WAMBO COAL
SITE WATER BALANCE

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Document Control

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Revisions

Rev No	Date	Description	By	Checked	Signature
0	Oct 2015	Development of WCPL document consistent with other Water Management Plans	WCPL/Palaris	SP	
1	Nov 2015	Incorporate comments from DP&E review	WCPL	SP	

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1.0 Introduction

1.1 Background

The Wambo Coal Mine (the Mine) is situated approximately 15 kilometres west of Singleton, near the village of Warkworth, New South Wales (**Figure 1**). Wambo is owned and operated by Wambo Coal Pty Limited (WCPL), a subsidiary of Peabody Energy Australia Pty Limited.

A range of open cut and underground mine operations have been conducted at WCPL since mining operations commenced in 1969. Mining under the current Development Consent (DA 305-7-2003) commenced in 2004 and permits both open cut, underground operations and associated activities to be conducted.

The approved run-of-mine (ROM) coal production rate is 14.7 million tonnes per annum and all product coal is transported from WCPL by rail. A summary of the approved Wambo Coal Mine is provided in **Table 1**.

Table 1: Summary of the Approved Wambo Coal Mine

Component	Approved Wambo Coal Mine[1]
Life of Mine	21 years (from the date of the commencement of Development Consent [DA305-7-2003]). 1st March 2025
Open Cut Mining	Open cut mining at a rate of up to 8 Mtpa of ROM coal from the Whybrow, Redbank Creek, Wambo and Whynot Seams
	An estimated total open cut ROM coal reserve of 98 Mt
	Open cut mining operations under current approved MOP
Underground Mining	Underground mining of up to 7.5 Mtpa of ROM coal from the Whybrow, Wambo, Arrowfield and Bowfield Seams. Underground ROM coal reserves are estimated at 109.3 Mt.
Subsidence commitments and management.	The subsidence performance measures listed in Conditions 22 and 22A of the Development Consent (DA305-7-2003).
ROM Coal Production Rate	Up to 14.7 Mtpa of ROM coal
Total ROM Coal Mined	207.3 Mt
Waste Rock Management	Waste rock deposited in open cut voids and in waste rock emplacements adjacent open cut operations
Total Waste Rock	640 million bank cubic metres (Mbcm)
Coal Washing	Coal handling and preparation plant (CHPP) capable of processing approximately 1,800 tonnes per hour (tph)
Product Coal	Production of up to 11.3 Mtpa of thermal coal predominantly for export
CHPP Reject Management	Coarse rejects and tailings would be incorporated, encapsulated and/or capped within open cut voids in accordance with existing Wambo management practices
Total CHPP Rejects	Approximately 28.2 Mt of coarse rejects and approximately 18.6 Mt of tailings
Water Supply	Make-up water demand to be met from runoff recovered from tailings storage areas, operational areas, dewatering, licensed extraction from Wollombi Brook and Hunter River
Mining Tenements	Coal Lease (CL) 365, CL374, CL397, Consolidated Coal Lease (CCL) 743, Mining Lease (ML) 1402, ML1572, ML1594, Authorisation (A) 444, Exploration Licence (EL) 7211.

Note: [1] Development Consent DA305-7-2003 (as modified April 2015)

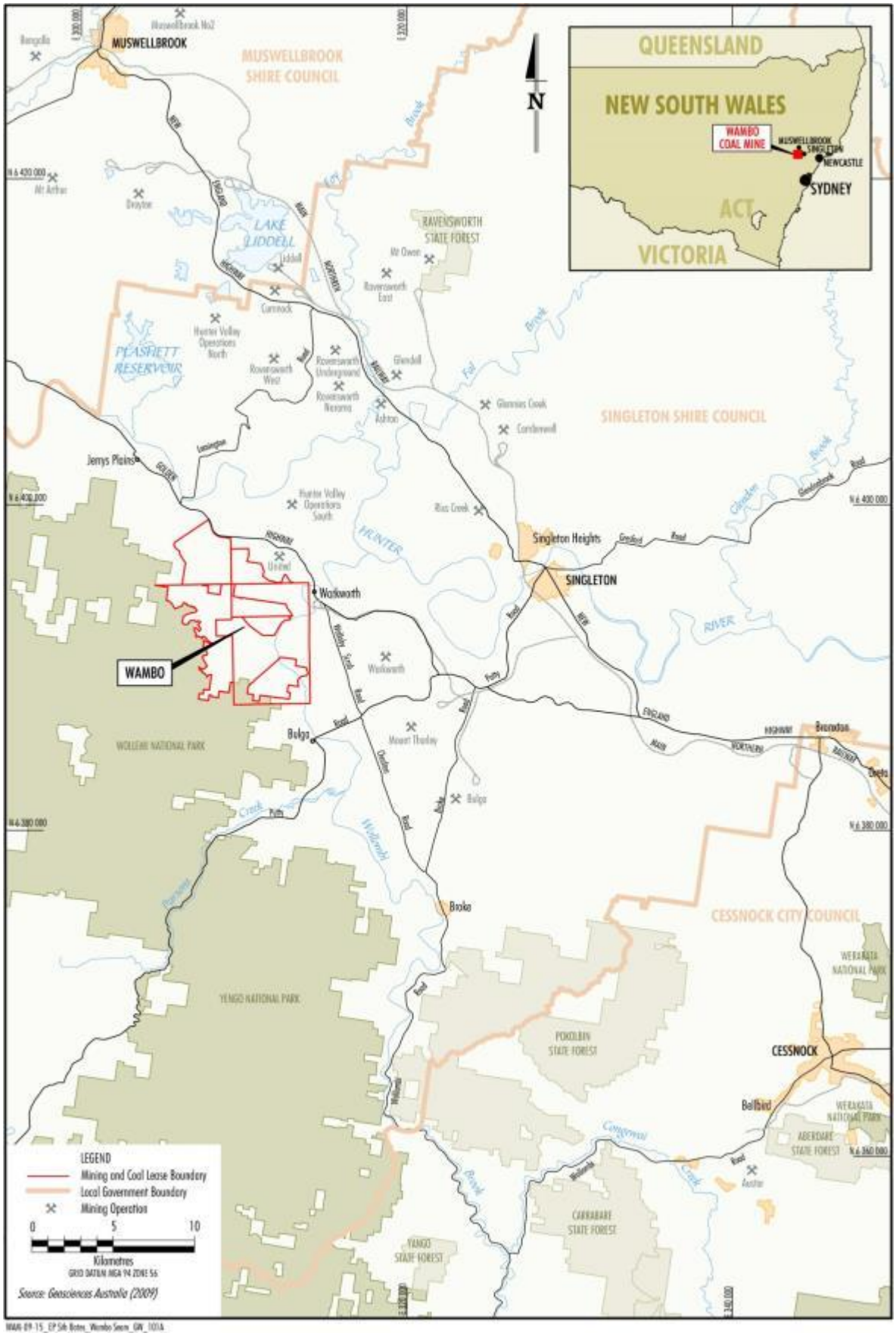

Figure 1: Wambo Coal Regional Location

In accordance with Schedule 4, Condition 30(a) of DA305-7-2003, WCPL are required to prepare a Site Water Balance (SWB), which forms part of the WCPL Site Water Management Plan. **Figure 2** shows the components of the WCPL Site Water Management Plan. This SWB should be read in conjunction with the other components of the WCPL Site Water Management Plan.

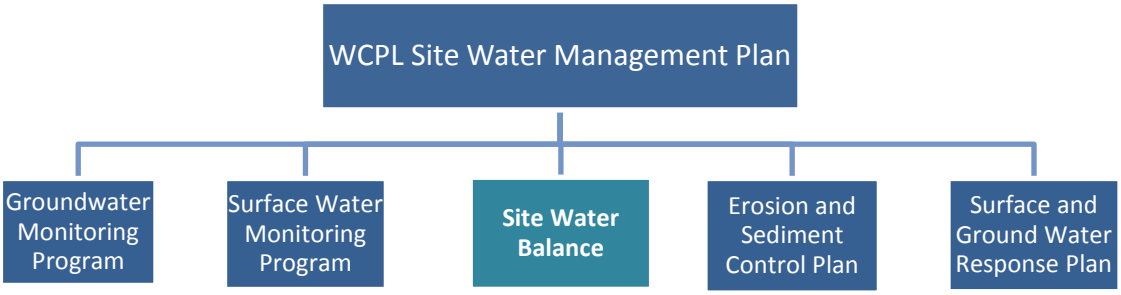

Figure 2: WCPL Site Water Management Plan

Condition 25 Schedule 4 of DA305-7-2003 requires that WCPL review and updated the SWB on an annual basis. A SWB was developed by Gilbert and Associates for the Mine in 2005 (Gilbert and Associates, 2005a) for…. Subsequent SWB's have been developed for the Mine as follows:

- In September 2005, SWB developed to satisfy Condition 25 Schedule 4 of DA305-7-2003 (Gilbert and Associates, September 2005);
- In April 2006, the SWB was updated in accordance with DA305-7-2003 and approved by the DP&E (formally the NSW Department of Planning) on the 30 June 2006 (WCPL, April 2006);
- In March 2010 the SWB was updated in accordance with DA305-7-2003 and resubmitted to the DP&E (Gilbert and Associates, March 2010);
- In January 2014 the SWB was reviewed and updated to incorporate a simulation model (**Section 3.2**) to verify the long term water balance for the site (Worley Parsons, January 2014);
- In November 2015 a review of the SWB, as part of the Surface Water Assessment for the United and Wambo Open Cut Coal Mine Project Environmental Assessment (**Section 3.3**) was under development.

