24 July 2014

WILPINJONG COAL MINE

Life of Mine Tailings Management Strategy

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REPORT

Report Number. 147625002-006 Rev 0

Distribution:

Wilpinjong Coal Pty Ltd - 1 electronic copy
Golder Associates - 1 File Copy

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Record of Issue

Company	Client Contact	Version	Date Issued	Method of Delivery
Wilpinjong Coal Pty Ltd	Jamie Lees	Rev A	6 June 2014	Email
Wilpinjong Coal Pty Ltd	Jamie Lees	Rev B	03 July 2014	Email
Wilpinjong Coal Pty Ltd	Jamie Lees	Rev C	16 July 2014	Email
Wilpinjong Coal Pty Ltd	Jamie Lees	Rev 0	24 July 2014	Email

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1.0 INTRODUCTION

Golder Associates Pty Ltd (Golder) has prepared this Life of Mine (LOM) Tailings Management Strategy for the Wilpinjong Coal Mine (Wilpinjong), operated by Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited.

1.1 Background

WCPL was granted Project Approval (05-0021) in February 2006 and mining operations commenced in late 2006. In July 2013 WCPL submitted a modification to the Wilpinjong Coal Mine Project Approval (Modification 5), comprising a number of proposed amendments to the approved Wilpinjong Coal Mine including;

- Open cut extensions
- An elevated waste rock emplacement
- Installation of a belt press filter plant (BPF), to allow the co-disposal of fine coal handling and preparation plant (CHPP) reject material (tailings) with coarse rejects in the waste rock emplacements.

On 7 February 2014, the Minister for Planning issued consolidated Project Approval conditions relating to Modification 5, which incorporates the requirement for preparation of a Waste Management Plan, of which this strategy is a sub-component. The tailings management strategy should be read in conjunction with the Waste Management Plan.

1.2 Objectives

After successful pilot plant testing and assessment in November 2013, WCPL have decided to change from a wet slurry tailings disposal system to a dry disposal system by installing a BPF, with a design life of at least 20 years. The BPF is expected to be commissioned by the end of 2014 (Peabody 2013b). The key objectives of the LOM tailings management strategy are to:

- Provide a strategy for future tailings (fine coal reject) management
- Comply with Project Approval 05-0021 (Modification 5) Condition 57(c), Schedule 3 , which requires preparation of a LOM Tailings Management Strategy
- Address all aspects of LOM tailings management, including design, operation, water balance, decommissioning and rehabilitation
- Comply with the Mining Act 1992, Coal Mine Health & Safety Act 2002 and Mining Lease 1573 conditions
- Satisfy Dam Safety Committee (DSC) regulatory requirements
- Describe how installation of the BPF will affect tailings management and what risks are associated with the change in tailings management
- Identify:
  - Any future approval requirements
  - Monitoring requirements
  - The future dumping strategy for coarse rejects, tailings and waste rock, the control of acid and metalliferrous drainage (AMD) and spontaneous combustion management.

A summary of regulatory requirements relevant to this strategy is contained in Table 1. Due to operational requirements, namely the proposed co-disposal of coarse rejects with tailings, the strategy also describes the management of coarse rejects.

1.3 Site description

The Wilpinjong open cut coal mine is located in the Western Coalfield in central New South Wales approximately 40 km north east of Mudgee, New South Wales (Figure 1). The mine has an expected life of 21 years.

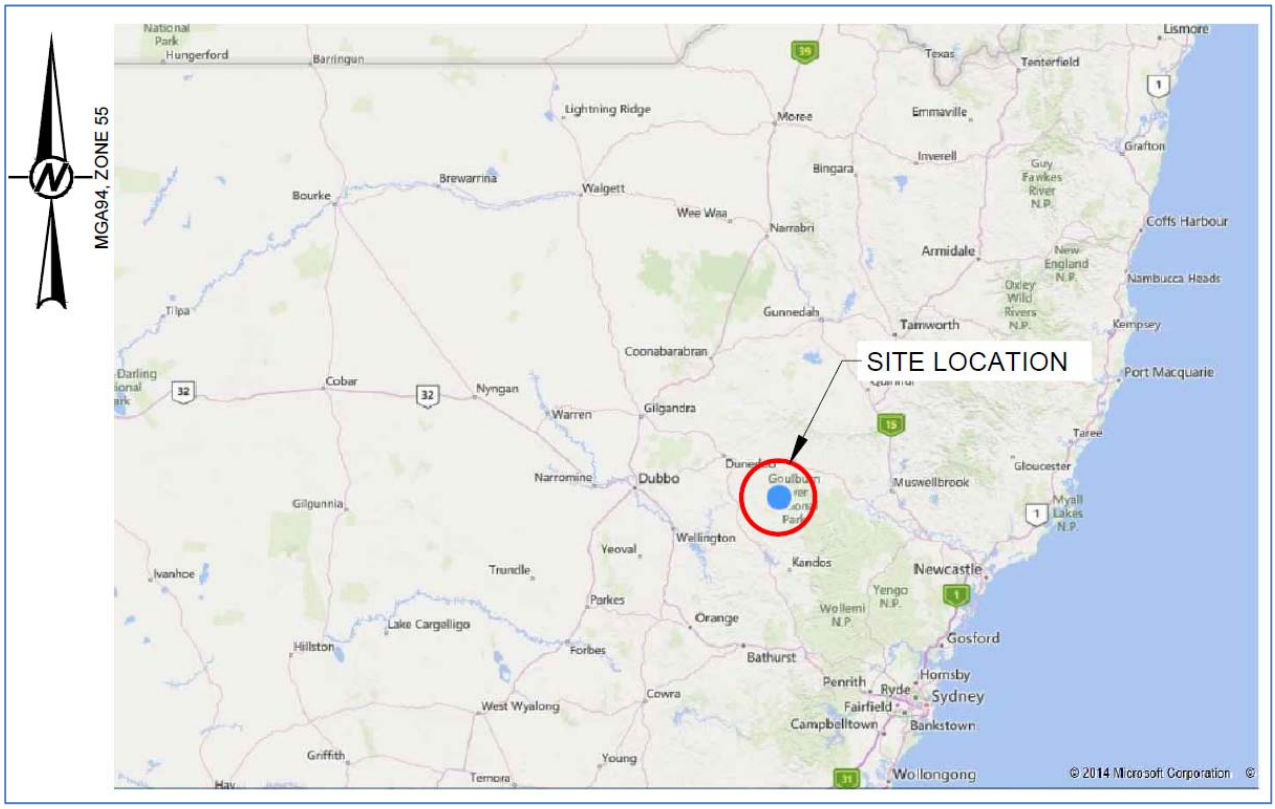

Figure 1: Site Locality Plan

2.0 REGULATORY REQUIREMENTS

Table 1 provides a checklist of how this strategy addresses the relevant regulatory conditions applicable to this site.

Table 1: Compliance Summary Table

Condition	Condition Wording	Where addressed
Project Approval		
Schedule 3, 57	The Proponent shall prepare and implement a Waste Management Plan for the project to the satisfaction of the Director-General. This plan must:	The LOM strategy addresses condition 57(c)
	(a) be submitted to the Director-General for approval prior to the acceptance of building wastes and the like at the site, or prior to the end of May 2014, whichever is the later;	Plan will be submitted by WCPL
	(b) identify the various waste streams of the project;	Tailings and rejects streams identified in Sections 4.2.2 and 6.2. Other waste streams are identified in the Waste Management Plan

	(c) include a Life of Mine Tailings Strategy that must: · be prepared by a team of suitably qualified and experienced persons whose appointment has been endorsed by the Executive Director, Mineral Resources; and · address all aspects of life-of-mine tailings management, including design, operation, water balance, decommissioning and rehabilitation.	Resumes were provided to the Executive Director, Mineral Resources Refer Sections 4.0, 6.0, 7.0, 8.0, 9.0 and 10.0
	(d) describe what measures would be implemented to manage other wastes at the site;	Waste Management Plan
	(e) describe in detail what measures would be implemented to prevent and manage spontaneous combustion events at the site;	Spontaneous combustion management measure for tailings and rejects outlined in Section 8.0 Spontaneous Combustion Management Plan (WCPL 2014b)
	(f) describe what measures would be implemented to reuse, recycle, or minimise wastes generated by the project; and	Waste Management Plan
	(g) include a program to monitor the effectiveness of these measures.	Section 11.0
POEO Act		
EPL, Condition O1.1	Treatment, storage, processing and reprocessing, transport and disposal of waste generated must be carried out in a competent manner.	Section 6.0
Coal Mine Health and Safety Act 2002		
Coal Mine Health and Safety Act 2002	Various requirements for operation of rejects emplacement areas in Sections 100, 101 and 102	Tailings dams have S100 approval. Golder recommends obtaining approvals for emplacement areas up until new regulation is in force. Section 12.0
Workplace Health and Safety (Mines) Act 2013		
Workplace Health and Safety (Mines) Act 2013.	The Work Health and Safety (Mines) Regulation 2014 under the Work Health and Safety (Mines) Act 2013 (**Public Consultation Draft**) defines and makes requirements for approval of reject emplacement areas.	Regulation is in draft (refer Section 12.0).
Coal Mine Health and Safety Act 2002		
Section 100 of the Coal Mine Health and Safety Act 2002	The approval outlines various inspection requirements.	Monitoring regime in Section 11.2
Dam Safety Act		
DSC standard and special conditions	Various monitoring requirements.	Monitoring regime in Section 11.2

3.0 STRATEGY OBJECTIVES

At the end of 2014 the LOM tailings disposal strategy will change from slurry transport of the tailings and its disposal into tailings dams (TDs) constructed in mining voids, to trucking of the filtered tailings with the coarse rejects and co-disposal of the combined rejects in the mine voids (Figure 2). The tailings will be:

i) Filtered and dewatered by belt press filters

ii) Mixed with the coarse rejects

iii) Hauled to and dumped in the mining voids with the coarse rejects

iv) Blended with and encapsulated by mine waste rock.

From time to time a small percentage of the tailings may be directed into a tailings dam when the BPF is not working.

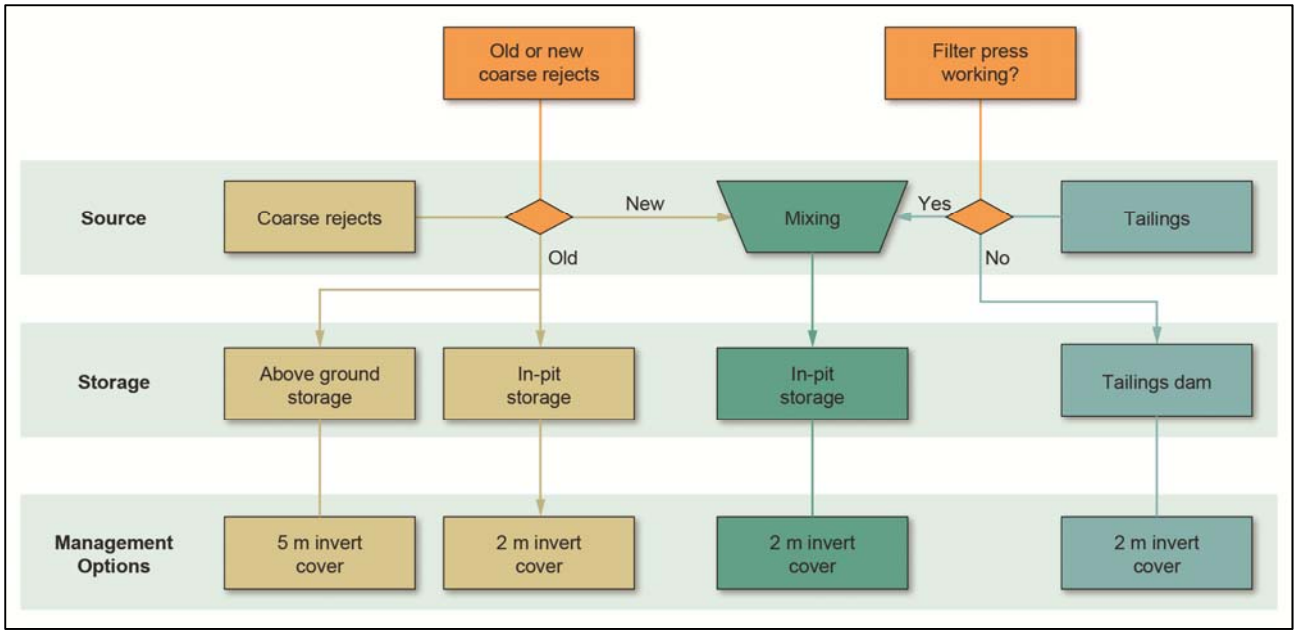

Figure 2: Proposed coarse rejects and tailings disposal processes at Wilpinjong

A copy of WCPL's indicative mine sequence is provided in Golder figure F004 (Attachment A).

The combined rejects management strategy going forward will have the following effects on the current tailings and coarse rejects disposal strategies:

a) Maximises water recovery by filtering the tailings

b) Maintains a tailings dam for contingency use

c) Reduces the mine's rehabilitation liability through not actively using tailings dams

d) Marginally increases the haulage cost by adding the tailings to the coarse rejects.

Material volumes are outlined in Section 4.2.2 and the current and future coarse rejects and tailings disposal flowchart is presented in Figure 2.

The current tailings management objectives (Section 4.2.1) are being met, as witnessed in the closure and successful rehabilitation of two tailings dams (TD1 and TD2) and the successful encapsulation of coarse rejects in mined out voids. The current coarse rejects disposal management system meets all of the closure criteria and will not be compromised in the future by the mixing of filtered tailings with coarse rejects.

In preparation of this strategy, Golder has considered and addressed relevant regulatory conditions (Section 2.0) as well as baseline data (Section 4.0) for current rejects management and BPF trials provided by WCPL. The risk register prepared as part of the project workshop on 17 March 2014 was used as a basis for preparation of this strategy, with the rationale for addressing key risks discussed in the following sections.

4.0 SITE OPERATIONS

4.1 Mining

Mining commenced at WCPL in September 2006. In 2010 WCPL was granted approval to mine up to 15 Mt of Run of Mine (ROM) coal per year. Steady state mining consists of a combination of truck and excavator mining and dozer bulk pushing of blasted overburden into the previous strip void followed by the removal of coal and interburden.

Coal and interburden is mined in a similar manner to the overburden. Dozers are used to rip and push the coal/interburden, followed by truck loaded by excavators. Overburden and interburden that is not bulk pushed with dozers is hauled into the previous strip void using haul trucks (Resource Strategies 2013).

The mining schedule as per the Modification 5 EA is shown in Table 2 in Section 4.2.1. The mine layout is shown in Figure 3 and the proposed mining sequence is shown in Golder figure F004 (Attachment A).

Figure 3: Site Plan (source WCPL July 2013)

4.2 Materials handling and rejects management

4.2.1 Rejects management philosophy

ROM coal is processed through the coal handling preparation plant (CHPP) at a rate of approximately 9 Mtpa. The coarse rejects produced by the CHPP (-75 mm to 0.5 mm) is trucked to the mined out voids and dispersed through the overburden. The tailings (finer than 0.5 mm) is pumped as a slurry to a series of tailings dams formed in mined-out voids for storage.

The objectives of the LOM tailings disposal strategy prior to the commissioning of the BPF have been:

1) Dispose of the tailings in the most cost effective manner

2) Recover as much water as possible for reuse

3) Place an effective cover of inert waste rock and soil to:

   a. Minimise infiltration

   b. Maximise runoff

   c. Prevent spontaneous combustion

   d. Meet the required final land use.

WCPL proposes to change from a slurry tailings disposal system to a dry disposal system by installing a BPF, with a design life of at last 20 years. The BPF is expected to be commissioned by the end of 2014 (Peabody 2013b). The tailings filter cake produced by the BPF will be mixed with the coarse rejects in the coarse rejects bin and transported with the coarse rejects to mined-out voids for co-disposal with mine waste rock. The proposed rejects management strategy is described in Section 6.0.

4.2.2 Key parameters and material volumes

Key parameters relevant to tailings and coarse rejects management were provided by WCPL and are listed below (WCPL 2014, Peabody 2013):

- CHPP throughput — varies
- CHPP average yield — 69%
- Tailings — 6.5% of CHPP feed
- Tailings — 585 000 tpa
- Density of tailings thickener outflow — 1.18 t/m^3
- Tailings thickener flow (observed) — 240 m^3/h
- Water content of the BPF filter cake — 30 – 45 % by weight.

Table 2 shows the mine schedule, assumed rejects production and, assuming the above parameters, the projected tailings production.

Table 2: Mine Schedule and projected waste production (2014 – 2026) (Mod 5)

Year	Waste Rock (Mbcm)[1]	ROM Coal (Mt)[2]	Product Coal (Mt)[2]	CHPP Feed (Mt)[2]	Bypass coal (Mt)[2]	Reject production (Mt)[2]	Tailings production (Mt)[3]
2014	31.9	14.9	12.2	8.7	6.8	3.3	0.6
2015	29.3	15.0	12.5	8.9	7.0	3.4	0.6
2016	28.0	15.0	11.9	8.5	6.7	3.3	0.6
2017	27.0	15.0	11.3	8.1	6.3	3.1	0.5
2018	33.3	14.7	11.0	7.8	6.2	3.0	0.5
2019	18.4	7.8	5.9	4.2	3.3	1.6	0.3
2020	17.4	7.3	5.5	3.9	3.1	1.5	0.3
2021	18.6	7.6	5.7	4.1	3.2	1.6	0.3
2022	21.0	8.0	5.8	4.1	3.2	1.6	0.3
2023	20.7	7.2	5.2	3.7	2.9	1.4	0.2
2024	20.2	7.1	5.1	3.6	2.9	1.4	0.2

Year	Waste Rock (Mbcm)[1]	ROM Coal (Mt)[2]	Product Coal (Mt)[2]	CHPP Feed (Mt)[2]	Bypass coal (Mt)[2]	Reject production (Mt)[2]	Tailings production (Mt)[3]
2025	10.1	4.7	3.4	2.4	1.9	0.9	0.2
2026	31.9	14.9	12.2	8.7	6.8	3.3	0.6

[1] Resource Strategies (2013)
[2] provided by WCPL
[3] assuming 6.5% of CHPP feed is tailings

Annual tailings production reduces over the life of the mine as CHPP feed decreases. Bypass coal does not produce tailings or rejects.

