CONTENTS

LIST OF TABLES

4.0 THE PROPOSAL

Key points

- The proposed mining operation will be contained within the boundaries of EL4918 and a part of Glennies Creek CL382. These tenements occupy an area of approximately 880 Ha;
- Exploration within the Ashton Coal Project area has identified 191Mt of in situ coal;
- Coal resources suitable for extraction by open cut and underground mining techniques have been identified;
- The initial development will focus on a small open cut mine, with a saleable production potential to both the domestic and export markets of approximately 1.7Mtpa. The open cut will operate for 7 years;
- An underground mine will commence operation in year 2 and is planned to produce up to 2.4Mtpa of product coal over a period of 18 years;
- Bowmans Creek will be diverted around the projected area of subsidence;
- Coal may be transported via private haul road to Macquarie Generations existing overland conveying system prior to construction of Ashton's rail loading facility;
- Pit top facilities for coal preparation, stockpiling and train loading will be constructed to the north of the New England Highway; and
- A coal handling and preparation plant (CHPP) will be constructed.

4.1 Overview

This section outlines the Ashton Coal Project proposal. The proposal involves the development of a new coal mine within Exploration Lease EL4918 and also includes a portion of Glennies Creek CL382. The project is to consist of an open cut and an underground coal mine, as well as a coal preparation plant and associated surface infrastructure. Environmental bunds will be constructed around the open cut operation and surface facilities.

The open cut operation will comprise of two pits, both of which will be contained within an area bounded by the Main Northern Railway, the New England Highway and Glennies Creek Road. The Arties Pit will be parallel to the New England Highway and will be used to develop the entry portal for the underground mine. The Barrett Pit will be located to the east of the Arties Pit. The total output of the open cut will be in the order of 12Mt of product coal over a seven (7) year period. Initial emplacement of overburden will be to the east of the Barrett Pit and in an area to the south of the New England Highway. Following development of these initial emplacement areas, overburden will be backfilled into the Barrett Pit. Opportunity will be taken to maximise the recovery of available coal by the use of highwall mining techniques at appropriate times. The final void will be filled with coarse and fine washery reject material.

The underground mine will be located to the south of the New England Highway. Entry will be via the highwall of the Arties Pit on the north side of the highway. The main headings will be aligned beneath the highway itself to maximise the recoverable area to the south whilst minimising impact from subsidence. The mine will be a descending multi seam operation and will target the Pikes Gully, Upper Liddell, Upper Lower Liddell and the Lower Barrett seams in sequence. Extraction will be by longwall methods with blocks approximately 250m wide and aligned parallel to the western boundary of the Exploration Licence (EL) 4918. Longwall production will commence in year 3 with total saleable output from the underground mine estimated to be 40Mt over a period of almost 18 years.

Bowmans Creek will need to be diverted in advance of the longwall development in approximately year 3. This allows sufficient time to develop stream ecology prior to the stream flows being diverted. The diversion of flows is proposed for year 5.

Pit top facilities for coal preparation, stockpiling and train loading will be constructed to the north of the highway adjacent to the Arties Pit. Raw coal from both the open cut and underground mines will be stockpiled on the floor of Arties Pit. Coal will be crushed then conveyed to the coal preparation plant (CPP) for processing. Product coal will be stockpiled via an overhead tripper and reclaimed into a rail loading bin. A rail siding will run parallel to the Main Northern Railway of sufficient length to allow for loading of 9,000t unit trains.

Administration, car parking, stores and bathhouse facilities will be located adjacent to the mine access intersection off Glennies Creek Road.

4.1.1 Proposal Objectives

The principal objective of the Ashton Coal Project is to develop an economically feasible plan for the safe and efficient recovery of the viable coal assets within the area.

In developing the mine plan, recognition has been given to the following:

- Ensuring that the selected mining methods are safe and efficient;
- Minimising any adverse social, environmental or amenity impacts;
- Maximising the recovery of the mineable resources within the area;
- Increasing employment opportunities within the local community;
- Maintaining a cost effective business, with low capital and operating costs.
- Minimal surface impact;
- Efficient mine layout, with a low development ratio in the underground mine;
- Inbuilt flexibility to adapt to changing environment or strategy;
- Low operating costs; and
- Minimum capital expenditure requirements.

4.2 Resource Evaluation

4.2.1 Location

The Ashton Coal Project is located in the Hunter Valley of NSW, approximately 14km north west of Singleton (refer **Figure 1.1**). The village of Camberwell is located approximately 600m to the south east of open cut and 1,500m east of the mine surface facilities. The project covers a surface area of approximately 880Ha.

The mining tenements that comprise the Ashton Coal Project includes EL4918, part EL5860 and part of Glennies Creek CL382.

4.2.2 Geology

The project area is located within the Hunter Coalfields of the Sydney Basin and includes coal resources and reserves that occur within the Foybrook Formation. This formation is part of the Vane Subgroup of the Whittingham Coal Measures and is the basal coal bearing sequence of the Singleton Supergroup. The areas to be mined are located on the western and north-eastern limbs of the Camberwell Anticline. Geological cross sections through the areas proposed for open cut and underground development are presented in **Figure 4.1** and **Figure 4.2.**

The major coal seams identified in the Project Area are, in descending stratigraphic order, the Lemington, Pikes Gully, Arties, Upper Liddell, Middle Liddell, Upper Lower Liddell, Lower Lower Liddell, Upper Barrett and Lower Barrett seams. These seams occur in the lower 180m of the Foybrook Formation. In the eastern part of the project area, the sequence has been progressively eroded until at the eastern boundary only the bottom 100m or so has been preserved. As a consequence, subcrops of all seams except the Upper and Lower Barrett seams are present as shown in **Figure 4.3.**

The strata within the Foybrook Formation comprises in order of predominance, fine to coarse grained sandstone, siltstone, conglomerate, mudstone, shale and coal. The top of the formation corresponds with the base of the overlying Bulga Formation which in turn is overlain by the Archerfield Sandstone and Jerrys Plains Sub group respectively. The latter includes the Bayswater Seam that has been mined in the adjacent Ravensworth development. Only a remnant portion of the Bayswater seam exists in the far western part the project area. In situ coal attributed to this seam does not form part of this development.

4.2.3 Previous Exploration

Initial investigations within the area began in late 1969, after the original proponents (Durham Holdings) acquired the mineral rights to the Ashton property. In 1969 and 1970, thirty four (34) fully cored holes (DRM 1 to DRM 34) comprising 4500m were drilled within the Ashton area. This work formed part of a larger exploration program that was serviced and managed by the Joint Coal Board (JCB) for Durham Holdings Ltd, a subsidiary of Consolidated Gold Fields Australia Ltd and Dalgety Australia Ltd.

