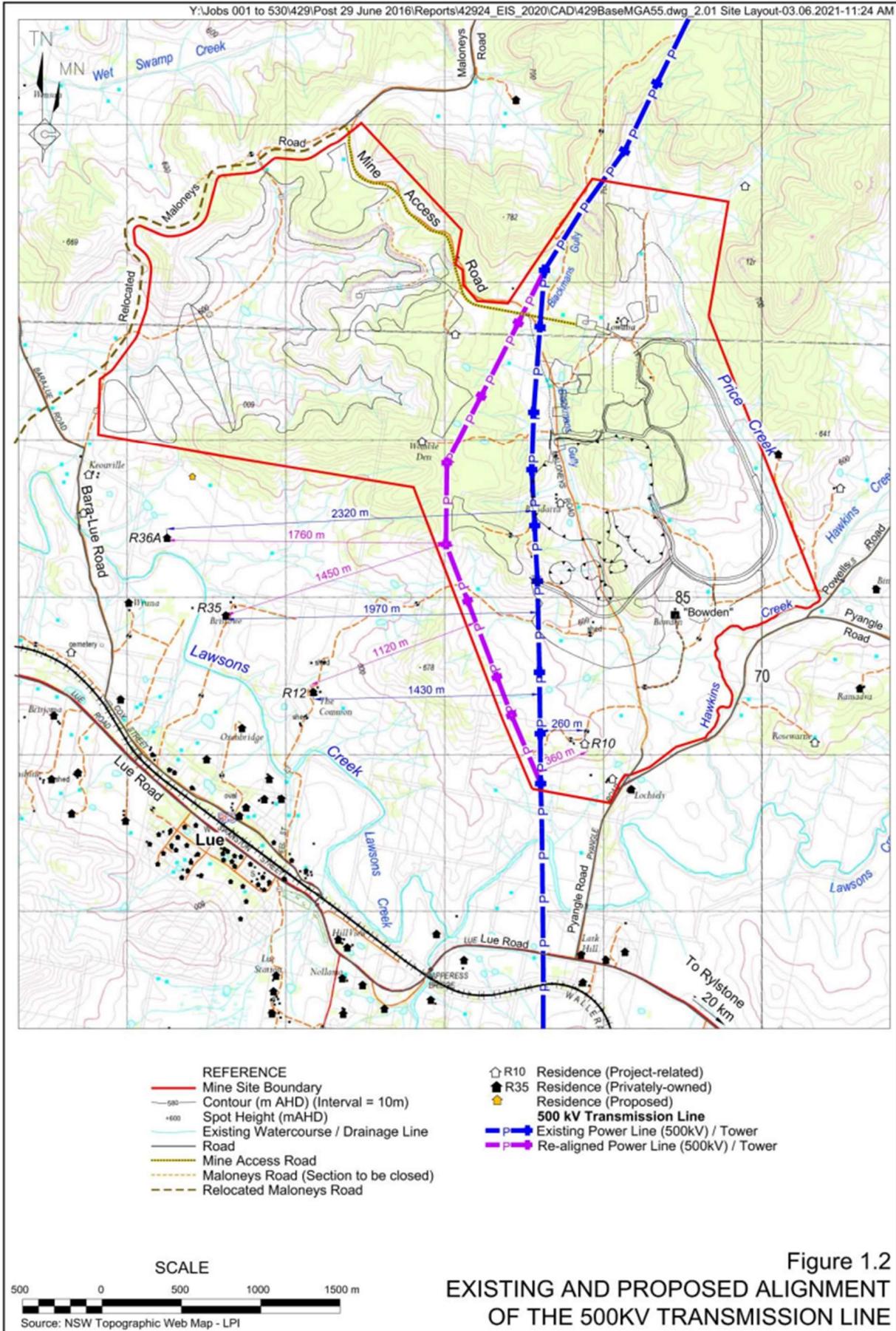


Figure B1-1 | Transmission line realignment

B2 – Second Amendment Report (Water Supply Amendment): Refer to “Amendments” folder on the Department’s website at: <https://www.planningportal.nsw.gov.au/major-projects/projects/bowdens-silver-temp>

Table B2.1 | Key project amendments – second amendment

Aspect	Amended Project (First Amendment)	Amended Project (Second Amendment)	Key Changes
Project Description	<ul style="list-style-type: none"> • Development of open cut silver mine • Relocation of Maloneys Road Water supply pipeline from the Ulan to the mine site • Relocation of 500 kV transmission line 	<ul style="list-style-type: none"> • Development of open cut silver mine • Relocation of Maloneys Road • Relocation of 500 kV transmission line 	<ul style="list-style-type: none"> • Removal of the water supply pipeline
Water System	<ul style="list-style-type: none"> • Water supply strategy, including: <ul style="list-style-type: none"> - Tailings dewatered in TSF and pumped to processing plant from decant pond - 65 ML turkeys nest dam - Soil stockpiles S5 and S6 on central ridge between open cut pit and TSF - Water production bores for supplying groundwater 	<ul style="list-style-type: none"> • Integrated water management and supply system, including: <ul style="list-style-type: none"> - tailings dewatered in paste thickener plant and pumped to processing plant - 130 ML turkeys nest dam - 130 ML water storage dam - 6 harvestable rights dams - Revised location and disturbance of soil stockpiles S5 and S6 - Water production bores for supplying groundwater and advanced dewatering of the open cut pit 	<ul style="list-style-type: none"> • Tailings dewatered in paste thickener plant • Turkeys nest dam increased from 65 ML to 130 ML • Addition of a 130 ML water storage dam to store clean water • Addition of 6 harvestable rights dams to collect surface water • Soil stockpiles S5 and S6 moved to provide space for the paste thickener plant and to reduce vegetation clearing • Extended use of water production bores for advanced dewatering of the open cut pit
Transmission Line	<ul style="list-style-type: none"> • Transmission realignment shown in Figure B1-1 	<ul style="list-style-type: none"> • Transmission line realignment shown in Figure B2-1 	<ul style="list-style-type: none"> • Amended realignment of the 500kV transmission line to address visual impact concerns raised by nearby residents
Site Layout	<ul style="list-style-type: none"> • Indicative general site layout 	<ul style="list-style-type: none"> • Updated site layout shown in Figure B2-2 	<ul style="list-style-type: none"> • Updated site layout to avoid biodiversity impacts and facilitate the integrated water management and supply system

