



Kookaburra Gully Graphite Mine

Tumby Bay District Community Consultation Group

Mine design, environmental assessment & PEPR progress
7 March 2017



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Project Status & Key Issues



- Design studies (to feasibility study level) essentially complete
- Environmental assessments nearing completion
- The Program for Environment Protection and Rehabilitation (PEPR) drafting has commenced

The outcomes of these studies define the project, enable preparation of the PEPR and other infrastructure related approvals.

Key Issues requiring further work:

- Ways to reduce capital & operating costs
- Better define target market segments
- Consider optimal production rate to match market demand
- Produce sufficient concentrate to test suitability of products for applications (pilot plant test-work)

Design Studies



2016 geotechnical and design studies:

- ▶ Geology & resource model (Orewin)
- ▶ Mine design – pit & waste rock facilities (AMC)
- ▶ Metallurgical test-work & process plant design (Inception Group & IMO)
- ▶ Tailings storage facility design (Golder Associates)
- ▶ Site water management (Golder Associates & CDM Smith)
- ▶ Road & transport logistics (Tonkin Consulting)
- ▶ Water supply options study (Inside Infrastructure)
- ▶ Power supply options study (GPA Engineering)
- ▶ Mine site general arrangement (Golder Associates)

Geology & Resource Model



- ▶ Drilling, sampling, analysis & data compilation
- ▶ Resource & waste rock modelling updated by OreWin provides basis for mine design and preparation of ore & waste rock schedules
- ▶ Q1 2017 – in-fill drilling program completed to better define ore reserves at Kookaburra Gully & mineral potential along strike to southwest

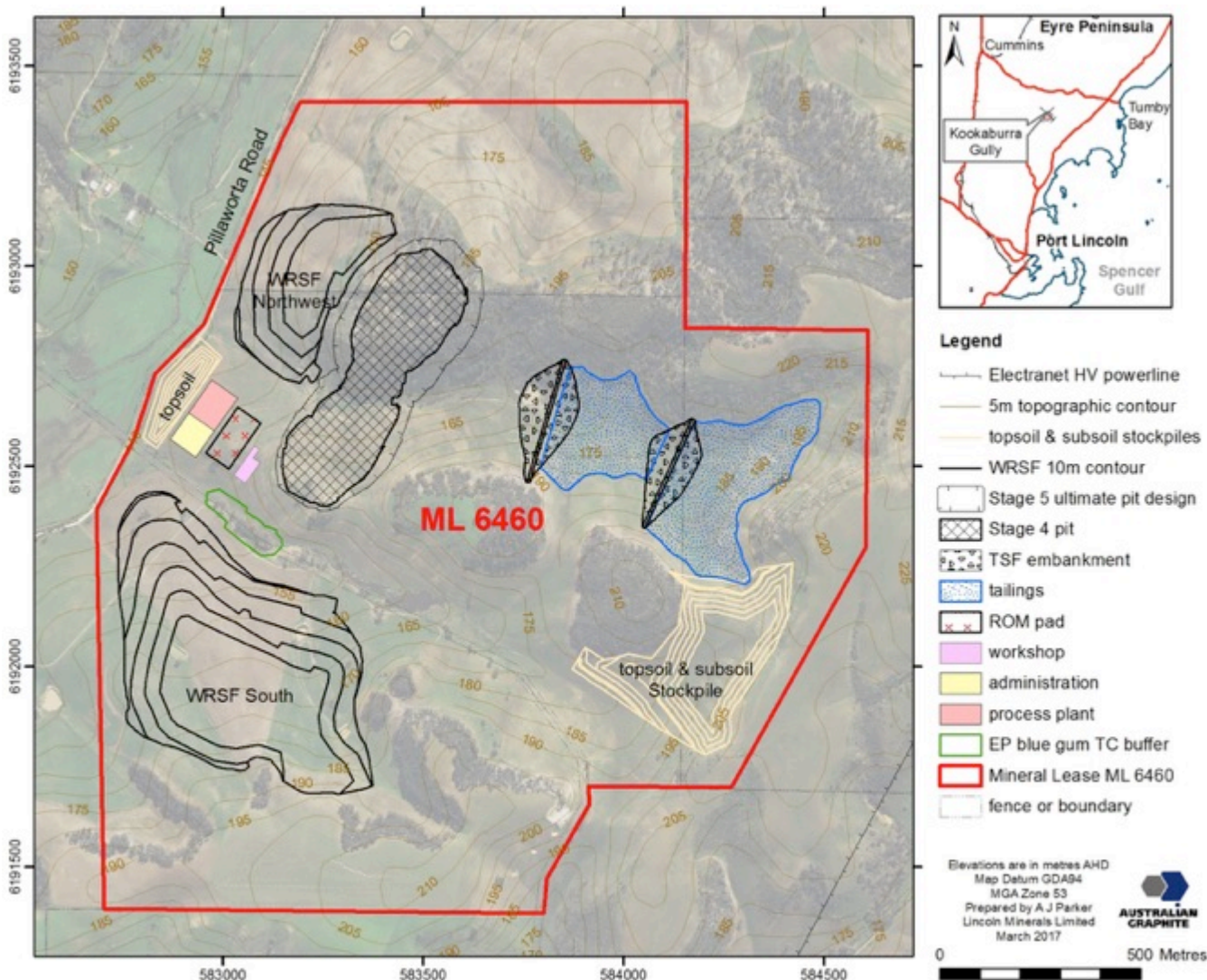


Next Steps:

- ▶ Drill sample analysis
- ▶ Detail geology
- ▶ Refine Resource Model
- ▶ Define Ore Reserves



Mine design – pit & waste rock facilities



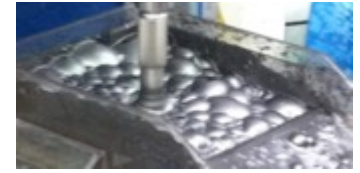
- Geotechnical core drilling & analysis undertaken H1 2016
- Geotechnical report completed by AMC
- Optimised pit shell, mine & waste rock facility design prepared by AMC

Next step:

- AMC to finalise mine design report as basis for description of operations in PEPR



Mine design – pit development stages



- Mine optimisation software supports an initial 4 stage mine based on current graphite prices
- Mine up to 250,000 tonnes ore per year
- Mine life (6+ years) will depend on progressive mine development & marketing strategy



Metallurgical test-work & process plant design



- ▶ Inception Group supervised metallurgical test-work & prepared process plant design
- ▶ Comprehensive laboratory-scale test-work program was undertaken at IMO (Perth) July-December 2016
- ▶ Process flow sheet & OPEX prepared (Inception Group)
- ▶ Process flow diagrams & CAPEX prepared (ammjohn)
- ▶ OPEX & CAPEX estimates used in mine pit design & financial model



Next step:

- ▶ Review & finalise reports as basis for description of operations in PEPR

Size Fraction (μm)	LMC 11 - Master Comp			LOX 1 - Oxide Comp		
	Mass	TC (%)	LOI (%)	Mass %	TC (%)	LOI (%)
500						
300	0.1%	93.20	96.00	0.4%	97.80	97.11
180	3.5%	93.20	96.00	5.2%	97.80	97.11
150	3.9%	95.80	97.22	4.7%	96.40	97.72
106	11.4%	96.60	97.46	14.8%	97.00	97.31
75	11.4%	96.70	97.41	12.7%	97.10	97.18
-75	69.7%	96.80	96.84	62.2%	93.80	94.52
Calc Head	100.0%	96.60	96.96	100.0%	95.04	95.57

Tailings storage facility design (TSF)

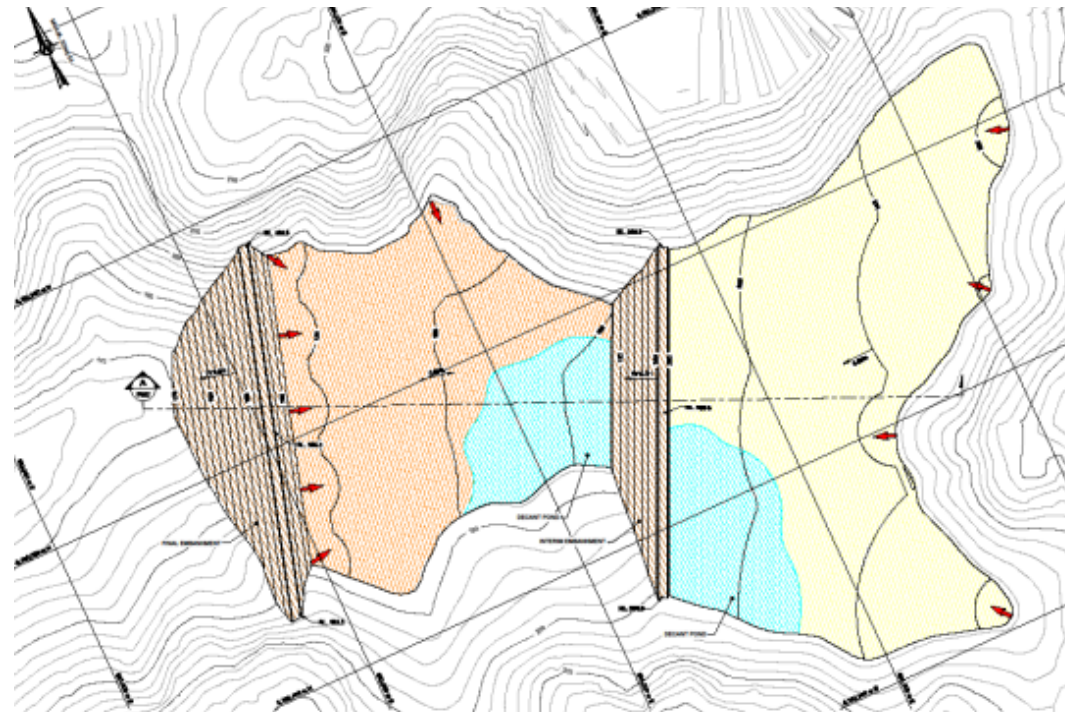


- ▶ Detailed geotechnical soil test pits & soil tests completed H1 2016
- ▶ Geotechnical investigation report for TSF received
- ▶ Tailings laboratory test-work report received
- ▶ TSF concept design & cost estimate received



