



# MINING OUTLOOK

## Papua New Guinea

Next wave of projects in the sector and forthcoming reforms.



**Jerry Garry**  
Managing Director  
Mineral Resources Authority  
15<sup>th</sup> August 2022



# World-Class Geological Destination

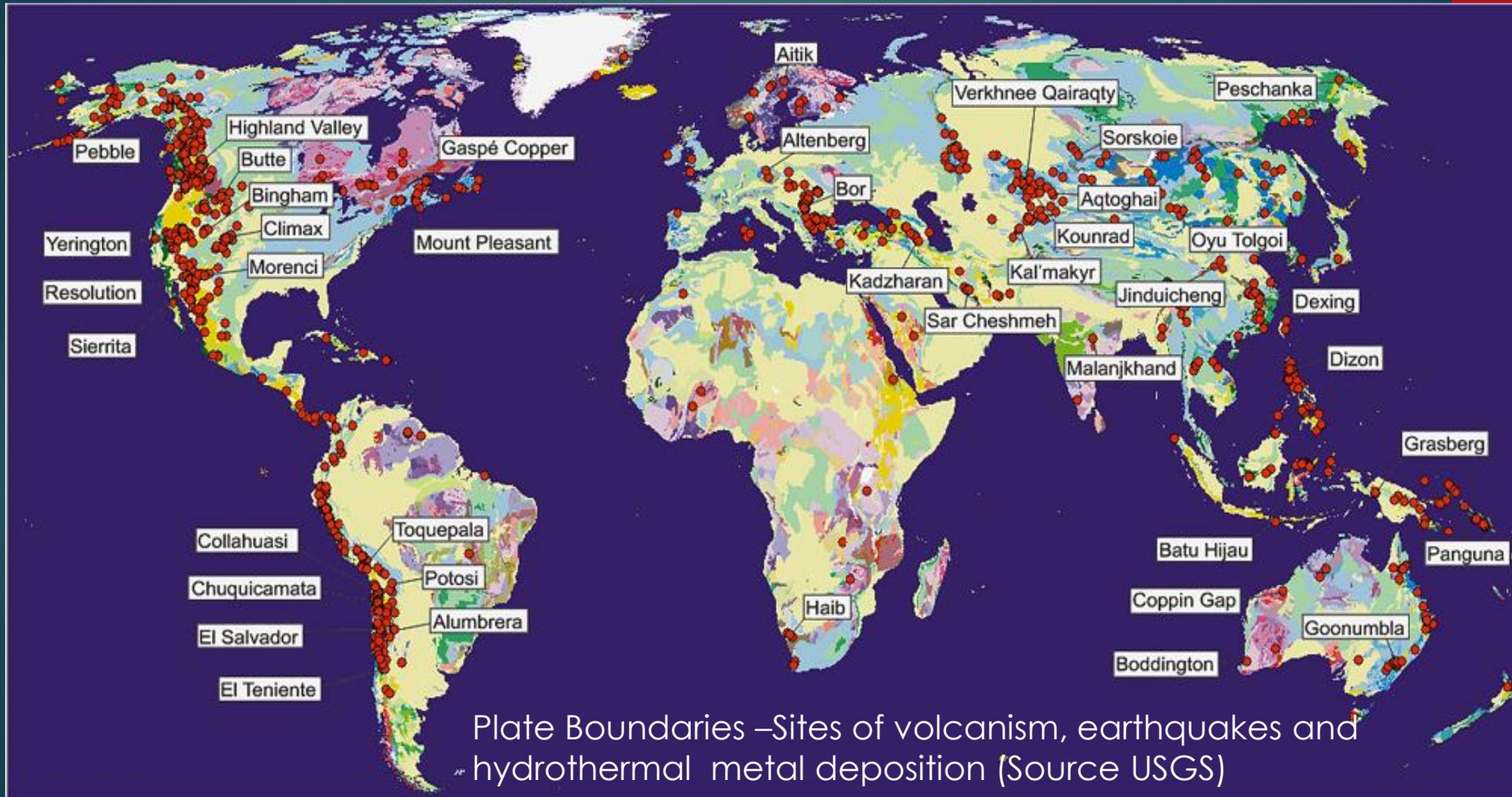
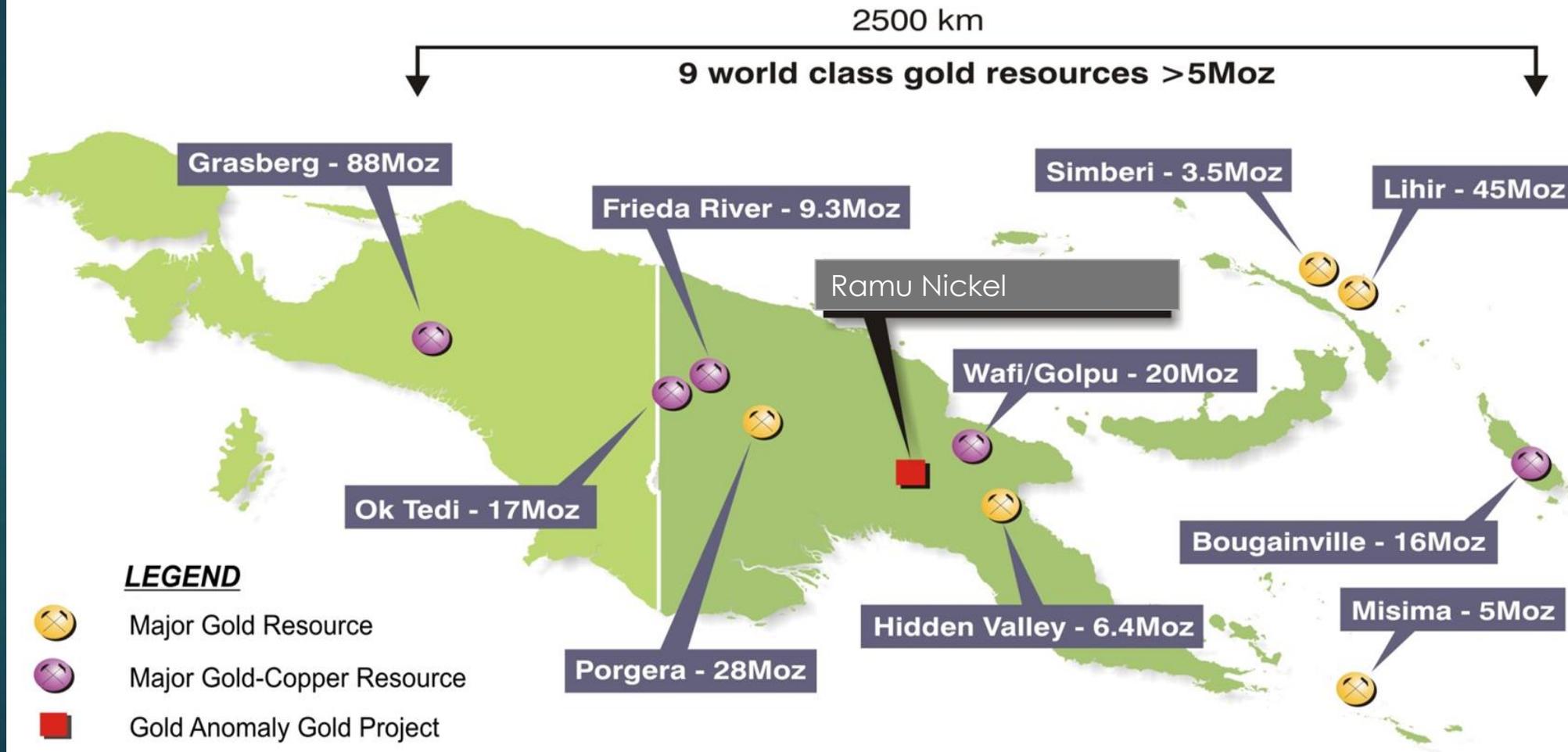


Plate Boundaries – Sites of volcanism, earthquakes and hydrothermal metal deposition (Source USGS)

# Proven World-Class Mineral Deposits

## PAPUA NEW GUINEA - ONE OF THE BEST ADDRESSES FOR THE DISCOVERY OF WORLD CLASS GOLD DEPOSITS



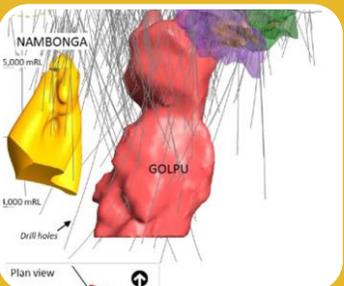


# Status of three Large-Scale Projects



## PORGERA MINE RE-OPENING

- 11 million ounces gold reserves; 600,000 ounces dori and 5% gold as concentrate per annum
- Shareholders Agreement and possibly new SML outstanding
- Benefits: 51% State Equity including 10% Landowners + 5% Enga Provincial Government (EPG)
- Resettlement, **Social Licence fee**, 3% royalty
- Re-opening anticipated by Q4/2022



## WAFI- GOLPU PERMITTING

- 19 million ounces gold and 8.6Mt copper resource; 200,000 ounces gold & 200-300,000 tons copper per annum;
- Environment Permit was Issued on December 18, 2020;
- Negotiations for Mining Development Contract in final stages; and
- Special Mining Lease Application before Mining Advisory Council – Q4/2022 Permitting



## FRIEDA RIVER PERMITTING

- Initiated Assessment. Deferred due to project complexities and over -commitments by the State Team
- Frieda Concept – shared-use power, road, bridge, wharf and airstrip development anchored upon mine development, and anticipates Public-private partnership arrangement.
- Anticipate resumption of assessments and commencement of MDC negotiations in Q1/2023.