4.3 Tailings dams

There are currently six tailings dams in varying life stages (TD1 though to TD6), with TD6 recently commissioned when TD5 reached its capacity. The tailings dam naming convention is shown in Table 3 and it is noted that some approval documents still refer to previous names.

Table 3: Tailings dam naming convention.

Previous name	Current name	Location
TD#1 West	TD1	Pit 1
TD#1 East	TD2	Pit 1
TD#2 Northeast	TD3	Pit 2
TD#2 South 1	TD4	Pit 2
TD#5	TD5	Pit 2
TD#6	TD6	Pit 2
TD#7	TD7	Pit 2

Further tailings dams may be located in pit 5 towards the west of the site. However, future tailings dams are expected to be only required if the proposed BPF does not functioning in the future. The containment schedule provided by WCPL is shown in and the location of the tailings dams is shown in Figure 4.

Table 4: Tailings dam containment schedule

Timetable	Tailings dam	Design Capacity (m³)	Cumulative Capacity (m³)	Status
March 2007 - Sept 2008	TD2	400 000	400 000	Fully rehabilitated
October 2008 - September 2009	TD1	370 000	770 000	Fully rehabilitated
October 2009 - February 2011	TD3	613 414	1 383 414	Undergoing consolidation
March 2011 - Apr 2012	TD4	679 195	2 062 609	Undergoing consolidation
March 2012 - October 2013	TD5	883 000	2 945 627	Undergoing consolidation
November 2013 – October 2015 (estimated)	TD6	1 480 000	4 425 627	Commissioned October 2013
Unknown dates	TD7	500 000	4 925 627	Conceptual design only

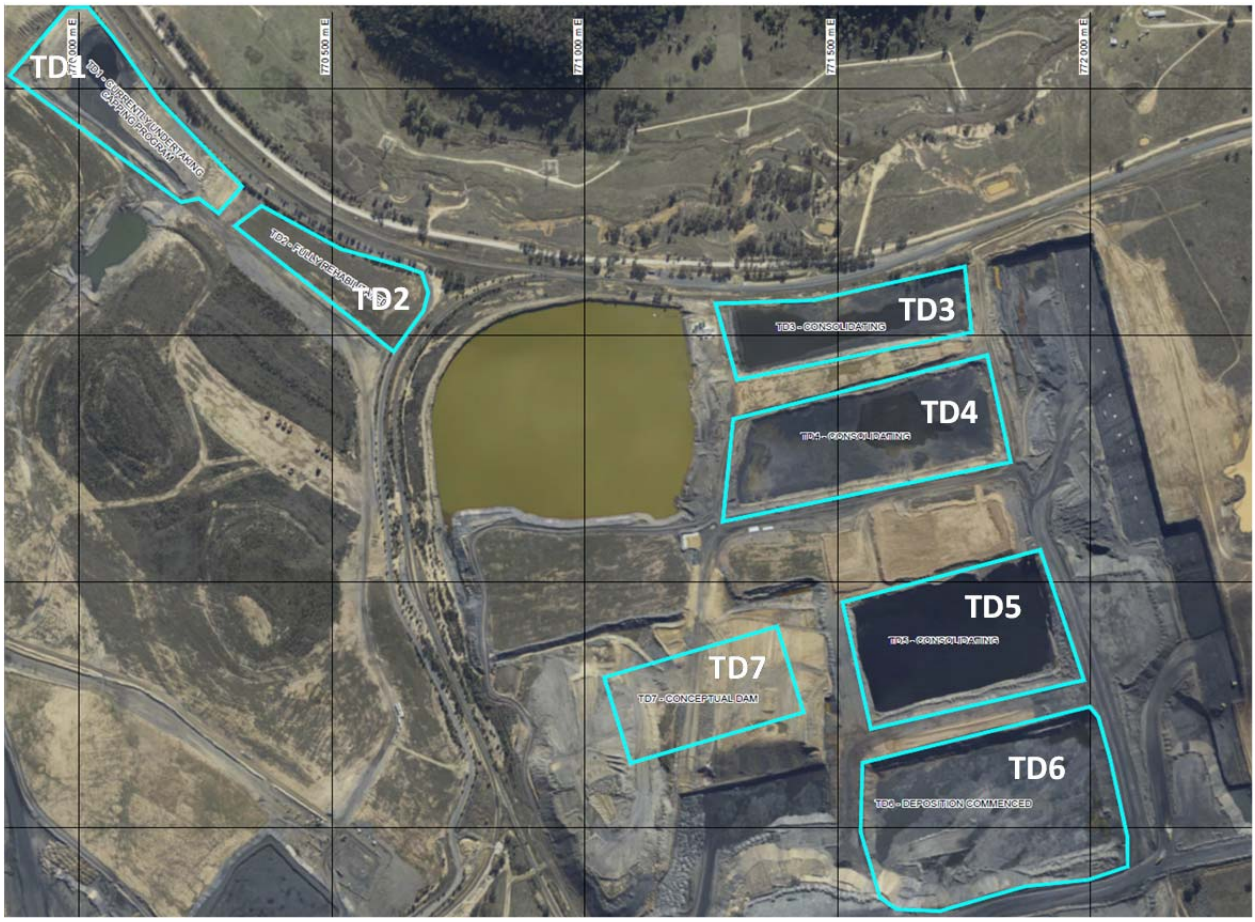

Figure 4: Location of tailings dams - TD1 to TD7

Figure 5: TD3 – under consolidation

Figure 6: TD6 - tailings disposal just commenced

Tailings dams, examples of which are shown in Figure 5 and Figure 6, are located in mined out voids. The tailings dams either tie into the surrounding landform or wide mine waste rock embankments (to accommodate mine haul trucks) are constructed across the voids to form the tailings dams.

The tailings dams have been designed to conform to the final post closure landform. TD1 and TD2 have been fully rehabilitated, while TD3, TD4 and TD5 are undergoing consolidation in preparation for rehabilitation.

4.4 Surface water management and site water balance

4.4.1 Management

Surface water on the site drains from the south towards Wilpinjong Creek in the north via a series of drains and creeks. The largest drainage features are Wilpinjong creek to the north of the mine and Cumbo creek in the eastern part of the mining lease. Upstream water diversions have been constructed to avoid surface water runoff entering the site.

A water balance model was developed by Gilbert & Associates (GA) in December 2013 using the GoldSim modelling package (Gilbert & Associates 2013b)Surface water shows the mine water management system.

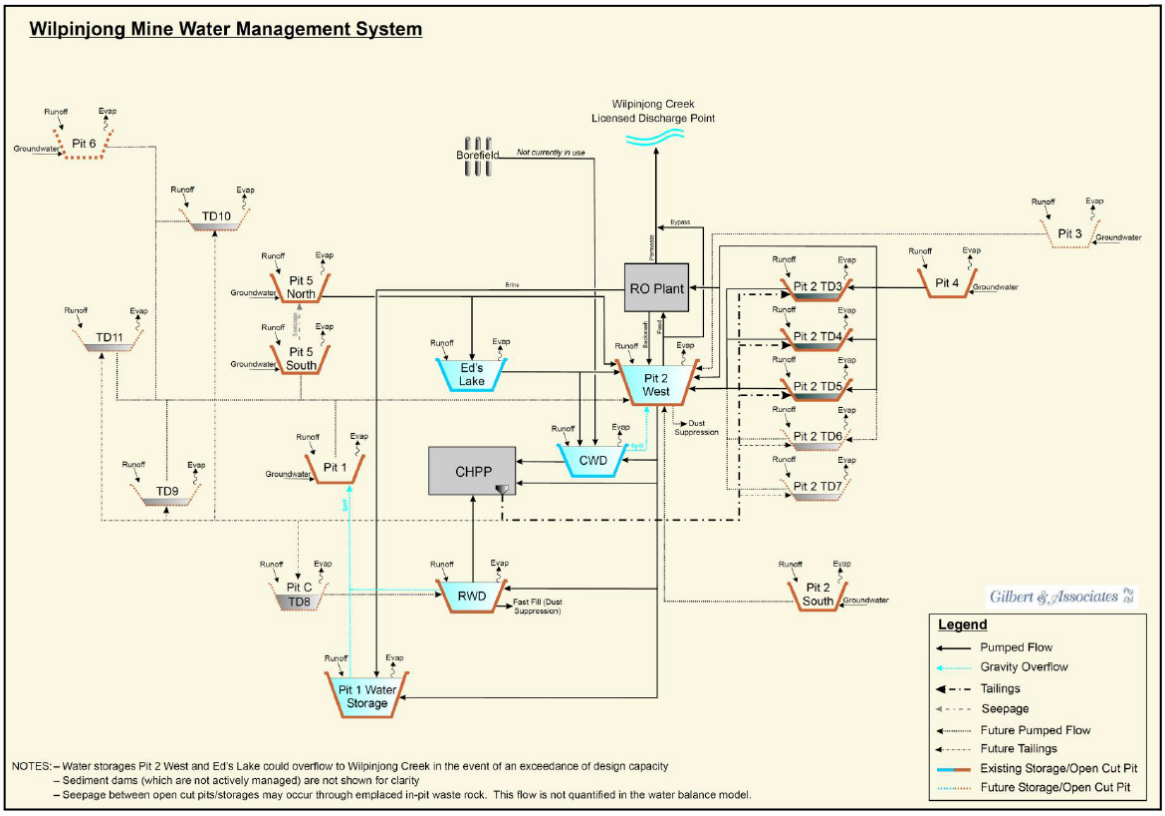

Figure 7: Mine water management system (Gilbert & Associates 2013b)

The primary water usage on the site is associated with coal washing processes in the CHPP and dust suppression around the mining operation. Water from the following sources is pumped into the mine's water storage pond system for use:

a) Open cut mined-out voids - surface water runoff and groundwater inflows

b) Tailings dams - water recovered from settled tailings and surface water runoff.

The capacity and operating levels of mine water storages is provided in the water balance model (Gilbert and Associates 2013b).

The volumes pumped from the main pit include rainfall and surface runoff in addition to groundwater inflow, but exclude evaporation from the pit and from groundwater seepage faces. There is also likely to be a

component of dam seepage for water that is recirculated across the site. The volumes are estimated from the number of hours of pump operation multiplied by a representative pump capacity.

The mine has a single water discharge point to Wilpinjong creek (as licenced by the Environment Protection Authority) for mine water treated through a Water Treatment Plant (WTP). The WTP operates to relieve stress on water storages. The licenced discharge limit of the WTP is a maximum electrical conductivity (EC) of 500 µS/cm and a pH range of 6.5 to 8.5.

The water balance model accounts for the mine expansion and introduction of the BPF. Based on planned expansion of mining operations up to 2026, the mine catchment area is expected to decrease until 2015, followed by a period of expansion up to 2019 and then remain stable until 2027. The water balance model assumes the BPF commences operation at the end of 2014. Modelling results reveal commissioning of a tailing BPF would approximately halve the make-up water demand of the CHPP. The predicted average inflow and outflow totals are provided in Table 5.

Table 5: Average model system Inflows and Outflows

Flows (ML/annum)	Without BPF	With BPF
Inflow	2 082	1 982
Outflow	2 218	2 077

Some key components of the site water management system, as shown in Figure 7, are (Gilbert & Associates 2013a, 2013b):

- Pit 2 West as the main water storage dam
- Recycle water dam (RWD) to provide water for road dust suppression
- Clean water dam (CWD) to supply water for the CHPP
- Tailings dams, from which supernatant seepage water is generally recovered for reuse on site.
- Upslope clean water diversion to divert runoff from undisturbed areas
- A pit dewatering system
- The WTP
- Pit 1 water storage for storage of brine from the WTP.

Note that once the tailings dams are rehabilitated no supernatant storage capacity remains and surface water runoff will be considered clean.

4.4.2 Surface water monitoring

WCPL have conducted an extensive water quality monitoring program; compiling a database of water quality observations with Mine site data from 2004 onwards. Monitoring locations include sites in Wilpinjong Creek, Cumbo Creek, Wollar Creek and site water storages. Water quality monitoring is predominantly undertaken by grab sampling, however continuous monitoring of EC and pH occurs at the WTP and gauging stations on Wilpinjong Creek and Cumbo Creek.

The surface water quality monitoring locations are illustrated on Figure 1 of the Surface Water Management and Monitoring Plan (SWMMP) (Peabody 2014). Table 4 (in Section 4.2 of the SWMMP) lists the monitoring sites, parameters monitored and WCPL's current period of recorded data.

4.5 Groundwater

4.5.1 Groundwater conditions

According to the initial groundwater impact assessment and the current groundwater monitoring program (AGE 2005, WCPL 2014d) the following comments regarding groundwater can be made:

- There are three distinct groundwater systems in the mining area:
  - Alluvial deposit (5 m thck), variable saturation and water level in creek beds 3 metres below ground level (mbgl)
  - ICM (15 – 50 m thick), perched aquifers in upper units and water level ranging 0.01 – 7.45 mbgl
  - Ulan Seam and Marrangaroo Sandstone, main aquifer, artesian in north and sub-artesian in the south, 2.73 m above ground level to 9.9 mbgl
- Natural groundwater quality in the area can be classified as highly saline
- Weathering profile in the area results in outcropping of ICM and Ulan Seam/Marrangaroo Sandstone formations, i.e. possibility for direct recharge
- A preliminary hydrogeological conceptual model for the site (Figure 8) was developed by AGE (2005).

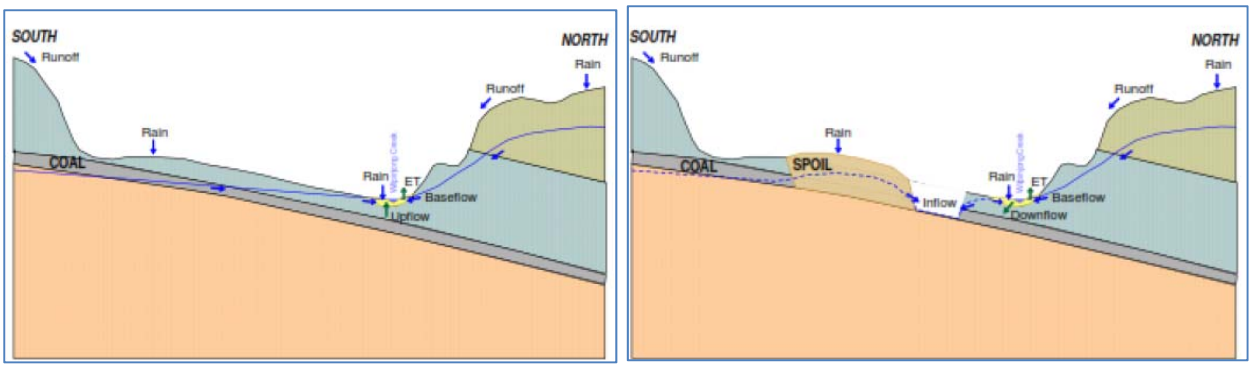

Figure 8: Hydrogeological conceptual model of the site before (left) and after (right) mining (Peabody 2014d)

4.5.2 Groundwater monitoring

A network groundwater monitoring bores has been in place at Wilpinjong since April 2006. The details of monitoring bores in the Wilpinjong network are summarised in Table 18 of the Groundwater Monitoring Program (GMP) (WCPL 2014d).

A set of 28 monitoring bores (PZ01 to PZ28) was drilled adjacent to Pit 1 and Pit 2 to monitor seepage from the tailings dams (Figure 10 of Resource Strategies 2013). The first 14 piezometers (PZ01 to PZ14) were monitored for water level, pH and electrical conductivity (EC) from April 2008 to December 2011. The second group (PZ15 to PZ28) was monitored for water level, pH and EC from November 2009 to December 2011.Since 2007, additional bores have been added to the WCPL groundwater monitoring network. A set of 28 monitoring bores (PZ01 to PZ28) was drilled adjacent to Pit 1 and Pit 2 to monitor tailings dam seepage from TD1 and TD2 (Figure 14). The first 14 piezometers (PZ01 to PZ14) were monitored for water level, pH and electrical conductivity (EC) from April 2008 to December 2011. The second group (PZ15 to PZ28) were monitored for water level, pH and EC from November 2009 to December 2011. Additional bores (PZ29 to PZ32) were installed in 2012 adjacent to Cumbo Creek in Proposed Pits 3 and 4.

Tailings dams TD1 and TD2 are alongside PZ10-14 and PZ01-09 respectively. The monitoring results showed that the water levels in PZ10-14 remained stable, apart from occasional rises that coincided with wet

events, suggesting that the equilibrium has been reached with the fluid in TD1[1]. The monitoring sites adjacent to TD2 (apart from PZ01 which remained generally stable) show generally rising water levels from 2010 onwards. However, this coincided with rises in the residual mass. On the whole, the responses at PZ02-PZ09 correlate closely with rainfall and do not seem to be affected by the proximity of TD2 (HydroSimulations, 2013).

As TD1 and TD2 have now been decommissioned and rehabilitated, there are no plans to continue monitoring these bores and they will be progressively decommissioned over the next 12 months, in consultation with the NSW Office of Water (NOW).

Table 7: Tailings Dam Seepage Monitoring Bores (PZ01-PZ28) (Source: WCPL, 2013)

Monitoring Site	Lithology	Start Date	End Date	Frequency	Location
PZ01-PZ14	Ulan Coal[1]	28 April 2008	30 December 2011	Monthly	Pit 1
PZ15-PZ28	Ulan Coal[1]	12 November 2009	30 December 2011	Monthly	Pit 1 – Pit 2
PZ29-PZ32	Ulan Coal[1]	19 November 2012	-	-	Pits 3 and 4

Table 6 outlines the groundwater monitoring parameters, monitoring locations and frequency of monitoring for the Wilpinjong in accordance with the GMP.

