

Rehabilitation at Pilbara Iron

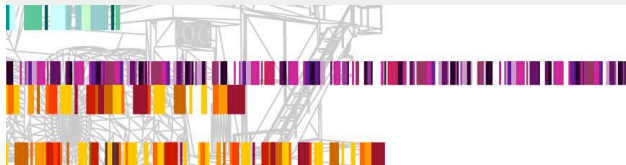


Chantal Latham

Environmental Advisor – Rehabilitation & Monitoring

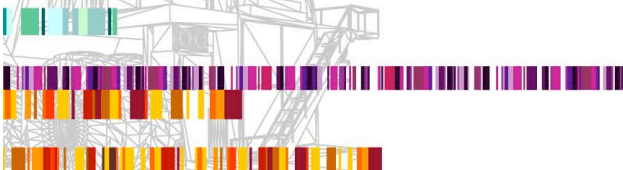


Location of Rio Tinto Businesses



Pilbara Iron

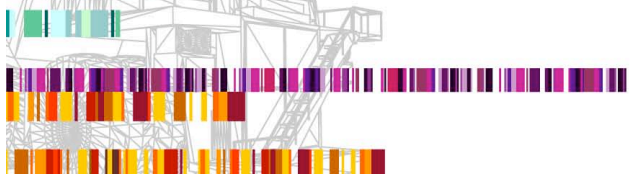
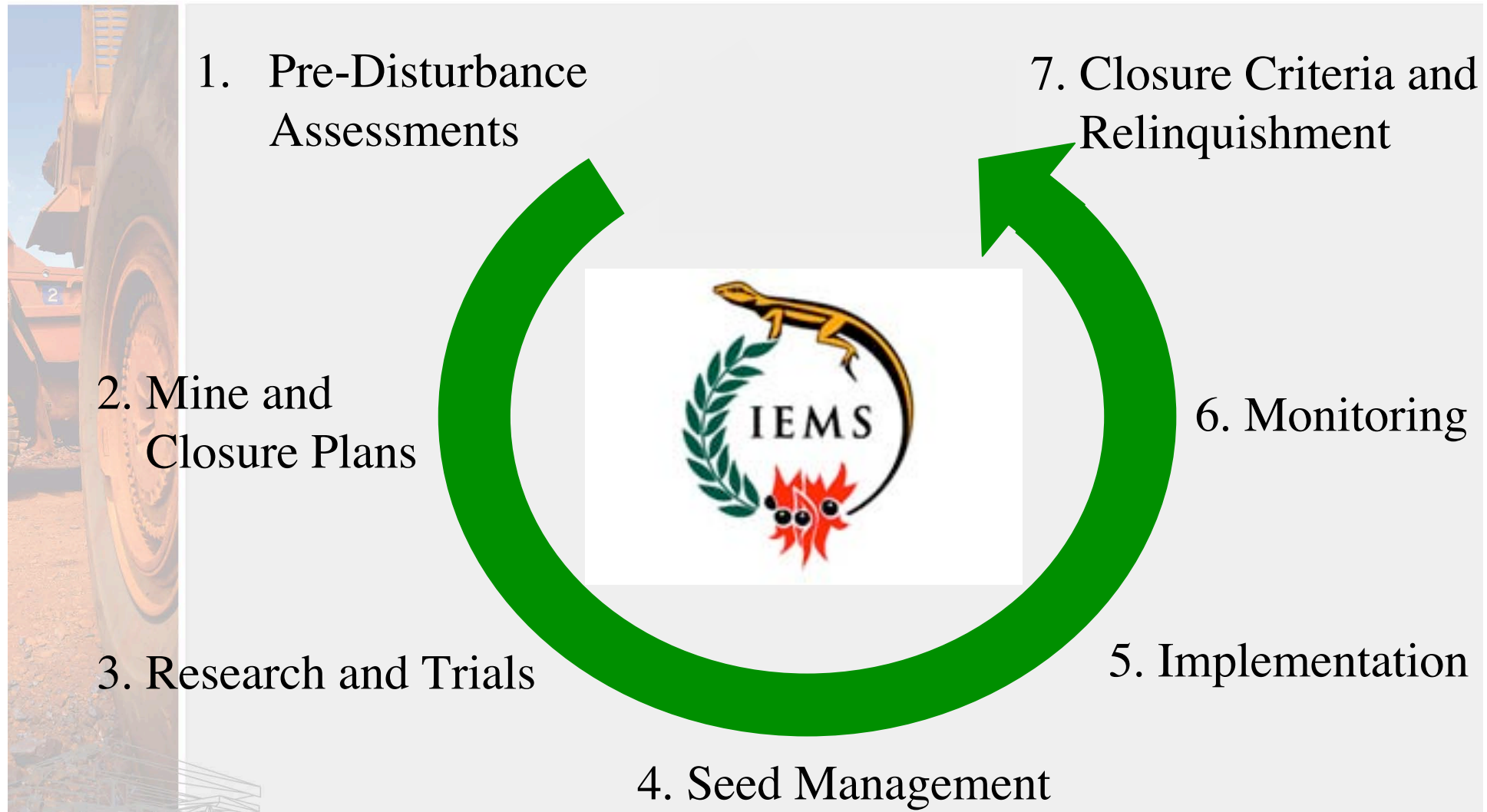
- Pilbara Iron (PI) was established in 2004 and manages, operates and maintains facilities on behalf of asset owners, Hamersley Iron and Robe River Iron Associates
- Network of 10 mines, three ports, and the largest privately owned heavy haul railway in the world
- Iron ore exports in 2006 totalled 150 million tonnes
- PI employs over 4,000 people



