

APPENDIX H9

FAILURE MODES AND EFFECTS ANALYS WORKSHOP OUTCOME TABLE

ANGAS PROCESSING FACILITY

MISCELLANEOUS PURPOSES LICENSE APPLICATION
2019/0826



ABN | 67 062 576 238

Unit 7 / 202-208 Glen Osmond Road | Fullarton SA 5063

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Consequence	Costs	Community / Media / Reputation	Human Health and Safety													
North	1a	Crown pillar collapse due to stope instability (also see central domain)	Injury and death to humans, damage to vehicle due to Callington Road damage	NL	L	L	n/a	n/a	L	L	L	L	Ma	Mo	H	Mo	Geotechnical assessment reporting (existing) to be summarised and referenced in Mine Closure Plan (MCP) and closure assessment to be added.	1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure	Mining One reviewed all available data at cessation of UG mining at AZM. October 2013 - confirmed "extremely low likelihood of underground workings that remain having any influence on the ground subsidence in the long term" - Backfill methodology approved in 2012 PEPR, Mining One reviewed backfill methodology and status of backfill in October 2013 and concluded extremely low risk as above. Detailed description will be included in Closure Plan V1G. - Monitoring plan has been included in Section 7 - Closure Outcomes and Completion Criteria (monitoring requirements)	NO FURTHER ACTIONS REQUIRED - other than required monitoring				
North	1b		Traffic disrupted due to Callington Road damage	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Check the monitoring data. GW modelling include no known changes (STEDs pond will be decommissioned > back to natural system - what influence will that have?) It should be rehabilitated to a natural wetland by the council). Mine Closure Plan to reference known data.	1. Assess current monitoring data and reference in MCP. 2. Update groundwater model based on data assessment (if require - motivate why not required). 3. Assess potential for groundwater mounding and subsequent outwards bound plume.	Appears STEDS ponds will continue to be used at a low rate (Council have not decommissioned as previously thought) - 2014 CR description. Will include in MCP V1G - Geotechnical assessment complete (as above) - GW model updated 2015 and recalibrated - data utilised from September 2013 - April 2015 from bores targeting mine void and in very close proximity to mine void (compared to regional bores previously used). This has validated the model (based on actual field data) Groundwater modelling updated. Refer Section 6.6.5 and Appendix AA, BB, CC and PP. Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria. Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	NO FURTHER ACTION REQUIRED - other than required monitoring				
North	1c		Increased infiltration to underground works leading to groundwater mounding and AMD released to groundwater	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Geotechnical assessment reporting (existing) to be summarised and referenced in Mine Closure Plan and closure assessment to be added.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Groundwater modelling updated. Refer Section 6.6.5 and Appendix AA, BB, CC and PP. Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria. Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	NO FURTHER ACTION REQUIRED - other than required monitoring				
North	1d		Increased STEDS lagoon seepage via cracks	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Geotechnical assessment reporting (existing) to be summarised and referenced in Mine Closure Plan and closure assessment to be added.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Groundwater modelling updated. Refer Section 6.6.5 and Appendix AA, BB, CC and PP. Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria. Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	NO FURTHER ACTION REQUIRED - other than required monitoring				
North	2a	Crown Pillar collapse due to instability of underground tunnelling (also see central)	Injury and death to humans, damage to vehicle via the Callington Road damage	NL	L	L	n/a	n/a	Ma	L	Ma	Mo	Mo	H	Mo	1. Geotechnical assessment reporting (existing) to be summarised and referenced in Mine Closure Plan (MCP) and closure assessment to be added. 2. Provide report referencing and monitoring info. Reference Collapse Failure Mode & Bulking Reporting.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 2a due to reclassification for potential consequence - death if it occurs 3) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	Terramin have discussed the backfill methodology and geotechnical aspects regarding the underground workings and risk of failure in Sections 6.4.5.1 (North Domain) and 6.5.5.1.1 (Central Domain) Monitoring will continue as per Outcome Criteria Tables in Section 7.				
North	2b		Traffic disrupted via the Callington Road damage	NL	L	L	n/a	n/a	Ma	L	Ma	Mo	Mo	H	L	Same risk rankings as the central domain ground subsidence / crack due to earthquake, but less likely to occur.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring					
North	2c		AMD released to groundwater via seepage	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Assess geotechnical stability based on post closure geotech modelling.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode		NO FURTHER ACTION REQUIRED - other than required monitoring			
North	2d		AMD released to surface water via exposure	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Assess geotechnical stability based on post closure geotech modelling.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode		NO FURTHER ACTION REQUIRED - other than required monitoring			
North	2e		Increased STEDS lagoon seepage via cracks	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Assess geotechnical stability based on post closure geotech modelling.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode		NO FURTHER ACTION REQUIRED - other than required monitoring			
North	3a	Ground subsidence / crack due to earthquake (also see central)	Injury and death to humans, damage to vehicle via the Callington Road damage	NL	L	L	n/a	n/a	L	L	L	L	Ma	Mo	L	Mo	Same risk rankings as the central domain ground subsidence / crack due to earthquake, but less likely to occur.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	Can't cave in due to 93% backfilled underneath Callington Road (Stopes and drives). Confirmed by Mining One report. - See mitigation comments as per above for subsidence and groundwater contamination risks Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring				
North	3b		Traffic discontinued via the Callington Road damage	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Assess geotechnical stability based on post closure geotech modelling.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring				
North	3c		AMD released to groundwater via seepage	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Assess geotechnical stability based on post closure geotech modelling.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring				
North	3d		AMD released to surface water via exposure	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Assess geotechnical stability based on post closure geotech modelling.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring				
North	3e		Increased STEDS lagoon seepage via cracks	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Assess geotechnical stability based on post closure geotech modelling.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	As above Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed acceptable 2) Human Health and Safety ranking changed for 3a due to reclassification for potential consequence - death if it occurs 3) No further work required for these failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring				
North	4	Wetlands drought due to instability of underlying operations	Loss of ecological function / lagoon habitat	NL	Ma	L	n/a	n/a	Ma	L	Mo	L	L	L	H	L	Assess geotechnical stability based on post closure geotech modelling.	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria	Geotechnical stability - as per above. During operations, with open stopes and blasting, no impacts observed of wetland function (water volumes). Hence, post cessation (without blasting or significant voids close to surface), wetland drying due to mining instability unlikely. Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed geotech acceptable 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring				

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Other Obligations	Consequences	Community / Media / Reputation	Human Health and Safety													
North	5a	Generation of AMD due to improper rehabilitation of drill sites	AMD released to groundwater via seepage	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Provide evidence of BH decom.	Provide decommissioning details and provide evidence of decommissioning.	Appendix G - register of drillhole status. Holes remaining throughout Care and Maintenance for geology (EM assessment) are cased PVC and capped	FURTHER ACTIONS REQUIRED 1) Continue rehabilitation works and provide documentation in PEPR of drill holes rehabilitation Sept 2015: 1) Ongoing rehabilitation to continue	Terramin maintain a register of drillhole and borehole status which has been discussed in all domain sections and the register has been included in Appendix G (drillholes) and Appendix BS. All drillholes/wells have been and will continue to be rehabilitation as per Earth Resources Information Sheet M21 - Mineral exploration drillholes - General specifications for			
North	5b		AMD released to surface water via exposure	NL	L	L	n/a	n/a	L	L	L	L	L	H	L	Provide evidence of BH decom.	As per North - 5a 1. Provide decommissioning details and provide evidence of decommissioning.	Refer to Table 6.2, Section 6.3.2.5 and Appendix G						
North	6a	Failure of underground workings causing surface subsidence	Damage to private infrastructure	NL	L	L	n/a	n/a	Mo	L	Mo	L	Mi	L	H	L	Ref geotech report and raise with council	As per 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria Plus 6. Commitment to inform council & DMITRE of potential instability by supplying final underground workings and backfill survey drawings, reports and associated information.	Geotechnical stability as per above - Mining One report and ongoing monitoring (Section 7) Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Government review confirmed geotech acceptable 2) No further work required for this failure mode	NO FURTHER ACTIONS REQUIRED - other than required monitoring	Terramin have discussed the backfill methodology and geotechnical aspects regarding the underground workings and risk of failure in Sections 6.4.5.1 (North Domain) and 6.5.5.1.1 (Central Domain) Monitoring will continue as per Outcome Criteria Tables in Section 7.			
Central / (North)	1a		AMD released to groundwater beyond the boundary via seepage - sink (post closure until groundwater rebound to steady state)	L	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Groundwater modelling completed, reference conclusions in MCP, recommended monitoring and model validation.	1. Assess groundwater model for the described scenario and maintenance plan. 2. Update MCP summarising and referencing the groundwater modelling report. 3. Include monitoring plan with validation criteria.	Following filling of mine void with water (October 2013 to Mid 2015), water quality testing demonstrates AMD formation successfully mitigated. E.g. Model for SO4 was 7507mg/L, in reality, was 2120mg/L and 2520mg/L in the mine void in the first 12 months. Highest risk was in first 12 months (decreased surface area exposed to oxygen). - Groundwater modelling updated. Refer Section 6.6.5 and Appendix AA, BB, CC and PP. Refer Table 7.5 for monitoring and closure criteria Levels in the boxcut will be reviewed following the groundwater modelling being updated with actual recharge data in 2015. Refer Section 6.6.5.1	FURTHER ACTIONS REQUIRED Further geochem work / clarification required to reduce risk and liability - see below: 1) Update the source term to account for in-situ sulfate due to dewatering and the backfill including the contribution the cement has played in the attenuation of actual and potential AMD 2) Assess the potential geochemistry change over time and update modelling 3) GW monitoring plan will be provided with MCCC V1G Note 2 bores, 1 inside and one in rock outside of mine workings 4) Levels in the boxcut will be reviewed following the groundwater modelling being updated with actual recharge data in 2015.				
Central / (North)	1b	Oxidation of sulphides in dewatering zone leading to groundwater contamination	AMD released to groundwater beyond the boundary via seepage- steady state reached	M	L	L	n/a	n/a	Mo	Mo-H	L	L	L	M	Mo-H	As above, Ambient high metals in GW Additional geochem modelling required	1. Assess groundwater model for the described scenario including additional geochemical assessment / modelling / fate & transport. 2. Update MCP summarising and referencing the updated groundwater modelling report. 3. Include monitoring plan with model validation criteria.		All mine recharge groundwater modelling has been updated. Discussion located in Section 6.5.5.2.1 (Central Domain). Updated geochemistry modelling is located in MCP Appendix BM. An AGT report summarising all modelling completed to date can be found in MCP Appendix BX.					
Central / (North)	1c		AMD released to box cut wetland due to mounding post closure	L	Mi	L	n/a	n/a	Mi	L	Mo	Mo	L	L	M	Mo	Confirm natural GW levels in comparison to base of backfilled Box Cut. Does the box cut recharge GW? Design of wetlands to account for groundwater movement.	1. Assess post closure steady state groundwater levels vs. final invert level of box cut, indicate variance in MCP and potential impacts and any mitigation measures, if required.						
Central / (North)	2a		AMD released to groundwater beyond the boundary via seepage - sink (post closure until groundwater rebound to steady state)	L	L	L	n/a	n/a	L	L	L	L	L	L	M	L	Provide Geochemistry data of paste fill and any material used for backfill. Assessment of the potential of AMD generation by these components.	1. Conduct geochemistry assessment of all forms of PAF materials used for backfill. 2. Assess the AMD potential of these backfilled PAF materials and interaction with groundwater model. 3. Include monitoring plan with model validation criteria & closure criteria.	URS and AGT reports complete (geochem) AMD model based on worst case scenario in 2012, updated in 2015 to current data - GW monitoring plan to be provided MCCC V1G 1. Refer Appendix OO 2. Refer Appendix OO, AA and CC. 3. Refer table 7.5 and 7.10	FURTHER ACTIONS REQUIRED 1) Provide an assessment of potential geochemical changes over time 2) Update worse case groundwater scenario based on geochemical changes over time	All mine recharge groundwater modelling has been updated. Discussion located in Section 6.5.5.2.1 (Central Domain). Updated geochemistry modelling is located in MCP Appendix BM. An AGT report summarising all modelling completed to date can be found in MCP Appendix BX.			
Central / (North)	2b	Oxidation of PAF material deposited in	AMD released to groundwater beyond the boundary via seepage- steady state reached	M	L	L	n/a	n/a	Mo	Mo-H	Mi	Mo	L	L	M	Mo-H	As per Central - 2a 1. Conduct geochemistry assessment of all forms of PAF materials used for backfill. 2. Assess the AMD potential of these backfilled PAF materials and interaction with groundwater model. 3. Include monitoring plan with model validation criteria & closure criteria.	As per Central - 2a 1. Conduct geochemistry assessment of all forms of PAF materials used for backfill. 2. Assess the AMD potential of these backfilled PAF materials and interaction with groundwater model. 3. Include monitoring plan with model validation criteria & closure criteria.	Sept 2015: 1) Government review did not confirm as acceptable 2) No information provided to assess potential geochemistry change over time - Level of confidence LOW (Government) 3) Further work required- To be reviewed by Government after completion					

