

# Finding another Morning Star

Peter Jackson

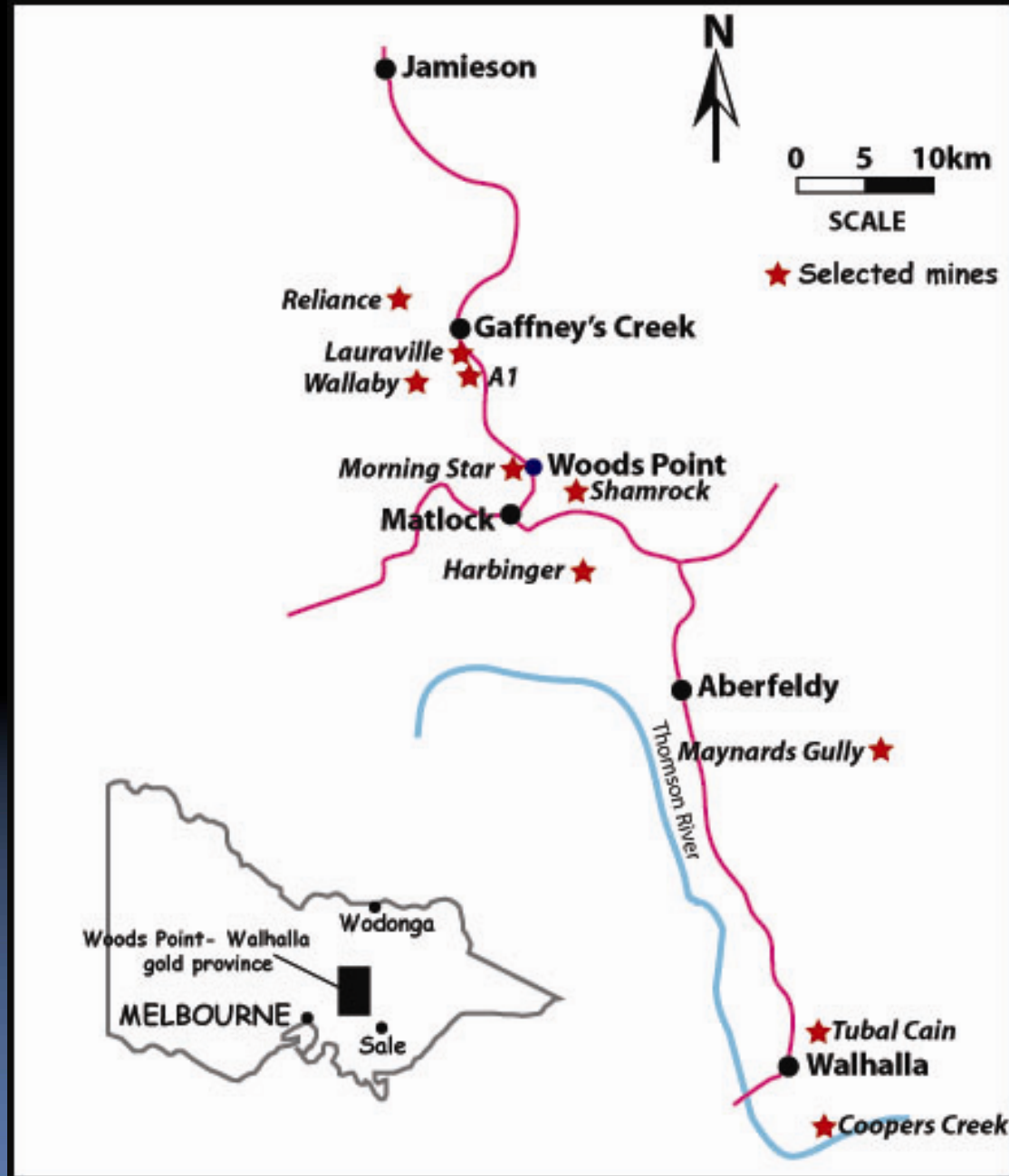
Morning Star Gold NL

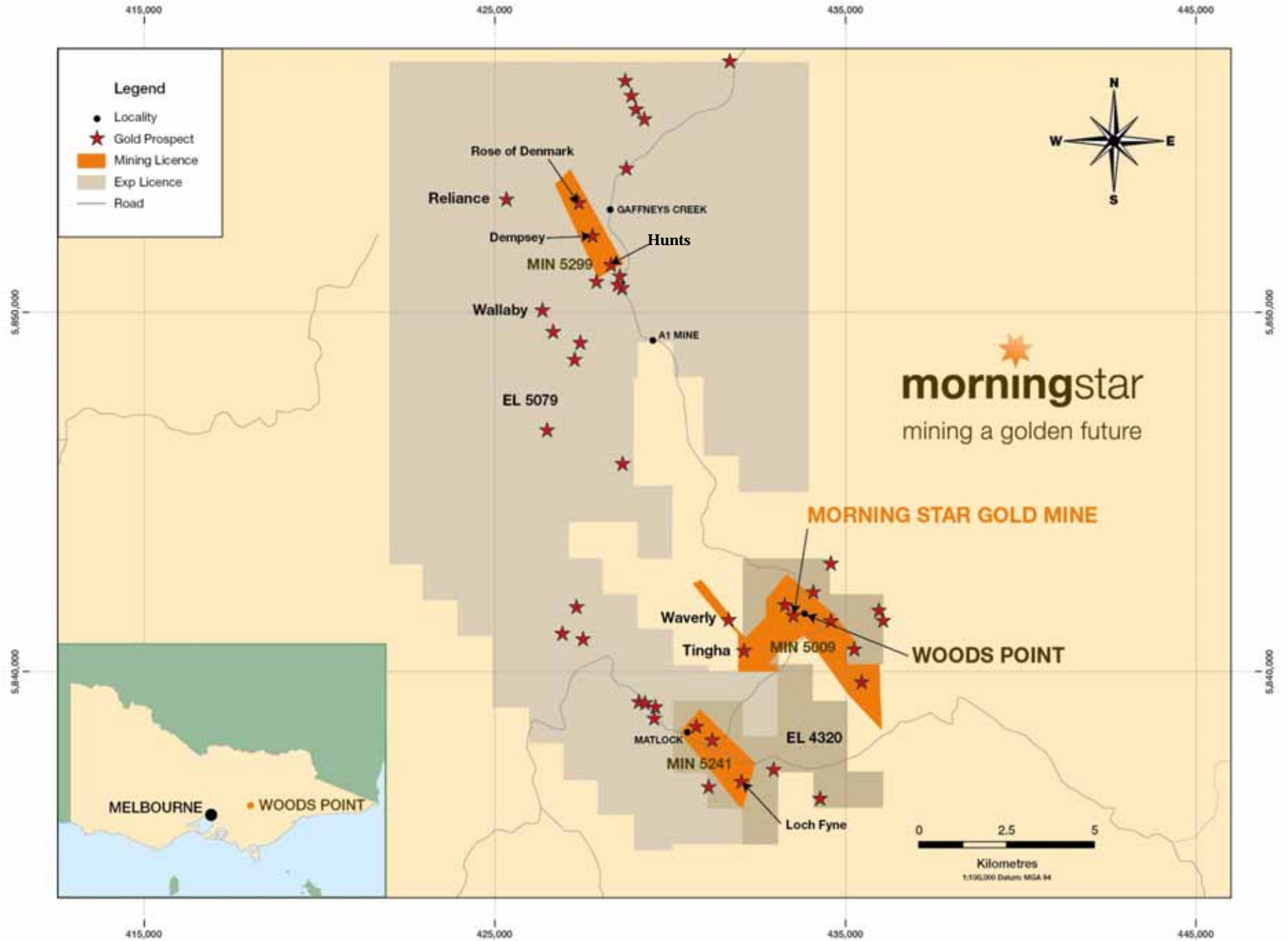


# Introduction

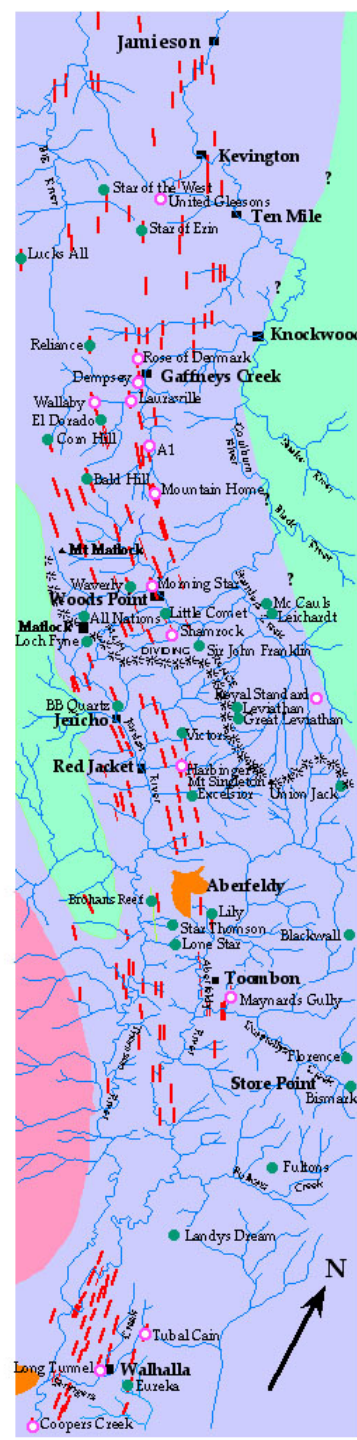
- Morning Star mine → one of >200 mines in the Walhalla -Woods Point gold province
- Mine produced >850,000 oz of gold (1862 – 1960)
- Gold occurs in dyke bulge-hosted quartz reefs
- Dyke bulge is ~450 metres long with a maximum width of 100 metres
- Dyke composition dominantly gabbro
- Bulge formed by multiple intrusions

# Location map





# Geological map of Walhalla synclinorium (after Junner 1920)



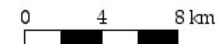
## Walhalla - Woods Point

### Gold Province

#### LEGEND

TERTIARY		alkali basalt
DEVONIAN		Baw Baw granodiorite
LOWER DEVONIAN		Walhalla Group sediments
SILURIAN		Jordan River Siltstones
		dykes
		mines
		study areas
		historical towns
		streams

