Report on Future Options For Rehabilitating the Hazelwood, Yallourn and Loy Yang Mines in the Latrobe Valley



Appendix E – Cost Estimates

Appendix E1 – Yallourn Cost Estimate Rehabilitation Measures

Appendix E2 – Yallourn Cost Estimate Pit Lake

Appendix E3 – Yallourn Cost Estimate Partial Backfill Below the Water Table

Appendix E4 – Hazelwood Cost Estimate Rehabilitation Measures

Appendix E5 – Hazelwood Cost Estimate Pit Lake

Appendix E6 – Hazelwood Cost Estimate Partial Backfill Below the Water Table

Appendix E7 – Loy Yang Cost Estimate Rehabilitation Measures

Appendix E8 – Loy Yang Cost Estimate Pit Lake

Appendix E9 – Loy Yang Cost Estimate Partial Backfill Below the Water Table

Document number

Appendix E1 – Yallourn Cost Estimate Rehabilitation Measures



Pof	Measure	Description	Unit Rate	HoM	Notes	Assumptions
	Bunding	Bunding constructed around perimeter of mine pit to 2 m height and 5m wide at based (top of bund 2 m	56.38	m	Loy Yang- bunding already in place around majority	Overarching: Clay composition (i.e SG 1.8) uniform across all
	- Landing	wide), bund setback 100 m. Specific gravity 1.8 assumed (1.55 if bulked) Max distance from stockpile 2 km.			of boundary, 2km alongside creek already exists.	sites.
					,,,,,	Overarching: External contractors will be utilised for rehab/
						earthworks.
2A	Material placement - Inpit (Bucket wheel activity to stockpile only).	Utilising existing bucket wheel, material spread but not contoured or reshaped.	2.50	m3		2A, 2B occur together as do 9A and 9B
	Material placement - Inpit (Inpit haulage only)	Specific gravity of 1.8. In-pit haulage from stockpile, then truck and shovel, assumed to n.e 5km each way.		m3	Rate quantity dependant	2A, 2B occur together as do 9A and 9B
	, , , , , , , , , , , , , , , , , , , ,					
3	Pit Backfill - Expit and Inpit haulage (onsite)	Material spread but not contoured or reshaped. Specific gravity of 1.8. Ex-pit haulage assumed to n.e 5 km	N/A	m3		
		each way, 0% gradient out of pit, 5km in pit haulage with 5% gradient.				
4	Internal dump removal	In-pit haulage of overburden dump to buttress batters. Specific gravity of 1.8. In-pit haulage assumed to n.e.	4.03	m3		
		2km each way.				
	Reshaping - Pit edge	Earthworks reshaping utilizing dozer. Likely angle 180 degrees.	3,199.38			
6	Reshaping - Pit wall	Earthworks reshaping utilizing dozer. Likely angle 37 degrees to 20 degree design slope. Average bench	1.06	m3		
	B B	height 18m. Material pushed down gradient.		ļ		
	Reshaping - Pit floor	Earthworks reshaping utilizing dozer. Likely angle 180 degrees (i.e flat) All rehabilitated areas will be deep ripped along contour (1m depth at 1m spacing) and seeded at a rate of 10	3,199.38 6.314.98			
8	Ripping and Seeding	ka/ha (\$5.000/Ha for seed).	0,314.90	па		
0.4	Long Haul Cut to Fill	Winning of material from stockpile, with haulage distance n.e 25 km each way on public roads. Average	N/A	m3		Loy Yang - no road, triples to be utilised during haulage.
9A	Long Hauf Cut to Fill	specific gravity of 1.8 assumed.	IVA	1113		Loy rang - no road, inpies to be dillised during hadrage.
		specific gravity of 1.0 assumed.				2A, 2B occur together as do 9A and 9B
9R	Pit Backfill - Expit and Inpit haulage (onsite)	Material spread but not contoured or reshaped. Specific gravity of 1.8. Ex-pit haulage assumed to n.e 5 km	N/A	m3	Rate quantity dependant	2A, 2B occur together as do 9A and 9B
35	in busining Expiration in the industry (clinical)	each way, 0% gradient out of pit. 5km in pit haulage with 5% gradient.			,	
10	Long Haul Cut to Fill	Winning of material from stockpile, with haulage distance n.e 25 km each way on mine haul road. Material	38.85	m3		
1		will be spread but not contoured or reshaped. Average specific gravity of 1.8 assumed. 5km in pit haulage.		1		
						Yallourn to Hazelwood existing haul road can be utilised.
11	Topsoiling	Winning of material from stockpile, with haulage distance n.e 10km each way. Topsoil spread to a depth of	12,215.82	ha		Sufficient topsoil quantities are available.
	·	200 mm . Specific gravity of 1.0 assumed.				
12	Slope Battering	To design slope (20 degrees) from angle of repose (37 degrees). Average bench height of 18 m assumed.	1.06	m3	Benches on site range from 12-24m in height.	
		Material pushed down gradient. Specific gravity of 1.8 assumed. Slope battering of exposed coal face only.			Median taken. GHD report suggests, covering a 50m	
					deep batter of exposed coal with 2m cover, would	
					required approx. 320,000 m3/km of batter length.	
40	Management and Maintenance		39,000.00	- /		All
13	wanagement and waintenance	Management and maintenance of infrastructure (includes servicing, monitoring?). Assume a fixed cost p/yr.	39,000.00	p/yr		Allowance of one person 30% of the year
14	Pumps and Pipework Installation	Relocation of pump to a level above final water level and relocation of exisiting pump station and pipework.	1.000.000.00	Item		Fixed Cost
	unips and ripework installation	recocation of pump to a level above final water level and relocation of existing pump station and pipework.	1,000,000.00	ittein		i ixed oddi
15	Buttressing	Clay material placed against a section of the pit wall to prevent continued movement or propagation of wall	15.40	m3		
	Duttiessing	failure. Specific gravity of 1.8. In-pit haulage assumed to n.e 5km each way.	10.10			
16	Pressure relief well installation	Installation of horizontals wells into pit wall to length of 100m, at intervals of 100m. 6m of PVC pushed in to	35.00	m	Approx. cost. \$2,000 for drill set-up. \$35 p/m of	
		protect outlet.			drilling.	
					French drain system an option.	
17	Drainage diversion	Installation of permanent drainage diversions. Assume excavation of a 5m wide, 2m deep. Length 1.5 x	6.44	m3		
1		perimeter of pit crest with a 20m set back channel. Material placed down slope side, and compacted/	1			
L		smoothed out.				
18	Levee construction	Winning of material from borrow pit, with haulage distance n.e. 10km each way and placement. Construction	17.29	m3		
L.	w. =	of levee 5m high, 25m at base 5m at top, 150m setback from pit.	F 000 000 00	lt		Friedrice and the contract of
19	Water Treatment System	Existing water treatment station upgraded/ modified to cope with discharge of treated water in to creeks and	5,000,000.00	item		Existing on site water treatment/ processing plants can be utilised.
20	Fencing	Construction of 2m high security fence around perimeter of an open void. Fence setback of a minimum of	70.00	m	Minor fencing likely to be required.	Sufficient fencing already in place around current mining leases for
20	renoing	150m from earthworks.	7 0.00		minor ronoring intory to be required.	all sites.
21	Recontouring	Recontouring of areas, outside of pit, <1m above natural relief to remove impediments to run-off and	1.791.82	ha		
1	• • • • • • • • • • • • • • • • • • • •	maximise drainage.				
22	Fertilising (Material cost only)	Application of fertiliser or gypsum over selected areas following seeding. To be undertaken concurrently with	20.50	ha		
1	- · · · · · · · · · · · · · · · · · · ·	seeding, however purchase of specific quantities of fertiliser will need to be accounted for. Material cost only				
L		50kg/Ha @ \$410/t				
	Compaction	Ground surface treatment. Moisture condition and compact existing surface	16,100.00			
25	Fire break	Mown fuel break, i.e grasslands. Spreading of topsoil and use of grass seed applied at 10kg/ha (\$5,000/Ha	18,530.00	ha	Incorporation of wet zone may need to be considered	Mowing of fuel break not required, sheep/farming will maintain
1		seed). Fire breaks 10 m wide every 100 m of rehabbed/revegetated land in mining lease/ buffer zone. Haul				grass length.
1		topsoil 10km each way, rip and seed 90% of area (fire break 100 x 10 in 100 x 100m area)				
1			1			
L						
26	Rip-Rap	Crushed concrete materials (availble free issue) utilised for armouring of pit lake edge. Ex-pit Haulage	31.70	m3	Sourced from road making materials.	
L		assumed to n.e 5 km each way. (0.5m thick rip rap)				
27	Semi Permeable Cover Placement	Excavation and pushing of available semi-permeable material from pit edge down pit wall to 2m depth, for		m3	Nominal provision, factored from slope battering rate	
1	The state of the s	entire pit depth	3.00	1		1 I

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Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									310,464 - - - - 13,515,965	23,313,266 8,159,162 14,768,271 3,077,528 6,858,080	3,510,000 3,510,000 1,170,000 - 2,360,418	27,133,730 11,669,162 15,938,271 3,077,528 22,734,464
RISK ISSUE	LANDFORM STABILITY (COLLAPSE)												
	Mobilisation, demobilisation, site establishment									14,784	1,110,156		1,124,940
<u>Design Control</u>	Placement of overburden (mine waste material), interseam materials and fill over batters to contribute to weight balance.												
Activity	Overburden (mine waste material) placement.		Assumed operational activity										
Pricing Item											-	-	
Activity	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.		Assumed operational activity										
Pricing Item											-	-	-
<u>Design Control</u>	Controlled repressurisation of the aquifer to achieve weight balance												
Activity	Sequential cessation of dewatering		Assumed operational activity										
Pricing Item										-	-	-	-
<u>Design Control</u>	Design and construction of slopes to suitable gradient												
Activity	Reshaping of selected batters for a safe and stable outcome.												
Pricing Item	Reshaping - Pit wall Slope battering	Short Term Short Term	Assumes whole area of AWT final sloped pit walls Assumed operational activity	92	92			ha	3,200.00	295,680	-	-	295,680
<u>Design Control</u>	Water management (water addition) to achieve weight balance.												
Activity	Surface water injection from flooding (i.e. diverting flood waters)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Required as all different sources of SW for injection	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	- 1,170,000	1,000,000 1,170,000
Activity	Surface water injection from water entitlement (i.e. neighbouring rivers, power station)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Required as all different sources of SW for injection	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	- -	1,000,000	- 1,170,000	1,000,000 1,170,000
Activity	Water injection from dewatering.												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Required as all different sources of SW for injection	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00		1,000,000	- 1,170,000	1,000,000 1,170,000
<u>Design Control</u>	Buttressing of selected high risk batters prior to pit filling.												
Activity	Buttressing selected batters to maintain safe and stable landform.		Assumed operational activity										
Pricing Item								m3	15.40	-	-	-	
Design Control	Installation of pressure relief wells / horizontal drains in high risk areas of pit cut back												
Activity	Pressure relief wells												
Pricing Item	Pressure relief well installation	Medium Term	Assuming to 100m depth of horizontal drilling. At 100m intervals. Across pit face- horizontally (not to depth) near surface, i.e around perimter. 101 bores required.	10,100		10,100		m	35.00	-	353,500	-	353,500
<u>Design Control</u>	Source additional overburden, interseam and fill materials off site from other mite sites												
Activity	Additional overburden sourcing		Assumed operational activity										

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Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									310,464 - - - 13,515,965	23,313,266 8,159,162 14,768,271 3,077,528 6,858,080	3,510,000 3,510,000 1,170,000 - 2,360,418	27,133,730 11,669,162 15,938,271 3,077,528 22,734,464
Pricing Item										-	-	-	-
Design Control	Design of drainage diversion and control on above water level batters												
Activity	Construction of levees and Drainage diversion to specific ARI.												
Pricing Item	Drainage diversion Levee construction Compaction	Medium Term Medium Term Medium Term	Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set back. With 20m set back from pit edge Levee 5m high. At setback of 150m from pit. 5m height at top, 25m at base. Compaction of pit edge	152,895 825,675 158		152,895 825,675 158		m3 m3 ha	6.44 17.29 16,100.00	-	984,644 14,275,921 2,543,800	-	984,644 14,275,921 2,543,800
	Slope Battering Ripping and Seeding	Medium Term Medium Term	Battering of levee only. Height 5m. To 20 degrees from angle repose. Pit edge only	44,792 158		44,792 158		m3 ha	1.06 6,314.98	- -	47,480 997,767	-	47,480 997,767
Design Control	Infiltration control.												
Activity	Low perm materials placed on uppermost surface batters to avoid water entering.		Assumed Fire Risk controls sufficient										
Pricing Item													
	SUB-TOTAL (LANDFORM STABILITY)						1		310,464	23,313,266	3,510,000	27,133,730
RISK ISSUE	GROUNDWATER												
	Mobilisation, demobilisation, site establishment									•	388,532	-	388,532
<u>Design Control</u>	Diversion of the shallow GW or SW prior to entering the pit, and treatment of it.												
Activity	Construction of horizontal drains and collection system with pumping. Bunding for SW.												
Pricing Item	Pressure relief well installation Pumps and Pipe Network Installation Management and Maintenance	Medium Term Medium Term Long Term	Assume landform stability control sufficient Inpit	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	- - -	1,000,000 - -	1,170,000	1,000,000 1,170,000
Design Control	Treatment of water either prior to entering pit, or acidic water.												
Activity	Water treatment to required standard for either offsite discharge or onsite retention.												
Pricing Item	Water treatment system Management and Maintenance	Medium Term Long Term	Assumes upgrade of existing infrastructure sufficient to cover SW and GW	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	5,000,000.00 39,000.00	- -	5,000,000	1,170,000	5,000,000 1,170,000
Design Control	Maintain appropriate salinity for end landuse.												
Activity	Install and maintain pumping system to control salinity.												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Expit	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	1,170,000	1,000,000 1,170,000
Design Control	Treatment of the pit lake water or restore and maintain appropriate WQ												
Activity	Installation of water treatment plant.		Above design control WTS assumed sufficient.										
Pricing Item													
<u>Design Control</u>	Regulate and limit landuse adjacent to the pit, i.e. nothing that may introduce critical contaminants.												
Activity	Buffer zone establishment												
Pricing Item	Fencing	Medium Term	150 m setback	11,009		11,009		m	70.00	-	770,630	-	770,630

