Manaaki Whenua
Landcare Research

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo

CRL Energy Ltd

UC
UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Objective 3

Remediation

Dave Trumm, Rowan Buxton

1. Aim of Objective 3
2. What remediation options are available?
3. How are options selected?
4. A look forward for Southland

1. Aim of Objective 3

Reduce impacts to acceptable levels

Water quality targets typically set by resource consent for a discharge point from a mine site

- It is up to mine operators to decide *how* to meet targets

Objective 3 provides - Toolbox

- Options for mine operators to meet targets
- Method to select options
- Confidence to stakeholders that mine operators have ability to meet targets

Impacts from Mine Drainage

- AMD (acid mine drainage)

- NMD (neutral mine drainage) + trace elements

Southland

- Impacts from mining may produce AMD
  - New data to be collected in Objective 1

- Most likely water quality impact from elevated turbidity, possibly NMD with elevated trace elements

2. What Options are Available?

- Upstream Control
  - Preventing / minimising mine drainage through overburden management

- Downstream Control
  - Treatment of mine drainage using water treatment systems

Upstream Control
Overburden Management

- Prevent formation of AMD/NMD by removing one of the three components necessary for AMD/NMD formation
  - Sulphides, Water, Oxygen
    - Premining rock analysis and planning
    - Segregation / Isolation
    - Covers / Cementation
    - Revegetation

- Treat mine drainage source
    - Blending acid generating material with neutralising material

Downstream Control
Water Treatment

- Active
  - Continuous dosing with base or other treatment media (lime, caustic soda, soda ash)
  - Regular operation and maintenance
  - Reliable and effective but costly

- Passive
  - No continuous dosing with chemicals
  - Take advantage of naturally occurring chemical and biological processes
  - Not “walk away” solution

