What is involved in a Groundwater Assessment?

BOWDENS SILVER

Understanding Groundwater Impacts

The SEARs for the Bowdens Silver Project require a detailed assessment of the Project's impacts on the groundwater resources beneath and surrounding the proposed open cut pit. It will be important to understand how much groundwater will flow into the open cut pit and its quality. In addition, the extent of drawdown of the regional groundwater table around the mine will need to established. The assessment is being undertaken in five stages.

Stage 1: Establish the depth, rainfall response and aquifer characteristics of the local and regional groundwater system, together with groundwater quality. We also need to understand the occurrence of springs within and surrounding the Mine Site. This information is collected via a monitoring program of existing bores around the Mine Site and a range of bores within the Mine Site.

Stage 2: Identify bores and springs (and their uses) that could be affected by groundwater inflows into the open cut pit.

Stage 3: Understand the NSW Government's requirements and rules for intersecting the regional groundwater table – through reference to Water Sharing Plans and policies. Bowdens Silver will need to obtain a series of water access licences.

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

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

Regional hydrogeology

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

Local aquifers, occurrence and management

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

What Groundwater activities have been undertaken so far?

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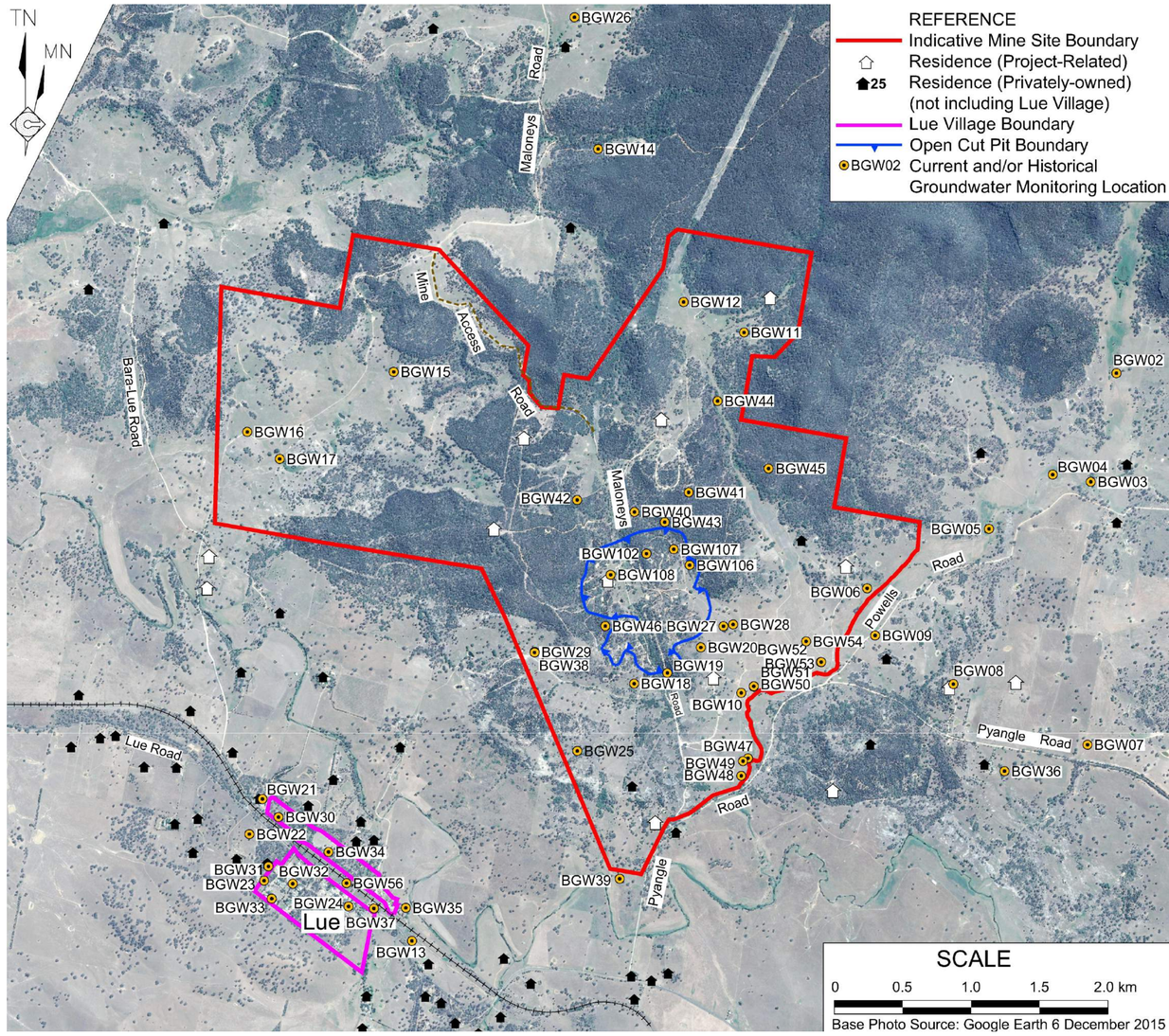
What monitoring has ben undertaken for the baseline assessment?