# Status of medium - scale projects

## EXISTING MINES



- **SIMBERI MINES:** permitted conversion from oxide to sulphide ore processing, US\$300 million (US\$170 mill CAPEX + US\$120 mill SUSCAPEX), 6 million ounces mineral reserves, 160kt ounces gold production per annum from 3Mtpa, AISC US\$896 per ounce, Payback 3 years, LOM extended for 11 years to 2035.
- **HIDDEN VALLEY MINES:** Mining Lease extended for 10 years to 2030, LOM to 2027.

## PERMITTED PROJECTS



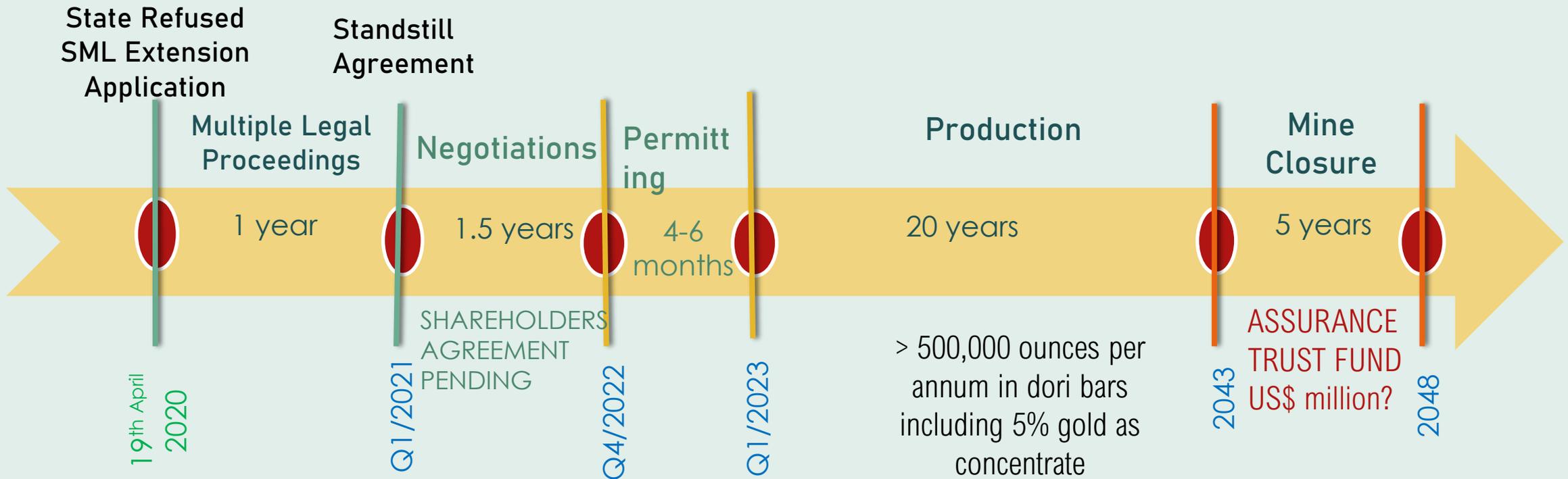
- **CENTRAL LIME, CLINKER & CEMENT.** Granted Mining Lease (ML) to 2040. Capital raising affected by COVID-19 , US\$ 350 million CAPEX – equity & Debt Financing. Energy intensive.
- **WOODLARK GOLD PROJECT.** ML Granted in 2014. 1 million ounce reserve. Capital raising ongoing; \$100 million in resource definition drilling & Landowner relocation, and development work in past 18 months.

## UNDER PERMITTING



- **MAMBARE NICKEL** – proposed **Direct Shipment Ore** (Laterite nickel-cobalt) targeting > 1.25 Ni grade. JORC Resource of 162.5 million tons @ 0.94% Ni and 0.09% Co (1.53 million tons of nickel) **WOWO GAP** - JORC Resource of 110 million tons @ 0.81% Ni and 0.06% Co (890K tons nickel + 66K tons of cobalt).
- **OK TEDI SML – EXTENSION FOR 20 YEARS** under processing, (LOM to 2031?)

