The Humble PSI Reimagined

Julie Palich
Director – Principal
Geocontam Risk Management

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The Humble Preliminary Site Investigation – History and Evolution

Pre 1990s

- Contaminated land management ad hoc. Growing awareness that past land use left a legacy of contamination.

1990s - early 2000s

- *Resource Management Act 1991* established a framework for managing environmental effects including contaminated land.

2000

- Hazardous Activities and Industries List (HAIL) built and identified potentially contaminating land uses.

2012

- NES-CS came into force
- PSI became a legally recognised instrument
- PSI became the primary screening mechanism for HAIL sites

2020s

- PSI is now the cornerstone underpinning contaminated site investigation work with a focus on assessing whether contamination is possible ***based on past activities***.

Contaminated Sites Assessment is at a Crossroad

Why the Traditional PSI No Longer Suits New Zealand's Regulatory Purpose

1. History shows that the standard EA process inadequately predicts and manages future contamination risks.
   i. Environmental approvals practitioners are often not across the broadening range of contaminants and use the blueprint of the past to predict future risk.
   ii. New contamination risks persist due to inadequate risk identification and design planning.
2. Regulatory demands and timeframes have shifted.
   i. The FTA process requires proponents to demonstrate early understanding of potential environmental risks within compressed timelines.
   ii. Traditional PSIs typically do not address contamination risks associated with future operational activities, creating uncertainty for regulators and project teams.
   iii. Integrating future risk assessment aligns with the intent of the National Environmental Standard for Assessing and Managing Contaminants in Soil (NES CS) and modern environmental management expectations.
3. Stakeholders and Community expect more.

Our knowledge of past contamination risks is mature and can be applied to the future.

Core Components of the Forward-Looking PSI Framework

1. Dual-lens contamination assessment
   i. Legacy contamination from historical land uses
   ii. Future contamination sources linked to proposed operations, materials, and infrastructure.
2. Expanded future-focussed conceptual site model
   i. Operational scenarios – infrastructure, earthworks
   ii. Potential contamination sources and storage locations
   iii. Expected changes in site hydrology and landform that may impact migration pathways
   iv. Future receptors sensitive to historic and new contaminants
3. Future Pathway and Scenario Screening
   i. Where contaminants *could* arise during construction, operations, and closure.
   ii. Pathways and receptors that *might be* affected in the context of historic and future land use.
   iii. Targeted management and monitoring requirements.
4. Targeted Baseline Study Design
   i. Aligned with existing and future environmental risks.
   ii. Proportionate and cost effective
   iii. Designed to prevent future data gaps that often lead to unnecessary remediation

The Forward-Looking PSI in Practice – Bendigo Ophir Gold Project FTA

1. The BOGP project area covers 568 Ha in the Central Otago goldfields
2. In the early 1860's Otago was a sheep-farming pastoral community.
3. Between 1860s and 1940s gold mining occurred using alluvial sluicing and hard rock mining with battery stamping methods.
4. Since 1980s modern mining exploration has been undertaken.
5. The proposed project includes both open cut and underground mining using conventional hard rock gold processing methods.
6. Operations will include:
   i. Processing plant.
   ii. Tailings, waste rock, and topsoil management areas.
   iii. Fleet workshops, vehicle washing, warehouses, and laydown areas.
   iv. Water treatment plant.

Come-In-Time historic battery and water wheel.