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Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary					_							
	Landform Stability (Collapse)									310,464	23,313,266	3,510,000	27,133,730
	Groundwater Surfacewater									- -	8,159,162 14,768,271	3,510,000 1,170,000	11,669,162 15,938,271
	Biodiversity Fire Risk									13,515,965	3,077,528 6,858,080	2,360,418	3,077,528 22,734,464
Design Control	Appropriate allocations maintained for GW during pit filling.												
Activity	Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item <u>Design Control</u>	Appropriate allocations maintained for GW post pit filling.									-	-	-	-
Activity	Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item										-	-	-	-
Design Control	Ensure that fundamental design parameters involving other water elements are robust enough to												
Activity	cope with variability/ changes. Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
Pricing Item	and a surjets on commune origing production data (and who indicate plus and evaplue manu)												
	SUB-TOTAL (GROUNDWATER)									-	8,159,162	3,510,000	11,669,162
RISK ISSUE	SURFACEWATER												
	Mobilisation, demobilisation, site establishment										703,251		703,251
Design Control	Maintenance of good water quality in the pit lake for discharge.												
Activity	Water treatment		Assumed GW system sufficient										
Pricing Item			Assumed GW system sufficient							-	-	-	-
Design Control_	Maintenance of good surface water quality in the lake for landuses.												
Activity	Installation of water treatment plant.		Assumed GW system sufficient										
Pricing Item													
<u>Design Control</u>	Design of surface water management facilities around the pit which drain away from pit.												
Activity	Construction of horizontal drains and collection system with pumping.		Assume GW provisions sufficient										
Pricing Item													
Activity	Bunding for SW.		Assume levee sufficient										
Pricing Item													
<u>Design Control</u>	Bunding around pit and running pit with freeboard.												
Activity	Bunding		Assume levee sufficient										
Pricing Item Design Control	Management of excess water between available storage areas i.e. other pits.												
Activity	Establishment and maintain existing distribution system between the pits.												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Expit. Assumes additional to GW infrastructure Expit. Assumes additional to GW infrastructure	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	- 1,170,000	1,000,000 1,170,000
<u>Design Control</u>	Appropriate allocations maintained for SW during pit filling.												
Activity	Regional regulation of SW allocations in accordance with pit lake requirements.												
Pricing Item										-	-	-	-
Design Control Activity	Appropriate allocations maintained for SW post pit filling. Peninnal regulation of SW allocations in accordance with pit lake requirements.												
Activity Pricing Item	Regional regulation of SW allocations in accordance with pit lake requirements.												
Design Control	Ensure that fundamental design parameters involving other water elements are robust enough to												
	cope with variability/ changes.												
Activity	Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
Pricing Item										-	-	-	-

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Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater									310,464	23,313,266 8,159,162	3,510,000 3,510,000	27,133,730 11,669,162
	Surfacewater Birddiversity Fire Risk									- - 13,515,965	14,768,271 3,077,528 6,858,080	1,170,000 - 2,360,418	15,938,271 3,077,528 22,734,464
										13,313,703	0,636,060	2,300,410	22,/34,404
<u>Design Control</u>	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.												
Activity	Reshaping and establishment of drainage, in the buffer zone and lease area.												
Pricing Item	Reshaping - Pit edge Recontouring	Medium Term Medium Term		158 158		158 158		ha ha	3,200.00 1,790.00		505,600 282,820	-	505,600 282,820
<u>Design Control</u>	Import material for reshaping												
Activity	Additional overburden sourcing												
Pricing Item	Long haul cut to fill	Medium Term	Assume nominal 0.2m depth at pit edge	316,000		316,000		m3	38.85	=	12,276,600	=	12,276,600
	SUB-TOTAL (SURFACEWATER)								-	14,768,271	1,170,000	15,938,271
RISK ISSUE	BIODIVERSITY												
	Mobilisation, demobilisation, site establishment										146,549		146,549
<u>Design Control</u>	Revegetation planning commensurate with final landuse and stability/ GW requirements.												
Activity	Revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Medium Term Medium Term	Assume 150m buffer area only Assume 150m buffer area only	158 158		158 158		ha ha	12,215.00 6,315.00	-	1,929,970 997,770	-	1,929,970 997,770
Design Control	Consider using natural soil improvement agents to improve the soil microbial condition and nutrient load												
Activity	Soil treatment												
Pricing Item	Addition of Fertiliser (material only)	Medium Term	Assume pit edge requires only	158		158		ha	20.50	=	3,239	=	3,239
	SUB-TOTAL (BIODIVERSITY)								-	3,077,528	-	3,077,528
RISK ISSUE	FIRE RISK												
	Mobilisation, demobilisation, site establishment									643,617	326,575	972	971,165
Design Control	Coal face must be covered or capped to prevent exposure												
Activity	Overburden placement		Assumed 2m clay layer sufficient to mitigate fire risk										
Pricing Item										-	-	-	
Activity	Those below final water table should be stabilised and covered for duration of pit filling.		Assumed butressing stability control sufficient										
Pricing Item											-	-	
Activity	Layer compacted with low perm material to prevent aeration (spontaneous combustion)												
	Semi Permeable Cover Placement	Short Term	2m semi-permeable layer. Assumes available from pit edge. AWT batters and BWT faces	3,383,816	3,383,816			m3	3.00	10,151,448	-		10,151,448
	Compaction	Short Term	AWT and BWT slopes	169	3,363,610			ha	16,100.00	2,720,900	- -	- -	2,720,900
Design Control	Programmed maintenance of the cover/ capping, including: monitoring, top up of the cover_												
Activity	Cover maintenance												
Pricing Item	Long Haul cut to fill	Long Term	Assume 0.5% cover requires maintenance per year. Based on total AWT semi-perm layer	462			462	m3	38.85	_	-	17,966	17,966
	Reshaping - Pit wall	Long Term	Assume 0.5% walls exposed require maintenance Based on AWT portion of semi-perm layer	0.46			0.46		3,200.00	_	-	1,480	1,480
Design Control_	Use of shallow rooted species for vegetation to prevent breach of the cover.												
Activity	Lake edge revegetation												
Pricing Item	Topsoiling	Medium Term	Assumes AWT slopes only	92		92		ha	12,215.00	-	1,129,762	-	1,129,762
Design Control	Ripping and Seeding	Medium Term	Assumes AWT slopes only	92		92		ha	6,315.00	-	584,073	-	584,073
<u>Design Control</u> Activity	Erosion prevention to avoid cover breach. Design of a shallower slope and use of erosion prevention measures. Battering of coal slope prior to												
. wavity	placement of cover to achieve consistent (minimum) level of cover.												
Pricing Item	Slope battering	Short Term	Assumed part of operations for stability control										
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					Quantil	ties					Short Term Medium Term Long Term 310,464 23,313,266 3,510,000 - 8,159,162 3,510,000 - 14,768,271 1,170,000 - 3,077,528 - 2,360,418 - 3,511,925 - 3,511,925		
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									- - -	8,159,162 14,768,271 3,077,528	3,510,000 1,170,000 -	27,133,730 11,669,162 15,938,271 3,077,528 22,734,464
	Rip-Rap	Medium Term	Assume pit edge only. Assume around pit perimiter, to 0.5m thickness to 10m depth.	110,786		110,786		m3	31.70	-	3,511,925	-	3,511,925
<u>Design Control</u>	Consideration of alternate fire control measures , possibly spraying exposed coal surfaces with fire retardant materials or chemicals.												
Activity	Fire retardant spraying		Assume other control sufficient										
Design Control	Control activities e.g. vehicle use in areas where there are coal seams or public access to rehabbed (high risk) areas												
Activity	Buffer zone establishment		Assume captured by fencing control for GW										
Pricing Item										-	-	-	-
Design Control_	Include (and maintain) fire breaks in revegetation design												
Activity	Fire breaks												
Pricing Item	Fire break	Medium Term	(150x10) per break. 110 breaks required.	17		17		ha	18,530.00	-	305,745	-	305,745
Design Control_	Cover with water (i.e. fill lake to maximum extent)												
Activity	Aquifer repressurisation												
Pricing Item	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00	-	-	1,170,000	1,170,000
Activity	Surface water injection												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term		1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	- 1,170,000	1,000,000 1,170,000
Design Control	Fill pit faster with surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
<u>Design Control</u>	Maintenance of water level using controlled surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
	SUB-TOTAL (FIRE RISK)								13,515,965	6,858,080	2,360,418	22,734,464



	т ф р от тип 20				Quan	tities						Costs	
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary Landform Stability (Collapse) Groundwater Surfacewater Blodiversity Fire Risk									1,246,899.53 - 13,515,965.30	23,311,951.18 8,159,161.50 14,768,271.00 3,077,527.95 6,858,079,98	3,510,000.00 3,510,000.00 1,170,000.00 2,360,418.27	28,068,850.71 11,669,161.50 15,938,271.00 3,077,527.95 22,734,463.55
RISK ISSUE	LANDFORM STABILITY (COLLAPSE)												
	Mobilisation, demobilisation, site establishment									59,376	1,110,093		1,169,469
Design Control	Placement of overburden (mine waste material), interseam materials and fill over batters to contribute to weig balance.	<u>ıt</u>											
Activity Pricing Item	Overburden (mine waste material) placement.		Assumed operational activity							:		:	:
Activity	Differential backfilling across floor and batters to create multi-level in-pit landform with some AWT and some E areas such that AWT batters are sloped as shallow as possible	WT											
Pricing Item	Internal dump removal Reshaping - Pit edge Reshaping - Pit wall Reshaping - Pit floor	Short Term Short Term Short Term Short Term	Assumed operational activity Addressed in surface water control measures Assumed total BWT pit wall area. Assumed outside the scope of operations Assumed outside the scope of operations	77 202	77 202			ha ha	3,200.00 3,200.00	245,443.36 646,400.00	:	:	245,443.36 646,400.00
Design Control	Controlled repressurisation of the aquifer to achieve weight balance												
Activity Pricing Item	Sequential cessation of dewatering		Assumed operational activity										
Design Control	Design and construction of slopes to suitable gradient												
Activity	Reshaping of selected batters for a safe and stable outcome.												
Pricing Item	Reshaping - Pit wall Slope Battering	Short Term Short Term	Assumes whole area of AWT final sloped pit walls Assumed operational activity	92	92			ha	3,200.00	295,680.00	-	-	295,680.00
Activity Pricing Item	Use of buffer zone material to achieve shallower slopes on upper overburden and coal batters		Assumed covered by slope battering activities							-			
Design Control	Water management (water addition) to achieve weight balance.												
Activity	Surface water injection from flooding (i.e. diverting flood waters)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	All required as different SW sources.	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00	- 1,170,000.00	1,000,000.00 1,170,000.00
Activity	Surface water injection from water entitlement (i.e. neighbouring rivers, power station)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	All required as different SW sources.	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Activity Pricing Item	Water injection from dewatering. Pumps and Pipe Network Installation	Medium Term	All required as different SW sources.	1		1		Fixed Cost: Item	1,000,000.00		1,000,000.00		1,000,000.00
	Management and Maintenance Buttressing of selected high risk batters prior to pit filling.	Long Term	Thirting and as a more than some cost.	30			30	Fixed cost p/yr	39,000.00		1,000,000.00	1,170,000.00	1,170,000.00
Activity Pricing Item	Buttressing selected batters to maintain safe and stable landform.		Assumed operational activity										
Design Control	Installation of pressure relief wells / horizontal drains in high risk areas of pit cut back												
Activity	Pressure relief wells												
Pricing Item	Pressure relief well installation	Medium Term	Assuming to 100m depth of horizontal drilling. At 100m intervals. Across pit face- horizontally (not to depth) near surface, i.e around perimter. 101 bores required.	10,100		10,100		m	35.00		353,500.00		353,500.00
Design Control	Source additional overburden, interseam and fill materials off site from other mite sites												
Activity	Additional overburden sourcing		Assumed operational activity										
Pricing Item										-	-	-	-
	Design of drainage diversion and control on above water level batters												
Activity Pricing Itom	Construction of levees and Drainage diversion to specific ARI.	Modium Torm	Assuma Smilida 2m deep Length 1 5 v										
Pricing Item	Drainage diversion Levee construction	Medium Term Medium Term	Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set back. With 20m set back Levee 5m high. At setback of 150m from pit. 5m height at top,	152,700		152,700		m3	6.44	-	983,388.00	-	983,388.00
	Compaction	Medium Term	25m at base. Compaction of pit edge only.	825,675 158		825,675 158		m3 ha	17.29 16,100.00	-	14,275,920.75 2,543,800.00	-	14,275,920.75 2,543,800.00
	Slope Battering	Medium Term	Battering of levee only. Height 5m. To 20 degrees from angle repose.	44,792		44,792		m3	1.06	-	47,479.52	-	47,479.52
	Ripping and Seeding	Medium Term	Pit edge only.	158		158		ha	6,315.00	-	997,770.00	-	997,770.00
	Infiltration control.												
Activity	Low perm materials placed on uppermost surface batters to avoid water entering.		Assumed Fire Risk controls sufficient										



	Quantities]					
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									1,246,899.53 - - - 13,515,965.30	8,159,161.50 14,768,271.00 3,077,527.95	3,510,000.00 3,510,000.00 1,170,000.00 - 2,360,418.27	28,068,850.71 11,669,161.50 15,938,271.00 3,077,527.95 22,734,463.55
Pricing Item													
RISK ISSUE	SUB-TOTAL (LANDFORM STABILITY) GROUNDWATER)								1,246,900	23,311,951.18	3,510,000.00	28,068,850.71
	Mobilisation, demobilisation, site establishment									•	388,532	•	388,532
Design Control	Diversion of the shallow GW or SW prior to entering the pit, and treatment of it.												
Activity	Construction of horizontal drains and collection system with pumping.												
Pricing Item	Pumps and pipework installation Pressure relief well installation Management and Maintenance	Medium Term Medium Term Long Term	Assume Landform Stability control sufficient Inpit	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	- - -	1,000,000.00 -	- 1,170,000.00	1,000,000.00 1,170,000.00
Activity	Bunding for SW.		Assume levee sufficient										
Pricing Item											-	-	-
Design Control	Treatment of water either prior to entering pit, or acidic water.												
Activity	Water treatment to required standard for either offsite discharge or onsite retention.												
Pricing Item	Water treatment system	Medium Term	Assumes upgrade of existing infrastructure sufficient to cover SW and GW	1		1		Fixed Cost: Item	5,000,000.00	-	5,000,000.00	-	5,000,000.00
	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00			1,170,000.00	1,170,000.00
	Maintain appropriate salinity for end landuse.												
	Install and maintain pumping system to control salinity.												
Pricing Item	Pumps and pipework installation Management and Maintenance	Medium Term Long Term	Expit	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	- -	1,000,000.00	- 1,170,000.00	1,000,000.00 1,170,000.00
	Treatment of the pit lake water or restore and maintain appropriate WQ												
Activity	Installation of water treatment plant.		Above design control WTS assumed sufficient.										
Pricing Item													
	Regulate and limit landuse adjacent to the pit, i.e. nothing that may introduce critical contaminants.												
Activity Pricing Item	Buffer zone establishment Fencing	Medium Term	150m setback	11,009		11,009		m	70.00		770,630.00	-	770,630.00
	Appropriate allocations maintained for GW during pit filling.	Wedidiii Teriii	TOTH SELBACK	11,005		11,009		""	70.00		770,030.00		770,030.00
Activity Pricing Item	Regional regulation of GW allocations in accordance with pit lake requirements.												
Design Control	Appropriate allocations maintained for GW post pit filling.												
Activity Pricing Item	Regional regulation of GW allocations in accordance with pit lake requirements.												
Design Control	Ensure that fundamental design parameters involving other water elements are robust enough to cope with variability/ changes.												
Activity Pricing Item	Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
	SUB-TOTAL (GROUNDWATER)									8,159,161.50	3,510,000.00	11,669,161.50
RISK ISSUE	SURFACEWATER												
	Mobilisation, demobilisation, site establishment									*	703,251	•	703,251
	Maintenance of good water quality in the pit lake for discharge.												
	Water treatment		Assume GW provisions sufficient										
Pricing Item	Maintenance of good surface water quality in the lake for landuses.										-	-	
	Installation of water treatment plant.												
Activity Pricing Item	installation of water treatment plant.												
Design Control	Design of surface water management facilities around the pit which drain away from pit.												
Activity	Construction of horizontal drains and collection system with pumping.		Assume GW provisions sufficient										
Pricing Item										-	-	-	-
Activity	Bunding for SW.		Assume levee sufficient										
Pricing Item										-	-	-	-
Design Control	Bunding around pit and running pit with freeboard.												