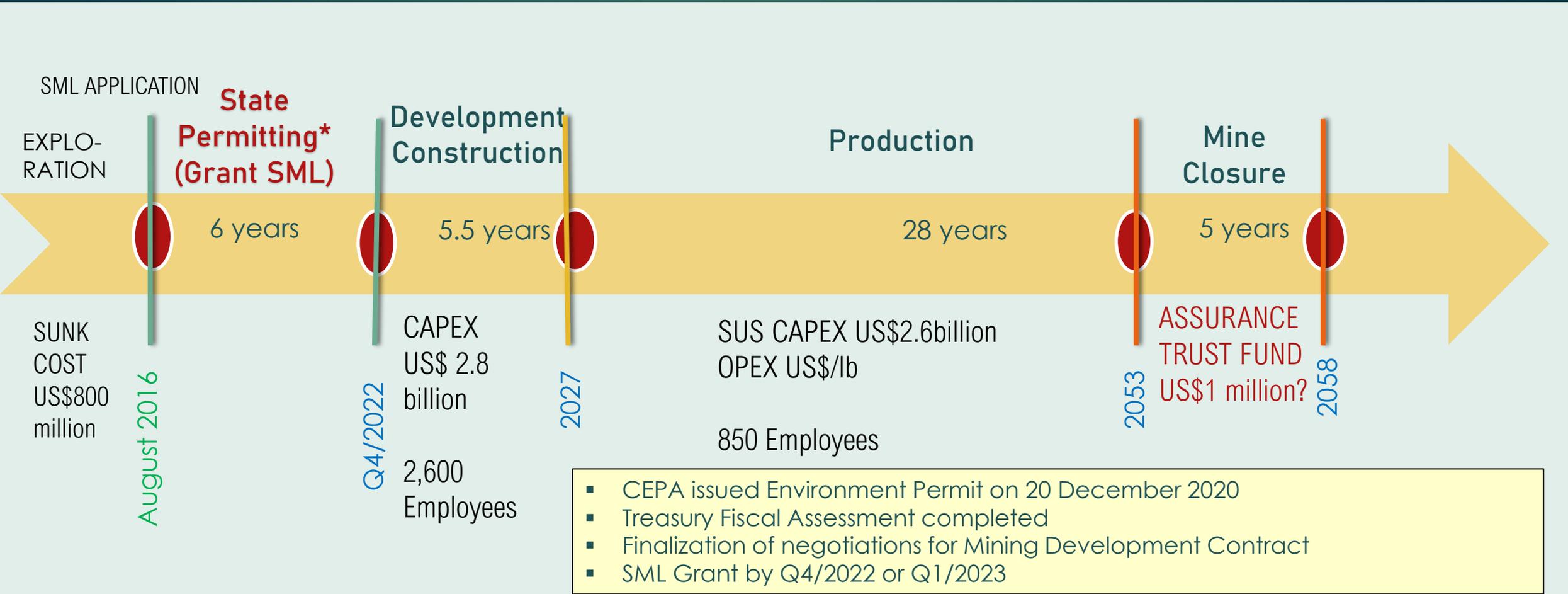
# Porgera Mine Re-opening Schedule



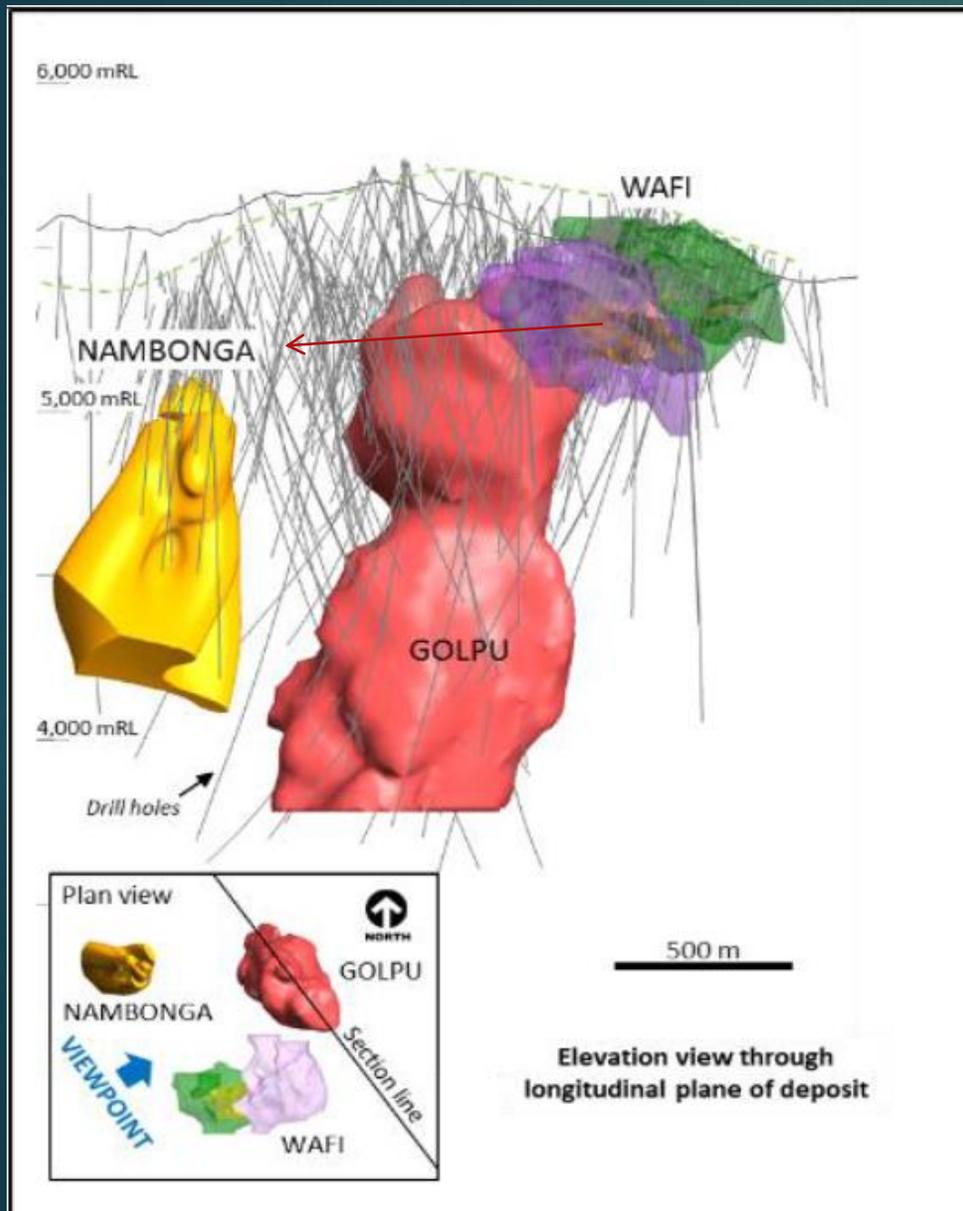
- Drive For Better Benefits
- Improving Business Modality
- Social Licence to borne entirely by the Mine

- Re-engagement Of >3,000 Jobs
- Contribute 500-600,000 Ounces Of Gold Per Annum
- 18.5% Metals sold will Remain In PNG at the Outset

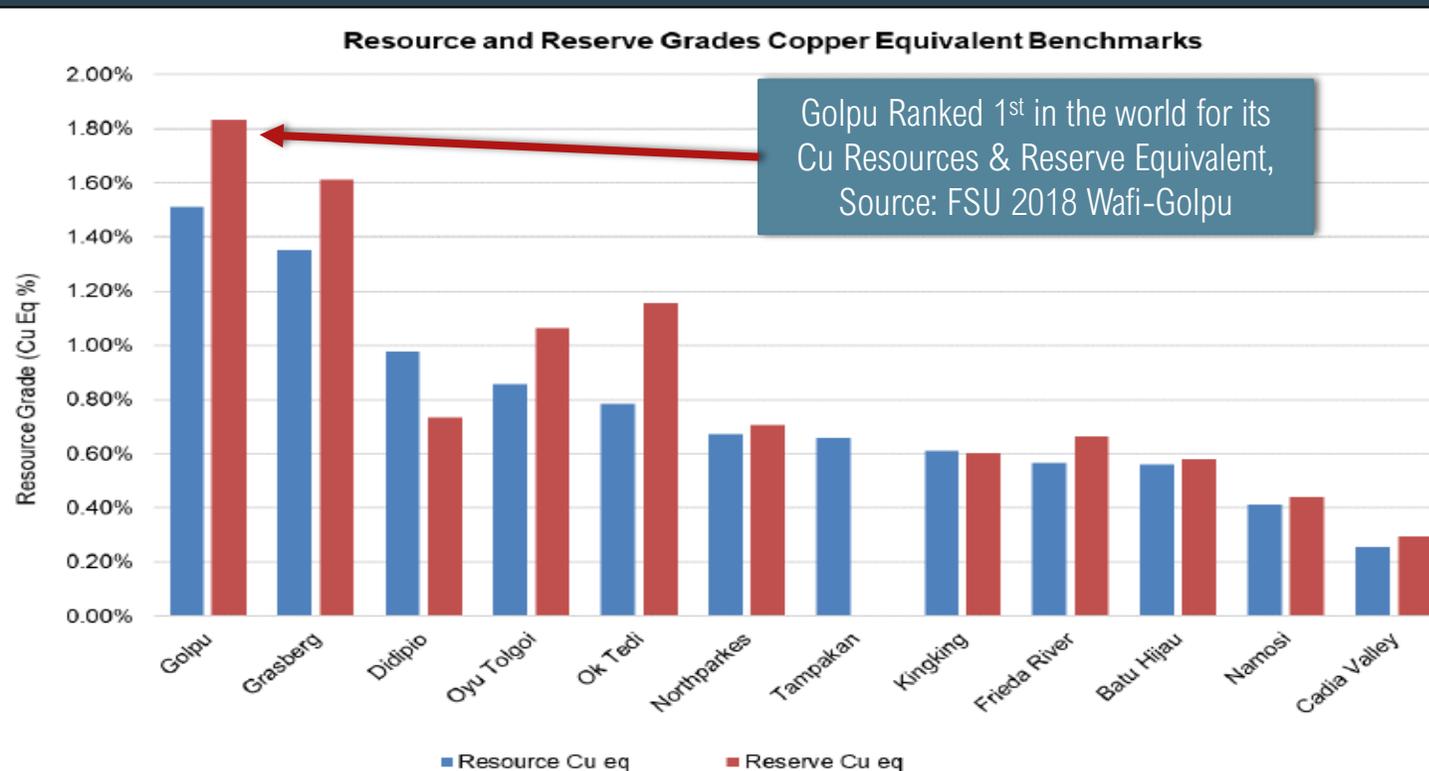
# Wafi-Golpu - Tentative Project Timeline



