Wallarah 2 Coal Project Site Water Management Strategy

April 2008

Wyong Areas Coal Joint Venture

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Date: 24th April '08.....

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1. Introduction

The proposed Wallarah 2 Coal Mine is aiming for the development of a long term environmentally sustainable project. Some of the objectives in development of this project include

- Making the Mine self sufficient with respect to the consumption and use of both potable quality and industrial quality water.
- Monitor and control the discharge of all run-off waters emanating from both the proposed mine sites, prior to entering any natural local water course.
- Retain all industrially contaminated water on site for further treatment.
- Collect and dispose of environmentally contaminated liquid waste in a manner approved by Statutory Authorities having jurisdiction over the site.

These objectives are consistent with Local and State Legislative Authorities development guidelines.

2. Potable and Process Water Management Systems

2.1 Buttonderry

Construction of the 10ML Entrance Road Dam and local area site storm water drainage system shown on drawing 2110325A-CIV-S072 in appendix A will be a high priority during the initial development phase. The purpose will be to create a water storage facility on site capable of retaining sufficient water to supply needs for construction and eventually, mining production operations.

Once established, the Buttonderry site will accommodate approximately 250 persons including management, administration, production and maintenance staff. When the Entrance Road Dam is filled to its normal operating capacity, the site is expected to be self sufficient in regard to supply of water for both potable and industrial use. The period of self sufficiency is expected to be "on-going" during normal climatic conditions, however, this may not be the case during a drought period exceeding approximately 2 months.

Water self sufficiency will be achieved by harvesting clean storm water from the site for storage in the Entrance Road Dam, or directly collected from the roofs of buildings into the Potable Water Storage Tanks, as depicted in figure 2.1.

An on site Water Treatment Plant will draw water from the Dam and provide potable quality water for domestic consumption during drier periods when roof storm water harvesting is insufficient to meet demand. During a drought period exceeding 2 months, it is expected that potable quality water will have to be imported.

An on site Sewage Treatment Plant will process all domestic waste water, with clarified effluent being directed to a local transpiration area or landscape irrigation or alternatively, via a disinfection and sterilisation unit for recycling into the Entrance Road Dam.

In terms of water management, the Buttonderry site is considered to be environmentally clean, as no coal product is handled on the site. Storm water harvested from the site is therefore considered to be clean water.

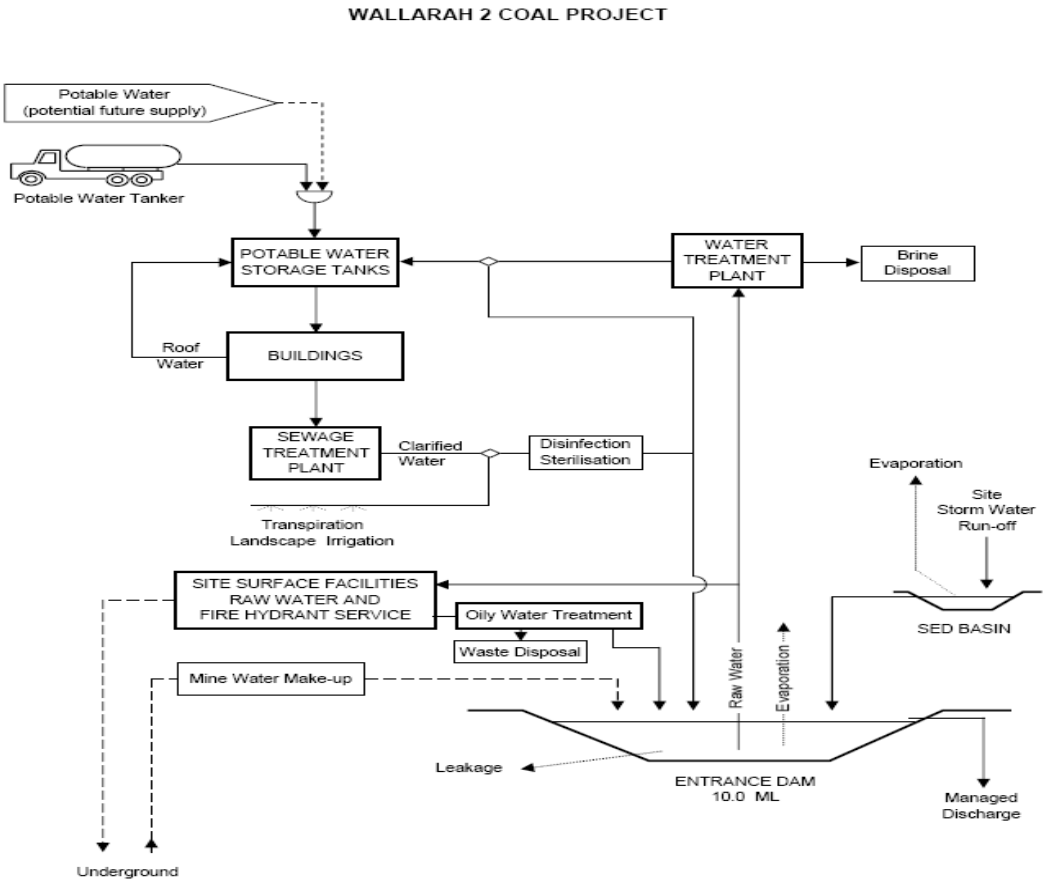
Access to the underground workings will be provided via a downcast shaft and lift car. The Buttonderry site will be the main access point to the mine for personnel, small items of plant and equipment and small quantities of material that can be manually handled. A small area of the site will be bunded to contain potentially dirty water that may result from personnel and equipment returning to the surface from underground. The bunded area will include the Lift Car staging area and adjacent Workshop plus the hard paved areas immediately surrounding these two facilities. Potentially contaminated water from this area will be processed in the Workshop Oily Water Treatment system to remove silt, particulate matter and hydrocarbons. Clarified water from the Oily Water Treatment system will be transferred to the Entrance Road Dam for recycling. Waste oil and contaminated sludge from the Oily Water Treatment Plant will be removed from site by a licensed Waste Removal Contractor.

