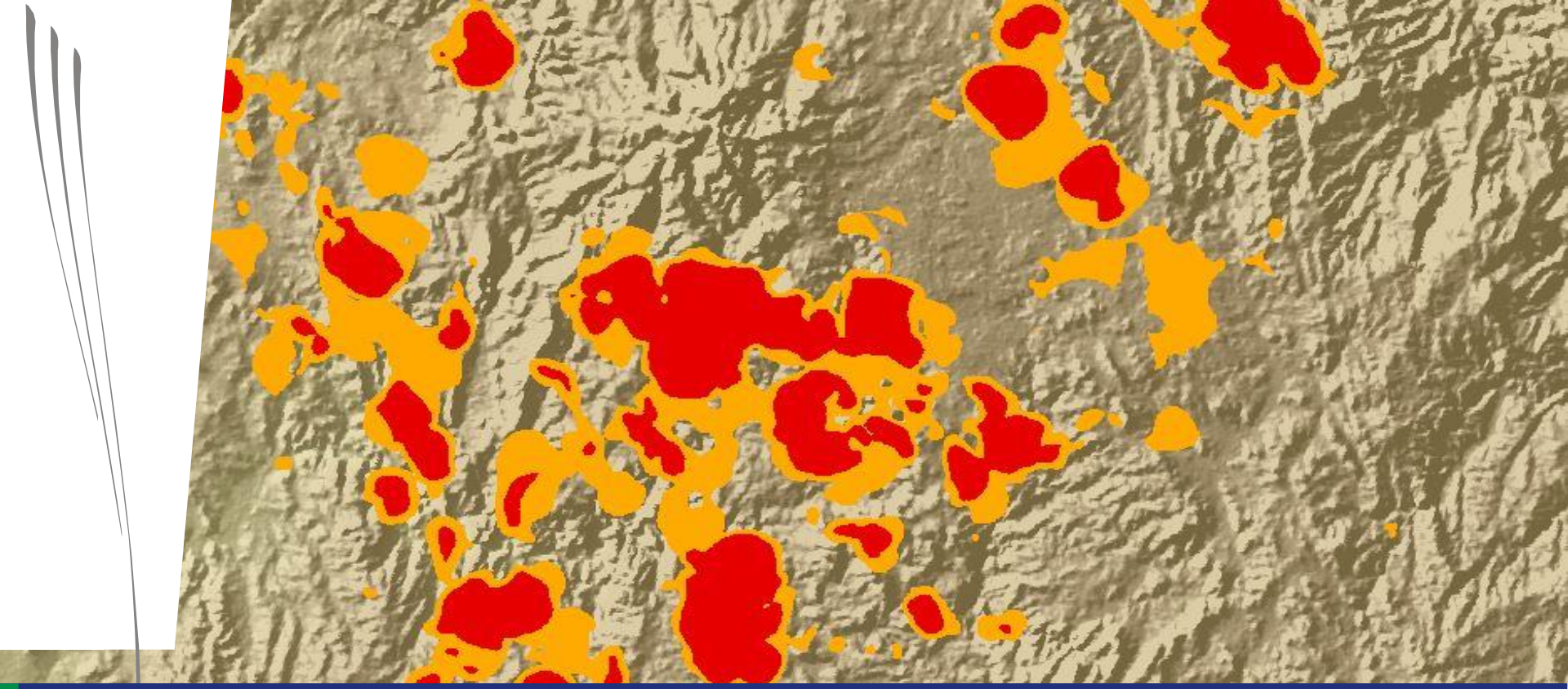

Exploration Targeting from Prospectivity Modelling in the Lachlan Fold Belt, NSW

Katie Peters
Kenex Ltd
June 2013

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Talk Outline

- Approaches to Exploration Targeting
- Prospectivity Modelling Advantages
- The Mineral Systems Approach
- Lachlan Fold Belt Prospectivity Models
- Defining Exploration Targets
- Target Analysis
- Exploration Implications

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Exploration Targeting

- Current methods to get to this:

Decreasing Exploration Risk

- Prior knowledge of the area
- Field relationships
- Geophysical targets
- Geochemical anomalism
- Mineral prospectivity modelling