				Quantitles							Costs		
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater									1,246,899.53	23,311,951.18 8,159,161.50	3,510,000.00 3,510,000.00	28,068,850.7 11,669,161.50
	Surfacewater Biodiversity									-	14,768,271.00 3,077,527.95	1,170,000.00	15,938,271.0 3,077,527.9
	Fire Risk									13,515,965.30	6,858,079.98	2,360,418.27	22,734,463.5
tivity	Bunding		Assume levee sufficient										
cing Item													
esign Control	Management of excess water between available storage areas i.e. other pits.												
tivity	Establishment and maintain existing distribution system between the pits.												
	Pumps and Pipework Installation	Medium Term	Expit. Assumes additional to GW infrastructure Expit. Assumes additional to GW infrastructure	1		1	20	Fixed Cost: Item	1,000,000.00 39,000.00	-	1,000,000.00	- 1,170,000.00	1,000,000.0 1,170,000.0
	Management and Maintenance Appropriate allocations maintained for SW during pit filling_	Long Term	expit. Assumes additional to GW infrastructure	30			30	Fixed cost p/yr	39,000.00			1,170,000.00	1,170,000.0
	Regional regulation of SW allocations in accordance with pit lake requirements.												
cing Item	negorial regulation of 544 anocastions in accordance with president requirements.										_		
sign Control	Appropriate allocations maintained for SW post pit filling.												
tivity	Regional regulation of SW allocations in accordance with pit lake requirements.												
cing Item													
	Ensure that fundamental design parameters involving other water elements are robust enough to cope with												
	variability/ changes.												
tivity	Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
cing Item	Minimise the area that is lost to the surrounding catchments, i.e. external areas surrounding pit reshaped									•			
sign Control	rehabbed, to minimise lake catchment. Create a controlled system.												
tivity	Reshaping and establishment of drainage, in the buffer zone and lease area.												
	Reshaping - pit edge Recountouring	Medium Term Medium Term		158 158		158 158		ha ha	3,200.00 1,790.00	-	505,600.00 282,820.00	-	505,600.0 282,820.0
esign Control	Import material for reshaping												
tivity	Additional overburden sourcing												
icing Item	Long haul cut to fill	Medium Term	Assume nominal 0.2m depth at pit edge	316,000		316,000		m3	38.85	-	12,276,600.00	-	12,276,600.0
	SUB-TOTAL (SURFACEWATER	(1)								-	14,768,271.00	1,170,000.00	15,938,271.0
SK ISSUE	BIODIVERSITY												
	Mobilisation, demobilisation, site establishment										146,549		146,5
esign Control	Revegetation planning commensurate with final landuse and stability/ GW requirements.												
tivity	Revegetation												
icing Item	Topsoiling	Medium Term Medium Term	Assume pit edge requires only	158 158		158 158		ha ha	12,215.00 6,315.00	-	1,929,970.00 997,770.00	-	1,929,970.0 997,770.0
	Ripping and Seeding Consider using natural soil improvement agents to improve the soil microbial condition and nutrient load	Medium Term	Assume pit edge requires only	158		158		па	6,315.00	-	997,770.00	-	997,770.0
	Soil treatment												
icing Item	Addition of fertiliser (material only)	Medium Term	Assume pit edge requires only	158		158		ha	20.50		3,239.00		3,239.0
	SUB-TOTAL (BIODIVERSIT)									-	3,077,527.95	-	3,077,527.9
SK ISSUE	FIRE RISK												
	Mobilisation, demobilisation, site establishment									643,617	326,575	972	971,10
esign Control	Coal face must be covered or capped to prevent exposure												
tivity	Overburden placement		Assumed 2m clay layer sufficient to mitigate fire risk										
icing Item													
ctivity	Those below final water table should be stabilised and covered for duration of pit filling.		Assumed butressing stability control sufficient										
i-i V													
ricing Item										-	-	-	
ctivity	Layer compacted with low perm material to prevent aeration (spontaneous combustion)	Chart Tarr	2										
ricing Item	Semi Permeable Cover Placement	Short Term	2m semi-permeable layer. Assumes available from pit edge. AWT batters and BWT faces	3,383,816				m3	3.00	10,151,447.91	-	-	10,151,447.9
	Compaction	Short Term	AWT and BWT slopes	169	169			ha	16,100.00	2,720,900.00	-	-	2,720,900.0
	Programmed maintenance of the cover/ capping, including: monitoring, top up of the cover.												
tivity	Cover maintenance												
icing Item	Long Haul cut to fill	Long Term	Assume 0.5% cover requires maintenance per year. Based on total AWT semi-perm layer	462			462	. m3	38.85	-	-	17,966.13	17,966.1
	Reshaping - Pit wall	Long Term	Assume 0.5% walls exposed require maintenance Based on AWT portion of semi-perm layer	0.46) ha	3,200.00	_		1,479.84	1,479.84



					Quar	ntities					Со	sts	
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									1,246,899.53 - - - 13,515,965.30	23,311,951.18 8,159,161.50 14,768,271.00 3,077,527.95 6,858,079.98	3,510,000.00 3,510,000.00 1,170,000.00 - 2,360,418.27	28,068,850.71 11,669,161.50 15,938,271.00 3,077,527.95 22,734,463.55
Design Control	Use of shallow rooted species for vegetation to prevent breach of the cover.												
Activity	Lake edge revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Medium Term Medium Term	Assumes AWT slopes only Assumes AWT slopes only	92 92		92 92		ha ha	12,215.00 6,315.00	-	1,129,762.28 584,072.76	-	1,129,762.28 584,072.76
Design Control	Erosion prevention to avoid cover breach.												
Activity	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.												
Pricing Item	Slope battering Rip-rap	Short Term Medium Term	Assumed part of operations for stability control Assume pit edge only. Assume around pit perimiter, to 0.5m thickness and 20m depth i.e to where water table lies.	110,786		110,786		m3	31.70	•	3,511,924.71		3,511,924.71
Design Control	Consideration of alternate fire control measures , possibly spraying exposed coal surfaces with fire retardant materials or chemicals.												
Activity	Fire retardant spraying		Assume other controls sufficient										
Design Control	Control activities e.g. vehicle use in areas where there are coal seams or _public access to rehabbed (high risk) areas												
Activity	Buffer zone establishment		Assume captured by fencing control for GW										
Pricing Item										-	-	-	-
Design Control	Include (and maintain) fire breaks in revegetation design												
Activity	Fire breaks												
Pricing Item	Fire break	Medium Term	(150x10) per break. 110 breaks required.	17		17		ha	18,530.00	-	305,745.00	-	305,745.00
Design Control	Cover with water (i.e. fill lake to maximum extent)												
Activity	Aquifer repressurisation												
Pricing Item	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00	-	-	1,170,000.00	1,170,000.00
Activity	Surface water injection												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term		1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Design Control	Fill pit faster with surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
Design Control	Maintenance of water level using controlled surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
	SUB-TOTAL (FIRE RISK	к)								13,515,965	6,858,079.98	2,360,418.27	22,734,463.55

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Appendix E4 – Hazelwood Cost Estimate Rehabilitation Measures

Ref Measure	Description	Unit Rate	UoM	Notes	Assumptions
1 Bunding	Bunding constructed around perimeter of mine pit to 2 m height and 5m wide at based (top of bund 2 m wide),	56.38	m	Loy Yang- bunding already in place around majority	Overarching: Clay composition (i.e SG 1.8) uniform across all
	bund setback 100 m. Specific gravity 1.8 assumed (1.55 if bulked) Max distance from stockpile 2 km.			of boundary, 2km alongside creek already exists.	sites.
					Overarching: External contractors will be utilised for rehab/
					earthworks.
2A Material placement - Inpit (Bucket wheel activity to stockpile only).	Utilising existing bucket wheel, material spread but not contoured or reshaped.	2.50	m3		2A, 2B occur together as do 9A and 9B
2B Material placement - Inpit (Inpit haulage only)	Specific gravity of 1.8. In-pit haulage from stockpile, then truck and shovel, assumed to n.e 5km each way.		m3	Rate quantity dependant	2A, 2B occur together as do 9A and 9B
3 Pit Backfill - Expit and Inpit haulage (onsite)	Material spread but not contoured or reshaped. Specific gravity of 1.8. Ex-pit haulage assumed to n.e 5 km each	6.23: 6.31	m3		
5 Fit Backiiii - Expit and inpit hadiage (onsite)	way, 0% gradient out of pit, 5km in pit haulage with 5% gradient.	0.20, 0.01	1110		
4 Internal dump removal	In-pit haulage of overburden dump to buttress batters. Specific gravity of 1.8. In-pit haulage assumed to n.e. 2km	3.85	m3		
4 Internal dump removal	each way.	3.03	1110		
5 Reshaping - Pit edge	Earthworks reshaping utilizing dozer. Likely angle 180 degrees.	3.199.38	ha		
6 Reshaping - Pit wall	Earthworks reshaping utilizing dozer. Likely angle 37 degrees to 20 degree design slope. Average bench height	1.06			
o Resilaping - Fit wall	18m. Material pushed down gradient.	1.00	1110		
7 Reshaping - Pit floor	Earthworks reshaping utilizing dozer. Likely angle 180 degrees (i.e flat)	3,199.38	ha		
8 Ripping and Seeding	All rehabilitated areas will be deep ripped along contour (1m depth at 1m spacing) and seeded at a rate of 10	6.314.98			
6 Ripping and Seeding	kn/ha (\$5.00/Ha for seed).	0,314.50	IIa		
	Winning of material from stockpile, with haulage distance n.e 25 km each way on public roads. Average specific	NI/A	m3		Loy Yang - no road, triples to be utilised during haulage.
9A Long Haul Cut to Fill		N/A	m3		
	gravity of 1.8 assumed.				2A, 2B occur together as do 9A and 9B
OD Dis Deviction of the State of Court Cou	Marie and Marie	NI/A	0	Data avantitu dan sa dant	OA OD assess to early as any day OA and OB
9B Pit Backfill - Expit and Inpit haulage (onsite)	Material spread but not contoured or reshaped. Specific gravity of 1.8. Ex-pit haulage assumed to n.e 5 km each	N/A	m3	Rate quantity dependant	2A, 2B occur together as do 9A and 9B
	way, 0% gradient out of pit, 5km in pit haulage with 5% gradient.		-		
10 Long Haul Cut to Fill	Winning of material from stockpile, with haulage distance n.e 25 km each way on mine haul road. Material will be	38.85	m3		
	spread but not contoured or reshaped. Average specific gravity of 1.8 assumed. 5km in pit haulage.				
					Yallourn to Hazelwood existing haul road can be utilised.
11 Topsoiling	Winning of material from stockpile, with haulage distance n.e 10km each way. Topsoil spread to a depth of 200	12,215.82	ha		Sufficient topsoil quantities are available.
	mm . Specific gravity of 1.0 assumed.				
12 Slope Battering	To design slope (20 degrees) from angle of repose (37 degrees). Average bench height of 18 m assumed.	1.06	m3	Benches on site range from 12-24m in height.	
	Material pushed down gradient. Specific gravity of 1.8 assumed. Slope battering of exposed coal face only.			Median taken. GHD report suggests, covering a 50m	
				deep batter of exposed coal with 2m cover, would	
				required approx. 320,000 m3/km of batter length.	
13 Management and Maintenance	Management and maintenance of infrastructure (includes servicing, monitoring?). Assume a fixed cost p/yr.	39,000.00	p/yr		Allowance of one person 30% of the year
			ļ		
14 Pumps and Pipework Installation	Relocation of pump to a level above final water level and relocation of exisiting pump station and pipework.	1,000,000.00	Item		Fixed Cost
15 Buttressing	Clay material placed against a section of the pit wall to prevent continued movement or propagation of wall	15.40	m3		
•	failure. Specific gravity of 1.8. In-pit haulage assumed to n.e 5km each way.				
16 Pressure relief well installation	Installation of horizontals wells into pit wall to length of 100m, at intervals of 100m. 6m of PVC pushed in to	35.00	m	Approx. cost. \$2,000 for drill set-up. \$35 p/m of	
	protect outlet.			drilling.	
				French drain system an option.	
17 Drainage diversion	Installation of permanent drainage diversions. Assume excavation of a 5m wide, 2m deep. Length 1.5 x perimeter	6.44	m3		
	of pit crest with a 20m set back channel. Material placed down slope side, and compacted/ smoothed out.				
			1		
18 Levee construction	Winning of material from borrow pit, with haulage distance n.e. 10km each way and placement. Construction of	17.29	m3		
	levee 5m high, 25m at base 5m at top, 150m setback from pit.		1		
19 Water Treatment System	Existing water treatment station upgraded/ modified to cope with discharge of treated water in to creeks and pit.	10,000,000.00	Item		Existing on site water treatment/ processing plants can be utilise
•			1		
20 Fencing	Construction of 2m high security fence around perimeter of an open void. Fence setback of a minimum of 150m	70.00	m	Minor fencing likely to be required.	Sufficient fencing already in place around current mining leases
-	from earthworks.		1		all sites.
21 Recontouring	Recontouring of areas, outside of pit, <1m above natural relief to remove impediments to run-off and maximise	1,791.82	ha		
=	drainage.		1		
22 Fertilising (Material cost only)	Application of fertiliser or gypsum over selected areas following seeding. To be undertaken concurrently with	20.50	ha		
J ,,	seeding, however purchase of specific quantities of fertiliser will need to be accounted for. Material cost only		1		
	50kg/Ha @ \$410/t		1		
24 Compaction	Ground surface treatment. Moisture condition and compact existing surface	16,100.00	ha		
25 Fire break	Mown fuel break, i.e grasslands. Spreading of topsoil and use of grass seed applied at 10kg/ha (\$5,000/Ha	18,530.00		Incorporation of wet zone may need to be considered	Mowing of fuel break not required, sheep/farming will maintain
	seed). Fire breaks 10 m wide every 100 m of rehabbed/revegetated land in mining lease/ buffer zone. Haul	.,,	1		grass length.
	topsoil 10km each way, rip and seed 90% of area (fire break 100 x 10 in 100 x 100m area)		1		J
	TEPE TERM TERM TERM TO A TO		1		
			1		
OO Die Dee		04.70	0	Odfddddd	
26 Rip-Rap	Crushed concrete materials (availble free issue) utilised for armouring of pit lake edge. Ex-pit Haulage assumed	31.70	ıns	Sourced from road making materials.	
	to n.e 5 km each way. (0.5m thick rip rap) Excavation and pushing of available semi-permeable material from pit edge down pit wall to 2m depth, for entire		m3	Nominal provision, factored from slope battering rate	
			ım3		1 I
27 Semi Permeable Cover Placement	bit depth	3.00		reminar provision, ractored from crope battering rate	1