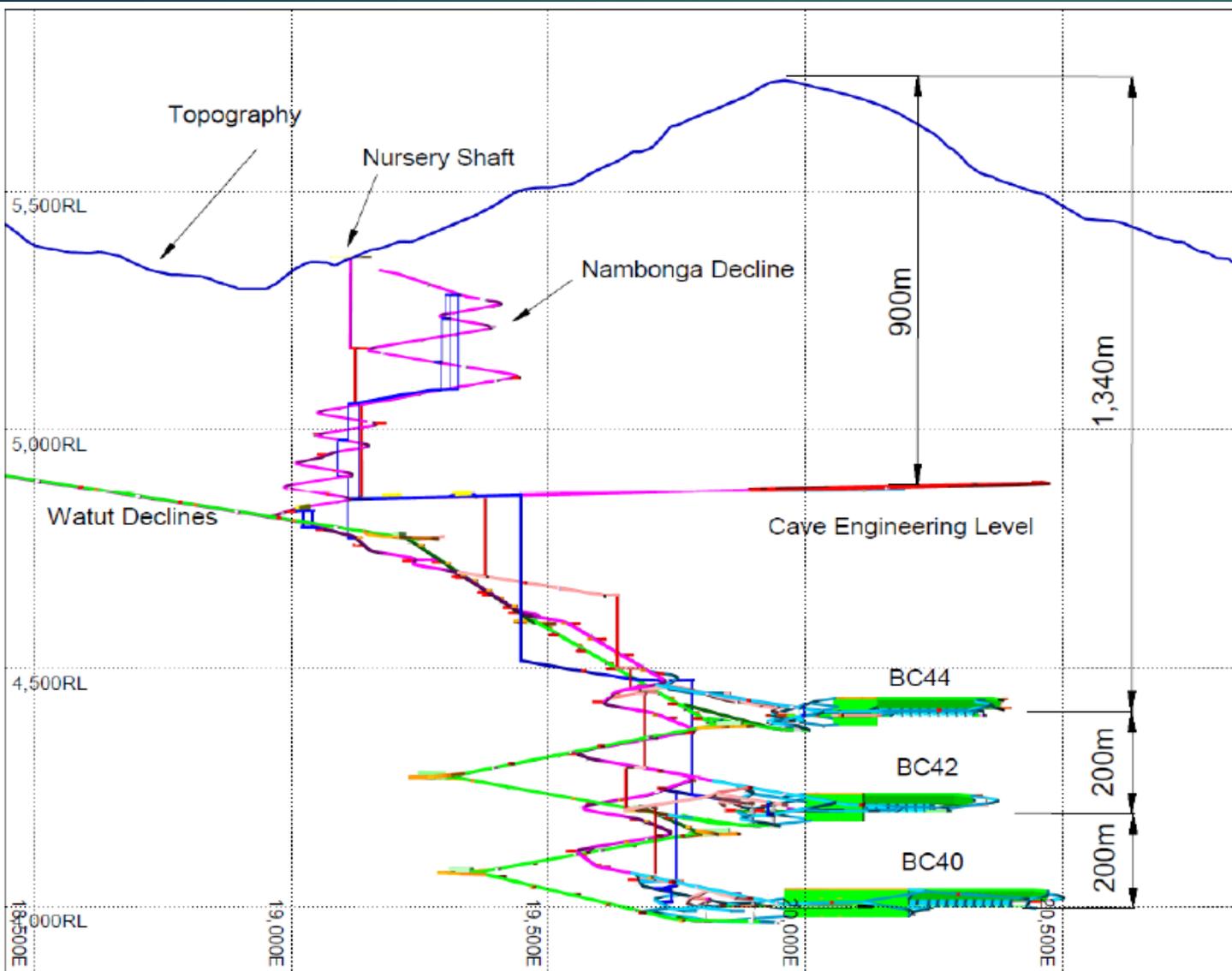
# Golpu Mineral Resource



- ✓ Total Mineral Resources (Indicated & Inferred) as at June 2017: 824Mt @0.7 g/t Au, 1.05% Cu & 1.25g/t Ag and 90 ppm Mo.
- ✓ Contained Metal 18.6Moz gold & 8.6Mt copper, 33.1 Moz silver & 74 kt Molybdenum
- ✓ Nambonga and Wafi mineral resources are not included.



# Golpu Mining – Schematic layout



## Cave Engineering Level

- 4825m RL
- Above Reid Fault

## BC44

- 4400m RL
- 65Mt, 7 years (2 year overlap with BC42)

## BC42

- 4200m RL
- 90Mt, 9 years (3 year overlap with BC40)

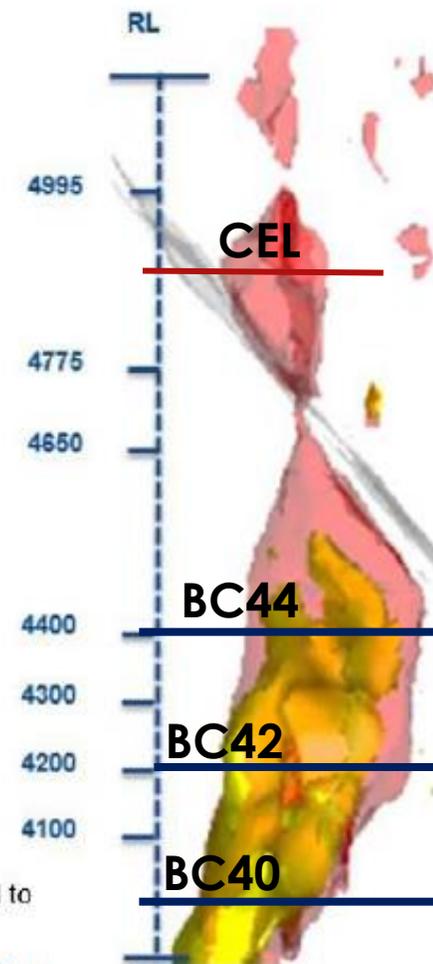
## BC40

- 4000m RL
- 210Mt, 16 years

Additionally 11Mt of development ore LOM to BC40; total 376Mt

Feasibility

Prefeasibility



# Mining Development Layout – Block cave

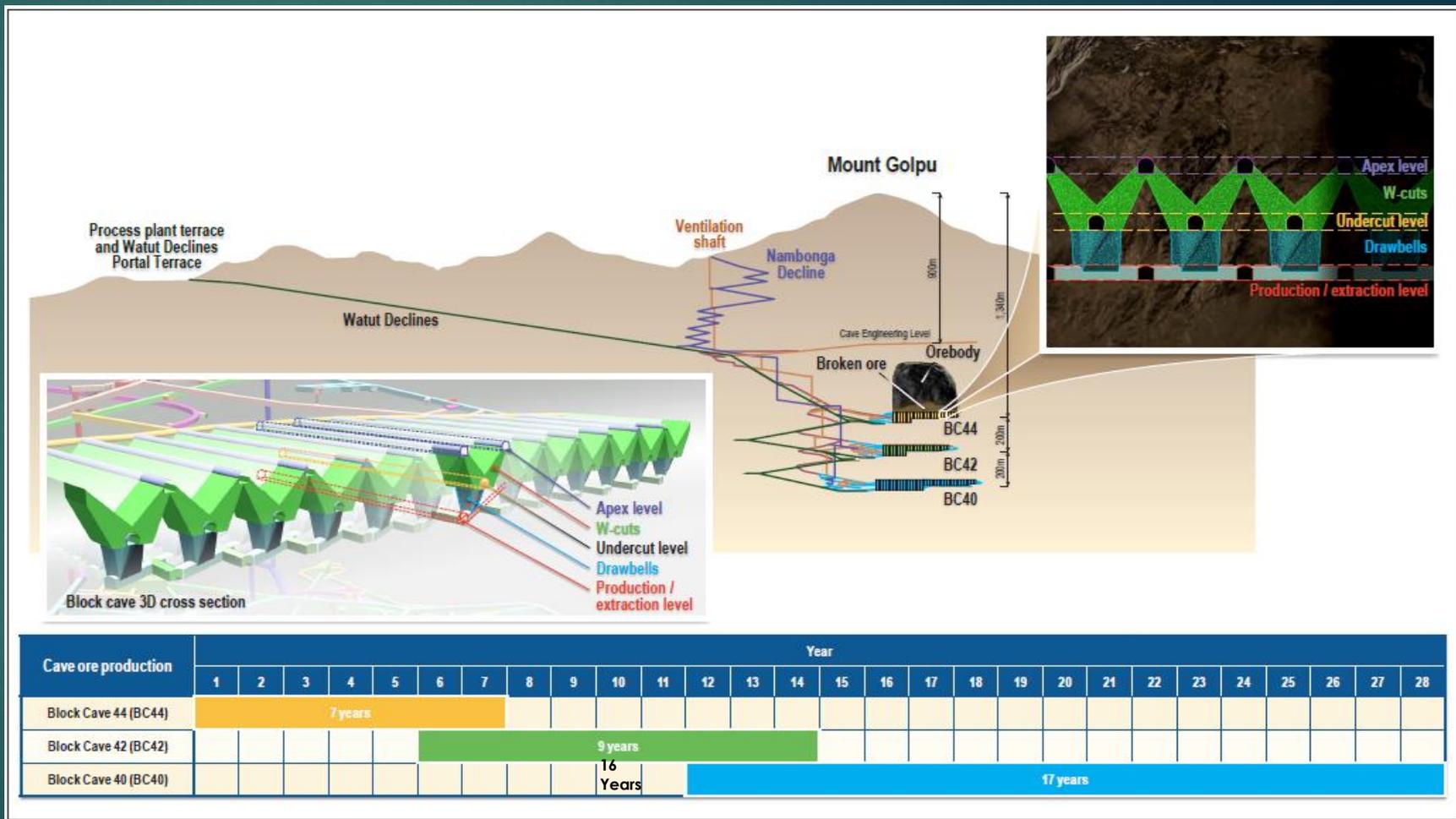
**First Underground Block Cave Mining Method to be deployed in PNG**

## MINING

Underground Block cave mining method  
 Mining via drawbells utilizing electric frontend loaders  
 Mining rate ore

## BENEFICIATION

Primary Crushing – Ore blasted and crushed underground; transport to the surface processing plant via conveyors