Exploration commenced with a series of strategically placed holes. Additional holes were then drilled to identify the outcrop of each of the seams considered for this earlier development. Bores were drilled to the base of the coal measures and confirmed that the Lower Barrett seam was the limit of economic seam development. The locations of the previously drilled exploration holes are shown on **Figure 4.3**.

4.2.4 Recent Exploration

In September 1999, the Minister for the Department of Mineral Resources (DMR) transferred to WML all rights, title and interests in EL4918 - the Ashton area. During the period February 2000 and June 2001, WML implemented a program of in-fill drilling comprising 22 boreholes (WML001 to WML022) to augment the work conducted by Durham Holdings. This included 1977m of coring and 1748m of open hole drilling. These investigations in conjunction with the earlier exploration confirmed the potential of the Ashton project.

4.2.5 Geological Description

The target seams and their development potential that comprise the Ashton Coal Project are as follows:-

• Pikes Gully	Underground and Open Cut
• Upper Arties	Open Cut
• Arties	Open Cut
• Upper Liddell	Underground and Open Cut
• Middle Liddell	Open Cut
• Upper Lower Liddell	Underground and Open Cut
• Lower Liddell	Open Cut
• Upper Barrett	Open Cut
• Upper Barrett Split	Open Cut
• Lower Barrett Split	Open Cut
• Lower Barrett	Underground and Open Cut

Geological Structure

The principal structural feature of the project area is the Camberwell Anticline. The axis of this structure trends along the eastern boundary of EL4918. The coal seams of principal interest subcrop along the eastern part of EL4918. These subcrops define the westerly dipping limb of the Camberwell Anticline. In the north eastern part of the project area the formation is folded around the axis of the Camberwell Anticline. At this location the formation is more steeply inclined from 9 to 18 degrees east. Exploration work has not revealed the presence of significant faulting or areas effected by igneous activity.

Coal Seam Geology

The coal resources identified within the project area are characterised by seam developments exhibiting considerable variation in thickness and raw ash content. Seam thickness varies from 0.3m (Lower Lower Liddell) to 3.9 m (Lower Barrett), though is generally in the range of 1.0 to 2.2m. Ash content within the target seams forms a continuum typically between 18% and 32%. As a general rule, the ash content increases with seam thickness. This is a characteristic of the resource and is attributed to the development of in seam stone partings and splitting within the Liddell and Barrett Seams.

The Lower Barrett seam, which is the deepest seam considered in this proposal, and the Pikes Gully seam which is the upper most, occur at depths ranging from 47 to 280, and 0 to 190m respectively. The interburden between the seams that occur within this interval varies in thickness from 6.0 to 55m.

4.2.6 Coal Resources and Reserves

The coal inventories provided in this section have been prepared in accordance with the processes and procedures advocated in the “Guidelines for the Estimation and Reporting of Australian Black Coal Resources and Reserves”. This guideline provides an approved methodology for estimating and reporting Coal In Situ, Coal Resources and Coal Reserves for government, public and non-public purposes.

In summary, Coal In Situ includes any occurrence of coal within a specified area that can be estimated “irrespective of thickness, depth, quality, mineability or economic potential”. Coal Resource is that part of the Coal In Situ category in such form and category that comprises “reasonable prospects for eventual economic extraction”, and, Coal Reserve is the “economically mineable” part of Coal Resource.

Coal In Situ and Coal Resources are qualified in terms of increasing confidence categories: inferred, indicated and measured. Coal Reserves are estimated from indicated and measured resource categories and may be assigned as Proven or Probable. These categories can then be combined and reported as Recoverable Coal Reserves.

Coal In Situ

Total In Situ Coal within the Project Area is 191Mt. Of this quantum 173Mt is measured and 18Mt indicated. The seam wise contribution to these inventories is provided in **Table 4.1.**

TABLE 4.1 SUMMARY OF IN SITU COAL						
					Tonnes	
Seam	Area (m^2)	Thick (m)	Ash %	RD	Measured	Indicated
Bayswater (1)	897,006	1.21	25.48	1.40		1,519,735
Bayswater (2)	975,831	1.20	28.37	1.40		1,639,199
Lemington	2,933,325	2.11	24.28	1.45	9,251,562	0
Pikes Gully	6,481,157	2.17	24.93	1.42	20,039,396	171,648
Arties	7,250,156	1.73	24.67	1.47	17,771,492	370,805
Upper Liddell	8,357,631	2.12	26.09	1.47	25,747,582	540,218
Middle Liddell (1)	5,780,630	0.74	10.55	1.33	5,429,927	318,995
Middle Liddell (2)	7,882,415	0.90	14.35	1.35	9,238,279	393,388
Upper Lower Liddell	9,255,905	2.04	18.85	1.41	26,015,389	944,460
Lower Lower Liddell	7,156,244	0.98	32.40	1.51		10,584,602
Upper Barrett	9,606,137	1.53	23.63	1.46	21,569,318	650,059
Upper Barrett split	3,080,977	0.82	26.94	1.50	3,423,353	104,147
Lower Barrett split	702,887	0.81	16.24	1.39	392,369	458,348
Lower Barrett	10,120,399	2.25	28.58	1.50	34,129,941	892,292
Grand Total					**173,008,608**	**18,587,896**

Coal Resources

Coal Resources have been assessed from the In Situ Coal inventory and have been further segregated on the basis of underground or open cut development potential. Underground Resources have been estimated at 67.4Mt. This resource is measured and includes coal occurring within the Pikes Gully, Upper Liddell, Upper Lower Liddell and Lower Barrett seams. A summary of these resources is provided in **Table 4.2**.

TABLE 4.2 SUMMARY OF UNDERGROUND COAL RESOURCES					
Seam	Area (m^2)	Thick (m)	Ash%	Density	Tonnes
Pikes Gully	5,814,450	2.14	23.06	1.43	17,846,496
Upper Liddell	5,814,450	2.14	27.54	1.49	18,145,876
Upper Lower Liddell	5,814,450	2.09	27.39	1.48	15,696,510
Lower Barrett	5,814,450	2.26	27.88	1.51	15,750,566
Grand Total					**67,439,448**

Resources identified for Open Cut development are estimated at 21.2Mt. Of this quantum 13.7Mt is measured and 7.5Mt indicated. A summary of these resources is presented in Table 4.3.