Pilbara Iron Operations

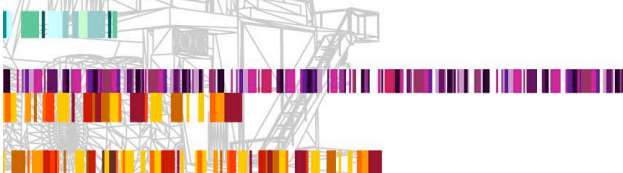


Rehabilitation Process Flow



1. Pre-Disturbance Assessments

- Information collected from biological surveys feed into rehabilitation:
 - Species list
 - Introduced species list
 - Description of DRF, Priority and significant flora and fauna
 - Description of vegetation communities
 - A map of vegetation units and their condition rating
 - Photographs of vegetation to be cleared
 - Classification and description of soil types
 - Coordinates for sample locations for rehabilitation criteria establishment or comparison

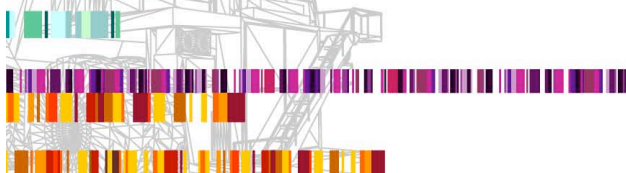


2. Mine and Closure Plans

- Closure plans (Rio Tinto Closure Standard)
- Life of mine plan (Rio Tinto Mineral Waste Standard)
- **5 year mine plan ***
- 2 year mine plan (updated quarterly)
- 3 month operational plan

