

Sustainable Mining by Drilling

A New Concept For
Narrow Vein Mining

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Mining Investment Asia
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Developing Polymetallic Mines on the Korean peninsula



- ❖ **KME - Private Australian Company**
 - Directors worked together in Korea for 25 years
- ❖ **Established Polymetallic Project Portfolio:**
 - Uiseong - Au-Cu-Zn-Pb-Ag ± Bi-In-W
 - Haman - Cu-Ag-Au ± Co-W
 - Goseong - Cu-Ag-Au ± Ge-Se-Bi
- ❖ **Historical Drilled Resources = ~4.5Moz AuEq**
 - “Drill-Ready” Resource Targets - Low Exploration Risk
 - High Grade Zones – Low Development Risk
 - Multiple Metals – Natural Risk Hedge
 - High Value Critical Metal By-products: Bi, In, W, Co
- ❖ **Base Metal Refineries – Onsan & Seokpo**
 - No Shipping Costs – major cost saving
- ❖ **South Korea**
 - OECD & G12 Country – Low Sovereign Risk
 - Excellent Infrastructure
 - Proximity to North Asia Region Markets
 - Low Business Risk
 - Leader in Technology & Innovation

Sustainable Mining by Drilling Concept (SMD)



Proponent: *Novamera Inc (Anaconda Mining & Memorial University)*

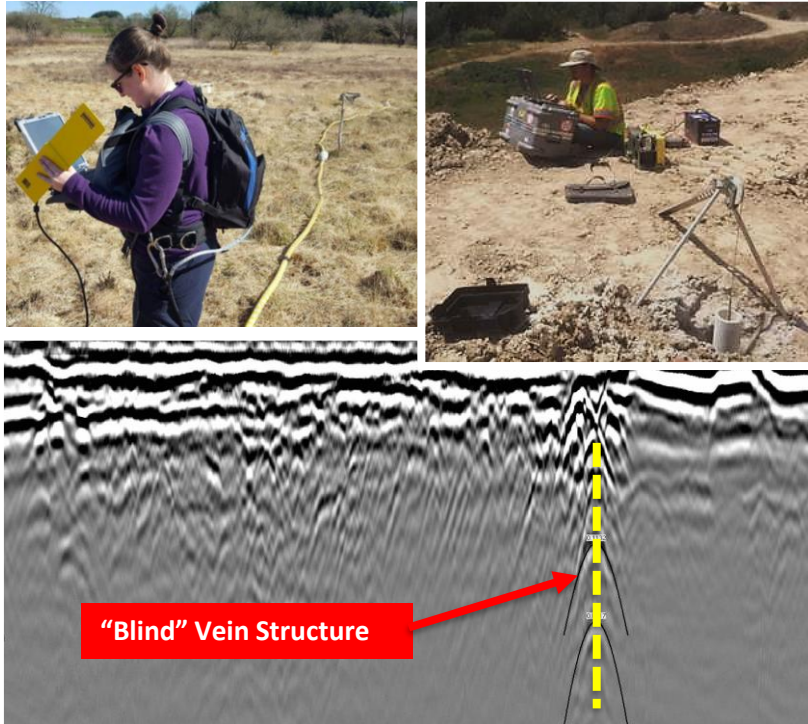
Pile Top RCD Drill Rig:

- Manufactured in Germany, South Korea & UK
- Used in Construction Industry: Foundations for Buildings, Bridges, Piers, Wind Turbines, Mine Shafts, etc
- Pile Top RCD Can be used to Extract sub-vertical Veins
- Large Diameter Drill Bits - enable Extraction of 1-6m Wide Veins
- Capable of drilling hard Rock (UCS of 350MPa) to below 300m depth
- Reverse Circulation Drilling method (“RCD”):
 - Airlifts Drill Cuttings as “slurry” to surface

Advantages of SMD:

- Very Safe – No Operators or Equipment required underground
- Minimal Dilution – Precise Targeting of Ore Vein
- Replaces Conventional Mining, Drill & Blast & Primary Crushing
- Cost Effective – Low Capital & Operating Costs
- Enables Rapid & Selective Mining Development & Ore Blending
- Environmentally Friendly:
 - Lower Energy Consumption
 - Water is Recycled
 - No Dust, No Vibration & Relatively Quiet operation
 - Rehabilitation of Drill Site is Rapid
 - No Tailings or Waste – Backfill of RCD hole