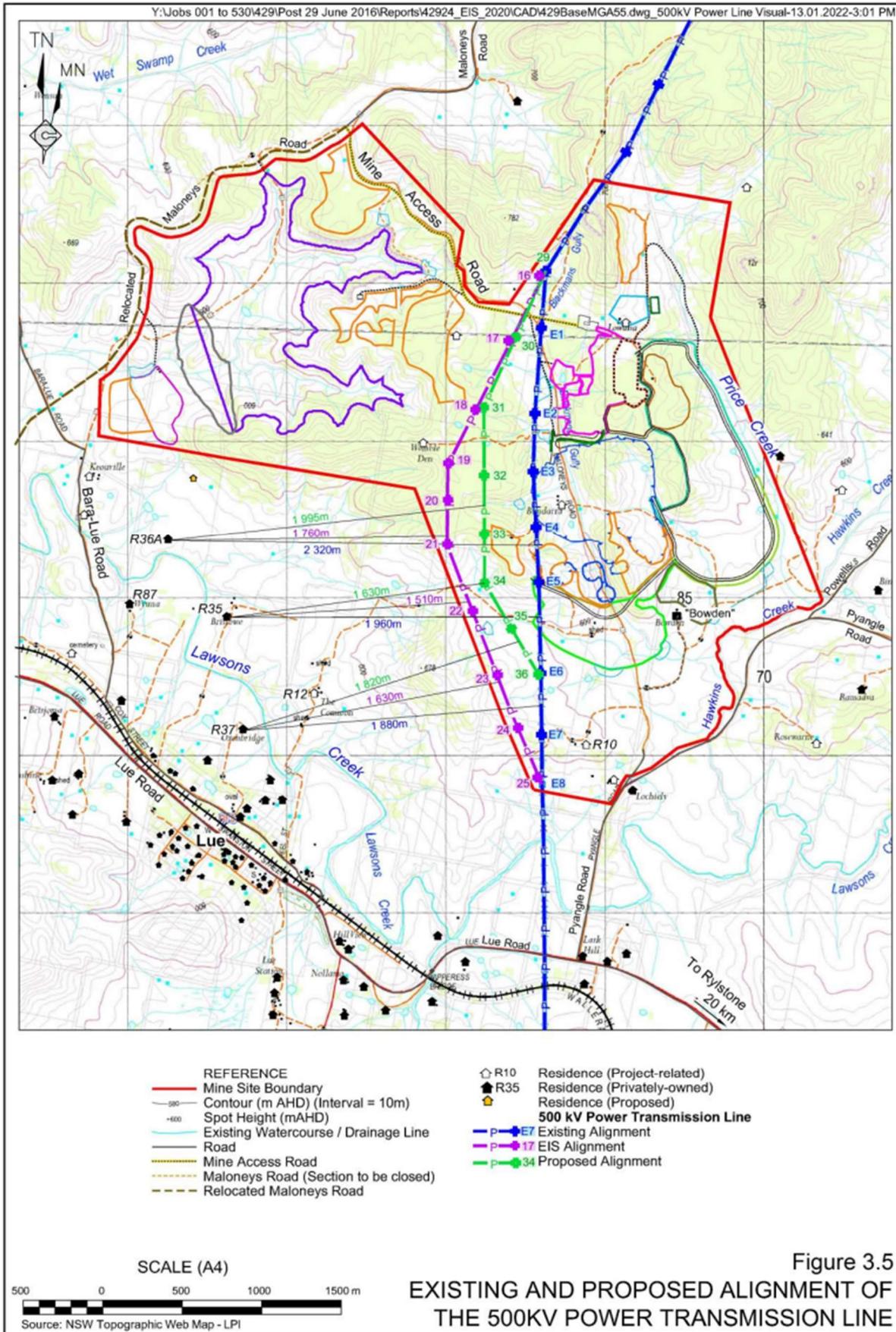
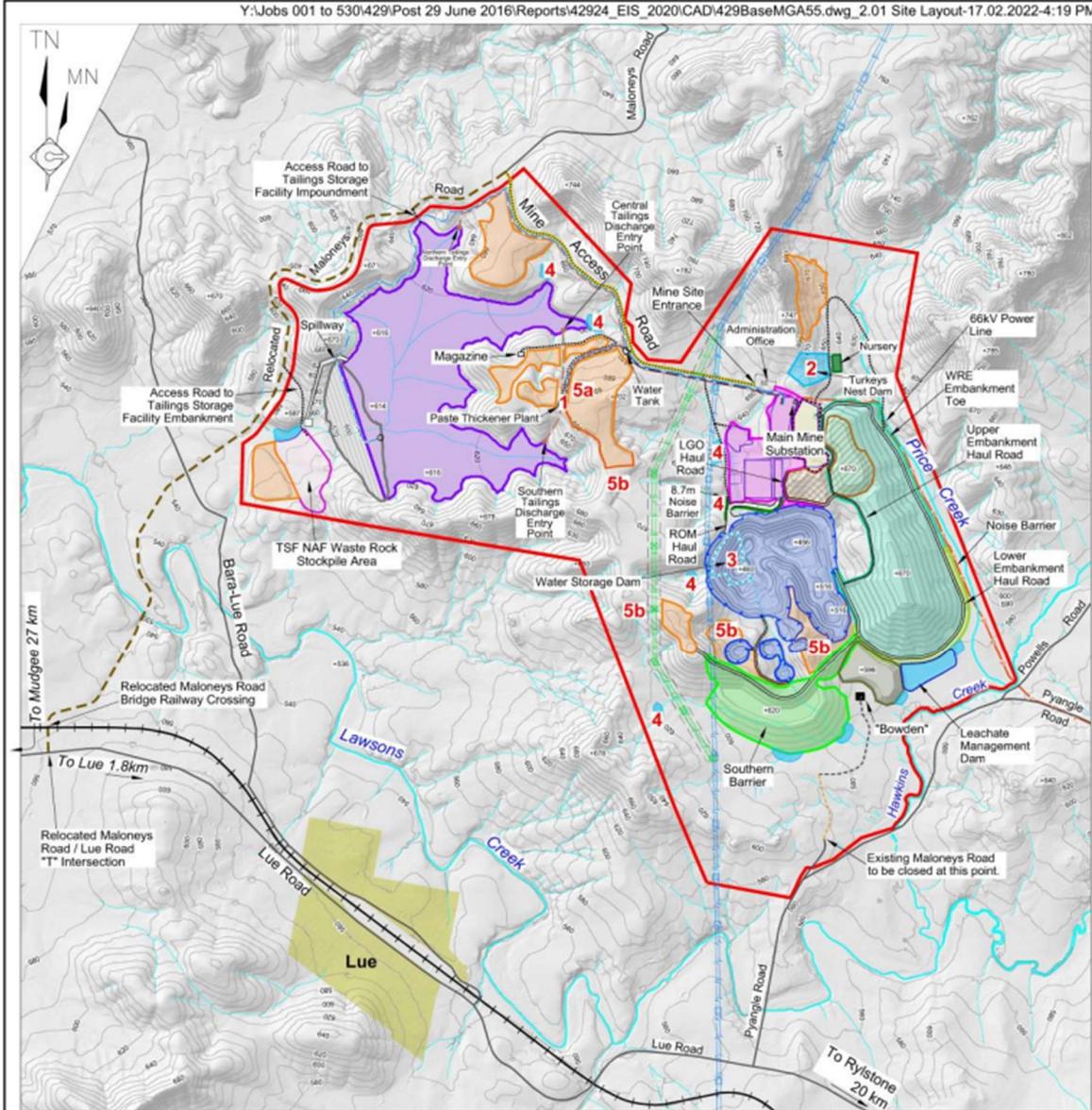