1.2 Purpose

This SWB has been developed to address the relevant requirements of DA305-7-2003. In accordance with Condition 30(a) Schedule 4 of DA305-7-2003, WCPL have prepared this SWB to provide information on:

- WCPL's water management system;
- Sources of water for the site;
- Water use on site;
- WCPL's Water Balance Model;
- Review and reporting requirements; and
- Responsibilities for site personnel (specifically in relation to this SWB).

The SWB has also been prepared in accordance with Schedule 6, Condition 4 of DA305-7-2003.

1.3 Scope

This SWB has been prepared in accordance with the relevant conditions of the DA305-7-2003 to provide a detailed overview of WCPL's water management system and water balance model. This SWB forms part of WCPL's Environmental Management System (EMS).

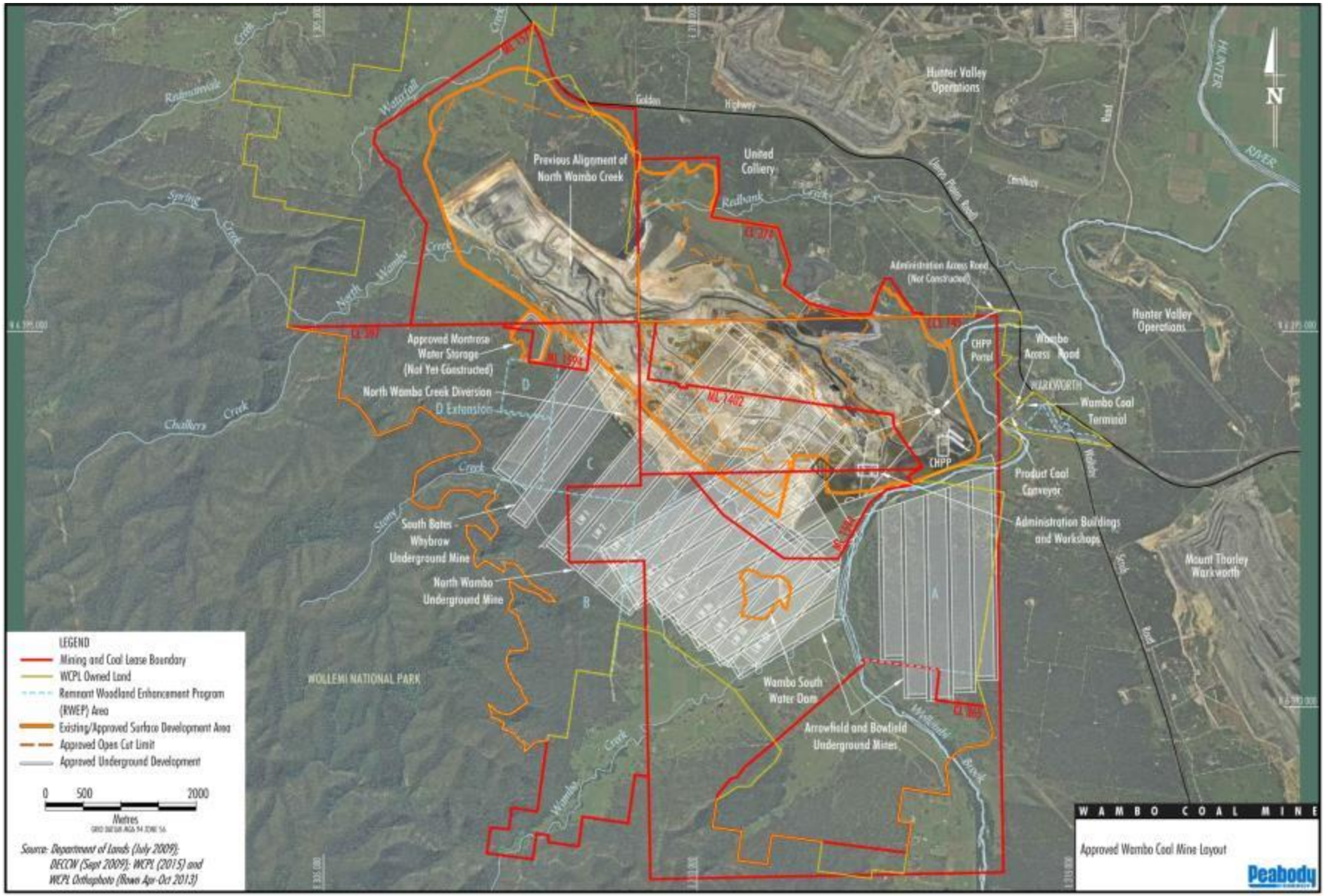

Figure 3: Approved Wambo Coal Mine Layout

1.4 Statutory Requirements

This SWB has been prepared to fulfil the requirements of DA305-7-2003 (**Table 2**). These requirements, and the section of the SWB where they are addressed, are shown in **Table 2**.

Table 2: DA305-7-2003 Requirements for the SWB

Schedule	Condition	DA 305-7-2003	GWMP Section
4	25	Each year the Applicant shall: a) Review the site water balance for the development against the predictions in the EIS; b) Re-calculate the site water balance for the development; c) Assess current and forecast compliance with the rules of the Hunter River Salinity Trading Scheme; and d) Report the results in the Annual Review. These calculations must exclude the clean water system, including any sediment control structures, and any dams in the mine lease area which fall under the Maximum Harvestable Right Dam Capacity; include any dams that are licensable under Section 205 of the Water Act 1912, and water harvested from any non-harvestable rights dam on the mine lease area; address balances of inflows, licenced water extractions, and transfers of water from the site to other sites; include an accounting system for water budgets; and include a salt budget.	**Section 4.2**
4	30	Before carrying out any development, the Applicant shall prepare a Site Water Management Plan for the development in consultation with DRE and NOW, and to the satisfaction of the Secretary. This plan must include: … (a) The predicted site water balance;	**This SWB**
6	4	**Management Plan Requirements** The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include: (a) detailed baseline data;	**Section 3.1**
		(b) a description of: - the relevant statutory requirements (including any relevant consent, licence or lease conditions);	**Section 1.4**
		- any relevant limits or performance measures/criteria;	**NA to the SWB**
		- the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;	**NA to the SWB**
		(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/ criteria;	**NA to the SWB**
		(d) a program to monitor and report on the: - impacts and environmental performance of the Wambo Mining Complex; - effectiveness of any management measures (see c above);	**Section 4.2**
		(e) a contingency plan to manage any unpredicted impacts and their consequences;	**NA to the SWB**
		(f) a program to investigate and implement ways to improve the environmental performance of the Wambo Mining Complex over time;	**Section 4.2**
		(g) a protocol for managing and reporting any: - incidents; - complaints; - non-compliances with statutory requirements; and - exceedances of the impact assessment criteria and/or performance criteria; and	**NA to the SWB**
		(h) a protocol for periodic review of the plan.	**Section 4.1**

1.5 Stakeholder Consultation

In accordance with Condition 30, Schedule 4 of DA 305-7-2003, the development of the SWB (Version 0) has been undertaken in consultation with Department of Resources and Energy (formerly the Department of Primary Industries or DPI) and NSW Office of Water (NOW), prior to submitting to the Secretary of the DP&E for approval.

Correspondence in relation to the SWB is attached as **Appendix A**.

2.0 Water Management System

2.1 System Description

The site water management strategy for the Mine is based on the containment and re-use of mine water and on the control of sediment that may be potentially carried with runoff from disturbed areas such as the waste rock emplacements.

The water management system controls waters generated from development and operational areas while diverting upstream water around such areas. It includes both permanent structures that will continue to operate post-closure and temporary structures that will only be required until the completion of rehabilitation works. The water management system includes:

- Up-catchment diversion structures;
- Water storage dams;
- Sediment dams;
- Water transfer infrastructure (i.e. pumps and pipelines);
- Licenced Discharge Point; and
- The North Wambo Creek Diversion.

A schematic of the site water management system is provided in Figure 4.