TABLE 4.3 OPEN CUT COAL RESOURCES						
					Tonnes	
Seam	Area	Thick (m)	Ash%	Density	Measured	Indicated
Pikes Gully	77,899	2.26	27.71	1.47	793,180	171,648
Arties seam	406,119	1.65	24.69	1.47	0	739,654
Upper Liddell	818,124	2.22	28.16	1.49	2,232,569	540,218
Middle Liddell (1)	829,031	0.81	13.35	1.37	627,918	318,995
Middle Liddell (2)	874,294	0.99	13.80	1.38	825,324	393,388
Upper Lower Liddell	1,336,169	2.25	23.27	1.43	3,249,609	944,460
Lower Lower Liddell	897,587	0.85	23.48	1.44	0	1,199,992
Upper Barrett	1,361,476	1.44	17.62	1.40	2,033,131	650,059
Upper Barrett split	983,613	0.86	26.94	1.50	0	972,951
Lower Barrett split	616,919	0.82	16.51	1.40	0	756,112
Lower Barrett	1,364,482	2.55	30.59	1.56	4,010,461	892,292
Grand Total					**13,772,192**	**7,579,769**

Coal Reserves
The recoverable reserves are derived from underground and open cut coal resources and have been estimated after the application of mining constraints imposed by the proposed methods of recovery. These estimates take account coal left behind in underground pillars, open cut batters and access ramps. Volume adjustments on account of dilution and surface moisture have also been considered. The recoverable reserves for the underground and open cut proposals are summarised in **Tables 4.4 and 4.5** respectively.

TABLE 4.4 SUMMARY OF RECOVERABLE UNDERGROUND RESERVES	
Seam	Recoverable Reserves
Pikes Gully	12,625,799
Upper Liddell	12,908,363
Upper Lower Liddell	10,262,091
Lower Barrett	13,029,075
Grand Total	**49,625,326**

TABLE 4.5 SUMMARY OF RECOVERABLE OPEN CUT RESERVES

Seam	Recoverable Reserves (t)
Pikes Gully	413,776
Arties[1]	382,028
Upper Liddell	1,218,036
Middle Liddell (1)[2]	1,520,827
Middle Liddell (2)	47,930
Upper Lower Liddell	2,258,282
Lower Lower Liddell	1,108,796
Upper Barrett	1,156,852
Upper Barrett Split	817,543
Lower Barrett Split	752,332
Lower Barrett	2,390,924
Grand Total	**12,067,326**

Notes

1-Includes a small component of Upper Arties Split

2-The parting between Middle Liddel1 (1) and (2) splits is generally less than 0.3m. Reserves for Middle (1) includes coalesced Middle Liddell (2)

4.3 Coal Quality

The ash content of the ROM coal to be recovered from the proposed underground and open cut developments will generally range from 18 to 32%. This is regarded as too high to meet the export market specifications without beneficiation. Raw coal will be processed in the Ashton Coal Preparation Plant, which is to produce steaming coal and semi soft coking coal for the export market, and sized raw coal for domestic consumption.

Test work carried out on selected working sections indicates a low ash product (8.5% average) with strong coking properties can be recovered. Alternatively, a slightly higher ash (10.5% average) semi-soft or thermal product can be recovered.

Petrographically, the coal matter within the seams to be mined contains large proportions of Vitrinite. An analysis of polished sections that were prepared from a selection of composite samples reveals that reactive macerals (Vitrinite and Liptonite) comprise between 75 to 85% of total lithotypes. Vitrinite reflectance (R^o Max) is in the order of 78 to 82%.

The chemical properties of the coal have been determined from test work carried out on representative samples recovered during exploration. Ash fusion temperatures (Deformation and Flow) generally exceed 1560^0 Celsius. Sulphur within all seams is low and other elements such as chlorine and phosphorous are also low.

4.4 Mining Constraints

The significant constraints to mining within the Ashton area include the following:

- The village of Camberwell due to its proximity to the open cut mine;
- The New England Highway and the need to minimise potential subsidence impacts;
- The Main Northern Railway located on the northern boundary of the exploration licence area;
- Glennies Creek and its associated alluvial flood plain;
- The Hunter River and its associated alluvials;
- Potential flooding impacts on the underground mine operation;
- The presence of in seam gases is minimal and should not form a constraint to mining;
- Ensure that the Bowmans Creek diversion is outside the limit of subsidence;
- Geological constraints limiting the area available for open cut mining; and
- Lease boundaries of the exploration licence and the mine lease extension areas.

4.5 Mining Method

The Ashton Coal Project will incorporate both open cut and underground mining methods. These methods will be subject to a detailed risk analysis to ensure that identified hazards are mitigated to an acceptable level. They will then be documented into comprehensive Mining Operations Plans which will apply current best mining practice and will meet the agreed environmental outcomes.

The conceptual mining methods are described below:-

4.5.1 Open Cut

The open cut operation comprises of 2 pits, both of which are contained within an area bounded by the Main Northern Rail Line, the New England Highway and Glennies Creek Road.

The Arties Pit will be mined to the base of the Arties seam providing highwall access to the underground as well as providing a protected area below the existing surface levels for the storage of ROM coal from both the open cut and underground mines. Some 1.5Mbcm of overburden will be removed from this pit and used for environmental bunding, infrastructure earthworks, rail siding embankment and road works. All of these works will take place within the initial construction period, which is shown in **Figure 4.4**.

The Barrett Pit, will be positioned to the east of the Arties Pit near the peak of the Camberwell anticline. This pit will operate for approximately 7 years. The initial development of this pit is shown in **Figure 4.5**. Approximately 1Mbcm will be removed initially to establish environmental bunds immediately north of Glennies Creek Road. The formation will be generally 15m high to minimise visual, noise and dust impacts on the residents of Camberwell village. Environmental bunds will be planted with indigenous species and grassed immediately following establishment.

The mining method will commence with the removal and stockpiling of vegetation. Selected trees will be placed on the bunds to provide a replacement habitat for local fauna. Remaining vegetation will be mulched and spread within the revegetated areas.

Topsoil will be selectively reclaimed and stockpiled in dedicated areas for subsequent re use in the rehabilitation of the overburden emplacement areas.

Where practicable clean surface waters will be progressively diverted around the operational areas to avoid contamination.

Mining of overburden will be conducted using 2 hydraulic excavators and trucks as the limited strike length and confined operating conditions precludes the use of draglines or large rope shovels.

The open cut will be developed in a series of benches matched to the reach of the excavators. This method will have the advantage of limiting the size of overburden blasts which will minimise the extent of vibration felt in the village of Camberwell. The blast design will also limit the amount of explosive per initiating delay to control the noise and vibration effects and to limit the potential for the ejection of flyrock onto public roads or the rail line. A Shotfiring and Explosives Management System will be developed to establish and maintain effective control of this critical process.

Excavated overburden will initially be placed in 2 locations out of pit until the mine development has reached the stage where all material can be disposed of within the excavated area. This is expected to be achieved within 2 years of the commencement of Barrett pit operations. The 2 dump locations are the East Emplacement Area (12Mbcm including environmental bunds) and the West Emplacement Area (5Mbcm including environmental bunds).