Active Systems

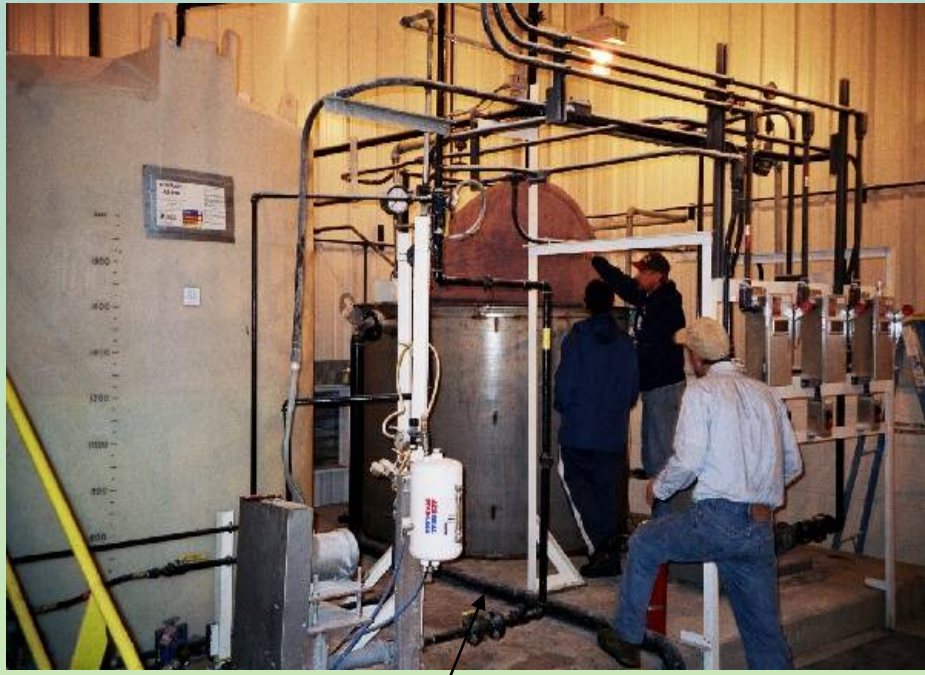
Simple

Hopper

Calcium Oxide

Paddle Wheel

Complex



Hydrated Lime Tanks

Flocculent Tanks

Bells, whistles

Passive Systems

Open Limestone Channel

