

# SEG 2024 Conference: Sustainable Mineral Exploration and Development

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## Structural Controls on Williams Brook Gold Mineralization, New Brunswick, Canada

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The Williams Brook Property, owned by Puma Exploration Inc., is located within the Appalachian Orogen in New Brunswick, Canada. The property is underlain by the Lower Devonian Wapske Formation, which comprises metasedimentary rocks locally interleaved with tuffaceous to massive rhyolite flows, mafic volcanic, and mafic intrusive rocks. The Wapske Formation is bounded to the west by the regional, dextral Rocky Brook–Millstream Fault ("RBMF"), which was active during Early Devonian Acadian orogenesis.

The Lynx Gold Zone (LGZ), a new gold discovery with diamond drill intersections including 5.55 g/t gold over 50.15 m, occurs along the contact between non-foliated rhyolite and pervasively foliated and tightly folded metasedimentary rocks. The lithological contact typically strikes southwest to south-southwest. The pervasive foliation strikes northeast or southwest and generally dips steeply to the northwest or southeast. The foliation is axial planar to gently northeast-plunging folds.

Mineralization in the LGZ is structurally controlled by the veins emplaced within the rhyolite and along the rhyolite–metasedimentary rock contact. Gold mineralization is hosted in quartz veins, typically planar within rhyolite, and folded and attenuated within the metasedimentary rocks. A total of four major vein sets were identified from trench mapping, televiewer interpretation and oriented core measurements. Auriferous veins present two main orientations: a shallow-dipping vein set and a steep vein set oriented parallel to the regional RBMF trend. The mineralized veins show mutual crosscutting relationship, suggesting that veins are syn-tectonic and were emplaced during the same deformation event. Three-dimensional structural modelling of the LGZ reveals that gold mineralization has a shallow, northeast plunge that is subparallel to the fold axis of regional folds. Based on these observations, both the structural fabrics and auriferous quartz veins of the LGZ are interpreted to have formed during a single dextral transpressive event associated with the RBMF during the Acadian orogenesis.