



# PNG EXPLORATION

**PNG Mining and Petroleum conference 2014**

**Mike Humphries: Executive General Manager – Exploration**

**3 December 2014**

**Harmony Gold Mining Company Limited**

Registration no. 1950/038232/06

Ticker codes: JSE (HAR), NYSE (HMY)

[www.harmony.co.za](http://www.harmony.co.za)

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## Competent Person Statement

The information in the presentation that relates to Exploration Results was compiled by Mike Humphries. Mr Humphries is the Executive General Manager – Exploration for Southeast Asia, and a full time employee of Harmony Gold Mining Company Limited. Mr Humphries is a member of the Australian Institute of Geologists and has sufficient experience which is relevant to the styles of mineralisation and types of deposits under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the "JORC Code". Mr Humphries consents to the inclusion in this presentation of the matters based on this information in the form and context in which they appear.

# Agenda

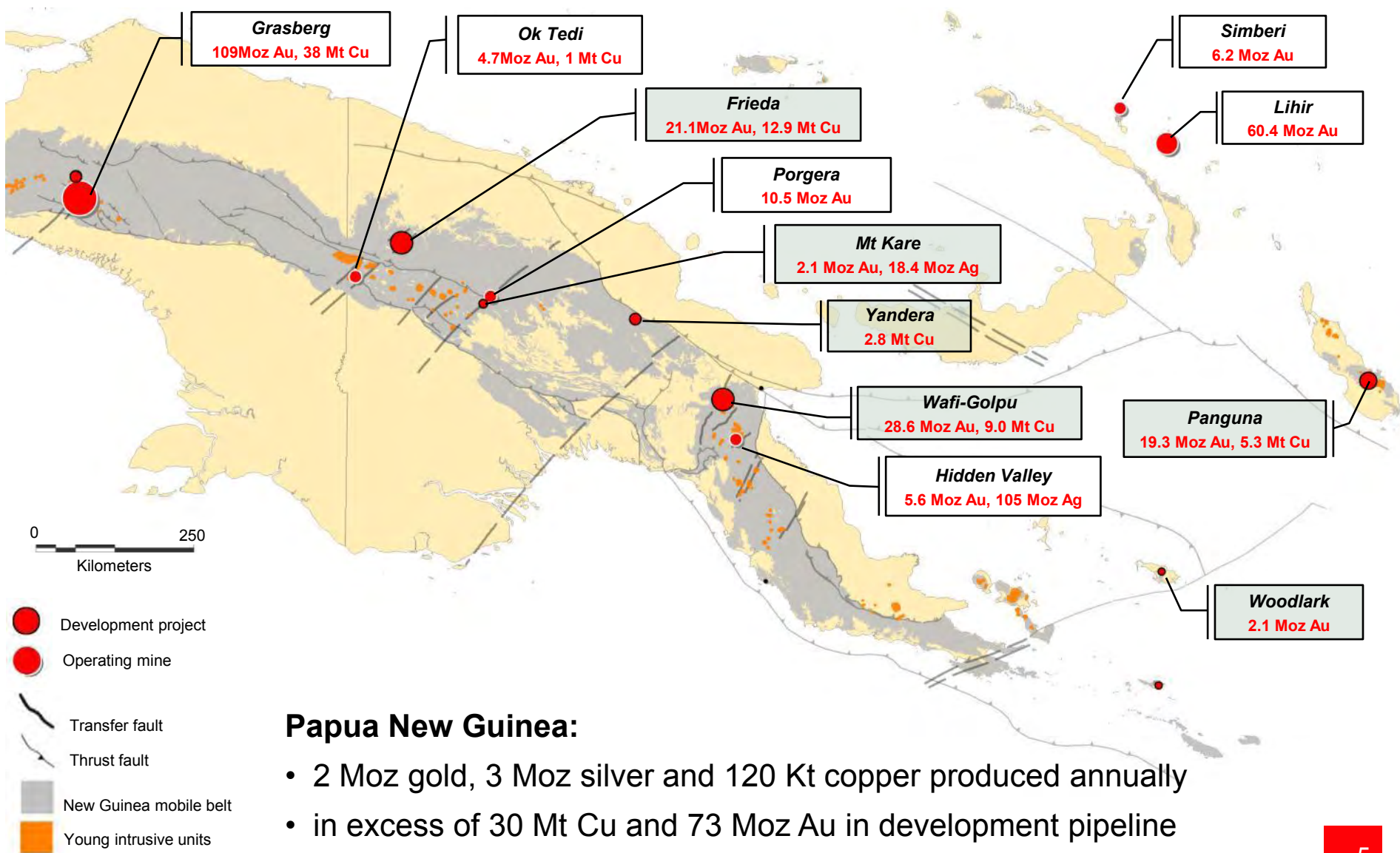
- 1 PNG exploration
- 2 Kili Teke – EL2310
- 3 Conclusion