Table 6: Summary of the groundwater monitoring programme

Monitoring Parameter	Monitoring Sites	Frequency
Water level, field pH, EC and volume of water extracted	• Open Cut Operations- Main pit sump(s) • Open Cut Operations- Dewatering Bores • Water Supply Bores- GWs1 to GWs19	Monthly
Sodium (Na), Potassium (K), Magnesium (Mg), Calcium (Ca), Hydrogen Carbonate (HCO_2), SO_4, Total Iron (Fe).	• Wilpinjong Creek- GWa1 to GWa4, GWa7 (Alluvium) GWc1 and GWc2 (Coal Measures) • Cumbo Creek- GWa5 and GWa6 (Alluvium) and GWc3 (Coal Measure) • Wollar Creek- GWc4 (Coal Measures) • Wollar Village- GWa8 (Alluvium) and GWc5 (Coal Measure)	Every six months
Water level, field pH and EC	• Wilpinjong Creek- GWa1 to GWa4 and GWa7 (Alluvium) and GWc1 and CWc2 (Coal Measures) • Cumbo Creek- GWa5 and GWa6 (Alluvium) and GWc5 (Coal Measures)	Monthly
	• Wollar Creek- GWc4 (Coal Measures) • Wollar Village- GWa8 (Alluvium) and GWc5 (Coal Measures)	Quarterly
Water level, field pH and EC, Na, K, Mg, Ca, Cl, HCO_2, SO_4, and Total Fe	• Landholder bores, wells and waterholes.	Quarterly

4.6 Acid mine drainage potential

The sulphidic minerals contained in coal, coarse rejects or tailings may be acid generating when exposed to water and/or air. Consequently the primary strategy in AMD management is minimisation of the exposure of reactive sulphides to air and water. As this acidified water is generated by the oxidation of sulphides, it

[1] The fluid level in TD1 and TD2 is not known (HydroSimulations, 2013).

[1] Installed depth to be determined

migrates through the waste rock piles, metals and salts are dissolved and the acid is neutralised to a certain extent.

Section 3.3.1 of the Mine Operations Plan (MOP) (WCPL 2014) defines the coarse rejects as having a mild capacity for the generation of acid and being non-saline, while the tailings are recognised as having a low capacity for the generation of acid. The risk of AMD due to exposure of coal rejects to atmospheric conditions is thus noted.

The management plan outlined in the MOD5 Environmental Assessment (Resource Strategies 2013) and the MOP state that coarse rejects will be hauled to open cut voids for backfilling and placement with mine waste rock at a ratio of at least 2:1. The coarse rejects are not to be placed within 5 m of the final landform surface.

The tailings in the tailings dams remain saturated during the operational phase and the surface area of non-saturated tailings is minimised and periodically covered by fresh tailings. When the tailings dams are filled a 2 m cap is placed over the surface of the tailings to provide a barrier to oxidation.

The following statistical summary of reported data is given in Table 7; the data is supplied to facilitate evaluation of proposed options in the MOP and WTS.

Table 7: Summary statistical data from geochemical assessment report (EGi, 2005)

		pH	EC	%TS	MPA	ANC	ANC/MPA	NAPP	NAG	NAGpH
Overburden	Average	7.4	119	0.07	2.3	5.9	7.7	-3.6	3.6	6.1
	Median	7.4	109	0.04	1.0	5.0	4.2	-3.0	0.0	6.6
	Min	5.8	32	0.01	0.0	1.0	0.2	-11.0	0.0	2.5
	Max	8.3	311	0.97	30.0	13.0	38.0	24.0	53.0	7.9
Tailings	Average	5.6	1430	0.53	15.8	1.8	0.2	14.0	12.4	4.4
	Median	6.3	1060	0.37	11.0	1.0	0.1	10.0	8.0	4.5
	Min	3.8	524	0.30	9.0	0.0	0.0	5.0	3.0	2.9
	Max	6.9	3740	0.99	30.0	4.0	0.4	30.0	26.0	5.9
Coarse Rejects	Average	4.9	359	0.30	9.2	4.4	0.7	4.8	5.6	5.1
	Median	4.6	404	0.29	9.0	2.0	0.2	7.0	7.0	4.9
	Min	3.9	211	0.17	5.0	0.0	0.0	-11.0	0.0	3.9
	Max	6.7	445	0.41	13.0	16	3.1	13.0	8.0	7.0

EC = electrical conductivity (uS/cm), %TS = total sulfur percentage, MPA = maximum potential acidity, ANC = acid neutralising capacity, NAPP = net acid producing potential, NAG = net acid generation

The geochemical analysis performed by EGi (2005)[2] was considered to be sufficient for the initial mining area proposed in 2005 (Pit 1 and Pit 2). A summary of the information available and findings relating to the AMD potential at Wilpinjong as per EGi report (2005) is presented below:

- Overburden (50 samples) can mostly (<95%) be classified as non-acid forming (NAF) with a low salinity risk
- Raw coal and product coal (4 samples) is potential acid forming – low capacity (PAF-lc) with a low salinity risk

[2] EGi – Environmental Geochemistry International, Sydney.

- Coarse rejects (5 samples) has 4 samples which is potential acid forming (PAF) or PAF-lc and 1 sample was NAF. All samples have a low salinity risk
- Tailings are either PAF or PAF-lc and with a moderate to high salinity risk (EC 524 – 3740 μS/cm, mean value 1430 μS/cm and median value 1060 μS/cm)
- Further geochemical testing performed as project develops over the course of mine life.

Further geo chemical testing is being carried out on samples collected during the 2013 exploration program (WCPL 2014).

4.7 Spontaneous Combustion

Spontaneous combustion is the process by which carbonaceous material such as coal or coal rich rock ignites without an external heat source. Spontaneous combustion requires the following conditions to be present:

- Carbonaceous material
- Oxygen and moisture in the void spaces
- Heat generated by an oxidation process within the carbonaceous material.

The MOP identifies that coal and coal partings generally have a low propensity for spontaneous combustion, with the exception of interburden material associated with the lowest coal ply presenting the highest risk for spontaneous combustion.

Historically, spontaneous combustion events at Wilpinjong were associated with both ROM coal stockpiles as well as temporary waste rock emplacements (Resource Strategies 2013). Coal reject emplacement in the Elevated Waste Rock Emplacement (Pit 2) will be designed and constructed with designated carbonaceous material zones to avoid future exposures of the carbonaceous material.

Experience at neighbouring mines shows that spontaneous combustion can occur on carbonaceous material, despite a recent test of carbonaceous material indicating no self-heating (WCPL 2014b).

WCPL's spontaneous combustion prevention measures relevant to rejects and carbonaceous waste rock are outlined in the Spontaneous Combustion Management Plan (WCPL 2014b) and comprise:

- Placement of a minimum of 2 m of inert cover over final dumps
- Final dumps will be track rolled and will form low angle batters and covered with inert material
- No placement of carbonaceous material against the high wall
- Covering of tailings dams with a minimum of 2 m of inert material
- Inspection of rejects and tailings emplacement areas.

During 2014 additional spontaneous combustion propensity testing is being carried on the different plies within the coal seam across all working pits of the mine.

4.8 Mine rehabilitation strategy

The mine rehabilitation strategy is described in the Mining Operations Plan (MOP) (WCPL 2014). Disturbed areas are progressively rehabilitated. The future land use for the site includes grazing activities of varying intensity and the establishment of woodland habitat (WCPL 2014, Resource Strategies 2013).

The MOP outlines performance indicators, performance measures and completion criteria for rehabilitation. Key indicators and criteria specifically relating to tailings and rejects management have been extracted from Section 6 of the MOP and are summarised in Table 8.

If the strategy identifies additional requirements, then the strategy will inform the MOP and such changes will be incorporated.

Table 8: Applicable rehabilitation indicators, measures and completion criteria (WCPL 2014)

Performance Indicator	Performance Measure	Completion Criteria
Crust forming over completed tailings dams.	Forming crust is geotechnically stable to enable capping program.	Decommissioning of tailings storage facilities in accordance with approvals granted under Section 101 of the *Coal Mines Health and Safety Act 2002.* Rehabilitation of tailings dam to occur when they are deemed to be suitably safe by an appropriately qualified engineer.
Inert cover depth	Final landform capped with appropriate coverage of compacted inert material over carbonaceous material.	Inert cover will be placed on top of the rehabilitated final landform surface to provide a benign barrier between any overburden that has not completely equilibrated with surface geochemical conditions. The final landform surface will be reshaped using spoil from the mining operation. The landform surface will then be capped with at least 2 m of compacted inert cover. In elevated waste rock dumps, maintain a minimum of 5 m compacted inert material coverage over the carbonaceous material, including following final land form shaping of the Elevated Waste Rock Emplacement (in Pit 2).
Rejects emplacement	No spontaneous combustion and/or acid generation.	Coarse reject disposed of in mined out final voids as close to the pit floor as practically possible. A blend ratio of at least 2:1 (waste rock: coarse rejects) would be used with the aim of producing a mix with a sulphur content that has an acid producing potential less than the acid neutralising capacity of the waste rock. The reject will be covered with waste rock and then at least 2 m of inert cover when creating the final landform surface. Coarse reject emplacement in the Elevated Waste Rock Emplacement (Pit 2) will be designed and constructed with designated carbonaceous material zones to avoid future exposures of the carbonaceous material.
Tailings capping	Tailings dams capped with a minimum of 2 m of inert material.	Decommissioning of tailings storage facilities in accordance with approval granted under section 100 of the *Coal Mines Health and Safety Act 2002.* Placement of a coarse reject layer using hydraulic fill methods, or as otherwise prescribed, to permit the placement of inert material. Tailings dams capped with compacted inert material to a minimum depth of cover of 2 m, prior to final profiling and rehabilitation. Slope angles will be generally <5°, which is consistent with the surrounding landscape. The final landform of the emplacement will be free draining and consistent with the surrounding natural and rehabilitated landform.

A minimum of 2 m of inert material (Figure 8) is placed over the tailings to restrict oxygen and water ingress and the rise of salts (WCPL 2013), plus a nominal topsoil layer to enhance revegetation.

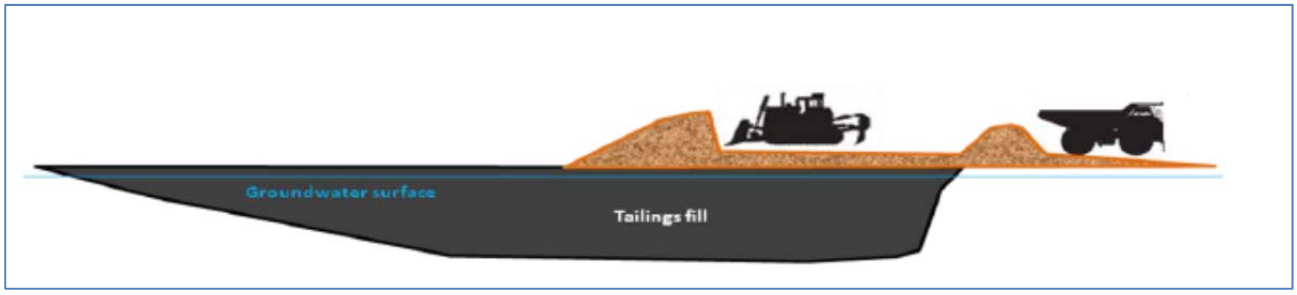

Figure 9: Safe backfilling practice

5.0 DESIGN RISK AND OPPORTUNITY ASSESSMENT

During a workshop between WCPL and Golder on 17 March 2014, a design risk and opportunity register was developed. This register has been used to develop this strategy and is provided in Attachment D for reference. Key risks identified are summarised in Table 9 and include key management plan inputs.

Table 9: Summary of key risks

No.	Risk/opportunity	Existing Controls	Management Plan input (in addition to existing controls)	Where addressed
1	Disruption to coal processing, create a bottleneck for CHPP throughput	Contingency storage capacity.	Design tailings storage to accommodate variation in CHPP throughput and delayed disposal of tailings.	Section 9.0
2	Failure of tailings storage facility.	Slope stability analysis. Maintain consistent proportion of fine and coarse material. Investigation of ponds prior to rehabilitation.		Design reports for tailings dams
3	Spontaneous combustion can result in open flame and burning of coarse rejects and tailings.	Follow Spontaneous combustion management plan. Regular monitoring and testing of coarse rejects and tailings to detect spontaneous combustion propensity and carbon content. Inspection of tailings dams prior to consolidation and capping. Capping of tailings dams reduces risk of oxidation.	Design of low permeability capping system to reduce infiltration of oxygen. Final landform designed to minimise runoff and erosion.	Sections 8.0 and 11.1.4
4	Waste rock can potentially oxidise to generate acid mine drainage which may then precipitate metals in the soil.	AMD monitoring. Minimise exposure to air during operational phase through saturation of tailings. The 2 m capping system also provides a barrier to oxidation. Dilution of rejects with overburden material at a ratio of at least 4:1.	Use of acid neutralising soil for tailings cover. Environmental Geochemistry International (2005) recommends a multi layered cover based on tailings properties.	Sections 7.4 and 6.9

No.	Risk/opportunity	Existing Controls	Management Plan input (in addition to existing controls)	Where addressed
5	Generation of dust plumes	Air quality monitoring, watering.		WCPL environmental management plans
6	Leachate/tailings leaking from the storage facility into groundwater.	Groundwater monitoring.		GWMP, Section 11.1.1
7	Pipeline to tailings dam is blocked or pipe burst.	Pipe flow monitoring.		
8	The tailings dam may overflow.	Water balance analysis, emergency spillway. Maintain adequate freeboard in ponds.		Section 11.2.1
9	A significant reduction in tailings strength and stiffness	Mixing of tailings with rejects or overburden material.	Introduction of BPF and disposal of tailings and coarse rejects with waste rock	Section 10.0
10	Settling of coarse rejects and tailings.	Compaction and consolidation during transfer of coarse rejects and tailings to storage facilities.		
11	Erosion of capping system to expose coarse rejects and tailings	Landform design, cover system, revegetation		MOP
12	Failure to meet the conditions outlined in the EPL licence, (and other regulatory requirements)	Environmental monitoring, planning and management systems.		Section 11.0; WCPL environmental management plans

6.0 FUTURE REJECTS MANAGEMENT STRATEGY

6.1 Filtered tailings production

The tailings slurry from the thickener underflow will be delivered to the belt press filter plant, where after flocculation the tailings will be filtered by the belt press filters to a manageable filter cake, with a solids content of between 55 and 70% by weight. The filtered tailings will then be conveyed to the rejects conveyor, which delivers coarse rejects from the CHPP to the coarse rejects bin. Figure 10 shows the flow chart for the production of the filtered tailings and its mixing and disposal with coarse rejects.

6.2 Transportation

The filtered tailings will mix with the coarse rejects on the conveyor and on discharge into the coarse rejects bin. The combined coarse rejects and filtered tailings will be trucked to the currently active disposal site by the mine's ROM haulage fleet.

The ratio of coarse rejects to filtered tailings at the mine is generally greater than 5:1, which means that there is theoretically sufficient void space within the coarse rejects to contain the tailings. Thus for majority of the time the transportation behaviour of the combined coal rejects should not be dictated by the tailings, but remain similar to that currently experienced for the coarse rejects. Periodically, when the ratio is unfavourable, the transport behaviour of the combined rejects will be controlled by the filtered tailings cake, which should not be an issue when the moisture content of the tailings filter cake is within specification.

There is a risk that from time to time the filtered tailings will be wetter than planned and, under such circumstances, tailings may flow from the combined rejects and possibly out of the truck trays which may require a review of handling and transport processes.

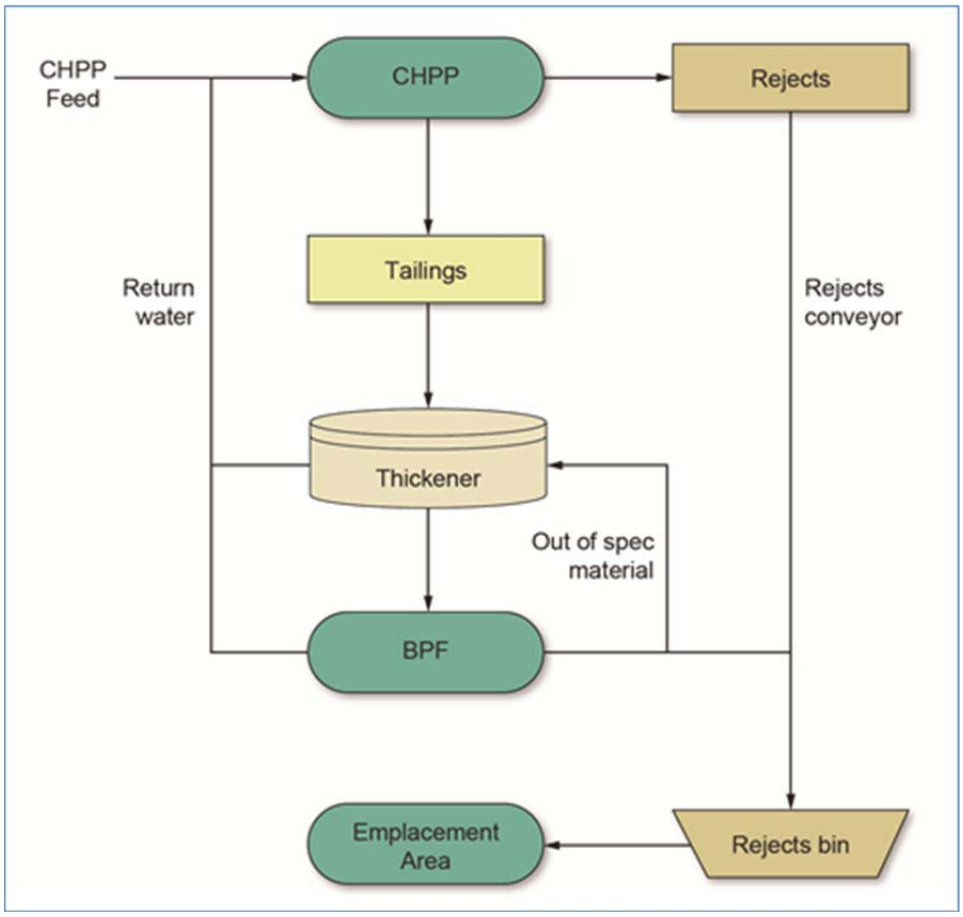

Figure 10: Coarse rejects and tailings flowchart

6.3 Dumping

There are two systems used for dumping the combined rejects into the voids:

i) Windrow dumping of the combined rejects on the base of the voids after the coal has been removed, which is then encapsulated with waste rock

ii) End tipping the combined rejects over the advancing waste rock backfill tip head and co-mingling of the combined rejects with the waste rock.