Anoxic Limestone Drain

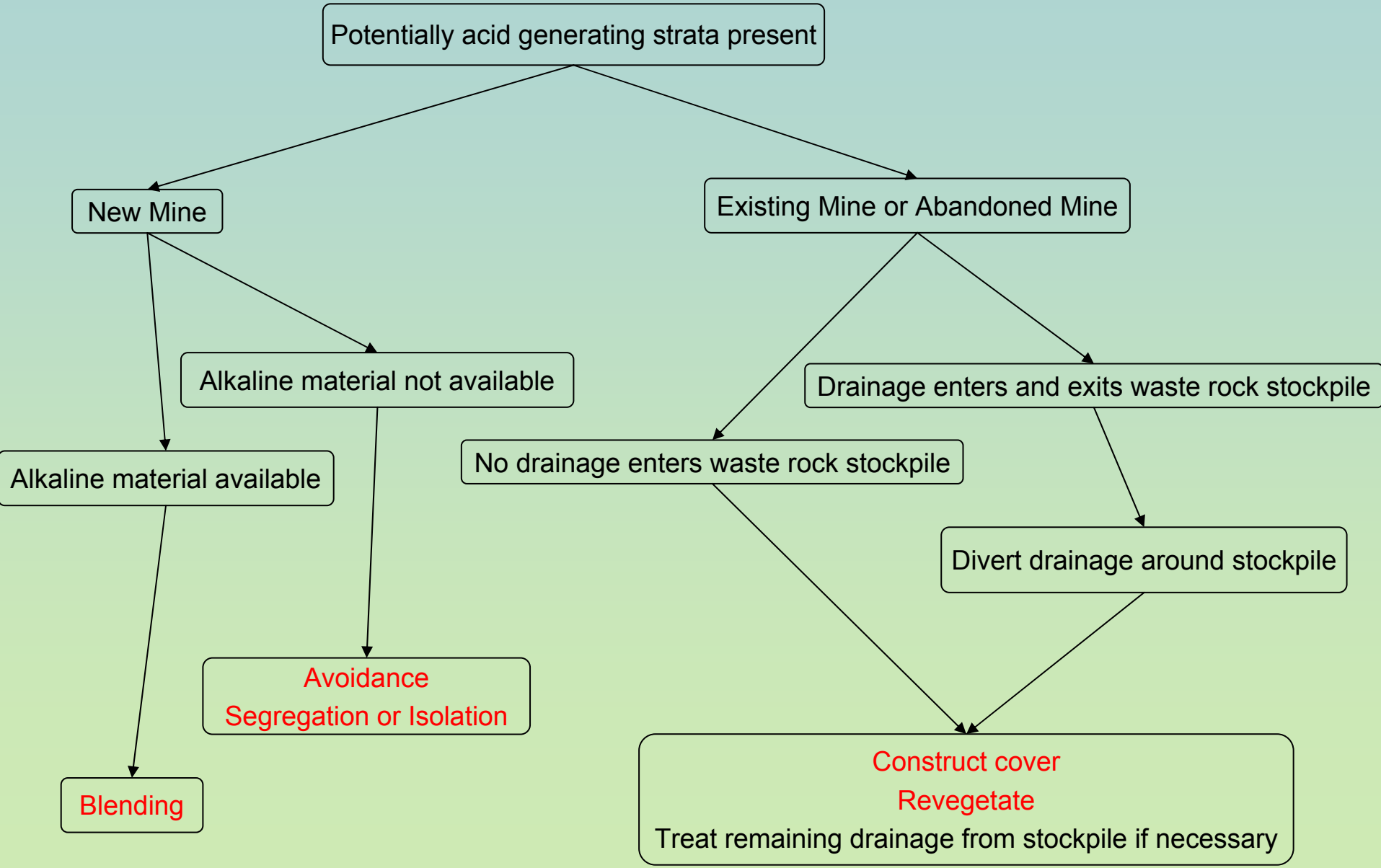
Limestone Leaching Bed

Wetlands
anaerobic, aerobic

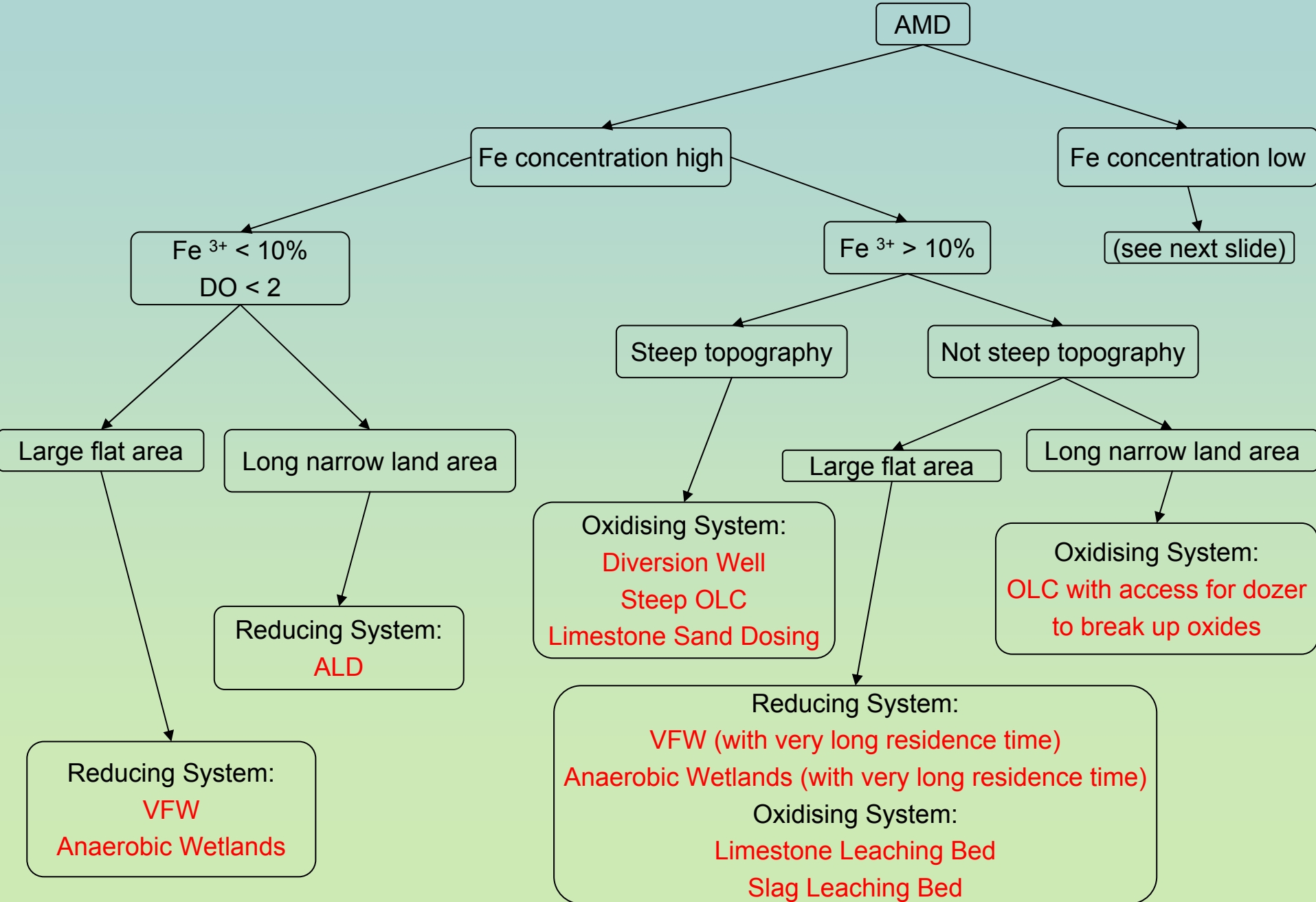
Reducing and Alkalinity Producing System (RAPS)