# **PNG EXPLORATION OVERVIEW**

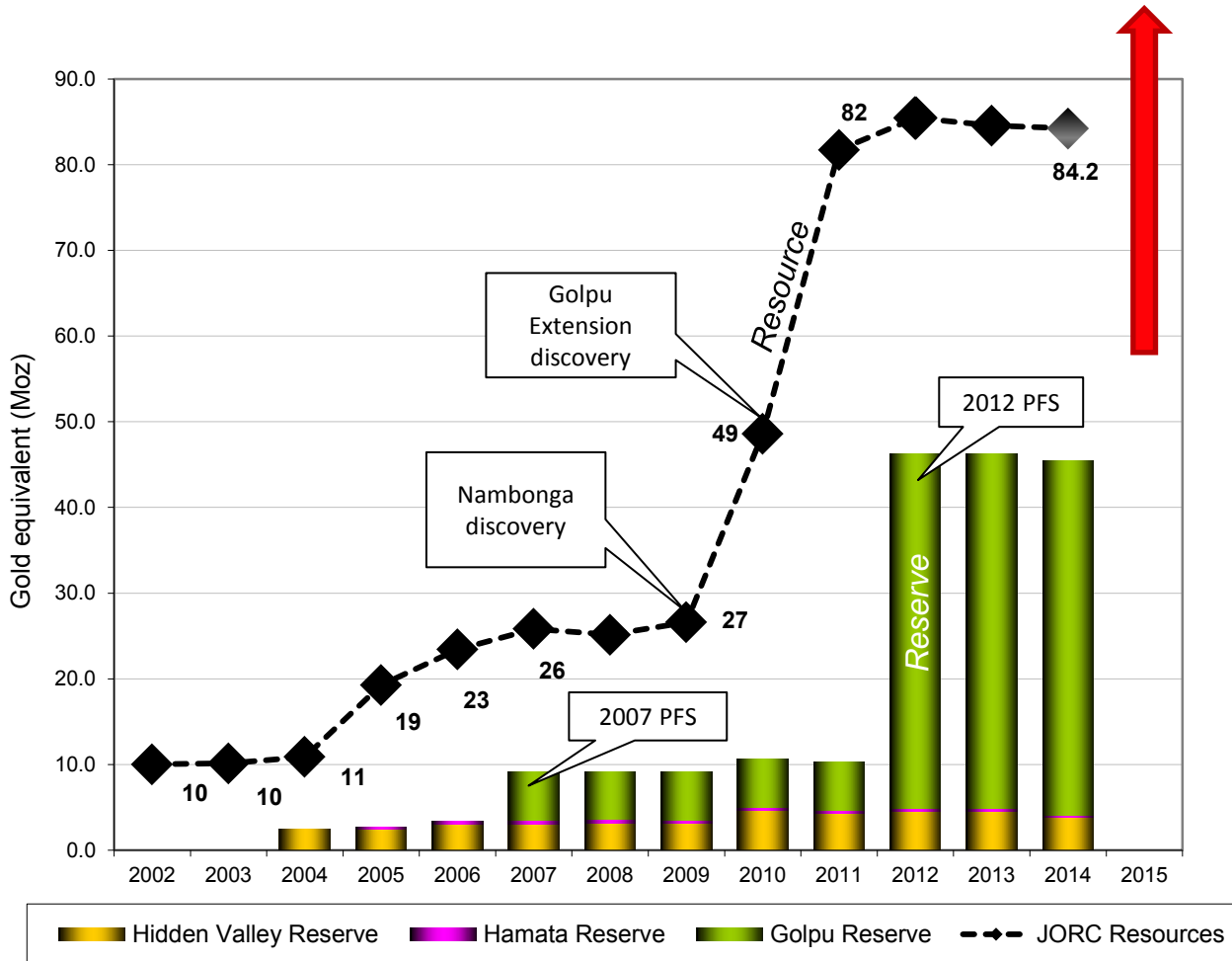
# PNG is an exceptional copper- gold province



## Papua New Guinea:

- 2 Moz gold, 3 Moz silver and 120 Kt copper produced annually
- in excess of 30 Mt Cu and 73 Moz Au in development pipeline

# PNG resource and reserve growth



- Exploring since 2003
- Well established teams networks, systems of safe work
- Developing pipeline of quality targets for future growth

## Resource growth<sup>1</sup>:

- 12.6 Moz Au & 4.5 Mt Cu, (32.3 Moz Au equivalent<sup>1</sup>)
- Cost per equivalent resource ounce: **A\$ 8.60**

## Reserve growth<sup>1</sup>:

- 7.8 Moz Au & 2.7 Mt Cu (22.7 Moz Au equivalent<sup>1</sup>)
- Cost per equivalent reserve ounce: **A\$ 20.30**

<sup>1</sup> Based on Harmony's 2003 - 2014 expenditure & JV equity ounces. Gold equivalent based on US\$1300/oz Au, US\$3.10/lb Cu, US\$21 /oz Ag with 100% recovery for all metals

<sup>2</sup> MMJV resources and reserves - expressed as 100%

# Creating employment

- 47 employees
  - 93% PNG national
- 27 permanent staff:
  - 4 geologists
- Operational hub at Mt Hagen
- Flow-on work:
  - Helicopter
  - Drilling
  - Assay
  - Construction contractors



# Safety is our top priority

- Approaching 4 years of Lost time injury free (1 428 days)
- Training in systems awareness and embed foundation H & S tools
  - job safety environment analysis utilisation for all work
  - emergency management systems and communication protocol
  - hazard ID / risk assessment and closing out corrective actions fully
- Risk management
  - focus on high risk areas
  - vehicles, helicopter slinging, tree felling, geotechnical, isolated field work
- Initiatives
  - senior first aid; vehicle management plan
  - risk assessment for aviation – preferred route planning
  - hazard reporting – lead indicator trends