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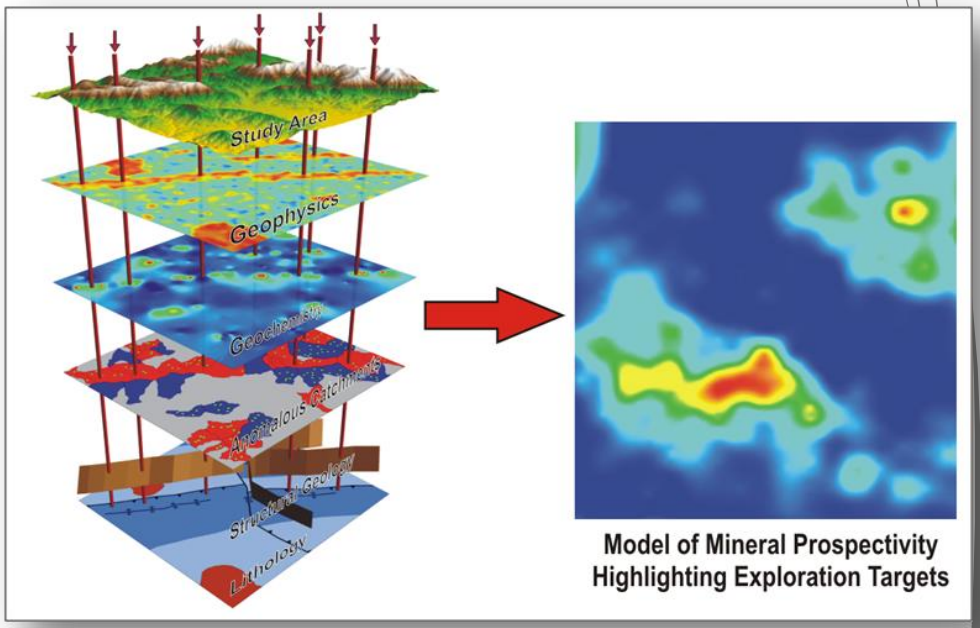
Prospectivity Modelling Advantages

- Weights of evidence, neural networks, fuzzy logic
- Combine all spatial data and knowledge of the mineral system to target effectively
- Spatial analysis of available data decreases the influence of geological bias
- Covers an entire country or region
- Incorporate the mineral system approach to make sure that the resulting exploration targets are likely to host a mineral deposit



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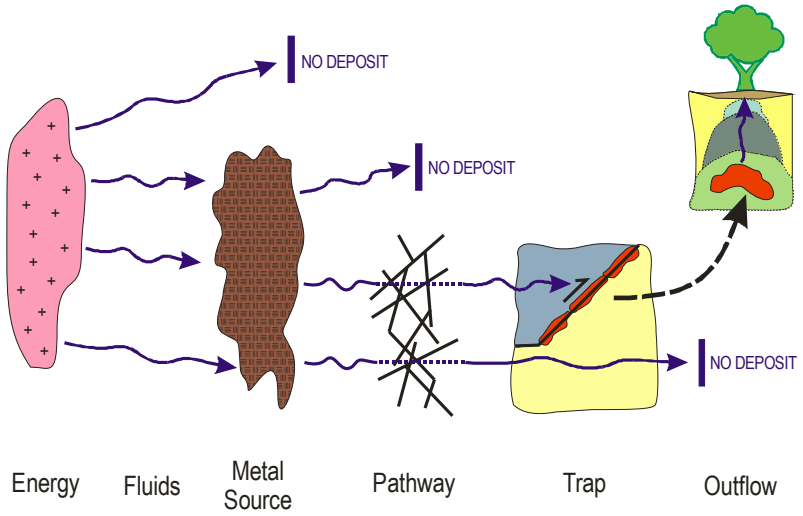
Mineral Systems Approach

- Identifies the mapable variables within a mineralised region that are critical to the ore forming process.

Source ⇒ fluid flow ⇒ transport pathways ⇒ trap/metal deposition ⇒ outflow

- Ensure that each part of the mineral system is represented by one or more predictive maps in the model.