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	• •		Quantities						Costs				
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									968,884 - - - 30,590,326	34,914,831 13,874,564 22,408,827 4,791,594 11,813,993	3,510,000 3,510,000 1,170,000 - 3,521,130	39,393,715 17,384,564 23,578,827 4,791,594 45,925,449
RISK ISSUE	LANDFORM STABILITY (COLLAPSE)												
	Mobilisation, demobilisation, site establishment									46,137	1,662,611	-	1,708,748
Design Control	Placement of overburden (mine waste material), interseam materials and fill over batters to contribute to weight balance.												
Activity	Overburden (mine waste material) placement.		Assumed operational activity										
Pricing Item											-	-	
Activity	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.		Assumed operational activity										
Pricing Item											-	-	-
Design Control_	Controlled repressurisation of the aquifer to achieve weight balance												
Activity	Sequential cessation of dewatering		Assumed operational activity										
Pricing Item										-	-	-	-
<u>Design Control</u>	Design and construction of slopes to suitable gradient												
Activity	Reshaping of selected batters for a safe and stable outcome.												
Pricing Item	Reshaping - Pit wall Slope battering	Short Term Short Term	Assumes whole area of AWT final sloped pit walls Assumed operational activity	288	288			ha	3,200.00	922,746	-	-	922,746
<u>Design Control</u>	Water management (water addition) to achieve weight balance.												
Activity	Surface water injection from flooding (i.e. diverting flood waters)												
Pricing Item	Pumps and Pipe Network Installation	Medium Term	Required as all different sources of SW for injection	1		1		Fixed Cost: Item	1,000,000.00	-	1,000,000	-	1,000,000
	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00	-	=	1,170,000	1,170,000
Activity	Surface water injection from water entitlement (i.e. neighbouring rivers, power station)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Required as all different sources of SW for injection	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	- -	1,000,000	1,170,000	1,000,000 1,170,000
Activity	Water injection from dewatering.												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Ongoing	Required as all different sources of SW for injection	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	- 1,170,000	1,000,000 1,170,000
<u>Design Control</u>	Buttressing of selected high risk batters prior to pit filling.												
Activity	Buttressing selected batters to maintain safe and stable landform.		Assumed operational activity										
Pricing Item								m3	15.40	-	-	-	
Design Control	Installation of pressure relief wells / horizontal drains in high risk areas of pit cut back												
Activity	Pressure relief wells												
Pricing Item	Pressure relief well installation	Medium Term	Assuming to 100m depth of horizontal drilling. At 100m intervals. Across pit face- horizontally (not to depth) near surface, i.e around perimter pit 16400m. 164 bores required.	16,400		16,400		m	35.00	_	574,000	_	574,000
Design Control	Source additional overburden, interseam and fill materials off site from other mite sites			.,									
Activity	Additional overburden sourcing		Assumed operational activity										

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				Quantities					Costs				
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Blodiversity Fire Risk									968,884 - - - 30,590,326	34,914,831 13,874,564 22,408,827 4,791,594 11,813,993	3,510,000 3,510,000 1,170,000 - 3,521,130	39,393,715 17,384,564 23,578,827 4,791,594 45,925,449
Pricing Item										-	-	-	-
Design Control_	Design of drainage diversion and control on above water level batters												
Activity	Construction of levees and Drainage diversion to specific ARI.												
Pricing Item	Drainage diversion Levee construction Compaction	Medium Term Medium Term Medium Term	Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set back. With 20m set back from pit edge Levee 5m high. At setback of 150m from pit. 5m height at top, 25m at base. Compaction of pit edge	247,875 1,300,575 246		247,875 1,300,575 246		m3 m3 ha	6.44 17.29 16,100.00	-	1,596,315 22,486,942 3,960,600	- - -	1,596,315 22,486,942 3,960,600
	Slope Battering Ripping and Seeding	Medium Term Medium Term	Battering of levee only. Height 5m. To 20 degrees from angle repose. Pit edge only	76,300 246		76,300 246		m3 ha	1.06 6,314.98	-	80,878 1,553,485	-	80,878 1,553,485
Design Control	infiltration control.												
Activity	Low perm materials placed on uppermost surface batters to avoid water entering.		Assumed fire risk activities sufficient										
Pricing Item													
	SUB-TOTAL (LANDFORM STABILIT	7)								968,884	34,914,831	3,510,000	39,393,715
RISK ISSUE	GROUNDWATER												
	Mobilisation, demobilisation, site establishment									-	660,694		660,694
Design Control	Diversion of the shallow GW or SW prior to entering the pit, and treatment of it.												
Activity	Construction of horizontal drains and collection system with pumping. Bunding for SW.												
Pricing Item	Pressure relief well installation Pumps and Pipe Network Installation Management and Maintenance	Medium Term Medium Term Long Term	Assume Landform Stability control sufficient Inpit Inpit	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000 - -	1,170,000	1,000,000 1,170,000
Design Control_	Treatment of water either prior to entering pit, or acidic water.												
Activity	Water treatment to required standard for either offsite discharge or onsite retention.												
Pricing Item	Water treatment system	Medium Term	Assumes upgrade of existing infrastructure sufficient to cover SW and GW	1		1		Fixed Cost: Item	10,000,000.00	-	10,000,000	-	10,000,000
	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00	-	-	1,170,000	1,170,000
Design Control	Maintain appropriate salinity for end landuse.												
Activity Pricing Item	Install and maintain pumping system to control salinity. Pumps and Pipe Network Installation	Medium Term	Expit	1		1		Fixed Cost: Item	1,000,000.00	_	1,000,000	_	1,000,000
	Management and Maintenance	Long Term		30			30		39,000.00	-	-	1,170,000	1,170,000
Design Control	Treatment of the pit lake water or restore and maintain appropriate WQ												
Activity	Installation of water treatment plant.												
Pricing Item			Above design control WTS assumed sufficient.										
Design Control	Regulate and limit landuse adjacent to the pit, i.e. nothing that may introduce critical contaminants	-											
Activity	Buffer zone establishment												
Pricing Item	Fencing	Medium Term	150 m setback	17,341		17,341		m	70.00	-	1,213,870	-	1,213,870

	••	Quantities							Costs				
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater									968,884 -	34,914,831 13,874,564	3,510,000 3,510,000	39,393,715 17,384,564
	Surfacewater Biodiversity									-	22,408,827 4,791,594	1,170,000	23,578,827 4,791,594
	Fire Risk									30,590,326	11,813,993	3,521,130	
	Appropriate allocations maintained for GW during pit filling.												
	Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item	Appropriate allocations maintained for GW post pit filling.									-	-	-	-
	Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item	negaritati ogginitati of ott unocations in accordance that particle requirements.									-	-	-	-
<u>Design Control</u>	Ensure that fundamental design parameters involving other water elements are robust enough to cope with variability/ changes.												
Activity	Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
Pricing Item										-	-		-
	SUB-TOTAL (GROUNDWATER)									-	13,874,564	3,510,000	17,384,564
RISK ISSUE	SURFACEWATER												
	Mobilisation, demobilisation, site establishment									-	1,067,087	-	1,067,087
<u>Design Control</u>	Maintenance of good water quality in the pit lake for discharge.												
Activity	Water treatment		Assumed GW system sufficient										
Pricing Item Design Control	Maletaness of and orders unter multi-lie the late for lands on		Assumed GW system sufficient							-	-	-	-
Activity	Maintenance of good surface water quality in the lake for landuses_ Installation of water treatment plant.		Assumed GW system sufficient										
Pricing Item	installation of race a catherin plant.		yourned over system surrount										
Design Control	Design of surface water management facilities around the pit which drain away from pit.												
Activity	Construction of horizontal drains and collection system with pumping.		Assume GW provisions sufficient										
Pricing Item													
Activity	Bunding for SW.		Assume levee sufficient										
Pricing Item													
Design Control_	Bunding around pit and running pit with freeboard.												
Activity	Bunding		Assume levee sufficient										
Pricing Item													
<u>Design Control</u>	Management of excess water between available storage areas i.e. other pits.												
Activity	Establishment and maintain existing distribution system between the pits.												
	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Expit. Assumes additional to GW infrastructure Expit. Assumes additional to GW infrastructure	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	1,170,000	1,000,000 1,170,000
	Appropriate allocations maintained for SW during pit filling.												
	Regional regulation of SW allocations in accordance with pit lake requirements.												
Pricing Item	A CHARLES OF THE CONTRACT OF T												-
	Appropriate allocations maintained for SW post pit filling. Peningal regulation of SW allocations in accordance with pit lake requirements.												
Activity Pricing Item	Regional regulation of SW allocations in accordance with pit lake requirements.												
<u>Design Control</u>	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)												
Pricing Item										-			

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	- P P				Quantities					Costs			
ltem	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									968,884 - - - 30,590,326	34,914,831 13,874,564 22,408,827 4,791,594 11,813,993	3,510,000 3,510,000 1,170,000 - 3,521,130	39,393,715 17,384,564 23,578,827 4,791,594 45,925,449
	riie rūsk									30,370,320	11,013,773	3,321,130	45,925,449
Design Control	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.												
Activity	Reshaping and establishment of drainage, in the buffer zone and lease area.												
Pricing Item	Reshaping - Pit edge Recontouring	Medium Term Medium Term		246 246		246 246		ha ha	3,200.00 1,790.00	- -	787,200 440,340	- -	787,200 440,340
Design Control_	Import material for reshaping												
Activity	Additional overburden sourcing							_					
Pricing Item	Long haul cut to fill SUB-TOTAL (SURFACEWATER	Medium Term	Assume nominal 0.2m depth at pit edge	492,000		492,000		m3	38.85	-	19,114,200 22,408,827	1,170,000	19,114,200 23,578,827
RISK ISSUE	BIODIVERSITY	91									22,400,027	1,170,000	23,310,021
	Mobilisation, demobilisation, site establishment										228,171		228,171
Design Control_	Revegetation planning commensurate with final landuse and stability/ GW requirements.												
Activity	Revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Medium Term Medium Term	Assume 150m buffer area only Assume 150m buffer area only	246 246		246 246		ha ha	12,215.00 6,315.00	- -	3,004,890 1,553,490	-	3,004,890 1,553,490
Design Control	Consider using natural soil improvement agents to improve the soil microbial condition and nutrient load												
Activity	Soil treatment												
Pricing Item	Addition of Fertiliser (material only)	Medium Term	Assume pit edge requires only	246		246		ha	20.50	-	5,043	-	5,043
	SUB-TOTAL (BIODIVERSITY)								-	4,791,594	-	4,791,594
RISK ISSUE	FIRE RISK												
	Mobilisation, demobilisation, site establishment									1,456,682	562,571	56,244	2,075,498
Design Control	Coal face must be covered or capped to prevent exposure												
Activity	Overburden placement		Assumed 2m clay layer sufficient to mitigate fire risk										
Pricing Item										-	-	-	
Activity	Those below final water table should be stabilised and covered for duration of pit filling.		Assumed butressing stability control sufficient										
Pricing Item	laura comported with law norm material to prevent coration (mantaneous combustion)										-	-	
Activity	Layer compacted with low perm material to prevent aeration (spontaneous combustion) Semi Permeable Cover Placement	Short Term	2m semi-permeable layer. Assumes available from pit edge. AWT batters										
	Compaction	Short Term	and BWT faces AWT and BWT slopes	7,656,674 383	7,656,674 383			m3 ha	3.00 16,100.00	22,970,022 6,163,623	-	-	22,970,022 6,163,623
Design Control	Programmed maintenance of the cover/ capping, including: monitoring, top up of the cover.												
Activity	Cover maintenance												
Pricing Item	Long Haul cut to fill	Long Term	Assume 0.5% cover requires maintenance per year. Based on total AWT semi-perm layer	28,836			28,836	m3	38.85	_	_	1,120,272	1,120,272
	Reshaping - Pit wall	Long Term	Assume 0.5% walls exposed require maintenance Based on AWT portion of semi-perm layer	1.44			1.44		3,200.00	-	-	4,614	4,614
Design Control_	Use of shallow rooted species for vegetation to prevent breach of the cover.												
Activity	Lake edge revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Short Term Short Term	Assumes AWT slopes only Assumes AWT slopes only	288 288		288 288		ha ha	12,215.00 6,315.00	- -	3,522,296 1,820,982		3,522,296 1,820,982
Design Control_	Erosion prevention to avoid cover breach_												
Activity	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.												
Pricing Item	Slope battering		Assumed part of operations for stability control										
1	Rip-Rap	Medium Term	Assume around pit perimiter, to 0.5m thickness to 10m depth.	139,633		139,633		m3	31.70	-	4,426,364	-	4,426,364

