

### **Geochemical and Structural Comparison of the Golden Pike and Dunlops Crossing Stockwork Orebodies, Golden Mile, Kalgoorlie, WA**

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The Golden Mile is situated in the Kalgoorlie Terrane, within the Eastern Goldfields of the Archaean Yilgarn Craton in Western Australia. It is one of the world's richest gold deposits, having produced more than 65 million ounces of gold since its discovery in 1893. In 1989, the entire area was combined into Kalgoorlie Consolidated Gold Mines (KCGM), which is now operated by Northern Star Resources. As of March 2025, KCGM holds 13.2 Moz Au in reserves and 31.6 Moz Au in resources.

Gold mineralisation in the Golden Mile is hosted by two main mineralisation styles: Fimiston-style shear veins and Mt Charlotte-style stockwork veining. This study focuses on two Mt Charlotte-style orebodies within the Golden Mile: Golden Pike and Dunlops Crossing. Both are adjacent to the Golden Pike Fault, a NNE-striking, west-dipping, structure marked by a wide mylonitic deformation zone. Although the fault is barren, it juxtaposes two key host units: the granophyric unit of the Williamstown Dolerite and the granophyric Unit 8 of the fractionated Golden Mile Dolerite (GMD).

The Golden Pike stockwork is hosted in the granophyric GMD and features quartz veins with intense hematite alteration halos extending up to 30 cm, often associated with visible gold. In contrast, the Dunlops Crossing stockwork, hosted in the Williamstown Dolerite, is characterised by quartz veins with sericite-carbonate alteration halos up to 10 cm wide. Despite similar vein orientations, the two systems exhibit distinct geochemical signatures and alteration styles.

Geochemical and structural data have been integrated to improve orebody definition, highlighting the critical role of host stratigraphy in controlling alteration and grade. This comparative study offers insights into the structural and lithological controls on mineralisation within the Golden Mile, with important implications for future exploration targeting and resource definition.