The final level (RL 125m) of the East Emplacement Area is limited to ensure that all operations are confined behind the Glennies Creek Road environmental screen. This minimises the potential for visual, noise and dust impacts on the residents of Camberwell village. Likewise, the final level of the West Emplacement Area has been limited to RL105m.

Due to the proximity of the open cut mine to the village of Camberwell, special consideration has been given to the adoption of mining techniques which will minimise the generation of dust and/or noise. During periods of adverse climatic conditions and to ensure that EPA goals are not exceeded the following practices have been adopted:

- Overburden trucks will not operate during the night shift;
- The open cut pit and the out of pit emplacement areas will be developed as multi level operations;
- The overburden trucks will be fitted with advanced noise reduction technology.
- During periods of adverse climatic conditions, measured from real time air quality monitors in the village, upper level operations will be progressively transferred to lower levels to maintain sound emission goals;
- Should the air quality continue to approach EPA limits the operations would be progressively shut down; and
- Dust suppression will be provided during periods of operation. Enhanced controls will be implemented during periods of adverse climatic conditions.

Coal fragmentation will be by dozer ripping. The coal and thinner interburden quantities will be mined using front end loaders and trucks.

Overburden will be transported to the West Emplacement Area during the first 2 years of mine life. A purpose built road with dual carriageways will be constructed under the Bowmans Creek overbridge for this purpose. This road could also be used for the transport of domestic coal to the Macquarie Generation overland conveyor belt system during the first 18 months of mine life when rail loadout facilities are not yet available. A creek crossing will be required as part of this roadway.

4.5.2 Auguring and Highwall Mining

The design of the Barrett Pit flattens the angle of the final highwall to allow further mining of the thicker seams by auger and highwall mining. Working sections of the Pikes Gully, Arties, Upper Liddell, Middle Liddell, Upper Lower Liddell and Lower Barrett seams that are thicker than 1.5m would be suited to highwall mining from the open cut endwalls and highwalls. Recovery by highwall mining from the northern endwalls must occur as open cut mining progresses but benches can be left in the final highwall for recovery of residual reserves to the west and southwest.

Working sections of the seams between 0.8m and 1.5m thick can be recovered by auger mining. The seams which are amenable to this method include the Lower Liddell, Upper Barrett, Upper Barrett Split and Lower Barrett Split.

4.5.3 Underground

The proposed underground mine is located south of the New England Highway. Access to the underground mine is from the highwall of the Arties Pit which is located to the north of the highway. The main headings will generally be aligned beneath the highway thereby minimising the impact of subsidence whilst maximising the recovery of coal.

The extent of mining operations is defined by the subsidence barrier protecting Glennies Creek to the east, the Hunter River and associated alluvials to the south and the subsidence barrier to the Bowmans Creek diversion channel to the west.

The mine plan is designed as a descending multi seam longwall operation with 4 seams of mineable thickness extracted over the 18 year operating life. Longwall blocks of approximately 250m face width will be mined. The first or upper seam (Pikes Gully) will be extracted down dip (east to west) with the 3 remaining seams extracted up dip (west to east).

As subsidence impacts will result from the progressive extraction of the 4 seams, surface earthworks will be progressively developed to ensure surface area run-off water is directed away from the subsided area and not allowed to pool. In addition these works will address any areas of surface cracking that may occur. Total subsidence is expect to be up to 5.9m.

An interseam drift provides conveyor coal transport to the permanent ROM stockpile in the Arties Pit. The reverse to dip drift will be driven from the Western end of the Pikes Gully workings to the Lower Barrett providing access to all the lower seams.

The Bowmans Creek diversion will be established in sufficient time to allow stream ecology to be developed prior to the diversion of flows. The construction will be undertaken in Year 3 some 18 months ahead of longwall mining in block 4 (the first block that impacts on the existing alignment). The transfer of stream flow will be timed to occur prior to subsidence of the existing stream in year 5. The proposed operations at year 4 are shown in **Figure 4.6**

The Bowmans Creek diversion channel has been designed to replicate the existing ponds and riffle environment currently in the stream bed. The general cross section of the diversion has been designed to contain a 1 in 100 year flooding event. Earthworks will prevent the Hunter River flooding back up the existing flood plain of Bowmans Creek. This could lead to increased water make in the underground mine however, the expected extent of subsidence cracking should limit the inflow to within the installed pumping capacity of the underground mine.

The environmental bunding in the infrastructure area has been designed to be higher than the maximum predicted flood event calculated by the designers of the Bowmans Creek overbridge i.e 69.00m AHD. During the first (ie. 2 years while the Western Emplacement Area is operational) the design criteria of the haul road will breach this bund at 66.5m AHD. In the event of a significant flood during this 2 year period a contingency plan involving the dumping of overburden material to achieve 69.0m AHD has been allowed.

The underground mine will be developed through to longwall block 5 of the Pikes Gully seam by year 7 of the project, as shown in **Figure 4.7**. The open cut mine is expected to be completed and under rehabilitation at this time.

4.6 Mine Schedule and Equipment

The overall mine schedule has been developed with the goal of establishing the environmental bunds within the first 6 months of operation. Out of pit emplacement areas have been scheduled for completion within the first 2 years of operation.

The CPP and its associated conveyors and stockpiles, as well as the train loading system, rail siding, offices, car parks and bathhouse are all scheduled for completion within the first 18 months.

4.6.1 Open Cut Mine

Overburden production is scheduled to occur on the basis of 12 hours per day, 7 days per week. Allowance has been included for production to be restricted or halted during periods of adverse weather conditions. Planned production equipment includes 2 backhoe style hydraulic excavators, with up to 8 (No.) 190t trucks. Coal and partings will be removed on day and afternoon shift.

TABLE 4.6
OPEN CUT MINE EQUIPMENT

Equipment Type	**No Off**	**Hours of Operation / day**
Hydraulic Excavators	2	12
Trucks (overburden)	8	12
Drills	3	15
Dozers	4	12
Front end Loaders – Coal / partings	1	15
Trucks (Coal)	3	15
Water Carts	2	15 plus
Graders	1	15

4.6.2 Underground

Development drivage of the main headings will commence following the completion of CHPP and rail loadout facilities in year 2. The first longwall block development will be completed 15 months after start of underground operations and a 6 month period has been allowed for the longwall to ramp up to full production capacity. Year 4 will be the first year of full longwall production.

The longwall is scheduled to operate on the basis of 24 hours/day on a rotating shift basis.

4.6.3 CHPP

Construction of the CHPP, rail siding, conveyors and associated stockpiles and loading bins is scheduled for completion within 15 months of the start of construction activities on site. The cross section of the ROM conveyor system is shown in **Figure 4.8** and the product conveyor system is shown in **Figure 4.9**.

