Mineral potential mapping in western NSW: new insights into the distribution of IOCG, VMS, orogenic gold and Broken Hill-type mineral systems

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A recent mineral potential study of the Curnamona Province and Delamerian-Thomson Orogens in western NSW has focussed on four key mineral systems with economic potential in the region (Figure 1). Pre-competitive datasets created and held by the GSNSW were combined with weights of evidence spatial modelling techniques to map the potential for Broken Hill type Pb-Zn-Ag (Figure 2) and iron-oxide copper–gold mineral systems in the Curnamona Province and orogenic Au and volcanic-associated massive sulfide mineral systems in the Delamerian–Thomson Orogen of the Koonenberry Belt.

Mineral deposit/exploration models for each mineral system were developed based on extensive research and new data collected specifically for the project. These models were used as 'cookbooks' to establish the key predictive variables that represent the different critical ore forming processes in each mineral system: source, transport, trap and deposition.

The resulting mineral potential maps were successful in predicting the location of known BHT Pb-Zn-Ag, IOCG, orogenic Au, and VMS mineralisation, mainly in outcropping areas. A major challenge for mineral potential mapping in western NSW is the extreme contrast in data density between outcropping and covered areas. The outcropping areas are data-rich and also coincide with virtually all known mineralisation. However, given the main purpose of the project is for land-use planning and advice, the restriction of the highly prospective areas to outcropping tracts near known mineralisation has provided statistically defendable maps that can be confidently used to consider the potential for resource development against other land-use types. From an exploration viewpoint, the project has resulted in the collation and quality control of a vast geological dataset, including the individual attribution (order, kinematics, timing etc.) of over 20,000 faults and the levelling of over 232,000 multi-element geochemical assays (separated into drill hole, stream sediment, rock chip, and soil samples). The results have highlighted new areas of potential for hosting mineralisation that are currently poorly explored, and the combination of data that are key to unlocking new discoveries.