Both of these methods have been used in the past to successfully dump coarse rejects and combined rejects. The system used will vary periodically through the mine life to suit mining operations. However, a requirement to dump combined rejects below the projected modelled groundwater levels after recovery may mean that tip head dumping can only be used in select areas of the mine.

6.4 Disposal management

Under normal operating conditions the addition of filtered tailings to the coarse rejects will not change the current disposal methodology used for the coarse rejects. The exception will be when the filtered tailings is wetter than usual or if the coarse rejects to filtered tailings is less than 5:1, when it may cause the combined coal rejects to flow.

- Windrow dumping – Wetter than specified filtered tailings should not be an issue, as there is no plan to traffic over the combined rejects when it is dumped in windrows until sometime after placement, by which time the tailings are expected to dry sufficiently through desiccation not to impede traffic.
- Tip head dumping - The effect of the wetter filtered tailings will vary noticeable when the combined rejects is dumped over the tip head, as the wetter filtered tailings can be expected to flow to the base of the advancing face. Care must be taken to limit the volume of filtered tailings reaching the toe of the tip head, as they could cause localised instability of the advancing tip head face. This can be controlled by:
  - Limiting the rate of advancement of the tip head face to match the desiccation rate of the tailings
  - Temporarily changing to windrow dumping until the BPF issues are resolved.

6.5 LOM disposal plans

The filtered tailings will be disposed of in the mined out voids in combination with the coarse rejects. WCPL has an integrated mine plan that is well developed and is reviewed regularly to meet market and geological factors. The addition of filtered tailings to the coarse rejects will have little or no effect on the volume of or the planning of the disposal of the combined coal rejects.

Golder figure F007 (Attachment A) indicates the plan for the dumping of the combined rejects.

6.6 Surface water management

As the filtered tailings will be mixed with the coarse rejects and encapsulated by or co-mingled with the waste rock in the mined out voids, the current and future water management plans developed by the mine for the mined-out voids will apply. No change is required to these due to the addition of tailings.

Surface water is unlikely to be impacted by the combined tailings and rejects management as runoff from the voids is returned to the mine's surface water management system. Water collected within the tailings dams is also managed within the mine's water management system in accordance with the WCPL surface water Management & Monitoring Plan.

6.7 Groundwater

The influence of a recovering groundwater levels would be to saturate combined rejects, which would effectively reduce the amount of oxygen available for AMD processes. Also, the low hydraulic conductivity of the tailings and of the combined rejects would result in a decrease of water flow through the emplacement areas. The net result would be that the mobilisation of contaminants would be reduced in low hydraulic conductivity zones.

The combined rejects should be placed in the voids, so that recovering groundwater levels to allow for saturation of the material.

6.8 Management of spontaneous combustion

Spontaneous combustion of the coarse rejects and susceptible mine waste rock is controlled by the placement of this material within the mined voids and covering with a minimum of 2 m thickness of inert waste rock as quickly as practical,. An outer cover slope in line with final landform rehabilitation requirements and 5 m of inert cover for surface stockpiles has to be maintained for the rejects to limit air ingress. The addition of filtered tailings will not change this requirement or process.

6.9 Management of acid mine drainage

Acid mine drainage will be controlled in a similar manner to the control of spontaneous combustion, i.e. the combined rejects will continue to be separated from air by capping with inert material as quickly as practical. The addition of filtered tailings to coarse rejects will not affect the existing management of AMD associated with the dumping of the coarse rejects.

6.10 Decommissioning and rehabilitation

Currently, as each mined-out void is filled with coarse rejects and mine waste rock, the backfilled area is capped with a minimum 2 m thick layer of inert waste rock, followed by a layer of topsoil to be ready for rehabilitation.

The addition of filtered tailings to the coarse rejects will not require any changes to this plan.

7.0 CONCEPTUAL GEOCHEMICAL MODEL

A geochemical conceptual model was developed for the disposal of tailings at WCM, which considered the following disposal scenarios for tailings and combined rejects (coarse rejects with tailings – co-disposal):

7.1 Scenario 1: Tailings dams with rebounding groundwater

Currently the tailings are slurried and pumped to and deposited in engineered tailings dams constructed within mined out voids. Internal walls of tailings dams are formed with a combination of in situ materials and dumped mine waste rock. Some or all of the tailings deposited in the tailings dams are below the natural groundwater level.

7.2 Scenario 2: In-pit combined rejects disposal with rebounding groundwater

Co-disposal of filtered tailings would be undertaken in accordance with the existing management measures for disposal of coarse rejects, where the coarse rejects is placed below the natural surface in the mined-out voids with sufficient coverage by non-acid forming overburden to reduce oxygen ingress through the rehabilitated profile. This would be consistent with the current practice of covering tailings with more than 2 m of inert capping material prior to final profiling and rehabilitation.

7.3 Hydraulic conductivities

The estimated hydraulic conductivity values are (Hegazy et al., 2004, Wysocka et al., 2007):

- In situ material and dumped waste rock — 10^{-1} to 10^{-4} m/d
- Tailings after consolidation — 10^{-1} to 10^{-3} m/d
- Coarse rejects — 1 to 10^{-2} m/d

The estimated hydraulic conductivity values for the two aquifer systems identified at site are (Ward and Kelly 2013):

- Alluvium — 10 to 10^{-2} m/d
- Illawarra Coal Measures (ICM) — 10^{-2} – 10^{-3} m/d.

The approximate salinity of the aquifers within the Alluvium and ICM is 2 300 and 3 200 µS/cm respectively.

7.4 Acid mine drainage prevention

The geochemical and geohydrological conceptual models have been developed for the tailings (Figure 11) and co-disposal (Figure 12) scenarios. Reported data indicates that there is no difference in the salinity risk posed by either option.

In both scenarios the potential for AMD is present and will depend on the layering efficiency and exposure to atmospheric oxygen and water.

7.4.1 Tailings dams

Once deposition ceases the water level in the tailings dams will fall, to regional groundwater levels, as water seeps out of the tailings and into the surrounding waste rock or in situ rock or soils. During this period salts will be carried out of the tailings and there is a potential for AMD generation in the dewatered portion of the tailings (Figure 11).

The influence of a recovering groundwater levels would be to maintain a level of saturated tailings at the groundwater level, effectively reducing the amount of oxygen available for the AMD processes.

The tailings in the tailings dams are expected to be impacted by groundwater level fluctuations, while the transport of oxygen to the tailings would be reduced due to the presence of the low permeability capping layer.

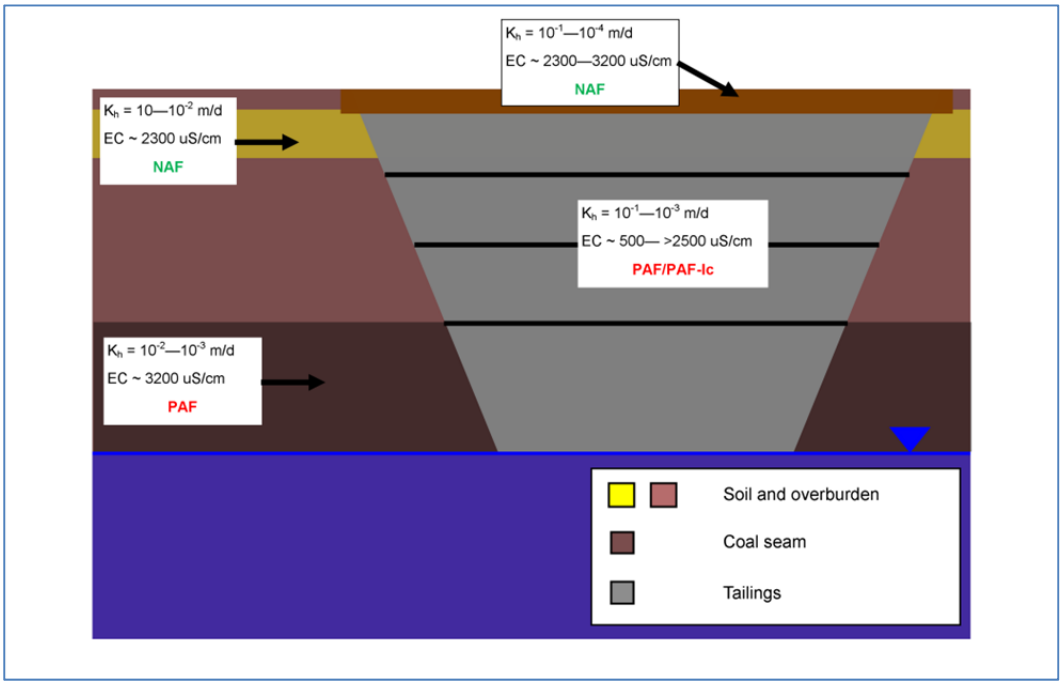

Figure 11: Tailing dams - geochemical conceptual model.

7.4.2 Co-disposal

The influence of rebounding groundwater levels would be to saturate the mixed coarse rejects and filtered tailings, which are placed well below the natural groundwater level, and eventually to provide a water cover for the combined rejects, effectively minimising the amount of oxygen available for the AMD processes (Figure 12).

The hydraulic conductivity of the mixed coarse rejects and filtered tailings would result in a decrease of water flow, when compared with coarse rejects alone. The net result would be that the mobilisation of contaminants would be reduced in the low hydraulic conductivity zones.

Due to mixing inconsistencies it is expected that hydraulic conductivities of the combined rejects would be heterogeneous and would create zones of higher and lower permeability. The permeability of the co-disposal option would be controlled by the low permeability zones which would result in a decreased risk of mobilising contaminants to either the Alluvium or ICM aquifer systems. It should be highlighted that the expected local salt load from the combined rejects would be significantly less than that for the tailings dam system. Instead the risk would be associated with the AMD component of these disposal methods.

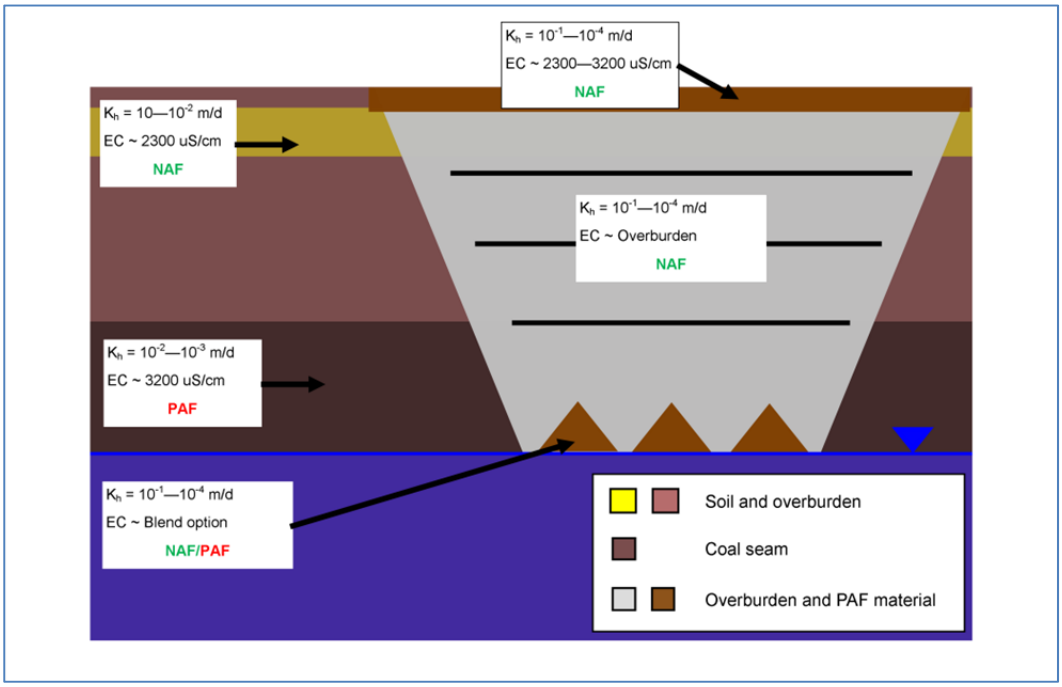

Figure 12: Pit floor windrow dumping - conceptual geochemical model.

7.4.3 Blending of combined rejects with waste rock

In order to evaluate the impacts of the blending of combined rejects with waste rock, a number of blends of the average and median data was taken from Table 7 and listed in Table 10. Calculated EC values are generally low for all possible mixing options. In order to reduce AMD related issues it is best to maintain a net negative NAPP. While the average NAPP values indicate a slightly negative value for blending ratios of 2:1 and higher, the median values (which are more representative of the mining operation) indicate positive NAPP values for a 2:1 blend, which is not acceptable. This ratio needs to be raised to 4:1 to reach negative NAPP values. Golder notes that there are not many data points recorded and recommends the further investigation is carried out during the current AMD studies to verify this recommendation.

Table 10: Blending ratios and waste type.

Blend material	Analysis	5:1 ratio		4:1 ratio		2:1 ratio	
		EC	NAPP	EC	NAPP	EC	NAPP
Waste rock to coarse rejects	Average	159	-2.2	179	-1.5	199	-0.8
	Median	158	-1.3	183	-0.5	207	0.3
Waste rock to tailings/rejects	Average	195	-1.9	210	-1.6	271	-0.2
	Median	180	-1.2	194	-0.9	251	0.5
Tailings/coarse rejects mixture is >1:8 ratio based on material schedule							

The preliminary assessment indicates that a blend of waste rock to rejects of at least 4:1 ratio is needed to achieve a negative median NAPP value for the waste rock and coarse rejects mixture and or the tailing/coarse rejects combination. In fact the waste rock to combined rejects ratio is significantly advantageous at <8:1. So as indicated above the combined rejects could be blended directly with the waste rock at the tipping head (Figure 13). These areas are to be capped and rehabilitated following the standard procedure for the mining voids.

Alternatively the combined rejects can be dumped in windrows at the bottom of the pit and then surrounded (in the windrows) and covered with waste rock. This option would be viable if it had a processing speed

benefit, i.e. rows could be covered with overburden in a short time frame to reduce oxidation rates. Placing the rejects in windrows has the benefit of limiting the size of any single deposit (Figure 12) and also ensures that the combined rejects are placed below the groundwater level.

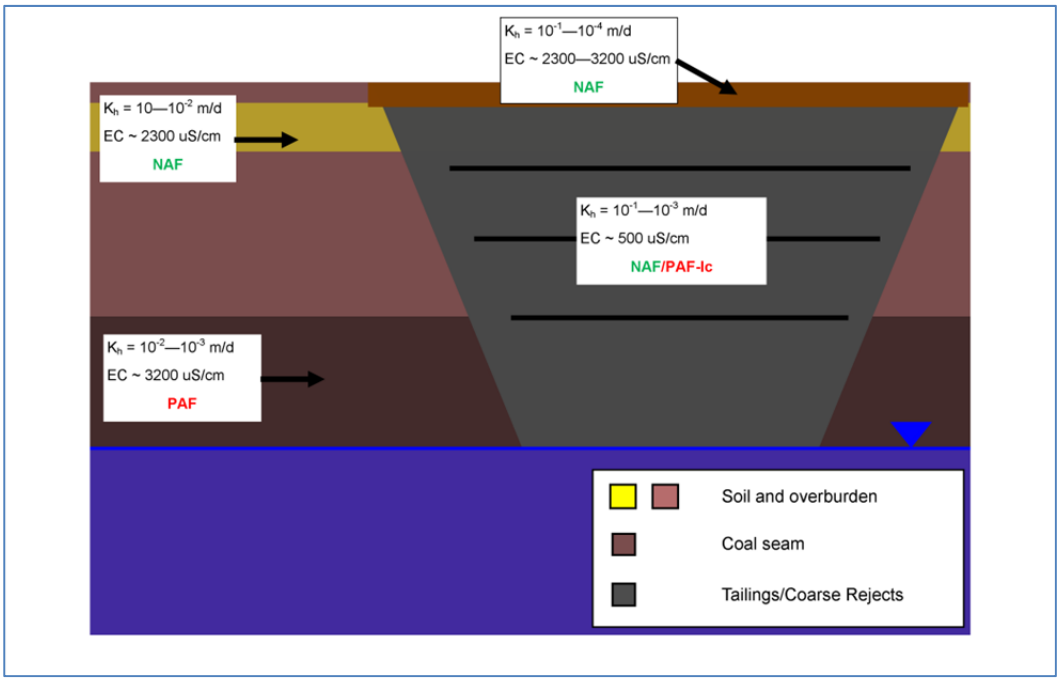

Figure 13: Tip-head dumping - conceptual geochemical model.

8.0 SPONTANEOUS COMBUSTION PREVENTION

Spontaneous combustion requires the following conditions to be present:

- Carbonaceous material
- Oxygen and moisture in the void spaces
- Heat generated by an oxidation process within the void space of the carbonaceous material.

Therefore the ingress of air into the carbonaceous material should be reduced by covering the material as soon as possible.

The addition of tailings to the coarse rejects significantly reduces the propensity for spontaneous combustion of the combined rejects by:

i) Reducing the ability for air to enter the combined coal rejects and provide oxygen to support the heating process

ii) Reducing the permeability of the combined rejects

iii) Reducing the free flow of water to support the ARD process.

This was demonstrated previously by Fierro et al (2000), who found that covering of tailings with a slurry significantly reduces the potential for spontaneous combustion.

AMD and spontaneous combustion often go hand in hand due to the sulphides and pyrites content being responsible for both reactions. If acid mine drainage issues are addressed as described in the previous section, the risk for spontaneous combustion is usually reduced.

Separating rows of combined rejects with waste rock will assist in the long term management of spontaneous combustion once the rows are covered, as it limits the size of any individual combined rejects deposit and decreases the overall ability for air to enter the system.

9.0 TAILINGS DAMS

Tailings damsTD1 and TD2 have been decommissioned and capped. TD3, TD4 and TD5 are no longer actively used for deposition of tailings and are currently being allowed to drain and consolidate in preparation for decommissioning.

TD6 is the current active tailings emplacement. The tailings slurry is delivered to the south end of TD6 and supernatant water is recovered using portable pumps from the north end. The estimated filling date of TD6 is October 2015, based on current filling rates and a level survey conducted by WCPL on 4 July 2014. When the BPF system is commissioned towards the end of 2014 TD6 would have approximately 10 months of tailings storage capacity at current production rates, but as TD6 will now only be used to accommodate tailings slurry during contingency periods, such as shutdowns of the BPF or when the tailings thickener is bypassed, its operating life would be much longer than 10 months.

