



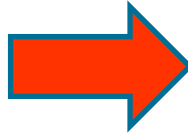
Exploration Targeting from Prospectivity Modelling of Multiple Deposit Types in the Lachlan Fold Belt, NSW

Talk Outline

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

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



1000
Prospects
Identified

100
Detailed
Investigations

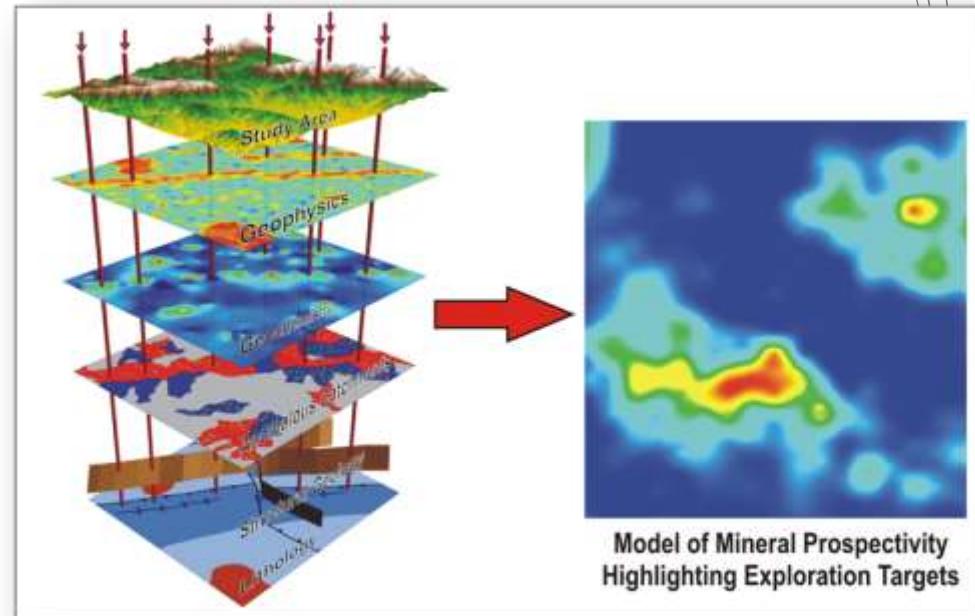
10
Major Drill
Programmes

1
New Mine
Developed

The Chances of Exploration Success

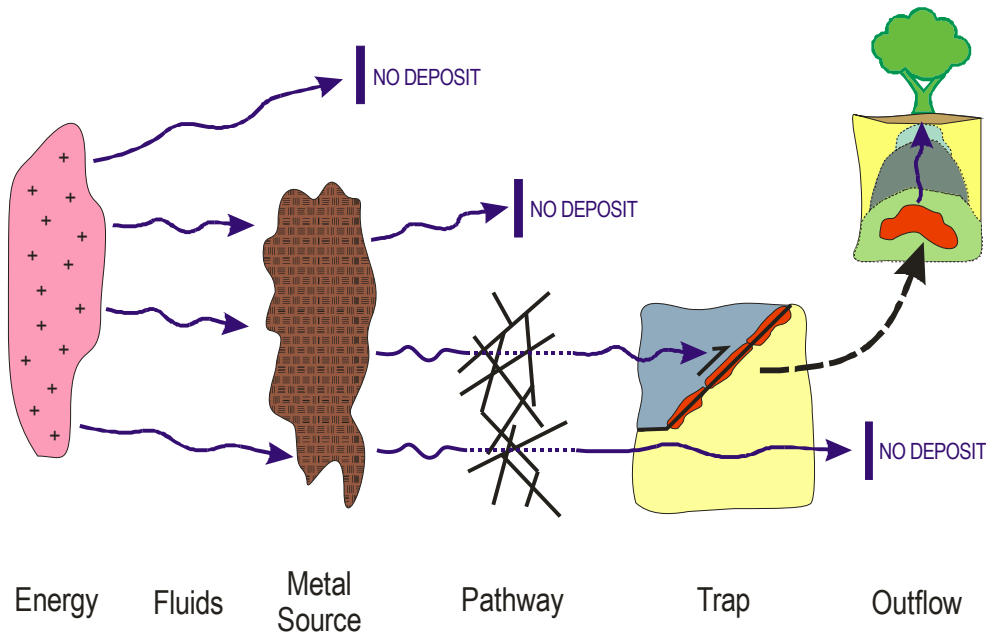
Prospectivity Modelling Advantages

- Combine spatial data and knowledge to target effectively
- Potential to lead to bias
- Data-rich or data-poor, large scale or small scale, all deposit types
- Incorporate the mineral system approach