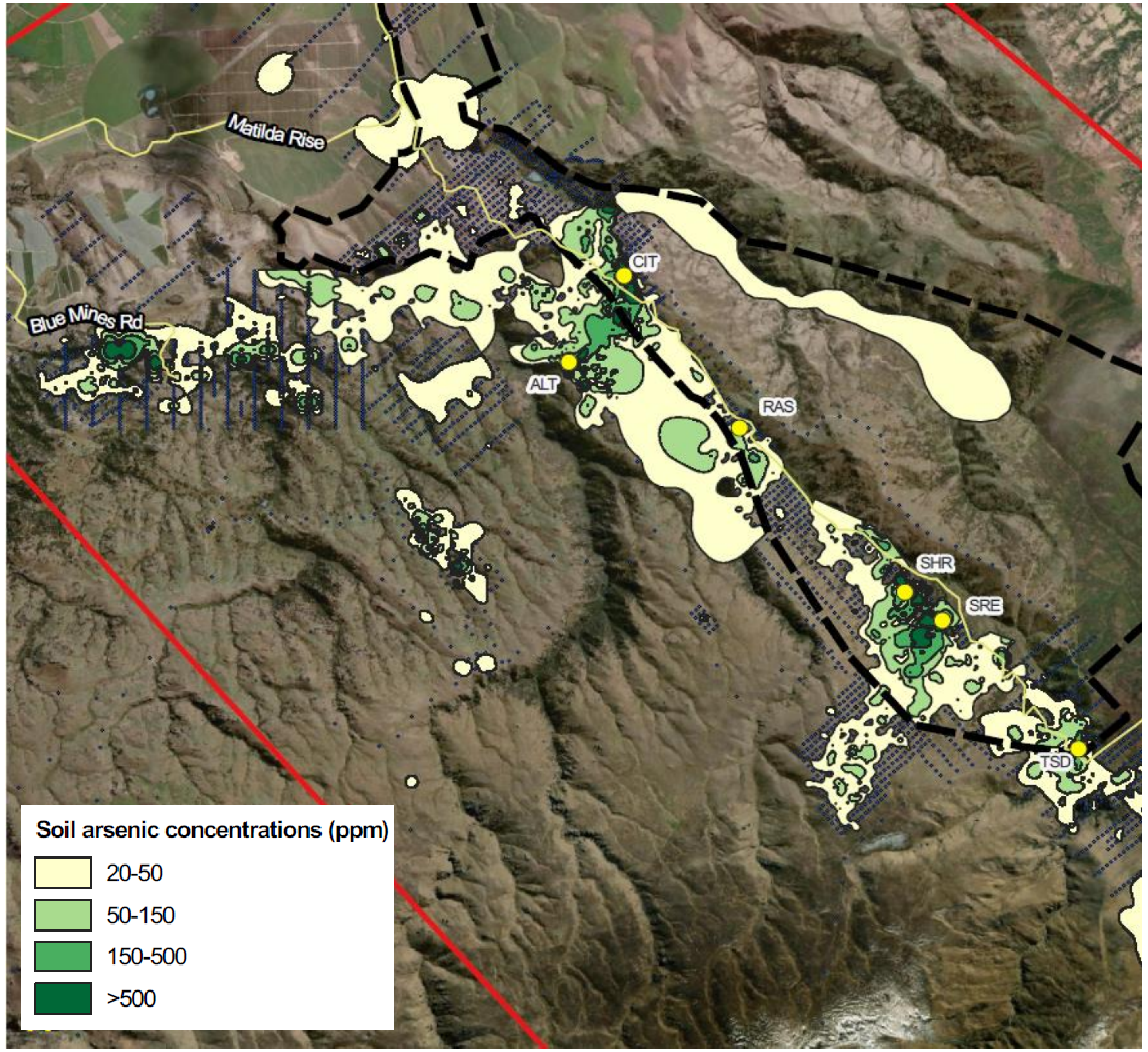
Historic vs Future Risk Profile

HISTORIC CONTAMINATION RISKS		
APEC	COPC	RISK
CIT Historic Mining Area	Sulfate (SO_4)	MODERATE
Eureka Historic Mining Area	Metals: As, Cd	
Alta Historic Mining Area		
RAS Historic Mining Area		
Historic Sluicing Area		
Historic Mine		
Historic Tailings Fields		
Historic Water Races		INSIGNIFICANT
Historic Dam	None identified	INSIGNIFICANT
Pastoral Land Use	Nitrogen compounds: NO_3, Amm-N	MODERATE
Woolsheds	Metals: As OCP, DDT, lindane, dieldrin and aldrin	INSIGNIFICANT (Offsite - Not a source that will impact this project)