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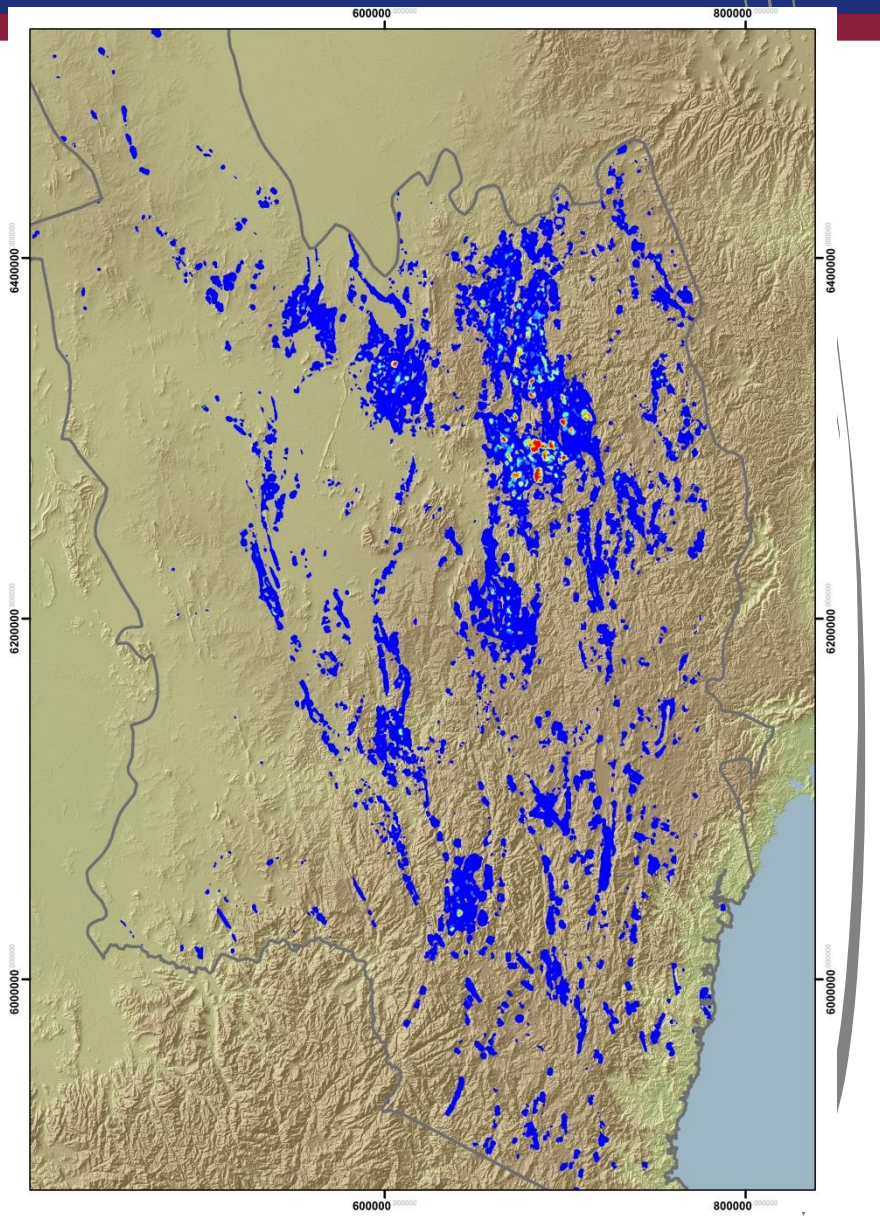
Prospectivity Modelling in the LFB - NSW

- Models for Porphyry Cu-Au, Skarn Au, Orogenic Au and VMS
- Weights of evidence
- Incorporate predictive maps that cover each component of the mineral system

- Porphyry Model
  - 10% of the study area prospective for Porphyry Au-Cu mineralisation
  - Before modelling 1:100,000 chance,
  - After modelling 1:10,000 chance of finding a deposit in any 2 km^2 area chosen at random