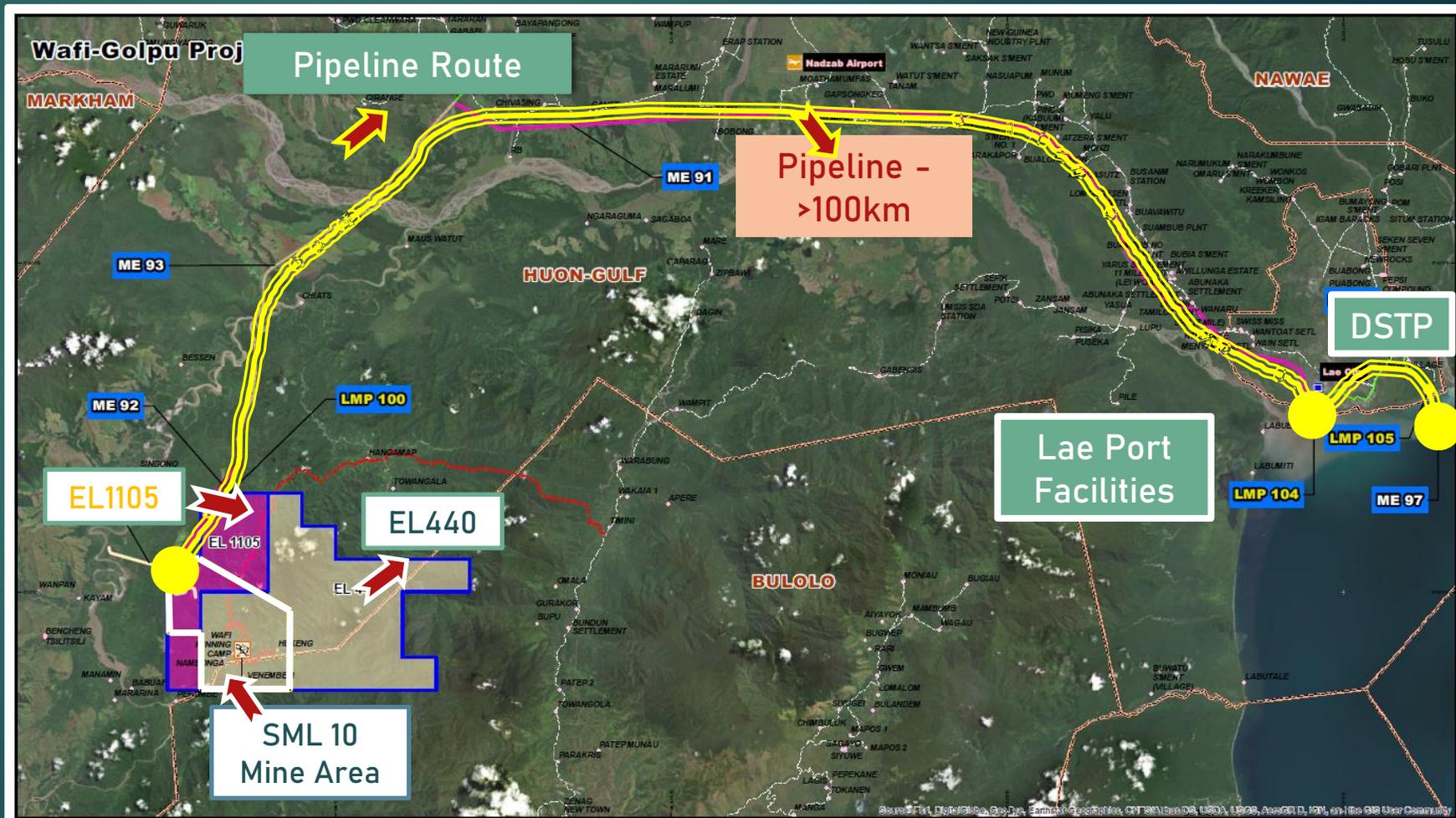
# Wafi-Golpu Project Footprint

## PROCESSING

Conventional floatation circuit to produce copper-gold concentrate.

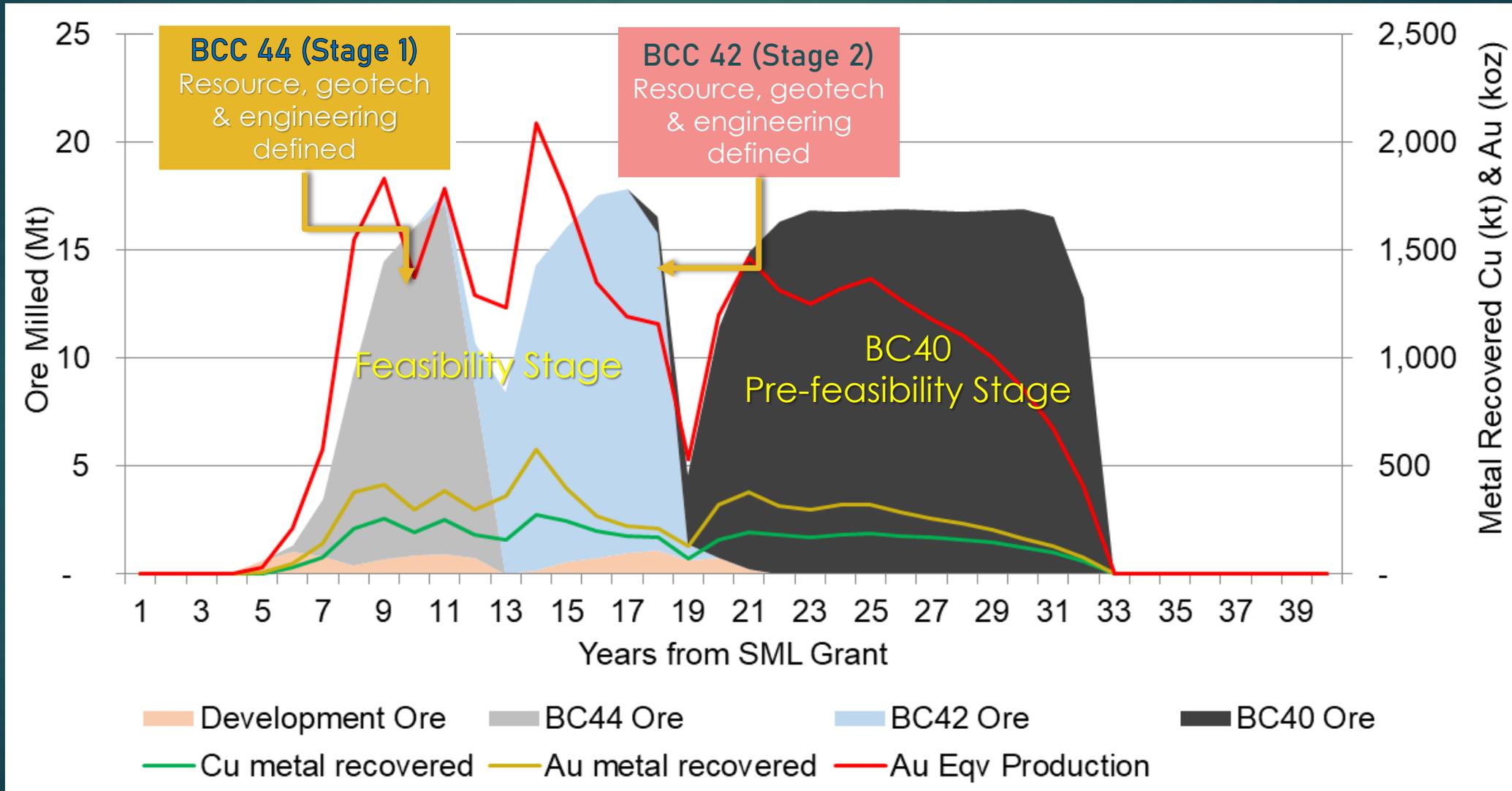
## >100KM PIPELINES TRANSPORT MEDIUM

1. Copper-gold concentrate product from mine to the Wharf
2. Tailings Product from the Mill to the Deep Sea Tailings Placement Site
3. Fuel, Oil and Lubricant transport from Wharf to Minesite