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Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									968,884 - - - 30,590,326	34,914,831 13,874,564 22,408,827 4,791,594 11,813,993	3,510,000 3,510,000 1,170,000 - 3,521,130	39,393,715 17,384,564 23,578,827 4,791,594 45,925,449
Design Control_	Consideration of alternate fire control measures , possibly spraying exposed coal surfaces with fire												
	retardant materials or chemicals.												
Activity	Fire retardant spraying		Assumed other fire risk controls sufficient										
Activity	Buffer zone establishment		Assume captured by fencing control for GW										
Pricing Item										-	-	-	-
Design Control_	Include (and maintain) fire breaks in revegetation design												
Activity	Fire breaks												
Pricing Item	Fire break	Medium Term	(150x10) per break. 173 breaks required.	26		26		ha	18,530.00	-	481,780	-	481,780
Design Control_	Cover with water (i.e. fill lake to maximum extent)												
Activity	Aquifer repressurisation												
Pricing Item	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00	-	-	1,170,000	1,170,000
Activity	Surface water injection												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term		1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	- -	1,000,000	1,170,000	1,000,000 1,170,000
Design Control	Fill pit faster with surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
Design Control_	Maintenance of water level using controlled surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
	SUB-TOTAL (FIRE RISK)								30,590,326	11,813,993	3,521,130	45,925,449



The content of the		- 				Quan	tities					Cos	ıts	
March Marc	Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
March Marc		Summary												
March Marc		Groundwater									4,095,281.22	13,874,563.50	3,510,000.00	42,520,117.65 17,384,563.50
Marie		Biodiversity									30.590.326.46	4,791,594.15	-	23,578,827.00 4,791,594.15 45,924,476.53
Marie													-,,	,
Mathematical Continues Mathematical Contin											105.012	1//2/11		1.857.625
Marie Mari											195,013	1,002,011		1,857,625
Region	<u>Design control</u>													
New 1	Activity	Overburden (mine waste material) placement.	Short Term	Assumed operational activity										
No.	Pricing Item										-	-	-	-
March Marc	Activity	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												
Month of the profession of t											-	-	-	-
Second				Assumed total BWT pit wall area. Assumed outside the scope of	04	04			ha	2 200 00	202 221 47	-	-	302,321.47
Second		Reshaping - Pit floor	Short Term									-	-	2,675,200.00
Page	Design Control	Controlled repressurisation of the aquifer to achieve weight balance												
Second Company of the Company of t	Activity	Sequential cessation of dewatering		Assumed operational activity										
Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Second Secon											-	-		
Section Sect														
Second S			C	A CAMPE LL L'E	200	200				0.000.00	000 744 04			000 744 04
Property		Slope Battering			288	288			ha	3,200.00	922,746.36	-	-	922,746.36
Market protection Mark		Use of buffer zone material to achieve shallower slopes on upper overburden and coal batters		Assumed covered by slope battering activities										
Acting the following fine design from all registers from fronting the design from all registers from fronting the design from all registers from fronting the design from fronting the following fine from the following the following from the f	Pricing Item										-	-	-	-
Product Prod														
Messagement and Messagement an					_									
Active More rejected from Section Householders and Management and Administration Lung from All required an efficient SW sources. Active More rejected from Section Householders Active Plant SW sources and SW sources		Management and Maintenance	Medium Term Long Term	All required as different SW sources.	1 30		1	30			-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Management and Anteriorence Long Teem Long Court [Fine Coard Interest Coard Interest Management and Management														
Prioring from: Accounting feed price for instruction Accounting feed price feed		Management and Maintenance		All required as different SW sources.	1 30		1	30			-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Management Maintenance Long Tomin Cartering Confessor State (See State 1987) Listing Confessor State (See State														
Schreiding selected batters to maintain sale and stable bardorm. Assumed operational activity Pricing Item Pric	-	Management and Maintenance		All required as different SW sources.	1 30		1	30			-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Design Control Pressure relief wells Pricing Item Pressure relief wells Pricing Item Pressure relief well installation Pressure relief wells Pricing Item Pressure relief wells Pressure relief well installation Pressure relief wells Pressure relief well installation Pressure relief wells Pressure relief wells Pressure relief wells Pressure relief wells installation Pressu				Assumed operational activity										
Activity Pressure relief well installation Medium Term Assuming to 100m depth of horizontal drilling. At 100m intervals. Across pit face- horizontally (not to depth) near surface, 1e source additional overburdem, interseam and 68 materials off site from other mite sites Activity Additional overburdem sourcing Activity Additional overburdem sourcing Pricing Item Design control. Design of drainage diversion and control on above water level batters Activity Construction of levees and Drainage diversion to specific ARI. Medium Term Assumes fin wide, 2m deep, Length 1.5 x perimeter of pit crest with 30m set back 247,875 Activity Drainage diversion Medium Term Assume 5m wide, 2m deep, Length 1.5 x perimeter of pit crest with 30m set back with 30m set back with 30m set back 247,875 Activity 247,875 Activity Drainage diversion and control on above water level batters Activity Drainage diversion to specific ARI.	Pricing Item										-	-	-	-
Pricting Item Pressure relief well installation Medium Term Assuming to 100m depth of horizontal drilling, At 100m intervals. Across pit face, horizontally (not to depth) near surface, i.e around perimter. 164 bores required. 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16,400 16	Design Control	Installation of pressure relief wells / horizontal drains in high risk areas of pit cut back												
Across pit face- horizontally (not to depth) near surface, i.e around perimter. 164 bores required. 16,400 16,400 m 35.00 . 574,000.00	Activity	Pressure relief wells												
Besign Control Source additional overburden, interseam and fill materials off site from other mite sites Activity Additional overburden sourcing Assumed operational activity Pricing Item Design of drainage diversion and control on above water level batters Activity Construction of levees and Drainage diversion to specific ARI. Pricing Item Drainage diversion Medium Term Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set bask. With 20m set bask	Pricing Item	Pressure relief well installation	Medium Term	Across pit face- horizontally (not to depth) near surface, i.e										
Activity Additional overburden sourcing Assumed operational activity Design Control Design of drainage diversion and control on above water level batters Activity Construction of levees and Drainage diversion to specific ARI. Pricing Item Drainage diversion Levee construction Medium Term M	Decian Control	Source additional quarkurden interseem and fill materials off site from other mits sites		around perimter. 164 bores required.	16,400		16,400		m	35.00	-	574,000.00		574,000.00
Pricing Item Design Control Design of drainage diversion and control on above water level batters Activity Construction of levees and Drainage diversion to specific ARI. Pricing Item Drainage diversion Medium Term Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set back. With 20m set back Levee construction Medium Term Levee 5m high. At 1 setback of 150m from pit. 5m height at top,				Assumed operational activity										
Activity Construction of levees and Drainage diversion to specific ARI. Pricing Item Drainage diversion Medium Term Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set back. With 20m set back. Wit	-										-			
Pricing Item Drainage diversion Medium Term Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set back. With 20m set back 247,875 m3 6.44 - 1,596,315.00 - Levee construction Medium Term Levee 5m high. At setback of 150m from pit. 5m height at top,	Design Control	Design of drainage diversion and control on above water level batters												
with a 20m set back. With 20m set back 247,875 247,875 m3 6.44 - 1,596,315.00 - Levee construction Medium Term Levee 5m high. At setback of 150m from pit. 5m height at top,	Activity	Construction of levees and Drainage diversion to specific ARI.												
Levee construction Medium Term Levee 5m high. At setback of 150m from pit. 5m height at top,			Medium Term	with a 20m set back. With 20m set back	247,875		247,875		m3	6.44	-	1,596,315.00	-	1,596,315.00
				Levee 5m high. At setback of 150m from pit. 5m height at top, 25m at base.	1,300,575		1,300,575		m3	17.29	-	22,486,941.75	-	22,486,941.75
Compaction Medium Term Compaction of pit edge only. Slope Battering Medium Term Battering of levee only. Height 5m. To 20 degrees from angle				Battering of levee only. Height 5m. To 20 degrees from angle							-			3,960,600.00
repose. 76,300 76,300 m3 1.06 - 80,878.42 Ripping and Seeding Medium Term Pit edge only. 246 246 ha 6,315.00 - 1,553,490.00 -		Ripping and Seeding	Medium Term								-		-	80,878.42 1,553,490.00
Design Control Infiltration control.	Design Control	Infiltration control.												
Activity Low perm materials placed on uppermost surface batters to avoid water entering. Assumed Fire Risk controls sufficient	Activity	Low perm materials placed on uppermost surface batters to avoid water entering.		Assumed Fire Risk controls sufficient										



	• •				Quar	ntities					Cos	ts	
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater									4,095,281.22	34,914,836.43 13,874,563.50	3,510,000.00 3,510,000.00	42,520,117.65 17,384,563.50
	Surfacewater Biodiversity									-	22,408,827.00 4,791,594.15	1,170,000.00	23,578,827.00 4,791,594.15
	Fire Risk									30,590,326.46	11,813,020.31	3,522,716.95	45,924,476.53
Pricing Item													
RISK ISSUE	SUB-TOTAL (LANDFORM STABILITY) GROUNDWATER									4,095,281	34,914,836.43	3,510,000.00	42,520,117.65
	Mobilisation, demobilisation, site establishment										660,694		660,694
Design Control	Diversion of the shallow GW or SW prior to entering the pit, and treatment of it.												
Activity	Construction of horizontal drains and collection system with pumping.												
	Pumps and pipework installation Pressure relief well installation	Medium Term Medium Term	Assume Landform Stability control sufficient Inpit	1		1		Fixed Cost: Item	1,000,000.00	-	- 1,000,000.00	-	1,000,000.00
	Management and Maintenance	Long Term	•	30			30	Fixed cost p/yr	39,000.00	-	-	1,170,000.00	1,170,000.00
	Bunding for SW.		Assume levee sufficient										
Pricing Item	Treatment of water either prior to entering pit, or acidic water.										-	-	-
	Water treatment to required standard for either offsite discharge or onsite retention.												
	Water treatment to required standard for either offsite discharge of offsite retention.	Medium Term	Assumes upgrade of existing infrastructure sufficient to cover SW										
	Management and Maintenance	Long Term	and GW	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	10,000,000.00 39,000.00	-	10,000,000.00	1,170,000.00	10,000,000.00 1,170,000.00
Design Control	Maintain appropriate salinity for end landuse.												
Activity	Install and maintain pumping system to control salinity.												
	Pumps and pipework installation Management and Maintenance	Medium Term Long Term	Expit	1		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00	- 1,170,000.00	1,000,000.00 1,170,000.00
	Treatment of the pit lake water or_restore and maintain appropriate WQ	Long rom		30				r incu cost pryr	67,000.00			1,170,000.00	1,170,000.00
	Installation of water treatment plant.												
	Water treatment system Management and Maintenance	Medium Term Long Term	Assume above WTS sufficient to address this control										
Design Control	Regulate and limit landuse adjacent to the pit, i.e. nothing that may introduce critical contaminants.												
Activity	Buffer zone establishment												
Pricing Item	Fencing	Medium Term	150m setback	17,341		17,341		m	70.00	-	1,213,870.00	-	1,213,870.00
Design Control	Appropriate allocations maintained for GW during pit filling.												
	Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item	Appropriate allocations maintained for CW past pit filling									•	-	-	•
	Appropriate allocations maintained for GW post pit filling. Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item	negonal regulation of 644 allocations in accordance with president requirements.										-		
Design Control	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)												
Pricing Item	base initial designs on climate drange prediction data (allow for lattice ppt and evap demand)												
	SUB-TOTAL (GROUNDWATER)										13,874,563.50	3,510,000.00	17,384,563.50
	SURFACEWATER												
	Mobilisation, demobilisation, site establishment										1,067,087		1,067,087
	Maintenance of good water quality in the pit lake for discharge Water treatment		Assume GW provisions sufficient										
Activity Pricing Item			CAT PROTISIONS SURROUNE								_		
	Maintenance of good surface water quality in the lake for landuses.												
Activity	Installation of water treatment plant.												
Pricing Item													
Design Control	Design of surface water management facilities around the pit which drain away from pit.												
Activity	Construction of horizontal drains and collection system with pumping.		Assume GW provisions sufficient										
Pricing Item										-	-	-	-
Activity	Bunding for SW.		Assume levee sufficient										
Pricing Item										-	-	-	-
Design Control	Bunding around pit and running pit with freeboard.												