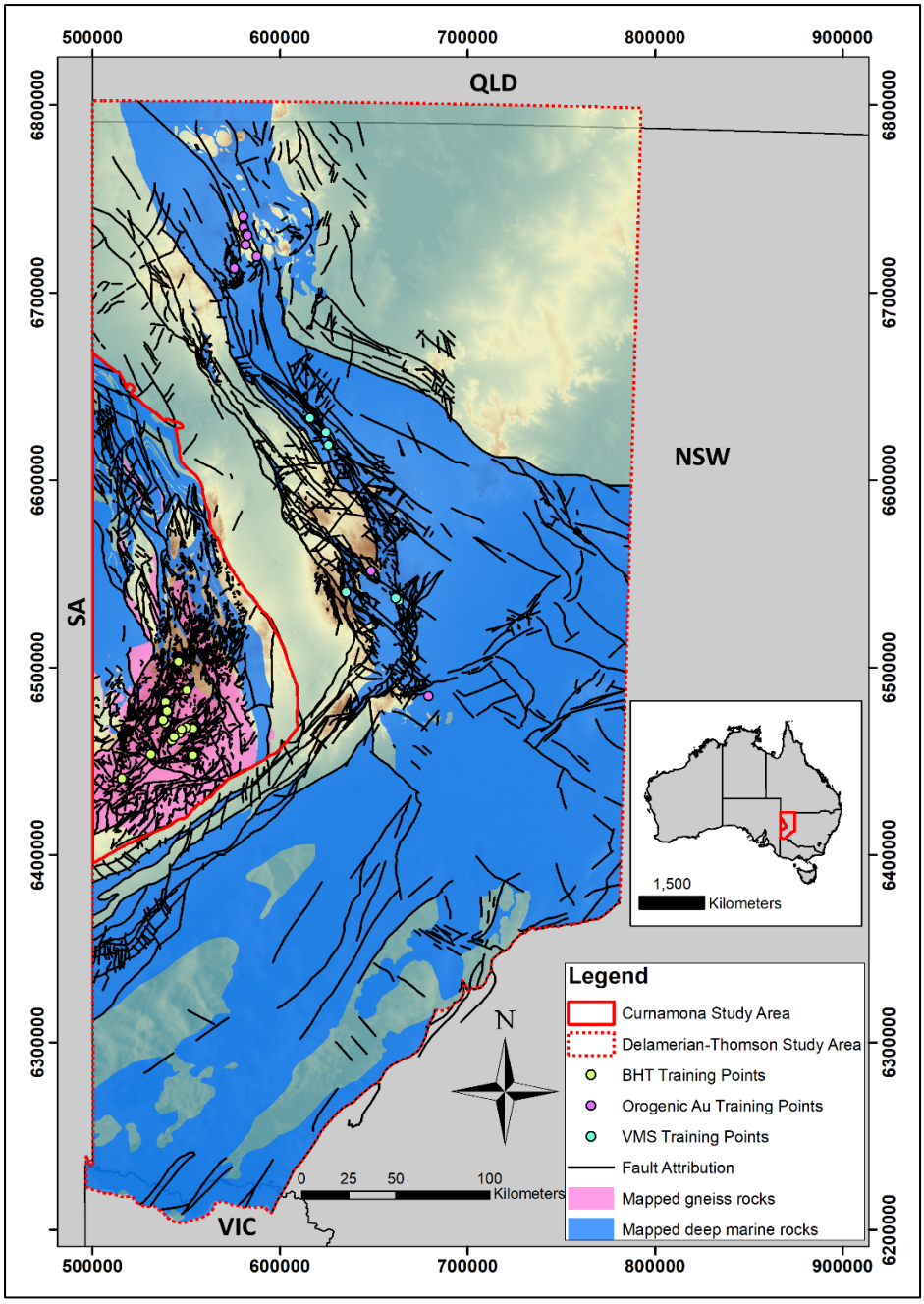

Figure 1. Location of the Curnamona and Delamerian-Thomson study areas in NSW Zone 54.

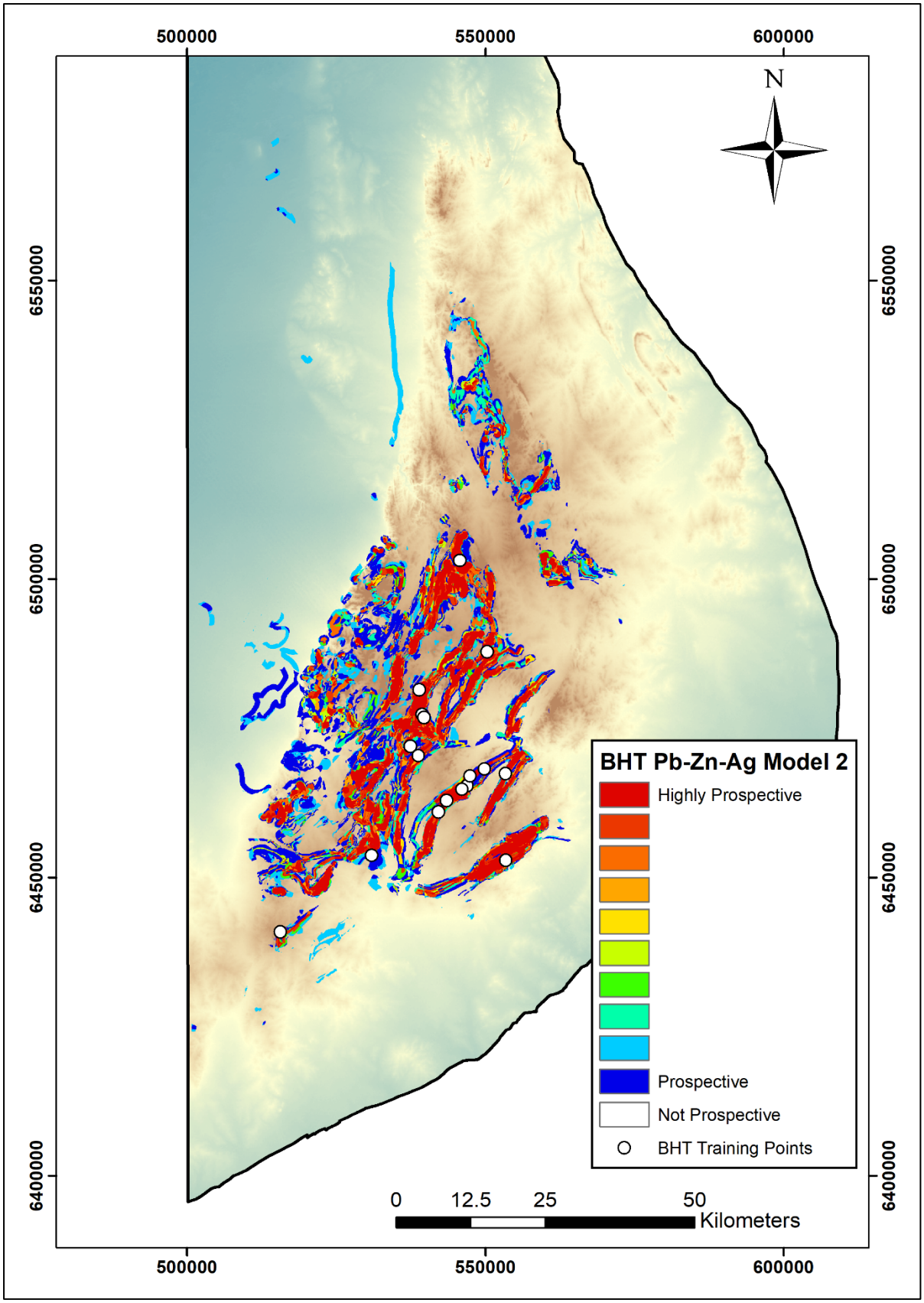

Figure 2. Broken Hill Type Pb-Zn-Ag mineral potential results for the Curnamona Province.