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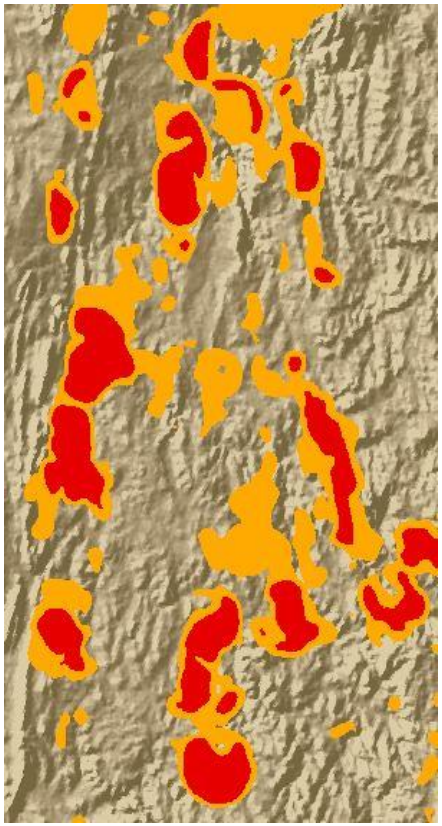
Defining Exploration Targets

- Aim to get from regional to prospect scale quickly and cheaply
- Type of targets depends on the scale of the model and the detail of the data
  - Exploration Targets
  - Drill Targets
- For the regional LFB models most targets will need follow up work before they can be upgraded to drill targets



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Defining Exploration Targets

- Two cut-off values: Post probability values greater than large producing mines such as Cadia Hill Mine; Post probability greater than smaller mines and deposits.
- Porphyry model
  - 1779 Targets (1468 lower cut-off, 311 higher cut-off)
  - 0.9% of study area covered by exploration targets