	• •				Quan	tities					Co	sts	
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater									4,095,281.22	34,914,836.43 13,874,563.50	3,510,000.00 3,510,000.00	42,520,117.65 17,384,563.50
	Surfacewater Biodiversity									-	22,408,827.00 4,791,594.15	1,170,000.00	23,578,827.00 4,791,594.15
	Fire Risk									30,590,326.46	11,813,020.31	3,522,716.95	45,924,476.53
Activity	Dundina		Assume levee sufficient										
Activity Pricing Item	Bunding	Medium Term	Assume levee sufficient										
	Management of excess water between available storage areas i.e. other pits.	I I I I I I I I I I I I I I I I I I I											
	Establishment and maintain existing distribution system between the pits.												
	Pumps and Pipework Installation	Medium Term	Expit	1		1		Fixed Cost: Item	1,000,000.00	-	1,000,000.00	-	1,000,000.00
	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00	•	-	1,170,000.00	1,170,000.00
	Appropriate allocations maintained for SW during pit filling Regional regulation of SW allocations in accordance with pit lake requirements.												
Pricing Item	ледиона и единатили от эту апосватиль ян ассотивное with pix take requirements.										_		
	Appropriate allocations maintained for SW post pit filling.												
	Regional regulation of SW allocations in accordance with pit lake requirements.												
Pricing Item											-		
	Ensure that fundamental design parameters involving other water elements are robust enough to cope with												
	<u>variability/ changes.</u> Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
Pricing Item													_
	Minimise the area that is lost to the surrounding catchments, i.e. external areas surrounding pit reshaped												
Activity	rehabbed, to minimise lake catchment. Create a controlled system. Reshaping and establishment of drainage, in the buffer zone and lease area.												
	Reshaping - pit edge	Medium Term		246		246		ha	3,200.00		787,200.00		787,200.00
	Recountouring	Medium Term		246		246		ha	1,790.00	-	440,340.00	-	440,340.00
	Import material for reshaping												
	Additional overburden sourcing												
Pricing Item	Long haul cut to fill SUB-TOTAL (SURFACEWATER)	Medium Term	Assume nominal 0.2m depth at pit edge	492,000		492,000		m3	38.85	-	19,114,200.00 22,408,827.00	1,170,000.00	19,114,200.00 23,578,827.00
DICK ICCLIE										-	22,408,827.00	1,170,000.00	23,578,827.00
	BIODIVERSITY Mobilisation, demobilisation, site establishment										228,171		228,171
	Revegetation planning commensurate with final landuse and stability/ GW requirements.										220,171		220,171
	Revegetation												
	Topsoiling	Medium Term	Assume pit edge requires only	246		246		ha	12,215.00	-	3,004,890.00	-	3,004,890.00
		Medium Term	Assume pit edge requires only	246		246		ha	6,315.00	-	1,553,490.00	-	1,553,490.00
	Consider using natural soil improvement agents to improve the soil microbial condition and nutrient load												
	Soil treatment Addition of fertiliser (material only)	Medium Term	Assume pit edge requires only	246		246		ha	20.50		5,043.00		5,043.00
. nong itom	SUB-TOTAL (BIODIVERSITY)			240		240		.10	20.30		4,791,594.15	-	4,791,594.15
RISK ISSUE	FIRE RISK												
	Mobilisation, demobilisation, site establishment									1,456,682	562,525	56,320	2,075,451
Design Control	Coal face must be covered or capped to prevent exposure												
Activity	Overburden placement		Assumed 2m clay layer sufficient to mitigate fire risk										
Pricing Item													
Activity	Those below final water table should be stabilised and covered for duration of pit filling.		Assumed butressing stability control sufficient										
Pricing Item													
	Layer compacted with low perm material to prevent aeration (spontaneous combustion)												
		Short Term	2m semi-permeable layer. Assumes available from pit edge. AWT										
	Compaction	Short Term	batters and BWT faces AWT and BWT slopes	7,656,674 383	7,656,674 383			m3 ha	3.00 16,100.00	22,970,021.74 6,163,622.50	-	-	22,970,021.74 6,163,622.50
Design Control	Programmed maintenance of the cover/ capping, including: monitoring, top up of the cover.												
Activity	Cover maintenance												
Pricing Item	Long Haul cut to fill	Long Term	Assume 0.5% cover requires maintenance per year. Based on total AWT semi-perm layer	28,836			28,836	i m3	38.85	-	-	1,120,271.75	1,120,271.75



					Quar	ntities				Costs		sts	
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									4,095,281.22 - - - 30,590,326.46	34,914,836.43 13,874,563.50 22,408,827.00 4,791,594.15 11,813,020.31	3,510,000.00 3,510,000.00 1,170,000.00 - 3,522,716.95	42,520,117.65 17,384,563.50 23,578,827.00 4,791,594.15 45,924,476.53
	Reshaping - Pit wall	Long Term	Assume 0.5% walls exposed require maintenance Based on AWT portion of semi-perm layer	1.44			1.91	ha	3,200.00	-	-	6,125.34	4,613.73
Design Control	Use of shallow rooted species for vegetation to prevent breach of the cover.												
Activity	Lake edge revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Medium Term Medium Term	Assumes AWT slopes only Assumes AWT slopes only	288 288		288 288		ha ha	12,215.00 6,315.00	- -	3,522,295.87 1,820,982.27	-	3,522,295.87 1,820,982.27
Design Control	Erosion prevention to avoid cover breach.												
Activity	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.												
Pricing Item	Slope battering Rip-rap	Short Term Medium Term	Assumed part of operations for stability control Assume pit edge only. Assume around pit perimiter, to 0.5m thickness and 20m depth i.e to where water table lies.	139,633		139,633		m3	31.70	-	4,426,363.89		4,426,363.89
Design Control	Consideration of alternate fire control measures , possibly spraying exposed coal surfaces with fire retardant materials or chemicals.												
Activity	Fire retardant spraying		Assumed other fire risk controls sufficient										
Design Control	Control activities e.g. vehicle use in areas where there are coal seams or _public access to rehabbed (high risk)_areas												
Activity	Buffer zone establishment		Assume captured by fencing control for GW										
Pricing Item										-	-	-	-
Design Control	Include (and maintain) fire breaks in revegetation design												
Activity	Fire breaks												
Pricing Item	Fire break	Medium Term	(150x10) per break. 173 breaks required.	26		26		ha	18,530.00	-	480,853.50	-	480,853.50
Design Control	Cover with water (i.e. fill lake to maximum extent)												
Activity	Aquifer repressurisation												
Pricing Item	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00	-	-	1,170,000.00	1,170,000.00
Activity	Surface water injection												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term		1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Design Control	Fill pit faster with surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
Design Control	Maintenance of water level using controlled surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
	SUB-TOTAL (FIRE RISK)								30,590,326	11,813,020.31	3,522,716.95	45,924,476.53

Appendix E7 – Loy Yang Cost Estimate Rehabilitation Measures



Ref	Measure	Description	Unit Rate	UoM	Notes	Assumptions
	Bunding	Bunding constructed around perimeter of mine pit to 2 m height and 5m wide at based (top of bund 2 m	56.38		Loy Yang- bunding already in place around majority	Overarching: Clay composition (i.e SG 1.8) uniform across all
•		wide), bund setback 100 m. Specific gravity 1.8 assumed (1.55 if bulked) Max distance from stockpile 2	25.00	1	of boundary, 2km alongside creek already exists.	sites.
		km			or boundary, Earn alongoldo orook arroady oxioto.	Overarching: External contractors will be utilised for rehab/
						earthworks.
24	Material placement - Inpit (Bucket wheel activity to stockpile only).	Utilising existing bucket wheel, material spread but not contoured or reshaped.	2.50	m3		2A, 2B occur together as do 9A and 9B
	Material placement - Inpit (Bucket wheel activity to stockpile only). Material placement - Inpit (Inpit haulage only)	Specific gravity of 1.8. In-pit haulage from stockpile, then truck and shovel, assumed to n.e 5km each	5.97: 5.89	m3	Rate quantity dependant	2A, 2B occur together as do 9A and 9B
					Rate quantity dependant	ZA, ZB occur together as do 9A and 9B
3	Pit Backfill - Expit and Inpit haulage (onsite)	Material spread but not contoured or reshaped. Specific gravity of 1.8. Ex-pit haulage assumed to n.e 5	6.23; 6.31;	m3		
		km each way, 0% gradient out of pit, 5km in pit haulage with 5% gradient.	6.64			
4	Internal dump removal	In-pit haulage of overburden dump to buttress batters. Specific gravity of 1.8. In-pit haulage assumed to	4.03	m3		
		n.e. 2km each way.				
	Reshaping - Pit edge	Earthworks reshaping utilizing dozer. Likely angle 180 degrees.	3,199.38			
6	Reshaping - Pit wall	Earthworks reshaping utilizing dozer. Likely angle 37 degrees to 20 degree design slope. Average bench	1.06	m3		
		height 18m. Material pushed down gradient.				
	Reshaping - Pit floor	Earthworks reshaping utilizing dozer. Likely angle 180 degrees (i.e flat)	3,199.38			
8	Ripping and Seeding	All rehabilitated areas will be deep ripped along contour (1m depth at 1m spacing) and seeded at a rate	6,314.98	ha		
		of 10 kg/ha (\$5,000/Ha for seed).				
9A	Long Haul Cut to Fill	Winning of material from stockpile, with haulage distance n.e 25 km each way on public roads. Average	12.92	m3		Loy Yang - no road, triples to be utilised during haulage. 2A, 2B
		specific gravity of 1.8 assumed.				occur together as do 9A and 9B
QR.	Pit Backfill - Expit and Inpit haulage (onsite)	Material spread but not contoured or reshaped. Specific gravity of 1.8. Ex-pit haulage assumed to n.e 5	6.23; 6.31;	m3	Rate quantity dependant	2A, 2B occur together as do 9A and 9B
35	Tit Backiiii - Expit and inpit nadiage (onsite)	km each way, 0% gradient out of pit, 5km in pit haulage with 5% gradient.	6.64		riate quantity deportunit	Eri, 25 cocar together as as or and ob
11	Topsoiling	Winning of material from stockpile, with haulage distance n.e 10km each way. Topsoil spread to a depth	12,215.82	ha		Sufficient topsoil quantities are available.
11	ropsolling		12,215.02	na		Sunicient topson quantities are available.
	AL B.:	of 200 mm . Specific gravity of 1.0 assumed. To design slope (20 degrees) from angle of repose (37 degrees). Average bench height of 18 m assumed.	4.00	m3	Described as a literature from 40 04m in height	
12	Slope Battering		1.06	m3	Benches on site range from 12-24m in height.	
		Material pushed down gradient. Specific gravity of 1.8 assumed. Slope battering of exposed coal face			Median taken. GHD report suggests, covering a 50m	1
		only.			deep batter of exposed coal with 2m cover, would	
					required approx. 320,000 m3/km of batter length.	
13	Management and Maintenance	Management and maintenance of infrastructure (includes servicing, monitoring?). Assume a fixed cost	39,000.00	p/yr		Allowance of one person 30% of the year
		p/yr.				
14	Pumps and Pipework Installation	Relocation of pump to a level above final water level and relocation of exisiting pump station and	1,000,000.00	Item		Fixed Cost
		pipework.				
15	Buttressing	Clay material placed against a section of the pit wall to prevent continued movement or propagation of	15.40	m3		
	Dutticaanig	wall failure. Specific gravity of 1.8. In-pit haulage assumed to n.e 5km each way.	10.10			
16	Pressure relief well installation	Installation of horizontals wells into pit wall to length of 100m, at intervals of 100m. 6m of PVC pushed in	35.00	m	Approx. cost. \$2,000 for drill set-up. \$35 p/m of	
	1 1633th 6 16h61 Well Installation	to protect outlet.	33.00		drilling.	
		to protect outlet.				
47	Drainage diversion	Installation of permanent drainage diversions. Assume excavation of a 5m wide, 2m deep. Length 1.5 x	6.44	m3	French drain system an option.	
17	Drainage diversion	perimeter of pit crest with a 20m set back channel. Material placed down slope side, and compacted/	0.44	1113		
		smoothed out.	17.29	0		
18	Levee construction	Winning of material from borrow pit, with haulage distance n.e. 10km each way and placement.	17.29	m3		
	w. =	Construction of levee 5m high, 25m at base 5m at top, 150m setback from pit.	40.000.000.00	lt		Full the second
19	Water Treatment System	Existing water treatment station upgraded/ modified to cope with discharge of treated water in to creeks	10,000,000.00	Item		Existing on site water treatment/ processing plants can be utilised.
L		and pit.				
20	Fencing	Construction of 2m high security fence around perimeter of an open void. Fence setback of a minimum of	70.00	m	Minor fencing likely to be required.	Sufficient fencing already in place around current mining leases for
		150m from earthworks.				all sites.
21	Recontouring	Recontouring of areas, outside of pit, <1m above natural relief to remove impediments to run-off and	1,791.82	ha		
		maximise drainage.				
22	Fertilising (Material cost only)	Application of fertiliser or gypsum over selected areas following seeding. To be undertaken concurrently	20.50	ha		
		with seeding, however purchase of specific quantities of fertiliser will need to be accounted for. Material		1		
		cost only 50kg/Ha @ \$410/t				
24	Compaction	Ground surface treatment. Moisture condition and compact existing surface	16,100.00	ha		
	Fire break	Mown fuel break, i.e grasslands. Spreading of topsoil and use of grass seed applied at 10kg/ha	18,530.00		Incorporation of wet zone may need to be considered	Mowing of fuel break not required, sheep/farming will maintain
		(\$5,000/Ha seed). Fire breaks 10 m wide every 100 m of rehabbed/revegetated land in mining lease/		1		grass length.
		buffer zone. Haul topsoil 10km each way, rip and seed 90% of area (fire break 100 x 10 in 100 x 100m		1		3
		area)		1		
		aica)		1		
26	Rip-Rap	Crushed concrete materials (availble free issue) utilised for armouring of pit lake edge. Ex-pit Haulage	31.70	m3	Sourced from road making materials.	
		assumed to n.e 5 km each way. (0.5m thick rip rap)				
27	Semi Permeable Cover Placement	Excavation and pushing of available semi-permeable material from pit edge down pit wall to 2m depth,		m3	Nominal provision, factored from slope battering rate	
		for entire pit depth	3.00	1		

			_		Quanti	ties					Cos		
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									417,637 - - - 43,052,176	29,752,531 13,676,040 10,676,348 4,109,863 13,307,200	3,510,000 3,510,000 1,170,000 - 3,183,883	33,680,169 17,186,040 11,846,348 4,109,863 59,543,259
RISK ISSUE	LANDFORM STABILITY (COLLAPSE)												
	Mobilisation, demobilisation, site establishment									19,887	1,416,787		1,436,675
<u>Design Control</u>	Placement of overburden (mine waste material), interseam materials and fill over batters to contribute to weight balance.												
Activity	Overburden (mine waste material) placement.		Assumed operational activity										
Pricing Item											-	÷	
Activity	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.		Assumed operational activity										
Pricing Item											-	-	-
Design Control	Controlled repressurisation of the aquifer to achieve weight balance												
Activity Pricing Item	Sequential cessation of dewatering		Assumed operational activity							-	-	-	
<u>Design Control</u>	Design and construction of slopes to suitable gradient, i.e. 1.5 FoS for static and approx. 1.05 (dynamic or seismic case)												
Activity	Reshaping of selected batters for a safe and stable outcome.												
Pricing Item	Reshaping - Pit wall Slope battering	Short Term Short Term Short Term	Assumes whole area of AWT final sloped pit walls Assumed operational activity	124	124			ha	3,200.00	397,750	- -	- -	397,750
Design Control	Water management (water addition) to achieve weight balance.												
Activity	Surface water injection from flooding (i.e. diverting flood waters)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Required as all different sources of SW for injection	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	1,170,000	1,000,000 1,170,000
Activity	Surface water injection from water entitlement (i.e. neighbouring rivers, power station)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Required as all different sources of SW for injection	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	- 1,170,000	1,000,000 1,170,000
Activity	Water injection from dewatering.												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Required as all different sources of SW for injection	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	- 1,170,000	1,000,000 1,170,000
<u>Design Control</u>	Buttressing of selected high risk batters prior to pit filling.												
Activity	Buttressing selected batters to maintain safe and stable landform.		Assumed operational activity										
Pricing Item								m3	15.40	-	-	-	
<u>Design Control</u>	Installation of pressure relief wells / horizontal drains in high risk areas of pit cut back												
Activity	Pressure relief wells												
Pricing Item	Pressure relief well installation	Medium Term	Assuming to 100m depth of horizontal drilling. At 100m intervals. Across pit face- horizontally (not to depth) near surface, i.e around 4 x 2.5km pit. 130 bores required.	13,000		13,000		m	35.00	-	455,000	-	455,000
Design Control_	Source additional overburden, interseam and fill materials off site from other mite sites												
Activity	Additional overburden sourcing		Assumed operational activity										