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
				Likelihood	Environmental	Impact	Special	Consideration	Legal	Other	Obligation	Consequence	Costs	Community	Media	Reputation							
Central / (North)	2c	mine voids leading to groundwater contamination	AMD released to box cut wetland due to mounding post closure	L	Mi	L	n/a	n/a	n/a	Mi	L	Mi	L	L	L	M	L	Confirm natural GW levels in comparison to base of backfilled Box Cut. Does the box cut recharge GW? Design of wetlands to account for groundwater movement.	As per Central - 1c 1. Assess post closure steady state groundwater levels vs. final invert level of box cut, indicate variance in MCP and potential impacts and any mitigation measures, if required.	Refer Central - 1c Addressed in the submitted MCP (Dec 15). AGT modelled the steady-state GW level which will create an ephemeral wetland in the base of the boxcut (neutral when balanced over summer-winter season). The revegetation plan has taken into account the ephemeral wetland nature. Sept 2015: 1) Government review did not confirm as acceptable 2) Groundwater consultants could not confirm – Level of confidence LOW (Government) 3) Further work / clarification required	FURTHER ACTIONS REQUIRED 1) Provide a detailed design and construction drawings for the boxcut/wetland 2) Provide a detailed design and construction drawings for the decline and shaft plugs 3) Update GW model based on detailed design 4) include surface water management plan in closure plan 5) Undertake construct to design audits, and include these audits as leading indicator criteria for Outcome: "No adverse impact to the supply of water by the mining operations to existing users and water dependant ecosystems" and " No contamination and pollution is caused by waste products and hazardous materials used in mine operations"	An AGT report summarising all modelling completed to date can be found in MCP Appendix BX. Detailed design and construction drawings for the decline and vent shaft plugs described in section 6.5.5.2.2 (decline) and 6.5.5.2.4 (vent shaft). Complete design located in Appendix AT and construction work plans located in Appendix BU. Surface water management plan is located in Appendix CC. Section 7 includes construct to design audits as leading indicators in the Outcome Measurement and Criteria Tables.	
Central	3	Collapse due to failure of the ground support in first 100m of decline	Public safety in Box Cut Area	L	L	L	n/a	n/a	L	L	Mi	L	Mi	Mo-H	L	Mo-H	Design details referenced, geotech assessment of fill, verification of construction	1. Assess this risk scenario, summarise and reference existing geotechnical reports. 2. Conduct detail design including slope stability analysis, construction monitoring plan and verification.	Mining One report - ground support not included in subsidence assessment, hence most conservative conditions assessed. Extremely low risk of subsidence even without ground support. BOXCUT: dxf files / design complete. Analysis of slope stability (1V:3H) has been discussed by URS, Parsons Brinkerhoff as being sufficient. Sept 2015: 1) Government review did not confirm as acceptable 2) First 100m not filled as per proposed design – Level of confidence LOW (Government) 3) Further work / clarification required	FURTHER ACTIONS REQUIRED 1) Provide a detailed design, implementation methodology and construction drawings for the decline backfill. 2) Ensure all Mining One recommendations are undertaken 3) Provide dewatering methodology 4) Undertake construct to design audits, and include these audits as leading indicator criteria for Outcome: "Ensure no damage occurs to third party infrastructure and no injuries or death result from collapse of the underground workings".	Detailed design and construction drawings for the decline and vent shaft plugs described in section 6.5.5.2.2 (decline) and 6.5.5.2.4 (vent shaft). Complete design located in Appendix AT and construction work plans located in Appendix BU. Section 7 includes construct to design audits as leading indicators in the Outcome Measurement and Criteria Tables for both decline and vent rise plugs.		
Central	4a	Instability of box cut slopes leading to localised slip failure	Instability of box cut slopes leading to localised slip failure	L	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Reference relevant information regarding backfill methodology (also see Southern Domain)	1. Assess this risk scenario, summarise and reference existing geotechnical reports. 2. Conduct detail design including slope stability analysis, construction monitoring plan and verification.	Extremely low risk of slope collapse due to earthquake (see above, backfilled) No chance of caving to surface, hence no oxygen can ingress to stimulate AMD Mining One designed capping and decline backfill such that is will not compress significantly over time EFA monitoring of erosion/vegetation is the preferred method to monitor and actively manage erosion/vegetation failures through understanding ecosystem function Slope stability analysis currently being undertaken by UofA student (PSD, erosion potential of soils exposed in recontour design) 1. Refer Appendix NN, QQ. 2. Refer Figure 6-3, 6-4, 6-5, Appendix NN, SS, QQ. Sept 2015: 1) Geotech review confirm acceptable (geotech only, erosion assessment/design not acceptable to limit future liability / bond) 2) No further work required for this specific failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	Terramin have discussed the backfill methodology and geotechnical aspects regarding the underground workings and risk of failure in Sections 6.4.5.1 (North Domain) and 6.5.5.1.1 (Central Domain). Erosional potential of the boxcut has been discussed in section 6.5.5.1.2.2 and supported by Appendix BO		
Central	4b	Stope collapse due to earthquake, insufficient backfill ratio, loss of backfilled fines during water filling	Increased oxidation and AMD released to groundwater via seepage	L	L	L	n/a	n/a	L	L	L	L	L	L	M	L	Higher oxygen ingress due to increased voids	As per Central - 2a 1. Conduct geochemistry assessment of all forms of PAF materials used for backfill. 2. Assess the AMD potential of these backfilled PAF materials and interaction with groundwater model. 3. Include monitoring plan with validation criteria.	Modelled geochemistry evolution of higher surface area AF material, hence most conservative To reduce risk further of GW contamination, failure of plug was modelled and subsequent GW plume determined GW monitoring plan to be included in MCP V1G 1. Refer Appendix OO 2. Refer Appendix OO, AA and CC. 3. Refer table 7.5 and 7.10 Sept 2015: 1) Geotech review confirm acceptable (geochem to be addressed as part of other failure modes to limit future liability / bond) 2) No further work required for this specific failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	Terramin have discussed the backfill methodology and geotechnical aspects regarding the underground workings and risk of failure in Sections 6.4.5.1 (North Domain) and 6.5.5.1.1 (Central Domain) An AGT report summarising all groundwater modelling completed to date can be found in MCP Appendix BX.		

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Other Obligations	Consequence	Community / Media / Reputation	Human Health and Safety													
Central	4c		Movement of vent shaft and decline caps leading to loss of box cut backfill and exposure	L	L	L	n/a	n/a	Mi	L	Mi	L	L	L	L	H	L	Commitment to providing details of fill and cap. Land management agreement	1. Assess box cut slope and underground stability post closure and after backfilling / cut to fill. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and validation criteria As per Central - 3. 6. Assess this risk scenario, summarise and reference existing geotechnical reports. 7. Detail design (vent capping and fill) including construction methodology, monitoring plan and verification. AND 8. Include details in land management plan.	Boxcut slope: as above See geotech reports for geotechnical stability - this reduces the risk of vent rise and decline plug "moving". RL75 has been backfilled >93%, minimum cave to surface possible. Refer to Sections 6.4.5, 3.7.2 and 6.6.5.1 MCP Refer to Section 7 for monitoring plan and verification Refer to Appendix SS, NN, and QQ Refer to Section 1.7, 6.3.2.4 and Appendix UU Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) Detailed design of caps/plugs required to limit liability / bond	FURTHER ACTIONS REQUIRED 1) Detailed design and construction drawings of decline & vent shaft plugs to be provided for review. 2) Include construct to design audits for decline, vent and shaft as leading indicator criteria for Outcome "No public deaths or injuries due to unauthorised entry to the mine site"	Terramin have discussed the backfill methodology and geotechnical aspects regarding the underground workings and risk of failure in Sections 6.4.5.1 (North Domain) and 6.5.5.1.1 (Central Domain) Detailed design and construction drawings for the decline and vent shaft plugs described in section 6.5.5.2.2 (decline) and 6.5.5.2.4 (vent shaft). Complete design located in Appendix AT and construction work plans located in Appendix BU. Section 7 includes construct to design audits as leading indicators in the Outcome Measurement and Criteria Tables for both decline and vent rise plugs.		
Central	5a	Ground subsidence / decline collapse / crack due to earthquake	Instability of box cut slopes leading to localised slip failure	L	L	L	n/a	n/a	L	L	L	L	L	L	L	H	L	Geotechnical assessment reporting to be summarised and referenced in Mine Closure Plan	1. Assess box cut slope and underground stability post closure and after backfilling / cut to fill. 2. Update MCP summarising and referencing the relevant geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. As per Central - 3. 5. If geotechnical reports are available assessing this risk scenario, summarise and reference. 6. Detail design including construction monitoring plan and verification. AND 7. Include details in land management agreement.	See above. Refer to Sections 6.4.5, 3.7.2 and 6.6.5.1 MCP Refer to Section 7 for monitoring plan and verification Refer to Appendix SS, NN, and QQ Refer to Section 1.7, 6.3.2.4 and Appendix UU Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) Detailed erosion assessment and design slopes required to limit liability / bond	FURTHER ACTIONS REQUIRED 1) Provide detailed design and construction drawings of boxcut , incorporating outputs from erosion assessment	Terramin have discussed the backfill methodology and geotechnical aspects regarding the underground workings and risk of failure in Sections 6.4.5.1 (North Domain) and 6.5.5.1.1 (Central Domain) Erosional potential of the boxcut has been discussed in section 6.5.5.1.2.2 and supported by Appendix BO Final landform and Materials balance located in Section 6.3.2 and final landform construction drawings located in Appendix BZ.		
Central	5b		Increased surface water to underground workings via infiltration	L	L	L	n/a	n/a	L	L	L	L	L	L	L	M	L	As per Central - 4a 1. Assess this risk scenario, summarise and reference existing geotechnical reports. 2. Conduct detail design including slope stability analysis, construction monitoring plan and verification.	See above. Decline capped with cement. Refer Appendix QQ Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	Terramin have discussed the backfill methodology and geotechnical aspects regarding the underground workings and risk of failure in Sections 6.4.5.1 (North Domain) and 6.5.5.1.1 (Central Domain) An AGT report summarising all groundwater modelling completed to date can be found in MCP Appendix BX.			
Central	6a	Erosion of cover soils of non-putrescibles landfill leading to exposure of waste	Exposure of potentially contaminated waste leading to surface water contamination	NL	L	L	n/a	n/a	L	L	L	L	L	L	M	L	EPA license requirements. Verification of only clean fill in Landfill - reference in MCP							
Central	6b		Exposure of contaminated waste leading to groundwater contamination	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	H	L	EPA license requirements. Landfill	Include summary of EPA Landfill licence closure requirements in MCP. EPA Landfill Closure requirements from EPA. Landfill cell on boundary - AHR / Terramin landfill cell (previously Garwoods) (License #: 34942) has been test excavated and no potentially contaminating waste identified. Bricks, cement, building rock demolition waste, wood, corrugated iron, all compliant with the 'Authorised Waste Streams' in EPA license 34942. Refer Table 6.6 and Appendix M Sept 2015: 1) Details to be included in PEPR	FURTHER ACTIONS REQUIRED 1) Provide closure details for the landfill site in the PEPR 2) include photos of excavations	EPA Landfill (license number 34942), materials, Waste Management Plan and cover requirements has been discussed in section 6.5.5.2.7.6. The EPA approved Waste Management Plan for the site has been included in Appendix BD.			
Central	6c		Exposure of waste leading to human health risk	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	H	L							