The CHPP and rail loading facilities will operate 24 hours per day, 7 days per week.

ROM coal facilities will include a 40,000t stockpile for the underground mine and a 25,000t stockpile for the open cut mine. An underground reclaim conveyor will transfer coal from the ROM stockpiles to the CPP via primary and secondary crushers. The CPP will be a single module dense medium spiral plant with a capacity in the region of 700t/hr.

Product coals will be transferred via an overhead tripper conveyor to the 160,000t product stockpile. An underground reclaim system transfers coal to the high rate train loading bin. The rail siding has been designed to accommodate 9,000t unit trains on the approach and departure side of the bin.

4.6.4 Mine Production

Production from the open cut mine will commence in Year 1 and will continue for a period of seven years.

Development of the underground mine will commence in Year 2, with the longwall commencing operation in Year 3 and reaching full production in Year 4. The longwall will progressively mine four separate seams in descending order, with the last seam being completed after 18 years of production (ie. Year 20).

Annual sales of coal from the project will depend on the seams being mined as well as the mix of domestic and export sales (which have significantly different recoveries), but are expected to peak at 4.2 to 4.4Mtpa.

4.7 Mine Services

4.7.1 Ventilation

The underground mine is quite compact with access roads and main headings being of minimum length from the surface to the longwall panels. The ventilation of the mine would therefore be quite efficient.

The longwall panels will be connected in pairs, thereby allowing a small volume of air to circumvent the sealed goaf areas thus ventilating the inbye section of roadway in the working longwall panel.

During development of the third and fifth longwall panels a small 600mm diameter borehole will be connected to the inbye end of the panels to ventilate this inbye portion of the travelling road as the face retreats. The borehole will be naturally ventilating under the influence of the mine fan. Without connection to the previously extracted longwall panels, they will be effectively isolated.

4.7.2 Gas Management

An assessment of total desorbable gas was carried out on seven coal samples recovered from WML010 and WML014, refer to **Figure 4.3.** These samples represented the major seams proposed for underground extraction. Depths ranged from 180 to 280m, which are the lowest operating levels considered for the development. Results indicate that the coal seams contain low to moderate quantities of gas which is predominately methane (CH_4:70-90%),with Nitrogen (N: 8-22%) and Carbon dioxide (CO_2: 1.5) making up the remainder. The gas content of the upper three seams: Pikes Gully, Upper Liddell and Upper Lower Liddell is low and should not form a constraint to mining. The deeper portions of the Lower Barrett Seam, proposed to be mined in years 15-20, reported desorbable gas levels generally in excess of 3-4 m^3/t. This will require the development of a gas management plan during the detailed planning and design phase of the project.

4.7.3 Water Supply

Water for use in the CPP, dust suppression and underground operation will be sourced from water collected on site and stored in the main settlement dams and process water dams, refer to **Figure 4.5**.

The main settlement dams will receive all runoff from disturbed catchments, including the coal stockpiles and haul roads; the open cuts; recycle water from the fine rejects ponds; run-off from the unrehabilitated components of the East Dump and West Dump. The settlement dams have adequate operating capacity with 50ML freeboard for storm events. Run-off from a 1:100 year 72 hour storm event will also be directed to the settlement dams.

Process water dams will receive water pumped from the settlement dam; water pumped from the underground mine dewatering pumps; and from the raw water during dry years when water is imported; water will be pumped from the process water dam to supply the CPP make up water requirements, the dust suppression water and to the raw water dam during medium rainfall years and wet years. The process water dam has sufficient capacity for operational requirements. Sufficient freeboard will be maintained to contain the incident rainfall from a 1:100 year 72 hour storms.

Opportunities exist to assist other mines in the area by the utilization of their excess mine water which would otherwise need to be stored by the utilization of their excess mine waters.

Potable waters will be collected off building roof areas and augmented by water being trucked into the mine site.

4.7.4 Electricity

Power supply to the site is available via an existing Energy Australia 66kV feeder that traverses the north eastern corner of the lease. This feeder is part of a ring system supplying the adjacent mines and ensures continuity of supply to the connected users. A substation will be located adjacent to the CPP.

The existing parallel 132kV & 66kV transmission lines will require relocation around the pit top facilities.

4.7.5 Underground Mine Dewatering

Specific mine dewatering requirements will vary depending on groundwater and strata conditions, as well as void sizes created by the mining process.

In generic terms, the dewatering system will consist of small compressed air or electric pumps located in water catchment areas or strategically located sumps. From here the water will be pumped to underground settling tanks, serviced by larger capacity pumps, which would then pump the water to the sump adjacent to the highwall entries.

It is envisaged large diameter pumping boreholes will be located in the lowest zone (generally in the south west corner) of the workings in each seam. The location of these boreholes would keep water levels down by pumping to the surface. Water stored on the surface will be utilised in the mine and CPP operations.

The potential for subsidence cracking to provide a direct hydraulic connection between the surface and the longwall panels may cause additional water inflows during flood events on Bowmans Creek that are greater than a 1 in 100 year reoccurrence frequency. Preliminary geological analysis indicates that the level of this in flow will be within the design capacity of the mines water management system but further detailed assessments will be conducted prior to the commencement of operation.

4.7.6 Administrative Facilities and Car Parking

The project administrative offices will be located on the surface at the eastern end of the Arties Pit. The bathhouse, first aid and car parking area will also be located in this area as shown in **Figure 4.10** and **Figure 4.11**.

The office facilities have been designed to accommodate up to 20 staff and visitors, whilst the bathhouse will have the capacity to handle two shifts of mine employees (both up to 40 personnel per shift) concurrently. A first aid station and muster room will be attached to the bathhouse.

Provision has been made for over 70 car parking spaces which is well in excess of the calculated requirements:-

TABLE 4.7
ESTIMATED CAR PARKING REQUIREMENTS

Work group	No. Personnel	Persons/vehicles	Car parks required
Shift 1	40	2	20
Shift 2	40	2	20
Staff	20	1.4	14
Visitors	10	1	10
Total			64

The construction contractors will be required to provide separate facilities for their own employees.

4.8 Rejects Handling and Emplacement

Depending on the mix of domestic and export sales and the proportion of thermal and coking coals, up to 10Mbcm of coarse rejects and tailings will be produced over the life of the project.

Coarse rejects will initially be placed in a dedicated area contained within the Eastern Emplacement Area for a period of approximately 6 months. Following this the coarse material will be buried within the overburden placed in the Barrett Pit, refer to **Figure 4.5**. Following completion of the open cut mining operation, all coarse rejects will be used to fill the final void of the Barrett Pit. The available void space is estimated to be 12Mbcm.