The site water management system operates predominately as a closed self-contained system. The water balance of the system fluctuates with climatic conditions and as the extent of the mining operations evolves over time.

A section of the North Wambo Creek has been diverted to avoid the Wambo Open Cut Mine. The North Wambo Creek diversion was constructed in accordance with the approved North Wambo Creek Diversion Plan.

A network of storages and drains has been established to capture runoff from mine water catchment areas. Runoff from areas disturbed by mining (including the CHPP and associated industrial areas) is collected in open cuts and mine water storages. These storages are used as priority sources of water for the CHPP and dust suppression. Runoff from haul roads is treated in sediment traps or is diverted to mine water storages.

CHPP tailings are discharged to the mined-out Hunter open cut pit. Water liberated from the settling tailings filters through spoil at the southern boundary of this area and reports to the mined-out Homestead open cut pit. Water is reticulated from this pit, via a series of dams, back to the CHPP.

An extensive reticulation system has been developed to transfer water between open cuts, underground operations and mine water storages, to source water from Wollombi Brook and the Hunter River, to facilitate controlled releases to Wollombi Brook (in accordance with EPL 529 and the Hunter River Salinity Trading Scheme) and to provide water to the adjacent United Collieries operation.

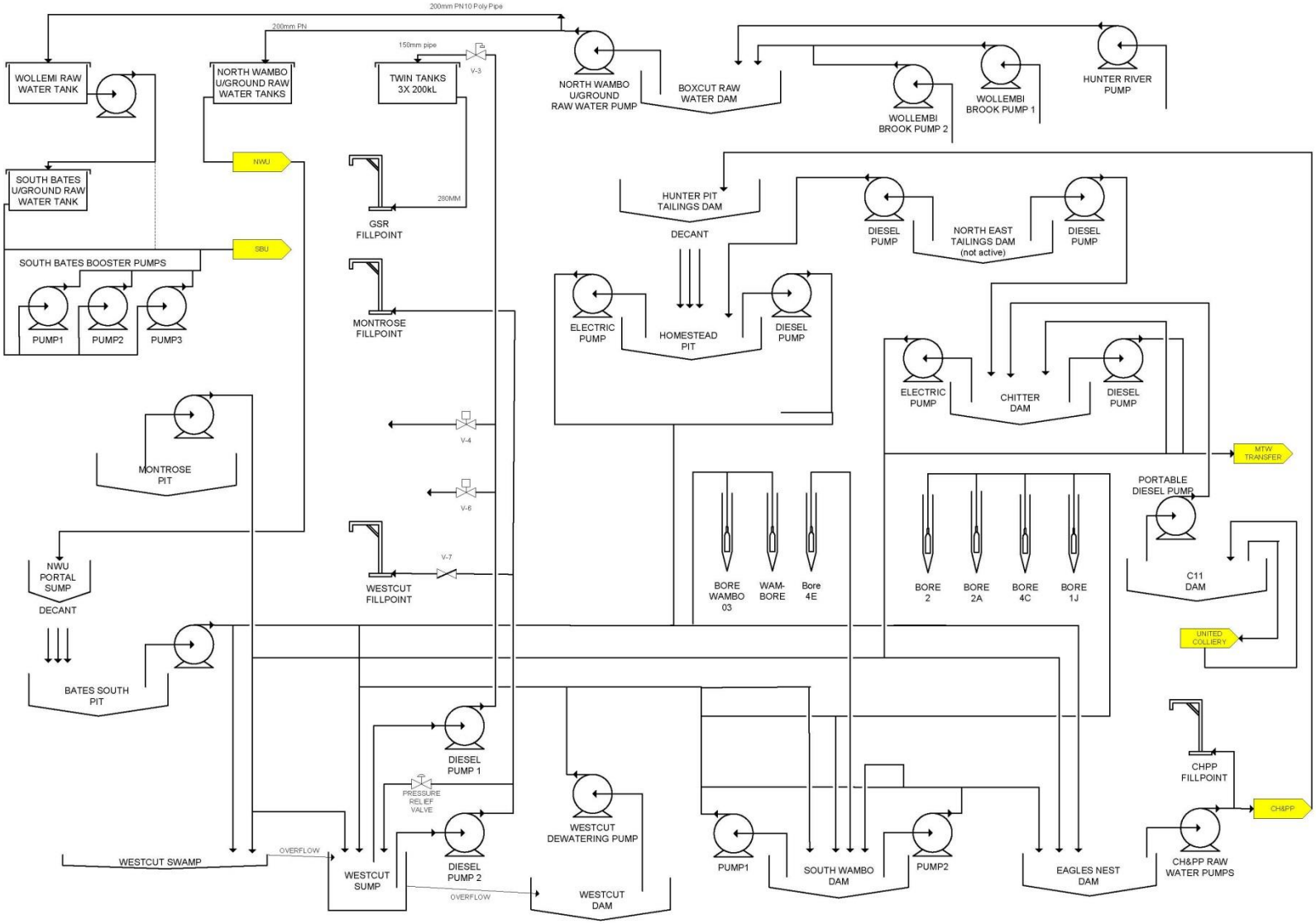

Figure 4: Water Management System

Runoff from rehabilitated and establishing revegetated mine areas is directed to sediment retention storages. These are either allowed to drain to local drainages or, depending upon the water quality, are directed to mine water storages.

The available water sources and the relatively large surface and underground storage capacity for mine water have provided WCPL with significant flexibility to manage the water system.

2.2 Water Sources

Water at the Mine is primarily sourced from:

- Water dewatered from open cuts;
- Water dewatered from the Underground Mine;
- Runoff and seepage from mine emplacement areas;
- Runoff and seepage from ROM and product coal stockpiles;
- Supernatant and rainfall yield from the tailings (fine rejects) disposal area;
- Haul road and hardstand area runoff;
- Runoff from workshop and vehicle re-fuelling area;
- Runoff from enhanced evaporation sprays; and
- Grey water from the domestic sewage treatment facility.

These sources of water represent water collected in site storages which originate from disturbed areas of the site, including poorest quality water, sediment laden water, drainage from areas disturbed by mining activity and Underground Mine water.

2.3 Water Uses

Water is predominantly required at the Mine for operation of the CHPP, for wash down of mobile plant, for dust suppression on haul roads and hardstand areas and for dust emission control sprays in the ROM and product coal stockpile areas. The water demand for haul road and stockpile dust suppression varies due to climatic conditions and the length and usage of haul roads. Similarly, the CHPP water demand varies with coal production rate and the underground water demand varies with underground mining rate.

Water is also used in the underground mine for dust suppression sprays, cooling of longwall miner motors and gearboxes and cooling of couplings and drives.

Some water is also used for watering vegetation establishment areas, fire fighting and other non-potable uses.

2.4 Mine Development

2.4.1 Open Cut

The Open Cut mine is divided into a number of pits. These pits comprise the Bates South Pit, Bates South Extended and Montrose Pit. Montrose Pit is divided into West and East Pits consistent with the splitting of the pit. Each pit is further divided into strips (approximately 100m wide) and blocks which are orientated to suit the sequence of mining which is influenced by seam dip, seam structures and strip ratio.

The South Bates Pit is being mined so as to provide a platform from which the underground will access the Whybrow seam. The remaining void will be filled to the base of the Wambo seam to allow the underground to access the Wambo seam. The majority of the waste from South Bates Pit will be placed back in the void, and some waste will be sourced from Montrose or South Bates Extended Pit.

To the immediate south of South Bates Pit, is the South Bates Extended Pit. This pit will only be mining the upper seams, due to interaction issues with the North Wambo Underground workings. The pit will be mined using both excavators and bulk dozer push.

The Montrose West Pit is on the down dip side of the coal seams and reaches its northern limit in 2017. Mining then reverses back within the Montrose East Pit. The box cut for Montrose pit was completed in 2014, and waste is now short hauled into the advancing void. Waste dumping will occur up to a maximum height of RL 160.

The Montrose West Pit will maintain a void on the north eastern side of the pit to minimise rehandle when the Montrose East Pit is removed. The mining sequence will follow a traditional benching arrangement to allow separate working areas for each excavator.

2.4.2 Underground

The approved North Wambo Underground (NWU) mine consists of eleven 250m longwall panels, with the panels oriented south-west to north-east **Figure 3**). Longwall panels LW1 - 5 have been developed off main headings driven from the existing Bates South highwall. Access to longwall panels LW6 to LW10 (and LW10a) is from the Homestead In-Pit open cut highwall. The longwall panels are approximately 1.7km to 3.6 km in length and extend to the southern side of Stony Creek.

The approved South Bates Underground (SBU) mine (Whybrow Seam) consists of three 228 - 240m longwall panels, with the panels oriented south-west to north-east (**Figure 3**). Longwall panels SBLW11, SBLW12 and SBLW13 will be developed off the Bates South highwall. The longwall panels are approximately 1.9km - 2.0km in length and extend to the southern side of Stony Creek (**Figure 3**).