Mineral Systems Approach

**Source → fluid flow → transport pathways
→ trap/metal deposition → outflow**



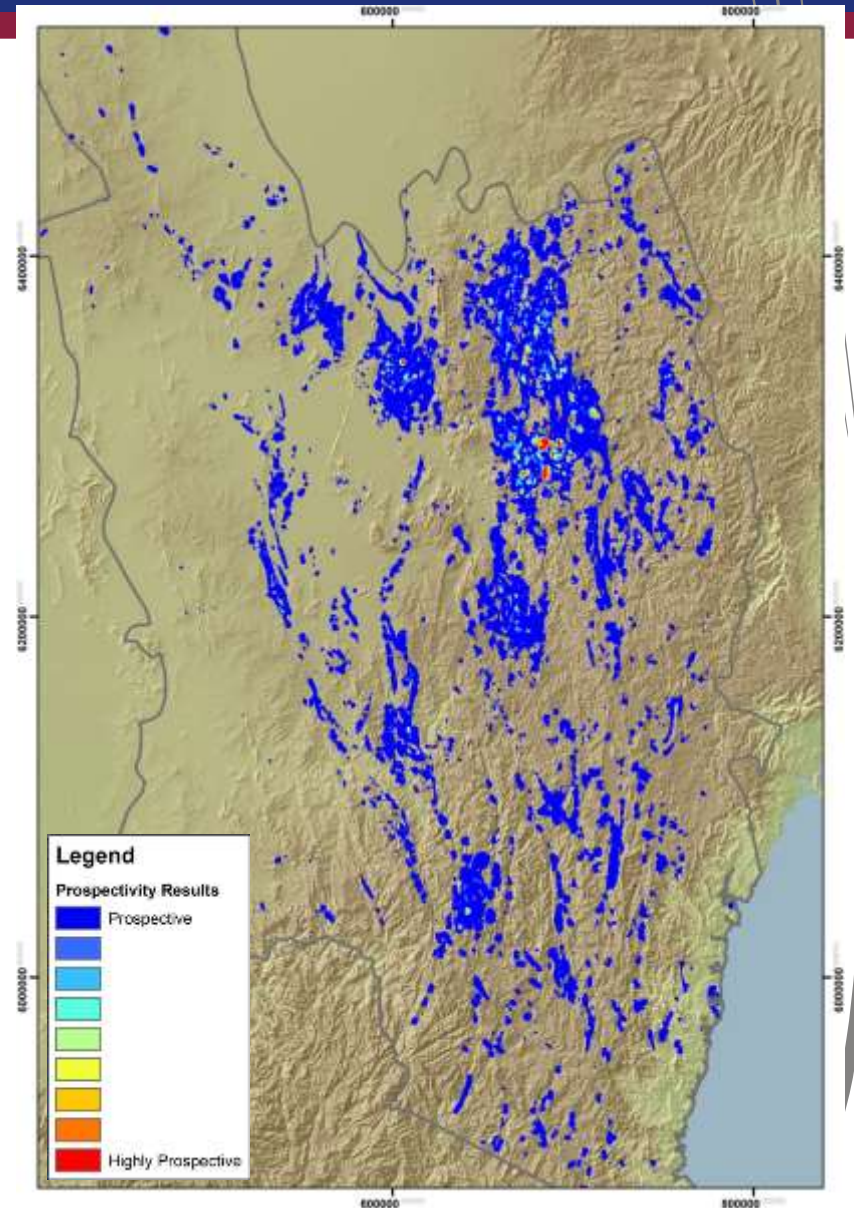
- Identifies the mapable variables within a mineralised region that are critical to the ore-forming process.

Prospectivity Modelling in the LFB

- Weights of Evidence (Bonham Carter, 1994)
- Successfully modelled for
 - Porphyry Cu-Au
 - Skarn Au
 - Orogenic Au
 - VMS
- Incorporate predictive maps that cover each component of the mineral system