Tailings will initially be placed in 2 storage ponds located adjacent the CPP as shown in **Figure 4.5**. The ponds will be developed utilizing coarse rejects as a filter medium and will be in operation for approximately 5 years. Transition ponds will be developed on the surface of the overburden dump during the final 2 years of the Barrett Pit and until the final void has been established. Tailings will then be placed directly into the final void.

4.9 Bowmans Creek Diversion

4.9.1 Description of the Proposal

As described in **Section 4.5.3**, underground mining is proposed for the extraction of coal from areas south of the New England Highway.

The existing Bowmans Creek channel flows across longwall panels 4, 5 and 6. Due to surface cracking following subsidence, there is potential for hydraulic connection between surface and stream flows, and the underground mine. Furthermore, variable subsidence along the existing creek alignment will alter the existing geomorphology, potentially modifying creek conveyance capacities and riverine habitats.

To address these issues, it is proposed that Bowmans Creek be permanently diverted so that is does not follow a path across land that could subside due to underground mining. Details of the proposed channel diversion are outlined in the following sections.

Alignment

The proposed alignment for the diversion of Bowmans Creek is shown in **Figure 4.12**. The proposed diversion is approximately 2.4 kilometres long and re-enters the existing Bowmans Creek channel about one kilometre north of the Hunter River. The alignment has been based on maximising the opportunity to incorporate meanders, while at the same time recognising critical constraints such as the alignment of Brunkers Lane, the footprint of the proposed longwall panels, and the EL4918 boundaries.

The proposed diversion will commence about 100 metres downstream of the New England Highway bridge crossing of the existing creek channel. The commencement point corresponds to a major pool formed by gravels deposited at bedrock outcrops along the channel bed. The bedrock and gravels have formed a riffle that impounds runoff within the pool during low flow conditions. The bedrock outcrops extend across the channel, and are particularly prominent along the left (*viewed looking downstream*) or southern bank, refer to **Appendix N** of **Volume 2**. The pool and associated riffle outcrops are a major geomorphic feature within the existing channel. It is proposed that the pool and its associated riffle be stabilised using large rock and that the proposed banks for the diversion channel be tailored to match the geometry of the bedrock outcrops.

The proposed alignment incorporates three major meanders between the New England Highway and the western lease boundary. The meanders have also been included to increase the length of the diverted channel, thereby increasing the potential for stream energy to be absorbed and changes in flow velocity to be minimised.

As shown in **Figure 4.12**, the diversion follows a generally south-westerly path toward the western lease boundary. This path avoids the zone of influence for subsidence due to underground mining along longwall panels 4, 5 and 6, and ensures the current alignment for Brunkers Lane can be maintained. At the western lease boundary, the diverted channel proceeds south following the western lease boundary until it intersects the existing Bowmans Creek channel. The stream length of the diverted Bowmans Creek channel between the New England Highway bridge and the Hunter River is 4.9 kilometres.

Channel Design

Typical sections for the proposed channel diversion are shown in **Figure 4.13**. They correspond to specific locations along the diversion channel alignment, as shown in **Figure 4.12**. The concept design for the diversion channel shape has been developed based on minimising the discharge of floodwaters across the surface of the underground mine from the realigned channel in events up to and including the 100 year recurrence flood, refer to **Figure 4.14.**

The proposed channel will be excavated into the existing floodplain of the lower reaches of Bowmans Creek. The diversion is to comprise a trapezoidal shaped low flow channel with a typical base width of 6 metres and a typical depth of 2.5 metres. The low flow channel has been designed to carry the peak discharge in the 1 year recurrence flood. Low flow channel side-slopes are to be graded at 1(V) in 4(H), rising to an in-channel terrace. The in-channel terrace is typically 12 metres wide, with the side-slopes of the remaining section rising to the natural surface of the floodplain into which the diversion channel is cut.

Pool and Riffle Sequences

As outlined in **Section 3.6.5**, the existing channel is characterised by a pool and riffle sequence formed by bedrock outcrops and gravel shoals. This sequence has developed as a response to floods and defines the manner in which low flows are transmitted downstream along the channel. The proposed channel diversion will be constructed to provide a similar pool and riffle sequence.

Up to 12 artificial riffles, or drop-structures, are to be constructed within the low flow channel over the length of the diversion. These structures will control in-channel velocities and minimise the potential for bed scour and erosion along the low flow channel. They have been designed to allow for the passage of fish and can be constructed to replicate the aquatic habitat provided by the existing creek. The channel bed-slope between riffles will be constructed to a grade of 1(V) in 1000(H).

Two types of riffles have been considered. Typical longitudinal sections of each are presented in **Figure 4.15**.

Option A is a rock ramp riffle which results in an effective channel bed drop of up to 0.5 metres. It is formed by a rock weir extending across the low flow channel, with loosely placed rock extending downstream from the weir at an average slope of 1(H) in 20(V). The toe of the riffle is defined by connected 1 metre by 1m rockfilled gabions extending across the width of the channel. As part of the design, the gabion toe is “keyed” into the side-slopes of the low flow channel to provide stability, and to resist bank erosion through the process of outflanking.

The purpose of the gabions is to provide a mechanism for energy dissipation, thereby preventing the formation of head cuts and bed scour. Large sized rip-rap is to be placed at the ridge to provide roughness, increase the pool diversity and habitat, and to prevent excessive erosion. The rip-rap will consist of angular rock of various sizes packed tightly to reduce the porosity of the structure. Large oversized rocks will be included in the riffles and will protrude from the surface creating a more complex but natural surface condition, thereby increasing habitat potential. The design effectively creates a channel bed drop that will not impede the passage of fish.

Option B is a more typical drop structure formed by a rock weir held in place by a series of driven wooden logs. The weir is designed to provide a maximum vertical drop of 0.3m which is the maximum step in the channel that can be used to ensure upstream migration of fish. The base of the drop is stabilised by rock-filled gabions and placed rip-rap which is positioned to prevent bed scour. This is typical of a hydraulic plunge pool.

It is proposed that a combination of riffles (*Option A*) and drop structures (*Option B*) be used within the diversion of Bowmans Creek. Although Option A is preferred due to the ease of fish passage, variations on both concepts will be developed for specific locations along the diversion as part of the detail design.

Habitat Generation

Apart from the structural components of the proposed riffles and drop structures to be incorporated into the channel diversion, it is also proposed that the channel be vegetated to create a similar habitat to that found in the existing Bowmans Creek channel. A typical section for the proposed stream diversion stabilised treatments is shown in **Figure 4.16**.