Figure 3.5
EXISTING AND PROPOSED ALIGNMENT OF
THE 500KV POWER TRANSMISSION LINE

Figure B2-1 | Amended transmission line realignment



- REFERENCE**
- Mine Site Boundary
 - Contour (m AHD) (Interval = 10m)
 - Spot Height (mAHD)
 - Existing Watercourse / Drainage Line
 - Road
 - Closed Railway Line
 - Existing Power Line (500kV) / Tower
 - Maloneys Road (Section to be closed)
 - Lue as displayed on Mid-Western Regional LEP, 2012
 - 1 **Amended Component Identifier Proposed Component**
 - Re-aligned Power Line (500kV) / Tower - with 70m Easement
 - Proposed 66kV Power Line
- Note:
 LGO = Low-grade Ore
 NAF = Non-acid Forming
 ROM = Run of Mine
 TSF = Tailings Storage Facility
 WRE = Waste Rock Emplacement
- SCALE**
- Tailings Pipeline
 - Tailings Discharge Pipeline
 - Decant / Paste Thickener Return Pipeline
 - Relocated Maloneys Road
 - Mine Access Road
 - Internal Road
 - Haul Road / Indicative Haul Road
 - Open Cut Pit
 - Mining Facility
 - Tailings Storage Facility
 - Processing Plant/ROM Pad Area
 - Soil Stockpile Area
 - Low-grade Ore Stockpile Area
 - TSF NAF Waste Rock Stockpile Area
 - Southern Barrier
 - Waste Rock Emplacement
 - Oxide Ore Stockpile
 - Water Management Infrastructure
 - Lower Embankment Noise Barrier
 - Noise Barrier



Source: Bowdens Silver Pty Limited

Figure 3.4
AMENDED MINE SITE LAYOUT

Figure B2-2 | Amended project layout

Appendix C – Statutory Considerations

The Department’s assessment of the project has given detailed consideration to a number of statutory requirements (see **section 4**). These include:

- the objects found in section 1.3 of the EP&A Act; and
- the matters listed under section 4.15(1) of the Act, including applicable environmental planning instruments and regulations.

A summary of these considerations is provided below. Reference should also be made to sections 3.2.3 and 6.1.4 of the EIS, where Bowdens Silver has also considered applicable legislation and environmental planning instruments in detail.

C1 Objects of the EP&A Act

Table C1.1 | Consideration of the proposal against the relevant objects of the EP&A Act

Objects of the EP&A Act	Consideration
<p>(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,</p> <p>(c) to promote the orderly and economic use and development of land,</p>	<ul style="list-style-type: none"> The project involves a permissible land use on the subject land. The resource has been determined to be significant from a State and regional perspective. The project would provide considerable socio-economic benefits.
<p>(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment</p>	<ul style="list-style-type: none"> The proposal can be carried out in a manner that is consistent with the principles of ESD, which have been considered through the project EIS and the Department's assessment (see section 4 and Appendix C.2) which has sought to integrate all significant environmental, social and economic considerations.
<p>(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,</p>	<ul style="list-style-type: none"> The project has been designed to minimise potential environmental impacts where practicable. Bowdens Silver would offset residual biodiversity impacts in accordance with the NSW and Commonwealth Government Policy. The project is able to be undertaken in a manner that would avoid impacts upon biodiversity values to the greatest extent possible. Both the precautionary principle and the conservation of biological diversity and ecological integrity has been applied in the assessment to avoid serious or irreversible damage to the environment wherever possible.
<p>(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),</p>	<ul style="list-style-type: none"> The project management measures have been developed in consultation with a wide range of community stakeholders. Bowdens Silver's proposed mitigation and management measures would ensure that the project would have acceptable impacts on Aboriginal cultural heritage and historic heritage.
<p>(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,</p>	<ul style="list-style-type: none"> The Department has notified and consulted with the affected Council and other NSW government authorities over the project and carefully considered all responses in its assessment.
<p>(j) to provide increased opportunity for community participation in environmental planning and assessment.</p>	<ul style="list-style-type: none"> The Department publicly exhibited the proposal and subsequent amendments, and requested community submissions which were all reviewed, considered and responded to by Bowdens Silver.