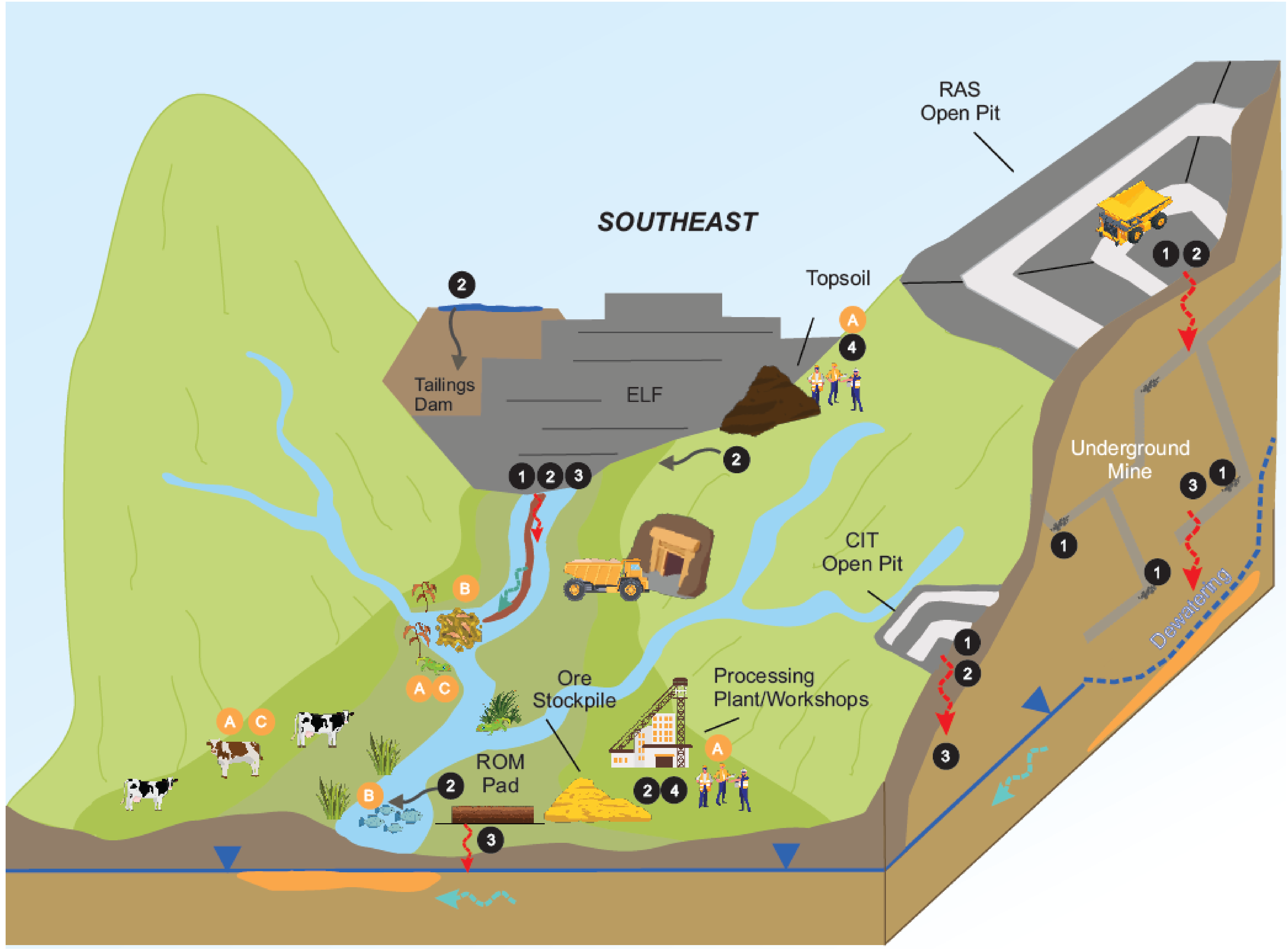
FUTURE CONTAMINATION RISKS		
APEC	COPC	RISK
Open Pits	Nitrogen compounds Sulfate Metals: Al, As, Fe, Cd, Co, Cu, Hg, Mn, Ni, Pb, Tl, Zn Petroleum hydrocarbons	HIGH
Underground Mine		
ROM Pad	Nitrogen compounds Sulfate Metals: Al, As, Fe, Cd, Co, Cu, Mn, Ni, Pb, Tl, Zn	MODERATE
Processing Plant	Cyanide, sulfate Metals: As, Cu	
Engineered Landform (ELF)	Nitrogen compounds Sulfate Metals: Al, As, Fe, Cd, Co, Cu, Hg, Mn, Ni, Pb, Tl, Zn	HIGH
Tailings Storage Facility (TSF)		
Topsoil Stockpiles	Metals: Al, As, Fe, Cd, Co, Cu, Hg, Mn, Ni, Pb, Tl and Zn	LOW
Vehicle Washdown and Refuelling Facilities	TRH, BTEX, PAH	MODERATE
Explosives Magazine and Emulsion Factory	Ammonium nitrate, TRH (diesel)	
Open Pit and Underground mining fleet workshops	Solvents, TRH, BTEX, PAH, metals, oils, and grease	