Next steps:

- ▶ Review & finalise TSF design report as basis for description of operations, water management & closure plan in PEPR



Site water management

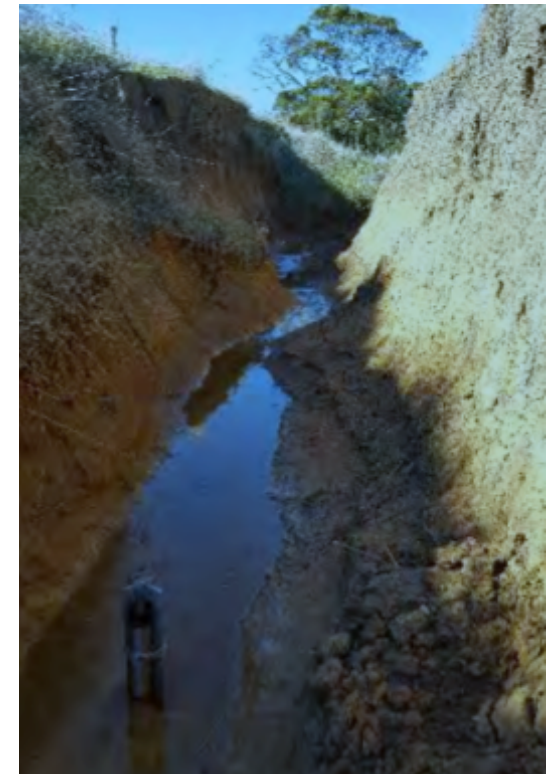


- ▶ Surface water-flow monitoring stations installed early 2016
- ▶ Golder Associates engaged to prepare site-wide water balance modelling and storm-water & sediment management review
- ▶ Water balance will inform make-up water requirement & enable refinement of water supply from Tod Reservoir



Next Steps:

- ▶ Design storm-water and sediment management system
- ▶ Water management report will form basis of water management section in PEPR