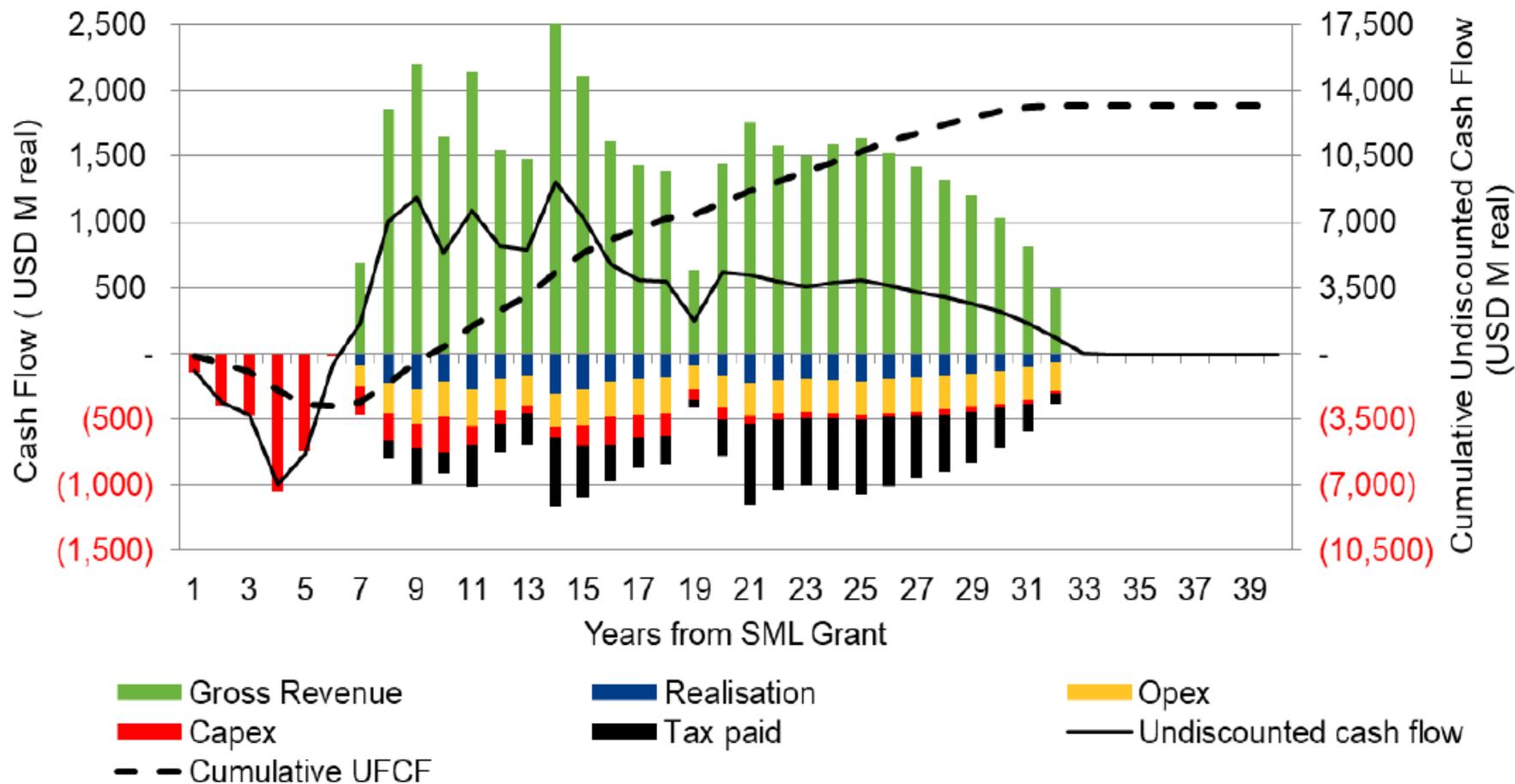


# Life Of Mine Production Profile

## ORE MINED AND METAL RECOVERED



## Free Cashflow



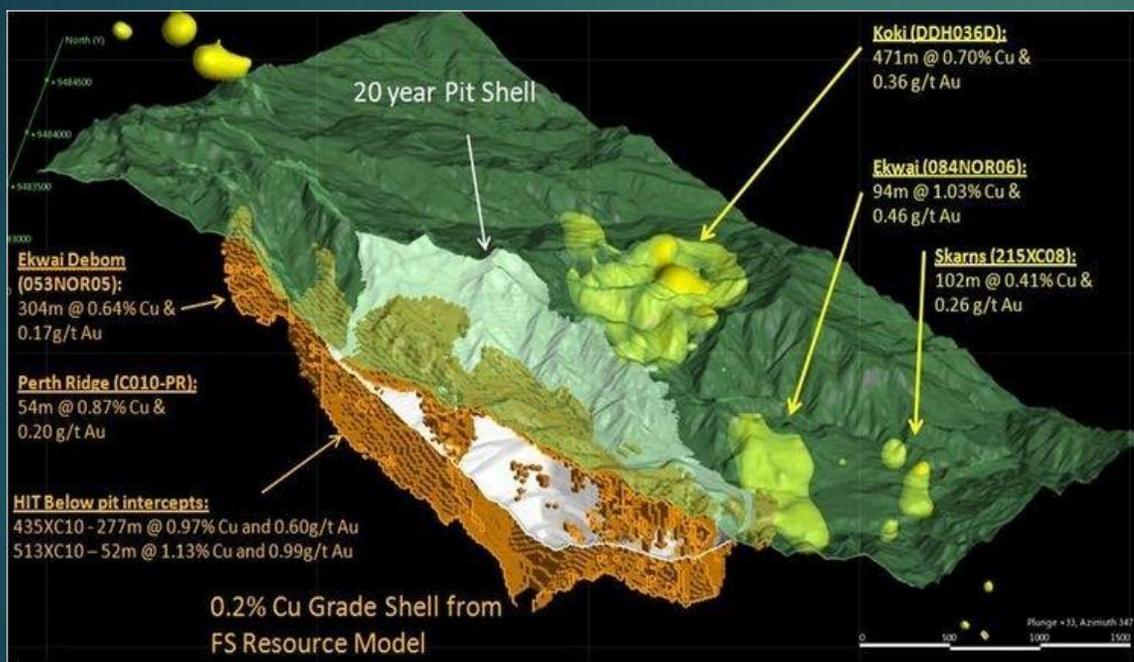
- Initial CAPEX US\$2.8 billion
- SUSCAPEX US\$2.6 billion
- OPEX US\$
- NPV US\$ 2.6 Bn
- IRR – 18.2%
- Payback Period - 9.54 years
- Free Cash Flow LOM – US\$13.16 Bn

# Frieda River Project - Tentative Timeline



- CEPA reviewing Environment Impact Statement
- Fiscal and Technical Peer Review and Assessment initiated
- Negotiations for Mining Development Contract pending
- SML Grant by Q4/ 2023

# FRIEDA RIVER COPPER GOLD RESOURCE



# FRIEDA RIVER PROJECT

4 interdependent components:

- Frieda River Copper-Gold Project (FRCGP), Frieda River Hydro-power Electric Project (FRHEP)
  - Sepik Infrastructure Project (SIP) and
  - Sepik Power Grid Project (SPGP)
- Total Capital Investment > US\$ 7 billion

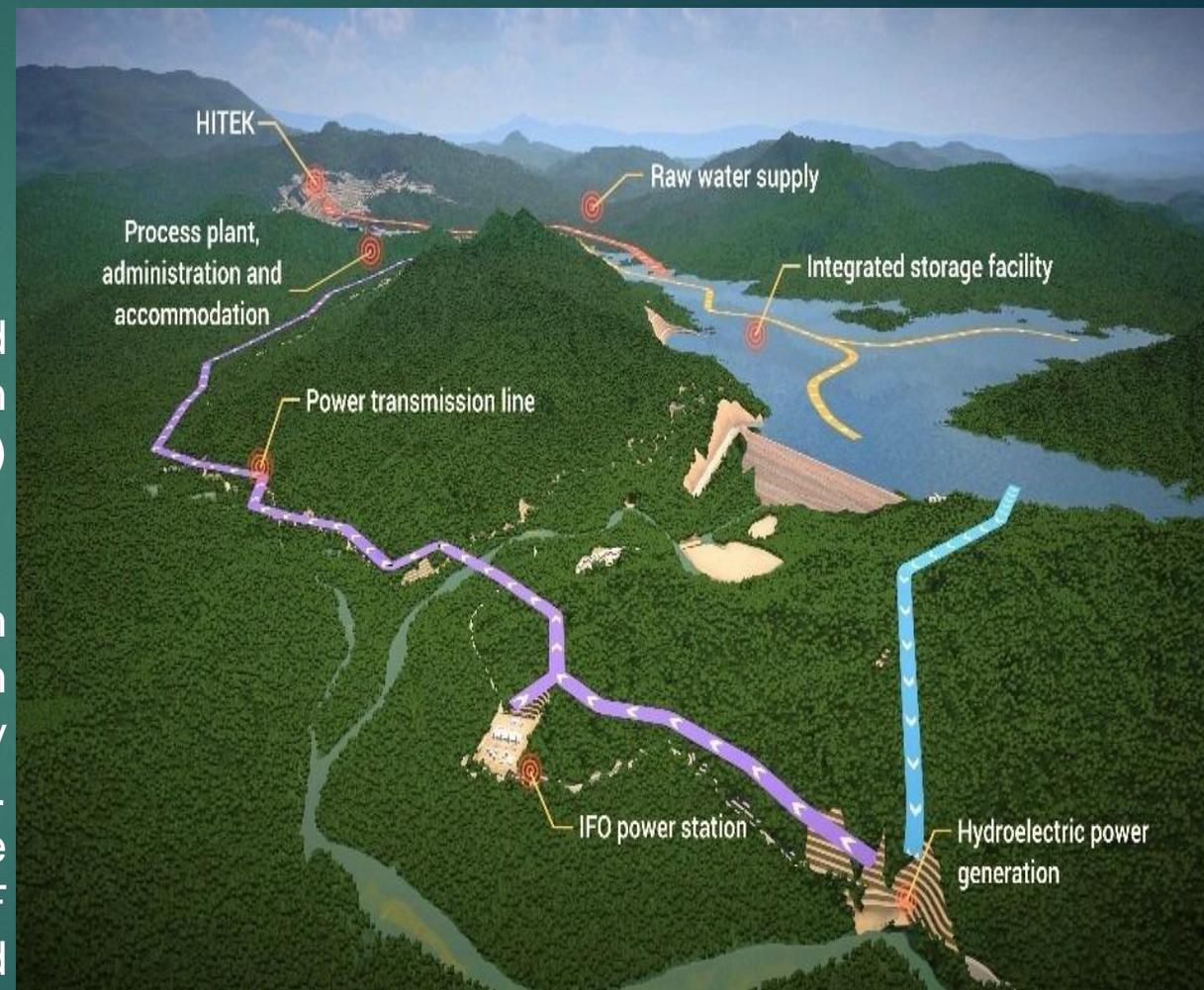
Combined Measured, Indicated and Inferred Mineral Resource of 2.6Bt at grades of 0.44% copper and 0.23 g/t gold (PanAust, 2017)

Contained metals 12 Mt Copper and 19 Million ounces Gold

# INTEGRATED STORAGE FACILITY (ISF)

Mine waste rock and process tailings will be stored subaqueously in the ISF which is designed to Australian National Committee on Large Dams (ANCOLD) standards

The ISF was designed as a large water dam rather than using conventional tailing storage facility design principles due to the higher level of stability and safety that forms the basis of the design for large water dams. This design philosophy was adopted by FRL to manage the risks associated with the characteristics of the ISF location, including seismic activity in the FRHEP area and the high rainfall, and the necessity for the ISF structure to remain stable under those conditions.