Site water supply for fire fighting and general industrial use will be pumped directly from the Entrance Road Dam to dedicated water storage tanks located elsewhere on site. Pump

stations located adjacent to the tanks will supply water to all areas of the site via a piped reticulation system.

Assessment of the site water balance requirements as shown in the table in figure 2.1, indicates the site can be made water self sufficient during a normal climatic “average” year. This will require harvesting storm water run-off from approximately 40Ha of the site during the initial construction phase. The harvest area could be reduced to approximately 30Ha after the commencement of mining operations.

Water that may discharge from the Entrance Road Dam into the adjacent local water course will be managed. Control measures will include monitoring of the water quality stored in the Dam. If the quality falls below acceptable standards for discharge, the on site Water Treatment Plant will recirculate water from the Dam to remove excess contaminants and ensure water quality is raised to meets environmental standards that are acceptable for discharge.



	Construction Phase		Production Year 1		Production Year 5		Production Year 10		Production Year 20 +	
Item	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply
Potable	13.69		13.69		13.69		13.69		13.69	
Process	30.00		18.85		18.85		18.85		18.85	
Rainfall		40.12		34.26		34.26		34.26		34.26
Losses	7.35		7.35		7.35		7.35		7.35	
Mine Water		0.00		0.00		n/a		n/a		n/a
Recycle		11.63		11.63		11.63		11.63		11.63
Other										
Sub-total	51.03	51.75	39.88	45.90	39.88	45.90	39.88	45.90	39.88	45.90
TOTAL	*0.00*	0.72	*0.00*	6.01	*0.00*	6.01	*0.00*	6.01	*0.00*	6.01

All tabulated values in ML/yr
Losses in the table above represent combined losses from Brine Disposal, plus Dam evaporation and leakage losses
Total Demand numbers in *italics* represents a deficit in the water balance
Total Supply numbers represent a potential surplus in the water balance

Figure 2.1 Buttonderry Site Water Management Strategy

2.2 Tooheys Road

The Tooheys Road site will provide access to the underground via a Drift tunnel. The tunnel will accommodate a vehicle travelling road and the product coal conveyor that will bring coal up to the surface stockpile and rail loading facility. In terms of water management, this site will be a coal contact area and all dirty water run-off from the site must be contained. Three dams will be constructed for this purpose as illustrated on drawing 2110325A-CIV-S071 in appendix A.

Construction of the 120ML Mine Operations Dam, 3.0ML Stockpile Dam, 3.0ML Portal Dam and local area site storm water drainage system will be a high priority during the initial development phase. The purpose will be to create water storage facilities on site capable of retaining all dirty water run-off. The run-off water will also provide sufficient water to supply needs for the construction phase and eventually, mining production operations.

When the Mine Operations Dam is filled to its normal operating capacity, the site is expected to be self sufficient in regard to supply of water for both potable and industrial use. The period of self sufficiency is expected to be “on-going” during normal climatic conditions, however, this may not be the case during a drought period exceeding approximately 2 months. Water self sufficiency will be achieved by capturing the dirty storm water run off from the site and directing it to the Mine Operations Dam, as well as collecting clean water from the roofs of buildings and directing this into the Potable Water Storage Tanks, as depicted in figure 2.2.