## Community affairs (CA)

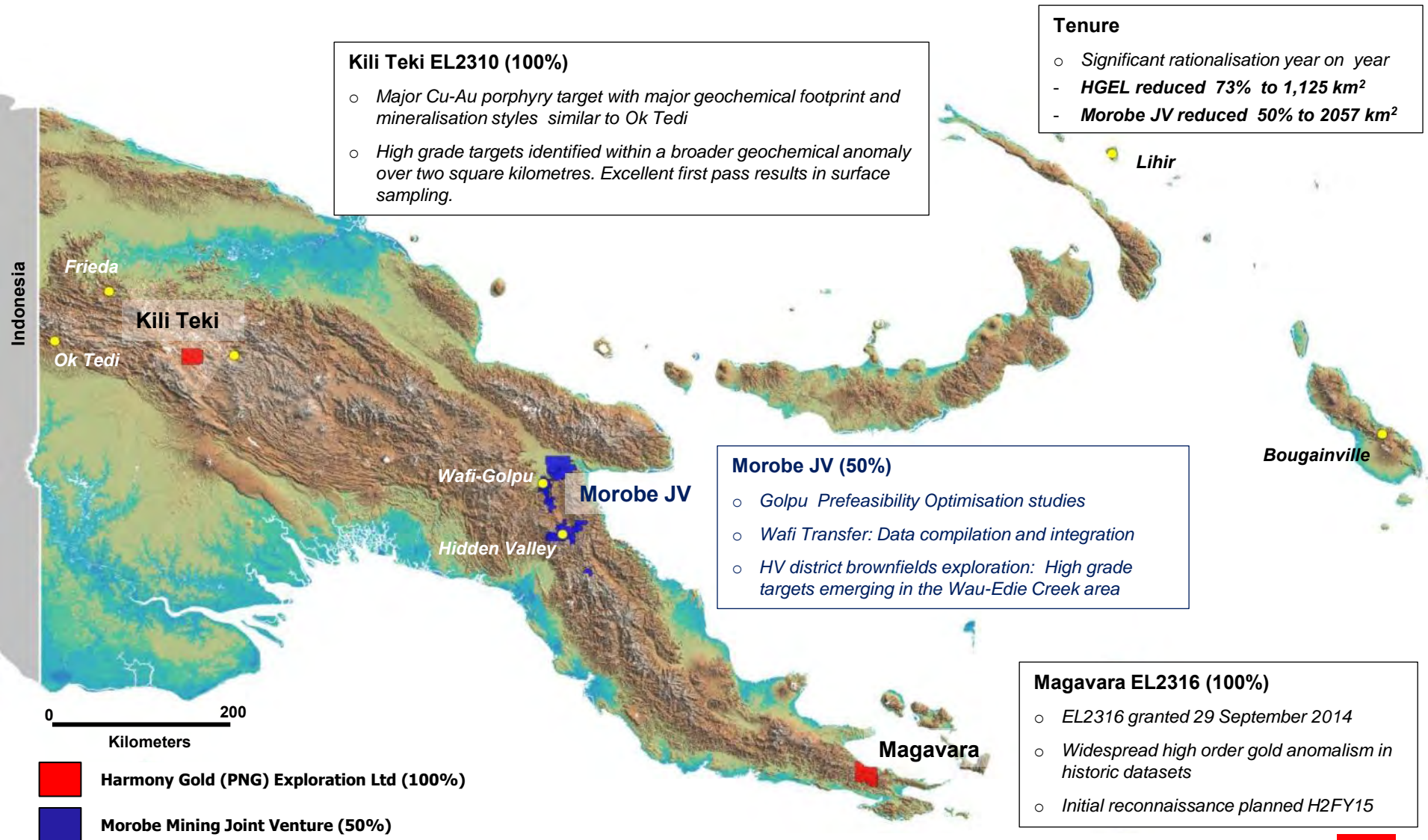
- Community projects underway
  - Measles vaccination facilitation
  - Community house / water catchment & storage
- Local labour/ employment
- Established community affairs guideline for CA staff
  - preliminary social mapping
  - community engagement and compensation agreements

## Environment

- Dedicated environment officer
- Baseline watercourse sampling regime
- Rehabilitation of cleared areas
- Maintain environmental database and reporting

- Productivity
  - engagement model developed for regular structured interaction for community support
  - proactive approach to safety
  - environment - strict compliance (drill pad construction standards, baseline water sampling)
- Helicopter utilisation
  - weekly forecast and budget tracking;
  - no fly days;
  - planning loads for utilizing full capacity
- Drilling
  - intense monitoring through drill production database to maximize utilization
- Competitive environment
  - high availability of contractors
  - excellent rates

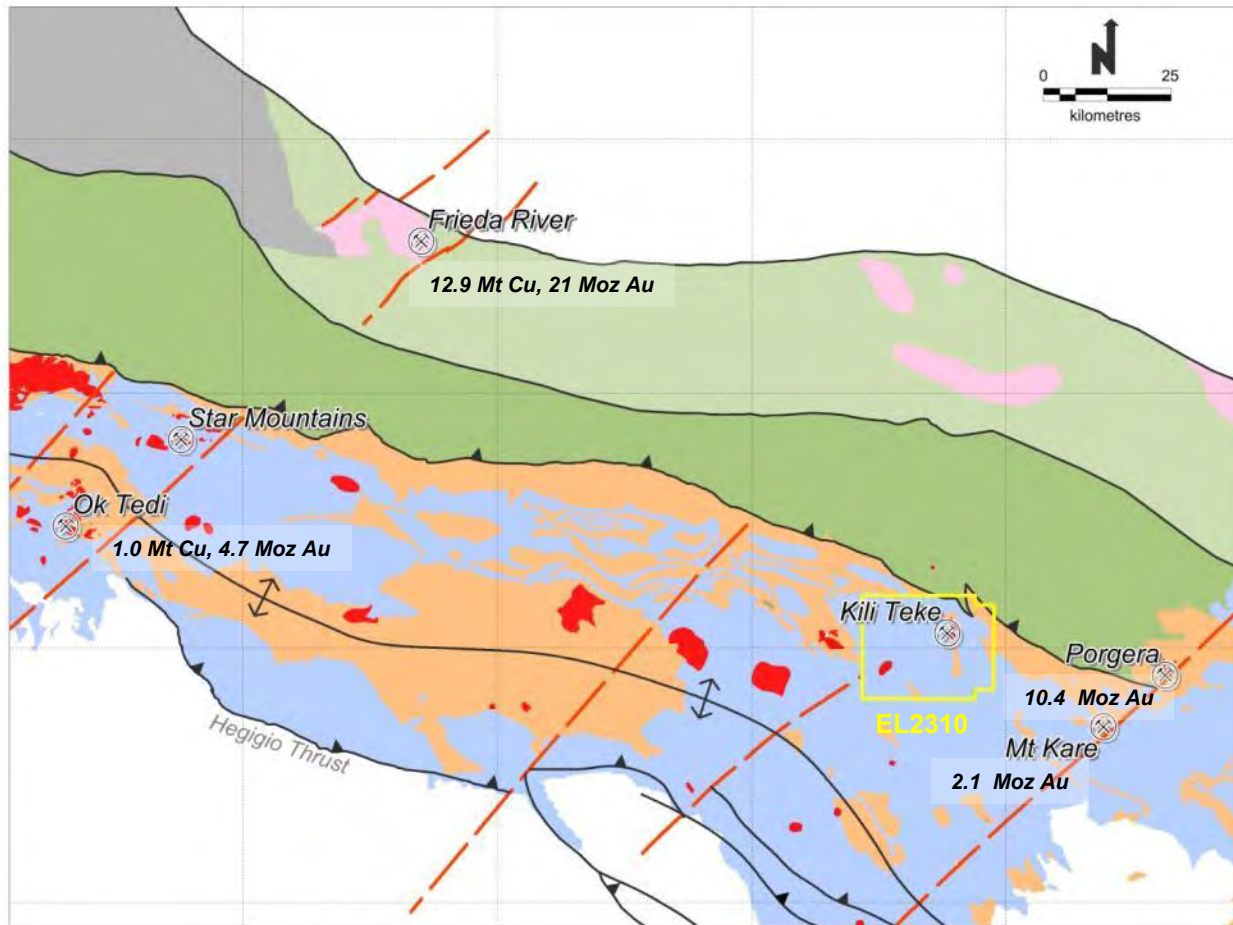
# Harmony PNG exploration portfolio FY15