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Other Obligations	Consequences	Costs	Community / Media / Reputation	Human Health and Safety												
Central	7a	Ground subsidence / crack due to instability of crown pillar (where under central domain)	Subsidence leading to infrastructure becoming unsafe for use	NL	L	L	n/a	n/a	Mi	L	L	L	L	L	L	H	L	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Post mining monitoring plan and validation criteria Plus	Crown pillar in Central domain is 95m. Mining One geotech report. Look at PB report 2012. Summarised and included in MCP V1G. Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	Terramin have discussed the backfill methodology and geotechnical aspects regarding the underground workings and risk of failure in Sections 6.4.5.1 (North Domain) and 6.5.5.1.1 (Central Domain)			
Central	7b		Subsidence leading to infrastructure loss	NL	Mo	L	n/a	n/a	Mi	L	Mi	L	L	L	L	M	L		Confirmed 93% backfill under road - provide info in MCP Refer to Sections 6.4.5, 3.7.2 and 6.6.5.1 MCP. Sept 2015: 1) Geotech review confirm acceptable geotechnical stability if 93% backfilled		Monitoring will continue as per Outcome Criteria Tables in Section 7.			
Central	8a	Off site groundwater contamination due to mounding under box cut	Due to above natural groundwater levels causing mounding (infiltration from wetland)	M	L	L	n/a	n/a	L	L	L	L	L	L	L	L	L	Stormwater drainage design into Box Cut (likely infiltration rates), update groundwater modelling, assess potential requirement to redirect stormwater away from box cut.	Updated GW model. GW mounding scenario modelled. Recontoured site plan (post rehab) includes surface water run off directions - limited catchment area for boxcut (not necessary to redirect). URS have provided a stormwater/run off design of the recontoured landform. 1. Refer Appendix NN 2. See Table 7.5 and Appendix for surface water redirections and monitoring plan. Sept 2015: 1) Details to be included in PEPR	FURTHER ACTIONS REQUIRED 1) Provide details of updated GW model, once the geochemistry and integration has been revised, in the PEPR 2) Surface water management 3) Water balance for boxcut 4) Undertake geochem work as for IDs Central 1a-c	An AGT report summarising all groundwater modelling completed to date can be found in MCP Appendix BX (including mounding). Updated geochemistry groundwater modelling has been completed and located in Appendix BM.			
Central	9a	Rehabilitation failure, due to contaminated soils not removed to sufficient depth or covered	Groundwater contamination via infiltration	L	L	L	n/a	n/a	L	L	L	L	L	L	L	M	L	Land management agreement. Provide Site Contamination Report and remedial plan and validation accordance with the NEPM	1. Commitment to undertake site contamination investigations based on the NEPM . 2. Include any relevant details in land management agreements.	Global Centre for Environmental Remediation & CRC Care trialling in-situ remediation, testwork for hydrocarbon contamination complete, will be included in MCP V1G. 1. Refer table 7.10 2. Appendix UU Sept 2015: 1) Details to be included in PEPR	FURTHER ACTIONS REQUIRED 1) Provide reports incorporating methodology, results and conclusions of each trial testing being undertaken, in the PEPR 2) detail future work required to meet future land use	The Outcome Measurable Criteria developed by the EPA for site contamination ensures the end land use will be achievable. Table 7-4. The location and extent of the assessment and remediation will be informed through assessment in accordance with the NEPM and EPA guidelines as part of the EPA process.		
Central	9b		End land use not being achievable	L	L	L	n/a	n/a	Mi	L	Mi	L	L	L	L	M	L	as above - Provide info around end land use council zoning? Light industrial- planning regs, etc.		End land use for central processing area will be industrial (zoned rural industry Alexandrina Council), as it has been since 1948. NEPM HIL levels reflects this. Evidence - Echunga aerial photo sheet No 6627-1, Jan-March 1979		The Outcome Measurable Criteria developed by the EPA for site contamination ensures the end land use will be achievable. Table 7-4. The location and extent of the assessment and remediation will be informed through assessment in accordance with the NEPM and EPA guidelines as part of the EPA process.		
Central	9c		dust causing nuisance and health impacts.	NL	L	L	n/a	n/a	Mi	L	Mo	L	L	L	L	H	L	Land management plan (EFA)	Reference land management plans in MCP and append	Currently with site in C&M (exposed soils with limited vegetation), site TSP levels are lower than surrounding land TSP levels. Indicates that once vegetated (post closure) levels will be satisfactory. Within much of the central area (processing plant and workshop) sheet limestone rock , resistant to excavator, is reached at between 100 - 200mm; easy to remove. dust monitoring will only cease once 12 months of stated standard has been met. Refer to Appendix UU Sept 2015: 1) Details to be included in PEPR	FURTHER ACTIONS REQUIRED 1) Provide an assessment of potential dust impacts post completion based on geochemical characteristics of the rehabilitation (borrow) materials.	Dust has been discussed in section 6.3.2.4		
Central & all Domains	9c		Exposed contaminated soils leading to Surface water runoff contamination	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	H	L	Land management plan. Provide Site Contamination Report and remedial plan and validation in accordance with SA EPA NEPM requirements	1. Commitment to undertake site contamination investigation based on NEPM. 2. Assess surface water management plan, particular monitoring and validation criteria. 3. Include decommissioning plan 4. Include in land management agreements.	Mitigation - Artificial sediment dams/traps in place currently. Will demonstrate compliance with baseline soil conditions prior to surrender of Lease - site contamination assessment. 1. Refer table 7.6 and 7.16 in the MCP 2. Refer table 7.5 in the MCP 3. The report will be included in the decommissioned report 4. Refer Appendix UU Sept 2015: 1) Details to be included in PEPR	FURTHER ACTIONS REQUIRED 1) Provide scope of works, including desk based summary and sampling and analysis plan for the final site contamination assessment, in the PEPR 2) Provide a remediation works and validation methodology	Surface water management plan has been developed and is located in Appendix CC.		
Central	10a	Poor vegetation establishment on re-contour due to lack of moisture, nutrients in soils	Intense rainfalls causing increased erosion	L	Mi	L	n/a	n/a	L	L	L	L	L	L	L	H	L	Evidence in the cover report etc. Field Trials recorded and referenced	Include summary of field trials and evidence of success in MCP. Provide post closure monitoring plan and validation criteria	Photos of vegetation growing on steep slopes/bunds - demonstrates likely success in closure Refer Appendix L PB Report provides evidence that vegetation currently growing on slopes with no topsoil. Have confidence that vegetation will grow - based on Appendix L veg cover trial, plus veg already growing on worse conditions, plus veg growing on landfill trial with no topsoil. Will summarise all relevant material in MCP V1G. Sept 2015:	FURTHER ACTIONS REQUIRED 1) Update/ Provide post closure monitoring plan in the PEPR 2) Provide plan with photo points identified 3) Provide an erosion assessment of re-contour 4) Provide method for validation of the erosion assessment, use validation as leading indicator criteria for Outcome: "Stabilise disturbed areas and prevent sediment from leaving the site."	Revegetation is discussed in section 6.3.2.2 for the whole of site. This includes the ongoing monitoring methodology. Erosion assessment discussed in section 6.3.2.1 and includes final site contours (from construction drawings in Appendix BZ). Validation of the erosion assessment will be undertaken by means of survey - outlined in section 7 - outcome measurement criteria tables. Surface water management plan - Appendix CC.		
Central	10b		Surface water and groundwater contamination via increased infiltration	L	Mi	L	n/a	n/a	L	L	Mi	L	L	L	L	L	L							