- 40 bores in network. Monitoring conducted at various locations since 2011
- Monitors groundwater systems including local, regional , alluvial and spring aquifers
- Collection of water level and groundwater quality data on a monthly basis
- Groundwater level ranges between 0.1 to 57 metres below ground surface
- Testing of aquifer parameters (pump tests, packer tests and recovery tests)

What are the results of the baseline groundwater monitoring program?

Varies with average values for bores:

- **Alluvium:**
  pH 6.0–7.2
  EC 131–2320 (µS/cm)
  Lead 2–7 (µg/L)
- **Local:**
  pH 5.4–7.6
  EC 299–2374 (µS/cm)
  Lead 1–16 (µg/L)
- **Regional:**
  pH 6.4–8.1
  EC 642– 4738 (µS/cm)
  Lead 1–29 (µg/L)
- **Springs:**
  pH 4.7–7.5
  EC 107–174 (µS/cm)
  Lead 1–8 (µg/L)



Current and/or historical groundwater monitoring locations

How is the Surface Water Assessment undertaken?

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Understanding Surface Water Impacts

The SEARs for the Bowdens Silver Project require a detailed assessment of the Project's impacts on the surface water resources within and surrounding the Mine Site. It will be important to understand how much water (and its quality) that flows across and near the Mine Site under a range of conditions (dry/average/wet). The assessment is being undertaken in six stages.

Stage 1: Identify the catchments within and surrounding the Mine Site – both regionally and locally and collect relevant stream flow, water quality and weather data to understand the variables influencing runoff.

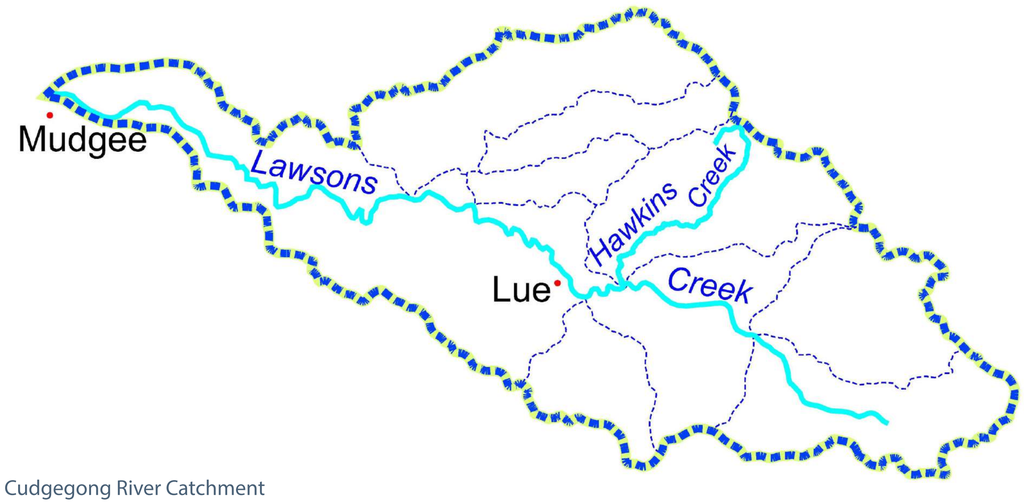
Stage 2: Identify existing surface water environment including surface water uses, environmental values and water quality together with stream flow behaviour, including flooding.

Stage 3: Understand the NSW Government's requirements and rules for interfering with existing streams through references to the Water Sharing Plans and policies. Bowdens Silver will need to obtain a series of licences to harvest water from within the Mine Site.

Stage 4: Undertake computer modelling taking into account the likely variables in stream flows to predict how much water would be collected for use within the Mine Site and what changes would occur to flows (and water quality) off site.

Stage 5: Identify the range of additional mitigation measures needed to ensure that surface water containing sediment or any pollutants does not exceed the requirements of the Environment Protection Licence for the Mine Site.

Stage 6: Predict the changes in stream flows downstream of the Mine Site (including flooding) and potential changes in water quality.



Cudgegong River Catchment

How is the Surface Water Assessment undertaken?