# KILI TEKE - EL2310



# Location and regional setting



**Structure**

- Fault/Thrust Major
- Transfer fault

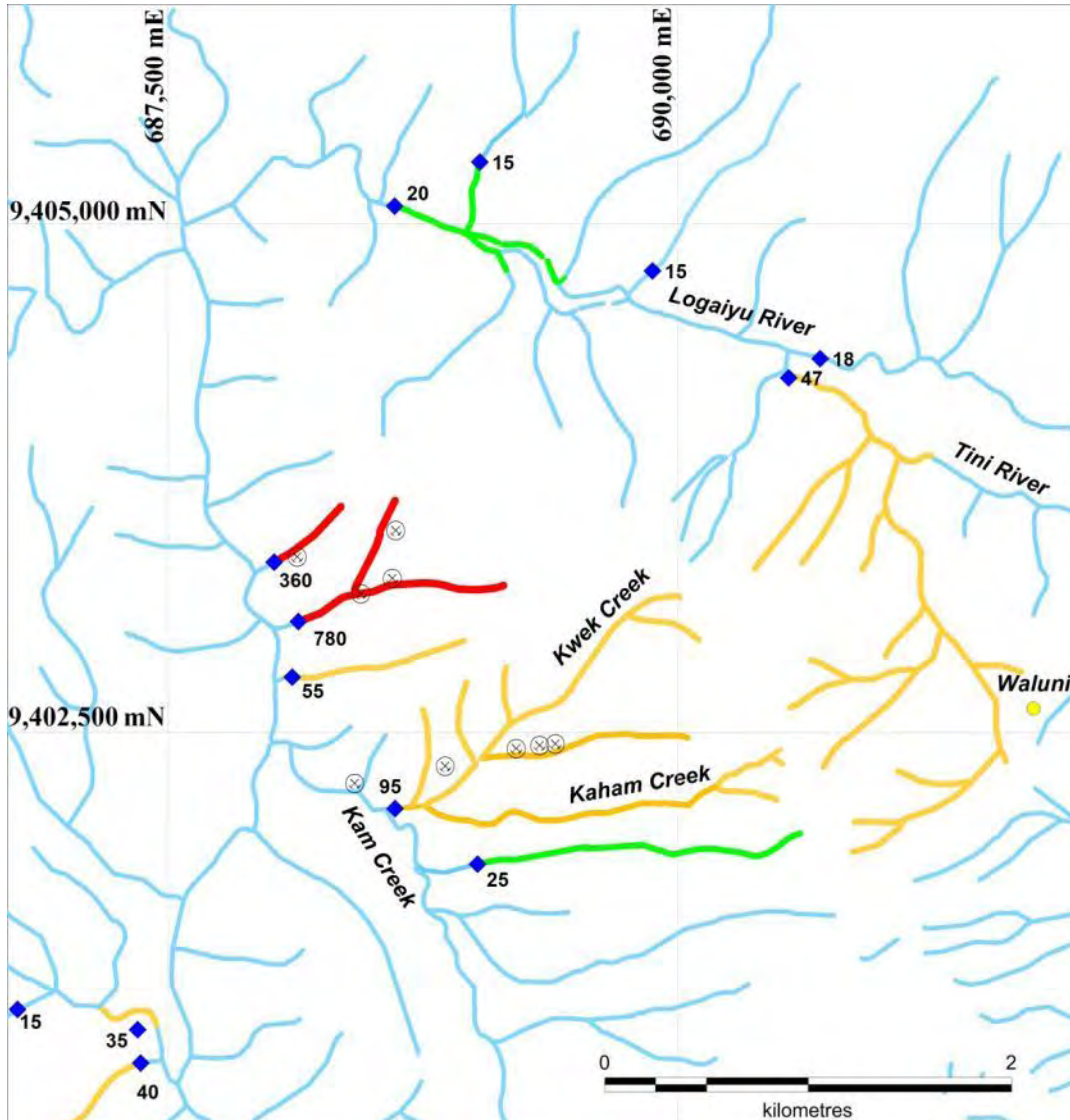
**Mobile Belt**

- Granodiorite (Miocene)
- Metamorphics: Undifferentiated
- (Mesozoic - Palaeogene)

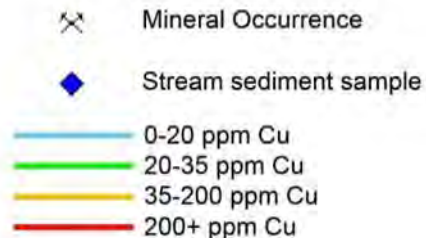
**Papuan Fold Belt**

- Fractionated intrusives (Plio-Pleistocene)
- Limestone (Palaeogene)
- Clastic Sediments (Mesozoic)