The proposed SBU (Wambo Seam)[1] is subject to modifying DA305-7-2003 (MOD15). MOD15 was submitted in July 2015 and is currently under determination by the DP&E.

[1] SBU (Wambo Seam) consists of three 222 - 240m longwall panels, with the panels oriented south-west to north-east. Longwall panels SBLW14, SBLW15 and SBLW16 will be developed off Main Headings developed off the Bates South East highwall. The longwall panels are approximately 1.5km – 1.8km in length and extend to the southern side of Stony Creek.

3.0 Water Balance Model

3.1 Original Water Balance Model Development

A water balance model was developed for the Mine water management system as part of Wambo Development Project EIS studies in 2003 (June, 2003). The model simulated inflows, outflows, transfers and changes in storage of water on site on a daily basis, under variable climatic conditions. The general components and linkages of the water management system simulated by the model are shown in schematic form on Figure 4.

3.1.1 Model Data and Assumptions

The model was set up to use 116 years of (July to June) rainfall data recorded at Jerry's Plains rainfall station, to examine 116 different climatic scenarios that may be experienced. Average monthly pan evaporation data were used in the model, drawn from regional long term average data.

Hydrological processes such as rainfall-runoff, evaporative losses, seepage through spoil areas and the settling and movement of water in the tailings void were simulated using lumped hydrological relationships. A linear relationship was used to simulate runoff and seepage from rainfall on the various catchments and mine landforms. These relationships were of the form:

Runoff or Seepage (megalitres [ML]) = C x Rainfall (millimetres [mm]) x Area (square kilometres [km^2])

Where C = runoff or seepage yield coefficient, and

Area = catchment or landform plan area.

The yield coefficients used in the modelling are summarised in **Table 3** below.

Table 3: Yield Coefficients used in Water Balance Model

Component	Yield Coefficient
Seepage from overburden spoil	0.25
Runoff from overburden spoil	0.14
Runoff from tailings area	0.5
Seepage from recently rehabilitated spoil	0.15
Runoff from undisturbed areas	0.1
Rainfall-runoff in open cut	0.8
Runoff from mine disturbed areas	0.45
Runoff from CHPP and coal stockpile areas	0.7

Predicted groundwater inflows to both open cut and underground mining activities were provided by AGE Consultants as part of Wambo Development Project Environmental Impact Statement (EIS) studies (2003).

Onsite water demand varies with coal production and climatic conditions and was assessed from monitored CHPP make-up volumes and recorded ROM coal tonnage. Above-ground dust suppression demand was based on a usage rate[2] of 120 L/t of (open cut) ROM coal.

[2] Wambo Development Project EIS (2003) studies.

Underground mine demand was estimated from a usage rate[1] of 83 L/ROM (underground) tonne.

A percentage of the water discharged with tailings was assumed to be recovered to mine water storages (47%).

The mine water storages are not modelled individually; rather a single total storage (representing all mine water storages) is modelled, with catchment inflow, evaporative loss and extraction to meet demands. When the volume in this storage drops to 20% of its available capacity, the model assumes that licensed extraction from the Wollombi Brook/Hunter River systems is commenced. In the model, release is simulated as “spills” from the mine water storage system. This is a model simplification. In reality, spills are avoided by undertaking controlled releases from the site in accordance with WCPL’s Environment Protection Licence and the requirements of the Hunter River Salinity Trading Scheme. Other storages explicitly modelled include the open cut, tailings storage and underground mine.

3.1.2 Model Results

Results of modelling indicated that the water management system would predominantly operate with a small water deficit (i.e. a requirement to import some water from the Hunter River, Wollombi Brook and/or surrounding mining operations). Model results conservatively indicated that there was a 32% chance that some external make-up would be required from these sources.

Modelling results indicated that off site disposal of excess water either to Wollombi Brook or transfer to other mining operations (i.e. periods when water volume on site was in excess of the water management system capacity), had a 47% chance of occurring. Any controlled releases to Wollombi Brook would be made in accordance with WCPL’s Environment Protection Licence.

3.2 Water Balance Model Review

Condition 25 Schedule 4 of DA305-7-2003 requires WCPL to review and re-calculate the SWB on an annual basis. As part of this review WCPL reruns the water balance model using actual monitoring data collected as part of WCPL’s water monitoring program.

The most recent review of the water balance model was undertaken by WorleyParsons in December 2013 as part of a Water Audit for the Mine (WorleyParsons, 2013). As part of the review Worley Parsons developed an OPSIM™ site water model, which incorporates the current operational water management systems, containment storages, catchment characteristics and other relevant factors.

3.2.1 Model Data and Assumptions

3.2.1.1 Rainfall and Evaporation

Climatic daily data for the Mine was obtained from the Department of Environment and Resource Management (DERM) Data Drill System for the Wambo Main Deposit (32.58°N, 150.99 E) location.

The average annual rainfall for the Mine is approximately 645 mm based on 125 years (1889 –2013) of daily data. Monthly site rainfall records for the Mine were provided by WCPL for the years 1997–2011. A review of the site data and Data Drill data indicated that the site data was 15% lower than the Drill Data therefore WorleyParsons adopted the Drill Data rainfalls for long term water management simulation and adjusted them by 15% (reduction) to be consistent with site recorded rainfall.

The average annual pan evaporation rate for the Mine was 1532mm based on 123 years of daily data (1889-2011). The lake evaporation rate for the Mine was calculated at 1391mm, based on a pan factor of 0.91. The WCPL OPCIM™ model accounts for reduced evaporation in mining pits through application of a reduction factor of 0.7, based on previous experience. Restricted evaporation in mining pits is justified on the basis of reduced sunlight exposure and reduced wind driven boundary layer circulation.

3.2.1.2 Catchment Description

A summary of the external catchments is provided in **Table 4.**

Table 4: WCPL Catchment Breakdown Summary

Storage/Area	Catchment Area (ha)[1]					
	Undisturbed	Hardstand	Mining	Spoil (rehab)	Spoil (not rehab)	Tailings
Bates North Open Cut	52.1	13.63	108.98	0	0	0
Bates South Open Cut	15.2	0	127.63	16.97	8.22	0
C11 Dam	12.9	3.4	0	7.97	3.72	0
Chitters Dam	1.1	14.89	0	11.16	5.57	0
Eagles Nest Dam	15.1	12.21	4.69	11.51	0.99	0
Gordon Below Franklin	1	22.8	9.06	11.69	25.03	0
Homestead Box Cut Dam	2.7	3.47	0	11.44	21.31	0
Homestead Central (Decant)	0.9	27.43	0.08	13.71	110.97	0
Homestead Pit (Old Portals)	0	17.35	7.98	96.16	99.94	0
Hunter Pit (Tailings)	6.5	0	0	16.73	25.66	26.68
Milk Can Dam	6.1	2.88	0	5.03	0	0
Montrose Open Cut	26	9.24	97.23	46.45	74.43	0
North East Open Cut	0.1	3.27	0	2.25	31.28	26.14
Wambo Box Cut (Clean)	0	11.32	0	0.8	0.48	0
West Cut Water Dam	2.5	9.07	0	16.92	49.98	0

Notes:

1. Catchment Area as at December 2013.

A plan showing the catchment and associated land use classifications is presented in **Figure 5.**