As part of the channel design, the interface between the stream bed and the steeper lower banks will be protected by placed rip-rap. The rip-rap is to be provided to a depth of approximately 0.5 metres below the anticipated bed scour depth, which will be determined at the detail design stage. The structural measures are provided to mitigate bed and bank scour, as it is recognised that scour at the bank toe ultimately controls the rate of bank erosion.

Planting on the realigned channel will increase the riparian species diversity above the current diversity, which has been depleted by former land use practices (*ie., cattle grazing and trampling*). Native species are readily available and able to be commercially grown from local seed. A combination of shrubs, herbs, native grasses and tree species specially selected for the flow velocities expected to be encountered across the in-channel terrace and along the better drained high banks, will be determined as part of the detail design. Examples of vegetation species that could be used to create an appropriate varietal habitat within the realigned stream, are listed in **Table 4.8**.

TABLE 4.8 EXAMPLES OF VEGETATION SPECIES TO BE USED IN STREAM REHABILITATION WORKS	
LOCATION	**SPECIES**
Lower banks	Lomandra longifolia Phragmites Austraus Juncus Usitatus Water Couch (Paspalum distichum) Swamp She-Oak (Casuarina Glauca) River She-Oak (Casuarina cunninghamiana)
Mid banks	Prickle Leaved Paperbark (Melaleuca styphelioides) Melaleuca thymifolia Melaleuca decora Rough-barked Apple (Angophora floribunda) Acacia Floribunda Shorthair Plumegrass (Dichelachne micrantha)
Upper banks	River Red Gum (Eucalyptus camaldulensis) Eucalyptus Amplifolia

In-stream wetland (*macrophyte*) plantings are proposed and will be concentrated within the stream bed and between the rip-rap protection. These species will reduce low flow velocities, assist in the prevention of bed scour and provide varietal aquatic habitat. Perennial native grasses are to be densely planted in the banks of the low flow channel, which are to be constructed are slope of 1(V) in 4(H).

A range of native grasses and trees are proposed for the in-channel bench and channel side-slopes. The potential for erosion along the in-channel terrace is to be mitigated through the use of dense copse of deep-rooted tree species with soil binding characteristics. A dense tree coverage increases the thickness of the boundary layer over the bank, thereby reducing shear stresses acting on the surface of the bank during high flows.

The dense copse will be aligned so as to centralise low and mid-bank flows, and thereby minimise erosion potential. The indigenous species selection and planting density will provide and enhance varietal habitat, and provide shade protection to the banks and in-stream habitat.

4.10 New England Highway Bridge Underpass

4.10.1 Existing Bridge

The New England Highway bridge crossing of Bowmans Creek was constructed in the early 1980s. The bridge has five 16m spans and is supported on cast-in-situ concrete piles that are founded a minimum of 300 mm into sound rock. The sound rock comprises fine siltstone and fine to medium sandstone with occasional bands of clay and coal seams.

The underside of the bridge deck is at a minimum elevation of 69.05m AHD. The highest recorded flood level at the bridge is 67.8m AHD, which occurred during the 1955 flood.

4.10.2 Description of the Proposal

A number of haul roads are proposed as part of the mine operations for the site. These are to be used to haul coal and excavated spoil material. A haul road is required to link the open cut mine, the west emplacement area and the Macquarie Generation conveyor system. The proposed alignment for the haul road is shown in **Figure 4.5**. It is proposed to be used by trucks hauling coal and excavated spoil material.

As shown in **Figure 4.17**, the haul road will need to pass beneath the New England Highway bridge crossing of Bowmans Creek. It is proposed that the haul road be located along the left bank of the Bowmans Creek (*viewed looking downstream*) adjacent to the Singleton abutment to the New England Highway bridge. The haul road will have two lanes. Trucks travelling south will be laden while northbound trucks will be empty.

4.10.3 Concept Design

At the bridge, the haul road will separate into two lanes located on each side of the first bridge pier. The eastern lane will have a finished surface level of 65.0m AHD. The western lane will be 0.5m lower to minimise the impact of earthworks on the low flow channel of Bowmans Creek.

Each lane will have a clear width of 6 metres. Excavation into the existing southern abutment scour apron will be required to provide the necessary lane width for the eastern lane. A retaining wall will be constructed to support the excavation and minimise any disturbance to the upper section of the apron. The western lane will be partly constructed on fill using compacted river gravel extending into the existing low flow channel of Bowmans Creek. Excavation of the channel along its western bank will be undertaken to compensate for the loss of channel conveyance at low flows.

Safety barriers will be used to protect the bridge structure and to prevent run-off by vehicles. The safety barriers would continue 20 to 30 metres past the bridge on each side.

4.11 Water Management

The objectives of the water management take into account the practical requirements to mine economically and safely and the water management principles detailed in Section 5 of the Water Management Act 2000. These objectives are:

- Meet the water supply needs of the project;

- Protect the safety of people and equipment in the mine by minimising the risk of large uncontrolled inflows of water into the mine from overlying water bodies;

- Eliminate or minimise the risk of off-site discharge of dirty or saline water, except as allowed under appropriate approvals and licences;

- Protect and restore water sources, floodplains and dependent ecosystems, wherever possible;

- Minimise land degradation;

- Protect and restore habitats wherever possible;

- Protect and enhance water quality;

- Minimise cumulative impacts on water sources and dependent ecosystems;

- Minimise impacts on downstream users of water sources and floodplains; and

Make the operation as simple and as reliable as possible to achieve above objectives.

4.11.1 Proposed Strategies

The strategies for handling surface, underground, waste, dirty and saline waters are described below:-

Clean Surface Water
The strategies for management of clean surface water are summarized below:-

- Clean surface water runoff from undisturbed catchments in the underground mine area to the south of the New England Highway will continue to be discharged via their “natural” water courses; and

- Clean water from undisturbed catchments in the open cut mine area to the north of the highway will either be collected and directed to the raw water dam for use in mine water supply, or possibly discharged off site;

Underground Mine Water
The strategy for management of water in the underground mine is summarized below:-

- Each successive longwall panel and the goaf from the proceeding panels will be maintained in a dewatered state for safety reasons;

- The longwall panels will be kept drained by pumping from a series of deep large diameter boreholes located at the southern end of every second panel;

- All underground water will be either directed towards the three borehole dewatering sumps or to the surface sump in the Arties Pit through various pumping stations and pipe-work underground;

- The dewatering boreholes will be deepened or upgraded on the completion of the panels in each seam; and

- Storage of water underground will be minimized.

Wastewater

The strategy for management of wastewater sources including the bathhouses and the various toilets and workshop-contaminated water will be to collect the wastewater by commercial waste collection tanker and dispose of it at an appropriate treatment plant. Suitable quality water will be spray irrigated onto environmental bunds and revegetated areas.

