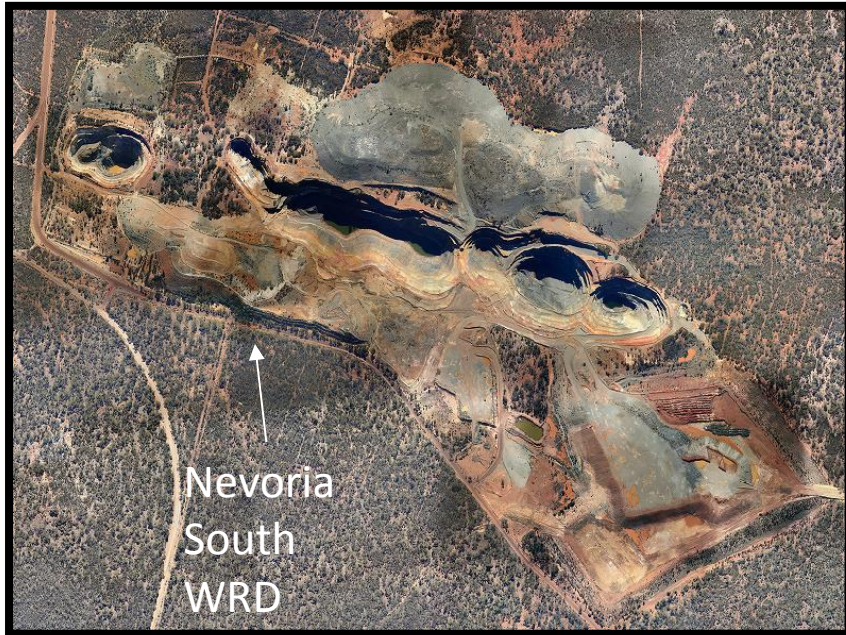


# Nevoria Mine



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- Headframe and shaft mining between 1906 to 1963
- Open pit mining in 1980s and 1990s
- Underground mining in 2000s
- Nevoria South Waste Rock Dump:
  - Constructed 1990s
  - Rehab 1997 & 2007
  - No berms
  - Total height 30m
  - 2,553,000m<sup>3</sup> volume; ~24ha
  - 20°; 37° & 70° batter slopes
  - Water shedding criteria for water management
  - Minimal environmental design
  - Seeding on western face
  - Waste rock mineralogy: Weathered basalt with clay alteration





# Nevoria South WRD



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# Nevoria South WRD



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# Nevoria South WRD



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# Nevoria South WRD



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- Variety of rehabilitation methods:
    - Bench & berm;
    - Contour ripped; and
    - Convex.
  - Topsoil depth and profile varies
  - Sporadic seeding
  - Erosion evident in bench & berm area, not where it has been contour ripped
- 
- Accepted in part by Department of Minerals and Energy (DME now DMIRS) in 1998 (relinquished)

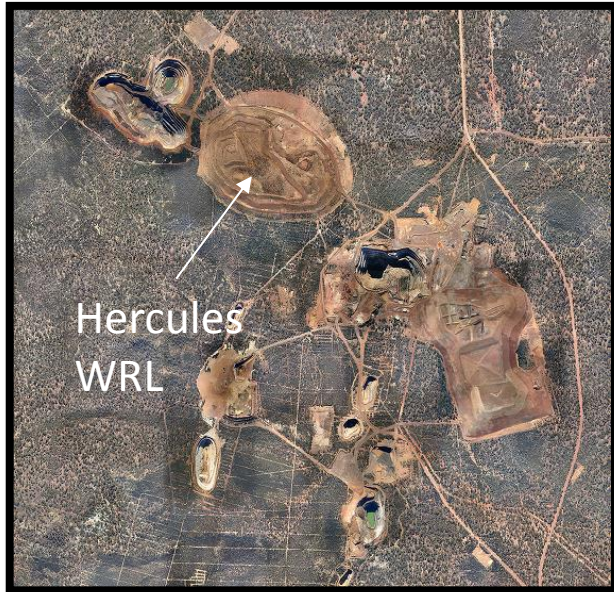
Nevoria	<ul style="list-style-type: none"><li>The northern and southern Waste Dumps appear stable and would be acceptable to DME excepting that portion of the western end of the southern waste dump covered under 1990's NOI's.</li></ul>
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# Hercules Mine



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- Burbidge area mined in 1890s
- Great Victoria Gold Mine (GVG) mined in 1990s and 2000s
- Hercules mined 2005 to 2007
- Hercules Waste Rock Landform
  - Constructed 2005 to 2007, over existing Tailings Storage Facility (TSF)
  - Total height 29m
  - 4,998,415m<sup>3</sup> volume; ~62ha
  - 15° to 18° batter slopes
  - Store and lease design criteria for water management
  - Top of landform is undulating and celled
  - Seeded
  - Waste rock mineralogy: Meta – sediments, gossan, ultramafic, encapsulated pyrite sediments