The rate of filling of TD6 is to be closely monitored and the design and S100 permitting of TD7 is to be initiated if TD6 is likely to be filled. The trigger level for design of a new tailings dam is once the tailings in TD6 have reached a level of RL 376 mAHD (ATC 2013). At that stage TD6 will have a storage capacity of about 300 000 t (six months storage at 2014 tailings production rates as per Table 2). This period allows for the design and approval of the new TD7.

9.1 Future out of pit tailings storage

There are likely to be periods when either BPF is not operating (at all or only partially) due to maintenance or breakdowns. During these periods the tailings slurry will be pumped into either a tailings dam or an emergency tailings dewatering cell.

9.1.1 Tailings dams

TD6 will have limited remaining capacity when the BPF is commissioned. WCPL have selected a location for a future tailings dam TD7, which is indicated in Figure 4. TD7 is proposed to be an in-pit tailings dam similar in design and operation to TD1 to TD6. Materials used to construct embankments for TD7 will likely be similar to those used in the construction of TD1 to TD6, namely mine waste rock or locally borrowed soils (ATC 2013).

Conceptual cross-sections of TD7 are provided in Golder figure F005 (Attachment A). The need for future tailings dams beyond TD7 depends on the performance of the BPF. It is considered that further tailings dams are unlikely required if the BPF operates as intended and as the tailings dam could be replaced with an emergency tailings dewatering cell.

9.1.2 Emergency tailings dewatering cell

An emergency tailings dewatering cell (ETDC) may be required to temporarily store and dewater slurried tailings during periods of BPF downtime. When the BPF is restarted and the tailings in the ETDC has dewatered sufficiently, the tailings is to be excavated and hauled with coarse rejects for disposal. The emergency tailings dewatering storage cell would then be available for re-use.

The ETDC would be an earthworks construction near the CHPP. It would be lined with 1 m of low permeability material, with a cover layer of rock to aid trafficking. The ETDC needs to be equipped with a decant water pump and an access ramp to allow removal of the tailings using the mine's earthmoving equipment. Surface water diversion drains should be constructed around the ETDC.

The required capacity of the ETDC will be in the order of two weeks of tailings production. This is about 22 500 t, or 33 000 m^3, based on the information provided in Table 2, excluding freeboard.
A conceptual cross-section and layout of an ETDC is provided in Golder figure F006 (Attachment A).

9.2 Tailings dam closure

WCPL have a tailings dam procedure in place that has been proven with the successful closure of TD2 (WCPL 2013). This procedure will be implemented for the other tailings dams as they are rehabilitated. The procedure, as outlined above is as follows:

1) Remove supernatant water from the surface of the tailings dam

2) Allow the tailings to desiccate and settle

2) Once the tailings have desiccated sufficiently to provide a trafficable surface, assessed either by using site experience gained with the already rehabilitated tailings dams or through in situ geotechnical bearing capacity testing using for example hand shear vane tests, import and place at least 2 m of selected, low permeability mine waste rock to provide a cover layer (consideration may need to be given to installing a capillary break between the cover layer and the tailings to reduce the risk of saline water migrating upwards through capillary action)

3) Profile the cover in line with the proposed closure final landform

4) Import and place at topsoil to provide an initial growth medium

5) Revegetate by seeding the surface area in line with the requirements of the MOP.

10.0 COAL REJECTS DISPOSAL PLAN RISKS

The coarse rejects and the combined coal rejects have to be dumped as low as possible in the mined-out voids, at least 2 m below the surface of waste rock dumps and preferably below the recovering water table to reduce oxygen ingress. The coarse rejects is dumped in rows across the bottom of the void. As a consequence of this requirement the risk to mining posed by the addition of filtered tailings to the coarse rejects relates to the stability of the waste rock placed over the combined rejects.

There are two techniques which the mine uses to place waste rock over the coarse rejects at the bottom of the void, which will continue to be used to cover the combined rejects, namely:

- Cast blast and dozer push waste rock across the coarse rejects
- Tip-head dump waste rock, advancing across the coarse rejects.

10.1 Cast blast and dozer push

The cast blast waste rock will form a thick firm operating platform cover over the dumped combined rejects for the following dozer push. Therefore there is a low risk that the geotechnical stability of this operation will be compromised by the addition of the filtered tailings, irrespective of the water content that the filtered tailings.

10.2 Tip-head dumping

There is a significant risk that the stability of the advancing tip-head face would be compromised by the thin combined rejects layer if there is either:

i) A low coarse rejects to filtered tailings ratio, such that the shear strength of the tailings controls the shear strength of the overall material

ii) The water content of the filtered tailings is higher than expected.

If either of these conditions is excepted then the tip-head dumping operation should be undertaken under strictly controlled conditions, using spotters and survey to monitor the movements of the advancing tip-head.

11.0 MONITORING

11.1 Environmental Monitoring

Environmental monitoring requirements of the site are regulated by the project approval and are summarised in the site Environmental Management and Monitoring Plans.

11.1.1 Groundwater

- All tailings dams should be monitored for seepage, both through visual inspection and groundwater monitoring
- The groundwater downstream of the tailings dams should be monitored for salinity and AMD impact from the tailings
- Once groundwater within the site has recovering following rehabilitation of sections of the site,
  - Groundwater adjacent to rejects emplacement areas should be monitored as an early warning system (EC, pH, SO_4)
  - Down gradient boundary of the site should be monitored for impact from rejects emplacement areas (EC, pH, SO_4).

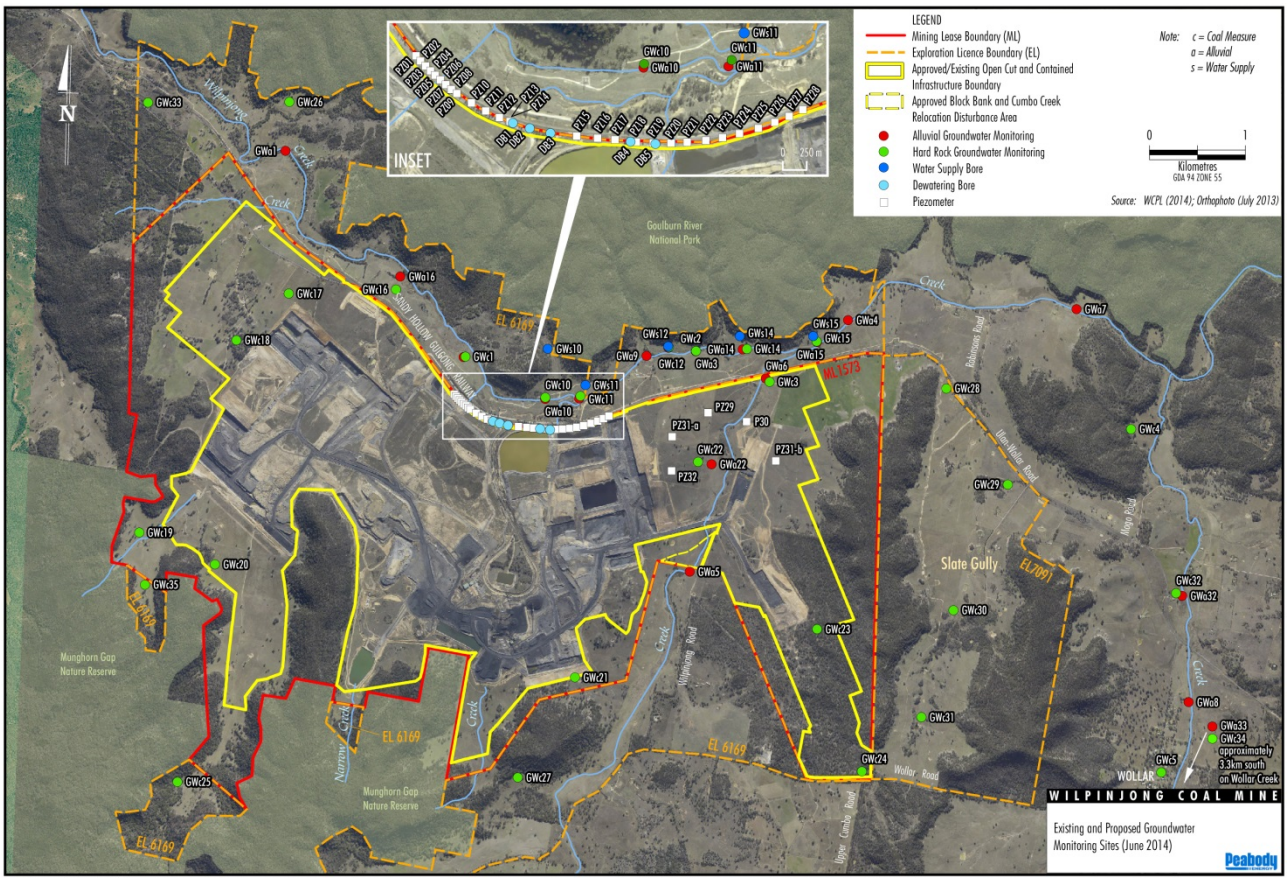

Figure 14: Groundwater monitoring network

Figure 14 shows the groundwater monitoring network across the Wilpinjong mine site.

11.1.2 Surface Water

- Water in tailings dams will be monitored for pH, EC, turbidity and SO_4 (monthly) as per the Surface Water Monitoring Plan (WCPL 2014c).

11.1.3 AMD

Acid mine drainage is controlled by the disposal methodology, in particular the separation of the rejects from air by means of capping. The rejects should be regularly tested for acid mine drainage potential. The tailings and coarse rejects should be tested on a six-monthly basis for:

- pH and salinity
- Total sulphur content
- Maximum potential acidity (MPA)
- Acid neutralising capacity (ANC)
- Net acid producing potential (NAPP)
- ANC/MPA ratio
- Net acid generation (NAG).

If a significant change in MPA, NAPP or NAG from the median properties in Table 7 is encountered, the rejects emplacement methodology should be reviewed with a view to amend the blending ratio.

11.1.4 Spontaneous combustion

The following monitoring should occur:

- Daily inspections of reject emplacement areas for signs of spontaneous combustion
- The current spontaneous combustion monitoring program should be reviewed when the results of the current propensity testing is received.

11.2 Geotechnical and operational monitoring

11.2.1 Tailings dams

Based on the DSC requirements (DSC 2013a, 2013b, presented in Attachment E):

Table 11: DSC Monitoring and reporting requirements – Tailings dams

Monitoring Event	Monitoring Frequency	Reporting frequency
Vibration monitoring	Per blast	Monthly Immediately if peak particle velocities (PPV) exceeds 50 mm/s
Liaison officer		When appointed
Seepage monitoring	As per seepage monitoring plan	Monthly Immediately if seepage changes significantly
Position of active mine faces		Monthly
Inspection of dam	Per blast	Monthly
Compliance statement		Monthly

Monitoring Event	Monitoring Frequency	Reporting frequency
Movement monitoring	Monthly	Monthly
Monitoring Management Plan review		Annually
Statistics report for financial year (1 July to 30 June)		Annually

The operation and maintenance plan (ATC 2013) for each dam should be followed. Monitoring requirements as outlined in ATC (2013) are summarised in the following table.

Table 12: Monitoring Requirements as per Operations Manual – Tailings dams

Monitoring Event	Monitoring Frequency	Reporting frequency
Tailings Surface Level	Weekly	Annually
Tailings discharge quantities	Monthly	Annually

11.2.2 CHPP/BPF

At the CHPP and BPF, the following observations should be made.

Table 13: Proposed monitoring for co-disposal areas

Monitoring Event	Monitoring Frequency	Reporting frequency
Consistency and water content of tailings filter cake	Daily	Annually
Density of thickener outflow	Daily	Annually
Water balance	Daily	Annually

11.2.3 Co-disposal areas

As pointed out in Section 5.0, the main geotechnical risk associated with the co-disposal is managing filtered tailings that is wetter than specified or an unfavourable (lower than 5:1) coarse rejects to filtered tailings mix ratio. Either of these situations could result in stability issues when the mine waste rock is dumped over the combined coal rejects.

Therefore the monitoring should address this risk as follows:

Table 14: Proposed monitoring for co-disposal areas

Monitoring Event	Monitoring Frequency	Reporting frequency
Consistency of combined coal rejects	Daily/monthly	Annually

11.3 Contingency measures

11.3.1 Tailings dams

Following installation of the BPF, the tailings dams fulfil a function as contingency tailings storage facilities for cases where the BPF is not operating as intended. Potential scenarios in which the BPF may not operate as intended are:

- Poor performance of the thickeners
- Power failure to the BPF
- Breakdown of one or more of the belt filters in the BPF
- Shut down of the whole BPF for maintenance
- Failure of the BPF to handle the design tailings tonnage
- Failure of the BPF to produce the required tailings water content.

The contingency measures to account for these scenarios are:

- Maintain at least 300 000 m^3 storage capacity (or six months) in one tailings dam as a contingency until the BPF is proven to function as intended
- Build a new tailings dam when the current operating tailings dam nears its targeted capacity (e.g. build TD7 when TD6 nears filling at RL 376 mAHD (ATC 2013)).

11.3.2 Co-disposal areas

The following contingency measures for risks arising from either the high water content of the tailings filter cake or an unfavourable coarse rejects/tailings ratio associated with the co-disposal are proposed:

- Tip-head dumping, using spotters and survey to monitor the advancing tip head (Section 10.2)

11.3.3 Belt press filter plant

- Partial bypass of the BPF and deposit the tailings slurry in a tailings dam as is currently the case (this affects contingencies outlined in Section 11.3.1).

11.4 Revision and review triggers

11.4.1 Requirements

The revision and review triggers for the strategy are based on the requirements of the project approval, Schedule 4, Condition 2.

11.4.2 Review triggers

The LOM Tailings Management Strategy shall be reviewed:

1) Following an incident associated with coarse rejects and or tailings management. Incidents are defined in the project approval, Schedule 5, Condition 7
2) Change in approved production limits
3) If changes occur to the coarse rejects and or tailings such as:
    a. Geotechnical properties (specific gravity and shear strength)
    b. Ratio of coarse rejects to filtered tailings

4) If the coarse rejects and or tailings management methodology outlined in this report cannot be followed, for example due to:

   a. Instability of the combined rejects at the co-disposal point, for example due to a larger than expected portion of filtered tailings in the mix

   b. Filtered tailings being wetter than expected resulting in transportation difficulties, such as flow out of trucks

   c. Larger than expected amount of tailings deposited in the tailings dams.

12.0 APPROVALS

Section 100 approval under the *Coal Mine Health and Safety Act 2002* is required for the establishment, operation or decommissioning of coal reject emplacement areas. However this approval requirement is to be affected by the *Work Health and Safety (Mines) Regulation 2014*, which is to be adopted shortly. This regulation provides a definition of emplacement areas to specifically exclude “any reject that has been disposed of with overburden in such a way that it does not alter the stability of any overburden dump”. Subject to meeting this definition, approval would not be required for the establishment, operation and/or decommissioning of reject emplacement areas. Instead notification to DRE would be required in accordance with Clause 34 of the 2014 regulation. This would likely be preferred as it is less onerous than approval requirements.

13.0 LIMITATIONS

Your attention is drawn to the document - “Limitations”, which is included in Attachment E. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by Golder, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

14.0 REFERENCES

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Wilpinjong Coal Pty Limited (2014d), Wilpinjong Coal Groundwater Monitoring Program*, Document number WI-ENV-MNP-0006, June 2014*

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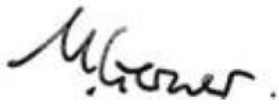
GOLDER ASSOCIATES PTY LTD

Daniel Dohle
Tailings Engineer



Mike Gowan
Principal

DD/MG/dd

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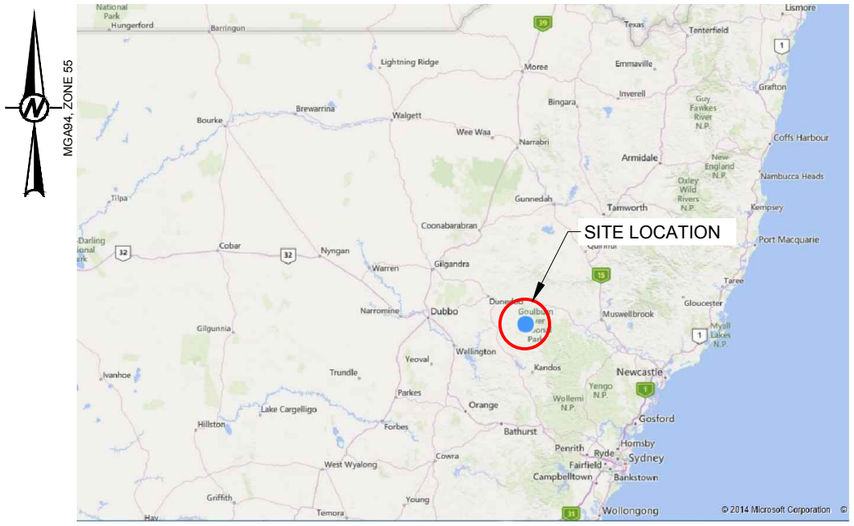
ATTACHMENT A

Golder figures

WILPINJONG LOM TAILINGS STRATEGY



LOCALITY PLAN
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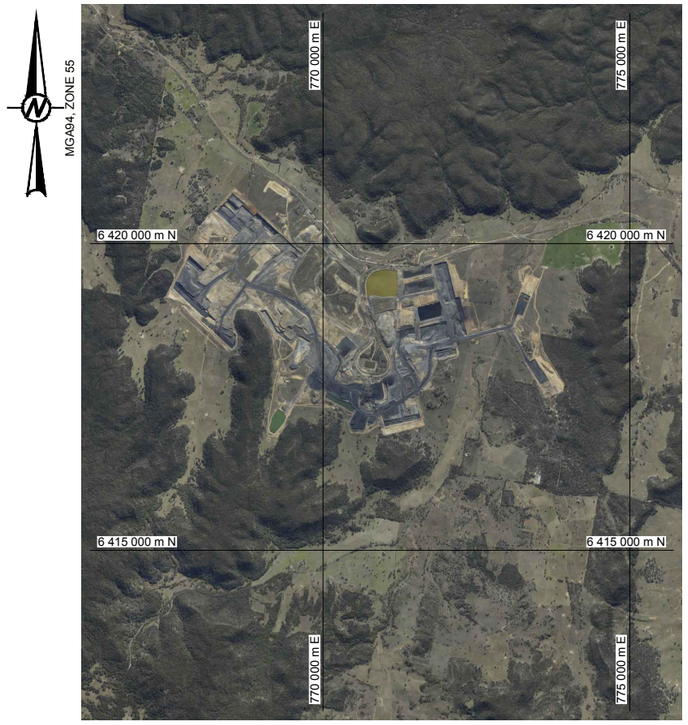


SITE LOCATION
SCALE 1:100,000 m

NOTES

1. THESE NOTES APPLY TO ALL PROJECT DRAWINGS IN THE SET UNLESS NOTED OTHERWISE AND SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATION.
2. ALL LEVELS ARE IN METRES TO AUSTRALIAN HEIGHT DATUM (AHD).
3. ALL CO-ORDINATES ARE IN METRES TO MAP GRID AUSTRALIA (MGA).
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
5. DIMENSIONS SHALL NOT BE SCALED OFF DRAWINGS.