#### SCALE





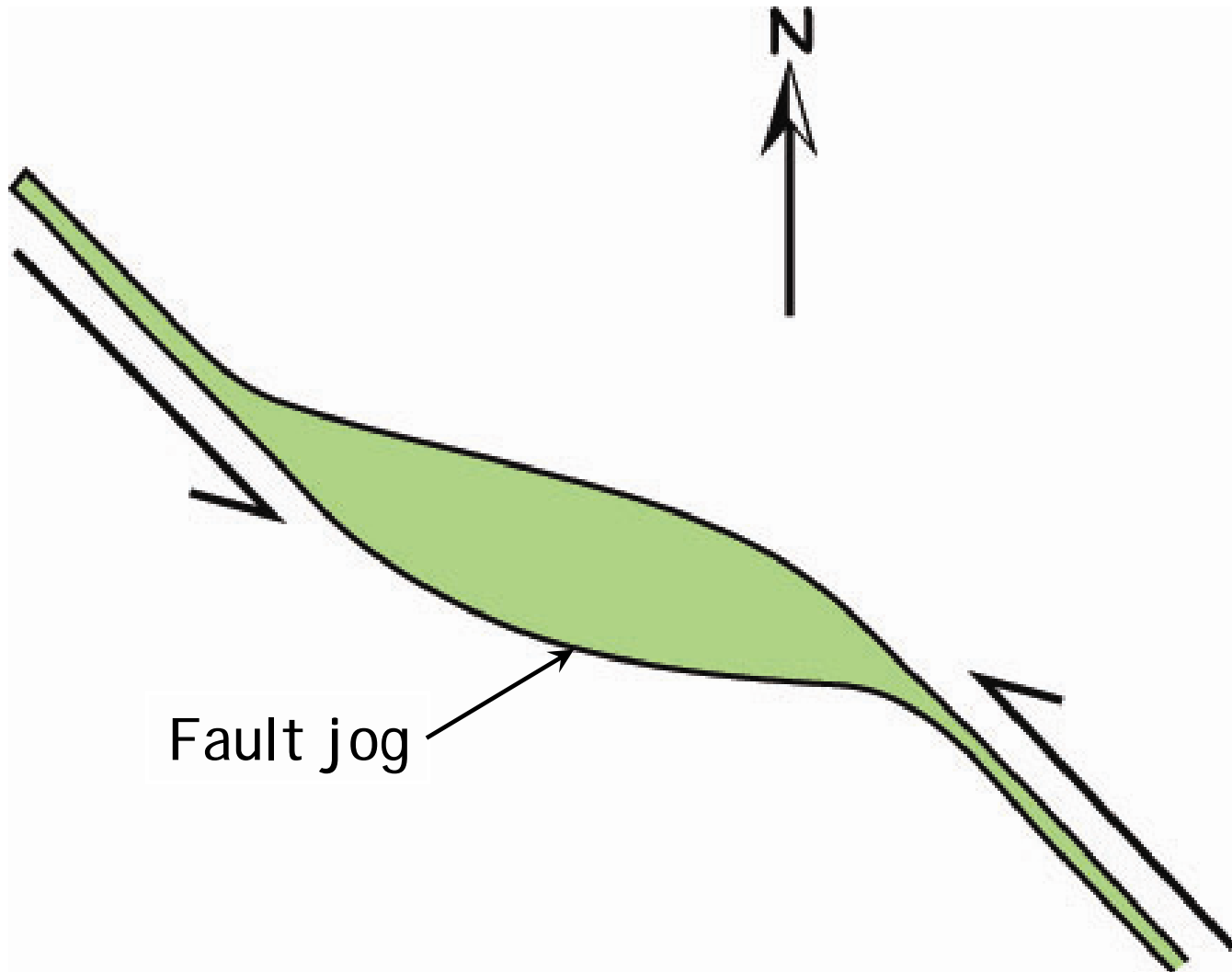
# Structural history

- Rocks deformed during Middle to Late Devonian, Tabberabberan Orogeny
- Two sequential stages in the deformation

Stage 1 Compressional → Uplift and folding

Stage 2 Transpressional → lateral faulting  
(dyke intrusion)  
→ reverse faulting