  - After targeting, 1:897 Chance of finding a deposit in any 2 km^2 area chosen at random
- Targets are then ranked based on maximum and mean post probability values

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Target Analysis

- Information that can be gathered on each target or group of targets includes:
  - Target description – targets can be described individually or as groups of targets
  - Is the area currently tenemented?
  - What is the local geology?
  - What existing mineral occurrences fall in the target area?
  - Is there any existing exploration information?
  - Is there any geochemical sampling and anomalism?
  - Is there any existing resource information?

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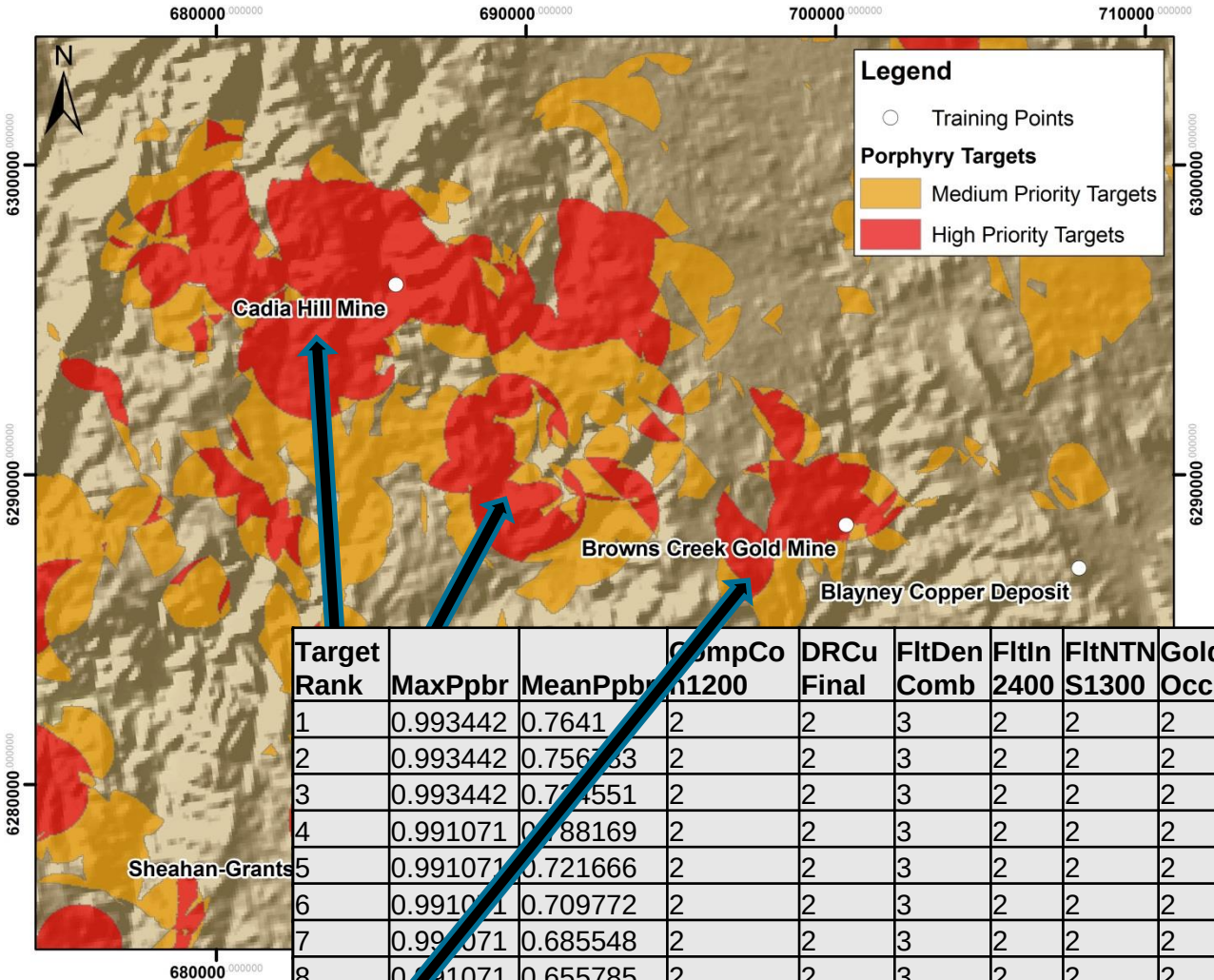
Porphyry Targets over the Cadia Region