C2 Ecologically Sustainable Development

The EP&A Act adopts the definition of ecologically sustainable development (ESD) found in the *Protection of the Environment Administration Act 1991*, as follows:

“ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

- (a) the precautionary principle;*
- (b) inter-generational equity;*
- (c) conservation of biological diversity and ecological integrity; and*
- (d) improved valuation, pricing and incentive mechanisms.”*

The Department has considered the principles and programs of ESD, as follows:

Precautionary Principle

The Department has assessed the project's threats of serious or irreversible environmental damage using reasonable worst case scenarios, and is satisfied that there is sufficient scientific certainty to enable the decision maker to weigh up the impacts of the project and determine the development application. The Department has considered all the available information presented and consulted closely with independent experts and key Government agencies to obtain advice on various aspects of the project.

While it is recognised the project would result in a number of impacts of varying significance, the key matters that could cause serious or irreversible environmental damage relate to impacts on water resources and amenity.

The EIS, amendment reports and the Department's assessment have identified management and mitigation measures to address potential environmental impacts, and include commitments and requirements to implement monitoring, auditing and reporting mechanisms.

Overall, the Department has assessed these matters in detail (see **section 6**) and considers that the recommended risk-based conditions and performance measures would provide appropriate protection for the environment and minimise the potential for any serious or irreversible environmental damage.

Intergenerational Equity

Intergenerational equity has been addressed through maximising efficiency and resource recovery and developing environmental management measures which are aimed at ensuring the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The Department acknowledges that impacts from large scaling mining projects have the potential to impact future generations if not managed appropriately. However, the Department also recognises that there remains a clear need to develop minerals deposits to meet society's basic requirements for the foreseeable future. The recommended conditions include a range of measures to minimise the short, medium and long term impacts of the project.

The Department also considers that the socio-economic benefits and provision of raw materials to meet society's demand would benefit future generations.

Conservation of Biological Diversity and Ecological Integrity

The project's potential impacts on biodiversity have been outlined in the Department's assessment of the project (see **section 6.5**). The Department considers that the conservation of biological diversity and ecological integrity has been applied through avoiding and minimising biodiversity impacts. The Department considers that the project's potential impacts would be reasonably mitigated and/or offset to enable the long-term biodiversity outcomes to be achieved for the region.

Improved Valuation, Pricing and Incentive Mechanisms

Valuation and pricing of resource has been considered through economic, social and cost-benefit analyses which have been completed as part of the EIS. The cost benefit analyses sought to weigh up the project's costs and benefits based on its full range of environmental, social and economic impacts.

The Department has carefully considered the costs and economic benefits of the project and support the conclusion that it would deliver a significant net benefit to the local region and the State of NSW.

The Department has also recommended performance-based conditions, where possible, to provide incentive to Bowdens Silver to achieve environmental outcomes and objectives in the most cost-effective way.

C3 Environmental Planning Instruments

Under section 4.15 of the EP&A Act, the consent authority is required to consider, amongst other things, the provisions of the relevant EPI's, including any exhibited draft EPIs²⁶. The Department notes Bowdens Silver's consideration of these instruments in its EIS (see section 3.2.3 of the EIS) and has undertaken its own consideration of the project against the applicable provisions of relevant EPIs.

Mid-Western Regional Local Environmental Plan 2012

The project disturbance area is located in the Mid-Western Regional local government area. All subject land within the proposed open cut mining areas is zoned RU1 (Primary Production) under the *Mid-Western Regional Local Environmental Plan 2012*.

Open cut mining is permissible with consent in this zone.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

At the time when the EIS was finalised, the *SEPP (Koala Habitat Protection) 2019* (2019 SEPP) had application. However, the 2019 SEPP was repealed on 1 March 2020 by the *SEPP (Koala Habitat Protection) 2020* (2020 SEPP), which was again repealed on 17 March 2021 by the *SEPP (Koala Habitat Protection) 2021*. On 1 March 2022, the 2020 SEPP and the 2021 SEPP was consolidated into the *State Environmental Planning Policy (Biodiversity and Conservation) 2021*.

This SEPP aims to conserve and manage Koala habitat to reverse the current trend of Koala population decline. In this respect, the Department considered of impacts of the project on Koala populations (see **section 6.5**).

The EIS's assessment of potential impacts on koalas was against the provisions of the 2019 SEPP. The 2019 SEPP had general application within the Mid-Western Regional LGA and the project is located within the Northwest Slopes Koala Management Area. The assessment undertaken for the project recorded a number of tree species that are listed as koala feed tree species under the SEPP. The assessment also confirmed the previous presence of koala based on two recent records in or adjacent to the project area and several records in the locality (although no koala were found during surveys).

Given the above, the EIS considered the project would result in a loss of 381.17 ha of native vegetation that is potentially used by koala. However, the assessment concluded that the project would not result in a significant impact due to the relatively localised nature of the disturbance compared to the wider local and regional distribution of koalas and the greater extent of habitat in the locality known to be used by koala, and the impact would be offset.

Overall, the Department is satisfied that the project is generally consistent with the aims, objectives and requirements of this SEPP.

²⁶ Note that due to the effect of clause 11 of the SRD SEPP, development control plans do not apply to SSD.

State Environmental Planning Policy (Planning Systems) 2021

The proposed development is declared to be State significant development under Division 4.7 of the EP&A Act as it is development for the purposes of mining and mining-related works that has a capital investment value of more than \$30 million, as specified in clause 5 of Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021*.

In accordance with section 4.5(a) of the EP&A Act, the Independent Planning Commission is the consent authority for the proposal as there were more than 50 unique objections to the project.

State Environmental Planning Policy (Transport and Infrastructure) 2021

The Transport and Infrastructure SEPP requires the consent authority to notify relevant public authorities about developments that may affect public infrastructure or public land. The Department notified Mid-Western Regional Council, Transport for NSW, Dams Safety Committee and Crown Lands about the proposed project.

The Transport and Infrastructure SEPP also requires the consent authority to notify the electricity supply authority if the development is carried out within 5 m of an exposed overhead electricity power line. The development would be within 5 m of the 500 kV transmission line owned by TransGrid. The Department notified TransGrid.