The Stockpile Dam and Portal Dam will serve as transient dirty water storage basins that will collect dirty water from specific areas. Each of these smaller Dams will normally be kept empty. As water is collected in the smaller dams, pumps in each Dam will transfer the water to the main Mine Operations Dam. The Mine Operations Dam will provide an 80ML surge storage capacity required to hold surplus water from a 1:100 year, 72 hour, rolling storm event. The Dam has a total storage capacity of 120 ML, hence has a maximum working volume of approximately 40 ML. This stored volume is expected to be sufficient for up to 2 months operation during a drought period.

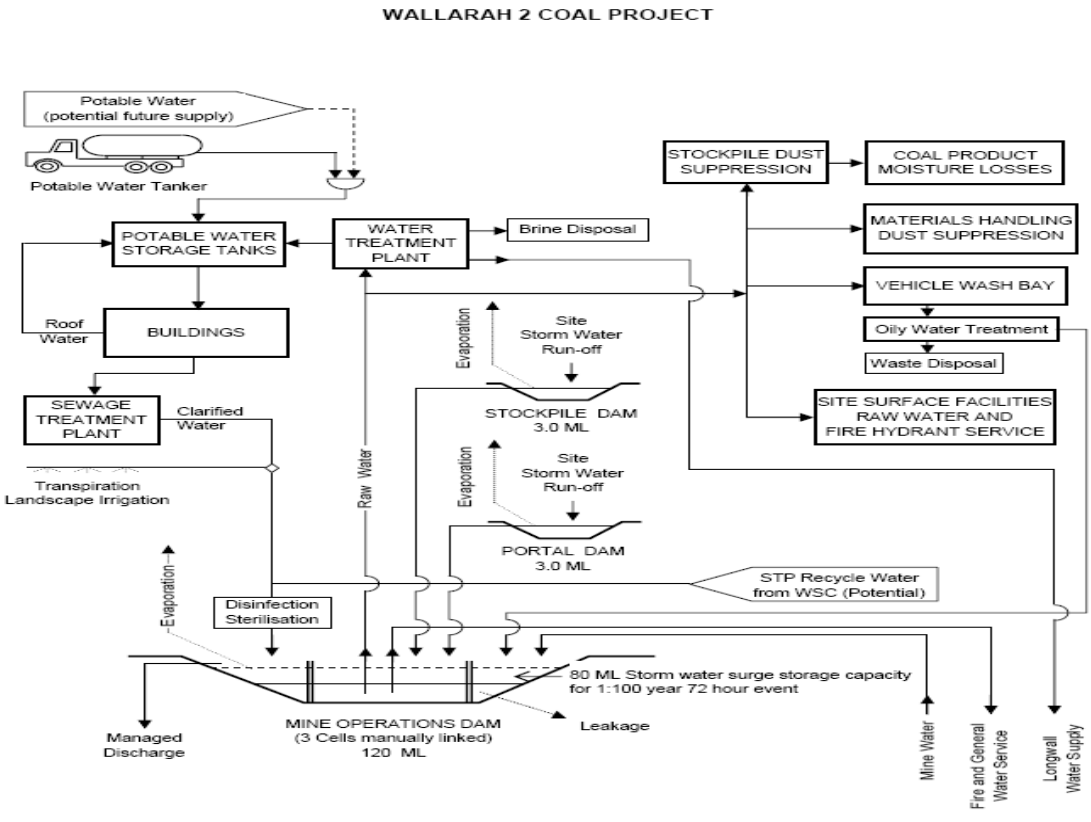
Once established, the Tooheys Road site will accommodate approximately 50 persons including production and maintenance staff. An on site Sewage Treatment Plant will process all domestic waste water, with clarified effluent being directed to a local transpiration area or landscape irrigation or alternatively, via a disinfection and sterilisation unit for recycling into the Mine Operations Dam. An on site Water Treatment Plant will draw water from the Mine Operations Dam and provide potable quality water for both domestic consumption and underground longwall consumption.

Surface facilities will include a Workshop and Vehicle Wash Bay. This area will be bunded to contain all dirty water that will be passed through an Oily Water Treatment system. This system will remove silt, particulate matter and hydrocarbons. Clarified water from the Oily Water Treatment system will be transferred to the Mine Operations Dam for recycling. Waste oil and contaminated sludge from the Oily Water Treatment Plant will be removed from site by a licensed Waste Removal Contractor.

