Natural Approach to Mine Rehabilitation

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FIG
Sydney, Australia

Rod Eckels, Landforma
Nicholas Bugosh, GeoFluv and Carlson Software

Waste Dumps

• Mine requirements
  – Move the dirt cost effectively
  – Meet regulatory requirements

• Regulators
  – Reduce the footprint
  – Protect local environment – water quality, drainage patterns, dust and noise

• Community input
  – Minimise disturbance
  – Return land to pre-mined use
Something just tells you it isn’t right . . .

Waste Dump Construction

- Mines build the waste dump to fit the most dirt in the smallest footprint – leads to flat-topped pyramid.

- The flat gradient slopes can be up to 1:3 (≈18°, 33%)
- Water flow control structures are constructed
  - Contour banks and
  - Rock drains
- Retention Ponds are built to hold turbid water
Contour Banks, Rock Drains, Retention Ponds

Problems with Waste Dumps

• Need Long term maintenance
  – Erosion and infrastructure failures
• Erosion leads to water quality issues
• Often do not provide habitats and biodiversity
New Approach to Mined Land Rehabilitation

• Combines knowledge of fluvial geomorphic principles with CAD programs and Machine Guidance to enable the construction of “natural” landforms.

• Drainage Patterns

A network of tributaries that join together to form larger channels – each characterised by gradient slope, discharge volume and sinuosity.

New Approach to Mined Land Rehabilitation

• Ridge line profiles – complex gradient slopes

• Channel Cross sections – allow for variable flow

(Rosgen, 1996)
Contour Maps

Natural Surface  Waste Dump

3D View of Traditional Design

• Long slopes without channels, promote rill and gully erosion
  – Needs artificial down-drains
• Water quality – turbid run-off
• Minimal diversity for vegetation and wildlife
• Does not blend with surrounding terrain
3D View of GeoFluv Design

- Complex slopes with smaller sub-watersheds to reduce erosion
- Water run-off less turbid
- Natural slope and habitat diversity for vegetation and wildlife
- Blends with surrounding terrain

Build with Machine Guidance
What does it look like when it is built?

LA Plata Mine – New Mexico USA

GeoFluv ‘laboratory’ and Results

One year later