The Department has consulted with public authorities and considered the matters raised in its assessment of the project (see **section 6**). Where appropriate, the Department has also developed conditions of consent to address the recommendations and advice of these public authorities. The Department considers that such conditions would provide appropriate protection for public infrastructure. As such, the Department considers that the requirements of the Infrastructure SEPP have been satisfied.

State Environmental Planning Policy (Resilience and Hazards) 2021

Hazardous and offensive development (chapter 3)

Chapter 3 of this SEPP requires persons proposing to carry out development for the purposes of potentially hazardous industry to prepare a Preliminary Hazard Analysis (PHA) and to submit this with the development application. The EIS has considered the potential hazards and risks associated with the project, including the storage and transportation of hazardous goods (see section 4.16 of the EIS).

The Department considers that suitable mitigation measures could be incorporated into the design of the project to ensure that it would meet relevant standards and be compatible with the existing or likely future use of land surrounding the mine. With the proposed measures in place, the Department considers that the potential hazards associated with the project can be managed.

The Department considers that the project would not increase risks to public safety and would not alter the consequences or likelihood of a hazardous event on the site or during materials transport. As such, the Department considers that the project is consistent with the provisions of this SEPP.

Remediation of land (chapter 4)

Chapter 4 of this SEPP relates to the remediation of contaminated land. Bowdens Silver has considered the potential land contamination matters associated with the project in its EIS (see section 3.2.3.4). The majority of proposed disturbance area has previously been used for grazing and/or exploration activities.

The Department considers that the project would not have a significant risk of existing contamination and that the proposal is generally consistent with the aims, objectives, and provisions of this SEPP.

Environmental Planning Policy (Resources and Energy) 2021

Section 2.9 of the SEPP identifies that mining is permissible with consent on any land where development for the purposes of agriculture or industry may be carried out (with or without development consent). Consequently, the proposed development is permissible with consent under this SEPP, and the Commission may determine the application.

In addition, Part 2.3 of the SEPP lists a number of matters that a consent authority must consider before determining an application for consent to undertake development for the purposes of mining. The Department has considered these matters in its assessment of the proposed project and has included a brief summary of these considerations below.

Non-discretionary development standards for mining (section 2.16)

Section 2.16 identifies non-discretionary development standards for the purposes of section 4.15(2) of the EP&A Act in relation to the carrying out of development for the purposes of mining. Throughout section 4 of the projects EIS, Bowdens Silver has provided consideration of the applicable standards and whether or not the project meets them.

The Department agrees with the conclusions provided in this assessment.

Compatibility with other land uses (section 2.17)

The Department's assessment has considered the potential impacts of the project on other land uses in the area. In addition, it has considered the potential impacts on downstream water users and potential noise, air quality, transport and visual impacts at nearby private residences. This assessment has been undertaken in consideration of the public benefits of the project, surrounding land uses and measures to avoid, mitigate or minimise any land use incompatibility.

Overall, the Department is satisfied that with the implementation of the recommended conditions, including performance measures and adaptive management, the project could be managed to minimise any potential land use conflicts and meet the aims, objectives, and provisions of section 2.17.

Voluntary Land Acquisition and Mitigation Policy (VLAMP) (section 2.18)

The Department's assessment has considered the NSW Government's *Voluntary Land Acquisition and Mitigation Policy* (December 2014). Two residences are predicted to be moderately impacted (for around 18 months) and 12 would experience negligible exceedances of the PNTLs (eight of them for a period of one to two months only during the relocation of the transmission line). The Department has recommended conditions affording mitigation rights to the two residences that would be moderately impacted.

In summary, the Department is satisfied that the project could be managed to minimise amenity impacts at surrounding private properties and that appropriate landowner rights have been offered through the agreement with Bowdens Silver and the affected receiver.

Compatibility with mining, petroleum and extractive industries (section 2.19)

There are no other mining operations immediately near the project, and the Department is satisfied that the project has been designed in a manner that is compatible with, and would not adversely affect, adjacent current or future mining-related activities.

Natural resource management and environmental management (section 2.20)

The Department has recommended a number of conditions aimed at ensuring that the project is undertaken in an environmentally responsible manner, including but not limited to, conditions in relation to water resources, amenity and biodiversity.

Resource recovery (section 2.21)

The Department has considered resource recovery in its assessment of the project and is satisfied that the project can be carried out in an efficient manner that optimises resource recovery within environmental constraints.

The Department has recommended conditions to ensure the project can be carried out in an efficient manner that optimises resource recovery, while giving appropriate recognition and protection for the environmental values that may be affected.

Transport (section 2.22)

Section 2.22 aims to limit the transport of coal, other minerals and their ores, and extractive materials on public roads. All ore extracted from the mine would be processed on site and the concentrate would be transported off site.

The Department has consulted with the applicable road authorities in relation to the project and taken this advice into consideration in its assessment (see **section 6.3**). The Department has also recommended conditions in relation to limit traffic impacts from the project.

Rehabilitation (section 2.23)

Section 2.23 outlines particular requirements relating to consideration of whether any consent granted should be subject to conditions aimed at ensuring rehabilitation of land disturbed by mining and, in particular, whether conditions should require preparation of a rehabilitation management plan, appropriate treatment of waste, remediation of soil contamination and the avoidance of public safety risks.

Bowdens Silver has provided a rehabilitation strategy for the project (see section 2.16 of the EIS). The strategy seeks to, where practicable, progressively create final landforms and integrate the sustainable development principles into all components of the project, including rehabilitation and mine closure.

The Department has considered the final landform proposed by Bowdens Silver (see **section 6.7**) and considers that the proposed final landforms and rehabilitation plans could be achieved to meet contemporary best practice in the NSW mining industry, and has recommended a comprehensive suite of conditions relating to rehabilitation of land disturbed by the project.

Summary of this SEPP (Chapter 2)

Based on its assessment of the project, the Department considers that it can be managed in a manner that is generally consistent with the aims, objectives and provisions of Chapter 2 of this SEPP.