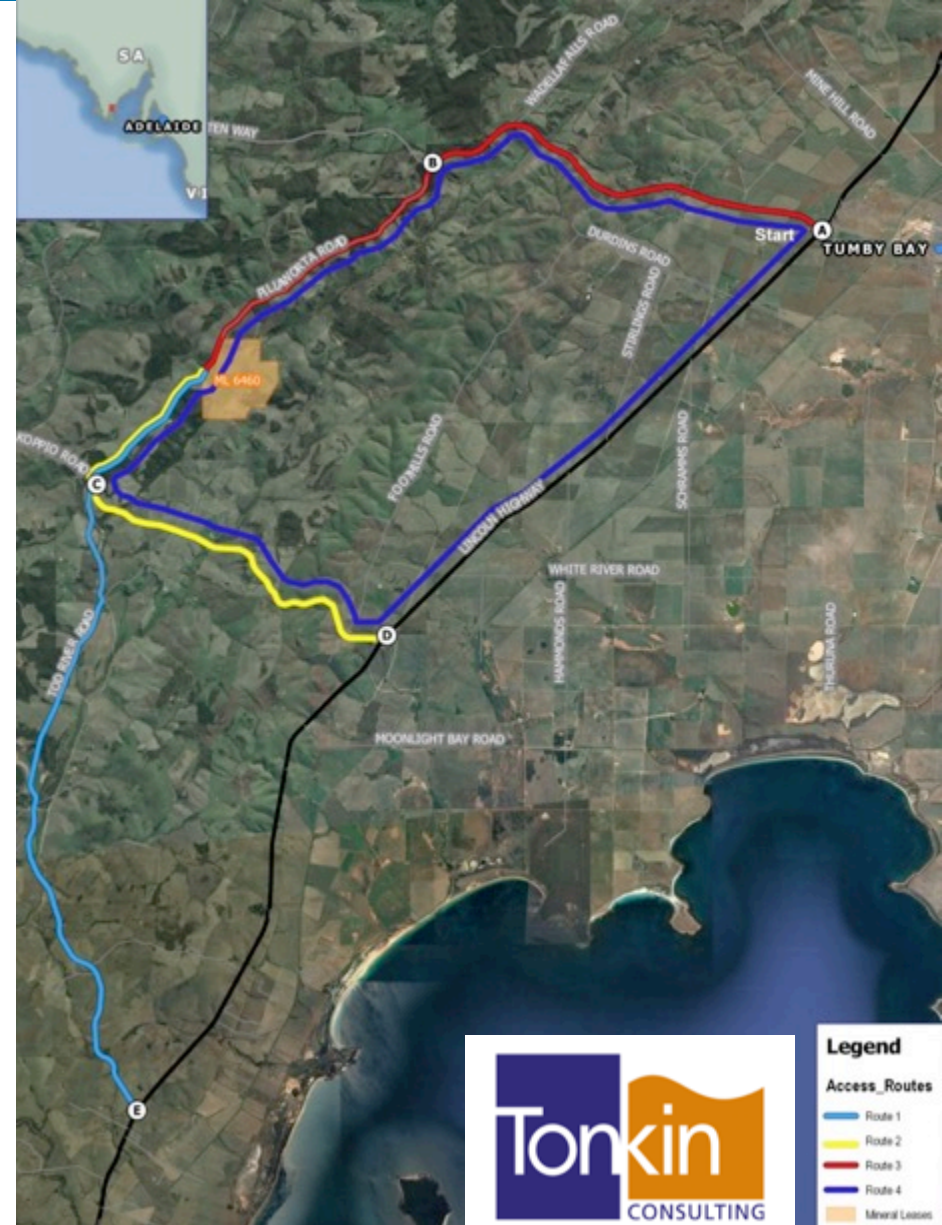
Surface water-flow monitoring station

Road transport route options study

- ▶ Tonkin Consulting undertook road route assessment, design & costing mid-2016
- ▶ All routes re-assessed including a ring route option (dark blue line on map)
- ▶ Considered road / public safety, overall travel distance, upgrade cost, maintenance costs, environmental constraints, community acceptability
- ▶ Recommended route is via Pillaworta Road & Bratten Way (red line on map)
- ▶ Report provided to DCTB & meeting held to discuss report recommendations

Next steps

- ▶ Prepare detailed design of road & intersection upgrade & seek approval from DCTB & DPTI
- ▶ Prepare road maintenance agreement with DCTB



Road transport route options study

Key recommendations



Pillaworta Road – Bratten Way intersection:

- ▶ Shoulder widening for left turn from Bratten Way into Pillaworta Road
- ▶ Sealing the Pillaworta Road approach to Bratten Way

Pillaworta Road:

- ▶ Upgrade to Category 2B requirements
- ▶ Upgrade drainage to ensure water ponding does not occur
- ▶ Provide delineation to highlight hazards along the roadway
- ▶ Prune vegetation to provide required clearances.

Traffic management:

- ▶ Implement car-pooling (or provide buses) for employee access to the mine
- ▶ Develop entry / exit staging to prevent two-way heavy vehicle congestion



Transport logistics



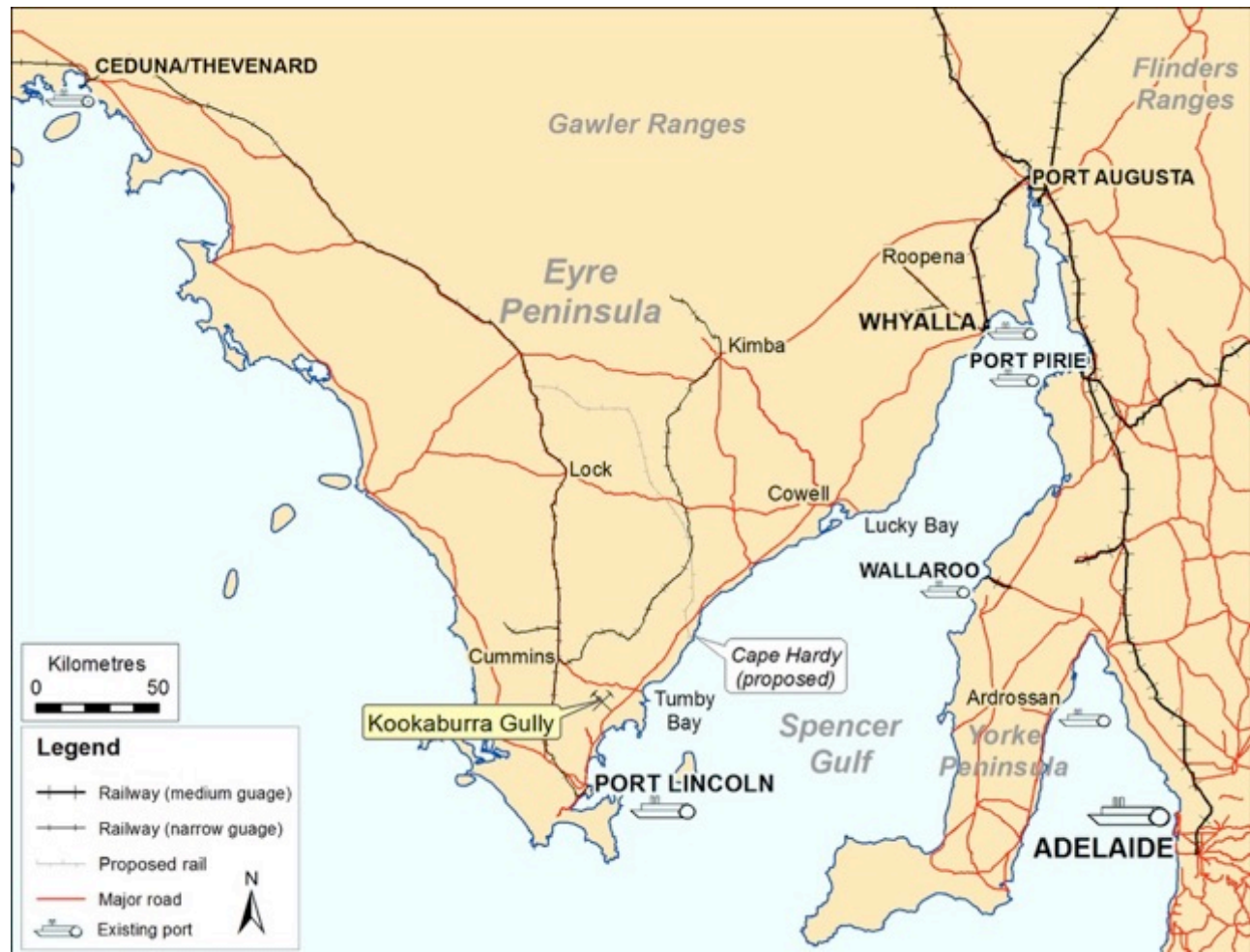
Further work required to confirm export port & transport logistics