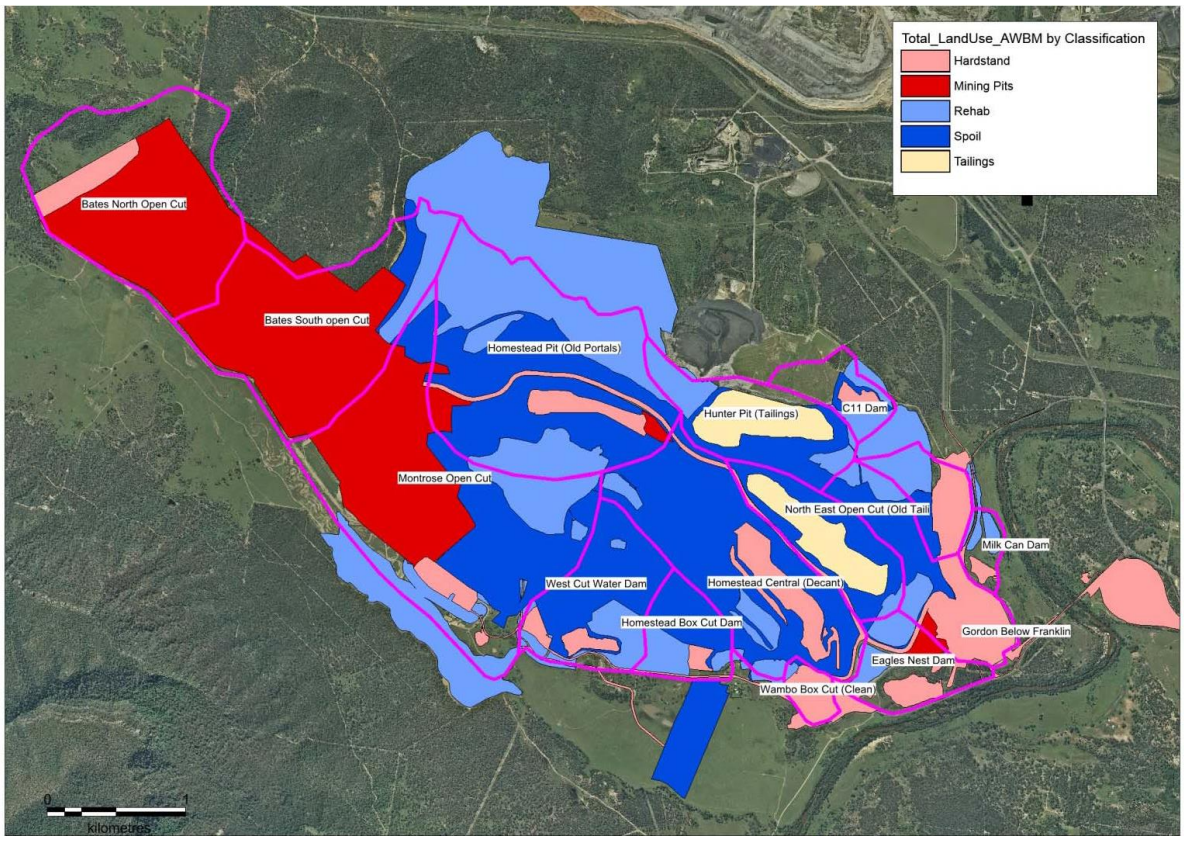

Figure 5: WCPL Catchments and Land Use Types

3.2.1.3 Surface Storages

WCPL currently operates a number of surface water storages, as detailed Table 5. WCPL personnel have also identified a number of critical levels for key mine water storages relating to portal access and water storages above the proposed underground operations, as indicated in the table below.

Table 5: WCPL Water Supply Storage Details

Storage Name	Full Supply Volume (ML)
Bates North Open Cut	10,656
Bates South Open Cut	11,195
C11 Dam	410
Chitters Dam	988
Eagles Nest Dam	180
Gordon Below Franklin	82
Homestead Box Cut Dam	32
Homestead Central (Decant)	585[1]
Homestead Pit (Old Portals)	95[1]
Hunter Pit (Tailings)	800[2]
Milk Can Dam	22
Montrose Open Cut	25,400
North East Open Cut	1,875
Wambo Box Cut (Clean)	95
West Cut Water Dam	25[3]
South Dam	486[3]
Total (Excluding Pits)	**3,800**
Total	**52,926**

Notes:

1. Storage available to portal level (total storage available)
2. Storage available above nominated tailings solids level
3. Critical levels for key storages

3.2.1.4 Underground Operations

WCPLs' North Wambo Underground has portal access via the Homestead Central Pit at RL 30m. The older underground at Wollemi is currently decommissioned. However due to the drift being located above the current North Wambo operations WCPL needs to maintain water levels within this area below the level of the underlying operational areas. A number of surface storages may be impacted i.e need to be maintained in a minimal or dewatered state, during development of longwall panels. These storages are the West Cut Water Dam and the South Dam.

The water levels within the current Wollemi underground operations are maintained by a bore pumping system that aims to keep the water within the overall drift at required levels. Previous bores 1A, 1B, 1C and 1D previously utilised to dewater the older board and pillar operations have been lost to subsidence however the remaining bores 2, 2A and 4C currently dewater the majority of the drift to lower levels.

3.2.1.5 Groundwater Inflows

Groundwater inflows to the Mine over the last few years have been as a direct result of the following:

- Regional groundwater inflows to the underground operations (Wollemi and North Wambo operations); and
- Inflows (seepage) via adjacent waterway alluvials about the open cut operations.

Inflows have also been observed within the southern open cut operation pit floor (no the highwall). This may be the result of seepage from the Homestead North Pit that received inflows from the current operation underground area dewatering.

3.2.1.6 Hunter River Salinity Trading Scheme

WCPL currently participates and has bought credits (currently owns 61 credit points) in the Hunter River Salinity Trading Scheme (HRSTS). Upon receipt of faxed confirmation (from the NSW Office of Water) of flow type (Low, High or Flood) and total salinity tonnage that can be released on a certain day WCPL reviews the salinity in the main Eagles Nest storage and calculates (based on the credits) the volumetric contribution that can be made to the adjacent Hunter River.

WCPL is also constrained by a requirement to have more than 500ML/day flowing down the adjacent Wollemi Brook before discharge can occur as this tributary carries the Mine's discharge to the Hunter River.

Modelling of the current capacity for discharge is limited without undertaking the following:

- Calibration of recorded flows for the Hunter River at Singleton and Wollemi Brook using rainfall data about the upstream catchment and estimation of the expected background salinity levels expected past the Mine; and
- Linking the current OPSIM model with the most recent long term output from the IQQM model for the Hunter River and Wollemi Brook at the Mine.

3.2.1.7 Raw Water Supply

WCPL currently has 1000ML/yr of Hunter high security (HSE) water available every year that is sourced from both the Hunter River and the Wollemi Brook Sump. HSE allocation has seldom dropped below 75% (and this only for a couple of years). This is because there has not been a major drought since the two big dams on the river were built.

The Hunter Water Sharing Plan has provision for the Minister to lower HSE below 75% "at his discretion" in such an event (this occurred late last decade in the Lachlan catchment). HSE is only the 4th highest ranked type of licence in the Water Sharing Plan.

WCPL also currently has two levels of licence from Wollombi Brook (which is unregulated) as follows:

- 350ML/yr under any flow regime; and
- 400 ML/yr when flow is greater than 38ML/d.

Current investigations have identified the difficulty in replicating the flows and salinity in the Hunter River and current modelling has provided raw water as a last resort when required.

3.2.2 Metered Data

WCPL has installed a number of flow meters to monitor water movement around the Mine. Metered data for flow meters, CHPP operations, mine water inventories and site discharges from the period June 2011 to July 2013 was used to calibrate and verify the WCPL OPCIM™ model.

3.2.3 CHPP Data

Data from WCPL's Coal Handling Preparation Plant (CHPP) including feed, product, reject and fine tailings tonnages for the period July 2011 to November 2013 were used to determine the CHPP makeup requirement of 9,380 tonnes (calculated from the total moisture related to tailings, reject and product minus raw feed moisture).

The total makeup pumping data to the operational modules for the plant over the period June 2011 to November 2013 was 9,360kL/day. The estimated wash down requirements for the same period was 1,740kL/day i.e. 18% of the water required for the coal process.

3.2.4 Mine Water Inventories

A summary of the total mine water inventory recorded for all key surface water storages (based on storage level and volume data for mining pits and site storages) for the period June 2011 to July 2013 is presented in **Figure 6.**