**Frieda River Copper-Gold Project**  
One of the largest undeveloped copper-gold deposits in the world providing long-term revenue.

**Frieda River Hydroelectric Project**  
A dam that will double the power generation capacity of PNG and drive economic growth for 100+ years.

**Sepik Infrastructure Project**  
Upgrade key infrastructure to support the Sepik Development Project and increase industrial growth.

**Sepik Power Grid Project**  
Development of power lines for electricity transmission around PNG to allow export and import of power.



## Power Generation capacity 600MW

Mine will utilize 180 MW increasing up to 280 MW

## Power Grid Reticulation

A 370-km-long 275 kV transmission line from the FRHEP to the Indonesian border via Vanimo.

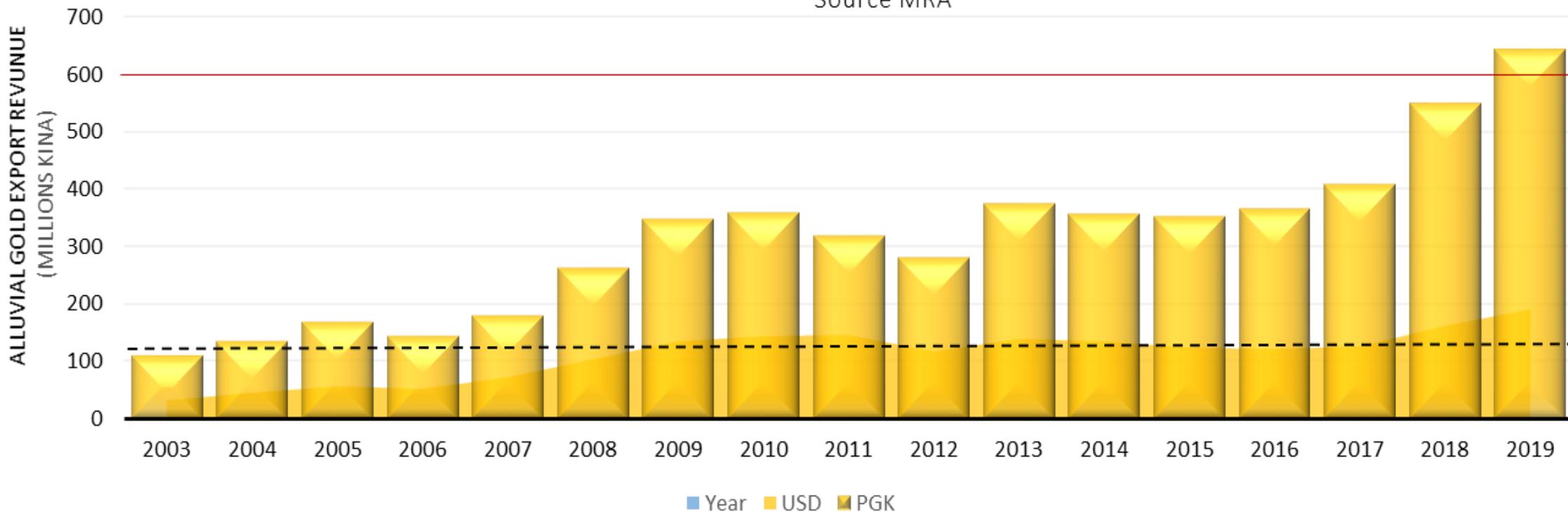
Due to the remote location and limited existing infrastructure in the region, the development of the mine will require significant investment in support infrastructure to provide the access, power and services necessary to operate the mine. Scope economically feasible mining project and to maximise the lasting development benefits to the region.

# Alluvial Gold Mining Sector

Alluvial Gold Export by Annual Revenue in Kina

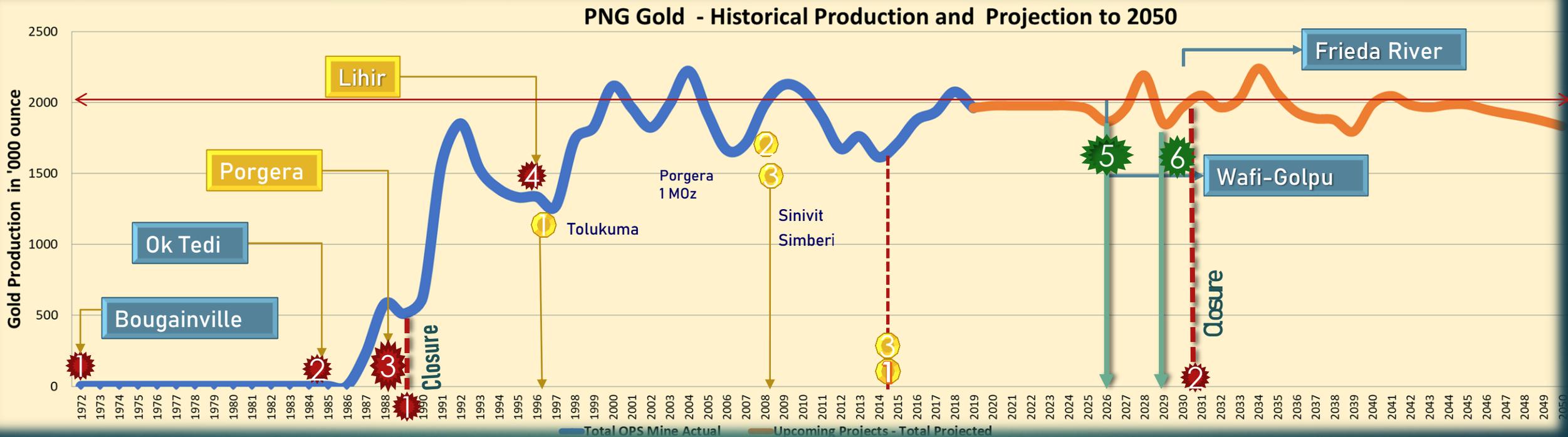
(2002 - 2019) .

Source MRA



Increased production from 80,000 ounces per annum in 2008 to over 120,000 ounces per annum. Interventions required to migrate from mainly artisanal mining to mechanized mining will increase gold production output.

# Gold Production - Historical & Forecasts



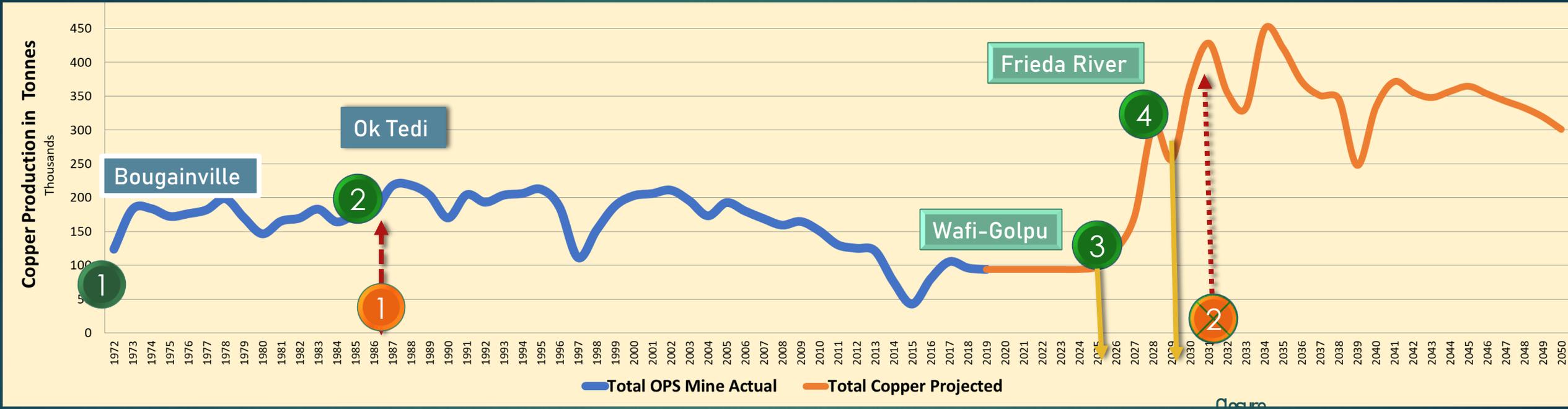
## MAJOR GOLD PRODUCERS

1. Lihir Gold Mine - >900koz per annum (pa)
2. Porgera Gold Mine - >500koz pa
3. Ok Tedi > 300koz pa to 2030?
4. Wafi- Golpu - 260koz pa to 20
5. Frieda River - 230kOz pa