# Formation of dyke bulge



# Dykes in the Woods Point dyke swarm

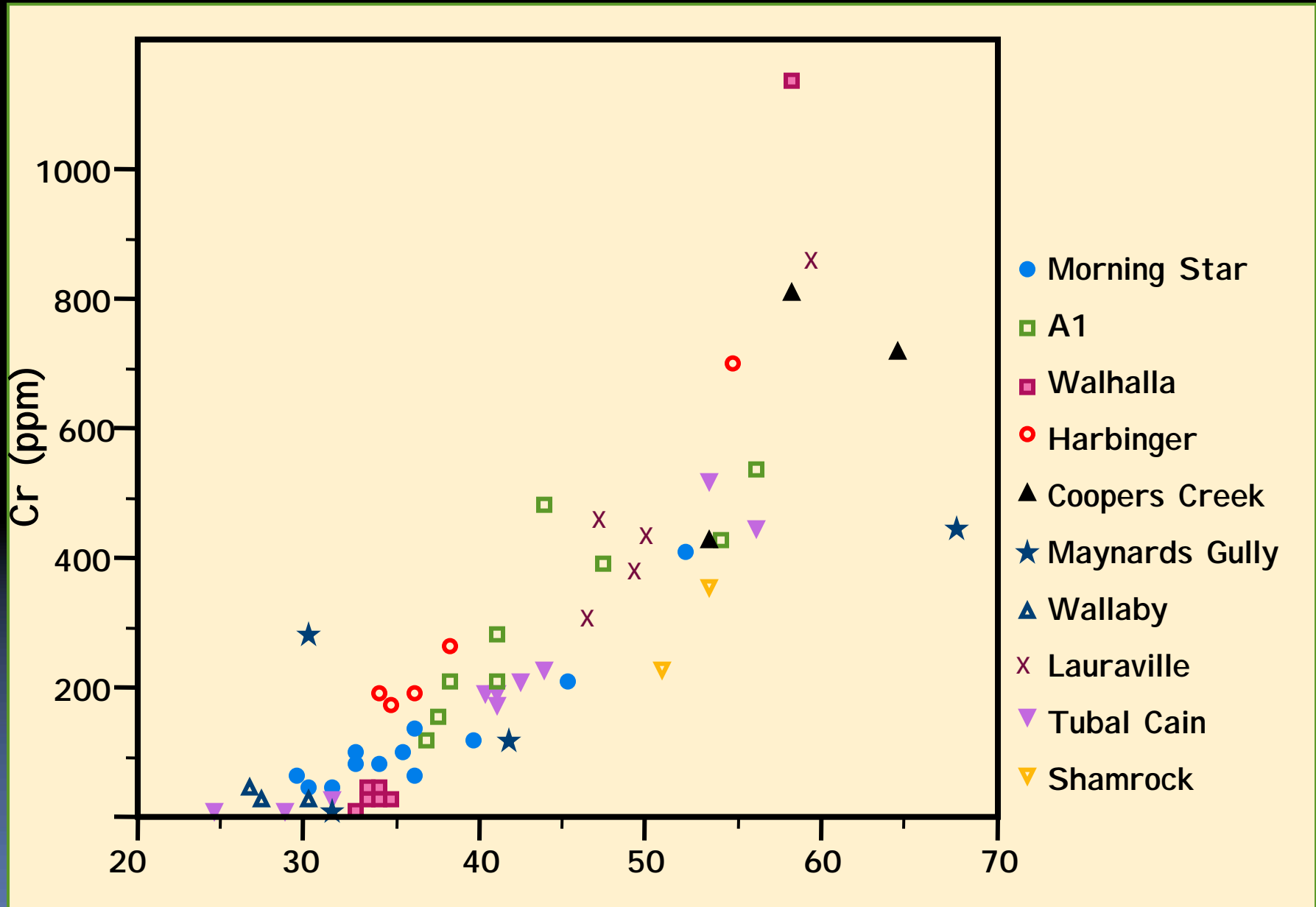
- Sub-parallel to regional strike (few cm to >100m wide)
- Age of dykes Late Middle-Early Upper Devonian (Marsden 1976)
- Compositions
  - hornblende peridotite
  - hornblende pyroxenite
  - hornblende gabbro
  - gabbroic diorite
- Dyke bulges → composite



# Contrasting dyke phases, Woods Point



# Cr v Mg No. variation diagram for selected Woods Point dykes



# Metasomatic alteration

- Deuteric alteration → chlorite, sericite, actinolite, prehnite, carbonates and leucoxene.  
Intensity increases with fractionation.
- Alteration enveloping veins → moderate to intense carbonate alteration, advanced sericitisation, weak to strong pyritisation.