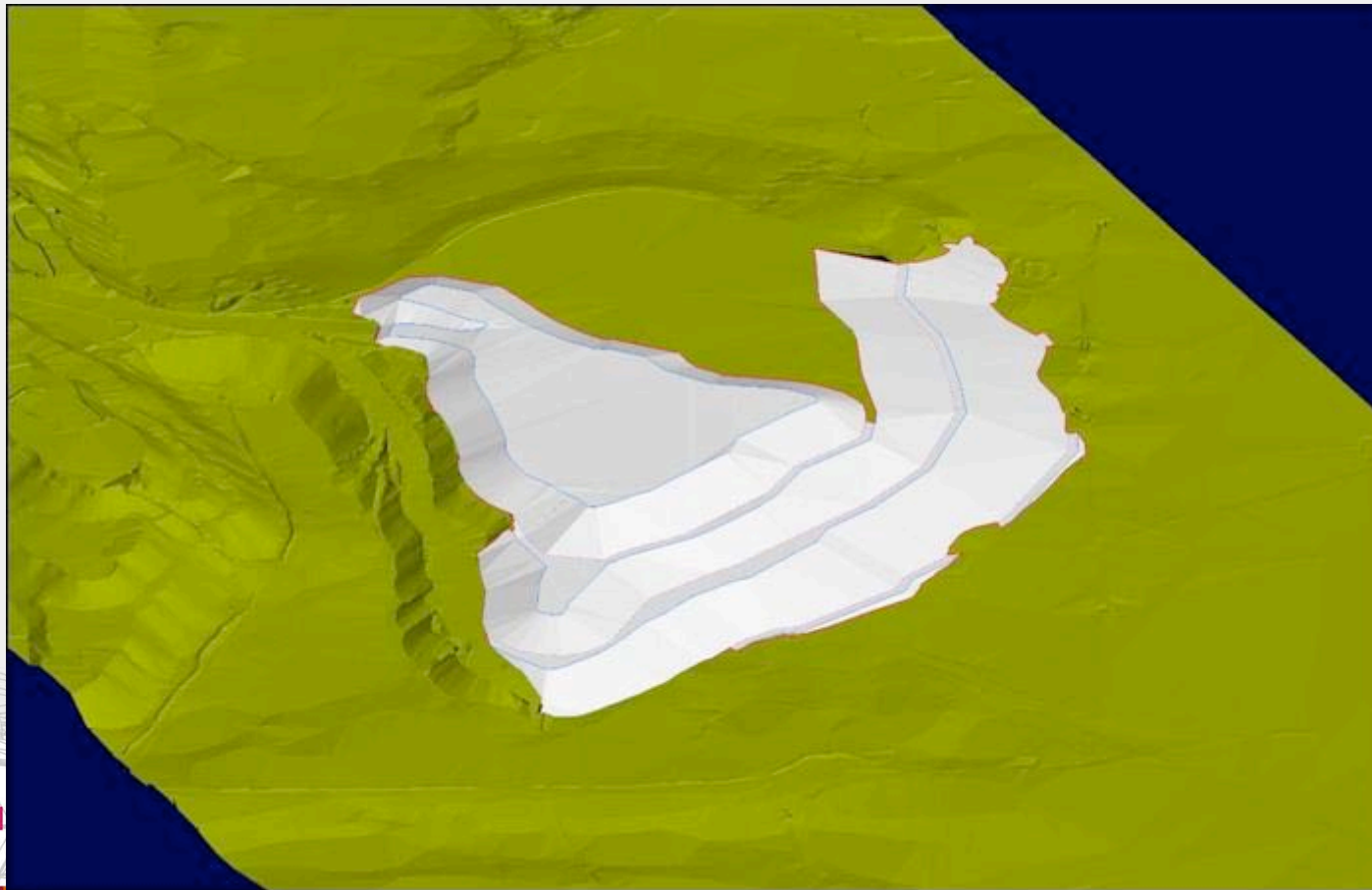
eg. Scheduled topsoil movements at Tom Price

		2007	2008	2009	2010
Quantity to haul	kt	50	300	300	181
Storage volume required	m ³	27,778	166,667	166,667	100,556