Target Ranking

Unique Conditions

Target Rank	MaxPpbr	MeanPpbr	CompCon1200	DRCu Final	FltDen Comb	FltIn 2400	FltNTN S1300	GoldMin Occ	Stream sAu3	MagSlp 550	SOFeIn tComb
1	0.993442	0.7641	2	2	3	2	2	2	2	2	3
2	0.993442	0.756[illegible]3	2	2	3	2	2	2	2	2	3
3	0.993442	0.7[illegible]4551	2	2	3	2	2	2	2	2	3
4	0.991071	0.[illegible]88169	2	2	3	2	2	2	2	2	2
5	0.991071	0.721666	2	2	3	2	2	2	2	2	2
6	0.991071	0.709772	2	2	3	2	2	2	2	2	2
7	0.991071	0.685548	2	2	3	2	2	2	2	2	2
8	0.991071	0.655785	2	2	3	2	2	2	2	2	2
9	0.987899	0.668819	2	2	3	2	2	-99	2	2	2
10	**0.978441**	**0.689796**	**2**	**2**	**3**	**2**	**2**	**1**	**2**	**2**	**3**

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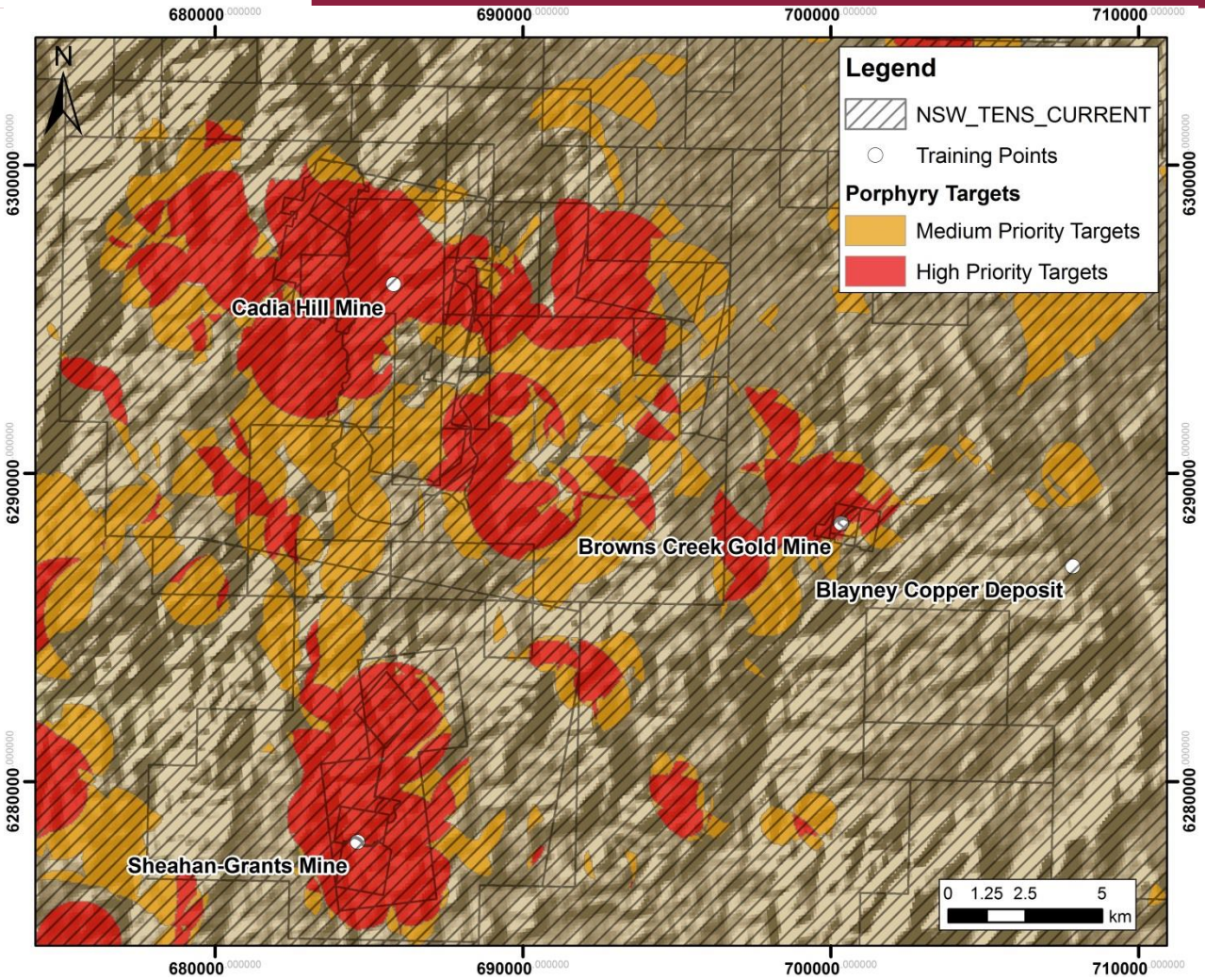
Tenement Information



All targets in the Cadia Region are currently tenemented

Possibility to find untenemented targets for acquisition in underexplored regions