0 2,500 5,000
1:100,000 METRES

REFERENCE
BASE AERIAL IMAGE PROVIDED BY WILPINJONG COAL PTY LTY, TAKEN FROM mga55_wilpinjong_rgb_1306_200.jpg, DATED 2014-03-06
BASE LOCALITY PLAN IMAGE TAKEN FROM BING MAP, DATED 2014-06-03 © 2014 MICROSOFT CORPORATION

CLIENT
WILPINJONG COAL PTY LTD

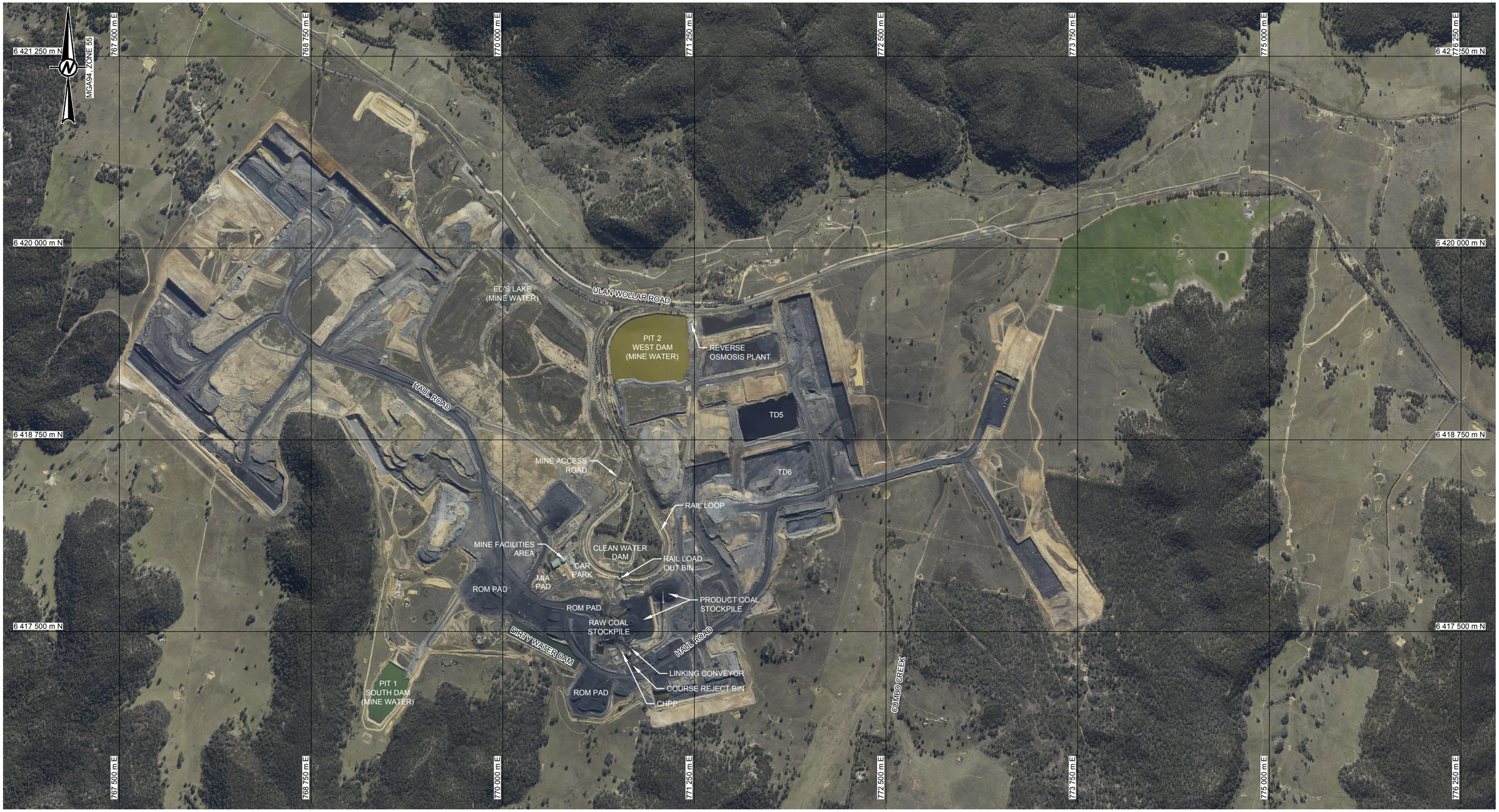
PROJECT
WILPINJONG LOM TAILINGS STRATEGY

CONSULTANT
Golder Associates

YYYY-MM-DD	2014-06-06
PREPARED	E.J.J
DESIGN	D.D
REVIEW	M.J.G
APPROVED	D.D

TITLE
SITE LOCALITY PLAN

PROJECT No.	REPORT	Rev.	FIGURE
147625002	006	A	F001



SITE PLAN

SCALE 1:25,000 m

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1:25,000 METRES

REFERENCE

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CLIENT

WILPINJONG COAL PTY LTD

PROJECT

WILPINJONG LOM TAILINGS STRATEGY

CONSULTANT

Golder Associates

YYYY-MM-DD	2014-06-06
PREPARED	E.J.J
DESIGN	D.D
REVIEW	M.J.G
APPROVED	D.D

TITLE

SITE PLAN

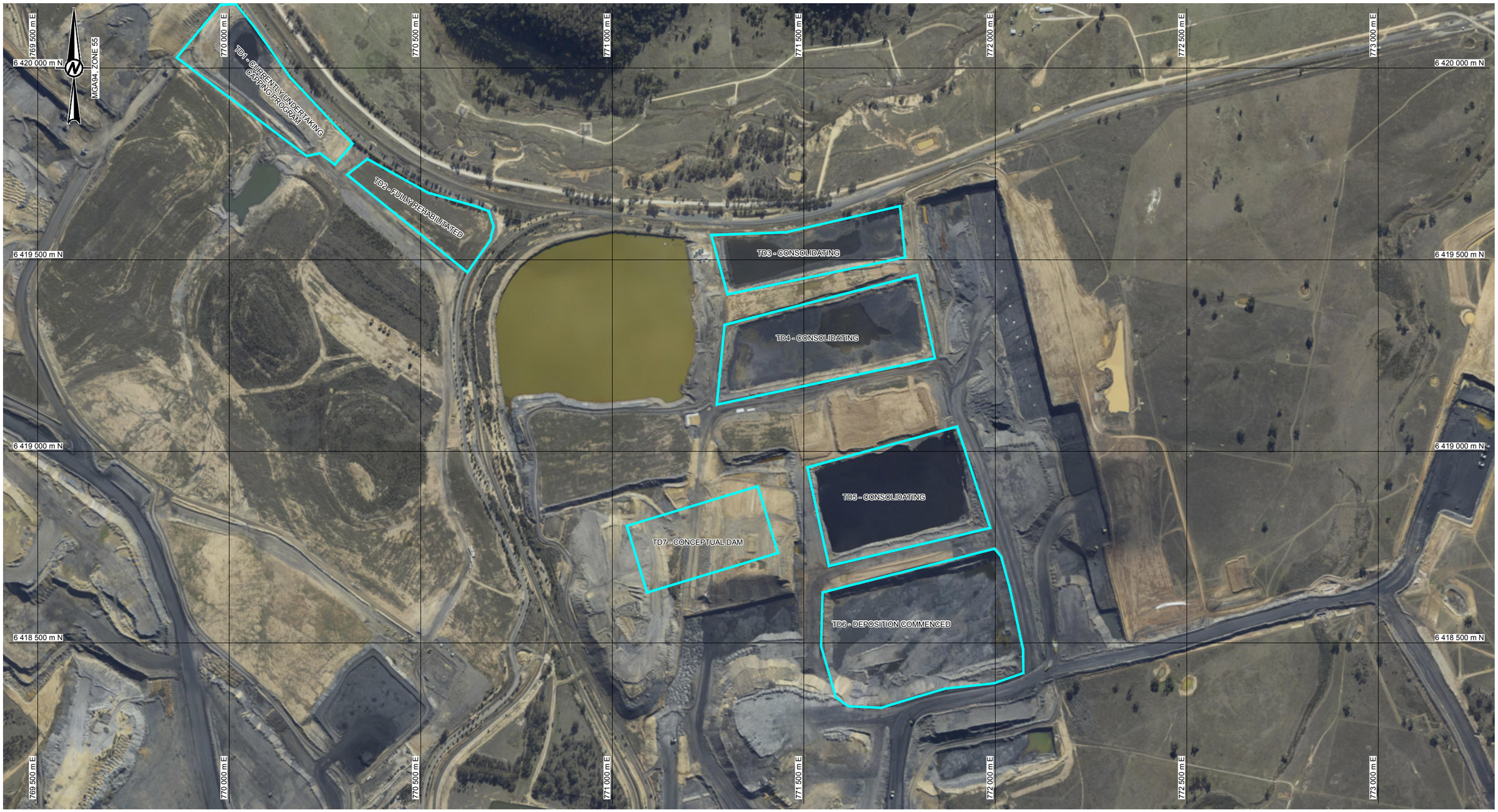
PROJECT No.	REPORT	Rev.	FIGURE
147625002	006	A	F002

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3

25 mm

0

Path: \\golder.gds\gap\Sydney\Jobs\ci\2014\147625002_WCPL_LoM Tailings_Wilpinjong\Technical Docs\CAD\FIGURES\ | File Name: 147625002-006-R-F002.dwg



LOCATION OF TAILINGS DAM

SCALE 1:10,000 m

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1:10,000 METRES

REFERENCE

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CLIENT

WILPINJONG COAL PTY LTD

PROJECT

WILPINJONG LOM TAILINGS STRATEGY

CONSULTANT

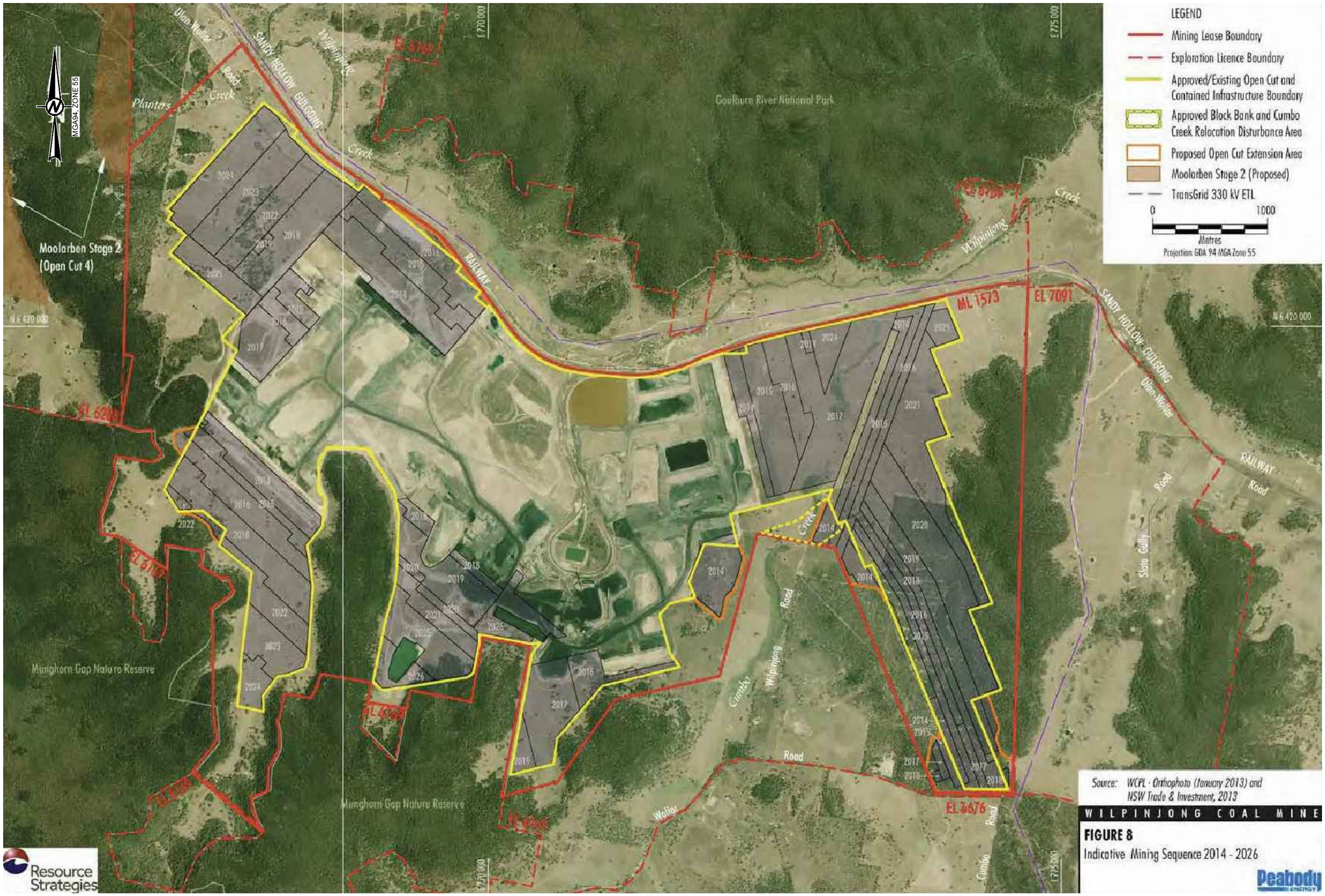
Golder Associates

YYYY-MM-DD	2014-06-06
PREPARED	E.J.J
DESIGN	D.D
REVIEW	M.J.G
APPROVED	D.D

TITLE

LOCATION OF TAILINGS DAM

PROJECT No.	REPORT	Rev.	FIGURE
147625002	006	A	F003



MINING SCHEDULE

SCALE: NOT TO SCALE

REFERENCE

BASE PLAN SOURCE FROM WILPINJONG COAL MINE MOD 5 EA - MAIN REPORT.PDF PROVIDED BY WILPINJONG COAL PTY LTY, DATED 2014-01-28

CLIENT

WILPINJONG COAL PTY LTD

PROJECT

WILPINJONG LOM TAILINGS STRATEGY

CONSULTANT

Golder Associates

YYYY-MM-DD	2014-06-06
PREPARED	E.J.J
DESIGN	D.D
REVIEW	M.J.G
APPROVED	D.D

TITLE

MINING SCHEDULE

PROJECT No.	REPORT	Rev.	FIGURE
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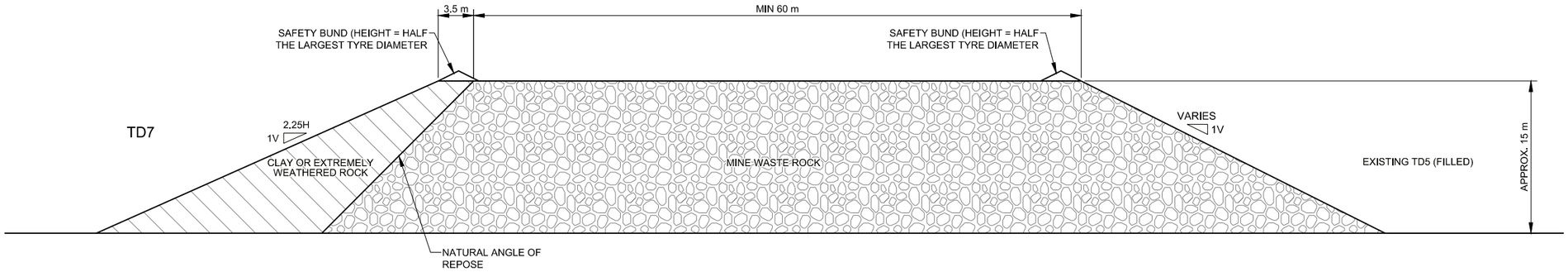
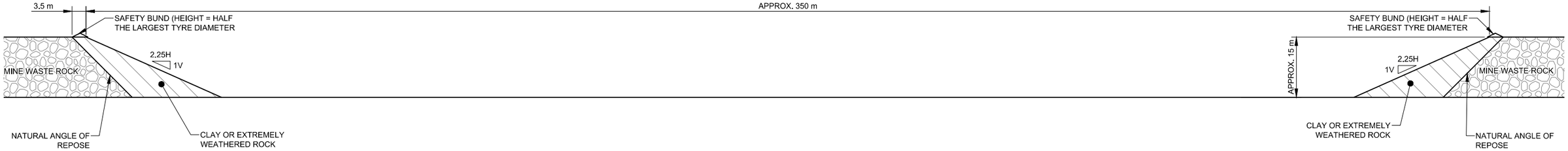


CONCEPTUAL SECTION TD7 - EMBANKMENT

SCALE 1:500 m



CONCEPTUAL SECTION TD7

SCALE 1:1,000 m

NOTES:

CONCEPTUAL SECTIONS BASED ON DESIGN FOR TD6 (ATC 2013)