Vein Mapping Technology



Ground Penetrating Radar:

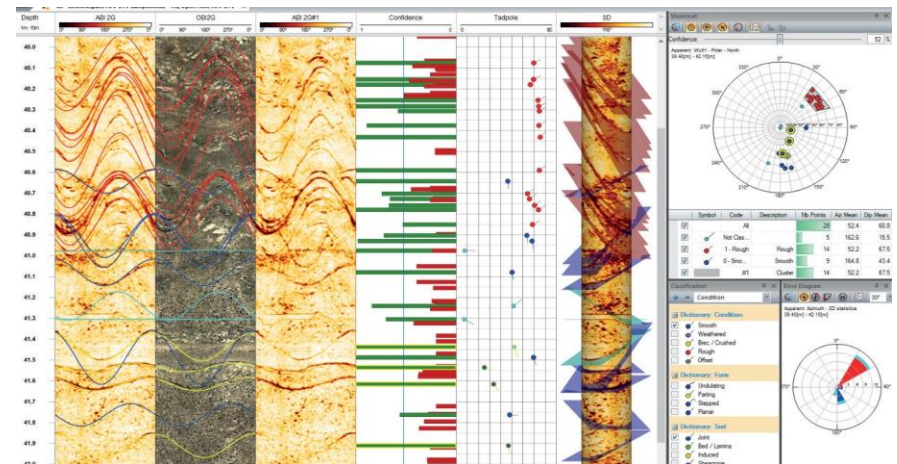
- Rough Terrain Antenna "snake" dragged through jungle
- Radio signals Transmitted
- Reflected Pulse Return signal Recorded
- "See the Vein" within Bedrock below Soil-Colluvium "Cover"

Diamond Core & RC/DTH Drill Holes:

- Orientated Core used to Confirm Vein Structure
- Geology, RQD, Fractures, Joints, Hardness, Strength Data
- Geochemical Assaying of Vein & Alteration halo
- Engineering Data evaluated for SMD operation
- Geo-Metallurgical Data evaluated for Mill operation
- Resource Estimation

Acoustic/Optical Borehole Televiewer:

- Lowered by winch into Drill Holes after completion
- Drill Hole Orientation Survey is highly accurate
- Sonic pulses transmitted and return signal recorded
- Vein, RQD, Fracture & Joint Orientations Confirmed insitu
- Engineering Data collected evaluated for SMD operation





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Vein Mapping & Directional Steering Technology



