Appendix G – Indicative Implementation Schedules

Appendix G1 – Pit Lake

Appendix G2 – Partial Backfill Below the Water Table

Appendix G1 – Pit Lake Implementation Timeline

Risk Issue	Design Control (secondary control activities in blue)	Activity	Implementation Schedule		
			Short	Medium	Long
Landform Stability (Collapse)	Placement of overburden (mine waste material), interseam materials and fill over batters to contribute to weight balance.	Overburden (mine waste material) placement. Utilizing available mine waste material, which will be spread as uniformly as practical and as low as possible across the pit floor. Can only be implemented once mine has reached depth.	Y	Y	
	Controlled repressurisation of the aquifer to achieve weight balance	Sequential cessation of dewatering	Y	Y	
	Design and construction of slopes to suitable gradient	Reshaping of selected batters for a safe and stable outcome.	Y	Y	
	Water management (water addition) to achieve weight balance.	Surface water injection from flooding (i.e. diverting flood waters) Surface water injection from water entitlement (i.e. neighbouring rivers, power station) Water injection from dewatering.		Y	Y
	Buttressing of selected high risk batters prior to pit filling.	Buttressing selected batters to maintain safe and stable landform.	Y		
	Installation of pressure relief wells / horizontal drains in high risk areas of pit cut back	Pressure relief wells	Y	Y	Y
	Source additional overburden, interseam and fill materials off site from other mite sites	Additional overburden sourcing			
	Design of drainage diversion and control on above water level batters	Construction of levees and Drainage diversion to specific ARI.	Y	Y	Y
	Infiltration control.	Low perm materials placed on uppermost surface batters to avoid water entering.	Y	Y	Y
Groundwater	Diversion of the shallow GW or SW prior to entering the pit, and treatment of it.	Construction of horizontal drains and collection system with pumping. Bunding for SW.			Y
	Treatment of water either prior to entering pit, or acidic water.	Water treatment to required standard for either offsite discharge or onsite retention.		Y	Y
	Maintain appropriate salinity for end landuse.	Install and maintain pumping system to control salinity.			Y
	Treatment of the pit lake water or restore and maintain appropriate WQ	Installation of water treatment plant.		Y	Y
	Regulate and limit landuse adjacent to the pit, i.e. nothing that may introduce critical contaminants.	Buffer zone establishment			Y
	Appropriate allocations maintained for GW during pit filling.	Regional regulation of GW allocations in accordance with pit lake requirements.	Y	Y	Y

	Appropriate allocations maintained for GW post pit filling.	Regional regulation of GW allocations in accordance with pit lake requirements.			Y
	Ensure that fundamental design parameters involving other water elements are robust enough to cope with variability/ changes.	Base initial designs on climate change prediction data (allow for future ppt and evap demand)		Y	Y
Surface Water	Maintenance of good water quality in the pit lake for discharge.	Water treatment		Y	Y
	Maintenance of good surface water quality in the lake for landuses.	Installation of water treatment plant.			Y
	Design of surface water management facilities around the pit which drain away from pit.	Construction of horizontal drains and collection system with pumping. Bunding for SW.			Y
	Bunding around pit and running pit with freeboard.	Bunding			Y
	Management of excess water between available storage areas i.e. other pits.	Establishment and maintain existing distribution system between the pits.		Y	Y
	Appropriate allocations maintained for SW during pit filling.	Regional regulation of SW allocations in accordance with pit lake requirements.	Y	Y	Y
	Appropriate allocations maintained for SW post pit filling.	Regional regulation of SW allocations in accordance with pit lake requirements.			Y
	Ensure that fundamental design parameters involving other water elements are robust enough to cope with variability/ changes.	Base initial designs on climate change prediction data (allow for future ppt and evap demand)		Y	Y
	Minimise the area that is lost to the surrounding catchments, i.e. external areas surrounding pit reshaped rehabbed, to minimise lake catchment. Create a controlled system.	Reshaping and establishment of drainage, in the buffer zone and lease area.	Y	Y	
	Import material for reshaping	Additional overburden sourcing		Y	
Biodiversity	Revegetation planning commensurate with final landuse and stability/ GW requirements.	Revegetation	Y	Y	
	Consider using natural soil improvement agents to improve the soil microbial condition and nutrient load	Soil treatment		Y	
Fire risk	Coal face must be covered or capped to prevent exposure	Overburden placement Those below final water table should be stabilised and covered for duration of pit filling. Layer compacted with low perm material to prevent aeration (spontaneous combustion)		Y	Y
	Programmed maintenance of the cover/ capping, including: monitoring, top up of the cover.	Cover maintenance		Y	Y
	Use of shallow rooted species for vegetation to prevent breach of the cover.	Lake edge revegetation		Y	
	Erosion prevention to avoid cover breach.	Design of a shallower slope and use of erosion prevention measures. Battering of coal slope prior to placement of cover to achieve consistent (minimum) level of cover.		Y	Y

	Control activities e.g. vehicle use in areas where there are coal seams or public access to rehabbed (high risk) areas	Buffer zone establishment		Y	Y
	Include (and maintain) fire breaks in revegetation design	Fire breaks		Y	Y
	Cover with water (i.e. fill lake to maximum extent)	Aquifer repressurisation Surface water injection		Y	Y
	Fill pit faster with surface water addition	Surface water addition	Y	Y	
	Maintenance of water level using controlled surface water addition	Surface water addition			Y