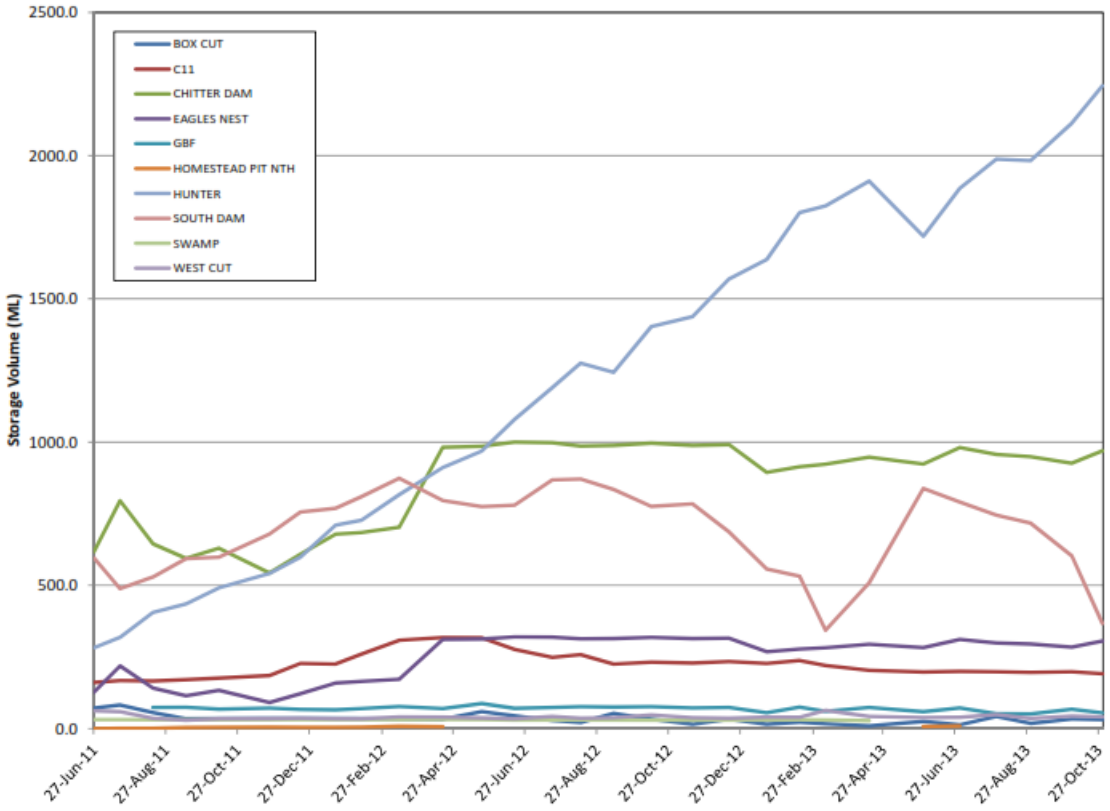

Figure 6: WCPL Recorded Water Inventory

Figure 6 shows the largest variation in inventory associated with the Hunter Tailings Dam over the period. As this storage is drained via seepage to the Homestead Pit Central it is expected that the majority of the increase is associated with the deposition of tailings solids. An assessment has indicated that an in-situ tailings density of 1.5m^3/t would be required to fill the dam to recorded levels over the period.

A plot showing the total inventory of the remaining storages over time is presented in **Figure 7.**

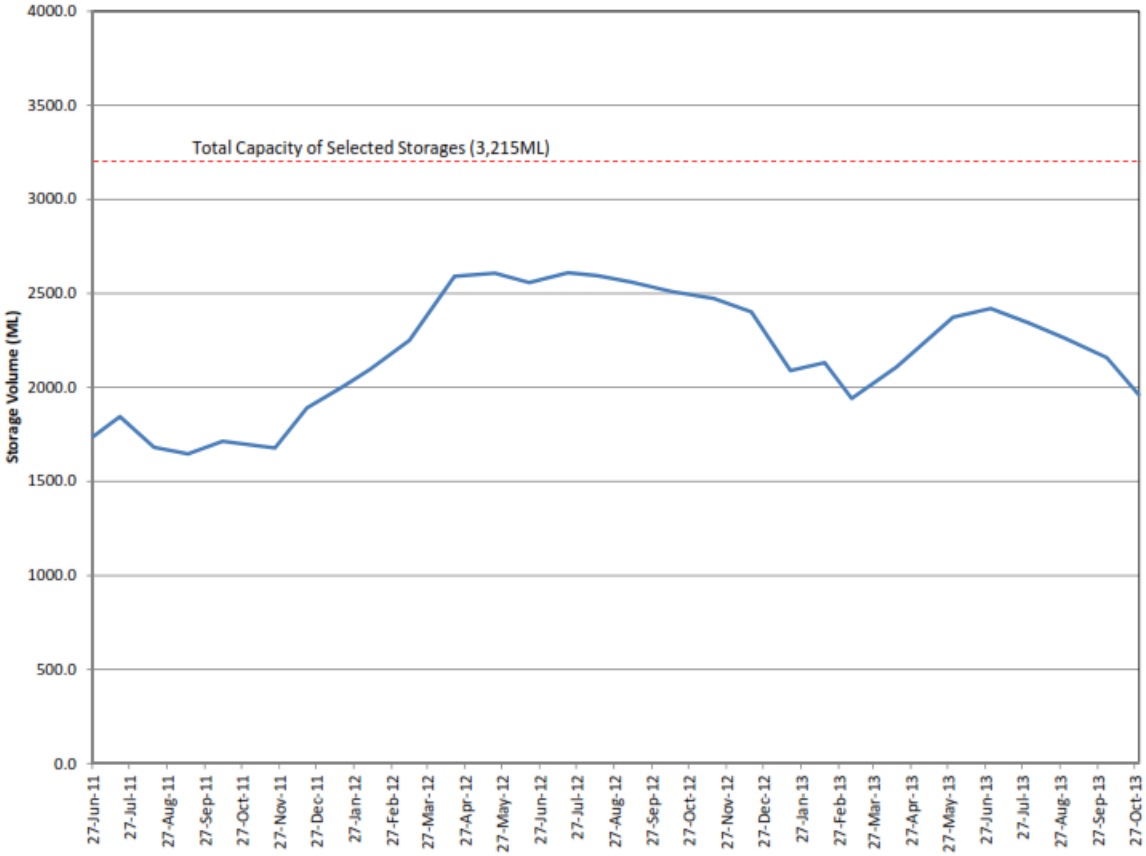

Figure 7: WCPL Mine Water Storages Water Inventory

Figure 7 shows that the combined mine water inventory increased significantly in early 2012 and 2013, with the maximum volume approaching 80% of capacity in mid-2012. Note that the Mine is currently operating at 60% of capacity.

3.2.5 Underground Groundwater Inflows

3.2.5.1 Current Operations

WCPL currently meters all water entering and leaving the current North Wambo operations. Metering has occurred continuously since July 2012 with recorded rates as follows:

- Raw Water into operations – 70kL/d (25ML/yr)
- De-watering (Out) – 3kL/d (1ML/yr)
- De-watering (to Tailgate) - 134kL/d (49ML/yr)

A water balance assessment on the underground operations shows that a net groundwater inflow rate of 65kL/d is required for the underground to match the recorded dewatering rates. Note however that a 25ML/yr Underground usage rate for 4Mtpa of coal production appears to be significantly lower than expected for underground operations of this type.

3.2.5.2 Decommissioned Wollemi Drift

As previously identified the current Wollemi Drift needs to be continuously dewatered to maintain water levels below the operational panel level within the current North Wambo underground operations. A preliminary water balance for the Wollemi Drift, based on the

current dewatering from all bores, has been undertaken to assess and estimate the required groundwater inflows.

A review of metered data from July 2011 to September 2013 shows that the older decommissioned bores (1, 1A to 1D) appeared to remove approx. 670ML from the old board and pillar operations and was operated to dewater the operations. Water level data for Bores 2 & 2A shows that over the period of pumping record the water level in the area rose by 10m, resulting in an additional 640ML of storage.

Current investigations have estimated the groundwater inflow rates to the Wollemi Drift at around 3,600kL/d (42L/s) dewatered via the 2, 2A and 4C bores.

3.2.5.3 Old Wambo Underground

A review of metered data has identified that the current operations includes dewatering from the old Wambo board and pillar operations located to the east of the current processing and ROM area. The data indicates an estimated groundwater inflow to the old Wambo underground of 433kL/day (5L/s).

3.2.6 Site Discharges

Recorded site discharge volumes from April 2009 to April 2015 are provided in **Table 6**.

Table 6: WCPL Recorded Release via the HRSTS

Date	Discharge (ML)	Date	Discharge (ML)	Date	Discharge (ML)
1/04/2009	35.09	6/02/2012	47.60	1/03/2013	33.00
2/04/2009	22.87	7/02/2012	34.90	2/03/2013	44.00
3/04/2009	10.81	8/02/2012	25.20	3/03/2013	92.70
18/11/2010	58.70	9/02/2012	15.00	4/03/2013	73.80
19/11/2010	33.18	22/02/2012	12.50	5/03/2013	58.00
20/11/2010	23.52	23/02/2012	17.10	6/03/2013	70.40
15/06/2011	32.40	3/03/2012	8.80	7/03/2013	69.40
16/06/2011	184.86	4/03/2012	58.90	8/03/2013	53.00
17/06/2011	141.30	5/03/2012	72.90	9/03/2013	24.10
18/06/2011	105.06	30/01/2013	13.40	10/03/2013	26.80
19/06/2011	78.21	31/01/2013	92.60	11/03/2013	28.00
20/06/2011	33.29	1/02/2013	48.70	12/03/2013	24.00
5/10/2011	18.10	2/02/2013	29.20	13/03/2013	16.00
29/11/2011	84.20	3/02/2013	31.70	14/03/2013	11.00
1/12/2011	23.61	4/02/2013	30.44	8/04/2014	9.60
2/12/2011	24.13	5/02/2013	26.80	23/04/2015	8.56
3/12/2011	22.60	6/02/2013	17.80	24/04/2015	4.04
14/12/2011	23.44	7/02/2013	9.90	25/04/2015	38.5
15/12/2011	37.02	25/02/2013	76.50	26/04/2015	27.1
16/12/2011	38.39	26/02/2013	84.00	27/04/2015	24.3
4/02/2012	19.10	27/02/2013	89.30	28/04/2015	20.9
5/02/2012	47.00	28/02/2013	46.90	29/04/2015	16.7