Novamera Inc: *Anaconda Mining Inc & Memorial University of Newfoundland*

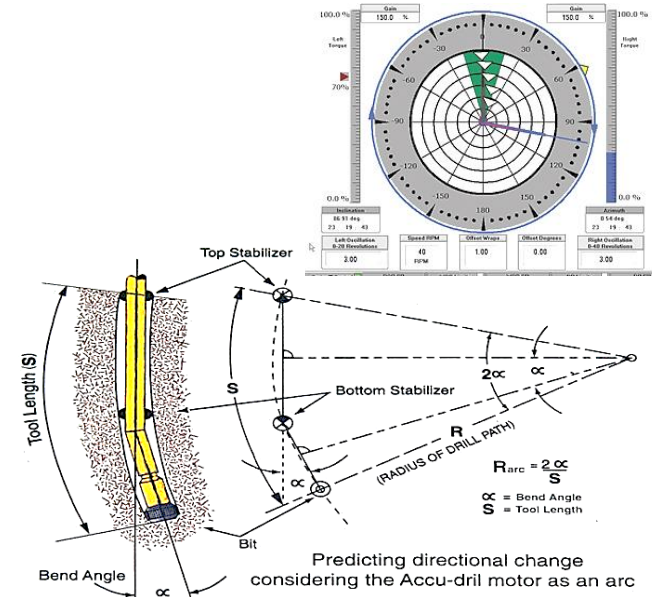
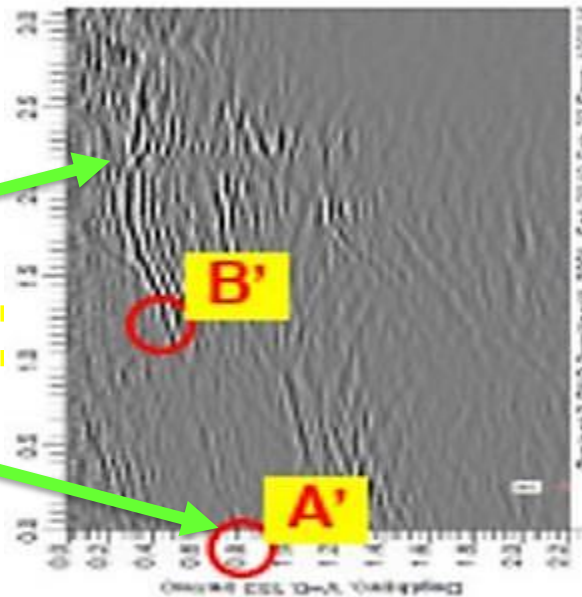
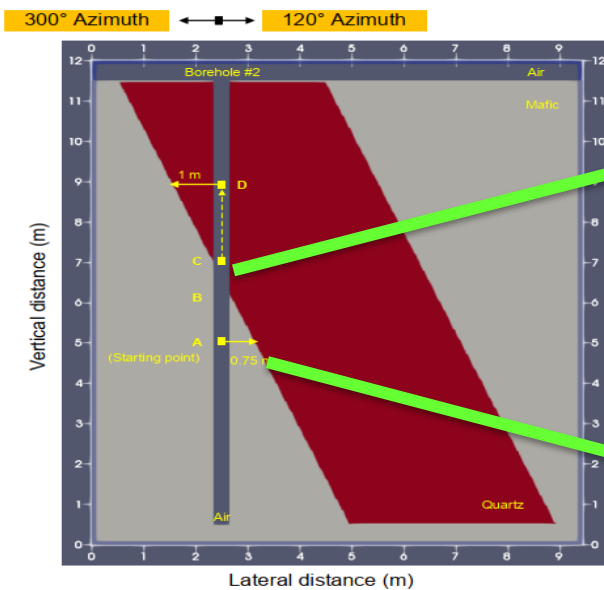
Pilot Hole drilled into Vein and Borehole Radar Probe lowered into hole

Subsurface Imaging using GPR & Direction Locator (Patent pending) guides pilot Hole down dip, staying midway between hanging wall and foot wall

Survey Tool - Measures Continuous Hole Orientation (Azimuth, Dip & Depth)

Borehole Radar Imaging “Sees the Vein” by Varying Radio Signal Frequency

Directional Steering Motor Tool steers the Pilot Hole to “Follow the Vein”



Drill Bit Cutter Technology

Novamera has 8 Custom Innovation Patents pending:

Near Borehole Imaging Tool (“NBIT”) Developments:

- Directionality improvements to Reflected Return Pulse signal
- Integrate Survey Tool into GPR & Wireline Tool

Drill Bit Developments:

- “Stinger” follows pilot hole trace within the Vein
- Deviation of 1° per 3m run with Drill Tube “Joiner”



- Hole Diameter 1.0 – 6.8m varied to suit Vein width.
- Number of Roller Bit Cutters depends on Hole Diameter
- Cutter Selection - depends on “Drillability” Rock Parameters:
 - Hardness, Abrasivity, Tensile & Compressive Strength
- Tungsten-Carbide Bit & Matrix Metallurgy - Continuous Development
- Manufactured in South Korea, Germany, Sweden, UK & Canada
- Series 13 Roller Bit Cutters: Button, Tooth, Disc or Universal Types



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Main Structure

- 1. MAST BOOM
- 2. WORKING PLATFORM
- 3. ADAPTER
- 4. CASING CLAMP
- 5. SLIDE BOX
- 6. GEAR BOX (POWER SWIVEL)
- 7. OPERATION ROOM
- 8. SUCTION STABILIZER
- 9. SINGLE STABILIZER

Pile Top RCD Drill Rig

Features:

Reverse Circulation Drilling method (“RCD”):