2. Mine and Closure Plans

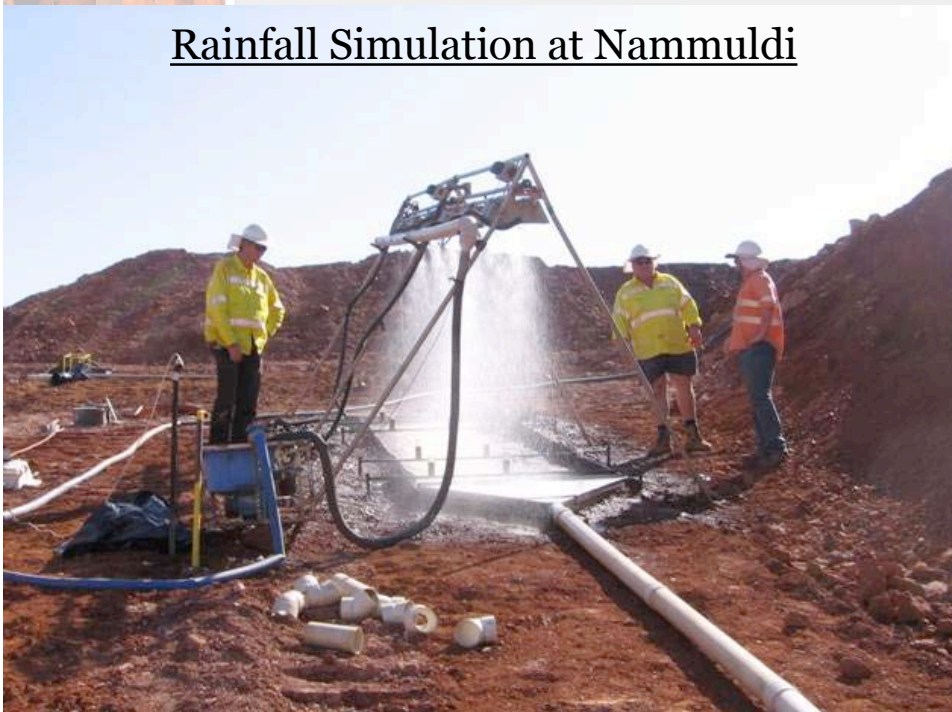
- Standard berm and bench waste dump designs
- Topsoil scheduling and stockpile locations
- Scheduling of potentially acid forming waste rock
- Rehabilitation schedule to be developed



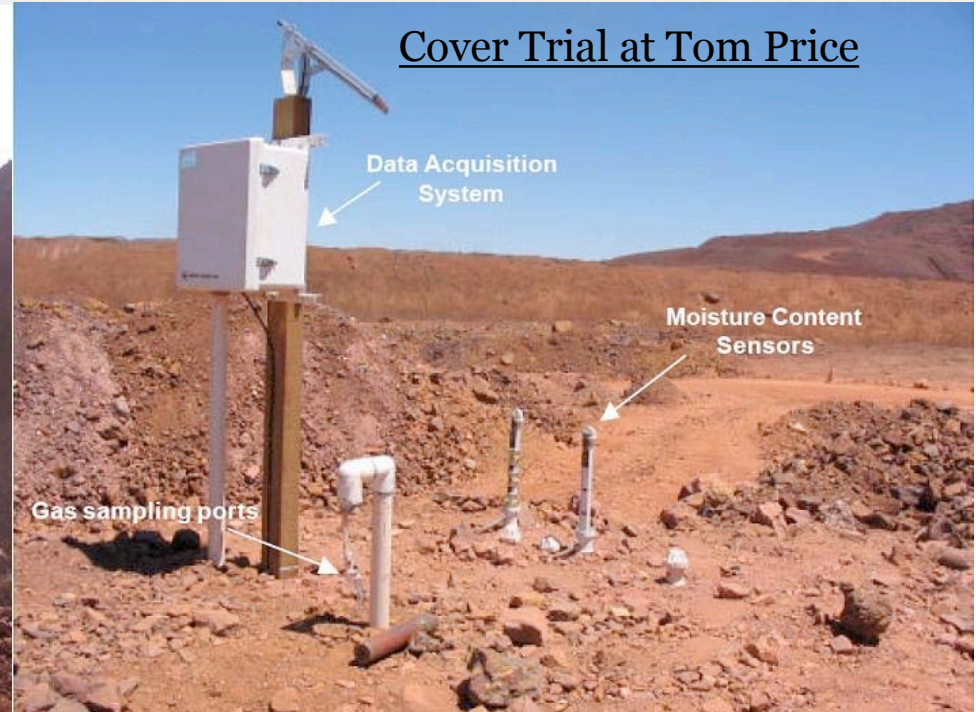
3. Research and Trials

- Concave slope trials
- Rainfall simulation and soil characterisation
- Store and Release Covers
- Trials of fertiliser, seeding rates and topsoil depths
- Research partner in Telfer's 'Ecohydrological feedbacks between vegetation and soil in natural and engineered landforms in arid Australia' project