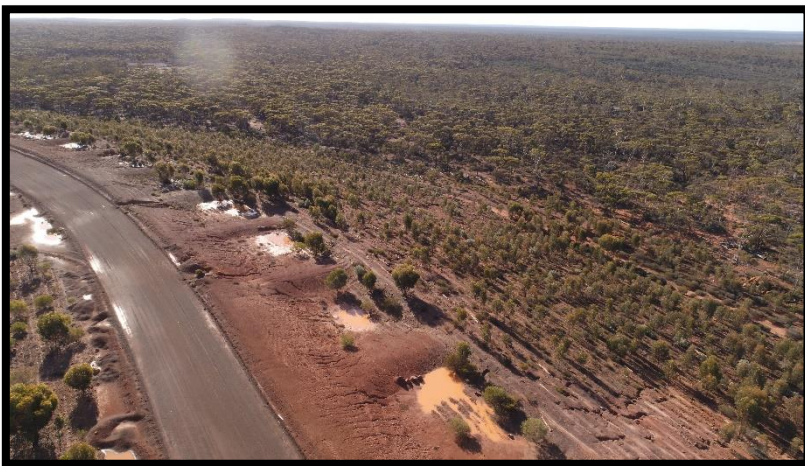




# Hercules WRL



MINJAR GOLD

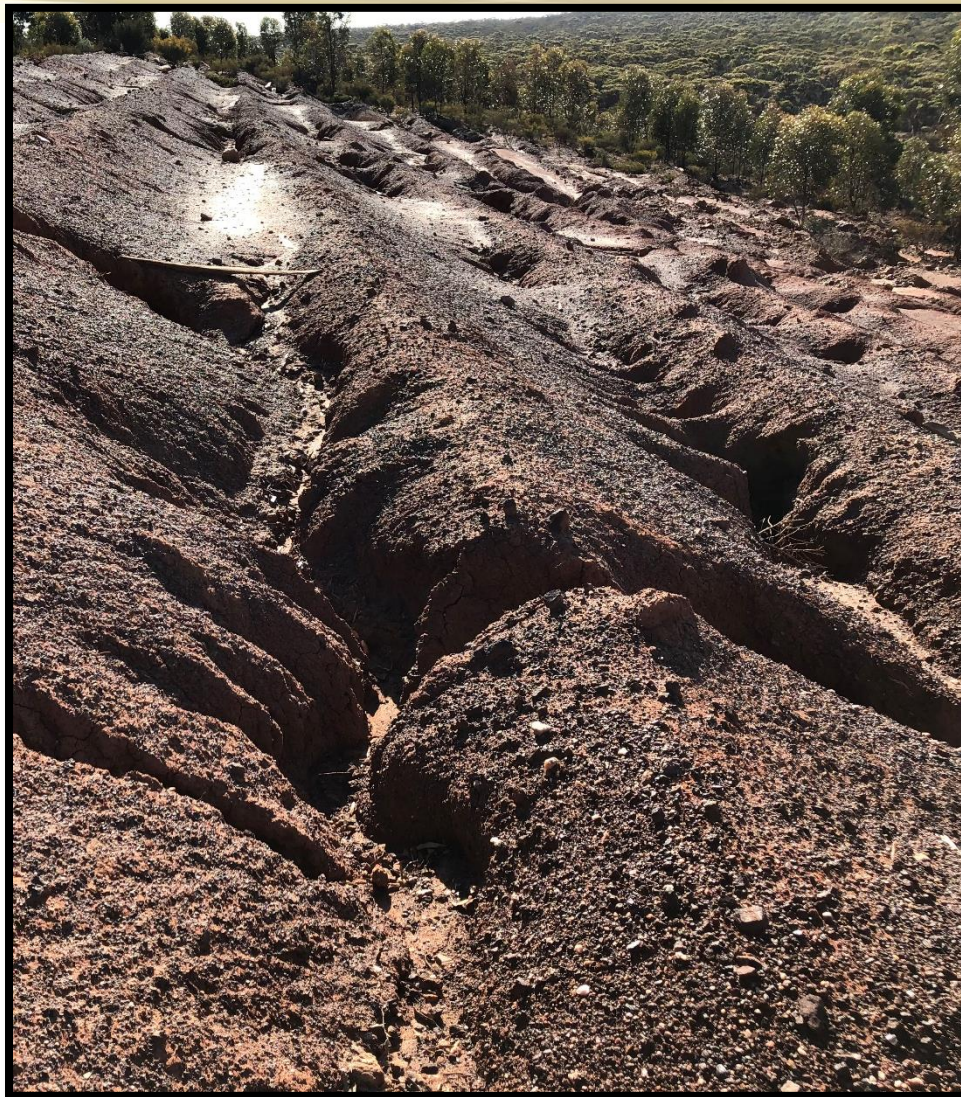




# Hercules WRL



MINJAR GOLD





# Hercules WRL



MINJAR GOLD





# Hercules WRL



MINJAR GOLD





# Hercules WRL and Minjar's Way Forward



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- All available caprock and topsoil to be used (Hercules had minimum ~0.7m caprock and ~0.1m of topsoil)
  - Importance of competent material vs topsoil
- Material more important on slopes rather than top surface
- Forest debris important - placed on contour and track rolled for stability
- Trapezoidal crestal bund, 1-2m high, back sloped
- Inclusion of compartmentalised cells on top surface
- Objectives of ripping:
  - Disrupt surface compaction;
  - Provide a tie-in between rehabilitation material and underlying material;
  - Provide micro-niches for seed germination; and
  - Reduce water flow.
- Ripping:
  - On contour, at least 1m deep;
  - Spacing of 1.2m to allow adequate compaction disruption between rip lines;
  - Winged tyne;
  - Survey of contour pegs or competent operators; and
  - Dozer speed controlled.
- No mid-slope berm
- Toe berm (drain)



# Minjar's Progressive Rehabilitation



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# Conclusions



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- Rehabilitation and revegetation requirements have changed throughout the years
- Previously accepted rehabilitation would not pass current standards
- Difficulty in achieving current rehabilitation and revegetation standards on legacy waste rock landforms and dumps due to:
  - Cost / benefit analysis
  - Environmental damage to established vegetation
  - Safety
  - Outcomes?
- What are realistic standards for rehabilitation?
- How do we future proof rehabilitation and revegetation efforts?



# Questions?



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