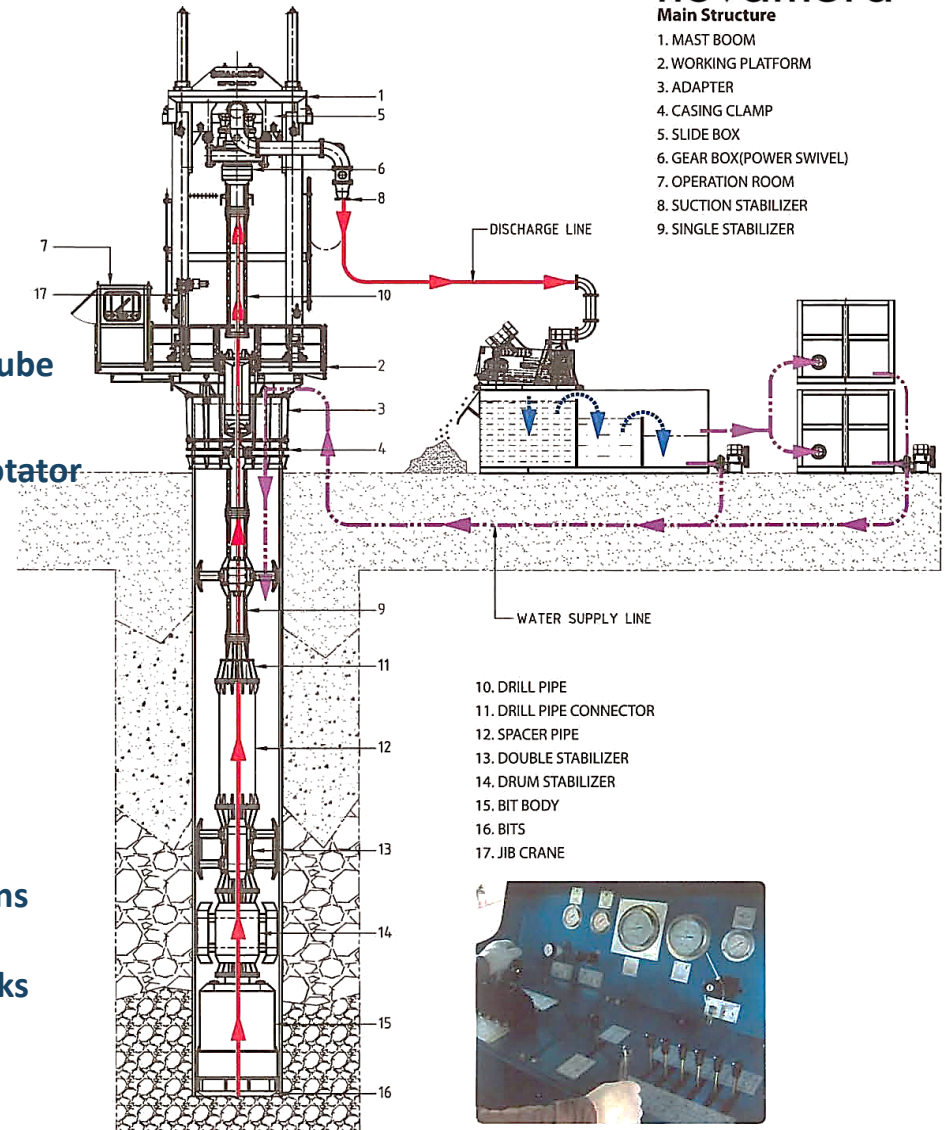
- Water added to hole outside the Drill Pipe
- Compressed Air injected through the Drill Pipe
- Solid Cuttings enter the Cutting Head-Suction opening
- Air-Liquid flow “Lifts” Cuttings to surface inside Drill Tube

Standard Equipment for Pile Top Operation:

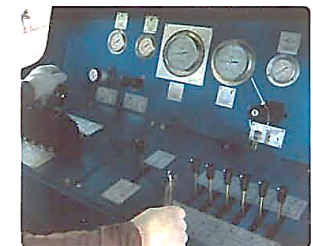
- Power Pack, Air Compressor, Support Crane, Casing Rotator
- 1 Operator + 2 Offsiders
- Wireless Remote Monitoring & Control

Pile Top RCD Operation Sequence:

1. Casing Rotator used to install Casing for Support
2. RCD Drill lifted by Crane and Clamped onto Casing
3. Crane lifts Bottom Hole Assembly into Drill
4. Bottom Hole Assembly is attached to Power Swivel
5. Water pumped into the Hole and Drilling proceeds
6. Drill Rod String is extended by adding 3m Drill Pipe runs
7. Stabilizers are fitted to support the Drill String
8. Drill Cuttings are de-watered by Cyclone and Mud Tanks
9. Water Recycled by Mud Tanks for Re-Use by RCD Drill
10. Drill Tube and Bottom Hole Assembly recovered



- 10. DRILL PIPE
- 11. DRILL PIPE CONNECTOR
- 12. SPACER PIPE
- 13. DOUBLE STABILIZER
- 14. DRUM STABILIZER
- 15. BIT BODY
- 16. BITS
- 17. JIB CRANE





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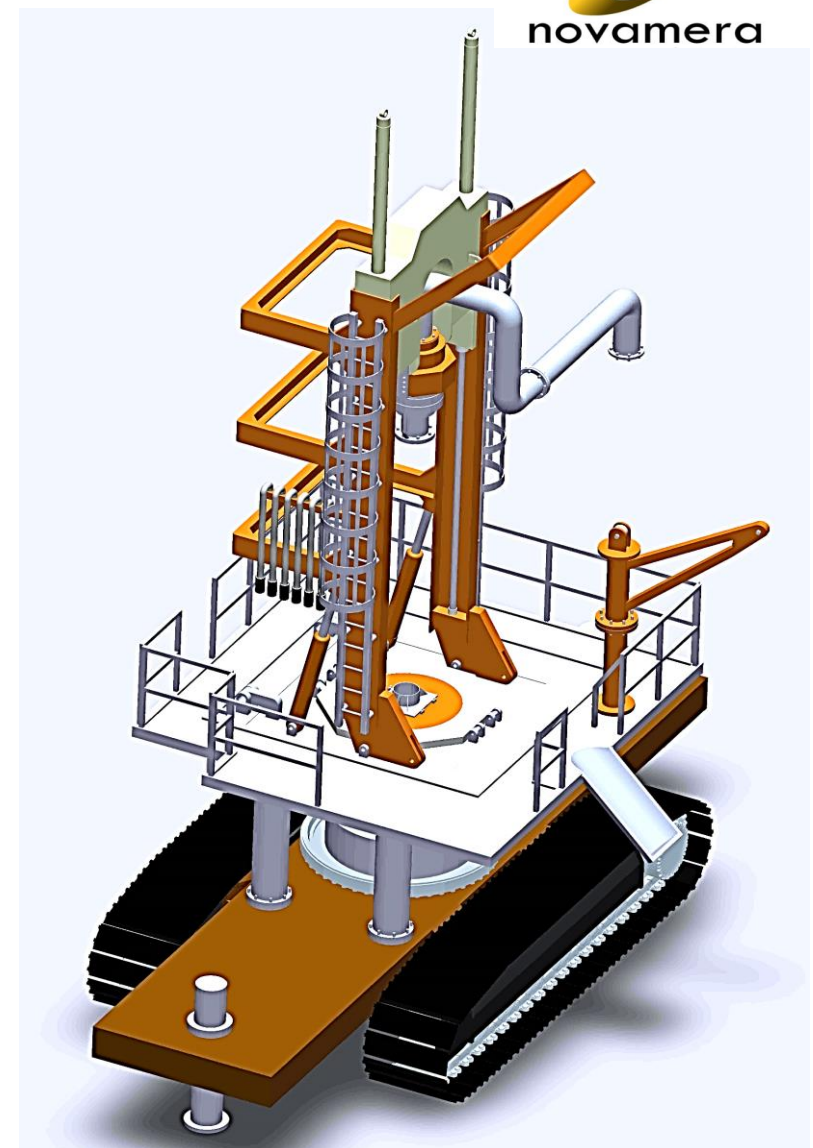
Mobile Pile Top RCD Drill Rig

Mobile Crawler Track-Mounted Design:

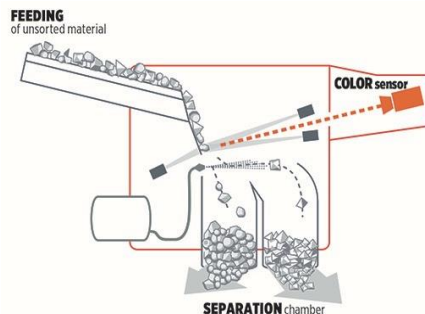
- Engineering Drawings already prepared (*Novamera*)
- No Support Crane Required
- Power Pack
- Air Compressor
- Electrical Power Option
- 1 Operator + 2 Offsiders
- Wireless Remote Monitoring & Control

