MINING, EXPLORATION & GEOSCIENCE
Department of Regional NSW

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ADVICE RESPONSE: Bowdens Silver Project (SSD-5765) – Additional advice on Assessment

Dear Rose-Anne

I refer to your correspondence dated 24 August 2022 inviting the Department of Regional NSW – Mining, Exploration & Geoscience (MEG) to provide additional advice to the Department of Planning and Environment on the Bowdens Silver Project (Bowdens or the Project).

Bowdens Silver deposit — comment on ore deposit economic factors

Silver production in Australia is of great economic and historical significance, most notably from Broken Hill. According to the most recent review by Geoscience Australia in 2018, Australia's national demonstrated reserves and resources of silver were about 25.40 kilotonnes (kt) and 88.35 kt respectively, with NSW hosting about 15 percent thereof.

The Bowdens silver deposit is the largest undeveloped silver project in Australia and one of the largest globally.

Current reserves (Proved and probable) :

29.2 (Million tonnes) (Mt) @ 69 grams per tonne (g/t)* Ag, 0.44% Zn and 0.32% Zn (30 g/t Ag equivalent^ cut-off!) containing 2,063 tonnes (t) Ag (66.32 Moz Ag) 130.84 t Zn, 95.53 t Pb.

Current resources (Measured, indicated and inferred):

128 Mt @ 40 g/t Ag, 0.38% Zn, 0.26% Pb containing 5,070 t Ag (164 Moz Ag) 333 kt Pb, 486 kt Zn.

This constitutes about 21 percent of all current silver resources in NSW.

Ore deposits must be considered in terms of grade verses tonnage, whereby lower-grade deposits, or those for less valuable commodities can be economic given greater tonnages. Large deposits are more amenable to economies of scale and may have a good chance to be mined. Alternatively, higher grade deposits typically create higher rates of return for the producers.

Geological factors including deposit style and ore mineralogy also significantly affect economic viability, as of course does the mining method. For example, open pit methods are economic at lower grades, compared to underground stope and pillar mining. Most silver deposits also host economic concentrations of other metals, most importantly lead and zinc, along with gold.

Why is Bowdens designated a silver deposit?

Bowdens is best termed a silver deposit as silver is the principal commodity, even given relative low silver grades. The Bowdens lead and zinc grades are also typically <1%. Primary lead and zinc mines typically have grades of several percent or more. The grades compared with other competing deposits, directly affects profitability and is more important than the contained dollar value of any particular metal. Bowdens approximate value of reserves is about $1.2B for silver, $475M for zinc and $190M for lead.

Lead and zinc were used by the proponent to calculate metal price-dependent silver^ equivalent values which is common practise in ore reserve calculations. The high percent grades of lead and zinc used for the calculations compared with silver, show that silver is economically predominant. Therefore, Bowdens could reasonably be termed a primary silver deposit.

Notes:

* g/t = parts per million
^ Silver equivalent: Ag Eq (g/t) = Ag g/t) + 33.48* Pb (%) + 49.61*Zn (%)
! The cut-off grade of 30 g/t Ag means that the proponent believes that mineralisation of lower grade will not generally be economic to mine at least initially.

Comparisons with other silver mines

Silver is a globally traded commodity with transparent pricing so comparisons with deposits worldwide are meaningful. Larger silver deposits tend to host a slightly greater percentage of total metal endowment than some other commodities, for example those such as antimony and gold. A recent review by Ruberti & Massari (2018) discussed twelve of the world's top fifteen leading silver mines, which represent 54 percent of the worldwide primary silver production and 16 percent of all global silver mining production. The results show that at roughly 60 g/t, Bowdens ore would be of relatively low grade, and below the leading producers globally. Note that many mines recover silver at grades as low as a 1 g/t, where silver is not the primary commodity.

In Australia, the largest current producer of silver is the Cannington mine in Queensland where underground reserves of sulphide ore are 23 Mt @ 191 g/t Ag, 5.58% Pb, and 3.50% Zn. However, open pit resources are likely to be economic at lower grades - currently 91 g/t 2.89% Pb and 2.27% Zn.

In short, reserves at Bowdens are amenable to open pit mining with relatively lower proportions of overburden to ore (<2.5) and hence could potentially prove economic given strong silver prices.

Geological factors – global silver deposits

The tables below show the size (Figure 1) and grade (Figure 2Figure) of world-class deposits globally from major compilations by the United States Geological Survey (Singer 1995; USGS2010). While prices have fluctuated and global production has increased, average tonnages and grades of *deposits* of silver, lead and zinc (the metals at Bowdens) have not drastically changed and remain instructive.

Figure 1 - Size of silver deposits globally

Size as Tonnage of Mineralized Rock and Percentage of Total Metal in the Largest 50 and 10 Percent of Gold, Silver, Copper, Zinc, and Lead Deposits

		Gold	Silver	Copper	Zinc	Lead
Largest 50% of deposits	Metric tons (millions)	2	3.5	5.9	3.6	3.7
	Percent total metal	98	96	99	96	96
Largest 10% of deposits	Metric tons (millions)	74	120	290	41	50
	Percent total metal	77	47	79	62	66

Source: Singer, Donald A. United States Geological Survey (1995) World Class Base and Precious Metal Deposits – A Quantitative Analysis, Economic Geology Vol. 90, pp 100.

At 120 Mt Bowdens would rank among the 10% of largest deposits globally.

Figure 2 - Grade of silver deposits globally

QUANTITATIVE ANALYSIS OF WORLD CLASS DEPOSITS

Minimum Average Grade and Percentage of Total Metal in the Richest 50 and 10 Percent of Gold, Silver, Copper, Zinc, and Lead Deposits

		Gold	Silver	Copper	Zinc	Lead
Richest 50% of deposits	Minimum average grade	3 g/t	25 g/t	1%	3.9%	2.1%
	Percent total metal	74	77	44	79	78
Richest 10% of deposits	Minimum average grade	18 g/t	360 g/t	3%	10%	9%
	Percent total metal	12	19	10	24	12

Source: Singer, Donald A. United States Geological Survey (1995) World Class Base and Precious Metal Deposits – A Quantitative Analysis, Economic Geology Vol. 90, pp 97.

Bowdens is low grade but would rank among the top 50% of deposits globally.

Geological Factors — the potential for further discovery and development of silver resources in NSW

Bowdens is mainly an intermediate sulfidation epithermal deposit of Permian age, unlike most deposits that have been mined to date in NSW. Extensive sequences of analogous and prospective Late Carboniferous to Early Permian rocks occur at surface or beneath shallow cover along the margin of the Sydney-Bowen Basin, extending from the Shoalhaven region into Queensland. These analogous rock packages host numerous smaller Ag deposits, mined historically in NSW, along with significant recently mined deposits in Queensland, for example, around Texas near the NSW–Queensland border. Mining of the large Bowdens deposits would not only be economically significant — but could lead to further development of such deposits in NSW in the future.

For further advice on this matter, please contact Adam Banister, Senior Advisory Officer, Industry Advisory & Mining Concierge unit - Industry Development branch on 02 4063 6860 or mining.concierge@regional.nsw.gov.au.

Sincerely

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for

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