Site water supply for fire fighting and general industrial use will be pumped directly from the Mine Operations Dam to dedicated water storage tanks located elsewhere on site. Pump stations located adjacent to the tanks will supply water to all surface and underground areas of the site via a piped reticulation system. Water supply for surface level stockpile dust suppression, and materials handling systems dust suppression, will be pumped directly from

the Dam. Off-site discharge of water from the Mine Operations Dam into the adjacent local water course will be managed. Control measures will include monitoring of the water quality stored in the Dam. If the quality falls below acceptable standards for discharge, the on site Water Treatment Plant will recirculate water from the Dam to remove excess contaminants and ensure water quality is raised to meets environmental standards that are acceptable for discharge. Depending on water level, and water quality in the Dam, an off-site discharge pump station will transfer up to 80ML of surplus "surge storm water" into the local water course. This operation will be done in strict compliance with Statutory Regulations.

Assessment of the site water balance requirements indicates the site will be in water deficit during the first production year. The deficit is attributable to water requirements for operation of the Longwall. This deficit will progressively reduce over the next five production years as mine seepage water make (supply) from underground increases as mining progresses. To make up the deficit, a combination of imported Potable water and STP Recycled water will be sourced from external suppliers.



	Construction		Production Year 1		Production Year 5		Production Year 10		Production Year 20 +	
Item	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply
Potable	9.00		314.44		314.44		314.44		314.44	
Process	30.00		83.80							
Rainfall		161.65		161.65		161.65		161.65		161.65
Losses	65.20		65.20		65.20		65.20		65.20	
Mine Water		0.00		36.50		219.00		328.50		474.50
Recycle		0.00		2.19		2.19		2.19		2.19
Other										
Sub-total	104.20	161.65	463.44	200.34	379.64	382.84	379.64	492.34	379.64	638.34
TOTAL	*0.00*	57.45	*263.10*	0.00	*0.00*	3.20	*0.00*	112.70	*0.00*	258.70

All tabulated values in ML/yr
Losses in the table above represent the combined total of all losses
Total Demand numbers in *italics* represents a deficit in the water balance
Total Supply numbers represent a potential surplus in the water balance

Figure 2.2 Tooheys Road Water Management Diagram

3. Water Quality and Salinity Considerations

3.1 Buttonderry

Buttonderry will produce environmentally clean storm water run-off, as no coal product is handled on this site. The Entrance Road Dam will harvest a portion of the storm water run-off from the site, and store up to 10ML. This volume is expected to be sufficient reserve to meet local site demand for periods up to 2 months normal operation.

Water quality in the Dam will be constantly monitored and treated as required by the on-site Water Treatment Plant (WTP) to ensure the water is an acceptable standard for reuse as industrial process water and also meets DECC/EPA standards for off-site discharge.

The Entrance Road Dam will discharge off-site on those occasions when the Dam is already full, and a normal rainstorm event occurs. Hence there is a need to constantly monitor and maintain the water quality to DECC/EPA standards. The concentrated liquor or brine arising from the WTP will be the “removal” point for saline material and other contaminants extracted from the site water reservoir.

3.2 Tooheys Road

A portion of the Tooheys Road site will produce saline “coal contact” storm water run-off which will be retained on site.

The Mine Operations Dam will have a total storage capacity of 120ML, with an operating storage volume of 40ML, and a surge storage volume of 80ML. It is expected there will be no uncontrolled off-site discharge of water from the Tooheys Road site during periods of normal mining operations and climatic conditions (rainfall) up to a 1:100 year, 72 hour rolling rainstorm event. The 1:100 year rain storm event is expected to generate a surge volume of 80ML which can be retained by the Dam.

Water quality in the Dam will be constantly monitored and treated as required by the on-site Water Treatment Plant (WTP) to ensure the water is an acceptable standard for reuse as industrial process water and also meets DECC/EPA standards for off-site discharge. Pumps will control the discharge of up to 80ML of surplus water after a rain storm event. Controlled discharge will only occur when water quality meets DECC/EPA standards. The concentrated liquor or brine arising from the WTP will be the “removal” point for saline material and other contaminants extracted from the site water reservoir.

3.3 Wallarah Creek water quality

There are two existing Wallarah Creek water quality monitoring stations managed by DECC/EPA. The stations are designated as W6 and W12, and located where indicated on the Local Area Plan in figure 3.1. W6 is located downstream from the proposed Tooheys Road site and W12 is downstream from the proposed Buttonderry site.