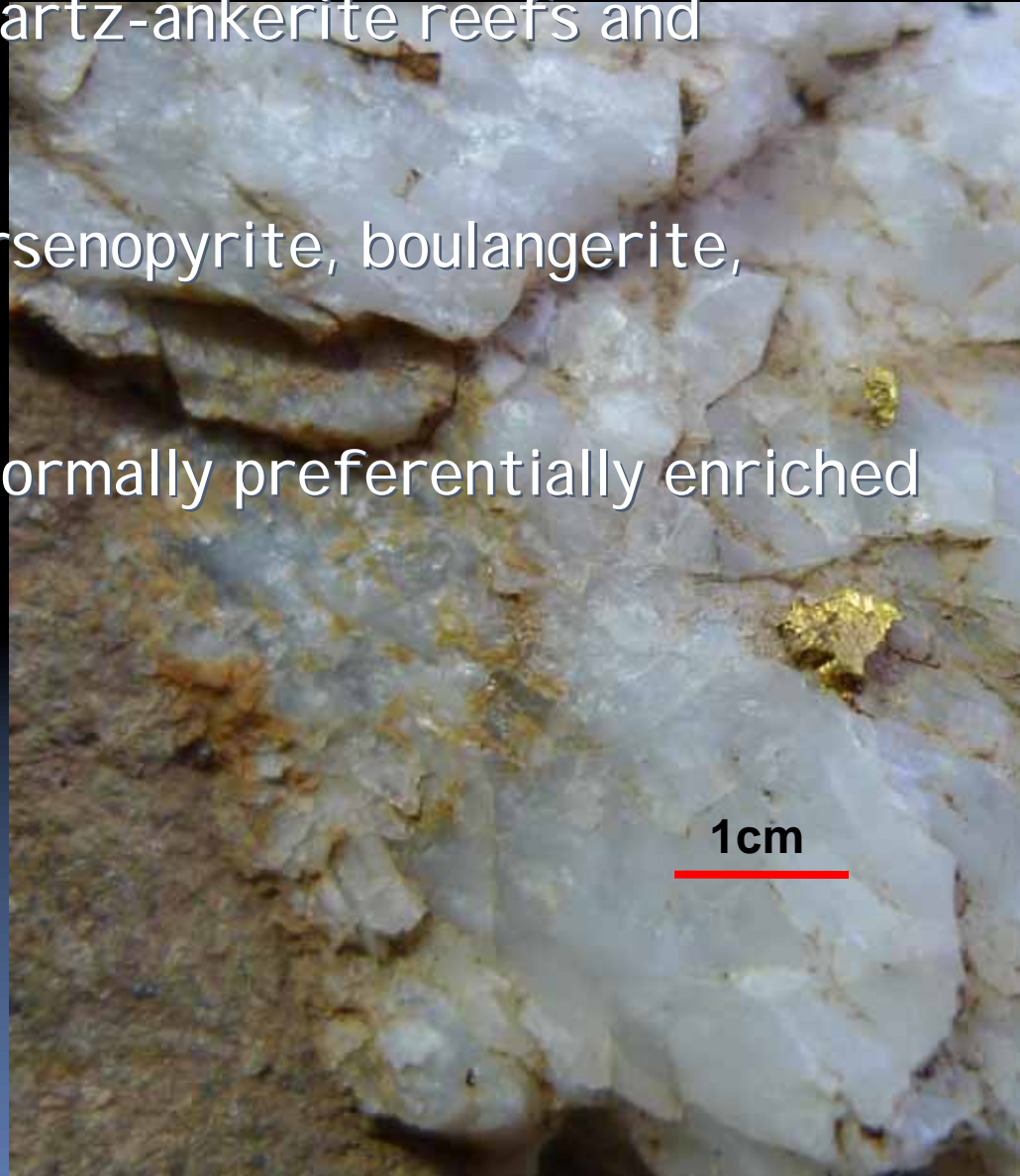


# Wallrock alteration



# Mineralisation

- Gold → dyke-hosted, quartz-ankerite reefs and along dyke contacts
- Accessories → pyrite, arsenopyrite, boulangerite, tetrahedrite
- One side of the dykes normally preferentially enriched