Rainfall Simulation at Nammuldi



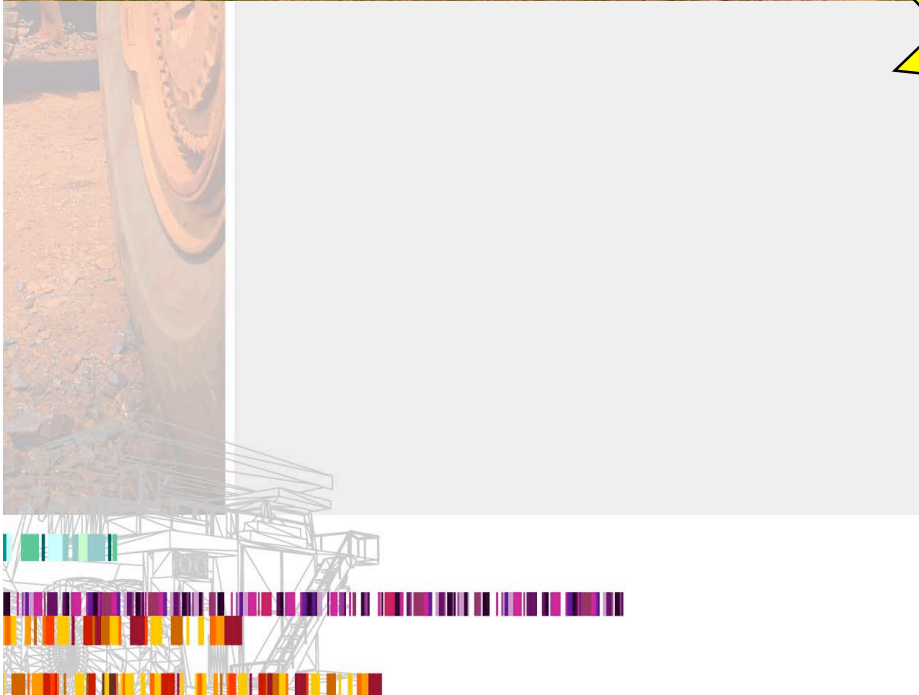
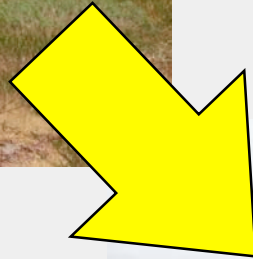
Cover Trial at Tom Price





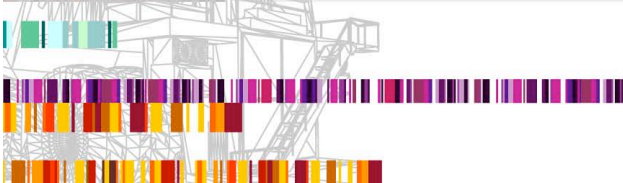
Nammuldi Lens C Waste
Dump Concave Slope Trial.

Completed March 2007.