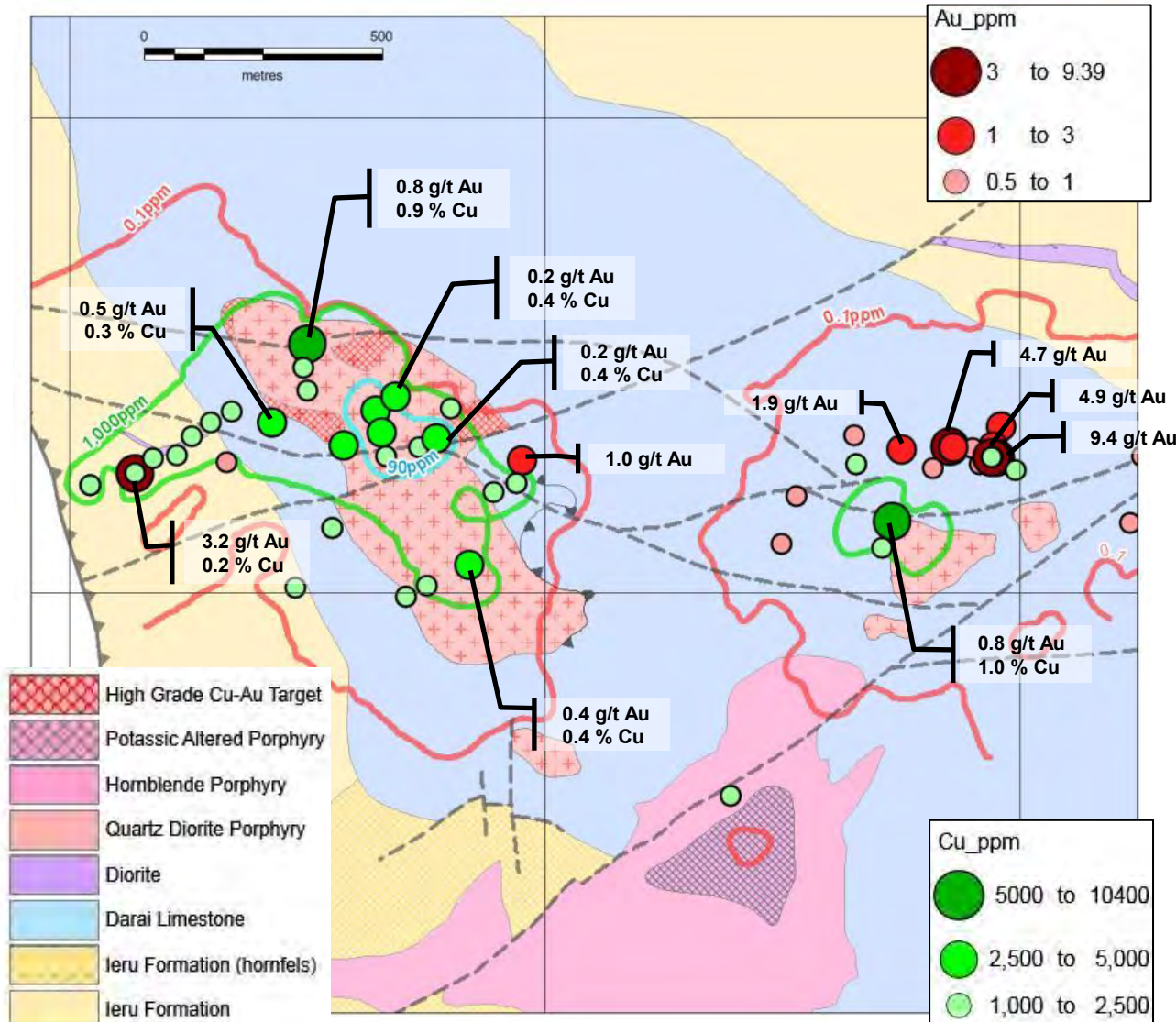
- **40km west of Porgera gold mine**
  - roads located 14 km from the prospect
- **Papuan Fold Belt**
  - world class metallogenic belt
  - prospective for porphyry Cu-Au, related Cu-Au skarn, and epithermal Au-Ag style mineralisation
  - young (<5 million year old), high-grade, long life mines: Ok Tedi (Cu/Au), Porgera (Au) and Grasberg (Cu-Au)
- **Favourable geological setting**
  - Inferred young multiphase intrusive complex
  - associated with northeast transfer structures
  - widespread alteration footprint with accompanying high order geochemical Cu-Au anomalies
  - porphyry Cu-Au and Cu-Au skarn mineralisation styles



- **Regional reconnaissance**
  - 1986 CRA Exploration : 7.5 g/t Au returned from float in the lower Logaiyu River
  - 1995-1996 Placer: located altered intrusive and peripheral skarn
  - 2007 European Union: release of Highlands aeromagnetic survey (stage 1)
- **Prospect Development**
  - 2009-2011 Aldridge Minerals: surface geochemistry; Induced Polarisation survey geophysics and drilled 3 holes
    - **KT003; 134m @ 0.28% Cu, 0.37 g/t Au**
    - **KT002; 137m @ 0.12 g/t Au**
    - **KT001; Abandoned in limestone**