Appendix D – Commonwealth Assessment

D1 Introduction

In accordance with the Bilateral Agreement between the Commonwealth and NSW Governments, the Department provides the following additional information required by the Commonwealth Minister, in order to decide whether or not to approve a proposed action (i.e. the project) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Department's assessment has been prepared based on the assessment contained in:

- Bowdens Silver's EIS;
- Bowdens Silver's Amendment Reports and Final BAR;
- advice received from State agencies and local councils;
- submissions received from special interest groups and the general community; and
- Bowdens Silver's Submissions Report and other information provided in response to the Department's requests.

It has given particular consideration to the advice provided by BCD regarding biodiversity and Bowdens Silver's final BAR, as well as to specific advice from BCD regarding the proposed action's potential impacts on Biodiversity Matters of National Environmental Significance (MNES) (see **section D2** and **Appendix A**).

This Appendix is supplementary to, and should be read in conjunction with, the main body of the Department's assessment report, particularly **section 6.5**, which include consideration of impacts to listed threatened species and communities (including for MNES) and avoidance, mitigation and offsetting measures for threatened species and communities.

BCD has undertaken a detailed review of the impacts of the proposed action on threatened communities and species listed under the EPBC Act, in accordance with templates provided by DCCEEW.

D2 Impacts on EPBC Listed Species and Communities

The project was determined by the Department of Climate Change, Energy the Environment and Water (DCCEEW) to be a controlled action for the controlling provision of listed threatened communities and species.

Section 6.5 describes the biodiversity assessment undertaken for the project and the resulting BAR. Field surveys for the assessment were conducted by EnviroKey Pty Ltd (EnviroKey) over a study area of approximately 2,141.2 ha. The project would disturb approximately 381.17 ha of native vegetation, with 180.17 ha of this classified as the BC Act Box-Gum Woodland and 146.72 ha meeting the classification of the EPBC Act listed Box-Gum Woodland.

All entities that were identified as requiring an assessment of significance were assessed.

The assessment concluded that the leek-orchid (*Prasophyllum sp Wybong*, *Philothea ericifolia*, Tarengo Leek Orchid, *Euphrasia arguta*, Booroolong Frog, Striped Legless Lizard, Superb Parrot, Brush-tailed Rock Wallaby, Grey-headed Flying-fox, Pink-tailed Worm-lizard, and Painted Honeyeater were not likely to occur in the project footprint.

An assessment of whether Corben's Long-eared Bat is likely to occur in the project footprint was not undertaken. However, BCD confirmed that the species is an ecosystem species and the biodiversity credit calculations account for impacts on that the species.

Squirrel Glider (*Petaurus norfolcensis*) and Regent Honeyeater are predicted to occur within the disturbance footprint based on the presence of good quality Box Gum Woodland (and for the Swift Parrot, the location of the project in relation to the Mudgee-Wollar key area and Capertee Valley key area defined by the National Recovery Plan for the Regent Honeyeater).

Impacts on one ecological community and four species likely to be significantly impacted were assessed and credit liabilities were calculated under the Framework for Biodiversity Assessment.

The ecosystems proposed to be cleared within the Commonwealth assessment footprint and impacted species are summarised in **Table D2.1**.

Table D2.1 | Ecosystem and species credits disturbance areas

Ecosystem/Species	Disturbance (ha)
PCT 273: White Box shrubby open forest on fine grained sediments on steep slopes in the Mudgee region of the of central western slopes of NSW	22.04
PCT 277: Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	22.97
PCT 281: Rough-Barked Apple - red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	157.2
PCT 323: Red Stringybark - Inland Scribbly Gum open forest on steep hills in the Mudgee – northern section of the NSW South Western Slopes Bioregion	98.3
PCT 324: Inland Scribbly Gum grassy open forest on hills in the Mudgee Region, NSW central western slopes	58.69
PCT 358: Mugga Ironbark - Red Box - White Box - Black Cypress Pine tall woodland on rises and hills in the northern NSW South Western Slopes Bioregion	0.71
Regent Honeyeater (<i>Anthochaera phrygia</i>)	381.17
Squirrel Glider (<i>Petaurus norfolcensis</i>)	381.17
Koala (Qld, NSW and the ACT) (<i>Phascolarctus cinereus</i>)	381.17
Large-eared Pied Bat (<i>Chalinolobus dwyeri</i>)	337.8
Small Purple-pea (<i>Swainsona recta</i>)	4 (individuals)

Bowdens Silver assessed the significance of the impacts on terrestrial and aquatic species using the methodology outlined in *Matters of National Environmental Significance Significant Impact Guidelines (2013)* (MNES Impact Guidelines), as documented in the BAR.

Further detailed consideration of the impact on these species is provided below.

EPBC listed species considered to be significantly impacted

Box Gum Woodland

The assessment predicts that the project would clear up to 22.97 ha of the *Blakely's Red Gum -Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion* (PCT 277) and 157.2 ha of *Rough-barked Apple-Red Gum-Yellow Box Woodland on Alluvial Clay to Loam Soil on Valley Flats in the Northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregions* (PCT 281). These are listed as endangered ecological communities (EECs) under the BC Act and also correspond with the White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands (Box Gum Woodland). 146.72 ha of this woodland meets the classification of the Box Gum Woodland CEEC.

This contravenes the Recovery Plan which seeks to achieve no net loss in extent and condition of an ecological community. Bowdens Silver has made all reasonable attempts to avoid impacts to Box Gum Woodland where possible through a substantial planning and design phase and has proposed mitigation measures to minimise potential impacts, including managing and protecting areas of Box Gum Woodland CEEC in perpetuity.

The assessment estimates that 22% of the total extent of Box Gum Woodland that occurs within the study area would be directly impacted, and although unquantified, the assessment observes the CEEC is reasonably well represented in the wider locality.

The assessment of significance undertaken for the project concluded that the clearing of this habitat is likely to result in significant impacts on the Box Gum Woodland.