3.2.7 Pit Groundwater Inflows

A preliminary OPSIM™ model was created to replicate expected inflows to the pit from rainfall/runoff and seepage from the underground dewatering. The variation between the expected inflows and those required to match the recorded pumped outflows was determined and is expected to be the groundwater inflows the system requires. A summary of the open cut mining pit water balance is presented in **Table 7.**

Table 7: Open Cut Dewatering – Water Balance (June 2011 – July 2013)

Item	Rate (kL/day)		Comment
	Inflow	Outflow	
Metered Dewatering		5,915	Based on recorded meters No. M03 & M82
Estimated Inflows	4,700		Preliminary estimated inflows from rainfall/runoff and seepage from Homestead Pit from Wambo North U/G dewatering
Groundwater Inflow	1,215		Estimated for water balance
Total	**5,915**	**5,915**	

Table 7 indicates that the Open Cut mining pit can expect a total groundwater inflow of around 1,215kL/d (15L/s) over the period. A plot showing the expected inflows to the pit from rainfall runoff and the recorded pit dewatering rates are shown in **Figure 8.**

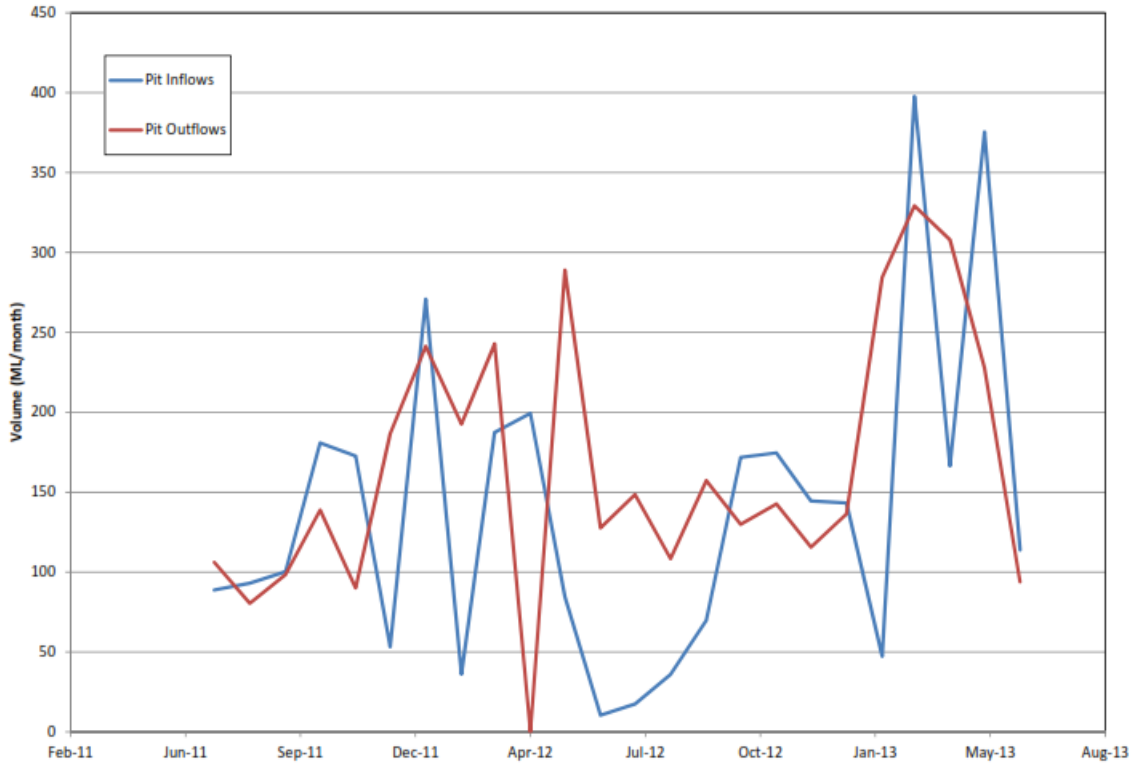

Figure 8: WCPL Open Cut Pit Assessment

Figure 8 shows that there appears to be some climatic correspondence between the pit dewatering and the rainfall/runoff inflows that suggests that the estimated groundwater inflow is not constant but dependent upon the adjacent waterway flows during wet periods.

3.2.8 2013/2014 Water Balance Summary

The water balance summary for 2013 and 2014 is provided in **Table 8**. The data indicates that there was a net deficit of 594.6MLof water in 2013. This increased to 1020.3ML in 2014.

Table 8: WCPL Water Balance Summary 2013/2014

	Year 2013	Year 2014
Water Sources (ML)		
Hunter River	49.3	150.5
Wollombi Brook	324.5	263.3
United Collieries	75.4	0
Rainfall/Runoff	1982.3	884.7
Underground Seepage	1339.2	1262
Open Cut Seepage	1238.9	756.9
Wollembi Sump	-	-
Site Wells	-	-
Total Water Inputs	**5003.6**	**3317.4**
Water Usage (ML)		
Dust Suppression	1073.6	1037.2
CHPP Consumption	951.9	937.8
Underground Usage	140.7	38.9
United Collieries Usage	-	-
Domestic Usage	2	2
Total Water Usage	**2168.2**	**2600.1**
Water Loss (ML)		
Evaporation – Mine Water & Tailings Dams	2208.6	1728
HRSTS Discharge	1221.4	9.6
Total Water Loss	**3,430**	**1,737.6**
Water Balance[1]	**-594.6**	**-1020.3**

Notes:

1. Water Balance calculated as follows: Total Water Inputs – Total Water Usage – Total Water Loss = Water Balance

3.3 2015 Water Balance Model Review

WCPL have engaged Gilbert and Associates to prepare a detailed site water balance as part of the Surface Water Assessment for the United and Wambo Open Cut Coal Mine Project Environmental Assessment. This water balance will:

- Account for available water sources and water demands for the Project;
- Assess demand and supply requirements and storage requirements under a range of rainfall/evaporation, groundwater make and production conditions;
- Identify any potential shortfalls in water supply and water sourcing options;
- Identify any need for controlled discharge via the HRSTS;
- Identify the risk and quantities of any predicted discharge from water storages into the environment;
- Include a salt balance for the Project; and
- Include a final void water and salt balance.

4.0 Review and Reporting

4.1 Review

A complete review of the SWB will occur:

- Annually;
- When there are changes to consent or licence conditions relating to aspects of this site water balance; or
- Following a significant change to the water management regime.

The revised SWB will be re-submitted to the Secretary for approval as required by Condition 30, Schedule 4 of DA305-7-2003.

4.2 Annual Review

Prior to the end of March each year, WCPL will review the environmental performance of the Mine and submit an Annual Review report to the DP&E. This report will:

- Describe the development (including any rehabilitation) that was carried out in the past year, and the development that is proposed to be carried out over the next year
- Include a comprehensive review of the monitoring results and complaints records of the Project over the past year, which includes a comparison of these results against the:
    - Relevant statutory requirements, limits or performance measures/criteria
    - Monitoring results of previous years; and
    - Relevant predictions in the EIS;
- Identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- Identify any trends in the monitoring data over the life of the Project;
- Identify any discrepancies between the predicted and actual impacts of the Project, and analyse the potential cause of any significant discrepancies; and
- Describe what measures will be implemented over the next year to improve the environmental performance of the Project.

In accordance with Condition 25 Schedule 4 of DA305-7-2003, WCPL will also include information specifically related to the SWB, including:

- A review of the site water balance against the predictions in the EIS;
- A re-calculated site water balance for the Mine; and
- An assessment of the current and forecast compliance with the rules of the HRSTS.

4.3 Website Updates

The SWB will be made publicly available on WCPL's website:

http://www.peabodyenergy.com/content/404/australia-mining/new-south-wales/wambo-mine)

Information on the website will be updated regularly as required by DA305-7-2003.

WCPL will also ensure that any information relevant to groundwater monitoring is uploaded to the website (and kept up to date). This includes:

- Current statutory approvals;
- Approved strategies, plans or programs required under the DA305-7-2003;
- A community complaints register;
- Minutes of Community Consultative Committee (CCC) meetings;
- Annual Reviews;
- A copy of any Independent Audits and WCPL's response to any recommendations in any audit; and
- Any other matter required by the Secretary.

5.0 Responsibilities

Table 9 below summarises responsibilities documented in the SWB. Responsibilities may be delegated as required.