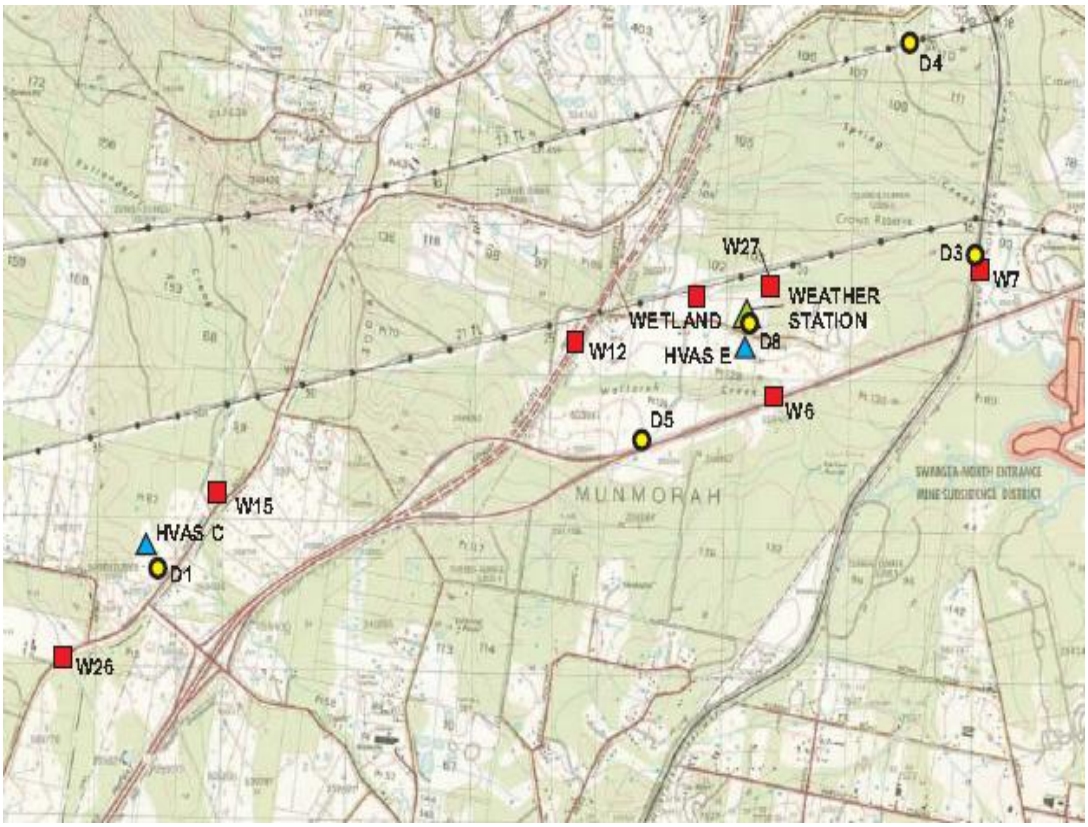


Figure 3.1 Local Area Plan showing position of existing Wallarah Creek water quality monitoring stations W6 and W12

Table 3.1 shows the current ANZECC recommended maximum values for acceptable quality fresh water Vs the typical range in water quality recorded from the W6 and W12 monitoring stations over the period 2006 to 2007. Highlighted cells indicate monitored levels in excess of the ANZECC recommended level. The table is included as a reference to the typical water quality existing in Wallarah Creek at a time prior to establishment of the Buttonderry and Tooheys Road mine sites.