0 10 20
1:500 METRES

0 25 50
1:1,000 METRES

CLIENT
WILPINJONG COAL PTY LTD

PROJECT
WILPINJONG LOM TAILINGS STRATEGY

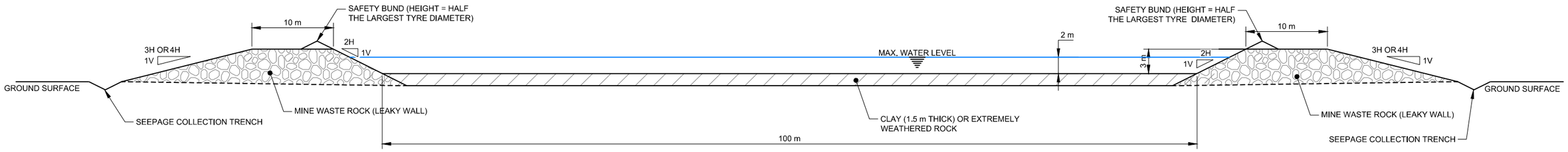
CONSULTANT

Golder Associates

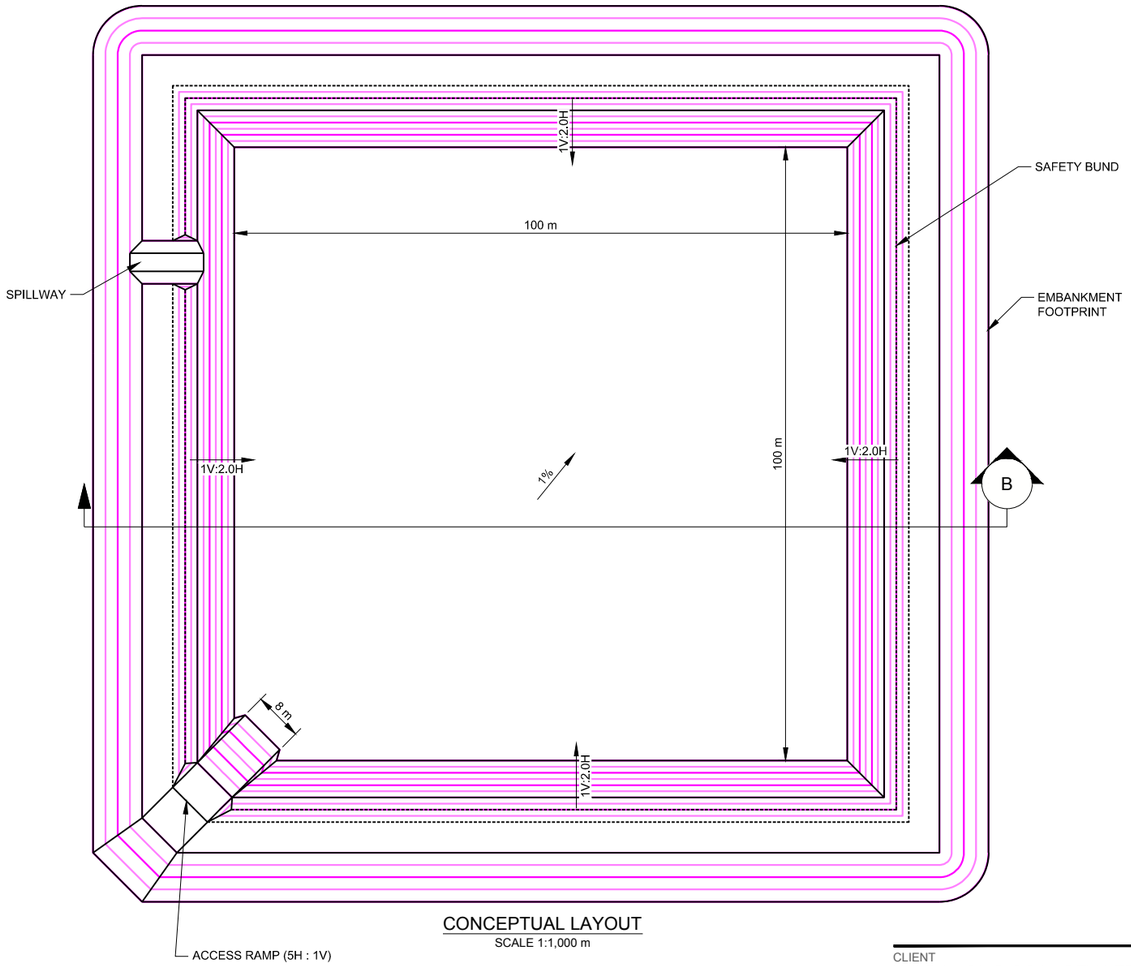
YYYY-MM-DD	2014-06-06
PREPARED	E.J.J
DESIGN	D.D
REVIEW	M.J.G
APPROVED	D.D

TITLE
TD7 CONCEPTUAL SECTIONS

PROJECT No.	REPORT	Rev.	FIGURE
147625002	006	A	F005



SCALE 1:500 m (B) CONCEPTUAL CROSS SECTION



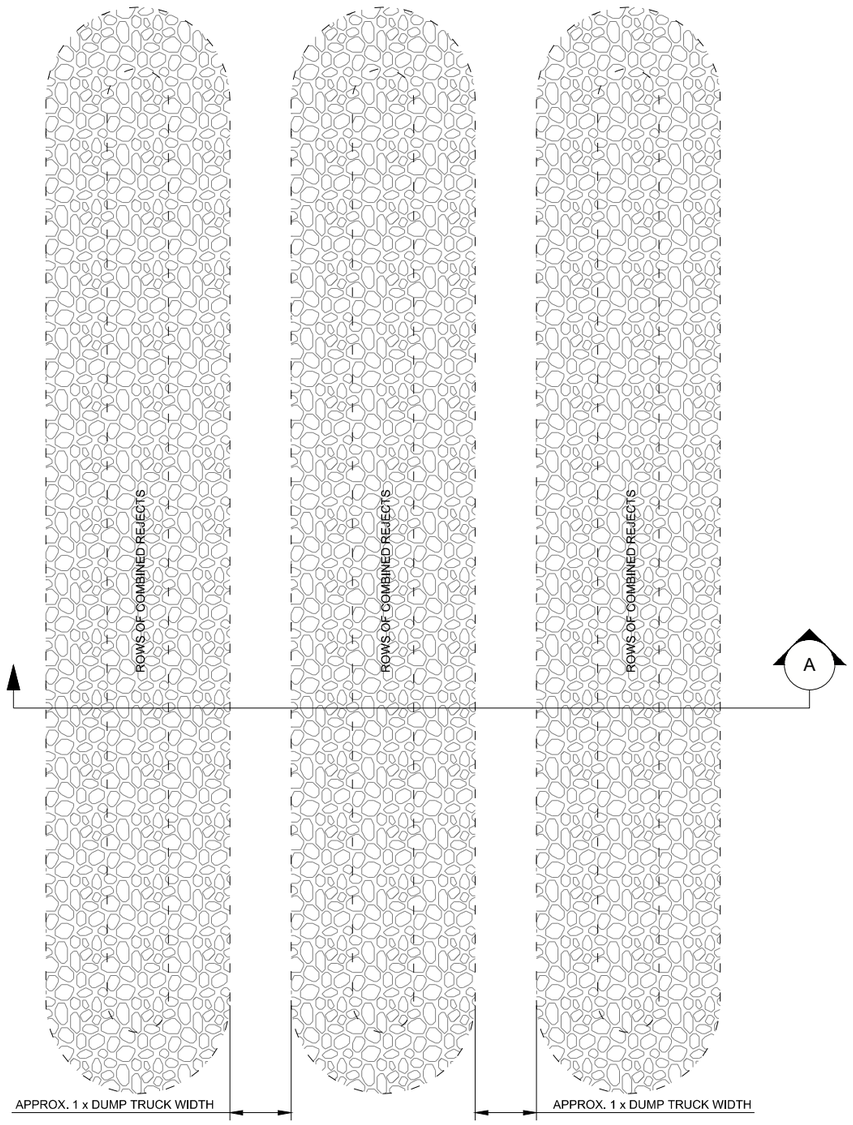
CONCEPTUAL LAYOUT
SCALE 1:1,000 m

0 10 20
1:500 METRES

0 25 50
1:1,000 METRES

CLIENT	WILPINJONG COAL PTY LTD
PROJECT	WILPINJONG LOM TAILINGS STRATEGY
CONSULTANT	Golder Associates
YYYY-MM-DD	2014-06-06
PREPARED	E.J.J
DESIGN	D.D
REVIEW	M.J.G
APPROVED	D.D
TITLE	**TAILING DEWATERING CELL - CONCEPTUAL LAYOUT AND SECTION**

PROJECT No.	REPORT	Rev.	FIGURE
147625002	006	A	F006



PLAN VIEW
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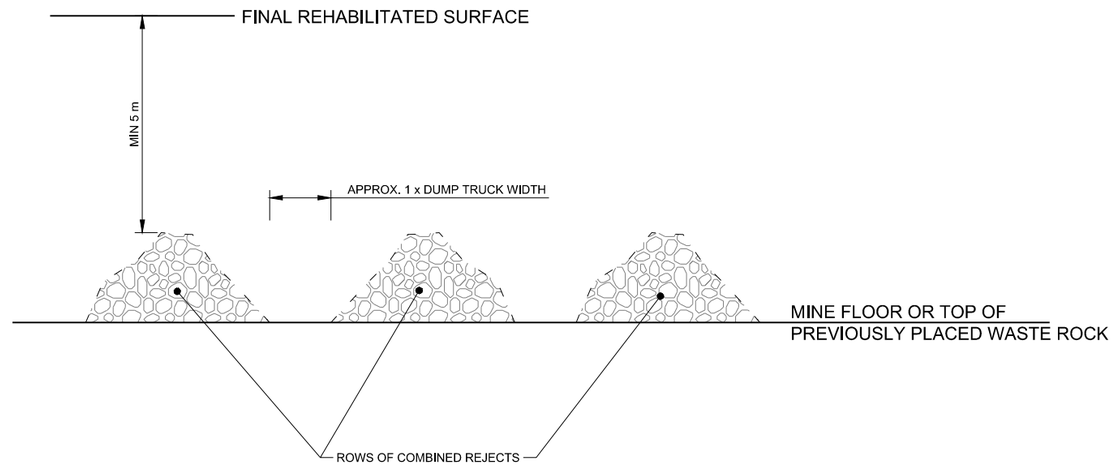

SCALE: NOT TO SCALE (A) TYPICAL CROSS SECTION VIEW

NOTES

1. ROWS OF COARSE REJECTS / TAILINGS MIX TO BE GRADUALLY COVERED WITH WASTE ROCK BY BLAST-CAST AND DOZER PUSH AND / OR TIP-HEAD DUMPING.
2. MINIMUM WASTE ROCK COVER IS 5 m WITH AT LEAST 2 m INERT COVER AT SURFACE.
3. REHABILITATION MEASURES ARE AS PER THE MOP 2014-2019 (WCPL 2014).

CLIENT	WILPINJONG COAL PTY LTD
PROJECT	WILPINJONG LOM TAILINGS STRATEGY
CONSULTANT	Golder Associates
YYYY-MM-DD	2014-06-06
PREPARED	E.J.J
DESIGN	D.D
REVIEW	M.J.G
APPROVED	D.D
TITLE	**CO-DISPOSAL DUMPING PLAN**
PROJECT No.	147625002
REPORT	006
Rev.	A
FIGURE	F007

ATTACHMENT B

DTI - Section 100 Approval

Date: 18 September 2013

Trade & Investment
Mine Safety

Mr. P. Grosvenor
Manager Mining Engineering
Wilpinjong Coal Pty Ltd
PO Box 2005,
MUDGEE, NSW, 2850

Our Ref: 13/2912

Establishment of Emplacement Facility Tailings Dam 6
Wilpinjong Coal Mine
SECTION 100 Coal Mine Health & Safety Act, 2002

Dear Sir,

Reference is made to your application and correspondence dated 19 July 2013 & 11 September 2013 respectively, wherein you seek approval to create a tailings reject emplacement area known as Tailings Dam 6 (TD6), at Wilpinjong Coal Mine.

Please be advised that pursuant to Section 100 of the Coal Mine Health & Safety Act 2002, approval is hereby granted for the creation of the above mentioned emplacement area, subject to the following conditions:-

(a) That the creation and use of TD6 emplacement area at Wilpinjong Coal Mine is completed in accordance with best practice requirements for the desiccation of tailings and the active removal of water from within the tailings facility.

(b) The establishment of TD6 is to be completed in accordance with the recommendations and commitments made within the application, and conducted within the areas shown on the plan listed below.

The application consists of:

I. Letter of application, dated 19 July 2013.
II. Application document "S100 Application – TD 6", dated July 2013
III. Design Report prepared by ATC Williams "Tailings Storage Facility TD6", N#106021R18Rev1, dated August 2013.
IV. Water and Tailings Strategy, dated September 2013.
V. Plan
Tailings Dam 6 – Location and Contour Plan, Scale 1:2,000, certified by mine surveyor 13/08/2013.

(c) An independent engineering assessment shall be made every 12 months of the holding structures and associated reject disposal project. This report shall be kept at the mine for review by Departmental officers, at their discretion.

(d) An assessment of the emplacement activities at TD6 will be completed every six months, to ensure that the operation of the facility is being completed in accordance with design, and in line with reporting requirements.

(e) Accountabilities for inspection, monitoring and surveillance will be established, and listed within the operational and maintenance manual for the tailings emplacement areas.

(f) Rehabilitation of the site will be commensurate with the objectives of the accepted Mining Operation Plan.

(g) The mine shall keep relevant inspection reports of the emplacement facility and make them available for review to Departmental officers as requested.

(h) Suitably qualified personnel are utilised to undertake inspections and assessments of the emplacement area. Open Cut Examiners or other competent persons receive relevant training to assist in determining the safe operation of the emplacement area.

(i) The location of the emplacement area(s) are to be recorded on the Mine Working Plan, which is to be prepared in accordance with the "Survey and Drafting Directions for Mine Surveyors NSW Coal 2013", issued pursuant to part 4, Clause 139, of the Coal Mines Health and Safety Regulation 2006.

(j) The date on which the emplacement area is commenced and completed in any particular emplacement is also to be recorded on the Mine Working Plan.

(k) This approval expires on 31 January 2016.

(l) By notice in writing the Chief Inspector of Coal Mines may vary or revoke this approval at any time.

It is pointed out that notwithstanding this emplacement approval, your company is still required to obtain any consent, licence or approval which may be necessary from the relevant Shire Council or any other Government Department or Instrumentality.

A copy of the submitted documentation has been appropriately endorsed and is included for your records.

Yours faithfully,

18/9/13

W. Barraclough
Acting Chief Inspector of Coal Mines

With delegated authority from the Minister of Mineral Resources.

ATTACHMENT C

Dam Safety Committee requirements

New South Wales Government

Dams Safety Committee

ANNEXURE "D"

STANDARD MINING CONDITIONS

The conditions are laid out as follows:

- Annexure D*x* (D, D1, etc) specify what is required to be done by the applicant, and what the DSC may do following certain triggers;
- Annexure E specifies the frequencies of monitoring and report, and the format of reports. That is, it provides details of the deliverables required by the approval;
- Other Annexures may specify additional details, for example Annexure B describes what should be recorded on geological plans.

In Annexure D*x* the section often includes a preamble. These may contain guidance as to how to satisfy a condition, or the background to a condition, but are not conditions in themselves. The conditions look like the following paragraph:

Annexure D Condition 0.0: This is a condition, you must comply with it.

Section I. GENERAL REQUIREMENTS

The following general conditions apply to the **WILPINJONG - 1** application.

There is considerable scope for the DSC to modify the frequency of reporting and monitoring, and the format of reporting, during the life of an approval. This is important as it allows the level of monitoring to be increased or decreased according to the risk perceived by the DSC. This section sets out a hierarchy within the approvals:

1. Annexure E;
2. a specified management plan;
3. Annexure D.

That is, any frequency specified in Annexure D is overridden by frequencies specified in a management plan or in Annexure E.

The DSC prefers applicant to prepare monitoring proposals in the first instance. Often these will become endorsed by being included as a reference in Annexure E. Annexure E will be re-issued by the DSC when there is a change to monitoring.

Annexure D Condition 1.1: The:

- **Frequency of monitoring;**
- **Frequency of reporting; and**
- **Format of reporting;**

For any condition hereunder will be as stated in Annexure E or, where no statement is provided in Annexure E, as stated in the relevant "Management Plan" as specified in Annexure E, or, where no Plan is specified in Annexure E or where the Plan makes no statement, as specified in the condition hereunder.

Annexure D Condition 1.2: The Dams Safety Committee ("the DSC") may modify the content of Annexure E, any associated Management Plan, or the frequency of monitoring or reporting or the format of reporting for any condition hereunder from time to time.

Annexure D Condition 1.3: Where the DSC has modified the conditions as per Condition 1.2 and has advised the liaison officer appointed under Condition 22 in writing those modified conditions replace any conditions hereunder and shall have the same effect as if they were part of the approval.

Annexure D Condition 1.4: The company shall arrange for DSC staff to inspect the workings from time to time when required by the Committee, and in particular when any significant features are encountered in the workings.

Section II. CORRESPONDENCE WITH THE DSC

Annexure D Condition 2.1: All correspondence with the Committee in regard to this approval shall be clearly labelled Wilpinjong - 1.

Annexure D Condition 2.2: Reports required under the Wilpinjong - 1 shall be sent to:

The Executive Engineer
N.S.W. Dams Safety Committee
Floor 3, Macquarie Tower,
10 Valentine Avenue,
Parramatta N.S.W. 2150

P.O. Box 3720
Parramatta N.S.W. 2124

Fax: (02) 9842 8071
Phone: (02) 9842 8073

Email: *mining@damsafety.nsw.gov.au*

Annexure D Condition 2.3: Copies of any reports or plans required to be provided to the Committee shall also be provided to the Senior Inspector of Coal Mines, Lithgow.