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Consequences	Costs	Community / Media / Reputation	Human Health and Safety													
Central	11a		Leading to the failure of the box cut slope	L	L	L	n/a	n/a	Mi	L	Mi	L	L	L	H	L	Details for the box cut design and reveg. Slope stability. Ref relevant report and assessment.	As per Central - 3 & 8a 1. Assess this risk scenario, summarise and reference existing geotechnical reports. 2. Conduct detail design including slope stability analysis, construction monitoring plan and validation criteria 3. Assess post closure steady state groundwater levels vs. final invert level of box cut, indicate variance in MCP and potential impacts and any mitigation measures, if required. AND 4. Assess surface water management plan, particular redirecting clean surface runoff away from box cut.	Further work on soil types, particle size distribution and erodibility currently being undertaken Refer Section 6.6 Refer to Section 6.6.6 for design See Table 7.5 and Appendix for surface water redirections and monitoring plan. Sept 2015: 1) Government review confirm geotechnically (slip) acceptable 2) For PEPR a detailed design including drawings are required 3) Note erosion stability issues	FURTHER ACTIONS REQUIRED 1) Provide an erosion assessment of the boxcut rehabilitation materials including source and characteristics - to be reviewed after completion 2) Provide a detailed design and construction drawings for the box cut 3) Update GW model based on detailed design include surface water management plan and include details in closure plan 4) Include construct to design audit of the box cut as a leading indicator criteria for Outcome: "Ensure no damage occurs to third party infrastructure and no injuries or death result from collapse of the underground workings" and "no public injuries or deaths resulting from unauthorised entry to the mine site." 5) Provide method for validation of the erosion assessment, use validation method as leading indicator criteria for Outcome: "Stabilise disturbed areas and prevent sediment from leaving the site." and "improve visual amenity of the mine site in the long term post closure."	erosion assessment - Appendix BO Boxcut construction design drawings - Appendix BZ Groundwater modelling summary report - Appendix BX surface water management plan - Appendix CC Construct to design audits included as leading indicators - section 7 Validation of erosion assessment through survey as leading indicators - section 7			
Central	11b	Poor construction and design of Box Cut	Increased soil erosion beyond design parameters	M	L	L	n/a	n/a	L	L	Mi	Mo	L	L	M	Mo	Details for the box cut design and reveg. Slope erosion stability. Ref relevant report and assessment.	1. Assess this risk scenario, summarise and reference existing soil characteristic and erosion stability and vegetation reports. 2. Conduct detail erosion modelling, monitoring plan and verification. 3. Assess surface water management plan, particular redirecting clean surface runoff away from box cut.	PB report - Boxcut erosion + current field work. Include additional information from academics EFA - EFA actively monitors and provides guidance on remediation if required. EFA must be sustainable prior to surrender. 1. Refer to Appendix SS 2. Refer to Appendix QQ 3. Refer to Table 7.5, Appendix PP and P Sept 2015: 1) Government review did not confirm acceptable - Level of confidence Low (Government) 2) For detailed PEPR a detailed design including drawings are required 3) Further work / clarification required - UofA student work to be reviewed after completion 4) Alternatively bond increased to account for assessment & design work and required closure construction	"Ensure no damage occurs to third party infrastructure and no injuries or death result from collapse of the underground workings" and "no public injuries or deaths resulting from unauthorised entry to the mine site." 5) Provide method for validation of the erosion assessment, use validation method as leading indicator criteria for Outcome: "Stabilise disturbed areas and prevent sediment from leaving the site." and "improve visual amenity of the mine site in the long term post closure."				
Central	11c		Poor veg establishment	L	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Same as tailings dam - include above comments	As per Central 10a Include summary of field trials and evidence of success in MCP. Provide post closure monitoring room and validation criteria.	EFA. Photos of veg growing on current steep slopes. See above. Refer Section 6.7.5.2 and Appendix L Refer Section 6.3.2.2 and Table 7.7	FURTHER ACTIONS REQUIRED 1) Provide reveg plan for the boxcut 2) Provide details of EFA transects for the boxcut	Revegetation plan for the boxcut outlined in section 6.5.5.2.6. Proposed LFA transects located on Figure 6-6			
Central	12a		Instability of re-contour via erosion	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Same as southern domain & rating	As per Central 10a Include summary of field trials and evidence of success in MCP. Provide post closure monitoring room and validation criteria.	Sclerophyllous Australian vegetation is adapted to fire. Acacias seed germinates and Eucalyptus resprouts with fire. Perennial grasses thrive with fire and reshoot. Fire is not a damaging risk to vegetation (healthy in some instances). Refer Section 6.7.5.2 and Appendix L Refer Section 6.3.2.2 and Table 7.7	FURTHER ACTIONS REQUIRED 1) Provide reveg plan for this area 2) Provide details of EFA transects for this area	Revegetation plan for the central domain outlined in section 6.5.5.2.6. Proposed LFA transects located on Figure 6-6.			
Central	12b	vegetation died-off due to fire	Surface water and groundwater contamination via increased infiltration	NL	Mi	L	n/a	n/a	L	L	L	L	L	L	H	L	Same as southern domain & rating	As per Central 10a 1. Include summary of field trials and evidence of success in MCP. Provide post closure monitoring room and validation criteria. PLUS - 2. Ensure all soils placed are suitable for use.	Perennial grasses - roots remain and hold soils together. Reshooting plants are still alive. Refer Section 6.7.5.2 and Appendix L Refer Section 6.3.2.2 and Table 7.7 Refer Table 7.6		Groundwater monitoring plan - Appendix BJ Surfacewater monitoring plan - Appendix CC			
Southern	1a		Release of tailings leading to adverse effects on the receiving environment	NL	Mi	L	n/a	n/a	Mi	L	Mo	L	L	L	H	L	Geotech report referenced within MCP.	As per North - 1a 1. Assess underground stability post closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Not applicable, no stopes in Southern Domain. All underground risks outlined in Central/North. Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	1b	Stope collapse due to earthquake loading leading to embankment or cover failure	Higher seepage volumes leads to unacceptable contamination of groundwater supply	NL	L	L	n/a	n/a	Mi	L	L	L	L	L	M	L	Leakage not been directly addressed	1. Assess current leakage monitoring data (volume & chemical) and reference in MCP. 2. Assess underground stability post closure and after backfilling with respect to this scenario. 3. Assess potential for groundwater mounding and subsequent outwards bound plume. 4. Update groundwater model (fate & transport) based on data assessment 5. Update MCP and reference and append	Not applicable, no stopes in Southern Domain. All underground risks outlined in Central/North. Refer to Section 6.7.5.2 Refer to Section 6.4.5 for Crown Pillar geotechnical review (2014 PEPR, Appendix T) Refer Section 6.6.5 and Appendix AA, BB, CC & PP for updated groundwater modelling Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Other Obligations	Consequence	Community / Media / Human Health and Safety															
Southern	1c		Higher seepage volumes leads to unacceptable contamination of surface water receptors	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	H	L	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Not applicable, no stopes in Southern Domain. All underground risks outlined in Central/North. Refer to Section 6.6.5.1 for a summary of the geotechnical report. Refer to Appendix LL for the TSF geotechnical Investigation Report. Refer to Section 6.6.5.1 for the backfilling methodology. Refer to Table 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	2a		Release of tailings leading to adverse effects on the receiving environment	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	M	L	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Not applicable, no stopes in Southern Domain. All underground risks outlined in Central/North. Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology. Refer Appendix NN for Post Closure Geotechnical Report. Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	2b	Stope collapse due to instability of underground tunnelling leading to embankment or cover failure	Higher seepage volumes leads to unacceptable contamination of groundwater supply	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	L	L	As per Southern - 1b 1. Assess current leakage monitoring data (volume & chemical) and reference in MCP. 2. Assess underground stability post closure and after backfilling with respect to this scenario. 3. Assess potential for groundwater mounding and subsequent outwards bound plume. 4. Update groundwater model (fate & transport) based on data assessment 5. Update MCP and reference and append 6. Closure criteria and validation monitoring	Not applicable, no stopes in Southern Domain. All underground risks outlined in Central/North. Refer to Section 6.7.5.2. Refer to Section 6.4.5 for Crown Pillar geotechnical review (2014 PEPR, Appendix T). Refer Section 6.6.5 and Appendix AA, BB, CC & PP for updated groundwater modelling. Refer Table 7.2 and 7.5 for monitoring and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	2c		Higher seepage volumes leads to unacceptable contamination of surface water receptors	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	L	L	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Not applicable, no stopes in Southern Domain. All underground risks outlined in Central/North. Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology. Refer Appendix NN for Post Closure Geotechnical Report. Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	3a		Release of tailings leading to adverse effects on the receiving environment	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	M	L	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology. Refer Appendix NN for Post Closure Geotechnical Report. Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Other Obligations	Consequence	Costs	Community / Media / Reputation	Human Health and Safety												
Southern	3b	Stope collapse due to instability of crown pillar leading to embankment or cover failure	Higher seepage volumes leads to unacceptable contamination of groundwater supply	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	L	Geotech report referenced within MCP.	As per Southern - 1b 1. Assess current leakage monitoring data (volume & chemical) and reference in MCP. 2. Assess underground stability post closure and after backfilling with respect to this scenario. 3. Assess potential for groundwater mounding and subsequent outwards bound plume. 4. Update groundwater model (fate & transport) based on data assessment 5. Update MCP and reference and append 6. Closure criteria and validation monitoring	Refer to Section 6.7.5.2 Refer to Section 6.4.5 for Crown Pillar geotechnical review (2014 PEPR, Appendix T) Refer Section 6.6.5 and Appendix AA, BB, CC & PP for updated groundwater modelling Refer Table 7.2 and 7.5 for monitoring and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	3c	Higher seepage volumes leads to unacceptable contamination of surface water receptors	Higher seepage volumes leads to unacceptable contamination of surface water receptors	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	Geotech report referenced within MCP.	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain				
Southern	4a	Release of Tailings due to Instability of TSF	Release of Tailings due to Instability of TSF	NL	Mi	L	n/a	n/a	Mi	L	Mo	L	L	L	H	Further design and documentation - final design	1. Assess TSF embankment closure design in conjunction with underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report.	Independently expertly reviewed that TSF rehabilitation construction occurred as per ANCOLD guidelines prior to closure documents submitted to DSD, outlined in closure plan Refer Appendix Refer Appendix LL for TSF Geotechnical Investigation Report Sept 2015: 1) Government review confirm geotechnically (slip) acceptable 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain				
Southern	4b	Ground subsidence / crack due to earthquake loading leading to instability:	Higher seepage volumes leads to unacceptable contamination of groundwater supply	NL	Mi	L	n/a	n/a	L	L	Mo	L	L	L	H	Check report & QC during construction (ATC Williams). Look at data from site data collection.	Reference TSF design, construction and as built documentation and any relevant Compliance reporting in MCP	seepage WQ and AGWT groundwater modelling Refer Section 6.7 for final capping design Sept 2015: 1) Details to be included in PEPR	FURTHER ACTION REQUIRED 1) Update and correct phytocap model then; 2) Update seepage WQ , 3) Update and provide groundwater modelling to be included in the PEPR	No underground workings located in the southern domain				
Southern	4c	Higher seepage volumes leads to unacceptable contamination of surface water receptors	Higher seepage volumes leads to unacceptable contamination of surface water receptors	NL	Mo	L	n/a	n/a	Mi	L	Mo	L	Mi	L	L	Further design and documentation - final design	Reference TSF design, construction and as built documentation and any relevant Compliance reporting in MCP	Refer Section 6.7 for final capping design Sept 2015: 1) Details to be included in PEPR	FURTHER ACTION REQUIRED 1) Update and correct the phytocap model then; 2) Provide detailed WQ seepage using updated phytocap data 3) provide updated groundwater modelling including potential for surface expression after corrections to phytocap modelling to be included in the PEPR	No underground workings located in the southern domain				
Southern	5a	Release of Tailings due to Instability of TSF	Release of Tailings due to Instability of TSF	NL	L	L	n/a	n/a	L	L	L	L	L	L	M	Geotech report referenced within MCP.	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Details to be included in PEPR	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain				
Southern	5b	Ground subsidence / crack due to instability of underground tunnelling	Higher seepage volumes leads to unacceptable contamination of groundwater supply	NL	L	L	n/a	n/a	L	L	Mi	L	L	L	L	Geotech report referenced within MCP.	As per Southern - 1b 1. Assess current leakage monitoring data (volume & chemical) and reference in MCP. 2. Assess underground stability post closure and after backfilling with respect to this scenario. 3. Assess potential for groundwater mounding and subsequent outwards bound plume. 4. Update groundwater model (fate & transport) based on data assessment 5. Update MCP and reference and append 6. Closure criteria and validation monitoring	no drives here Refer to Section 6.7.5.2 Refer to Section 6.4.5 for Crown Pillar geotechnical review (2014 PEPR, Appendix T) Refer Section 6.6.5 and Appendix AA, BB, CC & PP for updated groundwater modelling Refer Table 7.2 and 7.5 for monitoring and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain				