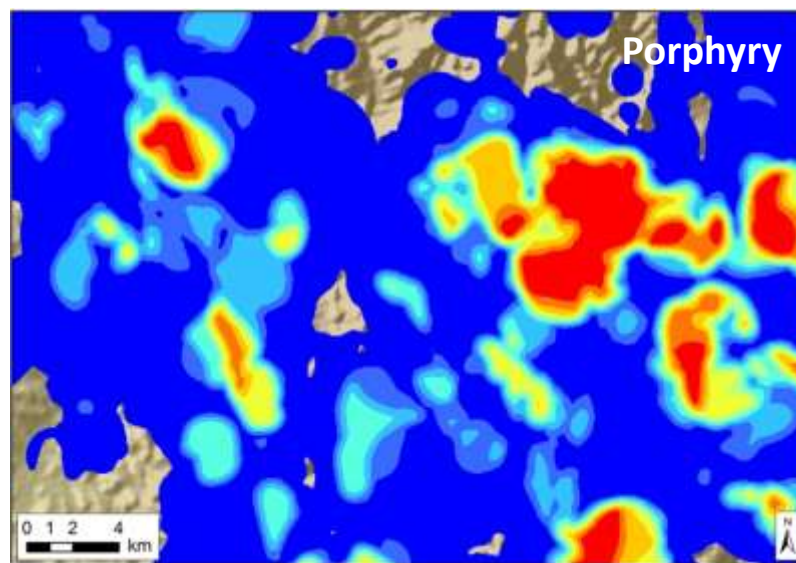
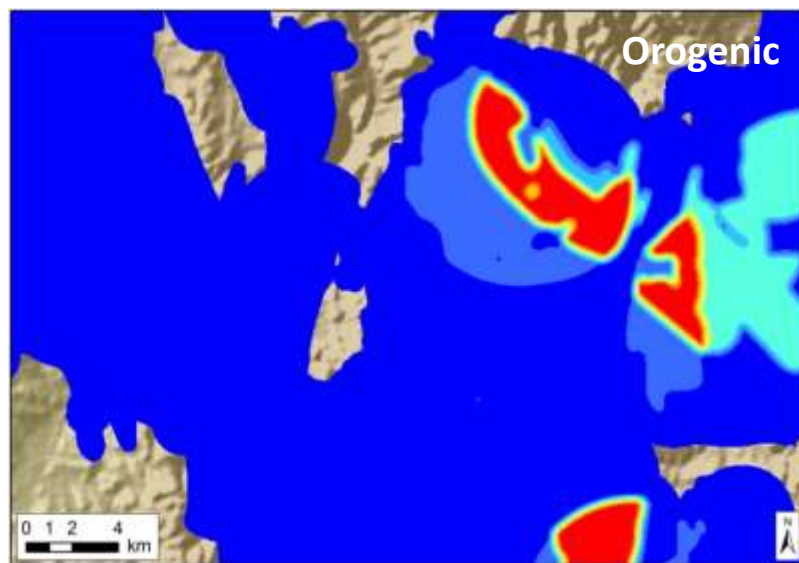
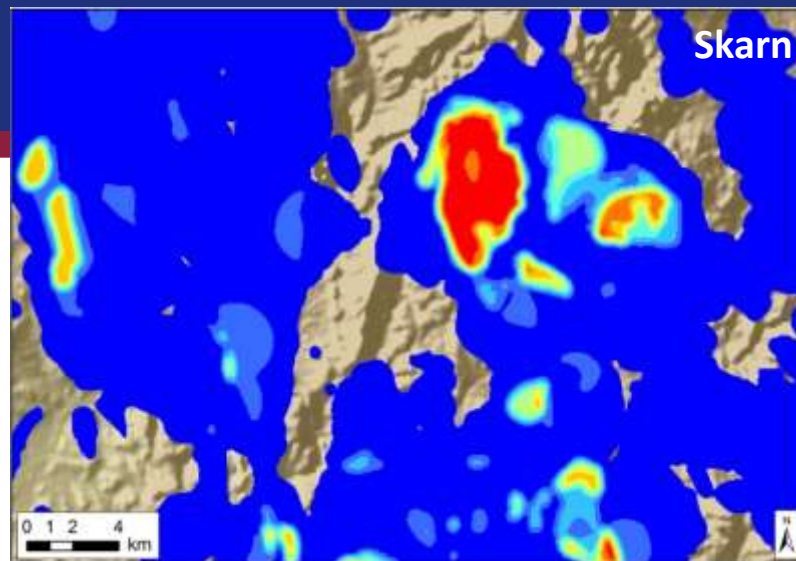
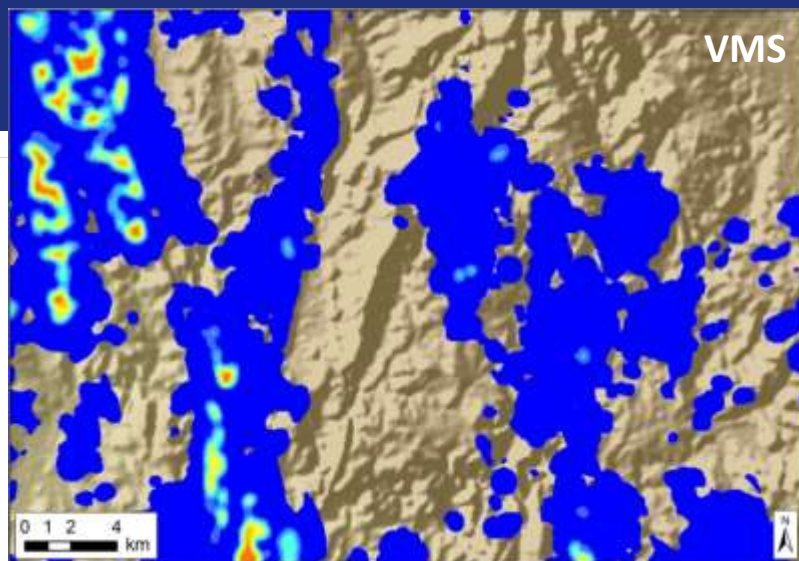
Example: Porphyry Cu-Au Model