					Quanti	ities					Cos	its	
ltem	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Blodiversity Fire Risk									417,637 - - - - 43,052,176	29,752,531 13,676,040 10,676,348 4,109,863 13,307,200	3,510,000 3,510,000 1,170,000 - 3,183,883	33,680,169 17,186,040 11,846,348 4,109,863 59,543,259
Pricing Item										-	-	-	-
Design Control_	Design of drainage diversion and control on above water level batters												
Activity	Construction of levees and Drainage diversion to specific ARI.												
Pricing Item	Drainage diversion Levee construction Compaction Slope Battering	Medium Term Medium Term Medium Term Medium Term	Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set back. With 20m set back from pit edge Levee 5m high. At setback of 150m from pit. 5m height at top, 25m at base. Compaction of pit edge Battering of levee only. Height 5m. To 20 degrees from angle repose.	206,720 1,084,500 211		206,720 1,084,500 211		m3 m3 ha	6.44 17.29 16,100.00	- - -	1,331,277 18,751,005 3,397,100	- -	1,331,277 18,751,005 3,397,100
	Ripping and Seeding	Medium Term	Pit edge only	65,002 211		65,002 211		m3 ha	1.06 6,314.98	-	68,902 1,332,461	-	68,902 1,332,461
Design Control	Infiltration control.	Wediam Term	in edge only	211		211		nu nu	0,314.70		1,002,401		1,332,401
	Low perm materials placed on uppermost surface batters to avoid water entering.		Assumed fire risk activities sufficient										
Activity Pricing Itom	cow perminaterials piaced on appennost surface batters to avoid water entering.		Assumed the risk activities sufficient										
Pricing Item	OUR TOTAL A HIPTORIANT	170								417,637	29,752,531	3,510,000	33,680,169
	SUB-TOTAL (LANDFORM STABIL	114)								417,037	29,/32,531	3,510,000	33,080,109
RISK ISSUE	GROUNDWATER												
	Mobilisation, demobilisation, site establishment									-	651,240	+	651,240
Design Control	Diversion of the shallow GW or SW prior to entering the pit, and treatment of it.												
Activity	Construction of horizontal drains and collection system with pumping. Bunding for SW.												
Pricing Item	Pressure relief well installation Pumps and Pipe Network Installation Management and Maintenance	Medium Term Medium Term Long Term	Assume Landform Stability control sufficient Inpit Inpit	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	- - -	1,000,000 - -	1,170,000 -	1,000,000 1,170,000
Design Control_	Treatment of water either prior to entering pit, or acidic water.												
Activity	Water treatment to required standard for either offsite discharge or onsite retention.												
Pricing Item	Water treatment system Management and Maintenance	Medium Term Long Term	Assumes upgrade of existing infrastructure sufficient to cover SW and GW	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	10,000,000.00 39,000.00	- -	10,000,000	- 1,170,000	10,000,000 1,170,000
Design Control_	Maintain appropriate salinity for end landuse.												
Activity	Install and maintain pumping system to control salinity.												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Expit	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00		1,000,000	- 1,170,000	1,000,000 1,170,000
Design Control	Treatment of the pit lake water or restore and maintain appropriate WQ												
Activity	Installation of water treatment plant.		Above design control WTS assumed sufficient.										
Pricing Item													
<u>Design Control</u>	Regulate and limit landuse adjacent to the pit, i.e. nothing that may introduce critical contaminan	ts.											
Activity	Buffer zone establishment												
Pricing Item	Fencing	Medium Term	150 m setback	14,640		14,640		m	70.00	-	1,024,800	-	1,024,800
nong item	renoing	Medium reffff	130 III 30 III 3	14,040		14,040	l	I ""	I /0.00		1,024,000	- 1	1,024,000

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Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary Landform Stability (Collapse)									417,637	29,752,531	3,510,000	33,680,169
	Groundwater Surfacewater									-	13,676,040 10,676,348	3,510,000 1,170,000	17,186,040 11,846,348
	Biodiversity Fire Risk									- 43,052,176	4,109,863 13,307,200	- 3,183,883	4,109,863 59,543,259
Design Control	Appropriate allocations maintained for GW during pit filling.												
Activity	Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item										-	-	-	-
Design Control	Appropriate allocations maintained for GW post pit filling.												
Activity Pricing Item	Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item Design Control	Ensure that fundamental design parameters involving other water elements are robust enough to												
	cope with variability/ changes.												
Activity	Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
Pricing Item	SUB-TOTAL (GROUNDWATER)										13,676,040	3,510,000	17,186,040
RISK ISSUE	SUB-TOTAL (GROUNDWATER) SURFACEWATER									-	13,070,040	3,310,000	17,100,040
NISN ISSUE	Mobilisation, demobilisation, site establishment										508,398		508,398
Design Control	Maintenance of good water quality in the pit lake for discharge.										300,370	_	300,370
Activity	Water treatment		Assumed GW system sufficient										
Pricing Item										-	-	-	-
Design Control_	Maintenance of good surface water quality in the lake for landuses.												
Activity	Installation of water treatment plant.		Assumed GW system sufficient										
Pricing Item													
Design Control_	Design of surface water management facilities around the pit which drain away from pit.												
Activity	Construction of horizontal drains and collection system with pumping.		Assume GW provisions sufficient										
Pricing Item													
Activity	Bunding for SW.		Assume levee sufficient										
Pricing Item													
Design Control	Bunding around pit and running pit with freeboard.												
Activity	Bunding		Assume levee sufficient										
Pricing Item													
<u>Design Control</u>	Management of excess water between available storage areas i.e. other pits.												
Activity	Establishment and maintain existing distribution system between the pits.												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	Expit. Assumes additional to GW infrastructure Expit. Assumes additional to GW infrastructure	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	- 1,170,000	1,000,000 1,170,000
<u>Design Control</u>	Appropriate allocations maintained for SW during pit filling.												
Activity	Regional regulation of SW allocations in accordance with pit lake requirements.												
Pricing Item										-	-	-	-
Design Control	Appropriate allocations maintained for SW post pit filling.												
Activity	Regional regulation of SW allocations in accordance with pit lake requirements.												
Pricing Item Design Control	Ensure that fundamental design parameters involving other water elements are robust enough to											-	
Design Control	cope with variability/ changes.												
Activity	Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
Pricing Item										-	-	-	

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Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									417,637 - - - - - 43,052,176	29,752,531 13,676,040 10,676,348 4,109,863 13,307,200	3,510,000 3,510,000 1,170,000 - 3,183,883	33,680,169 17,186,040 11,846,348 4,109,863 59,543,259
<u>Design Control</u>	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.												
Activity	Reshaping and establishment of drainage, in the buffer zone and lease area.												
Pricing Item	Reshaping - Pit edge Recontouring	Medium Term Medium Term		211 211		211 211		ha ha	3,200.00 1,790.00	- -	675,200 377,690		675,200 377,690
Design Control	Import material for reshaping												
Activity	Additional overburden sourcing												
Pricing Item		Medium Term Medium Term	Assume nominal 0.2m depth at pit edge Assume nominal 0.2m depth at pit edge	422,000 422,000		422,000 422,000		m3 m3	12.92 6.31	-	5,452,240 2,662,820		5,452,240 2,662,820
DIGIT IOOLIE	SUB-TOTAL (SURFACEWATER)									-	10,676,348	1,170,000	11,846,348
RISK ISSUE	BIODIVERSITY										105 700		105 700
Posign Control	Mobilisation, demobilisation, site establishment Revegetation planning commensurate with final landuse and stability/ GW requirements.										195,708	•	195,708
Design Control Activity	Revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Medium Term Medium Term	Assume 150m buffer area only Assume 150m buffer area only	211 211		211 211		ha ha	12,215.00 6,315.00	:	2,577,365 1,332,465		2,577,365 1,332,465
<u>Design Control</u>	Consider using natural soil improvement agents to improve the soil microbial condition and nutrient load												
Activity	Soil treatment												
Pricing Item	Addition of Fertiliser (material only)	Medium Term	Assume pit edge requires only	211		211		ha	20.50	-	4,326	-	4,326
	SUB-TOTAL (BIODIVERSITY)									-	4,109,863	-	4,109,863
RISK ISSUE	FIRE RISK												
	Mobilisation, demobilisation, site establishment									2,050,104	633,676	40,185	2,723,965
Design Control	Coal face must be covered or capped to prevent exposure												
Activity	Overburden placement		Assumed 2m clay layer sufficient to mitigate fire risk										
Pricing Item										-	-	-	
Activity	Those below final water table should be stabilised and covered for duration of pit filling.		Assumed butressing stability control sufficient										
Pricing Item											-	-	
Activity	Layer compacted with low perm material to prevent aeration (spontaneous combustion)												
		Short Term Short Term	2m semi-permeable layer. Assumes available from pit edge. AWT batters and BWT faces AWT and BWT slopes	10,775,840 539	10,775,840 539			m3 ha	3.00 16,100.00	32,327,521 8,674,551	-	-	32,327,521 8,674,551
Design Control	Programmed maintenance of the cover/ capping, including: monitoring, top up of the cover.												
Activity	Cover maintenance												
Pricing Item	Long Haul cut to fill	Long Term	Assume 0.5% cover requires maintenance per year. Based on total AWT					_					
	Material placement- expit	Long Term	semi-perm layer Assume 0.5% cover requires maintenance per year. Based on total AWT	41,450			41,450	m3	12.92	-	-	535,528	535,528
	Reshaping - Pit wall	Long Term	semi-perm layer Assume 0.5% walls exposed require maintenance Based on AWT portion of semi-perm layer	41,450			41,450	m3 ha	6.31 3,200.00	-	-	261,546 6,624	261,546 6,624
<u>Design Control</u>	Use of shallow rooted species for vegetation to prevent breach of the cover.												
Activity	Lake edge revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Medium Term Medium Term	Assumes AWT slopes only Assumes AWT slopes only	414 414		414 414		ha ha	12,215.00 6,315.00	- -	5,057,010 2,614,410	- -	5,057,010 2,614,410
Design Control	Erosion prevention to avoid cover breach.												
Activity	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.												

					Quanti	ties				Costs Short Term Medium Term Long Term			
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									417,637 - - - - 43,052,176	29,752,531 13,676,040 10,676,348 4,109,863 13,307,200	3,510,000 3,510,000 1,170,000 - 3,183,883	33,680,169 17,186,040 11,846,348 4,109,863 59,543,259
Pricing Item	Slope battering	Short Term	Assumed part of operations for stability control										
	Rip-Rap	Medium Term	Assume around pit perimiter, to 0.5m thickness to 10m depth.	113,389		113,389		m3	31.70	-	3,594,443	-	3,594,443
Design Control_	Consideration of alternate fire control measures , possibly spraying exposed coal surfaces with fire retardant materials or chemicals.												
Activity	Fire retardant spraying		Not required										
Design Control	Control activities e.g. vehicle use in areas where there are coal seams or public access to rehabbed (high risk) areas												
Activity	Buffer zone establishment		Assume captured by fencing control for GW										
Pricing Item										÷	-	-	-
Design Control_	Include (and maintain) fire breaks in revegetation design												
Activity	Fire breaks												
Pricing Item	Fire break	Medium Term	(150x10) per break. 146 breaks required.	22		22		ha	18,530.00	÷	407,660	-	407,660
<u>Design Control</u>	Cover with water (i.e. fill lake to maximum extent)												
Activity	Aquifer repressurisation												
Pricing Item	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00	-	-	1,170,000	1,170,000
Activity	Surface water injection												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term		1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000	- 1,170,000	1,000,000 1,170,000
<u>Design Control</u>	Fill pit faster with surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
<u>Design Control</u>	Maintenance of water level using controlled surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
	SUB-TOTAL (FIRE RIS	()								43,052,176	13,307,200	3,183,883	59,543,259