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Other	Consequence	Costs	Community / Media / Reputation	Human Health and Safety												
Southern	5c		Higher seepage volumes leads to unacceptable contamination of surface water receptors	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	L	L	Geotech report referenced within MCP.	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	no drives here, seepage water quality better than test decant water quality Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain		
Southern	6a		Release of Tailings due to Instability of TSF	NL	L	L	n/a	n/a	L	L	L	L	L	L	M	L	Design, monitoring	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	No crown pillar here Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	6b	Ground subsidence / crack due to instability of crown pillar	Higher seepage volumes leads to unacceptable contamination of groundwater supply	NL	L	L	n/a	n/a	Mi	L	L	L	L	L	L	L	Design, monitoring	As per Southern - 1b 1. Assess current leakage monitoring data (volume & chemical) and reference in MCP. 2. Assess underground stability post closure and after backfilling with respect to this scenario. 3. Assess potential for groundwater mounding and subsequent outwards bound plume. 4. Update groundwater model (fate & transport) based on data assessment 5. Update MCP and reference and append 6. Closure criteria and validation monitoring	No crown pillar here Refer to Section 6.7.5.2 Refer to Section 6.4.5 for Crown Pillar geotechnical review (2014 PEPR, Appendix T) Refer Section 6.6.5 and Appendix AA, BB, CC & PP for updated groundwater modelling Refer Table 7.2 and 7.5 for monitoring and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	6c		Higher seepage volumes leads to unacceptable contamination of surface water receptors	NL	L	L	n/a	n/a	Mi	L	L	L	L	L	L	L	Design, monitoring	As per North 1a - 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Include monitoring plan and closure criteria	No crown pillar here Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) Geotech review confirm acceptable geotechnical stability 2) No further work required for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			
Southern	7a		Higher seepage volumes leads to unacceptable contamination of groundwater supply	NL	L	L	n/a	n/a	Mi	L	L	L	L	L	L	L	ANCOLD Guidelines (2012) & Water Quality Guidelines (2003)	1. Assess embankment stability post closure. 2. Update MCP summarising and referencing the geotech report. 3. Reference relevant Compliance Reports, where relevant assessment information is held.	AGWT modelling using test water quality, not seepage water quality which is cleaner found no foreseeable impacts to Angas river or significant changes to groundwater quality. Refer to Section 6.6.5.1 for a summary of the geotechnical report. Refer to Appendix LL for the TSF geotechnical Investigation Report Refer to Section 6.6.5.1 for the backfilling methodology Refer Section Appendix AA, BB, CC and PP for groundwater modelling	FURTHER ACTION REQUIRED 1) Update and correct the phytocap model and design then; 2) Provide Detailed seepage WQ and 3) Provide updated groundwater modelling including potential for surface expression	No underground workings located in the southern domain			
Southern	7b	TSF embankment stability failure due to earthquake loading	Higher seepage volumes leads to unacceptable contamination of surface water receptors	NL	L	L	n/a	n/a	Mi	L	L	L	L	L	L	L	ANCOLD Guidelines (2012) & Water Quality Guidelines (2003)	1. Assess embankment stability post closure. 2. Update surface water management plan based on data assessment if required 3. Update MCP and reference	Refer to Table 7.2 and 7.5 for monitoring plan and closure criteria Sept 2015: 1) Details to be included in PEPR		No underground workings located in the southern domain			
Southern	7c		Unstable slopes leading to public safety risk	NL	L	L	n/a	n/a	Mi	L	Mo	L	Mi	L	H	L	ANCOLD Guidelines (2012) & Water Quality Guidelines (2003)	As per Southern - 7a 1. Assess embankment stability post closure. 2. Update MCP summarising and referencing the geotech report. 3. Reference relevant Compliance Reports, where relevant assessment information is held.		NO FURTHER ACTION REQUIRED - other than required monitoring	No underground workings located in the southern domain			

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental Impact	Special Consideration	Legal and Obligations	Other Obligations	Consequences	Costs	Community / Media / Reputation	Human Health and Safety												
Southern	8a		Higher seepage volumes leads to unacceptable contamination of groundwater supply	NL	Mo	L	n/a	n/a	Mi	L	Mo	L	L	L	L	L	L	Quantify seepage rates, what is the impact, water quality	Develop cover models that address performance of the system using a continuous climate data set over the long-term (i.e. do not use short databases and/or average, max, min approach) and include summary and reference in MCP	URS Phytocap Concept Report uses continuous climate data set. AGWT modelling using TSF water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality. Refer Section 6.7 for final capping design Sept 2015: 1) Government review did not confirm acceptable - may lead to bathtub effect and spill to surface water that could spread wide. Incorrect modelling - Level of confidence Low (Government) 2) For detailed PEPR detailed modelling and design including drawings are required 3) Further work required - as per separate review comments 4) Alternatively bond increased to account for assessment & design work and required closure construction	NO FURTHER ACTION REQUIRED - other than required monitoring			
Southern	8b		(HDPE) Higher seepage volumes leads to unacceptable contamination of surface water receptors	L	Mi	L	n/a	n/a	L	L	L	L	L	L	L	M	L	Consolidation assessment & cover design & hydro model	Refer Section 6.7 for final capping design Refer Section 6.5.5 for groundwater modelling Refer Table 7.5 and 7.10 for monitoring and closure criteria Sept 2015: 1) Government review did not confirm acceptable - may lead to bathtub effect and spill to surface water that could spread wide. Incorrect modelling - Level of confidence Low (Government) 2) For detailed PEPR detailed modelling and design including drawings are required 3) Further work required - as per separate review comments 4) Alternatively bond increased to account for assessment & design work and required closure construction					
Southern	8c	Disruption of TSF Cover due to tailings differential settling	(HDPE) Ponding of surface water increasing porewater pressure and infiltration (bottom liner)	L	Mi	L	n/a	n/a	Mo	Mo	Mi	L	L	L	M	Mo	Consolidation assessment & hydro model	1. Conduct consolidation assessment of tailings using site-specific material properties (i.e. field conditions). 2. Develop cover models that address performance of the system using a continuous climate data set over the long-term (i.e. do not use short databases and/or average, max, min approach) and include summary and reference in MCP 3. Update groundwater model 4. Include closure criteria and monitoring plan	Refer Section 6.7 for final capping design Refer Section 6.5.5 for groundwater modelling Refer Table 7.5 and 7.10 for monitoring and closure criteria Sept 2015: 1) Government review did not confirm acceptable - Incorrect modelling - Level of confidence Low (Government) 2) For detailed PEPR a detailed modelling and design including drawings are required 3) Further work required - as per separate review comments 4) Alternatively bond increased to account for assessment & design work and required closure construction	FURTHER ACTION REQUIRED 1) Differential survey data to be provided 2) Correct Phytocap modelling. Model not converging. See memorandum provided separately 3) Update cover system design and all associated modelling 4) Provide updated groundwater modelling including potential for surface expression 5) Provide detailed design and construction drawings for the phytocap 6) include phytocap construct to design audit as leading indicator for Outcomes "no contamination of natural water drainage systems and rivers and groundwater, land and soils occurs either on or off site resulting from permanent disposal or temporary storage of mine ore" and "no adverse impact to the supply of water by the mining operations to existing users and water dependant ecosystems" 7) include detailed phytocap performance monitoring plan - include some performance monitoring as leading indicator criteria for Outcomes "no contamination of natural water drainage systems and rivers and groundwater, land and soils occurs either on or off site resulting from permanent disposal or temporary storage of mine ore" and "no adverse impact to the supply of water by the mining operations to existing users and water dependant ecosystems"	Section 6.6.7 outlines all TSF capping requirements. - Final TSF ET cap design report located in Appendix AR - AGT groundwater summary report of all modelled scenarios located in Appendix BX - updated geochemistry groundwater modelling located in Appendix BM - TSF ET cover post construction monitoring plan in Appendix BY - Groundwater Monitoring and Response Plan in Appendix BJ - Surface water monitoring plan in Appendix CC			
Southern	8d		(ET) Higher seepage volumes leads to unacceptable contamination of surface water receptors	L	Mi	L	n/a	n/a	Mi	L	Mo	Mo	Mo	Mo	L	Mo	Consolidation assessment & hydro model	TSF surface surveying indicates minimal movement over time as tails dries, dried test surface is very hard and stable. AGWT modelling using test water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality Sept 2015: 1) Government review did not confirm acceptable - Incorrect modelling - Level of confidence Low (DSD & Government) 2) For detailed PEPR a detailed modelling and design including drawings are required 3) Further work required - as per separate review comments 4) Alternatively bond increased to account for assessment & design work and required closure construction						
Southern	8e		(ET) Ponding of surface water increasing porewater pressure and infiltration	L	Mo	Mo	n/a	n/a	Mo	Mo	Mi	L	L	L	M	Mo	Consolidation assessment & hydro model	AGWT modelling using test water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality Refer Section 6.7 for final capping design Refer Section 6.5.5 for groundwater modelling Refer Table 7.5 and 7.10 for monitoring and closure criteria Sept 2015: 1) Government review did not confirm acceptable - may lead to bathtub effect and spill to surface water that could spread wide. Incorrect modelling - Level of confidence Low (Government) 2) For detailed PEPR detailed modelling and design including drawings are required 3) Further work required - as per separate review comments 4) Alternatively bond increased to account for assessment & design work and required closure construction						