- 10.2 % of the study area prospective for mineralisation



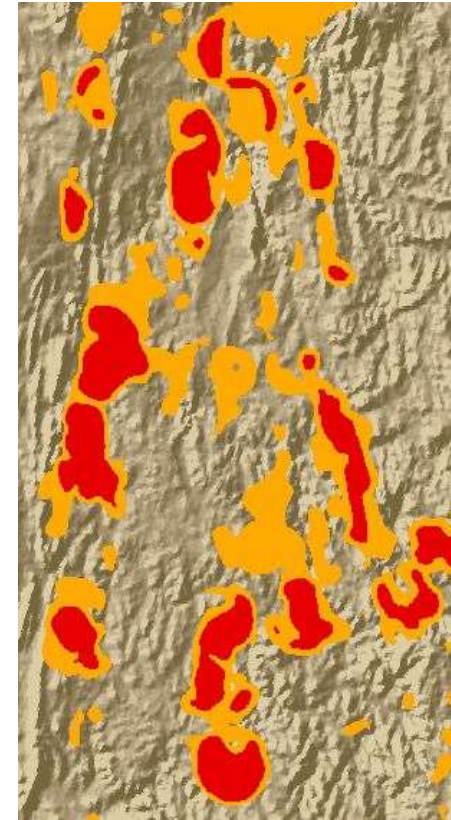
Prospectivity Modelling in the LFB

	Porphyry	Skarn
Source	Sil-Ord felsic to intermediate intrusives	Sil-Ord granites close to carbonates
Transport	Regional transcurrent faults	Regional transcurrent faults
Trap	Dilational fault zones	Chemical variations in lithology
Deposition	Proximal Au, Cu, Mo mineralisation Breccias	Proximal Au, Cu, Mo mineralisation Argillic/silica/potassium alteration
	VMS	Orogenic
Source	Mafic volcanics or clays	Greenschist metasediments
Transport	Fault and fracture density	Regional faults
Trap	Hydrothermal vents Palaeo-seafloor contacts	Dilational fault zones Reactive rock contrasts
Deposition	Sulphides Cu, Pb, Zn & Au mineralisation	Quartz veining Au, As, Cu, Sb & Zn mineralisation



Defining Exploration Targets

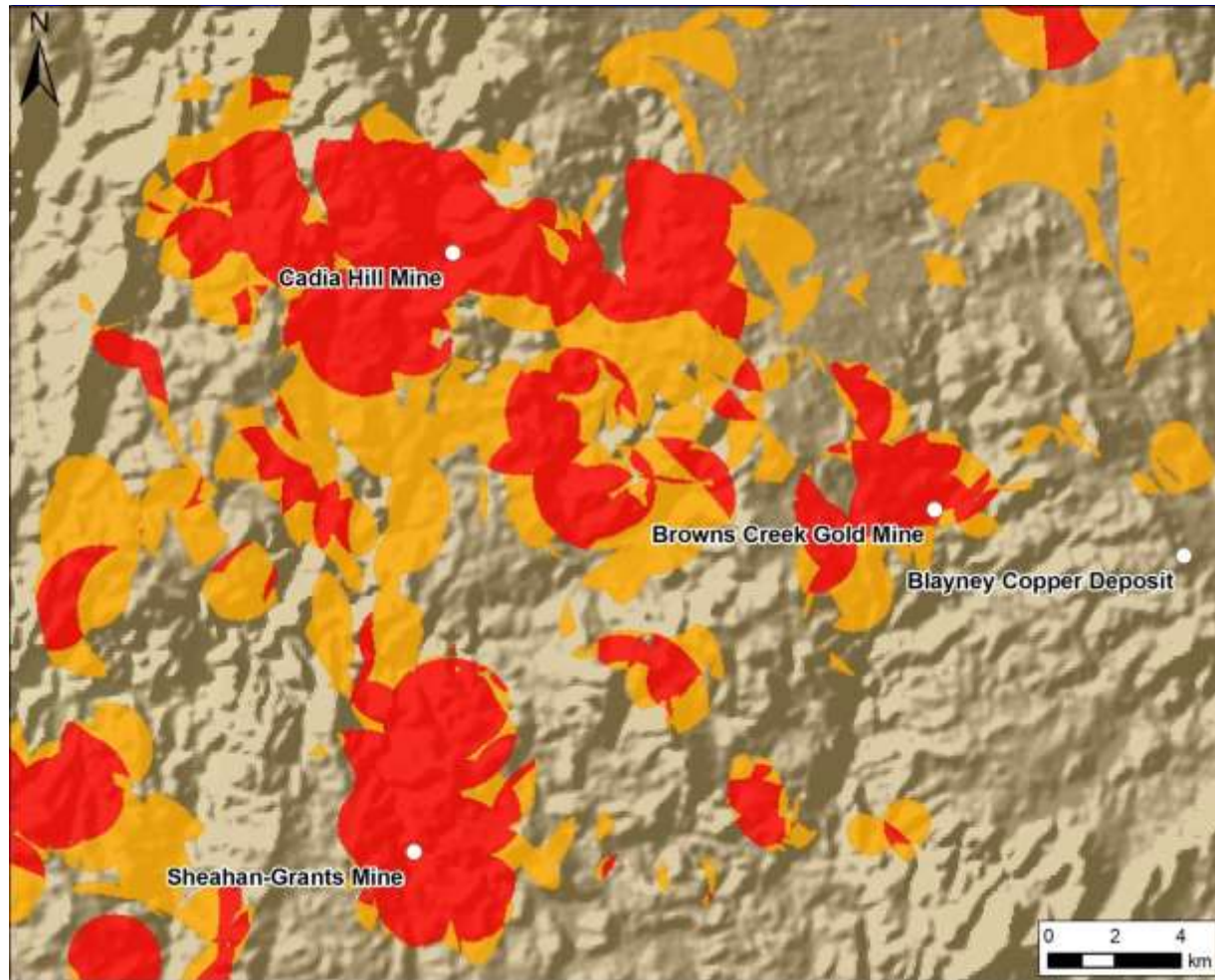
- Aim to get from regional to prospect scale quickly and cost effectively
- Type of targets depends on the scale of the model and the detail of the data
 - Exploration Targets
 - Drill Targets
- For the regional LFB models we can define exploration targets that may need follow up work before they can be upgraded to drill targets



