Mineral potential mapping of porphyry targets at the Bundarra Cu-Au project, Queensland

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The Bundarra porphyry Cu-Au project is held by Duke Exploration Ltd, and is located in central Queensland, Australia, 110 km south-west of Mackay. The project was acquired in 2017. Kenex has completed, for Duke, detailed mineral potential mapping over the project area, in order to focus drilling funds on the most prospective areas.

The project area surrounds the Cretaceous Bundarra Granodiorite, which intrudes the Permian Back Creek Group carbonaceous shales, sandstones and marls. Numerous Cu-Au occurrences are present within or near the hornfelsed contact aureole of the granodiorite. The project has been subject to significant exploration work, including mining of high-grade ore shoots in the late 1800s to early 1900s, however, modern exploration has been sporadic, and without comprehensive follow-up of encouraging results.

All available historic data has been compiled and incorporated into a mineral potential map based on the porphyry mineral system. Maps representing all components of the porphyry mineral system including source, transport, trap and deposition have been created, resulting in binary maps which show where each characteristic is present or absent. These are then compared to known mineral occurrences, or training points. The weights of evidence technique was used for the modelling. This technique calculates the relationship of the area covered by the characteristic being tested and the number of training data points that fall within that area. For each map a contrast value 'C' gives a relative measure of the strength of the correlation, and a Studentised contrast value 'StudC' gives a relative measure of the reliability of the C value, i.e. a high C and StudC value implies a strong spatial correlation and a reliable result, which occurs when more training points are captured within a smaller area.

The maps with the best spatial correlation to the training points for each mineral system component were selected for the final mineral potential model. Table 1 shows the eight spatial variables which were selected from a total of 60 mapped.

Spatial Variable	Mineral System component	Map Creation Technique	No. Training points	C	Stud C
Distance to intrusion contacts	Source	Buffer intrusion contacts, test for best buffer distance (360 m)	16	4.50	4.34
Distance to porphyry intrusions	Source	Buffer porphyry intrusions, test for best buffer distance (660 m)	13	3.46	5.40
Proximity to all faults	Transport	Map all faults and lineaments, test for best buffer distance (260 m)	15	2.88	2.79
Fault intersections	Transport	Identify intersection points, test for best buffer distance (580 m)	11	1.98	3.67
Rock reactivity	Formation of Trap	Assign relative reactivity number to geology map	9	1.53	3.03
EM Anomalies	Deposition of Metal	Reclassify EM data into 10 classes using natural breaks, test and select best class	12	2.57	4.44

Potassic alteration (K highs)	Deposition of Metal	Reclassify K data into 10 classes using natural break, test highs	11	3.30	6.11
Potassic alteration (Mag highs)	Deposition of Metal	Reclassify magnetic data into 10 classes using natural breaks, test highs	14	3.17	4.19

TABLE 1 – Results of the spatial variables tested using weights of evidence

These maps were combined to produce the mineral potential map. The results are shown in Figure 1. Dark blue areas have no prospectivity – very few of the input maps have favourable characteristics present in these areas. Red areas have the highest prospectivity – most of the favourable characteristics overlap in the input maps.

Most of the training points lie in areas of highest prospectivity. Within the areas of highest prospectivity, there are new areas which have had no work to date. These represent priority areas for future exploration. Not all of the training points lie in areas of high prospectivity. This could mean they are part of a different mineralising system or event to the other training points, or could be because of missing data, for example no faults recognised nearby, or no porphyry intrusions mapped nearby, but may be present below the surface.