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Consequences	Community / Media / Reputation	Human Health and Safety														
Southern	9a	Stability failure of TSF outer embankment including spillway due to erosion (insufficient design and/or grazing) leading to embankment and liner failure	Tailings / AMD released to surface water via exposure (contaminated sediment runoff and dust)	NL	Ma	Mo	n/a	n/a	Ma	Mo	Mo	L	Mo	L	H	Mo	Land management agreement. Erosion rates, drainage design	1. Conduct an erosion assessment based on site specific material characteristics and closure geometrical design. 2. Assess surface water management and provide drainage design. 3. Reference all relevant reports including site specific data analysis MCP. 4. Include management measures in land management agreements 5. Include closure criteria and monitoring plan	Phytocap construction plan to include QA/QC on drainage and spillway. EFA will assist in monitoring and actively managing. Soil erodibility of site material is currently being assessed. Refer Appendix QQ for erosion assessment Refer Appendix P, J and R for surface water drainage details Refer Table 7.5 for surface water monitoring and closure criteria Refer Appendix UU for Land Management Agreement	NO FURTHER ACTION REQUIRED - other than required monitoring	As above plus - Erosion assessment on TSF embankments - Appendix BO Spillway design included in Final landform designs - Appendix BZ Final landform and materials balance - Section 6.3.2.1 Construct to design audits included as leading indicators - section 7 (table 7-8)			
Southern	9b		AMD released to groundwater via seepage	NL	Mo	L	n/a	n/a	Mo	L	Mo	L	L	L	H	L	Land management agreement. Erosion rates, drainage design	1. Conduct an erosion assessment based on site specific material characteristics and closure geometrical design. 2. Reference all relevant reports including site specific data analysis MCP. 3. Include management measures in land management agreements 4. Include closure criteria and monitoring plan	Sept 2015: 1) Stability review confirmed 2) No further action for this failure mode					
Southern	9c		Tailings release via Spillway	L	Mi	L	n/a	n/a	Mi	L	Mo	Mo	L	L	M	Mo	Land management agreement. Erosion rates, drainage design	1. Conduct an erosion assessment based on site specific material characteristics and closure geometrical design. 2. Update MCP summarising and referencing the relevant geotech report. 3. Reference all relevant reports including	Phytocap construction plan to include QA/QC on drainage and spillway. EFA will assist in monitoring and actively managing. Soil erodibility of site material is currently being assessed. Refer Appendix QQ for erosion assessment Refer Appendix P, J and R for surface water drainage details Refer Table 7.5 for surface water monitoring and closure criteria	FURTHER ACTION REQUIRED - 1) Provide an erosion assessment of the TSF landform including spillway design 2) Provide a descriptions of materials to be used for surfaces and spillway and source locations 3) Provide a maintenance and monitoring plan for the TSF pre-completion and post completion	Section 6.6.7 outlines all TSF capping requirements. - Final TSF ET cap design report located in Appendix AR - AGT groundwater summary report of all modelled scenarios located in Appendix BX - updated geochemistry groundwater modelling located in Appendix BM - TSF ET cover post construction monitoring plan in Appendix			
Southern	9d		Gully forming leading to public safety risk (considered above)	L	L	L	n/a	n/a	L	L	L	L	L	L	L	L	Design, monitoring	1. Conduct an erosion assessment based on site specific material characteristics and closure geometrical design. 2. Assess surface water management and provide drainage design. 3. Reference all relevant reports including	Designed to ANCOLD guidelines 1. Included in the original embankment design (for a high wall), PEPR Appendix U, section 6 and 9; Refer Appendix PP 2. Included in the original embankment design, PEPR Appendix U, section 6 and 9. 3. MCP Table 7-10, EFA monitoring.					
Southern	10a	Stability failure of TSF Embankment due to increased pore-water pressure / surface ponding	AMD released to groundwater via seepage	NL	Mi	L	n/a	n/a	Ma	Mo	Ma	Mo	Mi	L	M	Mo	Assessing embankment stability with increased pore water	1. Assess TSF embankment closure design in conjunction with increased pore water pressure post closure. 2. Update MCP summarising and referencing the relevant geotech report. 3. Include closure criteria and monitoring plan	1. Included in the original embankment design (for a high wall), PEPR Appendix U, section 6 and 9; Refer Appendix PP 2. Included in the original embankment design, PEPR Appendix U, section 6 and 9. 3. MCP Table 7-10, EFA monitoring.	FURTHER ACTION REQUIRED 1) Correct Phytocap modelling as per 8b-e 2) Provide predicted WQ toe seepage over time	AGT groundwater summary report - Appendix BX Updated geochemistry data included in groundwater modelling - Appendix BM TSF ET Cap Post Construction Monitoring Plan includes seepage "triggers" - Appendix BY. ET Cap Design - Appendix AR			
Southern	10b		AMD released to surface water via exposure	NL	Ma	Mo	n/a	n/a	Ma	Mo	Ma	Mo	Mo	L	M	Mo	Assessing embankment stability with increased pore water	1. Assess TSF embankment closure design in conjunction with increased pore water pressure post closure. 2. Update MCP summarising and referencing the relevant geotech report. 3. Include closure criteria and monitoring plan	1. Included in the original embankment design (for a high wall), PEPR Appendix U, section 6 and 9; Refer Appendix PP 2. Included in the original embankment design, PEPR Appendix U, section 6 and 9. 3. MCP Table 7-10, EFA monitoring.					
Southern	10c		Unstable slopes resulting leading to public safety risk	NL	L	L	n/a	n/a	Ma	Mo	Ma	Mo	Mo	L	M	Mo	Design, monitoring	1. Assess TSF embankment closure design in conjunction with increased pore water pressure post closure. 2. Update MCP summarising and referencing the relevant geotech report. 3. Include closure criteria and monitoring plan	Sept 2015: 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR or increased liability and bond					
Southern	11	Basal HDPE failure due to holes produced in construction	Groundwater contamination via infiltration	L	Mi	L	n/a	n/a	Mi	L	L	L	L	L	M	L	Reference construction report of basal liner, and assessment of seepage and impacts. Length of time used in seepage model	1. Reference TSF design, construction and as built documentation in MCP. 2. Review current seepage (rate, quantity and chemical composition per collection pipe) and reference in MCP. 3. Assess current monitoring data and reference in MCP. 4. Update groundwater model based on data assessment.	AGWT modelling using test water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality. Can re-provide TSF design, construction and as built which were all provided and approved by DSD. Seepage rates have been reported quarterly and assays reported in CRs. Will be analysed further and included in V1G. Refer Section 6.7 for final capping design Refer Section 6.5.5 for groundwater modelling Refer Table 7.5 and 7.10 for monitoring and closure criteria Sept 2015: 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR or increased liability and bond	NO FURTHER ACTION REQUIRED - other than required monitoring	AGT groundwater summary report - Appendix BX Updated geochemistry data included in groundwater modelling - Appendix BM			
Southern	12a	HDPE Formation of holes / macro pores in	Groundwater contamination via infiltration	L	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Design, monitoring	As per Southern - 8a 1. Conduct an erosion assessment based on site specific material characteristics and closure geometrical design. 2. Assess surface water management and provide drainage design. 3. Reference all relevant reports including site specific data analysis MCP. 4. Include management measures in land management agreements 5. include closure criteria and monitoring plan	Further work on soil types, particle size distribution and erodibility currently being undertaken. Drainage design undertaken by URS (currently p 42). Batter angles of TSF walls to be reduced to 1V:3H (same as boxcut). Monitoring: EFA Refer Section 6.7 for final capping design Sept 2015: 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR	NO FURTHER ACTION REQUIRED - Currently				

Domain	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading indicators for further action required. Further work would be required should this opinion alter.	January 2017 PEPR with Closure Plan
				Environmental	Special Consideration	Legal and Obligations	Other Obligations	Conservation	Community	Health and Safety	Reputation	Human Health	Media / Community	Ecology	Soil	Water							
Southern	12b	pores in capping profile due to plant roots extending to base of capping profile vegetation died-off via uptake of salt / metals	L	L	L	n/a	n/a	L	L	L	L	L	L	L	M	L	Design, monitoring	As per Southern - 8a 1. Conduct an erosion assessment based on site specific material characteristics and closure geometrical design. 2. Assess surface water management and provide drainage design. 3. Reference all relevant reports including site specific data analysis MCP. 4. Include management measures in land management agreements 5. include closure criteria and monitoring plan AND 6. Cover thickness to take into consideration most likely vegetation community.	Further work on soil types, particle size distribution and erodibility currently being undertaken. Drainage design undertaken by URS (currently p 42). Batter angles of TSF walls to be reduced to 1V:3H (same as boxcut). Monitoring: EFA Refer Section 6.7 for final capping design Sept 2015: 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR		N/A		
Southern	13a	ET Formation of holes / macro pores in capping profile due to plant roots extending to base of capping profile Groundwater contamination via infiltration	L	Mi	L	n/a	n/a	Mo	Mo	Mi	L	Mi	L	H	Mo	ET Design, monitoring	As per Southern - 8a 1. Conduct an erosion assessment based on site specific material characteristics and closure geometrical design. 2. Assess surface water management and provide drainage design. 3. Reference all relevant reports including site specific data analysis MCP. 4. Include management measures in land management agreements	See AGWT ground water modelling comments. Plants selected do not have deep tap roots but larger lateral roots with fibrous roots to depth, fibrous roots throughout the cap profile is desirable to remove stored moisture. Refer Section 6.7 for final capping design 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR	FURTHER ACTION REQUIRED 1) Correct Phytocap modelling and provide detailed design. 2) Provide engineering construction drawings of the cover system based on cover system and erosion modelling/assessment 3)Include construct to design audit as a leading indicator criteria for Outcomes "no contamination of natural water drainage systems and rivers and groundwater, land and soils occurs either on or off site resulting from permanent disposal or"	Section 6.6.7 outlines all TSF capping requirements. - Final TSF ET cap design report located in Appendix AR - AGT groundwater summary report of all modelled scenarios located in Appendix BX - updated geochemistry groundwater modelling located in Appendix BM - TSF ET cover post construction monitoring plan in Appendix BY - Groundwater Monitoring and Response Plan in Appendix BJ - Surface water monitoring plan in Appendix CC - Erosion assessment on TSF embankments - Appendix BO			
Southern	13b	vegetation died-off via uptake of salt / metals	L	Mi	L	n/a	n/a	Mi	L	Mi	L	Mo	Mo	H	Mo	ET Design, monitoring	Capillary break layer will be trialled in field trial Refer Section 6.7 for final capping design 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR						
Southern	14	Formation of holes / macro pores in capping profile due to burrowing animals Groundwater contamination via infiltration	M	L	L	n/a	n/a	Mi	Mo	L	L	L	L	H	Mo	Animal control to be implemented and maintained	Develop and reference and append animal control management plan in MCP - include in Land Management Agreement	Feral animal management is a legal requirement for all landholders. No wombats in Strathalbyn. AGWT modelling using test water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality Refer Table 7.11 for weed and pest management Refer Appendix UU for Land Management Agreement	NO FURTHER ACTION REQUIRED - other than required monitoring	Burrowing animals addressed in section 6.6.9.2 Weed and Pest Management Plan as per Appendix AY			
Southern	15a	ET Plant uptake of metals and/or salts due to roots extending into tailings mass. Unacceptable health risks in wildlife and humans via excessive bioaccumulation of metals in plant tissue	M	Mi	Mo	n/a	n/a	L	L	Mi	Mo	Mi	Mo	M	Mo	Cover design to be completed. Potential for bioaccumulation in plants.	As per Southern - 8a 1. Conduct consolidation assessment of tailings using site-specific material properties (i.e. field conditions). 2. Develop cover models that address performance of the system using a continuous climate data set over the long-term (i.e. do not use short databases and/or average, max, min approach) and include summary and reference in MCP 3. Update groundwater model 4. Include closure criteria and monitoring plan	Capillary break, vegetation not palatable to humans, native fauna only eat grasses, grass roots do not appear to be deeper than 1.5 metres Refer Section 6.7 for final capping design	FURTHER ACTION REQUIRED 1) See ID Southern 13a & b 2) Assess thickness of cover system with respect proposed vegetation root depth	Discussion regarding bioaccumulation in section 6.6.7.6 ET Cap Design and discussion regarding cap thickness in Appendix AR			
Southern	15b	Surface water and groundwater contamination via increased infiltration	H	L	Mo	n/a	n/a	Mi	Mo	Mi	Mo	L	Mo	H	Mo	Potential impact on end land use via materials and thickness of layers in the cover.	Phytocap concept design has used continuous climate data set Local Melaleuca and Chenopods adapted to high saline conditions Refer Section 6.7 for final capping design Sept 2015: 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR						
Southern	16a	Poor vegetation establishment on capping due to lack of moisture, nutrients in soils Increased erosion via intense rainfalls	L	Mi	L	n/a	n/a	L	L	L	L	L	L	H	L	Evidence in the cover report etc. Field Trials recorded and referenced	1. As per Central 10a 2. Include summary of field trials and evidence of success in MCP. 3. Include closure criteria and monitoring plan	Will be monitoring Cap veg using EFA. Evidence of current successful veg establishment on paddock reveg areas (monitored with EFA) and steep noise bunds constructed from clean fill, low nutrients and exposed to both dry years(2014) and high rainfall events (e.g. Feb. and march 2011) Refer Central 10a Sept 2015: 1) No further action for this failure mode	NO FURTHER ACTION REQUIRED - other than required monitoring	- AGT groundwater summary report of all modelled scenarios located in Appendix BX - updated geochemistry groundwater modelling located in Appendix BM - TSF ET cover post construction monitoring plan in Appendix BY - Groundwater Monitoring and Response Plan in Appendix BJ - Surface water monitoring plan in Appendix CC - Erosion assessment on TSF embankments - Appendix BO - LFA as primary means of vegetation monitoring - revegetation plan for TSF located in section 6.6.8 - Maintenance table included in section 9.2 and a 5 year indicative schedule as per Appendix BH - weed and pest management as per plan in Appendix AY.			
Southern	16b	Surface water and groundwater contamination via increased infiltration	L	Mi	L	n/a	n/a	L	L	L	L	L	L	L	L	Add a low veg cover for the cover model. To allow confidence in infiltration rates.	1. As per Central 10b 2. Develop conservative cover models and include summary and reference in MCP 3. Include closure criteria and monitoring plan	Will be monitoring & managing Cap veg using EFA Refer Central 10b Sept 2015: 1) No further action for this failure mode					
Southern	17	Poor capping construction due to inadequate QA/QC program and/or inexperienced personnel supervising construction. Instability of capping via poor vegetation and increased erosion	L	L	L	n/a	n/a	L	L	L	L	L	L	M	L	Design, monitoring, QA/QC,	1. Reference capping design, construction and as built documentation in MCP 2. Include closure criteria and monitoring plan	Phytocap construction plan will be developed by independent experts to include QA QC checks. AACAP provides QA QC guidelines for construction of phytocap Sept 2015: 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR	FURTHER ACTION REQUIRED 1) Update MCP when capping design is completed 2) Update MCP tables as required 3) Provide QA/QC Construction Plan including but not limited to, material properties (corresponding to design requirements), material placement, compaction, monitoring instrument installation etc.	QA/QC to be developed upon completion of trial cap. A memo on how to undertake the trial will be drawn up and approved by the DSD prior to construction. Construct to design audits included in Outcome Measureable Criteria tables - Section 7 (Table 7-8)			