Defining Exploration Targets

- Two cut-off values:
 - Geological potential values greater than large producing mines e.g. Cadia Hill
 - Geological potential values greater than smaller mines and deposits
- Example: Porphyry model
 - 1779 exploration targets (1468 lower cut-off, 311 higher cut-off)
 - 0.9 % of study area covered by exploration targets (10.2% is prospective)
 - After targeting, 1:897 chance of finding a deposit in any 2 km² area chosen at random (improved from 1:100,000 before modelling)
- Targets are then ranked based on maximum and mean post probability values

Defining Exploration Targets



Target Analysis

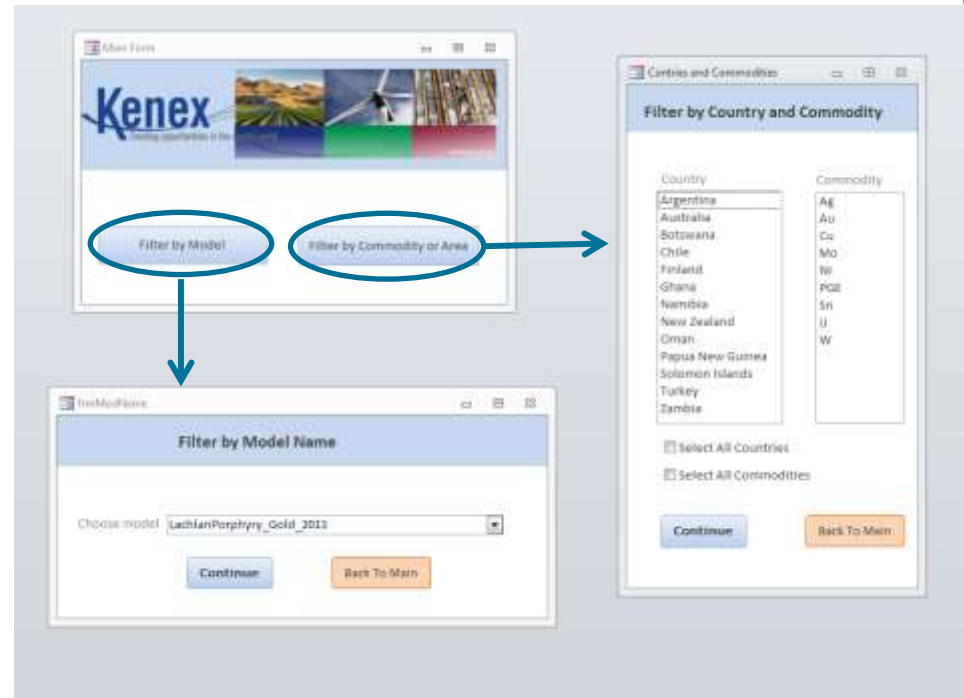
- Information that can be gathered on each target or group of targets includes:
 - Target description – targets can be described individually or in groups
 - Is the area currently tenemented?
 - What is the local geology?
 - What existing mineral occurrences fall in the target area?
 - Is there any existing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

Target Analysis

- Kenex have created an automated query system for our database of prospectivity model targets

Filter by model name to get a specific set of targets (Lachlan Porphyry in the example)

Filter by commodity or region/ country for a more generic query



Target ID

Spatial variables

Tenement status

Tenement holder

No. of mineral
occurrences

Mineral occurrence
description

Nearby targets

Local geology

Local faults

Region PPI ranking

Restricted land
status

qryModelReport

Model Information:

Target ID: 44/89 Model Name: NZ Epithermal Gold - Coromandel

Spatial Variables: Max PPBR: 0.99998 Mean PPBR: 0.988236 Rank: 1

N-NE Fault present, Stream As a nominal, Stream Au a nominal, Hydro de mag present, Argillic alteration present, Andesite present, Quartz vein present, High fault density, Fault intersection present, ...

Tenement Information:

Tenement Status: Partially Held Ten Last Update: 1/07/2014 No of historic tenements:

Ten Holder: Glass Earth (New Zealand) Limited, Waihi Gold Company Limited

Geochemistry:

DH Num: 87 Soil Num: 320 RC Num: 2626 SS Num: 634

DH Avg Value: 0.0934 SL Avg Value: RC Avg Value: 0.3197

DH Max Value: 3.71 SL Max Value: RC Max Value: 221

Mineral Occurrences:

Min Occ Number: 23 Near Min Occ Number: 1 Near Min Occ Buffer: 1000m

Relevant Min Occ:

Maratoto Stream Quarry A, Huanui Mine, Waitekauri, St Hippo Mine, Waitekauri Extended Claim, Durbar Mine, Waitekauri, Maratoto Mine, Walker's Maratoto Mine, Scotia Mine, Waitekauri, Grace Darling Mine, Empire Zone, Golden Cross, Tellurides Proprietary

Relevant Near Min Occ:

Waikino Quarry

Resource Amount:

General Information:

Close Targets: 44/84, 44/85,

Close Target Buffer: 1000m Region PPI Rank: 65.1

Geology:

Holocene Recent Sedimentary Deposits, Miocene Andesite, Miocene Rhyolite, Quaternary Alluvium

Fault Num: 10 Fault Orientation: 83.9, 29.3, 59.1, 110.8, 36.9, 17.0, 110.9, 100.6, 8.2, 104.8

Closest town: Whangamata Road description: National, Primary, Track, Secondary

Distance from town: 0.13542102 Closer Roads: 18

Restricted land status: Free Road Buffer: 5000m

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Model name

Target rank

Max & mean post
probability

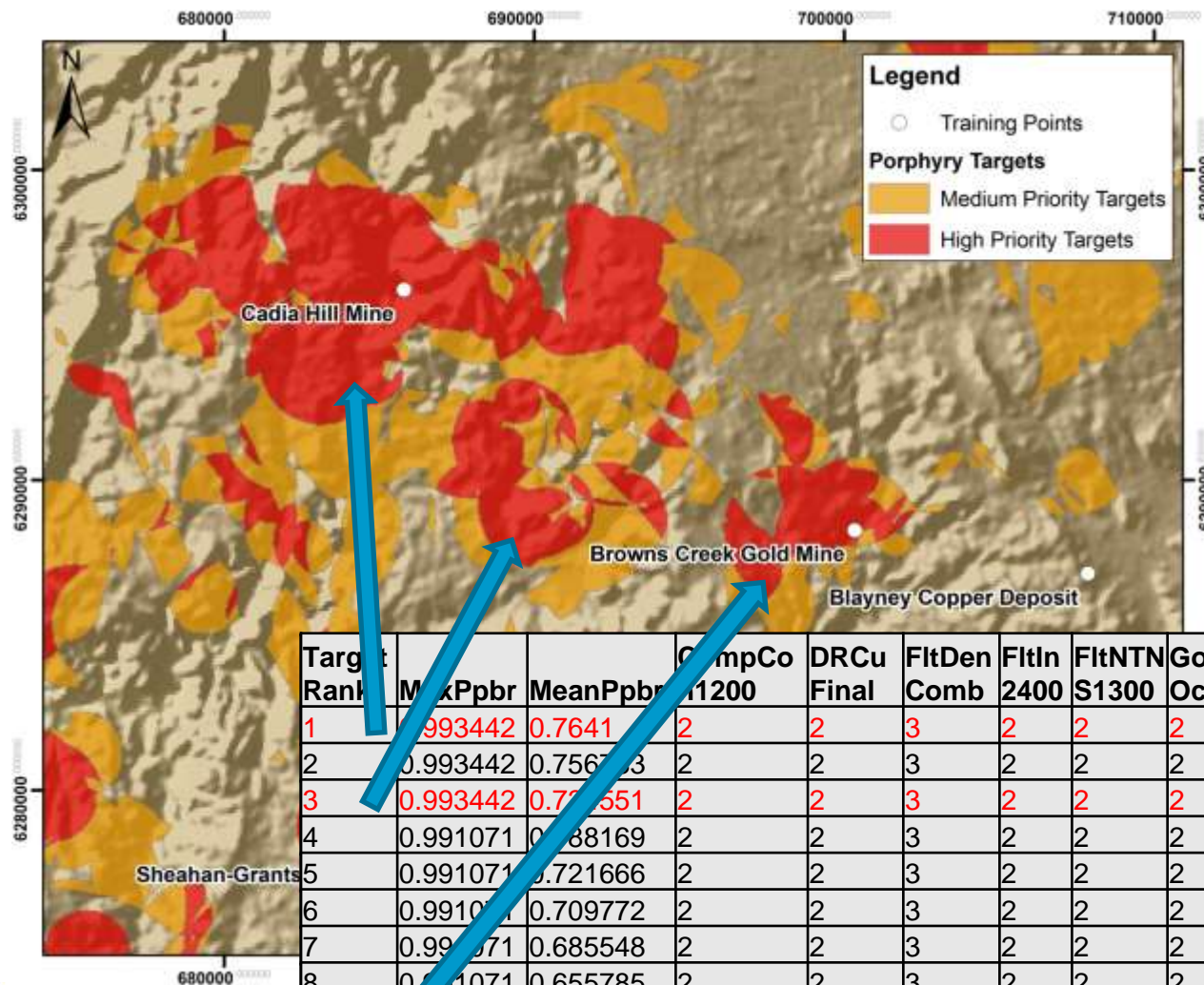
No. of drill holes,
rock chip, soil &
stream sediment
samples