Envisaged Pile Top RCD Mining Operation:

1. Bottom Hole Assembly is attached to Power Swivel
2. Water pumped into the Hole and Drilling proceeds
3. RCD Drills and follows the Vein using GPR Imaging
4. Drill Rod String is extended by adding 3m Drill Pipe runs
5. Stabilizers are fitted to support the Drill String
6. Drill Cuttings are pumped as “slurry” direct to Mill
7. Water is recycled for re-use in Drilling Operation
8. Drill Bit and Drill Tube recovered when EOH reached
9. RCD Drill Rig moves onto next Drill Site
10. A 2-4m “Stope” left between holes is Mined later
11. RCD Hole is backfilled with Waste and Mill Tailings
12. Rehabilitation & Revegetation of Drill Site commences



Beneficiation of Drill Cuttings



Drill Cuttings provide direct Run-Of-Mine Feed:

- Real Time Assaying of Cuttings – Waste or Ore streams
- Secondary-Tertiary Crushing: VSI/Cone Crusher to -2mm

Gravity Concentration Plant (Wet):

- -1mm Screened Slurry processed to Recover GR-Gold
- *Gekko IPJ, Falcon, Knelson Concentrators*

Dense Media Separation Plant (Wet/Dry):

- 2-1mm processed to Concentrate Sulphide Ore Feed
- *Sepro Condor*

Ore Sorters (Dry):

- Magnetic Separator – Remove/Recover Magnetite
- *TOMRA, Optosort LIBS X-Ray & Color Sorters*
- Concentrate Sulphide Ore Feed

Advantages:

- Low Capital & Low Operating Costs
- Highly Effective in “Up-Grading” Mill Feed
- Early Rejection of Waste - Minimize Dilution & Handling
- Waste is Returned to the RCD Hole as Backfill
- Water is Recycled for re-use
- Fully Automated, Compact Size & Easily Transported
- Suitable for Satellite Mining Operations

Water Recycling & Waste-Tailings Disposal

Each RCD Hole can be used as a Temporary Water Storage Facility for the next Drilling Operation

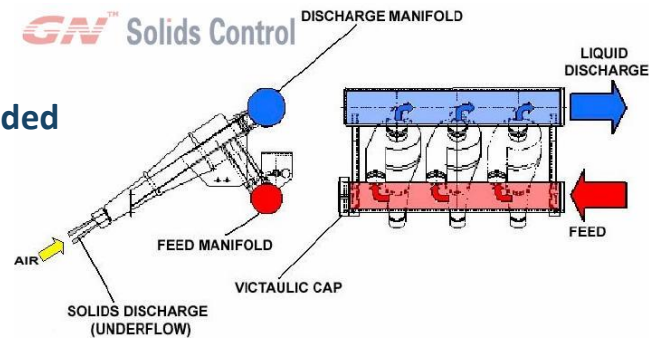
Waste Cuttings de-watered by De-Sander/Filter Press & Returned to the RCD Hole as Dry Backfill

Tailings (Wet or Dry) from the Mill is Returned to the RCD Hole void:

- Settling of Wet Tailings is aided by “Columnar” configuration of Hole & Water Currents
- Precipitation by Mineral Turbidity can be Expedited by addition of Flocculants/Coagulants
- Water is Clarified and Recovered from Top of Column
- Water is Re-used in Drilling & Milling operations

Paste Tailings can be Backfilled in RCD Hole void:

- Paste Backfill can also be Cemented/Neutralized if needed



Rehabilitation of Drill Site & Mine Closure

SMD operation facilitates Rapid Restoration of the “mined path” above Veins

Rehabilitation commences after the RCD Drill has moved onto next Drill Site:

- Stockpiled Topsoil is Replaced on the Drill Site
- Dressing, Seeding & Sapling Planting commences
- Rehabilitation facilitated using existing Water Storage Ponds

Water Ponds used as Dams & Wildlife Habitat after Mine Closure



Thank you for your interest

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