Section III. NOTIFICATION OF COMMENCEMENT OF MINING

This section does not apply to the Wilpinjong - 1 application

Section IV. INSPECTION OF WORKINGS

This section does not apply to the Wilpinjong - 1application

Section V. SEAM LEVEL GEOLOGICAL FEATURES

This section does not apply to the Wilpinjong - 1 application

Section VI. SURFACE GEOLOGY/TOPOGRAPHY

This section does not apply to the Wilpinjong – 1 application

Section VII. WATER MONITORING

This section does not apply to the Wilpinjong - 1 application

Section VIII. EMERGENCY WATER CONDITIONS

This section does not apply to the Wilpinjong - 1 application

Section IX. SUBSIDENCE AND STRAIN MONITORING

This section does not apply to the Wilpinjong - 1 application

Section X. PLANS SUPPLIED TO THE DSC

Annexure D Condition 10.1: **Several conditions require the company to submit plans to the DSC. Apart from the plans that may be required under condition 23, these plans shall share the same scale and base map to facilitate the comparison and correlation between different factors.**

Section XI. VARIATIONS

Annexure D Condition 11.1: **From time to time the company may desire to alter the approved mining within the notification area in a minor way (termed a "minor variation"). Applications for minor variations to approvals shall be made to the Chief Inspector of Coal Mines, who will refer the application to the DSC.**

Annexure D Condition 11.2: **The Committee requires all proposed variations, even small variations, be referred to it (via the Chief Inspector) for its consideration. To expedite the approval process where the proposed variation is urgent and very minor, DSC staff will give a decision by phone, fax, or email to the company, and inform the Chief Inspector of their decision. The company will then approach the Chief Inspector for formal approval or otherwise, with both parties aware of the Committee's decision. This procedure should only be followed in urgent situations.**

Annexure D Condition 11.3: The usual procedure is to submit a written application, with appropriate supporting documentation, to the Chief Inspector of Coal Mines, who will then forward this to the DSC for its consideration. The company should also send a copy of the application to the DSC so that it may begin processing it. This will allow for a quick reply.

Where the variation is sufficiently extensive (as determined by the DSC) the company will be required to submit a full application to mine within the notification area.

Annexure D Condition 11.4: The Chief Inspector of Coal Mines shall not approve any minor variation unless an endorsement by the DSC has been received.

Section XII. COMPLETION OF MONITORING

Annexure D Condition 12.1: Regardless of the status of mining or location of the active face, all monitoring and reporting shall continue as specified until the Committee considers that it is no longer required, or that the frequency of the monitoring can be altered. The company may apply to the Committee for modification to the frequency of monitoring, or for the discontinuance of monitoring.

Section XIII. COMMITTEE'S EMERGENCY POWERS

Annexure D Condition 13.1: The Minister, on notice from the Committee, may at any time or times suspend for a period of time, cancel, alter, omit from or add to this consent or the conditions of this consent.

Annexure D Condition 13.2: Regardless of the content of any management plan, the Committee may require by notice in writing the company to:

- Cease any or all mining at the subject area until such time as the Committee agrees that mining may recommence;
- Undertake investigations as specified by the Committee; and/or
- Undertake remedial works as specified by the Committee.

Section XIV. VIBRATION MONITORING

Where the Committee considers that a mining application will generate significant ground vibrations, for example as a result of blasting in an open cut, then the Committee may specify a peak particle velocity limit at critical structures. Vibration monitoring will normally be required to ensure that this limit is not exceeded.

Annexure D Condition 14.1: The Company shall ensure that peak particle velocities generated as a result of mining will not exceed 50 mm/s at any point on the Dams. A minimum requirement is that monitoring of blast vibration occurs on the crest of TD2N, TD2S, TD2SS and TD6.

Annexure D Condition 14.2: The Company will develop and implement a program to monitor particle velocities generated by mining at sites on the dam and will inform the DSC of the details of this monitoring program as soon as possible.

SECTION XIX STATISTICAL REPORTS

Annexure D Condition 19.1: **The company shall report in writing to the DSC the total tonnage of coal extracted from the Notification Area, and any other statistics related to the approval at intervals as specified in Annexure E.**

SECTION XX COMPLIANCE REPORTS

Where several monitoring programs are required under an approval it is difficult, and time consuming, to check compliance with the conditions. As it is the company's responsibility to maintain compliance with the conditions the Committee believes that the company is the appropriate organisation to undertake the bulk of this role.

Annexure D Condition 20: **The company shall submit a statement of its compliance with the required conditions at intervals as specified in Annexure E.**

SECTION XXI MONITORING, REPORTING AND EXTRACTION SCHEDULE

This section does not apply to the Wilpinjong - 1 application

SECTION XXII LIAISON OFFICER

Effective coordination and management of the monitoring programs is essential. To this end the Committee believes that a person should be nominated as a "liaison officer". Their responsibilities will include:

- Providing a point of contact for the Committee,
- Ensuring compliance with the monitoring conditions,
- Coordinating the supply of monitoring data to the Committee, and
- Ensuring that the Committee is kept up to date of the progress of mining.

Annexure D Condition 22.1: **The company shall appoint a suitably qualified and experienced person, acceptable to the Committee, as a liaison officer for the period when there is active mining in the notification area and for an additional period afterwards as determined by the Committee.**

SECTION XXIII REPORTS ON THE LOCATION OF THE FACE

Annexure D Condition 23.1: **The company shall provide a plan to the DSC showing the location of any active faces, to the satisfaction of the Committee, monthly or at intervals as specified by the Committee from time to time. These reports are to continue until such time as the Committee agrees that it should cease, regardless of whether there is active mining in the notification area.**

SECTION XXIV CESSATION OF THIS APPROVAL

Annexure D Condition 24.1: **No mining shall be undertaken in the approved area after 31 December 2020 unless such date is extended by the Committee.**

END OF ANNEXURE D

Annexure D Condition 14.3: Written reports on the results of the monitoring outlined in the above condition 14.2 shall be submitted to the DSC at intervals as specified in Annexure E.

Annexure D Condition 14.4: The DSC will be informed immediately if peak particle velocities, as a result of mining at any point on the dams, exceed 50mm/s.

Annexure D Condition 14.5: If peak particle velocities exceed the limits set in the above condition 14.4, then the DSC may require an inspection of the dam by a suitable dams engineer.

SECTION XV REPAIR OF DAMAGE TO PRESCRIBED DAMS

This section does not apply to the Wilpinjong - 1 application

SECTION XVI CONTINGENCY PLANS

This section does not apply to the Wilpinjong - 1 application

SECTION XVII MONITORING MANAGEMENT PLANS

Where several monitoring programs are required under an approval the Committee requires that a Management Plan be developed for these programs. The plan will specify at least:

- What is required to be done and when,
- What is required to be delivered and when, and
- Who is responsible for each task.

In certain circumstances it may be appropriate for the plan to incorporate other aspects, for example appropriate levels of training, the format of reports, or regular feedback from the Committee.

Annexure D Condition 17.1: The company shall prepare a Management Plan encompassing all of the monitoring programs required by the Committee.

Annexure D Condition 17.2: The plan required above is to be submitted to the DSC for its approval as soon as possible.

Annexure D Condition 17.3: The plan required above shall be reviewed by the company at intervals as specified in Annexure E. The review process shall include forwarding a copy of the plan to the DSC with a request for comments.

SECTION XVIII CLOSURE REQUIREMENTS

This section does not apply to the Wilpinjong - 1 application

New South Wales Government

Dams Safety Committee

ANNEXURE "D1"

SPECIAL MINING CONDITIONS

Section I. GENERAL REQUIREMENTS

The following general conditions apply to the Wilpinjong - 1 application.

Annexure D Condition 1.1: The:

- **Frequency of monitoring;**
- **Frequency of reporting; and**
- **Format of reporting;**

For any condition hereunder will be as stated in Annexure E or, where no statement is provided in Annexure E, as stated in the relevant "Management Plan" as specified in Annexure E, or, where no Plan is specified in Annexure E or where the Plan makes no statement, as specified in the condition hereunder.

Annexure D Condition 1.2: The Dams Safety Committee ("the DSC") may modify the content of Annexure E, any associated Management Plan, or the frequency of monitoring or reporting or the format of reporting for any condition hereunder from time to time.

Annexure D Condition 1.3: Where the DSC has modified the conditions as per Condition 1.2 and has advised the liaison officer appointed under Condition 22 in writing those modified conditions replace any conditions hereunder and shall have the same effect as if they were part of the approval.

Section II. INSPECTION OF DAMS

Annexure D1 Condition 2.1: The Company shall undertake a safety inspection of the dam, to a standard acceptable to the Committee, after each blast.

Annexure D1 Condition 2.2: The Company shall submit a report on the dam inspection results at intervals and in a format as specified in Annexure E.

Section III. SEEPAGE MONITORING

Annexure D1 Condition 3.1: **The Company shall develop a program of seepage monitoring, to a standard acceptable to the Committee, and submit it as soon as possible.**

Annexure D1 Condition 3.2: **The Company shall submit a report on the seepage results at intervals and in a format as specified in Annexure E.**

Annexure D1 Condition 3.3: **The Company will advise the Committee immediately if changes in the seepage from the dam are considered to be significant.**

Section IV. MOVEMENT MONITORING

Annexure D1 Condition 4.1: **The Company shall implement a program of movement monitoring for the crests of embankments TD2N, TD2S, TD2SS and TD6.**

Annexure D1 Condition 4.2: **The Company shall submit a report on the movement of the embankment at intervals and in a format as specified in Annexure E.**

End of Annexure D1

Annexure E

Frequency of Monitoring and Reporting Format Statement

Table of deliverables **Wilpinjong - 1 approval**

Frequency of Monitoring	Frequency of reporting	Condition	Deliverable Description	Due Date	Management Plan
	One off	ANN D/17	Monitoring Management Plan to the satisfaction of the Committee	As soon as possible	Reviewed annually
	One off	ANN D/14	Vibration monitoring program – DSC to be informed	As soon as possible	
	One off	ANN D/22.1	Liaison officer appointed	As soon as possible	
	One off	ANN D1/3	Seepage monitoring plan	As soon as possible	
	Monthly	ANN D/ 23.1	Reports on position of the face		
Per blast	Monthly	ANN D/ 14.3	Reports on results of vibration monitoring		
Per blast	Monthly	ANN D1/ 2	Reports on inspection of dam		
	Monthly	ANN D/ 20	Compliance statement		
	Monthly	ANN D1/3	Report on monitoring seepage		
Monthly	Monthly	ANN D1/4	Report on movement monitoring		
	Annually	ANN D/ 17	Review of Monitoring Management Plan	By July 31	

	Annually	ANN D/ 19	Statistics report for year ended 30 June	By July 31	
As required		ANN D/ 14.4	Notification if PPV exceeds 50 mm/s	Immediately	
As required		ANN D1/ 3.3	Notification if seepage changes significantly	Immediately	

THIS APPROVAL CEASES 31/12/2020

ATTACHMENT D

Risk register

Wilpinjong

Waste Management Plan - Life of Mine Tailings Strategy

Commercial Risk Assessment

FIELD INPUT NOT REQUIRED

						Risk with Existing Controls										Risk with Additional Controls						
						Likelihood Level		Impact Level								Likelihood Level		Impact Level				
Item Number	**Risk / Opportunity**	**Description**	**Cause/s**	**Impact of Risk/Opportunity**	**Existing Controls**	**Select from List**		**Select from List**			**Classification**	**Priority**	**Action**	**Management Plan input**	**Responsible Stakeholder**	**Select from List**		**Select from List**		**Classification**	**Priority**	**Further Remedies Required**	**Remedy Required**
		What can happen	How and why it can happen				e		a		auto	auto	auto				a		i	auto	auto	Yes/No	
R1	Delay in movement/disposal of tailings	Disruption to coal processing, create a bottleneck for CPP throughput	Rainfall events that prevent operation of plant/use of haul roads. BFP breakdown. Reached capacity of tailings dam.	Significantly decreased CPP throughput reduces net annual profit.	Contingency storage capacity.	D - Unlikely	D	5 - Severe	5	[redacted]	D5	High	Mitigate	Design tailings storage to accommodate variation in CPP throughput and delayed disposal of tailings.	Peabody Energy Australia	D - Unlikely	D	4 - Major	4	D4	Medium	No	
R2	Slope instability	Failure of tailings storage facility.	Inadequate mixing of fine and coarse rejects.	Failure of tailings storage facilities. Site contamination.	Slope stability analysis. Maintain consistent proportion of fine and coarse material. Investigation of ponds prior to rehabilitation.	D - Unlikely	D	4 - Major	4	[redacted]	D4	Medium	Monitor		Peabody Energy Australia								
R3	Spontaneous Combustion	Spontaneous combustion can result in open flame and burning of coal rejects and tailings.	Caused by an oxidation reaction, causing the coal to heat up beyond the ignition temperature.	Risk of burns to coal mine operators. Exposure of nearby receptors to air pollution.	Follow Spontaneous combustion management plan. Regular monitoring and testing of rejects and tailings to detect spontaneous combustion propensity and carbon content. Inspection of tailings dams prior to consolidation and capping. Capping of tailings dams reduces risk of oxidation.	B - Likely	B	3 - Moderate	3	[redacted]	B3	High	Mitigate	Design of low permeability capping system to reduce infiltration of oxygen. Final landform designed to minimise runoff and erosion.										
R4	Acid Metalliferous Drainage	Waste rock can potentially oxidate to generate acid mine drainage which may then precipitate metals in the soil.	Geochemical composition of the tailings and rejects and exposure to air and water.	May contaminate groundwater through soil seepage or surface water from runoff.	AMD monitoring. Minimise exposure to air during operational phase through saturation of tailings. The 2m capping system also provides a barrier to oxidation. Dilution of rejects with overburden material at a ratio of at least 2:1 (QUERY: is this realistic with BFP in place?).	C - Possible	C	3 - Moderate	3	[redacted]	C3	Medium	Monitor	Use of acid neutralising soil for tailings cover. Environmental Geochemistry International (2005) recommends a multi layered cover based on tailings properties.	Peabody Energy Australia	D - Unlikely	D	3 - Moderate	3	D3	Medium		
R5	Dust Generation	Generation of dust plumes	Increased dust generation form filtered tailings.	Exposure of nearby receptors to fine particulate matter. Breach of EPA licence conditions.	Air quality monitoring, watering.	B - Likely	B	2 - Minor	2	[redacted]	B2	Medium	Monitor										
R6	Leak in tailings and rejects storage facility	Leachate/tailings is leaked from the storage facility into groundwater.	Liner defect.	Contamination of groundwater.	Groundwater monitoring. Careful design and construction quality assurance for liner.	D - Unlikely	D	3 - Moderate	3	[redacted]	D3	Medium	Monitor										
R7	Pipeline blockages/failures	Pipeline to tailings dam is blocked, or pipe burst.	Pipe defect, overloading, precipitation, sedimentation in pipes.	Contamination of water. Reduction of CHPP throughput.	Pipe flow monitoring.	D - Unlikely	D	3 - Moderate	3	[redacted]	D3	Medium	Monitor										
R8	Tailings dam overtopping	The tailings dam may overflow.	Rainfall exceeds storage capacity, wave action overtopping the dam, water balance not maintained	Potentially contaminated runoff and contamination of surface water. Damage to mine infrastructure. Disruption to mine operations. Breach of EPA licence conditions.	Water balance analysis, emergency spillway. Maintain adequate freeboard in ponds.	E - Rare	D	3 - Moderate	3	[redacted]	D3	Medium	Monitor										
R9	Static tailings liquefaction	A significant reduction in tailings strength and stiffness	Slope instability	The resulting flowslide of liquefied tailings against the dam wall causing structural failure (may not be applicable if tailigns placed in mined out voids).	Mixing of tailings with rejects or overburden material.	D - Unlikely	D	4 - Major	4	[redacted]	D4	Medium	Monitor	Introduction of BPF and disposal of fine and coarse rejects with waste rock									
R10	Settlement	Settling of mine rejects and tailings.	slope instability, inadequate compaction/mixing of coarse and fine rejects.	Failure of tailings storage facilities. Site contamination.	Compaction and consolidation during transfer of rejects and tailings to storage facilities.	C - Possible	C	3 - Moderate	3	[redacted]	C3	Medium	Monitor										
R11	Erosion	Erosion of capping system to expose coal rejects and tailings	Rainfall, wind	Contamination of surface water, soil, groundwater.	Landform design, cover system, revegetation	C - Possible	C	3 - Moderate	3	[redacted]	C3	Medium	Monitor										
R12	Failure to meet regulatory requirements	Failure to meet the conditions outlined in the EP licence, (and other regulatory requirements)	Failure in environmental management	Fee/penalty, shutdown of operations.	Environmental monitoring, planning and management systems.	C - Possible	C	3 - Moderate	3	[redacted]	C3	Medium	Monitor										

Priority Matrix		Impact Level				
		1	2	3	4	5
Likelihood	A	Low	Medium	High	Extreme	Extreme
	B	Low	Medium	High	High	Extreme
	C	Low	Medium	Medium	High	Extreme
	D	Low	Low	Medium	Medium	High
	E	Low	Low	Low	Low	Medium

Legend	
	Immediate Action
	Heightened Action
	Business as Usual

Extreme/High/Medium to be analysed and mitigated/enhanced on Risk and Opportunity Matrix (if action is not Avoid or 100% Transfer)
Extreme/High require specific action plans and management responsibility
Medium requires specific monitoring and/or response procedures
Low managed by routine procedures

A - Almost Certain	A 1 - Negligible	1 A - Almost Certain	A 1 - Insignificant	A1	Low Manage
B - Likely	B 2 - Minor	2 B - Likely	B 2 - Minor	A2	Medium Monitor
C - Possible	C 3 - Moderate	3 C - Possible	C 3 - Moderate	A3	High Mitigate
D - Unlikely	D 4 - Major	4 D - Unlikely	D 4 - Major	A4	Extreme Mitigate
E - Rare	E 5 - Severe	5 E - Rare	E 5 - Outstanding	A5	Extreme Mitigate
				B1	Low Manage
				B2	Medium Monitor
				B3	High Mitigate
				B4	High Mitigate
				B5	Extreme Mitigate
				C1	Low Manage
				C2	Medium Monitor
				C3	Medium Monitor
				C4	High Mitigate
				C5	Extreme Mitigate
				D1	Low Manage
				D2	Low Manage
				D3	Medium Monitor
				D4	Medium Monitor
				D5	High Mitigate
				E1	Low Manage
				E2	Low Manage
				E3	Low Manage
				E4	Low Manage
				E5	Medium Monitor

ATTACHMENT E

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LIMITATIONS

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