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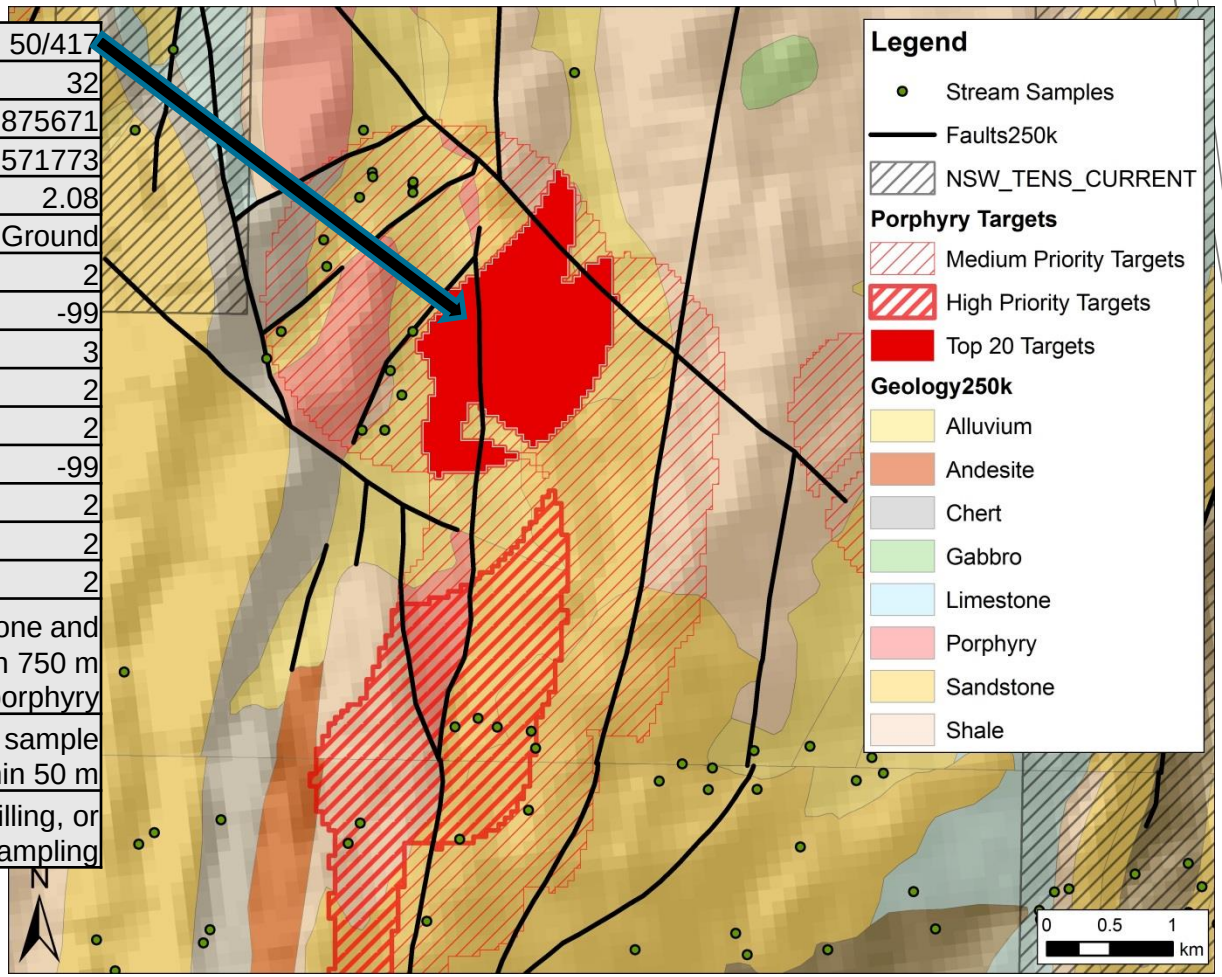
Target Analysis

Target ID	50/417
Rank	32
MaxPprb	0.875671
MeanPprb	0.571773
Area km2	2.08
Status	Free Ground
CompCon1200	2
DRCuFinal	-99
FltDenComb	3
FltIn2400	2
FltNTNS1300	2
GoldMinOcc	-99
StreamsAu3	2
MagSlp550	2
SOFeIntComb	2
Local Geology	Ordovician sandstone and Quaternary alluvium within 750 m of Silurian extrusive porphyry
Geochemistry	Anomalous stream Au sample within 50 m
Missing Data	No rock chip samples, drilling, or soil sampling



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Missing Data

- Prospectivity modelling allows for easy identification of areas of missing data
- Particularly geochemistry, geophysics, geological mapping such as quartz veins
- Geochemical sampling is concentrated over areas with known deposits
- Lower ranked targets could easily have probabilities enhanced with collection of detailed exploration data

What data is missing and if collected could it increase the prospectivity of the target area?

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Exploration Implications

- Prospectivity targeting can focus exploration in the right places
- Can find targets that suit different requirements - drill targets, exploration targets, targets on free ground, targets for joint venture
- Implications for exploration budgeting
- Exploration programmes can be planned based on what is known about each target from the prospectivity modelling and from the follow up analysis
- Collection of missing data can also be incorporated into the exploration programme
- Overall more informed decisions can be made and the risks of exploration reduced

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