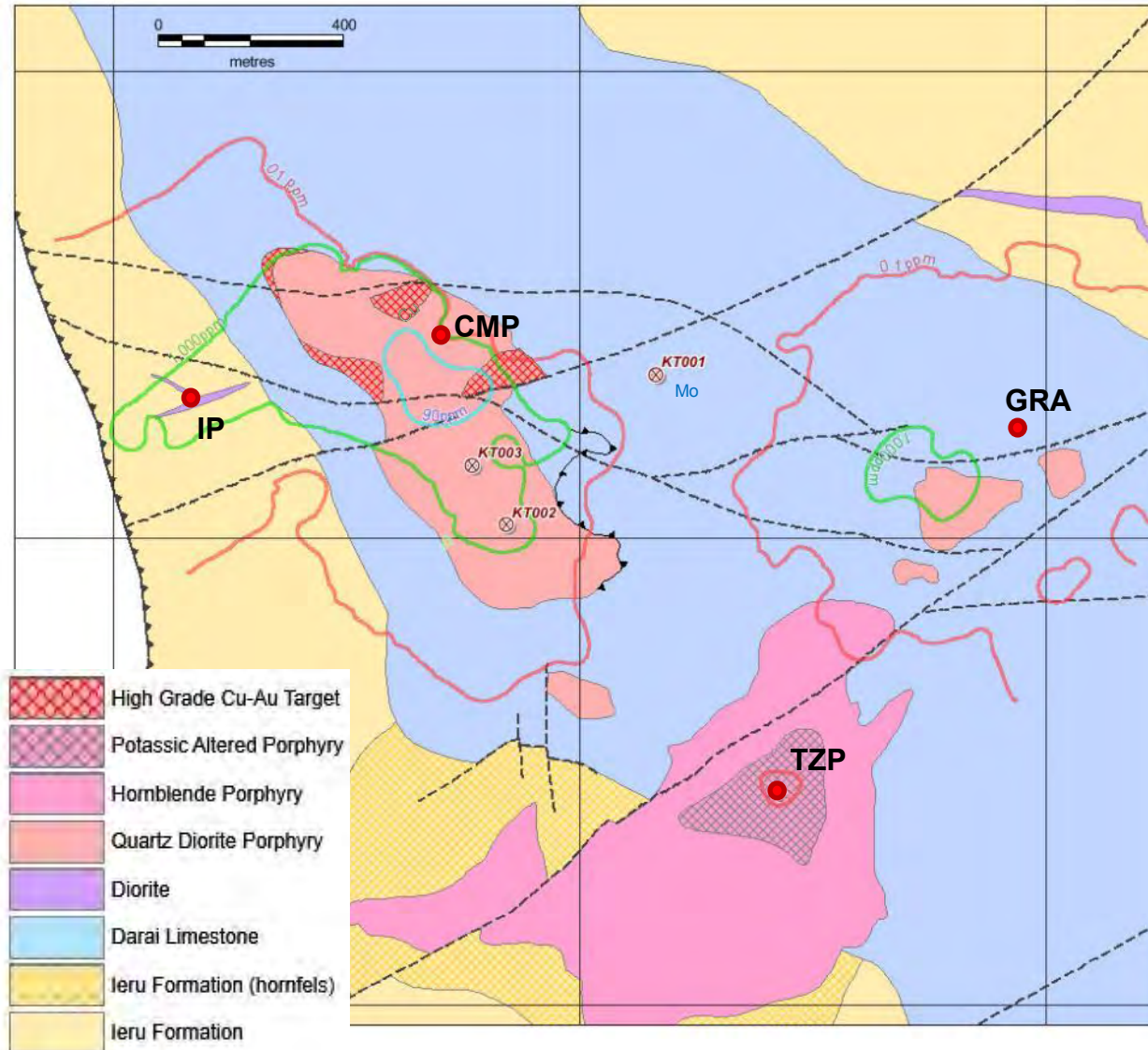


# Harmony exploration and results



- **EL2310 granted May 2014**
- **Work program**
  - Ridge and Spur soils (641 samples)
  - Detailed fact mapping and interpretation (8 square kilometers)
  - Rock chip sampling (458 samples)
  - Trenching 8 trenches (482m)
  - Relogging and reassay of historic holes
  - Petrology
  - Preliminary social mapping
  - Established base camp
  - Baseline water sampling
  - Detailed magnetic radiometric survey (480 line km)
  - Drill pad preparation

# Prospect summary



## Large scale Cu-Au footprint with high-grade zones:

### *Ieru Porphyry* (“IP”)

- Structurally controlled mineralisation
- Trenching: 132m @ 0.6 g/t Au, 0.5 % Cu
- Soils: to 3.2 g/t Au, 0.2% Cu

### *Gold Ridge Anomaly* (“GRA”)

- 1km x 0.5km > 0.1 g/t Au. Soils to 9.4 g/t Au
- Copper soil values to 1% Cu
- High Level Ag, As, Bi, Sb, Te association

### *Central Mineralised Porphyry* (“CMP”)

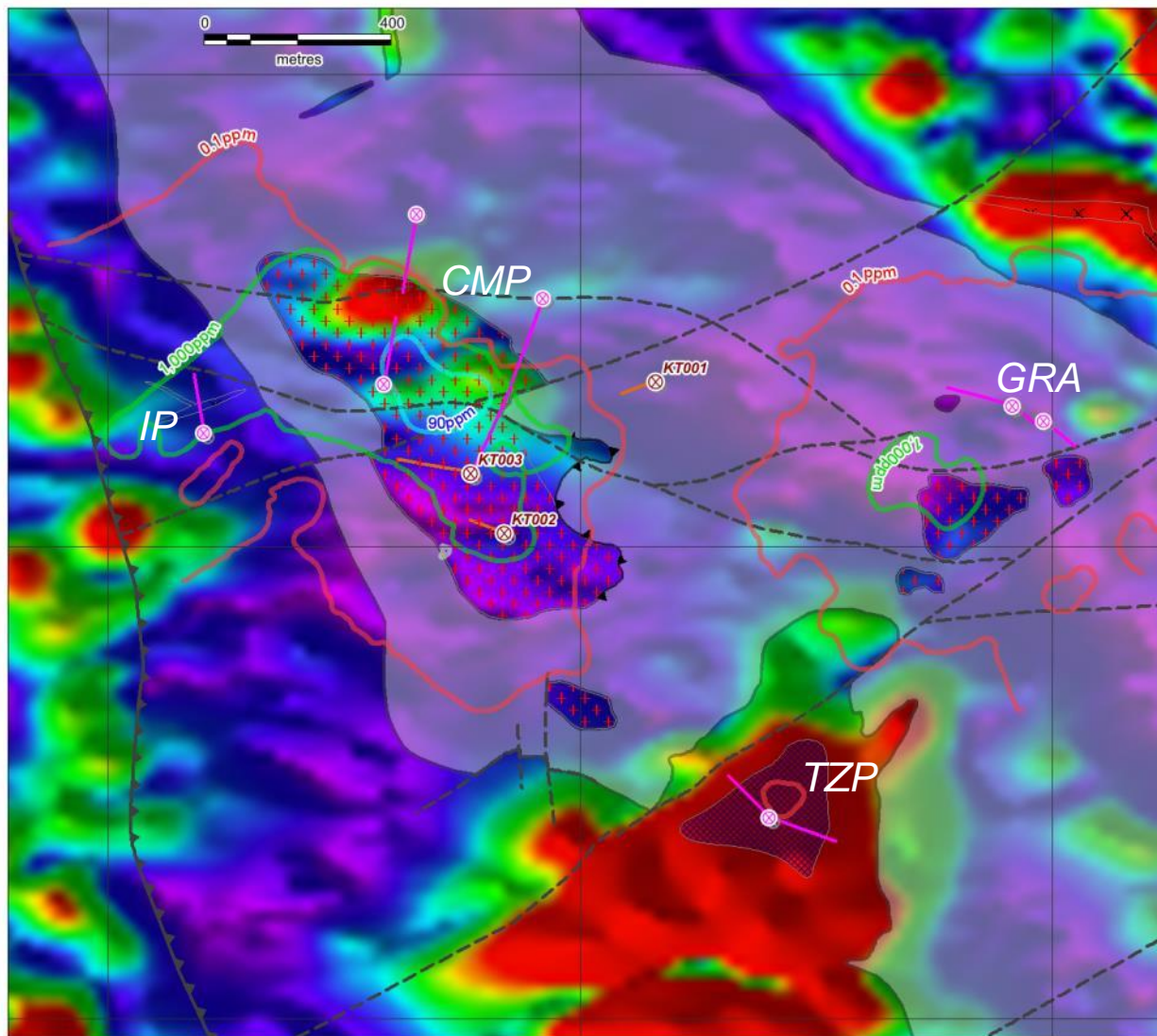
- Skarn & breccia to 5.2 g/t Au, 2.7% Cu
- Coincident Cu-Au-Mo soil anomaly
- 3 holes (KT001 failed) intersected mineralised porphyry: KT003:134m@ 0.28%Cu & 0.37g/t Au