3. How are options selected?

Upstream Control – Overburden Management



Downstream Control – Water Treatment



Examples of pilot trials
Water Treatment

Vertical Flow Wetland

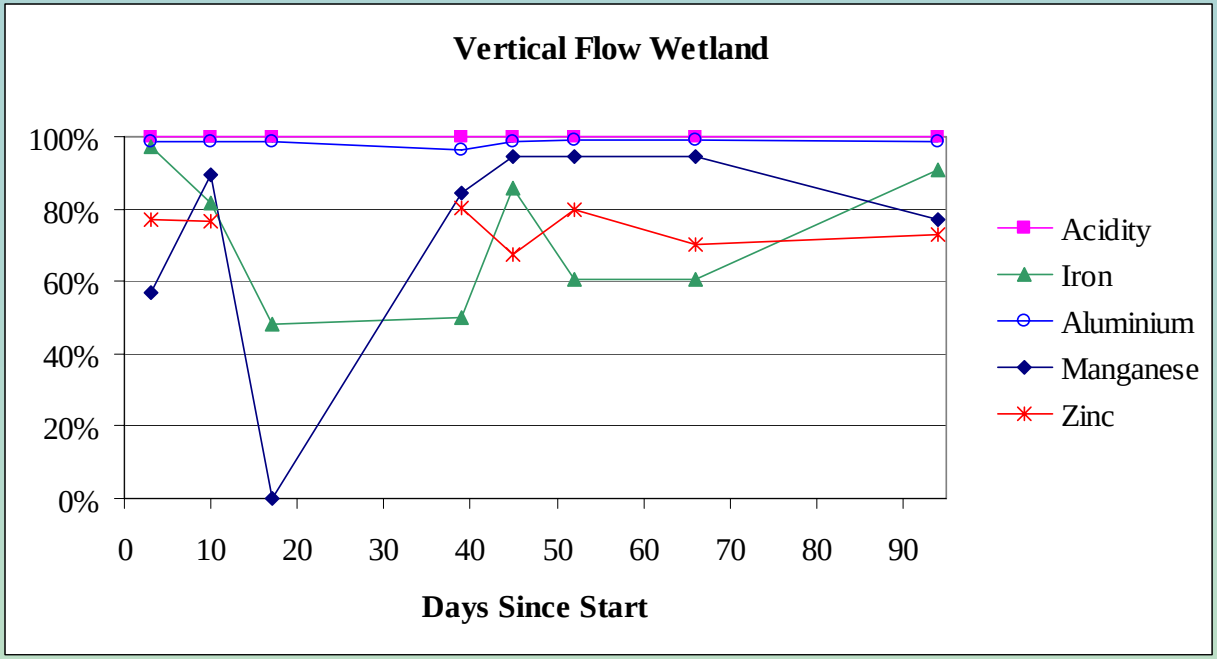
Diversion Well

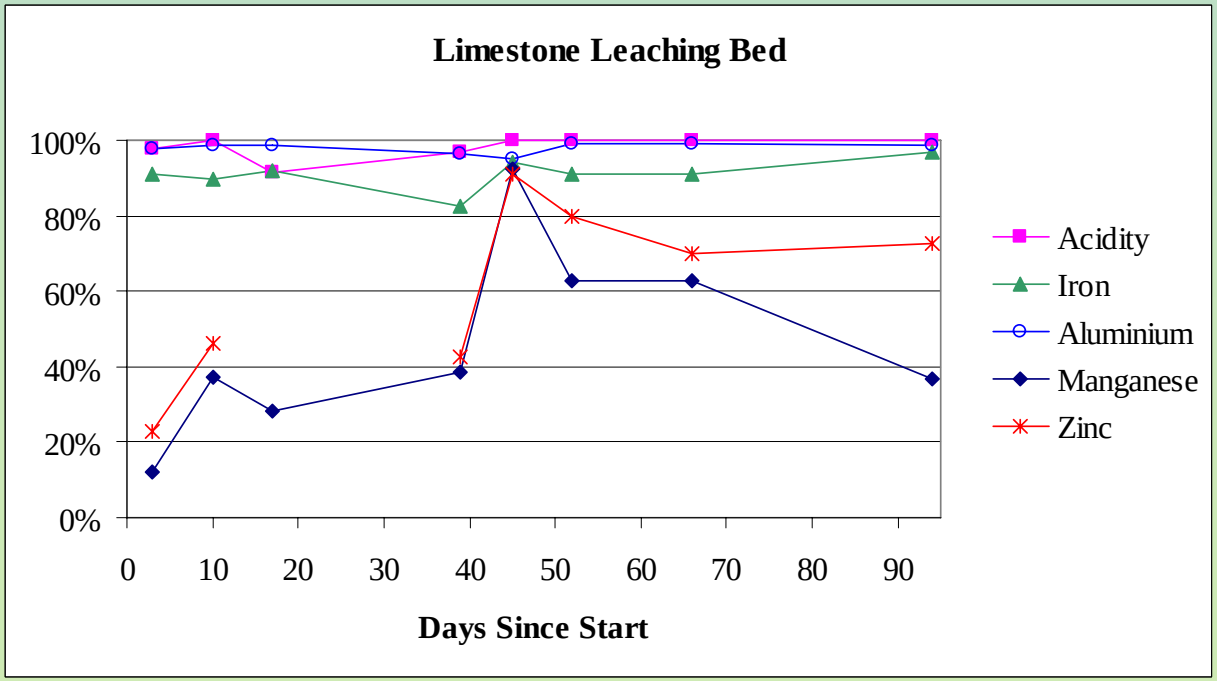
Limestone Leaching Bed

Open Limestone Channel

Pilot Trial Results

Herbert Stream





4. A Look Forward for Southland

- Methodology for AMD/NMD prevention and treatment transferable to Southland
- Other water quality issues relevant to Southland will be added to methodology (eg: turbidity?)

Conclusion

Objective 3 provides

Options for mine operators to meet water-quality threshold targets

Methodology to select options

Confidence to stakeholders that mine operators have ability to meet targets

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A rare chance in Southland to be proactive with respect to environmental issues around mining