Drill hole, rock chip,
soil & stream
sediment
geochemistry values

Nearby towns

No. & type of nearby
roads

Porphyry Targets over the Cadia Region

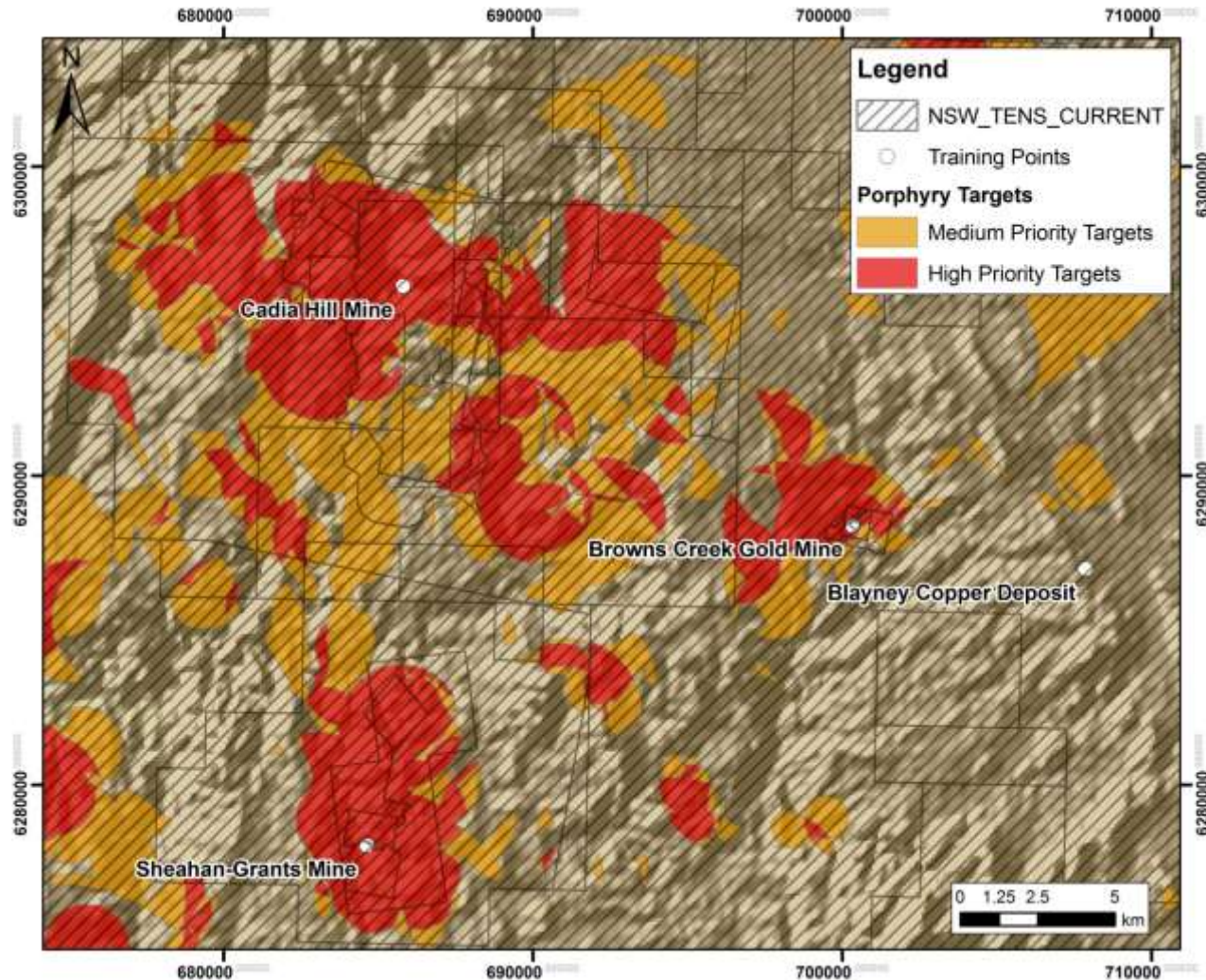


Target Ranking

Unique Conditions

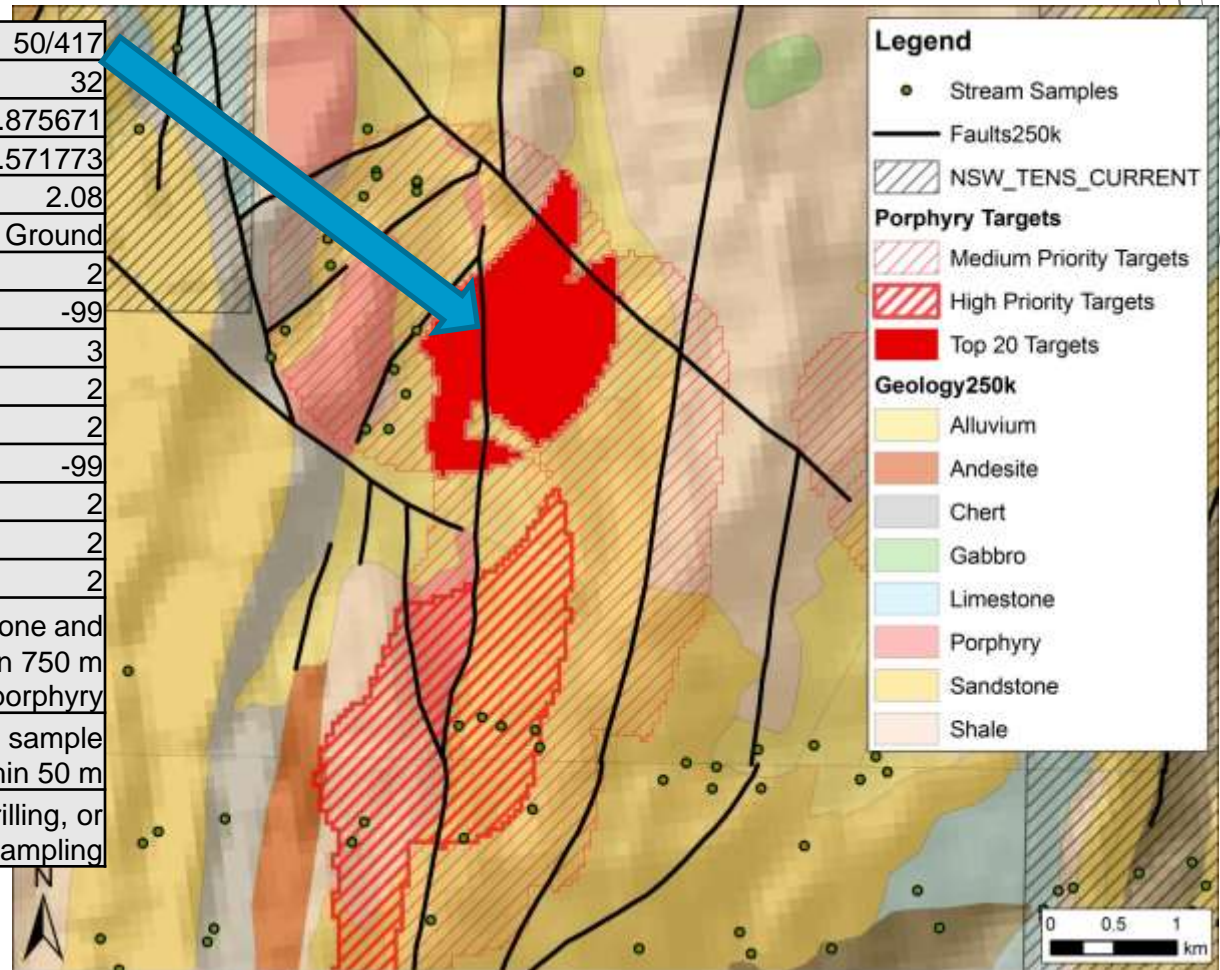
Target Rank	MaxPpbr	MeanPpbr	CompCo 1200	DRCu Final	FltDen Comb	FltIn 2400	FltNTN S1300	GoldMin Occ	Stream sAu3	MagSlp 550	SOFeIn tComb
1	0.993442	0.7641	2	2	3	2	2	2	2	2	3
2	0.993442	0.756753	2	2	3	2	2	2	2	2	3
3	0.993442	0.771551	2	2	3	2	2	2	2	2	3
4	0.991071	0.688169	2	2	3	2	2	2	2	2	2
5	0.991071	0.721666	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

Tenement Information