Bowdens Silver proposes an offset strategy which includes the retirement of 1,250 credits for PCT 277, and 10,118 credits for PCT 281. The credits for the EPBC component have not been distinguished from the non-EPBC credits (The area of non-EPBC Box Gum Woodland is 33.45 ha). BCD has confirmed that the calculation of offset credits is appropriate.

Regent honeyeater (*Anthochaera phrygia*)

The project has the potential to have a significant impact on Regent Honeyeater. The species was not detected despite comprehensive surveys. However, given there are previous records of the species in the locality, the location of the project in relation to the Mudgee-Wollar key area and Capertree Valley key area, and the presence of suitable habitat, the assessment considered it probable that the species uses the study area from time to time. Bowdens Silver has made all reasonable attempts to avoid impacts to potential foraging and breeding habitat where possible through a substantial planning and design phase and has proposed mitigation measures to minimise potential impacts. Bowdens Silver proposes an offset strategy which includes the retirement of 29,350 species credits for Regent Honeyeater.

EPBC listed species not considered to be significantly impacted

Koala (Qld, NSW and the ACT) (*Phascolarctus cinereus*)

While two koala have been recorded within or adjacent to the project site and the project would result in the loss of 381.17 hectares of habitat that is suitable for koala, the proposed action is considered unlikely to result in a significant impact due to the relatively localised nature of the BAR footprint when compared to the wider local and regional distribution of koala and the greater extent of habitat in the locality known to be used by koala.

Bowdens Silver has made all reasonable attempts to avoid impacts to potential foraging and breeding habitat where possible through a substantial planning and design phase and has proposed mitigation measures to minimise potential impacts. Bowdens Silver proposes an offset strategy which includes the retirement of 9,910 species credits for koala.

Large-eared Pied Bat (*Chalinolobus dwyeri*)

While Large-eared Pied Bat have been detected by echolocation call recording, the project footprint contains only potential foraging habitat. There are no potential roosting and maternity sites in rock outcrops, cliffs and crevices in the project area and it is these sites that are of the most importance to this species for long-term viability. For these reasons, the proposed action is unlikely to result in a significant impact to Large-eared Pied Bat. Bowdens Silver proposes an offset strategy which includes the retirement of 4,391 species credits for the Large-eared Pied Bat.

Spotted-tailed Quoll (southeastern mainland population)

The Spotted-tailed Quoll has been detected within the vicinity of the study area but was not detected within the BAR footprint despite comprehensive fauna surveys. Nonetheless, the vegetation types with the BAR footprint provide potential foraging habitat.

However, as there are large expanses of woodland and forest within the study areas and wider locality, the assessment considered the proposed action is unlikely to result in a significant impact to Spotted-Tailed Quoll. Bowdens Silver proposes an offset strategy which includes the retirement of 23,880 ecosystem credits for plant communities providing habitat for Spotted-tailed Quoll.

Swift Parrot

The action would remove about 381.17 ha of potential foraging habitation that could be used by Swift Parrot. However, the assessment concluded that the Swift Parrot is unlikely to be significantly impact by the action as the species does not breed in NSW, the habitat within the disturbance footprint is relatively localised in comparison to the distribution of the species in NSW, and the species is highly mobile and migratory and would not rely solely on the habitat in the study area. Bowdens Silver proposes an offset strategy which includes the retirement of 23,880 ecosystem credits for plant communities providing habitat for Swift Parrot.

Swainsona recta (Small Purple-pea)

The action would result in the removal of four Small Purple-pea located within a discrete area in the BAR footprint. The species is also known from the wider locality from several populations including the Mudgee Lookout and along the Mudgee-Lue Road. These records confirm the presence of a population in the general locality and the National Recovery Plan for the species identifies the Wellington-Mudgee population as the most significant in NSW.

However, it would be generally accepted that these four plants alone do not comprise plants critical to the survival of the species, nor that the habitat to be removed is critical to the survival of the species. For these reasons, the proposed action is unlikely to result in a significant impact to Small Purple-pea. Bowdens Silver proposes an offset strategy which includes the retirement of 104 species credits for the Small Purple-pea.

D3 Offsetting Impacts to EPBC Listed Species

Bowdens Silver has proposed a staged offsetting approach for the project, which would see the overall credit requirements for the project spilt into stages. Credits would be retired prior to clearing in each stage.

The ecosystems and species credits proposed to be offset in stages is shown in **Table D3.1**.

Table D3.1 | Staged ecosystem and species credit retirement

Ecosystem/Species	Credits Required	Stage 1	Stage 2	Stage 3
PCT 273	1,360	1,360		
PCT 277	1,250	307	233	710
PCT 281	10,118	7,053	1,532	1,533
PCT 323	6,959	3,517	2,181	1,262
PCT 324	4,150	2,895	544	711
PCT 358	42	37	5	
Regent Honeyeater	29,350	17,943	5,970	5,437
Squirrel Glider	8,386	5,127	1,706	1,553
Koala	9,910	6,059	2,016	1,835
Large-eared Pied Bat	4,391	2,860	835	696
<i>Swainsona recta</i>	104	0	104	0
<i>Swainsona sericea</i>	972	954	0	18

Note: PCTs 273, 277, 281, 323, 324, 358 provide habitat for Swift Parrot and Spotted-tailed Quoll and impacts on these species are offset through the retirement of ecosystem credits.

The areas proposed to be cleared in each stage are shown in **Figure D1**.