Parameter	Units	ANZECC Guidelines	Station W6 Recorded Data Range		Station W12 Recorded Data Range	
Temperature	^{0}C	n/s	12.6	23.1	11.5	29.3
pH		6.5 to 8.0	5.15	7.34	5.75	6.53
Dissolved Oxygen	% sat.	85 to 110	29.7	102.6	65.8	72.8
Electrical Conductivity	µc	n/s	65.9	507	162.2	421
Total Dissolved Solids	mg/L	n/s	32.2	338	78.8	230
Total Suspended Solids	mg/L	n/s	10.0	33.0	12.0	26.0
Calcium	mg/L	n/s	4.0	16.0	4.0	8.0
Magnesium	mg/L	n/s	1.0	11.0	3.0	4.0
Sodium	mg/L	n/s	8.0	103.0	20.0	39.0
Potassium	mg/L	n/s	1.0	4.0	3.0	4.0
Alkalinity as CaC03	mg/L	n/s	5.0	115.0	12.0	52.0
Sulphate as S04	mg/L	n/s	5.0	70.0	9.0	14.0
Chloride	mg/L	n/s	11.1	170	32.0	58.4
Iron	mg/L	n/s	0.31	2.23	0.51	1.08
Arsenic	mg/L	0.024	< 0.001		n/d	
Barium	mg/L	n/s	0.006	0.134	0.04	0.056
Cadmium	mg/L	0.0002	<0.0001		n/d	
Chromium	mg/L	0.0010	0.001	0.002	0.001	
Copper	mg/L	0.0014	0.001	0.004	0.004	0.009
Manganese	mg/L	1.9000	0.018	0.08	0.007	0.015
Nickel	mg/L	0.0110	0.001	0.002	0.002	0.003
Lead	mg/L	0.0500	< 0.001		0.001	0.002
Zinc	mg/L	0.0080	0.009	0.141	0.019	0.074
Mercury	mg/L	0.0006	< 0.0001		n/d	
Ammonia (NH3) as N	mg/L	0.90	0.013	0.206	0.012	0.023
Nitrite and Nitrate as N	mg/L	i/c	0.015	0.354	0.011	0.039
Total Kjeldahl Nitrogen as N	mg/L	n/s	0.3	1.9	0.6	1.0
Total Phosphorous as P	mg/L	0.05	0.03	0.22	0.01	0.59
Reactive Phosphorous	mg/L	0.02	0.0585 (95% UCL)		0.0333 (95% UCL)	
Faecal Coliforms	CFU/100ml	n/s	5	1100	23	920
Oil and Grease	mg/L	n/s	n/d		n/d	

Table 3.1 Wallarah Creek Water Quality Period May 2006 to May 2007

4. Conclusion

Preliminary engineering assessment shows that the aim of achieving a long term environmentally sustainable project is an attainable goal. Water self sufficiency can be achieved by harvesting storm water and mine water for storage in the dams, or directly collected from the roofs of buildings into the Potable Water Storage Tanks.

The Entrance Road Dam and Mine Operations Dam at Buttonderry and Tooheys Road respectively, have been sized such that when they are filled to their normal operating capacity, the site can be self sufficient for both potable and industrial use during normal climatic conditions. However, during drought periods exceeding approximately 2 months or more, it is expected that water will have to be imported to the Mine.

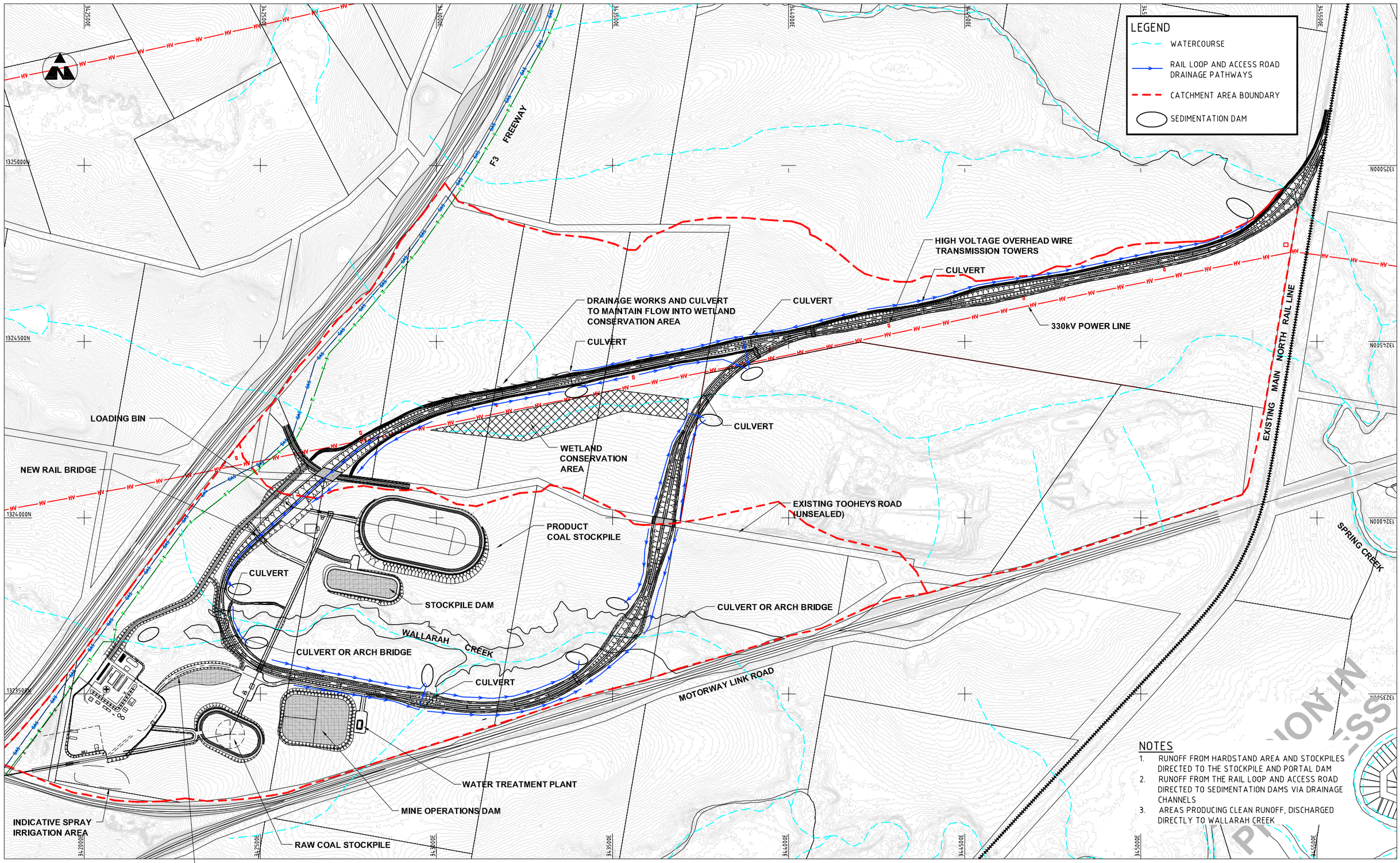
Assessment of the site water balance requirements indicates the Tooheys Road site will be in water deficit during the first production year. The deficit is attributable to water requirements for operation of the longwall. This deficit will progressively reduce over the next five production years as mine seepage water make (supply) from underground increases as mining progresses. To make up the deficit, a combination of imported Potable water and STP Recycled water will be sourced from external suppliers.