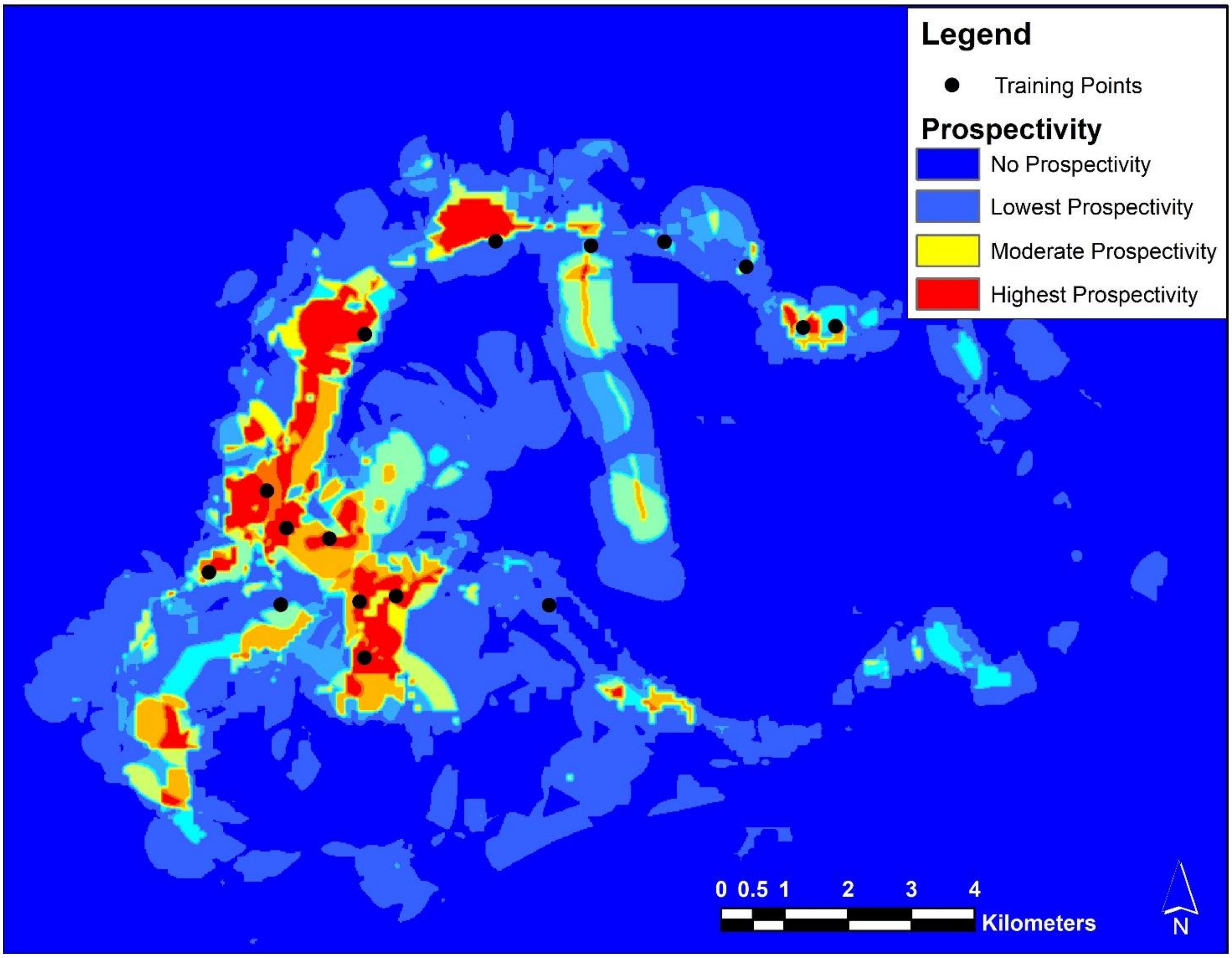

FIG 1 – Bundarra prospectivity model results. Dark blue areas have no prospectivity, red areas have the highest prospectivity.

The results show that the Bundarra project has areas which are highly prospective for porphyry deposits. The areas of highest prospectivity have been highlighted. These areas will be developed further by targeting in 3D, using processed geophysical data (magnetics and EM), and structural information from surface and drillholes. This will allow funds to focus on the targets with the greatest chance of success.