# Cross-section through the Morning Star dyke looking NW (modified from McAndrew 1965)

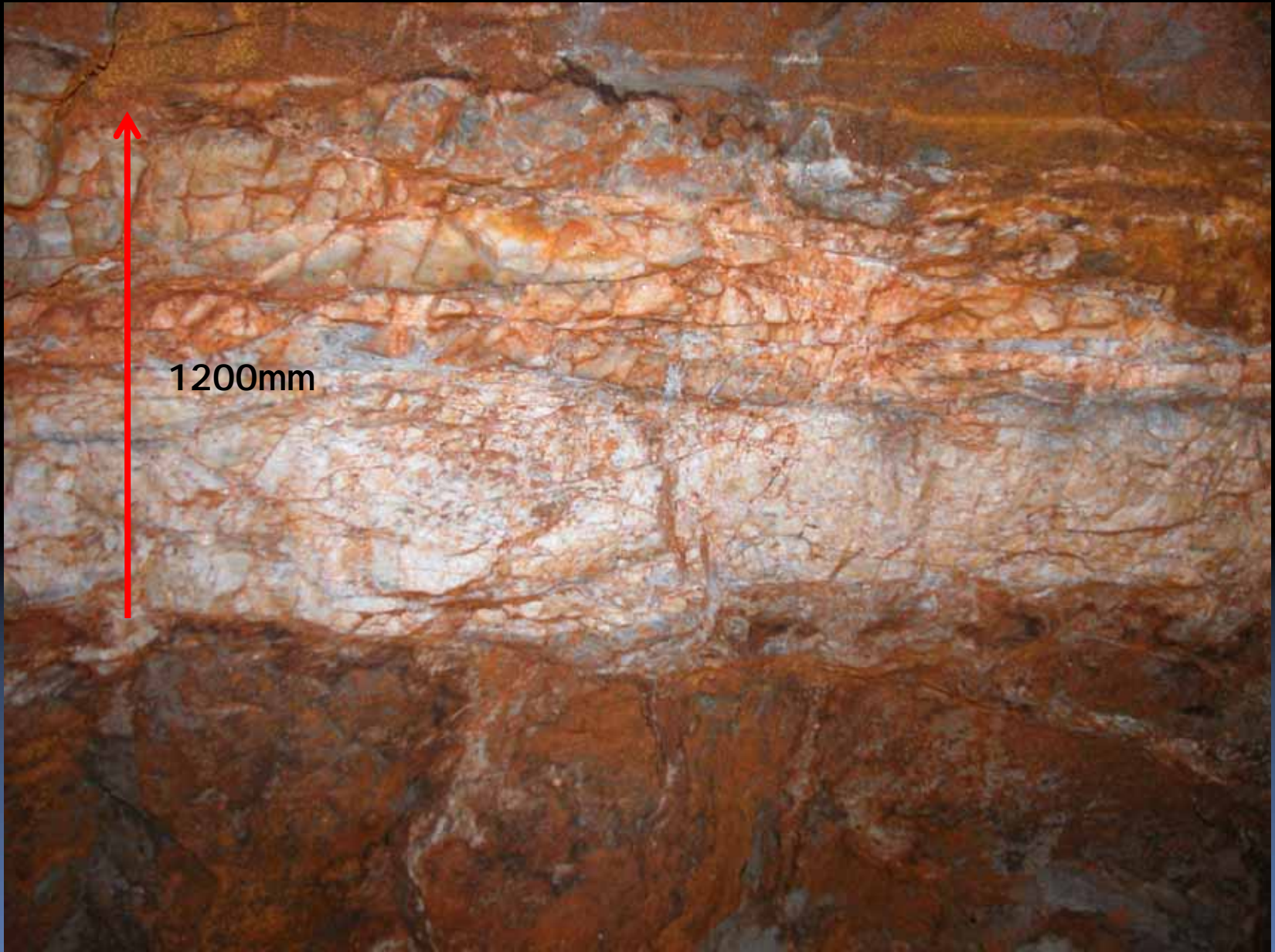


# Reef types

- (1) Massive, vuggy quartz reefs
- (2) Laminated reefs
- (3) Stockwork reefs
- (4) Breccia reefs
- (5) Composite reefs