- ▶ Graphite concentrate in containers to Port Adelaide by road or road/rail
- ▶ Freight depot in Tumby Bay
- ▶ Bulk samples to China (for metallurgical test-work)

Alternate ports:

Containers or bulka bags

- ▶ Port Lincoln
- ▶ Whyalla
- ▶ Port Pirie
- ▶ (? Cape Hardy)



Water supply options study

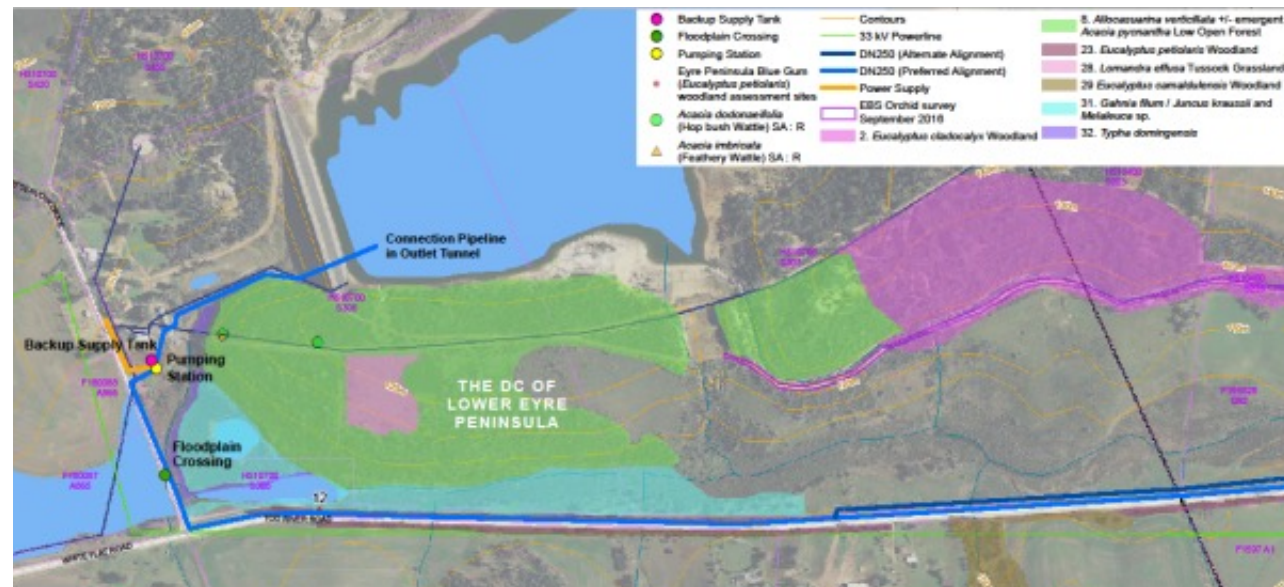


- ▶ Inside Infrastructure engaged to evaluate options for water supply & make recommendation
- ▶ Options considered: Tod Reservoir, SA Water mains supply &/or groundwater
- ▶ Final report received & meeting held with DCTB to discuss report recommendations



Next Steps

- Define approval pathway & requirements
- Negotiate agreement with SA Water for supply of Tod Reservoir water and access for construction & maintenance of pumping & pipeline infrastructure