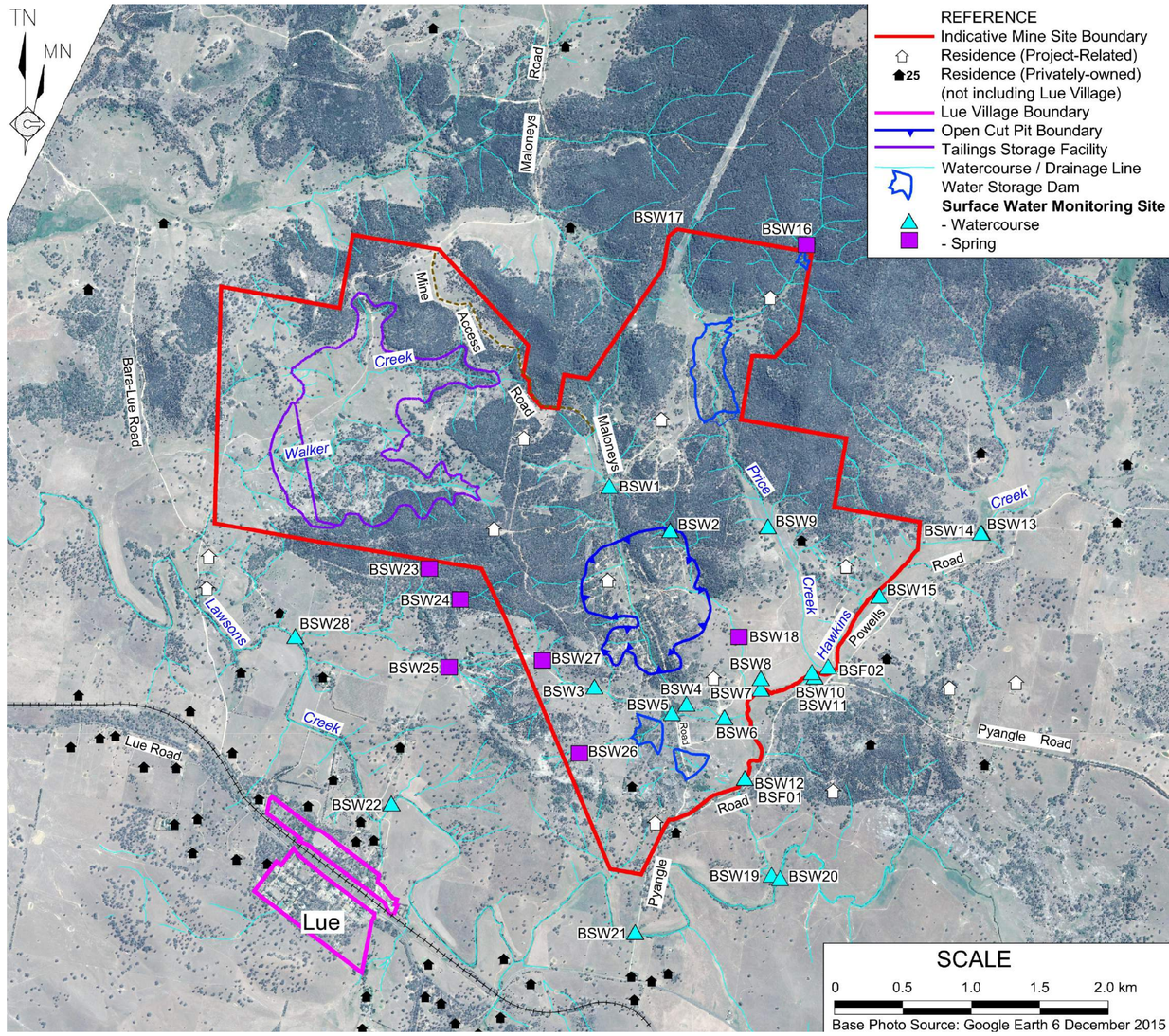
BOWDENS SILVER

What catchments and watercourses are included?

- Walker Creek, Price Creek and Blackmans Gully, minor watercourses, non – permanent
- Hawkins Creek, local watercourse, perennial.
- Lawsons Creek, regional watercourse, perennial
- Managed under Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012

When did the surface water monitoring program begin?

- Monitoring of local and regional watercourses commenced in 2012 at locations within, upstream and downstream of the proposed Mine Site .
- Collection water quality data and flow observations on a monthly basis.



Current and/or historical surface water monitoring locations

What Surface Water Studies have been undertaken?

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What were the results of the baseline studies?

pH
- Minimum values for pH within desired range at most locations
- Maximum values for pH outside desired range at most locations
- Median values for pH outside desired range at most locations

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

Electrical Conductivity (EC) (an indication of salinity)
- Minimum values for EC within desired range at most locations
- Maximum values for EC outside desired range at most locations
- Median values for EC outside desired range at most locations