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Other Obligations	Consequences	Costs	Community / Media / Reputation	Human Health and Safety												
Southern	18a	vegetation died-off due to bush fire	Instability of capping via increased erosion	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	H	L	1. As per Central 10a 2. Include summary of field trials and evidence of success in MCP. 3. Include rehabilitation plan - surface rehab and vegetation 4. Include closure criteria and monitoring plan	Sclerophorous Australian vegetation is adapted to fire. Acacias seed germinates and Eucalyptus resprouts with fire. Perennial grasses thrive with fire and reshoot. Fire is not a damaging risk to vegetation (healthy in some instances). Refer Appendix L	NO FURTHER ACTION REQUIRED - other than required monitoring	Vegetation chosen for TSF cap is endemic to the local region, fire resistant and the majority of vegetation can re-shoot from protected buds on their stems or roots, so they can recover rapidly after a fire. Thick bark protects these buds from the damaging heat of fires. The root mass of these plants remains alive after a bushfire has gone through the vegetation, preventing increased infiltration.			
Southern	18b		Surface water and groundwater contamination via increased infiltration	NL	Mi	L	n/a	n/a	L	L	L	L	L	L	L	H	L	1. As per Central 10b 2. Develop conservative cover models and include summary and reference in MCP 3. Include closure criteria and monitoring plan	Same as above - Australian plants adapted Refer Appendix L					
Southern	19	Failure of containment of tailings & instability due to burrowing animals	Leading to reduced veg cover & increased erosion, increased infiltration rates.	H	Mo	Mo-H	n/a	n/a	Mi	Mo	L	Mo	L	Mo	M	Mo-H	Animal control management plan and Land management agreement development.	1. As per Southern - 14 2. Develop and reference animal control management plan in MCP - include in Land Management Agreement	Feral animal management is a legal requirement for all landholders. No wombats in Strathalbyn. Weed and Pest Program in place and will remain in place until surrender. Refer Table 7.11 for weed and pest management Refer Appendix UU for Land Management Agreement Refer Section 6.7 for final capping design	FURTHER ACTION REQUIRED 1) Update feral animal management plan for post surrender management for all relevant domains.	Burrowing animals addressed in section 6.6.9.2 Weed and Pest Management Plan as per Appendix AY			
Southern	20	Geotechnical failure of the cover due to erosion	Leading to Gullying and tailings exposure impacting surface water	L	Mi	L	n/a	n/a	Mi	L	Mi	L	Mi	L	H	L	Veg cover, cover design and surface water management, land management agreement, erosion reporting/ reference	1. Conduct consolidation assessment of tailings using site-specific material properties (i.e. field conditions). 2. Develop cover models that address performance of the system using a continuous climate data set over the long-term (i.e. do not use short databases and/or average, max, min approach) and include summary and reference in MCP 3. Surface drainage/ sediment modelling 4. include closure criteria and monitoring plan 5. Include Rehabilitation Plan (including veg)	EFA addresses this. URS conceptual phytocap Report addresses this. Add material/erosion characteristic investigation results & material Refer Table 7.11 for weed and pest management Refer Appendix UU for Land Management Agreement Refer Section 6.7 for final capping design Sept 2015: 1) Subsequent to completing the cover material assessment the site specific details to be included in the PEPR	FURTHER ACTIONS REQUIRED 1) Provide an erosion assessment of the phytocap construction materials including source and characteristics 2) Provide methodology to validate erosion assessment, include as leading indicator criteria for Outcomes "no contamination of natural water drainage systems and rivers and groundwater, land and soils occurs either on or off site resulting from permanent disposal or temporary storage of mine ore" and "no adverse impact to the supply of water by the mining operations to existing users and water dependant ecosystems" 3) Provide a maintenance and monitoring plan for the TSF pre-completion and post completion - including triggers for repair of gullies, sheet erosion and methodology etc... Identify the location of additional construction materials should any be required.	An assessment of soils to be used in the TSF phytocap was undertaken (MCP Appendix AR). The parameters of the local soils were used to develop the most suitable revegetation plan. The revegetation design includes the use of contour banking, mulch placement, sterile annual crop and direct seeding vegetation in contours to limit erosion to background levels (ref revegetation plan and erosion assessment) and increase propagation success. Validation of erosion leading indicators through survey - section 7 (Table 7-2). Surface water management plan - Appendix CC TSF ET Cap Post Construction Monitoring Plan - Appendix BY Site maintenance table - Section 9.2			
Southern	21a		Macro porosity increasing the potential for and extent of outer embankment erosion	L	Mo	Mo	n/a	n/a	Mi	L	Mi	L	Mi	L	M	Mo			As per southern 19					
Southern	21b	burrowing animals reducing the erosion resistance of outer embankment	Reduced or vegetation died-off due to lack of growth medium and/or moisture availability	L	Mo	Mo	n/a	n/a	Mi	L	Mi	L	L	L	M	Mo	Land management agreement	1. As per Southern - 14 2. Develop and reference animal control management plan in MCP - include in Land Management Agreement	Refer Table 7.11 for weed and pest management Refer Appendix UU for Land Management Agreement Sept 2015: 1) Government review did not confirm detailed materials balance indicating source and quality of Cover System and other construction materials. 2) For detailed PEPR a detailed material balance with material types, testing characteristics and source is required 3) Further work / clarification required - sterilised source that can not be utilised for other purposes have to be indicated including measures to main the resource 4) Alternatively bond increased to account for testing, assessment and purchase of materials	FURTHER ACTION REQUIRED 1) See ID Southern 20 2) See ID Southern 19	Burrowing animals addressed in section 6.6.9.2 Weed and Pest Management Plan as per Appendix AY			
Southern	22a	Degradation of HDPE liner (below tailings) leading to decreased containment capability	Expected release of contaminants to groundwater when and at levels expected	E	L	Mo	n/a	n/a	L	Mo	L	Mo	L	Mo	M	Mo	Acid generation reporting of tailings, modelling of holes report, does the modelling accurately represent the chemical breakdown of the HDPE? Update GW model. System changing over time. In 100yrs plus -tailings changed over time net percolation and chem. No contamination to GW. DMITRE & EPA to discuss	1. Assess the acid generating potential of the tailings in terms of anticipated moisture, gas, and temperature conditions over the long-term 2. Assess the chemical impact on the HDPE liner performance. 3. Assess the natural degradation of the liner over time and subsequently likely seepage rate 4. Build a groundwater model for the area surrounding the TSF, model over a minimum of a 1000yr period based on these assessments. (see mitigation / comments regarding considerations of reporting) 5. monitoring plan and closure criteria	AGT - modelling water scenarios of failure of basal liner 1. Appendix PP 2. PEPR Appendix U, section 8; Appendix PP; Angus Zinc Project Feasibility Study, June 2006 Appendix 3, page 648. 3. Appendix PP 4. Appendix PP. 5. MCP Table 7-10 Sept 2015: 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR	FURTHER ACTION REQUIRED 1) Correct Phytocap modelling. Model not converging. See memorandum provided separately 2) Detailed seepage WQ and groundwater modelling including potential for surface expression after corrections to phytocap modelling and fate transport	Section 6.6.7 outlines all TSF capping requirements. - Final TSF ET cap design report located in Appendix AR - AGT groundwater summary report of all modelled scenarios located in Appendix BX - updated geochemistry groundwater modelling located in Appendix BM - TSF ET cover post construction monitoring plan in Appendix BY - Groundwater Monitoring and Response Plan in Appendix BJ - Surface water monitoring plan in Appendix CC - Erosion assessment on TSF embankments - Appendix BO - Spillway design included in Final landform designs - Appendix BZ - Final landform and materials balance - Section 6.3.2.1 Construct to design audits included as leading indicators			
Southern	22b		Increased release of contaminants to groundwater due to poor liner construction	NL	Mo	L	n/a	n/a	Mo	L	Mo	L	L	L	M	L		As per Southern - 4c Reference TSF liner design, construction and as built documentation and any relevant Compliance reporting in MCP.	Refer Section 6.7 for final capping design	FURTHER ACTION REQUIRED 1) Correct Phytocap modelling. Model not converging. See memorandum provided separately 2) Detailed seepage WQ and groundwater modelling including potential for surface				