Water supply options study

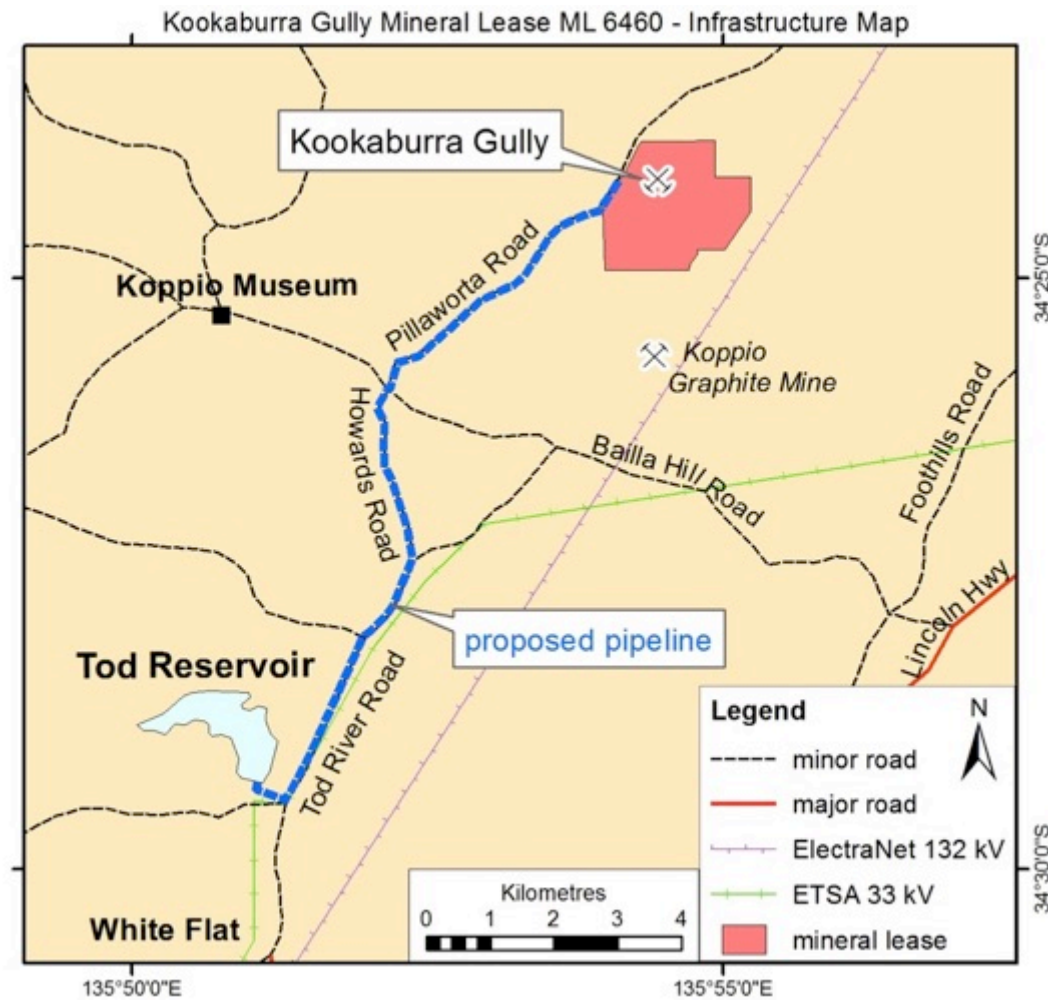


Recommendation: Raw water supply from Tod Reservoir with a standby potable connection (necessary to provide security of supply due to only 50% reliability of the Tod Reservoir supply)



Components:

- Connection to Tod Reservoir outlet
- Standby potable connection from the SA Water network
- Construction of a new pumping station adjacent to Reservoir Drive
- Buried PVC pipeline from Tod Reservoir to site
- High quality water provided by desalination plant & rainwater harvesting



Power supply options study



- ▶ GPA Engineering engaged to prepare power supply study report

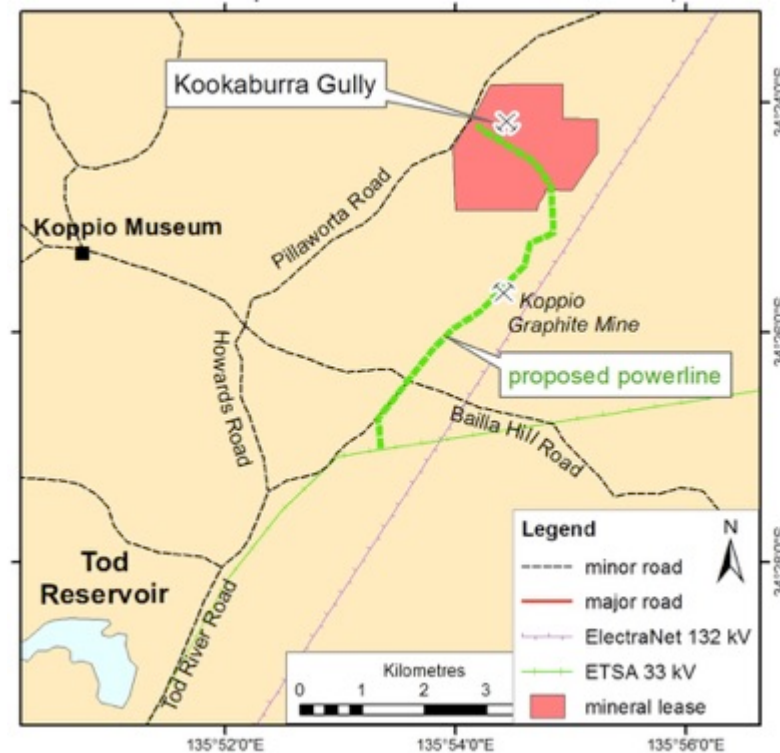


Option study outcomes:

- ▶ On-site diesel generation & alternate power generation sources such as solar, not commercially viable
- ▶ **Recommended:** HV grid connection via tee-off from the nearby 33 kV distribution network followed by a 5-6km overhead power line to the mine supply point
- ▶ Power transmission line route defined
- ▶ On-site gas generation is a potential alternative

Next steps

- ▶ Ecology survey along proposed route
- ▶ Finalise route design
- ▶ Negotiate landowner access agreement(s)
- ▶ Detailed design of connection, power transmission line, substation & site distribution
- ▶ Negotiate agreement with SA Power Networks



Mine site general arrangement

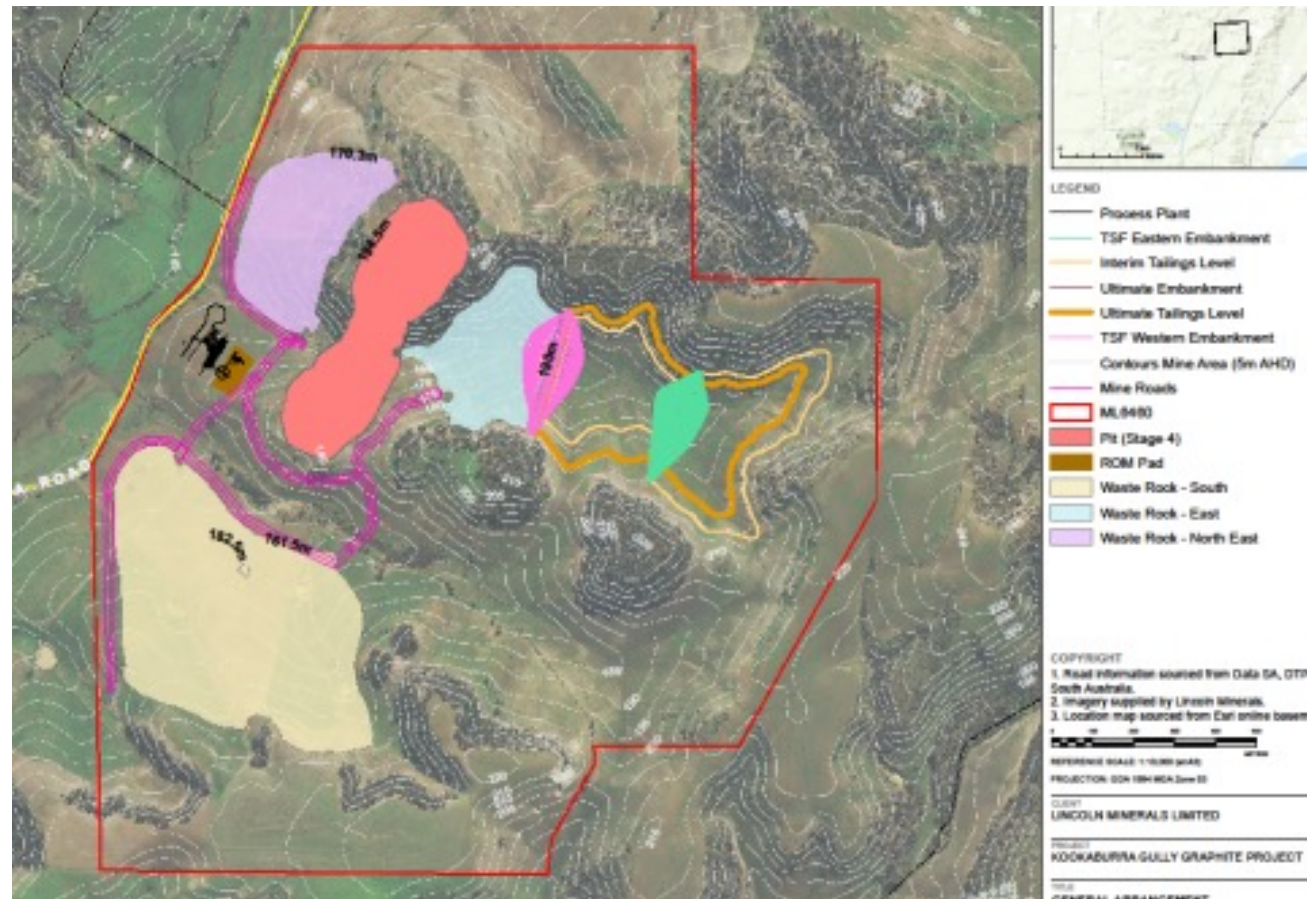


- ▶ Golder Associates engaged to prepare a mine site general arrangement (GA) drawing
- ▶ Draft GA includes all mine and process plant related infrastructure on the Mineral Lease

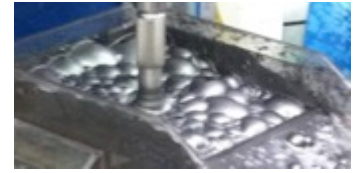


Next steps:

- ▶ Finalise mine site GA following site water management design
- ▶ EBS Ecology to review mine disturbance footprint
- ▶ Use GA as a basis for mine site disturbance & SEB offset calculation
- ▶ Use GA as base plan for the PEPR



Environmental Assessments



Environmental assessment studies:

- ▶ Air quality & noise (Pacific Environment)
- ▶ Groundwater & surface water (CDM Smith)
- ▶ Geochemistry (Earth Systems)
- ▶ Biodiversity, SEB offset & heritage (EBS Ecology)
- ▶ Mine rehabilitation & closure plan (Earth Systems & Golder Associates)

These assessment reports will form Appendices and the basis of the PEPR sections.

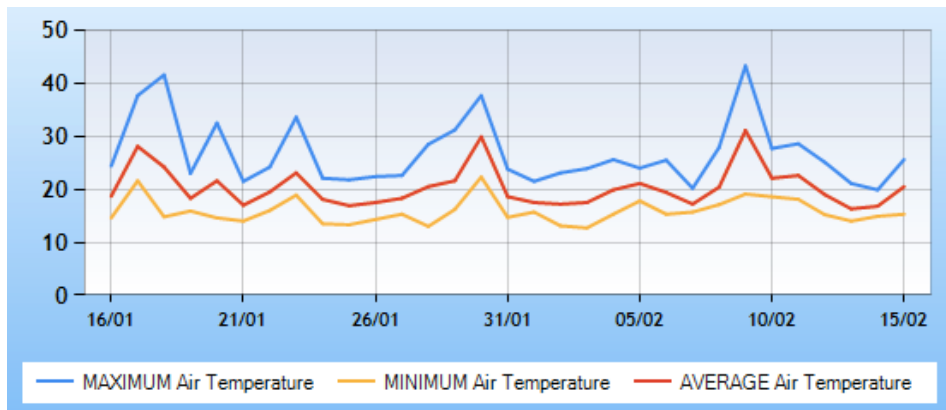
Air quality and noise



- ▶ Pacific Environment engaged to advise on installation of a weather station & to advise on the implications of air quality related ML conditions
- ▶ Weather station installed mid-2016
- ▶ Pacific Environment also engaged to prepare air quality & noise management & monitoring plans

Next Steps

- ▶ Review air quality & noise management & monitoring plans
- ▶ Incorporate into PEPR



Pacific Environment
Limited



Groundwater & surface water



- ▶ CDM Smith engaged to:
 - design & install baseline groundwater & surface water monitoring program
 - undertake groundwater supply options assessment
 - water impact assessment, including groundwater model development and surface & groundwater impact assessment
- ▶ Monitoring bores & gauging stations installed & monitored

Next Steps

- ▶ Pump tests on new groundwater monitoring wells
- ▶ Complete water impact assessment study following TSF design & site water management system design
- ▶ Water impact study report will form the basis of the water section in PEPR

**CDM
Smith**





- ▶ Earth Systems engaged to facilitate development of an environmental layer for the mine block model with specific attention to any potential acid forming rock (PAF) or acid mine drainage (AMD)
- ▶ Laboratory test-work completed on ore, waste rock & tailings samples
- ▶ Geochemical impact assessment report in progress



Next Steps

- ▶ Geochemical impact assessment report to be used as a basis for:
 - the finalisation of TSF design
 - site water system design
 - water impact assessment
 - final pit void management
 - waste rock facility design
 - mine closure plan
- ▶ all components of the PEPR

Biodiversity & Heritage



- ▶ EBS Ecology & EBS Heritage engaged to do:
 - baseline survey work for the Mining Lease Proposal
 - baseline & orchid surveys for transport, power supply & water supply pipeline routes
- ▶ Proposals received from Eyre Peninsula NRM Board and Nature Foundation for SEB offset



Next Steps

- ▶ Survey power transmission line route
- ▶ Complete draft biodiversity & heritage baseline & impact assessment reports for inclusion in PEPR
- ▶ Update SEB offset calculation and include in PEPR
- ▶ Recommend SEB offset approach following meetings with Eyre Peninsula NRM Board and Nature Foundation



Mine rehabilitation & closure plan



- ▶ Earth Systems & Golder Associates have been engaged to prepare the closure plan
- ▶ The closure plan will incorporate care & maintenance and rehabilitation plans and will require input from CDM Smith, AMC, Inception & EBS Ecology



Next Steps

- ▶ Review and discuss key aspects of closure plan with stakeholders
- ▶ Review, finalise and incorporate into the PEPR



Project Schedule



Milestone	Target Date
Infrastructure design studies completed	end 2016
Mine site general arrangement	Feb 2017
Mine design & impact assessments	Feb 2017
Project financial model update	Feb-Mar 2017
Project risk assessment	Mar 2017
Community consultation (ongoing)	Feb–Apr 2017
PEPR draft prepared	Apr 2017
Land access agreements complete	Apr 2017
PEPR approval – target	July 2017

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