Bowden Site Geology Problems - Lessons from Other Mines

Bowdens Project SSD 5765

IPC Presentation

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Pavich Presentation_IPC Hearing_Bowdens Silver V2

CONTENTS

1 SEARS requirements NOT met – as outlined in preceding LAG presentations today:

1. The SEARs have not been met in key ‘mine viability-determining’ areas.
2. Referring these key unanswered questions to the Conditions of Consent lowers the bar of approval - as the revised management plans will not be reviewed by IPC, instead the Planning Secretary (who may well not request independent review by DPE’s external experts)
3. Major amendments recently made to project, without revisiting modelling - reassessing implications
4. DPE, IPC and community need to learn lessons from failed mines to avoid similar problems here
5. This process unfairly gives mine a ‘foot in the door’ – that may be very hard to remove down the track.
6. IPC Commissioners have not been provided with evidence needed to make properly-informed decision – i.e. it’s not approval-ready
7. A failure of due process for IPC to take this pathway without first seeing these revised management plans and confirming that the SEARs have indeed been met.

Earthquake activity - level of risk in Australia
Bowdens Silver Faultlines

- Australia is seismically active
- Deadly Richter 5.6 Newcastle earthquake of 1989
- Earthquake claimed 13 lives
- 160 people were hospitalised
- 50,000 buildings were damaged - 40,000 were homes
- 300 buildings demolished
- 300,000 people affected - 1,000 made homeless
- Damage bill about $4 billion
- Earthquake felt over 200,000 sq. km - movements 800km from Newcastle
- Damaged buildings and facilities in 9000 sq. km

Largest possible Australian earthquake in Australia unknown but above Richter 7

- Earthquakes offshore southeastern Australia > Richter 7
- Similar to large Californian earthquakes was 1988 Tennant Creek earthquake - Richter 6.9
- Larger than 1994 Northridge earthquake near Los Angeles - R 6.7, damage $US 15 billion - 57 killed
- Possibility for earthquakes to strike quiet area shown by R 6.9 Tennant Creek earthquake 1988.

Prior to this event, Tennant Creek area exhibited no seismic activity whatsoever

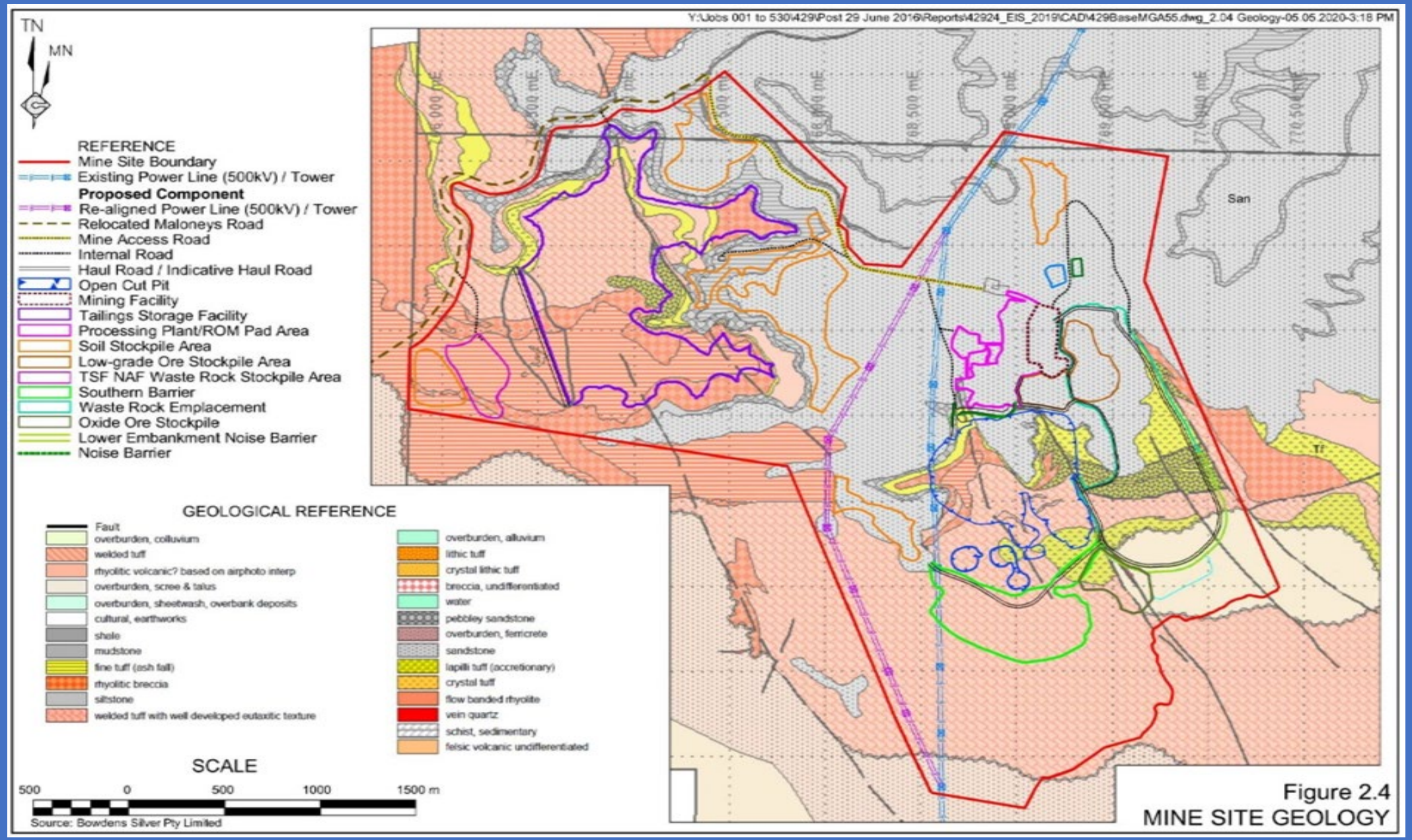
Mudgee – Lue region has many geological faults.