Appendix G2 – Indicative Partial Backfill Below the Water Table Implementation Schedule

Risk Issue	Design Control (secondary control in blue)	Activity	Implementation Schedule		
			Short	Medium	Long
Landform Stability (Collapse)	Placement of overburden (mine waste material), interseam materials and fill over batters to contribute to weight balance.	Overburden (mine waste material) placement. Differential backfilling across floor and batters to create multi-level in-pit landform with some AWT and some BWT areas such that AWT batters are sloped as shallow as possible	Y	Y	-
	Controlled repressurisation of the aquifer to achieve weight balance	Sequential cessation of dewatering		Y	
	Design and construction of slopes to suitable gradient	Reshaping of selected batters for a safe and stable outcome. Use of buffer zone material to achieve shallower slopes on upper overburden and coal batters	Y	Y	-
	Water management (water addition) to achieve weight balance.	Surface water injection from flooding (i.e. diverting flood waters) Surface water injection from water entitlement (i.e. neighbouring rivers, power station) Water injection from dewatering.		Y	Y
	Buttressing of selected high risk batters prior to pit filling.	Buttressing selected batters to maintain safe and stable landform.	Y		
	Installation of pressure relief wells / horizontal drains in high risk areas of pit cut back	Pressure relief wells	Y	Y	Y
	Source additional overburden, interseam and fill materials off site from other mite sites	Additional overburden sourcing			
	Design of drainage diversion and control on above water level batters	Construction of levees and Drainage diversion to specific ARI.	Y	Y	Y
	Infiltration control.	Low perm materials placed on uppermost surface batters to avoid water entering.	Y	Y	Y
Groundwater	Diversion of the shallow GW or SW prior to entering the pit, and treatment of it.	Construction of horizontal drains and collection system with pumping. Bunding for SW.			Y
	Treatment of water either prior to entering pit, or acidic water.	Water treatment to required standard for either offsite discharge or onsite retention.		Y	Y
	Maintain appropriate salinity for end landuse.	Install and maintain pumping system to control salinity.			Y

	Treatment of the pit lake water or restore and maintain appropriate WQ	Installation of water treatment plant.			Y
	Regulate and limit landuse adjacent to the pit, i.e. nothing that may introduce critical contaminants.	Buffer zone establishment			Y
	Appropriate allocations maintained for GW during pit filling.	Regional regulation of GW allocations in accordance with pit lake requirements.	Y	Y	
	Appropriate allocations maintained for GW post pit filling.	Regional regulation of GW allocations in accordance with pit lake requirements.			Y
	Ensure that fundamental design parameters involving other water elements are robust enough to cope with variability/ changes.	Base initial designs on climate change prediction data (allow for future ppt and evap demand)		Y	Y
Surface Water	Maintenance of good water quality in the pit lake for discharge.	Water treatment		Y	Y
	Maintenance of good surface water quality in the lake for landuses.	Installation of water treatment plant.			Y
	Design of surface water management facilities around the pit which drain away from pit.	Construction of horizontal drains and collection system with pumping. Bunding for SW.			Y
	Bunding around pit and running pit with freeboard.	Bunding			Y
	Management of excess water between available storage areas i.e. other pits.	Establishment and maintain existing distribution system between the pits.		Y	Y
	Appropriate allocations maintained for SW during pit filling.	Regional regulation of SW allocations in accordance with pit lake requirements.	Y	Y	
	Appropriate allocations maintained for SW post pit filling.	Regional regulation of SW allocations in accordance with pit lake requirements.			Y
	Ensure that fundamental design parameters involving other water elements are robust enough to cope with variability/ changes.	Base initial designs on climate change prediction data (allow for future ppt and evap demand)		Y	Y
	Minimise the area that is lost to the surrounding catchments, i.e. external areas surrounding pit reshaped rehabbed, to minimise lake catchment. Create a controlled system.	Reshaping and establishment of drainage, in the buffer zone and lease area.	Y	Y	
	Import material for reshaping	Additional overburden sourcing		Y	
Biodiversity	Revegetation planning commensurate with final landuse and stability/ GW requirements.	Revegetation	Y	Y	
	Consider using natural soil improvement agents to improve the soil microbial condition and nutrient load	Soil treatment		Y	
Fire risk	Coal face must be covered or capped to prevent exposure	Overburden placement Those below final water table should be stabilised and covered for duration of pit filling. Layer compacted with low perm material to prevent aeration (spontaneous combustion)		Y	Y
	Programmed maintenance of the cover/ capping, including: monitoring, top up of the cover.	Cover maintenance		Y	Y
	Use of shallow rooted species for vegetation to prevent breach of the cover.	Lake edge revegetation		Y	

	Erosion prevention to avoid cover breach.	Design of a shallower slope and use of erosion prevention measures. Battering of coal slope prior to placement of cover to achieve consistent (minimum) level of cover.		Y	Y
	Control activities e.g. vehicle use in areas where there are coal seams or public access to rehabbed (high risk) areas	Buffer zone establishment		Y	Y
	Include (and maintain) fire breaks in revegetation design	Fire breaks		Y	Y
	Cover with water (i.e. fill lake to maximum extent)	Aquifer repressurisation		Y	Y
	Maintenance of water level using controlled surface water addition	Surface water addition			Y