4. Seed Management

- Provenance seed collection
- Priority flora seed collection
- Seed storage
- Seed mixes
- Seed application - Hand Vs Machine
- Seed viability testing
- Seed treatment trials to break dormancy
- Increased involvement of traditional owners
- Looking at a Millennium Seed Bank Partnership

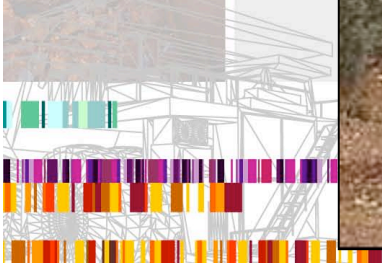


5. Implementation - Landform

- Landform earthworks
 - In-pit disposal preferred, but often not achievable
 - Water harvesting of incident rainfall
 - Direct water away from dump edges
 - Reduced slope angles for highly erodable materials
 - Berms (or Terraces) 10m wide, back sloping, 1 m deep, cross bunds every 100m
 - 2m abandonment bund at dump crest and toe



A rehabilitation
berm at Marandoo



5. Implementation - Erodibility

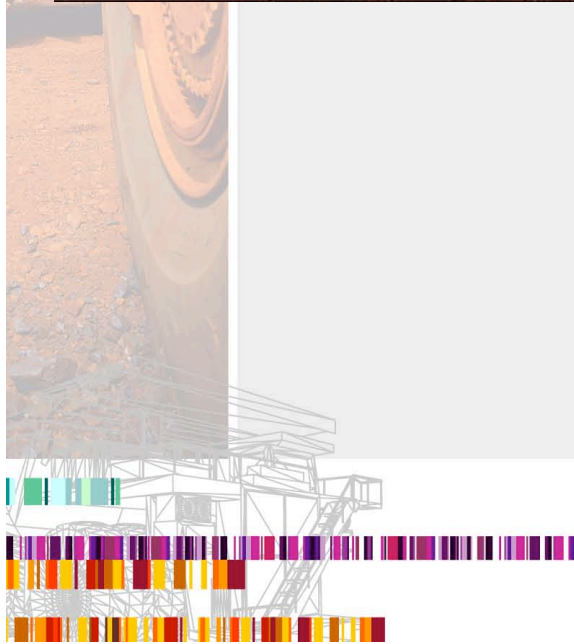
High



Moderate



Low



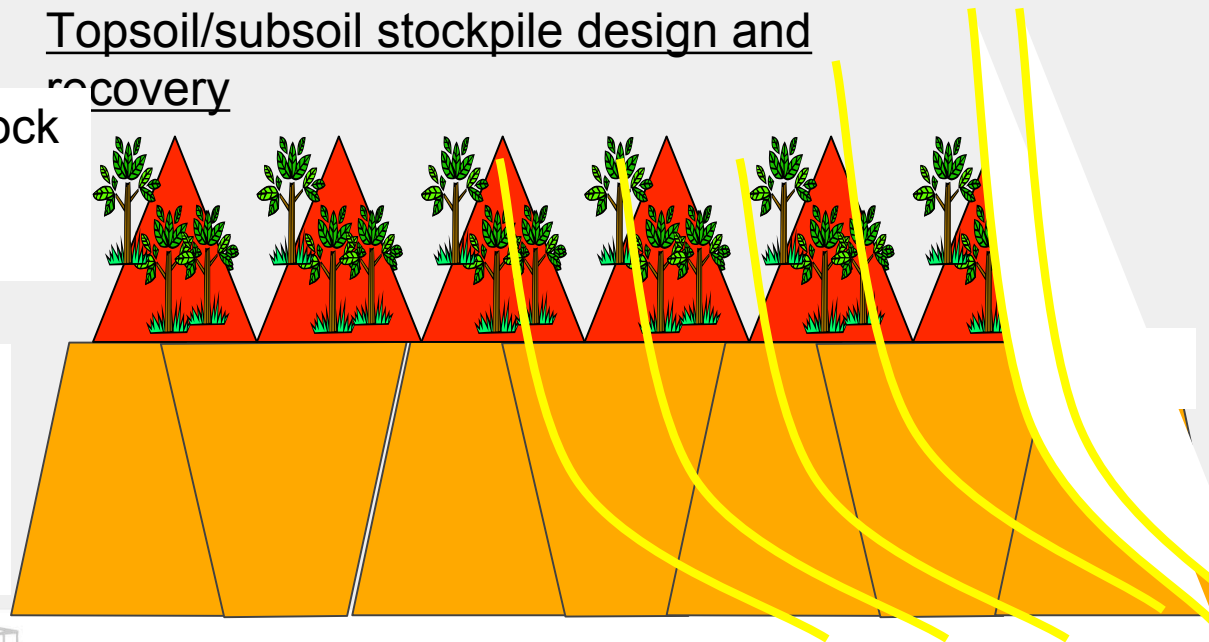
5. Implementation - Topsoil

- Recover 300mm of topsoil and 500 mm of subsoil
- Direct return whenever possible
- Unique stockpile design
- Return topsoil at 200 mm

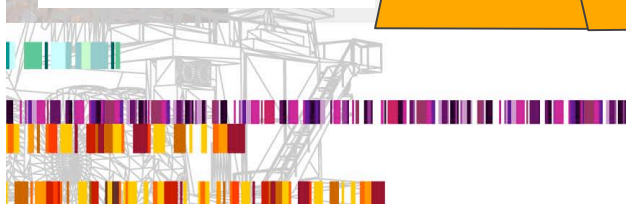
Topsoil/subsoil stockpile design and recovery

Topsoil is paddock dumped on top (max 3m)

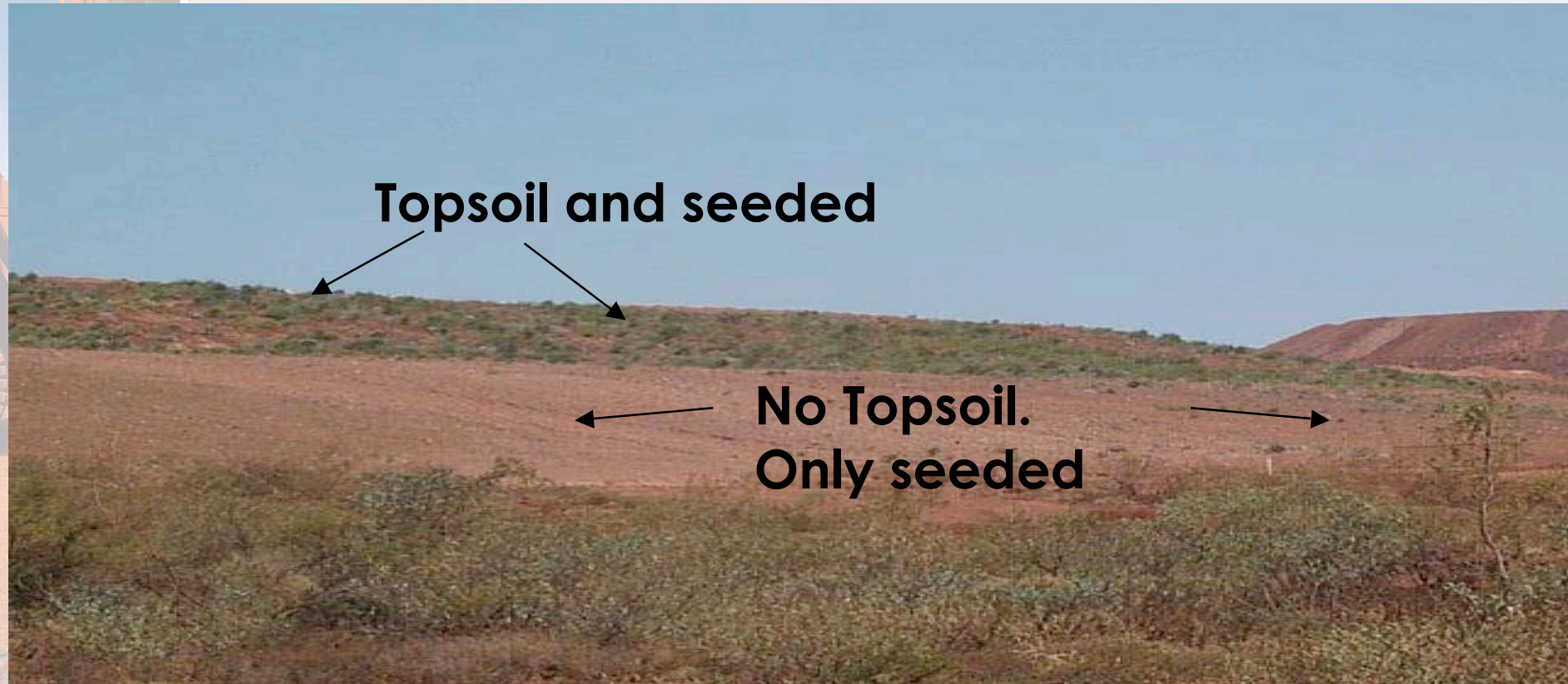
Subsoil is leveled to a max. height of 5m