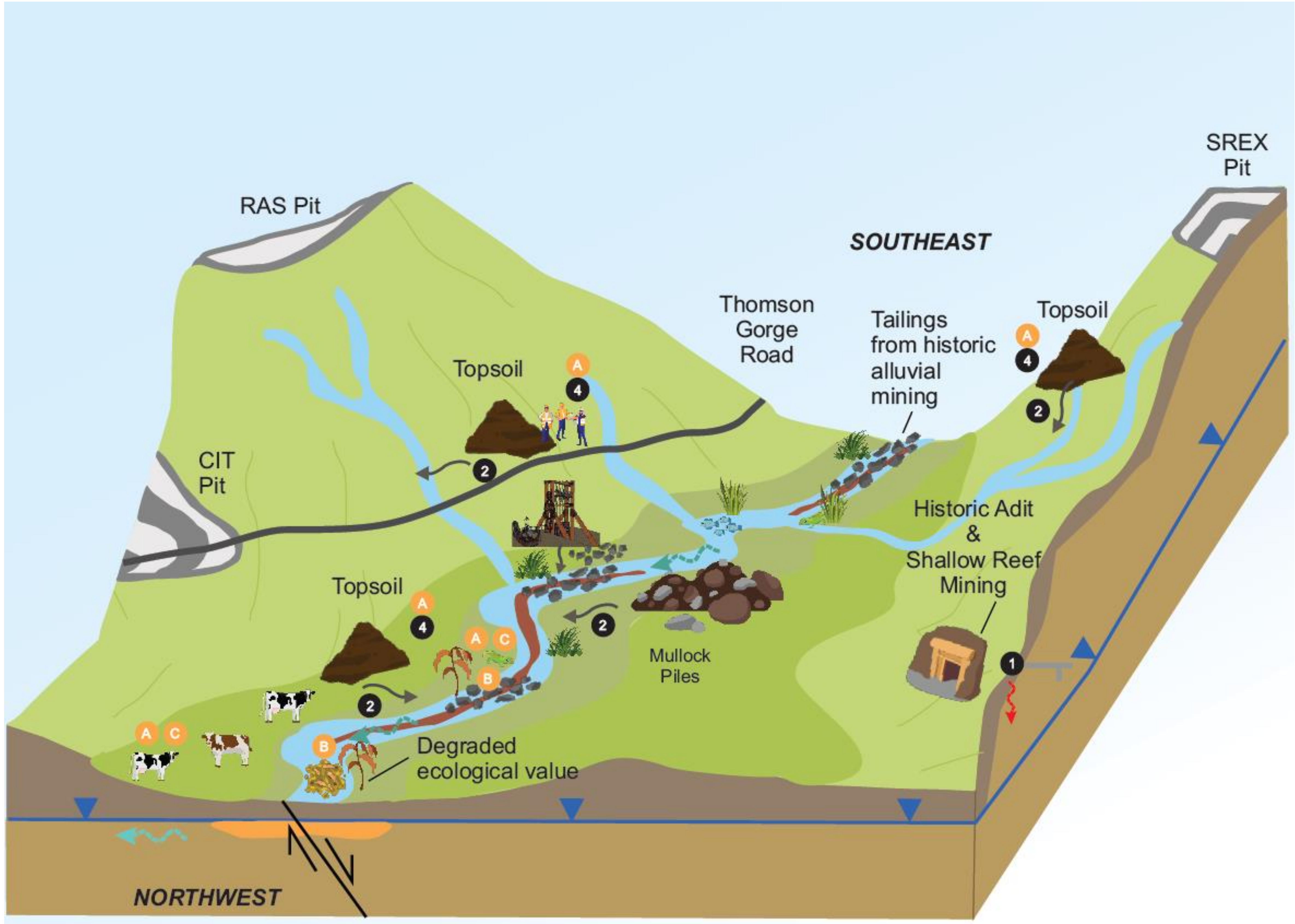
Improved Soil Investigation Design and Management Planning

- Initial soil assessment in the catchment with historic mine workings.
- BUT new mine infrastructure located in separate catchment.
- Forward-looking PSI highlighted need to quantify natural mineralised vs previously mined conditions.
- Broader range of metals included in pXRF screening to establish baseline.
- Allowed for different management targets to be set for the different catchments & early identification of need for SSTVs
- Reduced risk of unnecessary future remediation.
- Information available to address stakeholder concerns.



Integrated Historic and Future Contamination Risks – Conceptual Site Model





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Benefits of the Forward-Looking PSI to Industry, Regulators and Stakeholders

1. Regulators
   i. Improved early visibility of future risks.
   ii. Reduced iteration during the regulatory assessment.
   iii. Greater confidence in risk mitigation and long-term environmental planning.
2. Proponents
   i. Earlier identification of feasible contaminant controls.
   ii. Avoidance of overly conservative consent conditions and unfeasible future remediation obligations.
   iii. Smarter allocation of monitoring budgets and resources.
3. Community & Iwi
   i. Demonstration of commitment to preventing future contamination.
   ii. Clarity on how the project will be managed avoid long term environmental legacy issues.

Conclusions and Final Thoughts

- Our industry and knowledge base has substantially matured since the PSI's first inception.
- The HAIL, and our experience provides contaminated sites practitioners with a strong knowledge base to assess and manage BOTH existing and future contamination risks.
- Continuing to only apply our knowledge in a reactive manner to investigate what has happened, does not move us towards a better future.
- Clients, stakeholders, regulators, and the environment will benefit from practitioners applying what we have learned from the past to prevent contamination to occur in the future.
- We can start this process through the implementation of a forward-looking PSI.

Acknowledgements and Further Information

I would like to thank Matakanui Gold Limited for providing permission to share the forward-looking PSI approach adopted for the Bendigo-Ophir Gold Project to support the Fast Track Approvals process at this ALGA/WasteMINZ forum.

For further information on the Forward-Looking PSI:

Julie Palich

Director

Geocontam Risk Management Ltd.

julie.palich@geocontam.com.au

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