We experience minor earth tremors along these faults regularly - most unnoticed

As the Tennant Creek and Newcastle demonstrated - we must expect the unexpected.

Bowdens Silver EIS does not discuss faulting

EIS Mine Site Geology map has fault to edge of Tailings Storage Facility: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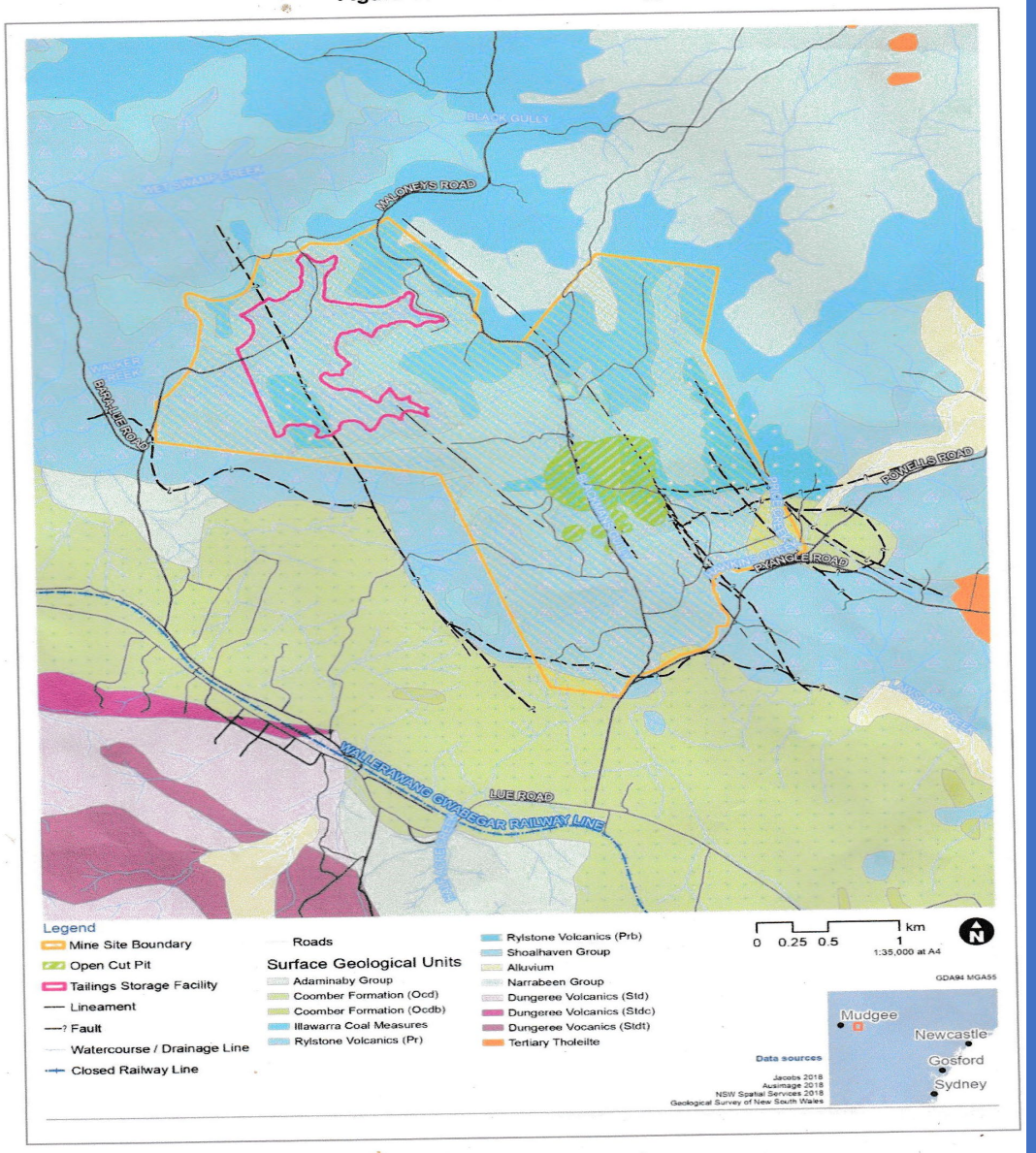
TN
MN
REFERENCE
Mine Site Boundary
Existing Power Line (500kV) / Tower
Proposed Component
Re-aligned Power Line (500kV) / Tower
Relocated Maloneys Road
Mine Access Road
Internal Road
Haul Road / Indicative Haul Road
Open Cut Pit
Mining Facility
Tailings Storage Facility
Processing Plant/ROM Pad Area
Soil Stockpile Area
Low-grade Ore Stockpile Area
TSF NAF Waste Rock Stockpile Area
Southern Barrier
Waste Rock Emplacement
Oxide Ore Stockpile
Lower Embankment Noise Barrier
Noise Barrier
GEOLOGICAL REFERENCE
Fault
overburden, colluvium
welded tuff
rhyolitic volcanic? based on airphoto interp
overburden, scree & talus
overburden, sheetwash, overbank deposits
cultural, earthworks
shale
mudstone
fine tuff (ash fall)
rhyolitic breccia
siltstone
welded tuff with well developed eutaxitic texture
overburden, alluvium
lithic tuff
crystal lithic tuff
breccia, undifferentiated
water
pebbley sandstone
overburden, ferricrete
sandstone
lapilli tuff (accretionary)
crystal tuff
flow banded rhyolite
vein quartz
schist, sedimentary
felsic volcanic undifferentiated
SCALE
500 0 500 1000 1500 m
Source: Bowdens Silver Pty Limited
San
Tf
Figure 2.4
MINE SITE GEOLOGY