## MINOR GOLD PRODUCERS

1. Simberi Mine - 100 -160koz pa
2. Hidden Valley Mine - >100koz pa
3. Kainantu Gold Mine - 100,000 - >300,000 Au Eq
4. Woodlark - >100koz pa

# Copper Production – Historical & Projections

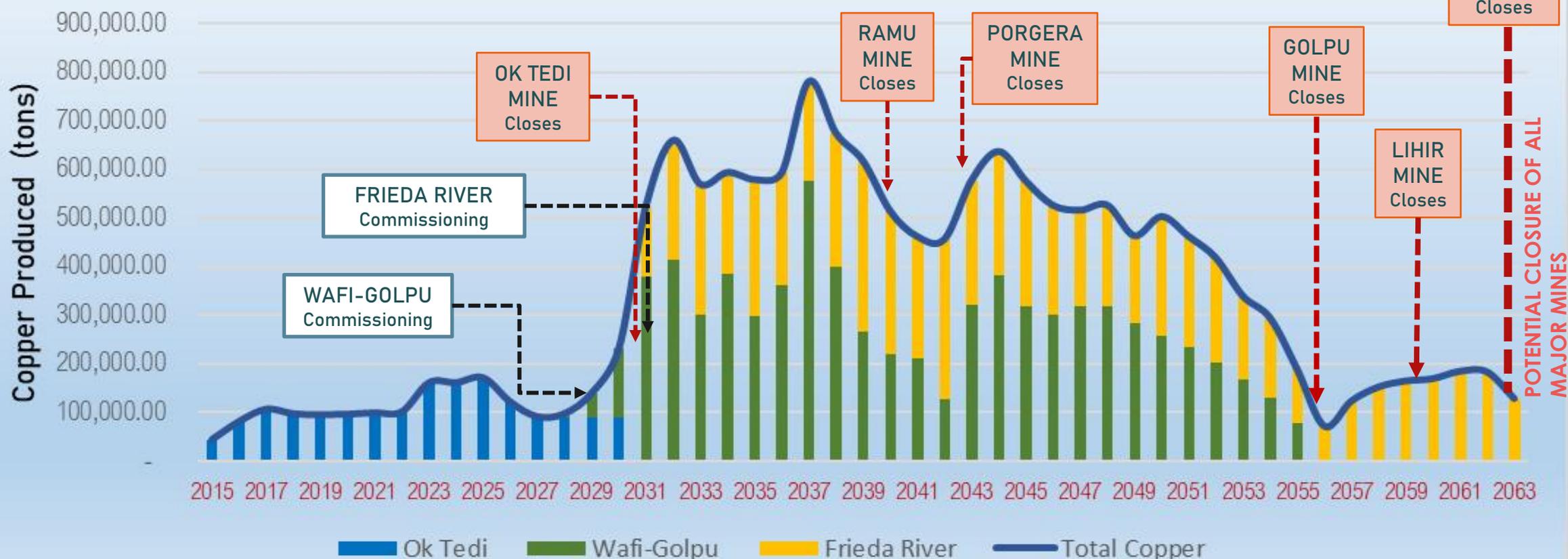


## MAJOR COPPER MINES & ADVANCED PROJECTS

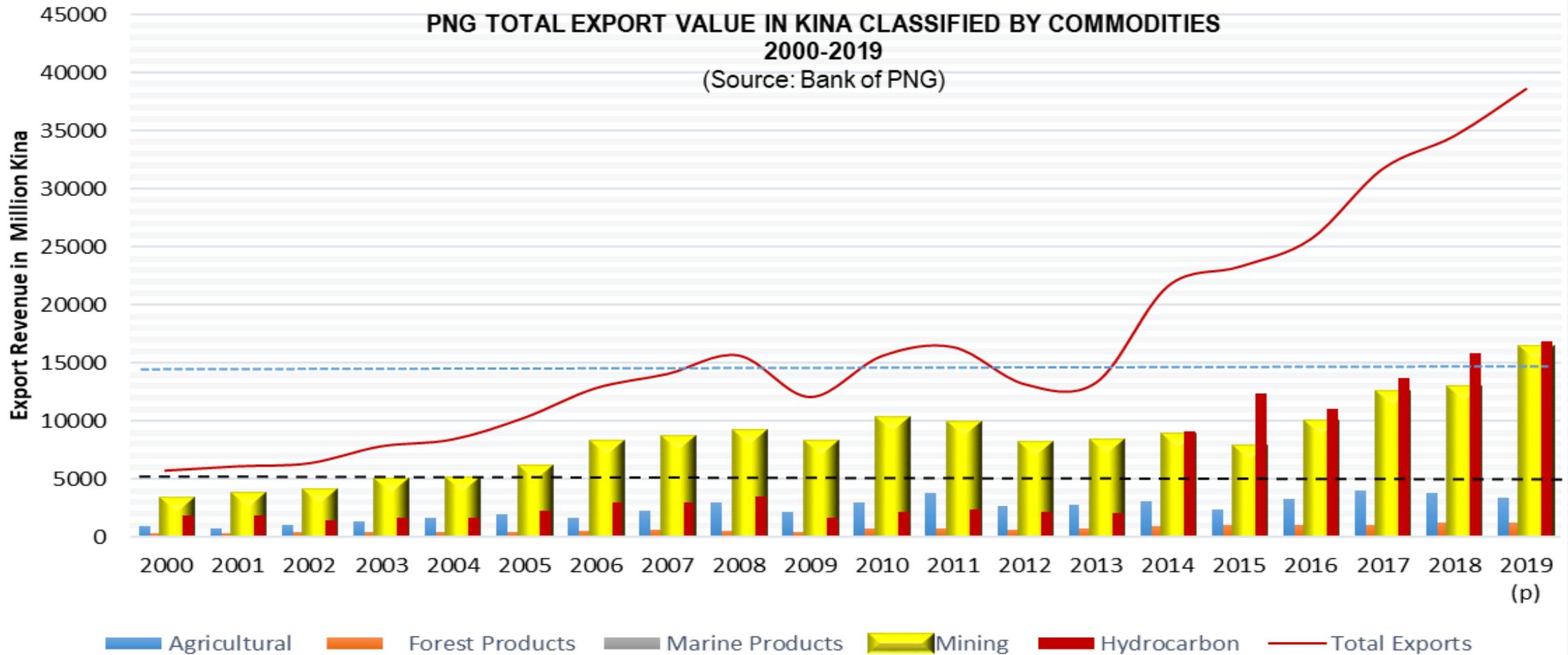
1	Bougainville	1972 - 1989	Mined 3 Mt copper (Cu) & 9.8 Moz gold (Au)	Remaining 4.6 Mt Cu & 16.3 g/t Au
2	Ok Tedi	1984 - 2031	Mined 5.09 Mt Cu & 15.6 Moz Au	Remaining 3.4 Mt Cu & 13 Moz Au 150k to >200k tpa copper to 2030?
3	Wafi- Golpu	2027 - 2056	Planned production rate - 200k tpa to >500k pta Cu to 2055	Resource - 8.6 Mt Cu & 19 Moz Au
4	Frieda River	2031 - 2063	Planned production rate - 175k tpa copper for 33 years Life of Mine	
5	Yandera	Pre-feasibility	2.4 Mt copper & 2.3 Moz Au	

# Mine Closure Outlook

## Copper Production - Papua New Guinea Historical & Outlook to 2063



# Export Imbalance - Mining & Hydrocarbon



# Export Imbalance - Mining & Hydrocarbon

Non-renewable commodities (minerals & hydrocarbon) continue to account for 80% of PNG's total export revenue.

This was recognized when developing the Medium -Term Strategic Plan III in 2018, but the status quo remains the same to this date, 2021.

Should the current trend continues without raising growth in the renewal sector, particularly the agriculture, forestry, tourism and marine sectors, the country may suffer from unsustainable economy when major non-renewal mineral resources are exhausted by 2055.



# Gaps - New Policies & Legislation



- **CAVEAT** - Revised Mining Act and New Policies will become effective after 2025. Caveat for Projects permitted prior to 2025, 50<sup>th</sup> Independence Anniversary.
- **SOCIAL LICENSING POLICY** - State intends to shift CSR obligations wholly to mining projects.
- **MINE CLOSURE POLICY** - Non-existent in legislation except a Guideline developed recently MRA, DMPGM with the support of Inter-Governmental Forum. Mine Closure will focus on sustainable and lasting socio-economic programs. Investing in agriculture, forest and marine to offset the imbalance. Pragmatic and realistic interventions during mine operational stage, even before commissioning of the mine, rather than 5 years or even after the mine closure.
- **POLICY - RENEWING MINERAL DEPOSITS**  
 Major mineral deposits will be depleted and pragmatic intervention policies to drive sustainability of mining industry in PNG.

**The Life Cycle of a Mine,**  
 (After University of Arizona website)

- **POLICY - GROWING NON-RENEWABLE ECONOMIC SECTOR**

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