

The Progress of Rehabilitation



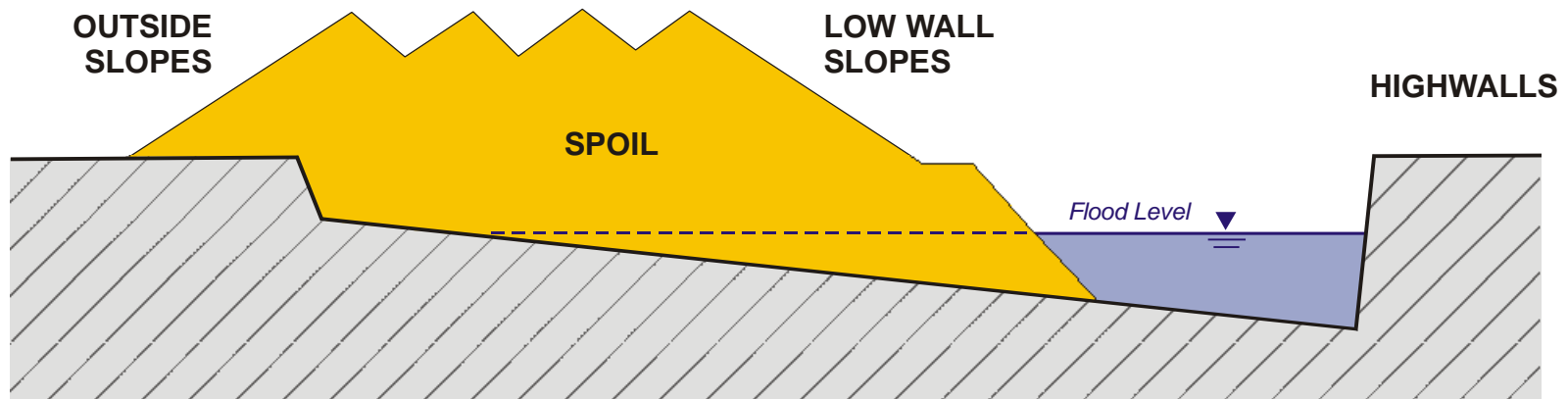
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History

- Prior to Sept 1990 some mining leases had restore or rehabilitate conditions, others didn't.
- Sept 1990 – May 1995 shall undertake rehabilitation to satisfaction of the Minister. The requirements were defined in EMOS. From May 1995 to January 2001 EMOS was statutory requirement.
- Post 2001 rehabilitation should comply with Rehabilitation Guideline & EA conditions
- Original mine site EOs willing to “have a go”
 - Conducted many trials

Open Cut Problem Areas

- Out of pit slope
- Elevated landform
- Low wall
- Final void
- Highwall



Challenges

- Dispersive material
- Final Land Use
 - Grazing
 - Bushland / native ecosystem
- Four general rehabilitation goals:
 - site safety
 - site stability
 - avoidance of adverse impacts off-site and
 - ability to sustain an agreed land-use

Unstable and/or dispersive material



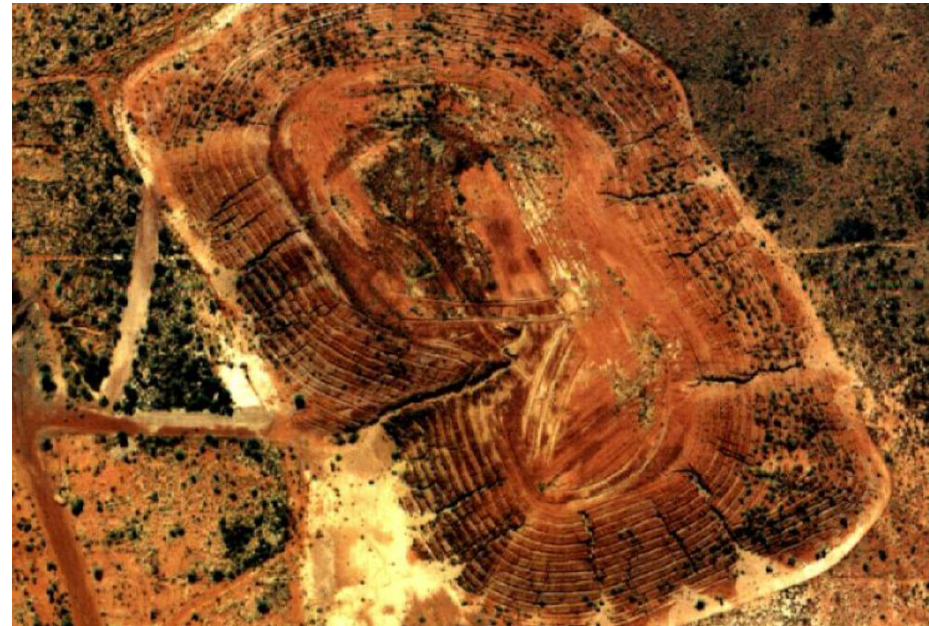
Rehabilitation Strategies for Dispersive Spoil in Order of Increasing Risk