Geology map from Groundwater consultant has fault underneath Tailings Storage Facility:

Figure 11 Surface Geology



Reactivation of old fault lines occurs within the Lue region

Fault movement at Bowdens allowing release of toxic residues from Tailings Storage Facility would have very severe consequences downstream.

Significant difficulties have occurred during tunnel construction through faults at Australian projects

- Worker deaths occurred during Snowy Mountains Authority tunnelling through faults
- Usually by associated rockfalls when tunnelling through fractured, deeply weathered, very wet faultlines
- Many hundreds of metres below the surface - unlined tunnels can resemble cathedrals not railway tunnels.

Below Bowdens Silver Tailings Storage Facility fractured, deeply weathered, very wet conditions may exist at the fault line

- Failure of the proposed TSF liner may lead to easy faultline throughflow of water with pollutants to Lawson Creek.
- 500 years of integrity of this liner essential but cannot be assured.
- Lawson Creek joins Cudgegong River downstream of Mudgee domestic town water intakes
- Gulgong draws town water from Cudgegong River downstream of Lawson Creek
- Effective management of Bowdens Silver project critical for Gulgong residents.

2 Lessons from Other Mines

Tailings Storage Facility and other sediment / water management failures

Clarence Colliery – Newnes Plateau (above Lithgow)

- July 2015 coal fines from Clarence Colliery dam spilled into the Wollangambe River
- Pollution with outflow of coal and other mine wastes from mine at least 22 km downstream
- Reduction of abundance and variety of pollution-sensitive aquatic macroinvertebrates
- Company was advised by geotechnical engineer that work needed to stabilise the dam.
- No work on dam followed
- Miners must follow professional advice and have strong regulatory oversight.

Coalmines – central Queensland 2010

- Prolonged rainfall over Queensland's mining regions during the 2010/2011 wet season
- Huge volumes of water poured into pits and leaked into underground areas
- Following years of drought some mines had been designed to catch as much runoff as possible
- Storage facilities and dams became so full that operators were forced to pump excess water into pits
- Access to equipment, storage facilities and monitoring sites was cut.
- Gigantic mining equipment was swamped by floodwaters
- Coal railway lines were closed
- Climate Change increased severity + frequency extreme weather must be addressed in planning / managing developments incl mining