# Massive quartz reef



1200mm



# Composite laminated/breccia reef, Morning Star





# Coarse stockwork transitional to breccia reef





# Breccia reef, Morning Star mine



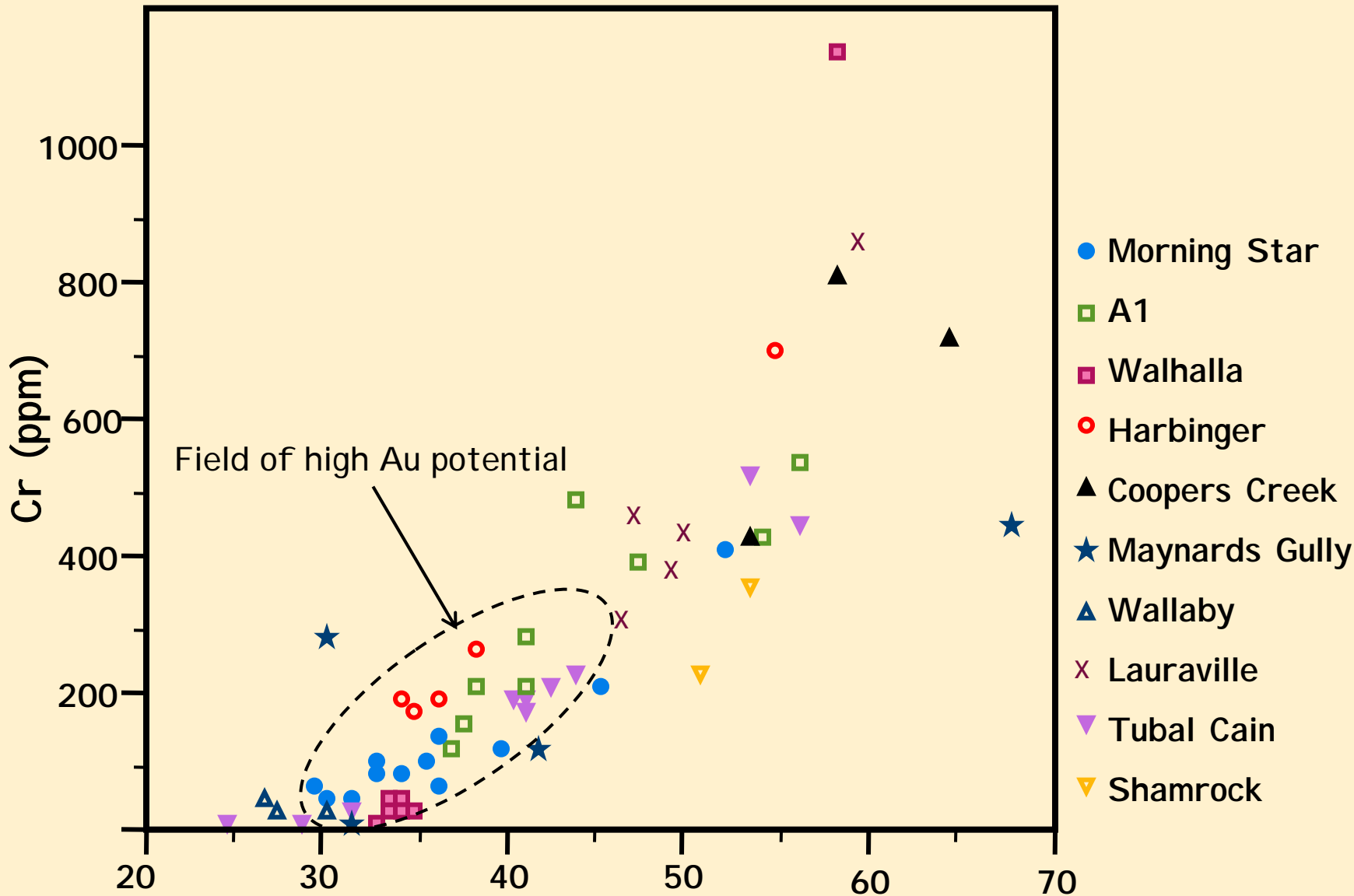
# Exploration model

Spatial relationship between Au mineralisation and dykes.

The following features are considered to be favorable in exploring for dyke-hosted gold deposits in the Woods Point dyke swarm

1. Evolved (felsic) dyke compositions
2. Offset or inflection in dyke trend
3. Pyrite halo in surrounding sediments

# Cr v Mg No. variation diagram for selected Woods Point dykes



# Exploration model

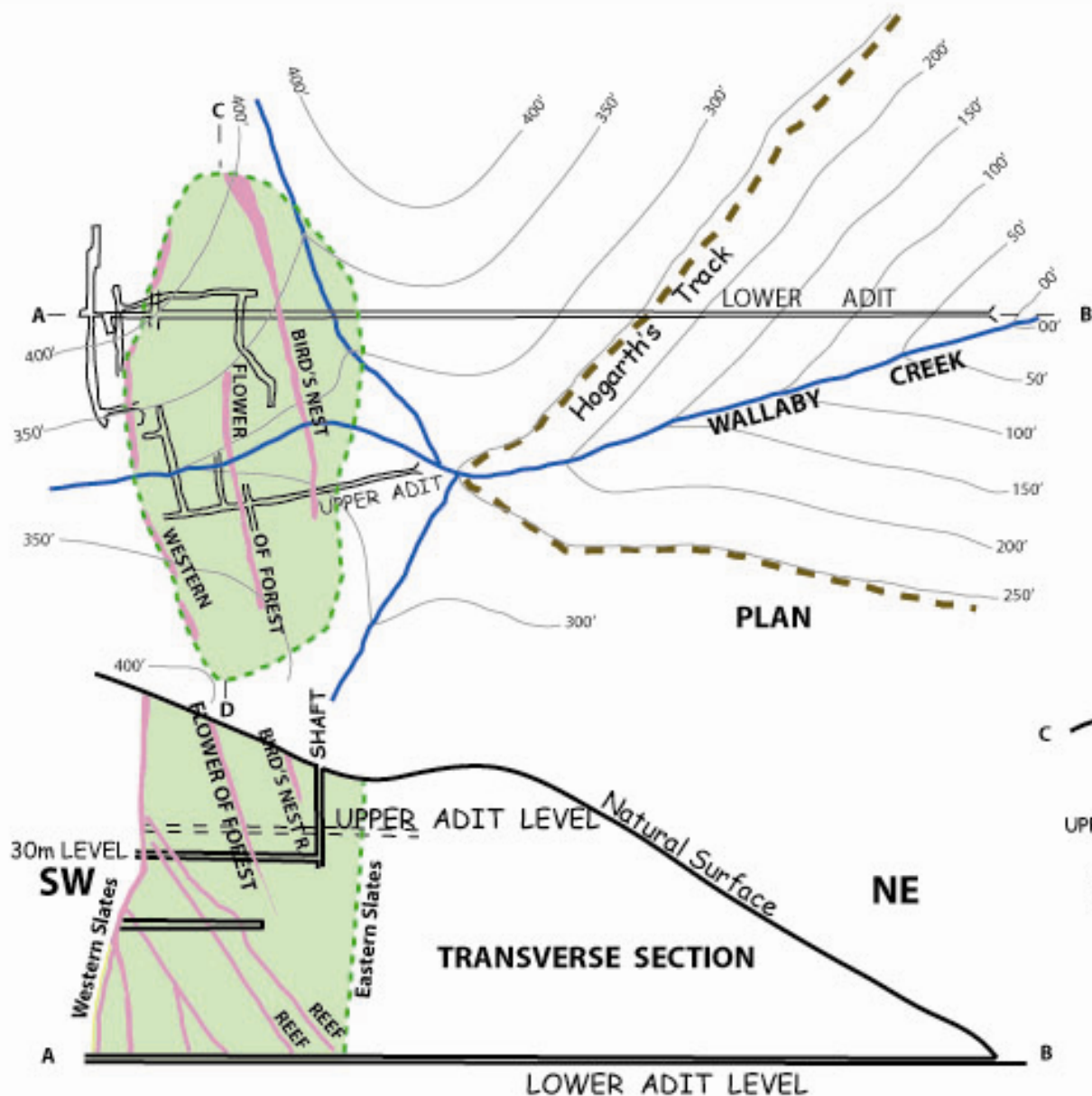
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# Wallaby mine, Gaffney's Creek (after Kenny 1926)