Water quality in the dams will be constantly monitored and treated as required by the on-site Water Treatment Plant (WTP) to ensure the water is an acceptable standard for reuse as industrial process water and also meets DECC/EPA standards for off-site discharge.

Appendix A

Drawings

2110325A-CIV-S071



NOTES

1. RUNOFF FROM HARDSTAND AREA AND STOCKPILES DIRECTED TO THE STOCKPILE AND PORTAL DAM
2. RUNOFF FROM THE RAIL LOOP AND ACCESS ROAD DIRECTED TO SEDIMENTATION DAMS VIA DRAINAGE CHANNELS
3. AREAS PRODUCING CLEAN RUNOFF, DISCHARGED DIRECTLY TO WALLARAH CREEK

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

100mm AT FULL SIZE

REV	DATE	DESCRIPTION	DRAWN	CHECK	DESIGN	VERIFY
D	07.03.08	ISSUED FOR INFORMATION	ZV	AF	PR	PR
C	23.11.07	ISSUED FOR INFORMATION	WM	PR		
B	04.04.07	SPRING CREEK AMRNDED	WM	PR	CE	CW
A	20.03.07	ISSUED FOR INFORMATION	WM	PR		

NCSI certified Quality System to ISO 9001

SCALES
0 50 100 200 300
Full Size 1:5000 ; Half Reduction 1:10000
SCALE (m)