Table 9: Site Water Balance Responsibilities

No	Task	Responsibility	Timing
1	Review and update the SWB in accordance with **Section 4.1**	E&C Manager	As required by **Section 4.1**
2	Ensure that controlled releases are undertaken in accordance with the Environmental Protection Licence and the Hunter River Salinity Trading Scheme.	E&C Manager	As required
3	Report site water balance in the Annual Review	E&C Manager	Annually
4	Ensure water level and meter data relevant to the CHPP is collated and provided to the Environmental Department in a timely manner	CHPP Manager	As required
5	Ensure water level and meter data relevant to the Mine (other than CHPP area) is collated and provided to the Environmental Department in a timely manner	Water Infrastructure Manager	As required
6	Ensure water level meters and pumps around the CHPP are properly maintained and calibrated	CHPP Manager	As required
7	Ensure water level meters and pumps around the Mine (other than the CHPP area) are properly maintained and calibrated	Water Infrastructure Manager	As required

6.0 References

- Development Consent (DA305-7-2003)
- Wambo Development Project Environmental Impact Statement (EIS), July 2003
- Wambo Environment Protection Licence (529)
- *Water Act 1912*
- *Environmental Planning and Assessment Act 1979*
- Hunter Unregulated and Alluvial Water Sources Water Sharing Plan
- Gilbert and Associates (June 2003) Surface Water Assessment [(Appendix E of the Wambo Development Project - Environmental Impact Statement July 2003)].
- Gilbert and Associates (September 2005) Wambo Coal – Site Water Balance (Version 1)
- Gilbert and Associates (April 2006) Wambo Coal – Site Water Balance (Version 2)
- Gilbert and Associates (March 2010) Wambo Coal – Site Water Balance Review
- Worley Parsons (January 2014) OPSIM Water Balance Model Initial Investigations – January 2014.

APPENDIX A
CORRESPONDENCE WITH REGULATORY AUTHORITIES

Peabody ENERGY

NSW GOVERNMENT | Planning & Environment

Contact: Scott Brooks
Phone: 6575 3401
Fax: 6575 3415
Email: scott.brooks@planning.nsw.gov.au
Our ref: 305-7-2003

The General Manager
Wambo Mine
PMB 1
SINGLETON NSW 2330

Attention: Steve Peart

Dear Steve

Wambo Coal – Approval of Water Management Plan

Thank you for forwarding the Wambo Water Management Plan and all its parts as required under project approval DA 305-7-2003 for the Department's consideration.

The Water Management Plan is required by Condition 30 Schedule 4 and the following 5 components of the Plan were reviewed:

- Site Water Balance (30)
- Erosion and Sediment Control Plan (32)
- Surface Water Monitoring Program (33)
- Ground Water Monitoring Program (34)
- Surface and Ground Water Response Plan (35).

The Department has reviewed these plans, and is satisfied that they generally address the requirements set out in the relevant conditions of the project approval. Consequently, I would like to advise you that the Secretary has approved the plans.

These plans come into force on the 30th November 2015 and remains in force until replaced by any future updated approved Plans.

I am aware that DPI Water are expected to comment on the Extraction Plan for the South Bates U/G (Wybrow seam) LW 11-13. Should this comment require significant changes to any component of the Water Management Plan, I ask if these changes could be made and the plans resubmitted for review and approval.

Could you please forward finalised copies of the above plan (preferably in PDF format with a copy of this approval letter appended) for the Department's records by the end of November 2015.

If you require further information or clarification in this matter please contact Scott Brooks on 6575 3401 or by email to scott.brooks@planning.nsw.gov.au.

Yours sincerely

Scott Brooks
Investigations (Lead), Compliance
27 - 11 - 2015
As Nominee for the Secretary, Planning & Environment

NSW GOVERNMENT
Department of Planning

Mining & Extractive Industries
Major Development Assessment
Phone: (02) 9228 6487
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23-33 Bridge Street
GPO Box 39
SYDNEY NSW 2001

24.10.5
J-T
WD
RH
GH

Mr Tony Sutherland
Wambo Coal Pty Ltd
PMB 1
SINGLETON NSW 2330

Dear Mr Sutherland

Wambo Development Project
Management Plans and Monitoring Programs

Thank you for forwarding the following documents required under the Wambo development consent (DA 305-7-2003) for the Department's consideration:

- Noise Monitoring Program (condition 9, Schedule 4);
- Site Water Balance (condition 25, Schedule 4);
- Erosion and Sediment Control Plan (condition 32, Schedule 4);
- Surface Water Monitoring Program (condition 33, Schedule 4);
- Groundwater Monitoring Program (condition 34, Schedule 4); and
- Environmental Management Strategy (condition 1, Schedule 6).

The Department has reviewed these documents and is generally satisfied they address the requirements of the relevant conditions in the development consent. Consequently, I would like to advise you that the Director-General has approved these documents. However, the Surface Water Monitoring Programme has been approved on the proviso that it is revised following the approval of the North Wambo Creek Diversion Plan.

The Director-General has previously approved the Air Quality Monitoring Program, Flora and Fauna Management Plan, and Landowner Notification Strategy for the development, but notes there are several other matters which must be satisfied prior to commencing certain operations under the new consent. These matters include:

- Blast Monitoring Program (condition 19, Schedule 4);
- Blast Management Plan (condition 20, Schedule 4);
- Site Water Management Plan (condition 30, Schedule 4);
- Surface and Groundwater Response Plan (condition 35, Schedule 4);
- Surface and Sub-Surface Investigation Program (condition 36, Schedule 4)
- Archival Record of the Wambo Homestead Complex (condition 62, Schedule 4);
- Assessment of options for reducing the greenhouse gas emissions of the development (condition 87, Schedule 4);
- Environmental Monitoring Program (condition 2, Schedule 6).

The Department also notes that under condition 5 of Schedule 4, the development consent will only commence after all previous development consents for the Wambo coal mine have been surrendered, excluding DA No. 108/91 issued by Singleton Shire Council, to the satisfaction of the Director-General.

I would appreciate it if you would advise the Department of when you expect to commence open cut and underground operations under DA 305-7-2003, and when you are likely to submit the various outstanding documents required under the consent.

If you have any enquiries about this matter, please contact Mike Young on 9228 6481.

Yours sincerely

per David Kitto 10/10/05
Manager
Mining & Extractive Industries
as delegate for the Director-General

NSW GOVERNMENT
Department of Planning

Mining & Extractive Industries
Major Development Assessment

Phone: (02) 9228 6481
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Email: mike.young@planning.nsw.gov.au

Level 4 Western Gallery
23-33 Bridge Street
GPO Box 39
SYDNEY NSW 2001

Ms Julie Thomas
Environmental Officer
Wambo Coal Pty Ltd
PMB 1
SINGLETON NSW 2330

Our ref: S02/02197

Dear Julie

Wambo Coal Mine – Updated Management Plans

Thank you for forwarding updated versions of the following documents for the Wambo Coal Mine:

- Site Water Balance;
- Erosion and Sediment Control Plan (ESCP);
- Groundwater Monitoring Program (GWMP);
- Surface and Groundwater Response Plan (SGWRP); and
- Environmental Monitoring Program (EMP).

As you are aware, earlier versions of these documents were reviewed by the Department and were approved by the Director-General, approval of the EMP being subject to certain matters being addressed. The Department notes that the matters raised in regard to the earlier version of the EMP have now been satisfactorily addressed.

In addition, please be advised that the Department agrees to Wambo Coal's request to extend the date for submission of the Skinner Blast Management Plan until June 2007, to accommodate property acquisition negotiations with the affected land owner.

If you have any queries or would like to discuss these matters further, please contact Michael Moore on 9228 6306.

Yours sincerely

Mike Young
Manager,
Mining and Extractive Industries

30/6/06

Peabody

WAMBO COAL

28 April 2010

The Director-General
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Attention: Ms Belinda Parker

Dear Belinda

WAMBO COAL REVISED SITE WATER MANAGEMENT PLAN

Pursuant to Consent Condition 33, Schedule 4, DA 305-7-2003, Wambo Coal's Site Water Management Plan (SWMP) has been revised in consultation with Department of Industry and Investment (DII) and Department of Environment, Climate Change and Water (DECCW), prior to submission to the Department of Planning (DoP) for approval.

The SWMP has been revised three times since 2005 in response to consent modifications. The latest revision of the SWMP was triggered following consent modifications relating to the approval of the Chitter Dam and South Dam in June and August 2009, respectively.

Wambo Coal's SWMP is a collective term for the following documents which are enclosed for your approval:

- A Surface Water Monitoring Program;
- A Groundwater Monitoring Program;
- An Erosion and Sediment Control Plan;
- A Surface and Groundwater Response Plan; and
- The Site Water Balance.

For your convenience, I have also enclosed a summary of all of the changes that have been made since the SWMP was originally approved in 2005.

Please contact me on (02) 6570 2217 if you require any further information.

Yours sincerely

Sarah Bailey
Environment and Community Manager

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