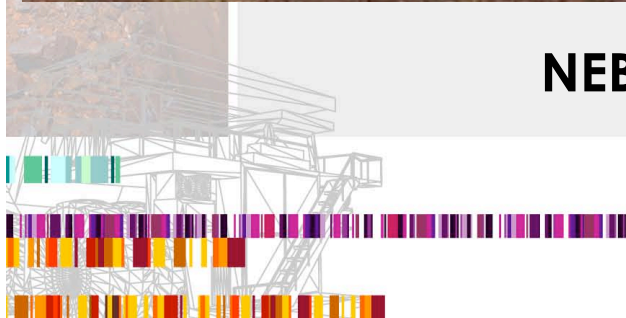
Topsoil and subsoil is mixed as it is recovered using a loader



5. Implementation - Topsoil

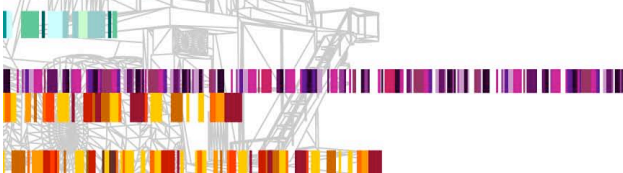


NEBC - Tom Price Rehab (1999)



5. Implementation (Cont.)

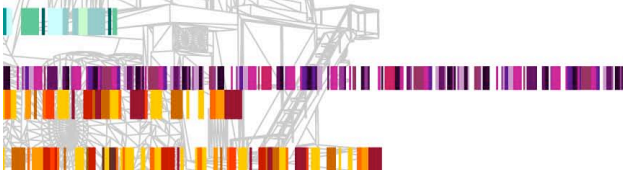
- Ripping along the contour
- Triple tyne
- Continual Improvement:
 - Rock Armouring
 - Vegetation Mulch
 - Appointment of Environmental Advisor - Rehabilitation and Monitoring in 2006.



6. Monitoring

- A large scale review and assessment of vegetation monitoring is underway:
 - Toolbox = Desktop reviews, Ecosystem Function Analysis, botanical surveys, remote sensing, photographic monitoring.
- Key question to be addressed:
 - Is intervention required?

Landscape Function
Analysis assessment on
Mesa N at Pannawonica
December 2006



7. Closure Criteria and Relinquishment

eg. Tom Price Mine

Future Land Use Option

Use components of the mine as a tourist attraction, for recreation facilities or the development of other viable economic activities and restore the remainder of the lease to native vegetation.

Rehabilitation Objectives & Targets

Positive net impact on biodiversity.

Sustainable endemic vegetation communities.

Post-mining landforms that minimise water ponding and are non-polluting.

Safe, stable and uncontaminated. Aesthetically compatible.

In Conclusion

- Ongoing Issues:
 - Full integration of rehabilitation into the mine plan
 - Appropriate and efficient monitoring
 - Development of closure criteria
- We are always looking for improvement ideas and therefore techniques are continually evolving

What more could Pilbara Iron be doing?

Waste dump rehabilitation
at Marandoo