Rank Strategy	Comments	Provisos
1	Bury under other spoil	Do not locate dispersive spoil at toe of low wall
2	Cover with at least a metre of rocky spoil	Select cover material that is able to store and release infiltration without allowing free water to contact the dispersive spoil
3	Topsoil and grass cover (some trees might be introduced later)	Select slope angle to avoid sliding failure along the soil/spoil interface when wet. Provide measures to assist erosion control until grass is established.
Not Recommended for Tertiary Spoil		
4	Trees and shrubs without continuous grass/ground cover	High risk of gully erosion
5	Landforms with plateau or batter ponds	Ponds only poorly establish vegetation, and allow water to enter landform

Contour Banks / benches

- Contour banks are earthen structures constructed across slopes, at intervals down the slope.
- They intercept run-off and safely channel it into stable waterways.
- Their function is to reduce slope length and to intercept runoff before it concentrates into an erosive force.
- Contour banks play an important role in acting as sediment traps. Up to 80% of the soil moved from a contour bay may be deposited in the contour bank channel.

Learn from agriculture ?



Former contour banks



Ponded landforms



Successes

- Australian subsidence case studies in areas of undulating topography and well drained soils have shown negligible effects on broad-acre cropping (wheat, soya beans, lucerne and pasture) and viticulture production.
- Progressive rehabilitation signed off for initial LW panels at Kestrel returned to grazing.
- Creek diversions completed according to 2002 ACARP guidelines (adopted by DNRM) heading toward relinquishment.
- Examples of successful spoil rehabilitation.

Creek Diversion



Spoil Rehab - 3 months & 15 months

- Wheat in winter & millet in summer provide rapid ground cover, which is eventually replaced by perennial grasses



Final Outer Slope



Failures

- Failure to learn from mistakes.
 - Still constructing engineering structures for final landforms
 - Structures still failing
- Knowledge sharing and mentoring.
 - Most of the old heads from 80s & 90s gone
 - Wiki ACARP project, may be too little, too late
 - Re-inventing the wheel.
- Still see sites planned around mining only, then rehabilitation is an add-on.
 - Eg final void located next to diversion only protected by levee.

Rehabilitation Progress ?

- The total Bowen Basin coal area disturbed until 2006 was 95,600 ha, of which 26,700 ha had been rehabilitated (DERM 2007). (28%)
- Currently 156,200 ha disturbed (coal), 29,200 ha rehabilitated. (19%)
- Total Rehab Liability (coal) - \$4.9B (\$38.5k/ha)
- FA after discounts - \$4.4B

Where to from here

- Historic rehabilitation (pre 2001) must be evaluated against requirements in place when rehabilitation was completed.
 - If there is an identified objective (eg low intensity grazing) evidence must be provided how objective has been achieved
- Progressive signoff
 - Progressive Rehabilitation Advisory Committee
 - Evidence that completion criteria met
 - Risk assessment
 - What components at risk of failure
 - Likelihood of failure
 - Consequence of failure

Acknowledgements

- Various ACARP projects
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