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Other Obligations	Consequences	Costs	Community / Media / Reputation	Human Health and Safety												
Southern	22c		Increased release of contaminants to groundwater due to chemical impact (from tailings (water) pH and chemical composition)	M	Mo	Mo-H	n/a	n/a	Mo	Mo-H	Mo	Mo-H	L	L	L	Mo-H	methodology.	As per Southern - 22a 1. Assess the acid generating potential of the tailings in terms of anticipated moisture, gas, and temperature conditions over the long-term 2. Assess the chemical impact on the HDPE liner performance. 3. Assess the natural degradation of the liner over time and subsequently likely seepage rate 4. Build a groundwater model for the area surrounding the TSF, model over a minimum of a 1000yr period based on these assessments.	AGT - modelling water scenarios of failure of basal liner 1. Appendix PP 2. PEPR Appendix U, section 8; Appendix PP; Angas Zinc Project Feasibility Study, June 2006 Appendix 3, page 648. 3. Appendix PP 4. Appendix PP. 5. MCP Table 7-10 Sept 2015: 1) Subsequent to correcting the Phytocap modelling the site specific details to be included in the PEPR	expression after corrections to phytocap modelling and fate transport to be included in the PEPR 3) Provide engineering construction drawings of the cover system based on cover system and erosion modelling/assessment 4) Include construct to design audit as a leading indicator criteria 5) Provide performance monitoring plan for the cap 6) provide a QA/QC plan for all aspects of construction including, but not limited to, material properties, installation of performance monitoring equipment etc 7) provide a reveg plan for the TSF landform	- Construct to design audits included as leading indicators - section 7 (table 7-8) - LFA as primary means of vegetation monitoring - revegetation plan for TSF located in section 6.6.8 - Maintenance table included in section 9.2 and a 5 year indicative schedule as per Appendix BH - weed and pest management as per plan in Appendix AY.			
Southern	23a		Expected release of contaminants to groundwater when and at levels expected	E	Mo	H	n/a	n/a	Mo	H	Mo	H	Mi	Mo-H	L	H	Acid generation reporting of tailings, modelling of holes report, does the modelling accurately represent the chemical breakdown of the HDPE? Update GW model. System changing over time. In 100yrs plus -tailings changed over time net percolation and chem. No contamination to GW escaping the boundary. DMITRE & EPA to discuss methodology.	As per Southern - 22a 1. Assess the acid generating potential of the tailings in terms of anticipated moisture, gas, and temperature conditions over the long-term 2. Assess the chemical impact on the HDPE liner performance. 3. Assess the natural degradation of the liner over time and subsequently likely seepage rate 4. Build a groundwater model for the area surrounding the TSF, model over a minimum of a 1000yr period based on these assessments. (see mitigation / comments regarding considerations of reporting) 5. Assess current leakage monitoring data and reference in MCP 6. Monitoring plan and closure criteria	AGWT modelling using test water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality 1. Appendix PP 2. PEPR Appendix U, section 8; Appendix PP; Angas Zinc Project Feasibility Study, June 2006 Appendix 3, page 648. 3. Appendix PP 4. Appendix PP. 5. MCP Table 7-10 Sept 2015: 1) Not assessed since not preferred approach	NO FURTHER ACTION REQUIRED - NOT THE CURRENT PREFERRED OPTION. Further works would be required should this become the preferred option.				
Southern	23b	Degradation of HDPE cover (above tailings / covered with soil) leading to decreased infiltration control	Increased infiltration into tailings leading to increased porewater pressure leading to increased contaminants to groundwater due to poor cover construction	NL	Mo	L	n/a	n/a	Ma	Mo	Mo	L	L	L	L	Mo	Acid generation reporting of tailings, modelling of holes report, does the modelling accurately represent the chemical breakdown of the HDPE? Update GW model. System changing over time. In 100yrs plus -tailings changed over time net percolation and chem. No contamination to GW escaping the boundary. DMITRE & EPA to discuss methodology.	As per Southern - 23a 1. Assess the acid generating potential of the tailings in terms of anticipated moisture, gas, and temperature conditions over the long-term 2. Assess the chemical impact on the HDPE liner performance. 3. Assess the natural degradation of the liner over time and subsequently likely seepage rate associated with increase pore water pressure 4. Build a groundwater model for the area surrounding the TSF, model over a minimum of a 1000yr period based on these assessments. 5. Assess current leakage monitoring data and reference in MCP 6. Monitoring plan and closure criteria	AGWT modelling using test water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality 1. Appendix PP 2. PEPR Appendix U, section 8; Appendix PP; Angas Zinc Project Feasibility Study, June 2006 Appendix 3, page 648. 3. Appendix PP 4. Appendix PP. 5. MCP Table 7-10 Sept 2015: 1) Not assessed since not preferred approach	N/A				
Southern	23c		Increased infiltration into tailings due to chemical impact (from tailings (water) pH and chemical composition) leading to increased pore water pressure leading to increased contaminants to groundwater	M	Mo	Mo-H	n/a	n/a	Ma	H	Mo	Mo-H	L	L	L	H	Acid generation reporting of tailings, modelling of holes report, does the modelling accurately represent the chemical breakdown of the HDPE? Update GW model. System changing over time. In 100yrs plus -tailings changed over time net percolation and chem. No contamination to GW escaping the boundary. DMITRE & EPA to discuss methodology.	As per Southern - 23a 1. Assess the acid generating potential of the tailings in terms of anticipated moisture, gas, and temperature conditions over the long-term 2. Assess the chemical impact on the HDPE liner performance. 3. Assess the natural degradation of the liner over time and subsequently likely seepage rate associated with increase pore water pressure 4. Build a groundwater model for the area surrounding the TSF, model over a minimum of a 1000yr period based on these assessments. 5. Assess current leakage monitoring data and reference in MCP 6. Monitoring plan and closure criteria	AGWT modelling using test water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality 1. Appendix PP 2. PEPR Appendix U, section 8; Appendix PP; Angas Zinc Project Feasibility Study, June 2006 Appendix 3, page 648. 3. Appendix PP 4. Appendix PP. 5. MCP Table 7-10 Sept 2015: 1) Not assessed since not preferred approach	NO FURTHER ACTION REQUIRED - NOT THE CURRENT PREFERRED OPTION. Further works would be required should this become the preferred option.				
Southern	23d		Increased infiltration into tailings leading to increased pore water pressure leading to increased contaminants to groundwater due to chemical impact (from tailings (water) pH and chemical composition)	NL	L	L	n/a	n/a	L	L	L	L	L	L	M	L	Acid generation reporting of tailings, modelling of holes report, does the modelling accurately represent the chemical breakdown of the HDPE? Update GW model. System changing over time. In 100yrs plus -tailings changed over time net percolation and chem. No contamination to GW escaping the boundary. DMITRE & EPA to discuss methodology.	AGWT modelling using test water quality, not seepage water quality which is cleaner found not foreseeable impacts to Angas river or significant changes to groundwater quality 1. Appendix PP 2. PEPR Appendix U, section 8; Appendix PP; Angas Zinc Project Feasibility Study, June 2006 Appendix 3, page 648. 3. Appendix PP 4. Appendix PP. 5. MCP Table 7-10 Sept 2015: 1) Not assessed since not preferred approach						

Domain	Failure Mode	Failure Mode Description	Effects and Pathways	Likelihood	Consequences													Level of C	Highest R	Mitigation / Comments	Notes: Initial PEPR - Existing information must be referenced in the Mine Closure Plan (MCP) (Stand alone document)	July 2015 mitigation comments & Sept 2015 Workshop update	Uncertainties Associated with the Completion Strategies for PEPR revision. This column does not address required monitoring or completion criteria or leading	January 2017 PEPR with Closure Plan
					Environmental	Special Consideration	Legal and Obligations	Other Obligations	Consequences	Community / Media / Reputation	Human Health and Safety													
Buffer	1a	Stope collapse due to earthquake leading to surface instability	Residential house damage/collapse leading to human injury and death	NL	L	L	n/a	n/a	Mo	L	Ma	Mo	Ma	Mo	H	Mo	Refer to stability of the main central and northern domains	As per North 1a - "Same" assessment 1. Assess underground stability post-closure and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held.	No stopes or drives in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	No underground workings located in the buffer domain				
Buffer	1b	Stope collapse due to earthquake leading to surface instability	Property loss via residential house damage	NL	L	L	n/a	n/a	L	L	Mo	L	L	L	H	L	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology. 4. Reference relevant Compliance Reports, where relevant assessment information is held. 5. Commitment to inform council & DMITRE of potential instability by supplying final underground workings and backfill survey drawings and associated information.	No stopes or drives in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	No underground workings located in the buffer domain				
Buffer	2a	Stope collapse due to instability of underground tunnelling	Injury and death to humans via residential house damage	NL	L	L	n/a	n/a	L	L	Ma	Mo	L	L	H	Mo	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No stopes or drives in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable	No underground workings located in the buffer domain				
Buffer	2b	Stope collapse due to instability of underground tunnelling	Property loss via residential house damage	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No stopes or drives in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable	No underground workings located in the buffer domain				
Buffer	3a	Ground subsidence / crack due to earthquake	Injury and death to humans via residential house damage	NL	L	L	n/a	n/a	L	L	Ma	Mo	L	L	H	Mo	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No stopes or drives in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable	No underground workings located in the buffer domain				
Buffer	3b	Ground subsidence / crack due to earthquake	Property loss via residential house damage	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No stopes or drives in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable	No underground workings located in the buffer domain				
Buffer	4a	Ground subsidence / crack due to instability of underground tunnelling	Injury and death to humans via residential house damage	NL	L	L	n/a	n/a	L	L	Ma	Mo	L	L	H	Mo	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No crown pillar in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	No underground workings located in the buffer domain				
Buffer	4b	Ground subsidence / crack due to instability of underground tunnelling	Property loss via residential house damage	NL	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No crown pillar in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	No underground workings located in the buffer domain				
Buffer	4c	Ground subsidence / crack due to instability of underground tunnelling	Property loss via cropping damage	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	L	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No crown pillar in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	No underground workings located in the buffer domain				
Buffer	5a	Ground subsidence / crack due to instability of crown pillar	Injury and death to humans via residential house damage	NL	L	L	n/a	n/a	Mo	L	Ma	Mo	L	L	H	Mo	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No crown pillar in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	No underground workings located in the buffer domain				
Buffer	5b	Ground subsidence / crack due to instability of crown pillar	Property loss via residential house damage	NL	L	L	n/a	n/a	Mi	L	Mo	L	L	L	H	L	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No crown pillar in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	No underground workings located in the buffer domain				
Buffer	5c	Ground subsidence / crack due to instability of crown pillar	Property loss via cropping damage	NL	L	L	n/a	n/a	L	L	L	L	L	L	L	L	Refer to stability of the main central and northern domains	As per North - 6a 1. Assess underground stability post mining and after backfilling. 2. Update MCP summarising and referencing the geotech report. 3. Include information on backfill methodology.	No crown pillar in Buffer domain Refer Section 6.4.5 in the MCP and 2014 PEPR Appendix T. Refer to Section 3.7.2 of 2014 PEPR for backfilling methodology Refer Appendix NN for Post Closure Geotechnical Report Refer 7.2 for monitoring plan and closure criteria Sept 2015: 1) DSD review confirmed geotech acceptable 2) No further work required	No underground workings located in the buffer domain				
Buffer	6a	Generation of AMD due to improper rehabilitation of drill sites	AMD released to groundwater via seepage	L	L	L	n/a	n/a	Mi	L	Mi	L	L	L	L	L	Design, monitoring	As per North - 5a 1. Provide decommissioning details and provide evidence decommissioning.	Drillholes remaining in C&M are cased with PVC. All others are rehabilitated and recorded in Appendix G (MCP). Refer to Table 6.2, Section 6.3.2.5 and Appendix G.	FURTHER ACTION REQUIRED 1) Rehabilitate all drill sites	Terramin maintain a register of drillhole and borehole status which has been discussed in all domain sections and the register has been included in Appendix G (drillholes) and Appendix BS.			
Buffer	6b	Generation of AMD due to improper rehabilitation of drill sites	AMD released to surface water	L	L	L	n/a	n/a	Mi	L	Mi	L	L	L	L	L	Design, monitoring	As per North - 5a 1. Provide decommissioning details and provide evidence decommissioning.	unsaturated zone near surface means groundwater to surface water interactions do not occur on ML Refer to Table 6.2, Section 6.3.2.5 and Appendix G.	FURTHER ACTION REQUIRED 1) Rehabilitate all drill sites	All drillholes/wells have been and will continue to be rehabilitation as per Earth Resources Information Sheet M21 - Mineral exploration drillholes - General specifications for construction and backfilling.			
Buffer	7	Revegetation failure due to improper closure	Surface instability via erosion	L	L	L	n/a	n/a	L	L	L	L	L	L	H	L	Design, monitoring	As per Central 10a 1. Include summary of field trials and evidence of success in MCP. 2. Include a rehabilitation plan 3. Include closure criteria and monitoring plan	revegetation via direct seeding undertaken in 2013, monitored by EFA, no further revegetation areas in Buffer required. Refer Appendix L	NO FURTHER ACTION REQUIRED - other than required monitoring	No ground disturbance in buffer domain due to mining activities. Current SEB vegetation successful. See 2016 Compliance Report for LFA report. Remainder of domain will remain cropping, residential housing and SEB.			