	• •	_			Quar	ntities					Co	sts	
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater									2,641,957.42	29,752,535.92 14,846,040.00 10,676,347.50	3,510,000.00 2,340,000.00 1,170,000.00	35,904,493.34 17,186,040.00 11,846,347.50
	Biodiversity Fire Risk									43,052,176.16	4,109,863.28 13,307,199.66	3,183,883.11	4,109,863.28 59,543,258.93
RISK ISSUE	LANDFORM STABILITY (COLLAPSE)									125 007	1 /1/ 707		1.542.505
Design Control	Mobilisation, demobilisation, site establishment Placement of overburden (mine waste material), interseam materials and fill over batters to contribute to weight.									125,807	1,416,787		1,542,595
<u>besign control</u>	balance.												
Activity	Overburden (mine waste material) placement.	Short Term	Assumed operational activity										
Pricing Item										-	-	-	-
Activity	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												
Pricing Item	Internal dump removal	Short Term	Assumed operational activity							-	-	-	-
	Reshaping - Pit edge Reshaping - Pit wall	Short Term Short Term	Addressed in surface water control measures Assumed total BWT pit wall area. Assumed outside the scope of							-	-	-	-
	Reshaping - Pit floor	Short Term	operations Assumed outside the scope of operations	124 248	124 248			ha ha	3,200.00 3,200.00	397,749.92 793,600.00	-	-	397,749.92 793,600.00
Design Control	Controlled repressurisation of the aquifer to achieve weight balance												
Activity	Sequential cessation of dewatering		Assumed operational activity										
Pricing Item										-	-		
Design Control	Design and construction of slopes to suitable gradient												
Activity	Reshaping of selected batters for a safe and stable outcome.												
Pricing Item	Reshaping - Pit wall Slope Battering	Short Term Short Term	Assumes whole area of AWT final sloped pit walls Assumed operational activity	414	414			ha	3,200.00	1,324,800.00	-	-	1,324,800.00
Activity	Use of buffer zone material to achieve shallower slopes on upper overburden and coal batters		Assumed covered by slope battering activities										
Pricing Item										-	-	-	-
Design Control	Water management (water addition) to achieve weight balance.												
Activity	Surface water injection from flooding (i.e. diverting flood waters)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	All required as different SW sources.	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Activity	Surface water injection from water entitlement (i.e. neighbouring rivers, power station)												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term	All required as different SW sources.	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
	Water injection from dewatering. Pumps and Pipe Network Installation	Medium Term	All required as different SW sources.					Fixed Cost: Item	1,000,000.00		1,000,000.00		1,000,000.00
Pricing Item Design Control	Management and Maintenance Buttressing of selected high risk batters prior to pit filling.	Long Term	All required as different SW sources.	30		'	30	Fixed cost p/yr	39,000.00	-	1,000,000.00	1,170,000.00	1,170,000.00
Activity	Buttressing selected batters to maintain safe and stable landform.		Assumed operational activity										
Pricing Item										-	-	-	-
Design Control	Installation of pressure relief wells / horizontal drains in high risk areas of pit cut back												
Activity	Pressure relief wells												
Pricing Item	Pressure relief well installation	Medium Term	Assuming to 100m depth of horizontal drilling. At 100m intervals. Across pit face- horizontally (not to depth) near surface, i.e around 4 x 2.5km pit. 130 bores required.	13,000		13,000		m	35.00	-	455,000.00	-	455,000.00
Design Control	Source additional overburden, interseam and fill materials off site from other mite sites												
Activity	Additional overburden sourcing		Assumed operational activity										
Pricing Item										-	-	-	-
Design Control	Design of drainage diversion and control on above water level batters												
Activity	Construction of levees and Drainage diversion to specific ARI.												
Pricing Item	Drainage diversion	Medium Term	Assume 5m wide, 2m deep. Length 1.5 x perimeter of pit crest with a 20m set back. With 20m set back	206,720		206,720		m3	6.44		1,331,276.80	_	1,331,276.80
	Levee construction	Medium Term	Levee 5m high. At setback of 150m from pit. 5m height at top, 25m at base.	1,084,500		1,084,500		m3	17.29		18,751,005.00	-	18,751,005.00
	Compaction Slope Battering	Medium Term Medium Term	Compaction of pit edge only. Battering of levee only. Height 5m. To 20 degrees from angle	211		211		ha	16,100.00		3,397,100.00	-	3,397,100.00
	Ripping and Seeding	Medium Term	repose. Pit edge only.	65,002 211		65,002 211		m3 ha	1.06 6,315.00	-	68,901.70 1,332,465.00	-	68,901.70 1,332,465.00
Design Control	Infiltration control.												
Activity	Low perm materials placed on uppermost surface batters to avoid water entering.		Assumed Fire Risk controls sufficient										
								1					

	• •	-			Quar	ntities					Co	sts	
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse)									2,641,957.42	29,752,535.92	3,510,000.00	35,904,493.34
	Groundwater Surfacewater Biodiversity									-	14,846,040.00 10,676,347.50 4,109,863.28	2,340,000.00 1,170,000.00	17,186,040.00 11,846,347.50 4,109,863.28
	Fire Risk									43,052,176.16		3,183,883.11	59,543,258.93
Pricing Item													
	SUB-TOTAL (LANDFORM STABILITY)									2,641,957	29,752,535.92	3,510,000.00	35,904,493.34
	GROUNDWATER Mobilisation, demobilisation, site establishment										651,240		651,240
	Diversion of the shallow GW or SW prior to entering the pit, and treatment of it.										361,210		361,210
	Construction of horizontal drains and collection system with pumping.												
Pricing Item	Pumps and pipework installation	Medium Term	Assume Landform Stability control sufficient							-	-	-	
	Pressure relief well installation Management and Maintenance	Medium Term Long Term	Inpit	1 30		1 30		Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00 1,170,000.00	-	1,000,000.00 1,170,000.00
Activity	Bunding for SW.		Assume levee sufficient										
Pricing Item											-	-	-
	Treatment of water either prior to entering pit, or acidic water.												
	Water treatment to required standard for either offsite discharge or onsite retention.												
	Water treatment system	Medium Term	Assumes upgrade of existing infrastructure sufficient to cover SW and GW	1		1		Fixed Cost: Item	10,000,000.00	-	10,000,000.00	-	10,000,000.00
	Management and Maintenance	Long Term		30			30	D Fixed cost p/yr	39,000.00			1,170,000.00	1,170,000.00
_	Maintain appropriate salinity for end landuse. Install and maintain pumping system to control salinity.												
	Pumps and pipework installation	Medium Term	Expit	1		1		Fixed Cost: Item	1,000,000.00		1,000,000.00	-	1,000,000.00
	Management and Maintenance Treatment of the pit lake water or restore and maintain appropriate WQ	Long Term		30			30	D Fixed cost p/yr	39,000.00		-	1,170,000.00	1,170,000.00
	Installation of water treatment plant.		Assume above WTS sufficient to address this control										
Pricing Item													
Design Control	Regulate and limit landuse adjacent to the pit, i.e. nothing that may introduce critical contaminants.												
Activity	Buffer zone establishment												
Pricing Item	Fencing	Medium Term	150m setback	14,640		14,640		m	70.00	-	1,024,800.00	-	1,024,800.00
Design Control	Appropriate allocations maintained for GW during pit filling.												
	Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item	According to the control of the CW and the Fill of									•		-	•
	Appropriate allocations maintained for GW post pit filling. Regional regulation of GW allocations in accordance with pit lake requirements.												
Pricing Item	regional regulation of GW allocations in accordance with pit lake requirements.												
	Ensure that fundamental design parameters involving other water elements are robust enough to cope with												
	variability/ changes.												
Activity Pricing Item	Base initial designs on climate change prediction data (allow for future ppt and evap demand)												
g itcill	SUB-TOTAL (GROUNDWATER)										14,846,040.00	2,340,000.00	17,186,040.00
	SURFACEWATER												
	Mobilisation, demobilisation, site establishment										508,398	-	508,398
	Maintenance of good water quality in the pit lake for discharge.		Assume CW assuming a CC										
Activity Pricing Item	Water freatment		Assume GW provisions sufficient										
	Maintenance of good surface water quality in the lake for landuses.									-	-		
	Installation of water treatment plant.												
Pricing Item													
	Design of surface water management facilities around the pit which drain away from pit												
Activity	Construction of horizontal drains and collection system with pumping.		Assume GW provisions sufficient										
Pricing Item										-	-	-	-
Activity	Bunding for SW.		Assume levee sufficient										
Activity													
Pricing Item										-	-	-	-

				Quantities					Costs				
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater									2,641,957.42	29,752,535.92 14,846,040.00	3,510,000.00 2,340,000.00	35,904,493.34 17,186,040.00
	Surfacewater Biodiversity									-	10,676,347.50 4,109,863.28	1,170,000.00	11,846,347.50 4,109,863.28
	Fire Risk									43,052,176.16	13,307,199.66	3,183,883.11	59,543,258.93
Activity	Bunding		Assume levee sufficient										
Pricing Item													
Design Control	Management of excess water between available storage areas i.e. other pits.												
Activity	Establishment and maintain existing distribution system between the pits.												
Pricing Item	Pumps and Pipework Installation Management and Maintenance	Medium Term Long Term	Expit. Assumes additional to GW infrastructure Expit. Assumes additional to GW infrastructure	1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	-	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Design Control	Appropriate allocations maintained for SW during pit filling.												
Activity	Regional regulation of SW allocations in accordance with pit lake requirements.												
Pricing Item	Associate all the color and the COM and the COM											-	-
Design Control Activity	Appropriate allocations maintained for SW post pit filling. Regional regulation of SW allocations in accordance with pit lake requirements.												
Pricing Item	regional egulation of 5w anotations in accordance with pit take requirements.												
Design Control	Ensure that fundamental design parameters involving other water elements are robust enough to cope with												
Activity	variability/ changes												
Pricing Item	accommon accepts on annate analogy production accept (months) retrieved to per unit only												
Design Control	Minimise the area that is lost to the surrounding catchments, i.e. external areas surrounding pit reshaped												
Activity	rehabbed, to minimise lake catchment. Create a controlled system. Reshaping and establishment of drainage, in the buffer zone and lease area.												
Pricing Item	Reshaping - pit edge	Medium Term		211		211		ha	3,200.00	-	675,200.00	-	675,200.00
	Recountouring	Medium Term		211		211		ha	1,790.00	-	377,690.00	-	377,690.00
Design Control Activity	Import material for reshaping Additional overburden sourcing												
Pricing Item	Long haul cut to fill	Medium Term	Assume nominal 0.2m depth at pit edge	422,000		422,000		m3	12.92		5,452,240.00	-	5,452,240.00
	Material placement- expit	Medium Term	Assume nominal 0.2m depth at pit edge	422,000		422,000		m3	6.31	-	2,662,820.00	-	2,662,820.00
	SUB-TOTAL (SURFACEWATE)	R)								-	10,676,347.50	1,170,000.00	11,846,347.50
RISK ISSUE	BIODIVERSITY Mobilisation, demobilisation, site establishment										195,708		195,708
Design Control	Revegetation planning commensurate with final landuse and stability/ GW requirements.										173,700		175,700
Activity	Revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Medium Term Medium Term	Assume pit edge requires only Assume pit edge requires only	211 211		211 211		ha ha	12,215.00 6,315.00	-	2,577,365.00 1,332,465.00		2,577,365.00 1,332,465.00
Design Control	Consider using natural soil improvement agents to improve the soil microbial condition and nutrient load												
Activity	Soil treatment												
Pricing Item	Addition of fertiliser (material only)	Medium Term	Assume pit edge requires only	211		211		ha	20.50	-	4,325.50	-	4,325.50
DICK-ICCL	SUB-TOTAL (BIODIVERSIT	Y)								-	4,109,863.28	-	4,109,863.28
RISK ISSUE	FIRE RISK Mobilisation, demobilisation, site establishment									2,050,104	633,676	40,185	2,723,965
Design Control	violation, demonisation, site estatistiment Coal face must be covered or capped to prevent exposure.									2,030,104	053,076	40,185	2,723,903
Activity	Overburden placement		Assumed 2m clay layer sufficient to mitigate fire risk										
Pricing Item													
Activity	Those below final water table should be stabilised and covered for duration of pit filling.		Assumed butressing stability control sufficient										
Pricing Item													
Activity	Layer compacted with low perm material to prevent aeration (spontaneous combustion)												
Pricing Item	Semi Permeable Cover Placement	Short Term	2m semi-permeable layer. Assumes available from pit edge. AWT	10,775,840	10,775,840			m2	2.00	32,327,521.05			32,327,521.05
	Compaction	Short Term	batters and BWT faces AWT and BWT slopes	10,775,840 539	10,7/5,840 539			m3 ha	3.00 16,100.00	32,327,521.05 8,674,551.48	-	-	32,327,521.05 8,674,551.48
Design Control													
Activity	Cover maintenance												
Pricing Item	Long Haul cut to fill	Long Term	Assume 0.5% cover requires maintenance per year. Based on total AWT semi-perm layer	41,450			41,450	m3	12.92	-	-	535,527.75	535,527.75



					Quar	ntities					Co	sts	
Item	Item Description	Phase	Assumptions	Total	Short Term	Medium Term	Long Term	UoM	Rate	Short Term	Medium Term	Long Term	TOTAL
	Summary												
	Landform Stability (Collapse) Groundwater Surfacewater Biodiversity Fire Risk									2,641,957.42 - - - 43,052,176.16	14,846,040.00 10,676,347.50 4,109,863.28	3,510,000.00 2,340,000.00 1,170,000.00 3,183,883.11	35,904,493.34 17,186,040.00 11,846,347.50 4,109,863.28 59,543,258.93
	Material placement- expit	Long Term	Assume 0.5% cover requires maintenance per year. Based on total										
	Reshaping - Pit wall	Long Term	AWT semi-perm layer Assume 0.5% walls exposed require maintenance Based on AWT portion of semi-perm layer	41,450 2			41,450	m3 ! ha	6.31 3,200.00	-	-	261,546.45 6,624.00	261,546.45 6,624.00
Design Control	Use of shallow rooted species for vegetation to prevent breach of the cover.												
Activity	Lake edge revegetation												
Pricing Item	Topsoiling Ripping and Seeding	Medium Term Medium Term	Assumes AWT slopes only Assumes AWT slopes only	414 414		414 414		ha ha	12,215.00 6,315.00	-	5,057,010.00 2,614,410.00	-	5,057,010.00 2,614,410.00
Design Control	Erosion prevention to avoid cover breach.												
Activity	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.												
Pricing Item	Slope battering Rip-rap	Short Term Medium Term	Assumed part of operations for stability control Assume pit edge only. Assume around pit perimiter, to 0.5m thickness and 20m depth i.e to where water table lies.	113,389		113,389		m3	31.70	-	3,594,443.49		3,594,443.49
Design Control	Consideration of alternate fire control measures , possibly spraying exposed coal surfaces with fire retardant materials or chemicals.												
Activity	Fire retardant spraying		Assumed other fire risk controls sufficient										
Design Control	Control activities e.g. vehicle use in areas where there are coal seams or public access to rehabbed (high risk) areas.												
Activity	Buffer zone establishment		Assume captured by fencing control for GW										
Pricing Item			positive captures by tenang control to the							-	-		
Design Control	Include (and maintain) fire breaks in revegetation design												
Activity	Fire breaks												
Pricing Item	Fire break	Medium Term	(150x10) per break. 146 breaks required.	22		22		ha	18,530.00	-	407,660.00	-	407,660.00
Design Control	Cover with water (i.e. fill lake to maximum extent)												
Activity	Aquifer repressurisation												
Pricing Item	Management and Maintenance	Long Term		30			30	Fixed cost p/yr	39,000.00		-	1,170,000.00	1,170,000.00
Activity	Surface water injection												
Pricing Item	Pumps and Pipe Network Installation Management and Maintenance	Medium Term Long Term		1 30		1	30	Fixed Cost: Item Fixed cost p/yr	1,000,000.00 39,000.00	- -	1,000,000.00	1,170,000.00	1,000,000.00 1,170,000.00
Design Control	Fill pit faster with surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
Design Control	Maintenance of water level using controlled surface water addition												
Activity	Surface water addition		Assume surface water injecttion activitiy sufficient										
Pricing Item													
	SUB-TOTAL (FIRE RIS	K)								43,052,176	13,307,199.66	3,183,883.11	59,543,258.93
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