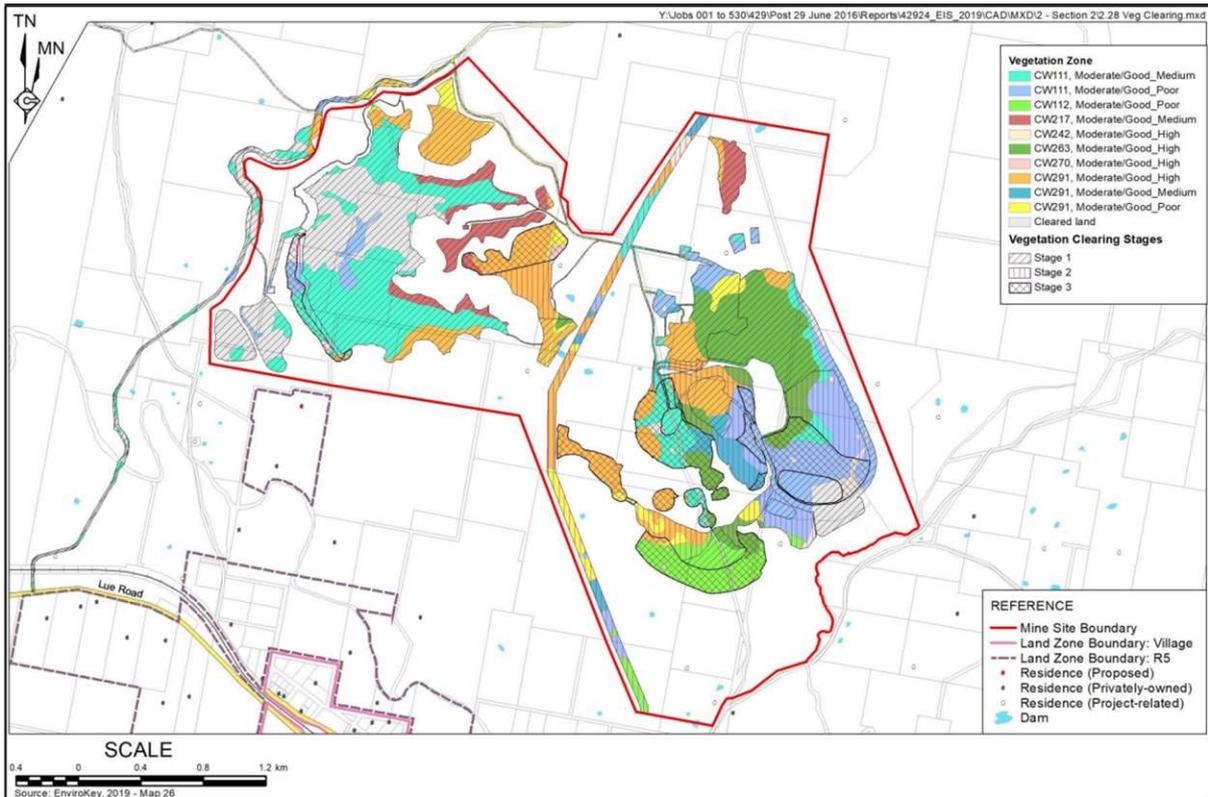


Figure D1 | Staged clearing

D4 Protected Matters

DCCEEW determined that other matters listed under the EPBC Act are not controlling provisions with respect to the proposed action. These include listed World Heritage, National Heritage, migratory species, Ramsar wetlands, Commonwealth marine environment, Commonwealth land, Commonwealth actions, nuclear actions, the Great Barrier Reef Marine Park and Commonwealth Heritage places overseas.

D5 Conclusions on Controlling Provisions

Threatened species and communities (sections 18 and 18A of the Act)

For the reasons set out in **section 6.5**, BCD's advice regarding the project's potential impacts on biodiversity MNES and this Appendix, the Department recommends that the impacts of the action would be acceptable, subject to the impact avoidance, mitigation and offsetting measures described in Bowdens Silver's EIS, Submissions Report, Amendment Report, final BDAR and the recommended conditions of consent in **Appendix E**.

D6 Additional EPBC Act Considerations

Table D6.1 contains the additional mandatory considerations, factors to be taken into account and factors to have regard to under the EPBC Act which are additional to those already addressed.

Table D6.1 | Additional considerations for the Commonwealth Minister under the EPBC Act

EPBC Act Section	Considerations	Conclusion
Mandatory considerations		
136(1)(b)	Social and economic matters are discussed in sections 6.4 and 6.6 of the assessment report.	<p>The Department considers that the proposed development would result in a range of benefits for the local and regional economy and is of public benefit. Negative social impacts, particularly on the local community residing in the area have been considered in the assessment of the development.</p> <p>A range of mitigation measures have been proposed by Bowdens Silver, including a Planning Agreement with Mid-Western Regional Council.</p>
Factors to be taken into account		
3A, 391(2)	<p>Principles of ecologically sustainable development (ESD), including the precautionary principle, have been taking into account, in particular:</p> <ul style="list-style-type: none"> • the long term and short term economic, environmental, social and equitable considerations that are relevant to this decision; • conditions that restrict environmental impacts and impose monitoring and adaptive management, reduce any lack of certainty related to the potential impacts of the project; • conditions requiring the project to be delivered and operated in a sustainable way to protect the environment for future generations and conserving the relevant matters of national environmental significance; • advice provided within this report reflects the importance of conserving biological diversity, ecological and cultural integrity in relation to all of the controlling provisions for this project; and • mitigation measures to be implemented which reflect improved valuation, pricing and incentive mechanisms are promoted by placing a financial cost on the proponent to mitigate the environmental impacts of the project. 	The Department considers that the project, if undertaken in accordance with the recommended conditions of consent, would be consistent with the principles of ESD.
136(2)(e)	Other information on the relevant impacts of the action.	The Department considers that all information relevant to the impacts of the project has been taken into account in this recommendation.
Factors to have regard to		
176(5)	Bioregional plans	There is no approved bioregional plan related to the activity.
Considerations on deciding on conditions		
134(4)	<p>Must consider:</p> <ul style="list-style-type: none"> • information provided by the person proposing to take the action or by the designated proponent of the action; and • the desirability of ensuring as far as practicable that the condition is a cost effective means for the Commonwealth and the person taking the action to achieve the object of the condition. 	<p>All project related documentation is available from the Department's website: www.majorprojects.planning.nsw.gov.au.</p> <p>The Department considers that the recommended conditions (see Appendix E) are a cost effective means of achieving their purpose.</p> <p>The conditions are based on the information provided by Bowden's Silver and was prepared in consultation with the Department, DCCEEW, DPE Water, EPA, BCD and other agencies.</p>

Appendix E – Recommended Instrument of Consent

Refer to 'Recommendation' folder on the Department's website at:

<https://www.planningportal.nsw.gov.au/major-projects/projects/bowdens-silver-temp>