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



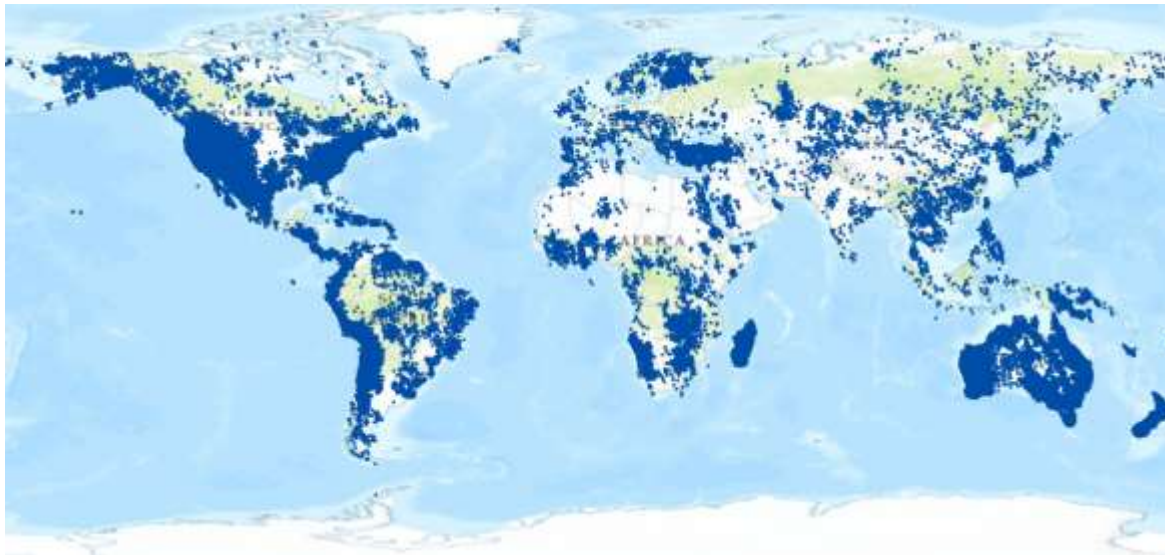
Missing Data

- 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 be easily have probabilities enhanced with collection of geochemical data

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

Exploration Implications

- Prospectivity targeting can decrease risk and focus exploration towards smaller areas and using more efficient methods
- Ability to find exploration targets, drill targets, targets on free ground, targets for joint venture
- Implications for exploration budgeting





PO Box 41136, Wellington, New Zealand

W: www.kenex.co.nz

E: info@kenex.co.nz