A1 ORIGINAL
DO NOT SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY
VERIFY ALL DIMENSIONS ON SITE

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SIGNED

DATE

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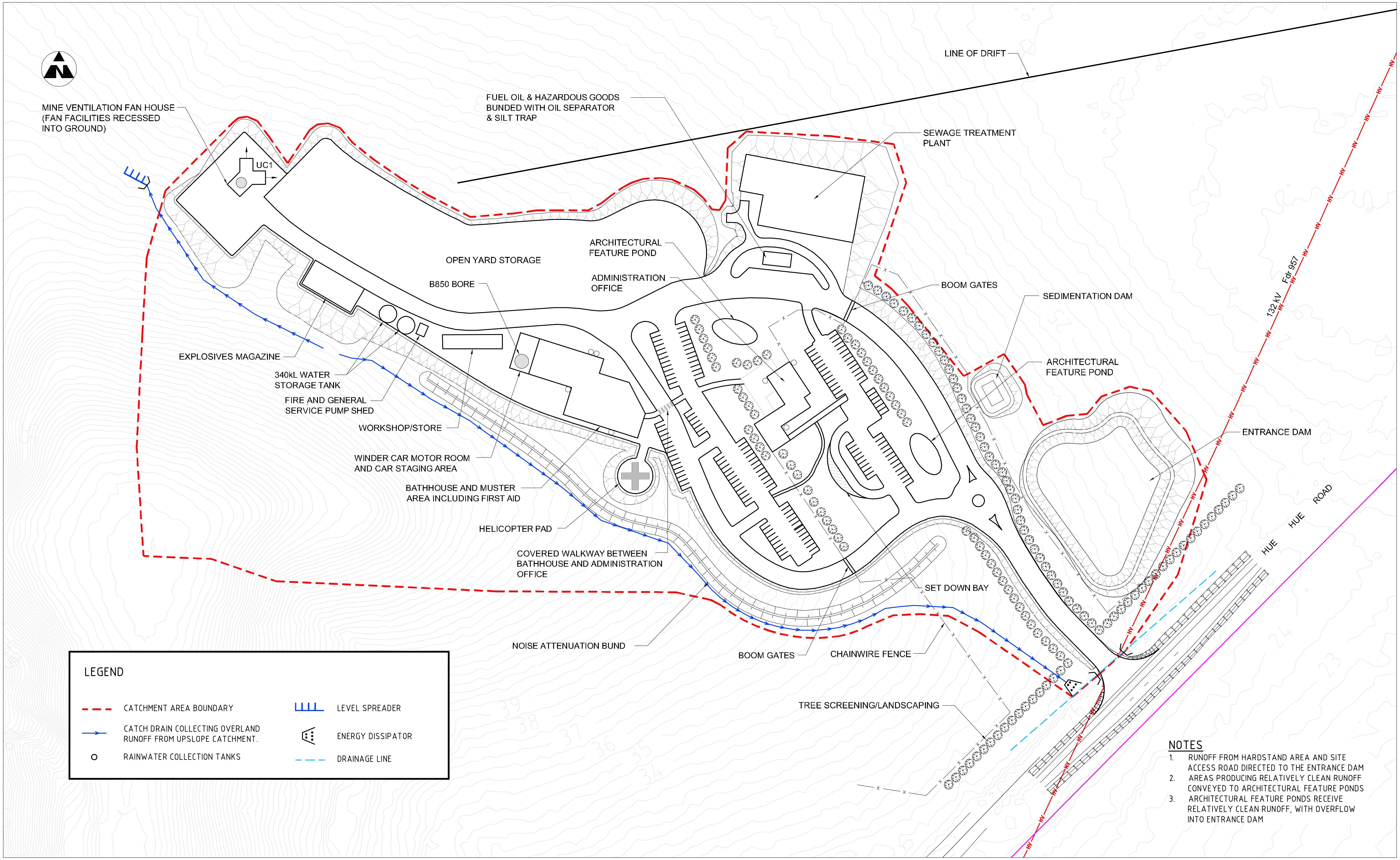
CLIENT
MINARCO

PROJECT
WALLARAH #2 COAL MINING PROJECT
TOOHEYS ROAD SITE
PROPOSED SURFACE WATER MANAGEMENT STRATEGY

PROJECT No.	DISCIPLINE	NUMBER	REV.
2110325A	CIV	S071	D

Plotted By: VARESLIJAZ Plot Date: 07/03/08 - 16:52 Cad File: J:\A352-ENG\PROJ\2110325A_CIV_Wallarah_N2\09_Drafting\001\ACAD\DRAWINGS\2110325A-CIV-S071.dwg

2110325A-CIV-S072



NOTES

1. RUNOFF FROM HARDSTAND AREA AND SITE ACCESS ROAD DIRECTED TO THE ENTRANCE DAM
2. AREAS PRODUCING RELATIVELY CLEAN RUNOFF CONVEYED TO ARCHITECTURAL FEATURE PONDS
3. ARCHITECTURAL FEATURE PONDS RECEIVE RELATIVELY CLEAN RUNOFF, WITH OVERFLOW INTO ENTRANCE DAM

100mm AT FULL SIZE

PRELIMINARY ISSUE
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REV	DATE	DESCRIPTION	DRAWN	CHECK	DESIGN	VERIFY
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B	21.03.07	CATCHMENT BOUNDARY AMENDED	WM	PR		
A	20.03.07	ISSUED FOR INFORMATION	WM	PR		

DRAWING CHECK PRINT
DATE RAISED 12 / 03 / 08 BY DATE
DRAFTING CHECK
ENGINEERING CHECK
BACK-DRAFTING CHECK
NEXT ACTION

SCALES 0 10 20 40 60
Full Size 1:1000 ; Half Reduction 1:2000
SCALE (m)

A1 ORIGINAL
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CLIENT
MINARCO

PROJECT
WALLARAH #2 COAL MINING PROJECT
BUTTONDERRY SITE
PROPOSED SURFACE WATER MANAGEMENT STRATEGY

PROJECT No.	DISCIPLINE	NUMBER	REV.
2110325A	CIV	S072	C

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