### *Transfer Zone Porphyry* (“TZP”)

- Potassic Altered Core with >7% sulphide
- Inferred high level, poorly exposed alteration system associated with a Cu-Au porphyry

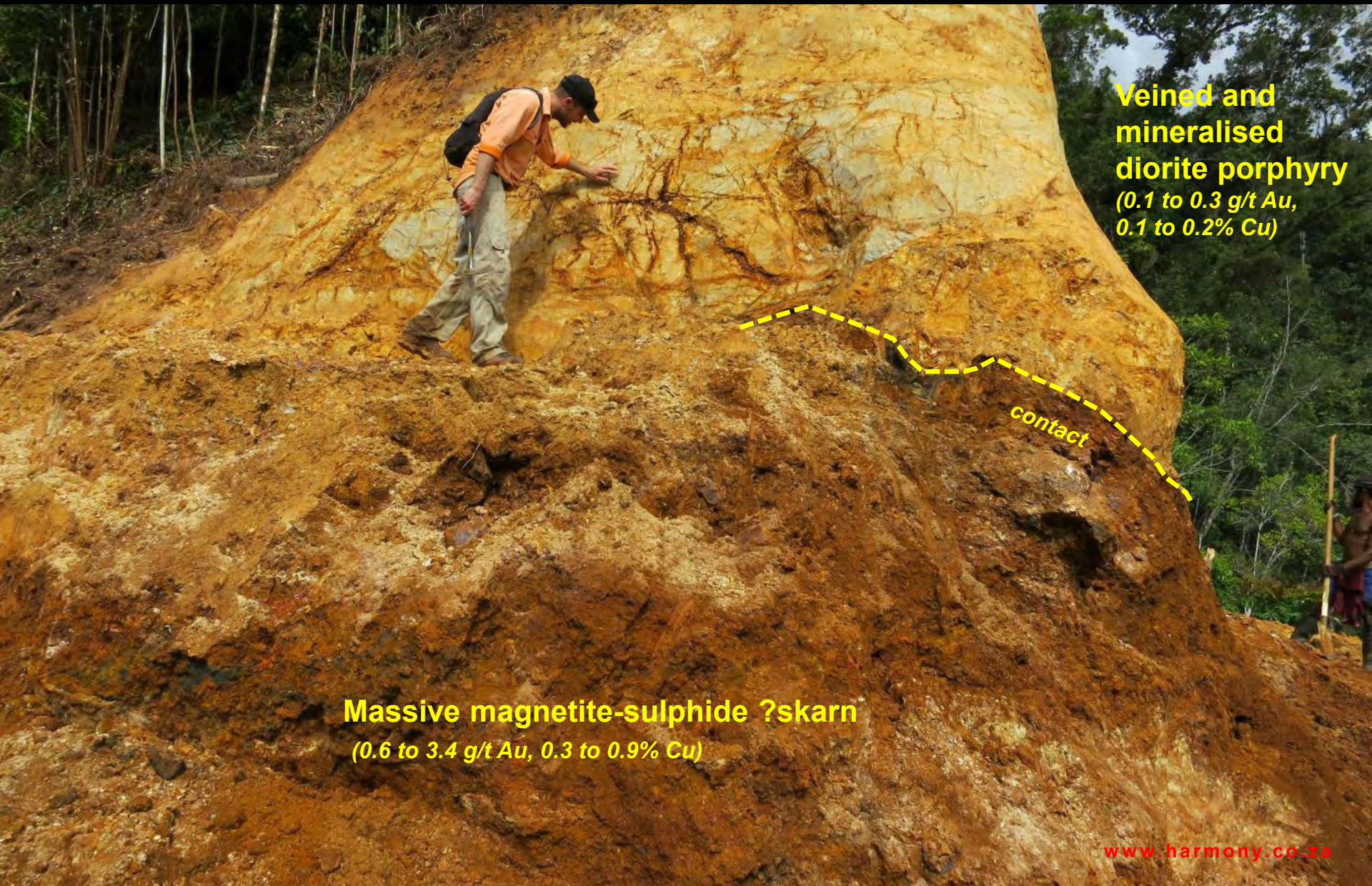


# Imaged magnetics – analytic signal



- Northeast trending faults
- Magnetite skarn associated with Central Mineralised Porphyry
- TZP composite porphyry as major discrete magnetic target
- Limestone, thrust and intrusive contacts





