

**Mafic extrusive (flood basalt) Ni-Cu-PGEs**

**Province Blank**

**Potential:**

**Certainty:**

Critical Elements (Assessment Criteria)	Identified	Not Identified, but likely	Unlikely	Weighting
<b>Setting</b>				
<ul style="list-style-type: none"> <li>• Extensive basaltic flood volcanism related to mantle (possibly related to plume activity) and associated with,</li> <li>• major crustal faults and intraplate rifts</li> <li>• Sulphide deposits in subvolcanic differentiated tholeiitic feeder-sills (30-350 m thick) to extensive basaltic flood volcanism</li> <li>•</li> <li>•</li> </ul>				
<b>Source (fluid, metal, energy)</b>				
<p>Fluids</p> <ul style="list-style-type: none"> <li>• Nil</li> </ul> <p><i>Metals (including sulphur)</i></p> <ul style="list-style-type: none"> <li>• Source of Ni, Cu, Co, PGEs – magmas from mantle</li> <li>• Source of S from country rocks at high crustal levels</li> </ul> <p><i>Energy</i></p> <ul style="list-style-type: none"> <li>• Multiphase igneous intrusive activity</li> <li>• Intraplate magmas derived from mantle</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>			

<b>Fluid/magma pathway</b>				
<ul style="list-style-type: none"> <li>• Feeder conduits along crustal faults</li> <li>•</li> </ul>				
<b>Trap (any of the following)</b>				
<ul style="list-style-type: none"> <li>• Presence of evaporites and carbonaceous rocks in the country rocks or alternatively, sulphides in the country rocks to facilitate S saturation formation of sulphide melt in the feeder sills and scavenging of Ni–Cu–Co and PGEs</li> <li>• Large R factor provided by interaction between large volumes of magma passing through feeder sills containing sulphide melt</li> <li>–</li> </ul>				
<b>Signs of mineralising process (any of the following, but if occurrences have been identified the level of certainty increases)</b>				
<ul style="list-style-type: none"> <li>• High sulphide content in feeder sills</li> <li>• Intrusion S saturated.</li> <li>• Heavy S isotopes of +8 to +12<math>\delta^{34}\text{S}</math></li> <li>• Feeder sills surrounded by intense aureole of contact metamorphism and metasomatism indicating prolonged magma flow</li> <li>• Evidence of chalcophile element depletion in overlying lavas</li> <li>• geochemical anomalies – pathfinder elements Cu, Ni, Cr, Co, Au, Pt, Pd, Mg, As, Hg</li> <li>• geophysical anomalies</li> <li>• Known occurrences of PGEs, Cr, Ni, Cu</li> <li>•</li> </ul>				
<b>Age</b>				
<ul style="list-style-type: none"> <li>• Phanerozoic (Norilsk – Permian/Triassic; Insizwa – Jurassic)</li> </ul>				

• Proterozoic (Duluth – Mesoproterozoic)				
<b>Preservation</b>				
• Feeder zones need to be preserved				