## WALLABY MINE

GAFFNEY'S CREEK

0 10 20 40m

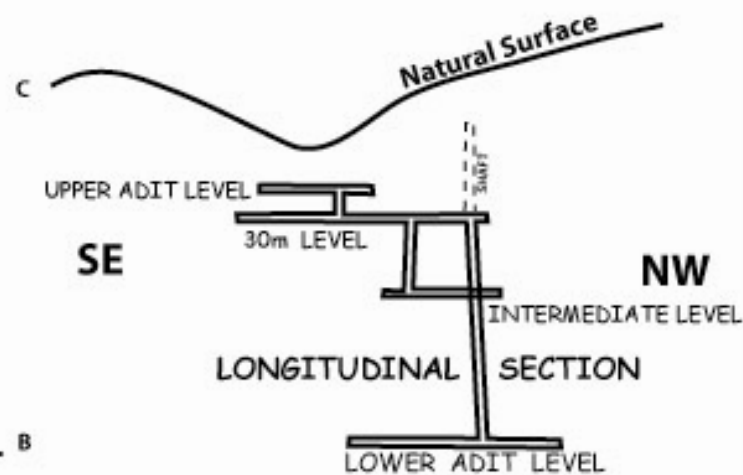
SCALE

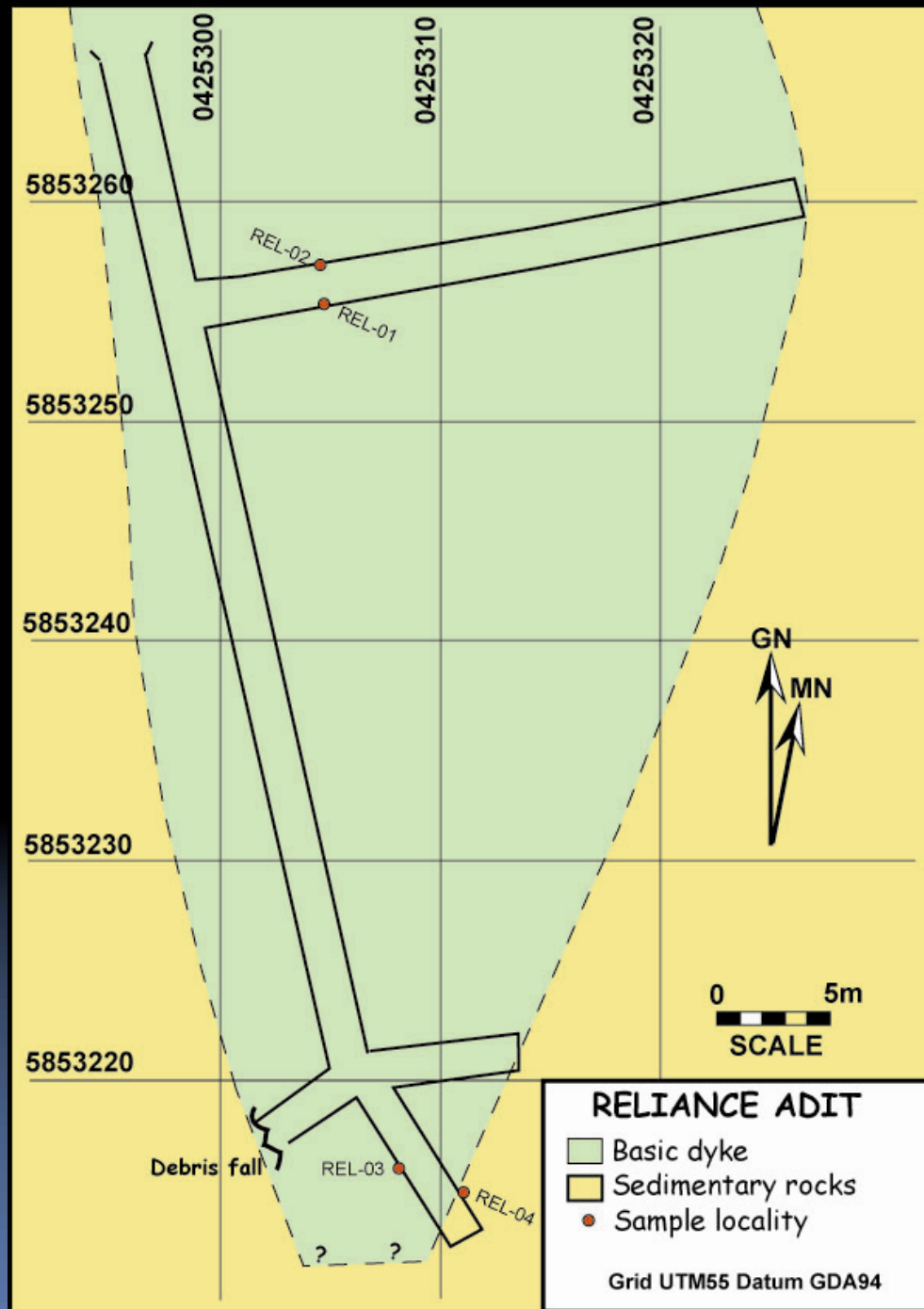
Gabbro

Quartz reef

Note: Topographic contour interval = 50 feet

MN





# Reliance adit