**Veined and mineralised diorite porphyry**  
(0.1 to 0.3 g/t Au,  
0.1 to 0.2% Cu)

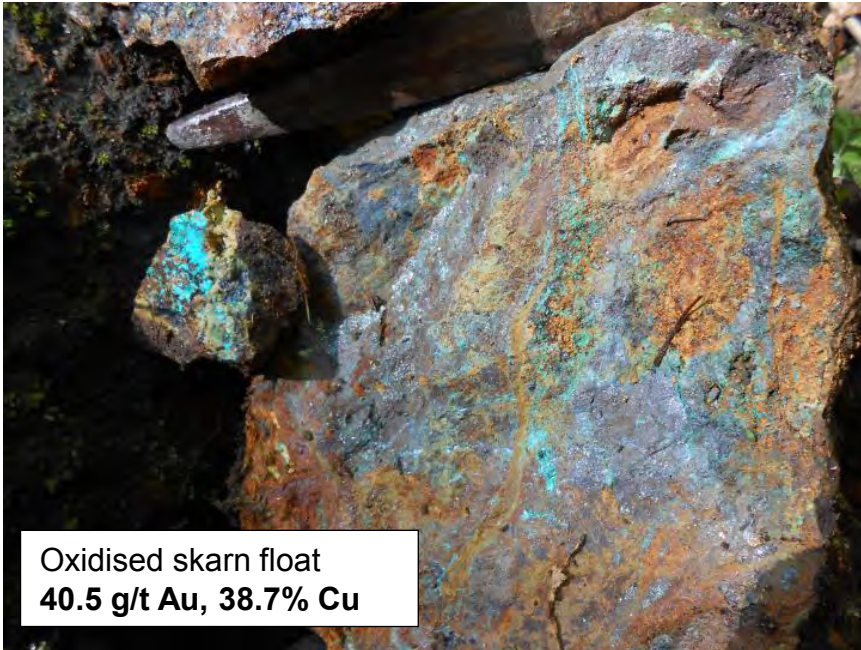
contact

**Massive magnetite-sulphide ?skarn**  
(0.6 to 3.4 g/t Au, 0.3 to 0.9% Cu)

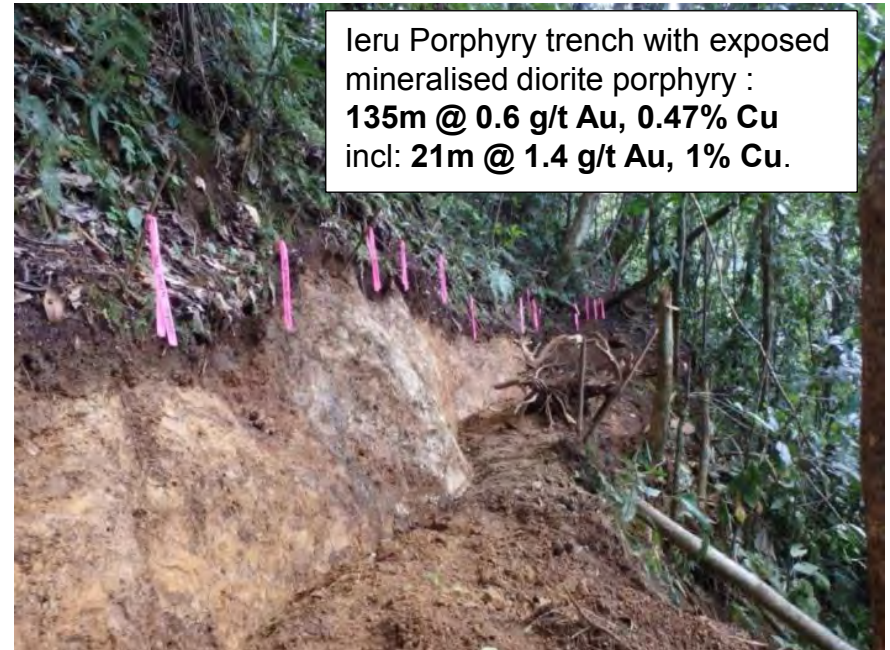


Copper stained, gossanous, brecciated skarn outcrop from head waters of Yalopi creek (**2.6 g/t Au, 2.7% Cu**)

# Prospect geology



Oxidised skarn float  
**40.5 g/t Au, 38.7% Cu**



Ieru Porphyry trench with exposed mineralised diorite porphyry :  
**135m @ 0.6 g/t Au, 0.47% Cu**  
incl: **21m @ 1.4 g/t Au, 1% Cu.**



KT003: veined sericite altered diorite porphyry.  
Interval shown 73-75m:  
**1.1 g/t Au, 0.6% Cu**



# CONCLUSION

- ✓ PNG is hugely prospective for gold and-copper gold deposits
- ✓ Our exploration expenditure in PNG has reaped rewards
  - over 32 million quality ounces added to the resource base
  - low cost of discovery
- ✓ Favorable climate
  - availability of contractors and resources
  - competitive rates
- ✓ Kili Teke – the next new world class copper-gold mine?
  - highly prospective belt, favourable host rocks and structural geological setting
  - widespread (kilometer scale) alteration and geochemical footprint
  - high-grade copper and gold assays forming discrete zones within the broader footprint
  - outcropping mineralised porphyry, high-grade Cu-Au skarn and mineralised breccia
  - supporting magnetic signatures

# QUESTIONS?

## CONTACT US

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[www.harmony.co.za](http://www.harmony.co.za)

## OUR KEY VALUE DRIVERS

1. We are efficient miners
2. We fund our capital to ensure future growth and profitability
3. We are experienced explorers, mine developers and operators in emerging economies
4. Golpu will develop into a world-class copper-gold mine

JSE (HAR)  
NYSE (HMY)