Dirty/Saline Water

The strategy for the management of the dirty and saline water streams are summarized below:

- Dirty water from disturbed catchments such as open cuts, waste dumps, plant areas and haul roads, will be kept separate from clean water runoff and will be collected and directed via sedimentation ponds to the main settlement dam for use in mine water supply;

- Dirty water will be reused wherever possible to minimise imported water requirements;

- Dirty water will not be discharged from the Ashton Coal Project except under licence within the rules of the Hunter River Salinity Trading Scheme (HRSTS), if necessary salt credits can be obtained;

- Sufficient freeboard will be maintained in the dirty water storages to contain the run-off from 1:100 year storm from the site catchments;

- The process water dam will always have sufficient water in storage to meet CPP demands for one month;

- A facility will be installed in the process water dam to enable rapid release of large volumes of saline water quickly according to the rules of the HRSTS, if the necessary salt credits are obtained;

- Make-up water will be imported either from excess water from neighbouring mines or from the Hunter River under licence; and

- The open cut final void will be used for storage of excess dirty and saline water once open cut mining ceases.

4.11.2 Surface Water Structures

Open Cut

The proposed drainage structures and sedimentation ponds for the Open Cut Mine area at Year 2 are presented in **Figure 4.18**. This shows the proposed alignment of drainage channels, the location of clean and dirty water storages, and their size. The arrangement is based on collecting and storing all runoff from disturbed areas (*haul road surfaces, coal stockpile areas, buildings, etc*). It has been assumed that all rainfall that falls on these areas will discharge to the sedimentation ponds. Four ponds are proposed for storage of this runoff. These sedimentation ponds are:-

- Pond A – which is to be sited near the northern entrance to the Open Cut area and adjacent to the Process Water Dam;

- Pond B - which is to sited between the Arties Pit and the westernmost Slurry Pond;

- Pond C - which is to be sited immediately north of the contractor's work area and adjacent to the proposed Clean Water Dam; and

- Pond D - which is to be sited between the east-west haul road and the Main Northern Railway, and which will store runoff from the haul road and the northern section of the area to be excavated to form the Barrett Pit.

Runoff from the Arties Pit area will be collected and stored in above ground sedimentation ponds to be located within the pit.

The effective management of runoff from the Open Cut Mine Area also requires collection of runoff from the land surface that will be mined to form the Barrett Pit. At Year 2, this area will remain undisturbed and therefore will retain existing vegetation cover. It is proposed that runoff from this area be collected in a Clean Water Dam to be constructed in the area adjacent to the proposed slurry ponds. The Clean Water Dam has been sized to cater for runoff generated after one day of rainfall in the design 72 hour duration 100 year recurrence storm. As this dam will hold clean water only, it is proposed that any additional volume of collected runoff from undisturbed areas be discharged directly to Bettys Creek. This would be effected by commencing discharge once the Clean Water Dam reached two-thirds of its capacity.

The Open Cut Final Void

Will be available to store water and fine rejects at the end of Year 7. The water management system will be modified at that time so that the fine rejects from the CPP will be placed directly into the open cut void. The final slopes of the Barrett Pit will also drain into the open cut void. The final void has an available storage capacity of between 10,000ML and 140,000ML.

West Emplacement Area

The extent of the West Emplacement Area at Year 2 is also shown on **Figure 4.18**.

In order to control the runoff and seepage, it is proposed that two sedimentation ponds be placed at the northern and southern "corners" of the emplacement. These ponds are referred to as Sedimentation Ponds F and G. They will store dirty water from the entire West Emplacement Area and have been designed to hold the total volume of runoff generated during the 72 hour duration 100 year recurrence storm.

Water stored in Sedimentation Ponds F and G will be held for use within the mine operation. In the event of the onset of storm activity when the dams are part full, it is proposed that excess runoff be pumped to the excavation formed for the diversion channel. As the earthworks for this channel will commence at least 18 months in advance of opening the channel, it will provide a suitable cavity for excess water.

East Emplacement Area

The East Emplacement area will be constructed over the first four years of the project effectively filling the area to an elevation of 125 m AHD.

Runoff from the stockpile will be collected in perimeter drainage channels in a similar manner to the proposal for the West Emplacement Area. The proposed alignment and shape of the drainage channels is shown in **Figure 4.19**. The drainage channel will direct runoff to two Sedimentation Ponds (*Ponds H and I*), to be located at the eastern end of the East Emplacement and adjacent to the Main Northern Railway line. These ponds have been sized based on providing storage for runoff in the design 72 hour duration 100 year recurrence storm.

Water from disturbed areas (collected in the sedimentation ponds for the open cut, western emplacement and eastern emplacement) will be conveyed to the settlement dam. Water from the settlement dam will be used in the mining process.

4.11.3 Water Balance

The water balance for the Ashton Coal Project is included in **Appendix O** of **Volume 2.**

Water balances were calculated for a range of wet, medium and dry years to evaluate the sensitivity of the project to a range of weather conditions. Three representative years, being year 2, year 5 and year 12 were selected. Year 2 is representative if Project years 1-4, year 5 is representative of Project years 5-7 and year 12 is representative of Project years 8-20.

For the wet, medium and dry scenarios the undisturbed catchments at the open cut have been excluded from the calculations. A water balance flow schedule is shown in **Figure 4.20**.

Wet Years

Calculations for wet years 2, 5 and 12 shows that there is a 49Ml surplus in year 2 and 27Ml surplus in year 5. In year 12 there is no surplus of water due to the large storage capacity in the open cut void.

Medium Years

Calculations for medium years 2, 5 and year 12 (after year 7 when the open cut is complete).

In year 2 the system is approximately in balance under medium rainfall conditions with about 1Mlpa of imported water being required.

In year 5 the system has a small water deficit under medium rainfall conditions. An estimated 90Ml of imported water is required. The deficit largely arises from reaching the peak water demand in the CPP and increased water use in the underground mine with operation of the longwall equipment.

In year 12, the water demand from the CPP reduces significantly. There is a slight surplus of water within the system which can be accommodated in the final void.

Dry Years

Calculation for dry years 2, 5 and 12 were considered.

In year 2 and 5 when the open cut is operating, there is a water deficit requiring 220Ml and 303Ml of imported water, despite harvesting water from all available catchments.

In year 12, there is a small surplus within the system which can be accommodated in the final void.

4.11.4 Underground Dewatering Facilities

Water from the underground mine, via either dewatering bores located in the southern end of the longwall panels or via internal drainage systems will be conveyed to the settlement dam. Water from the dam will be used in the mining process.

4.12 Rehabilitation of Disturbed Land

The rehabilitation objectives will be to reinstate the land to its pre-mining land capability and to create a long term stable landform for sustainable use.

The final landform and vegetation patterns are shown in **Figure 4.21.** Overburden emplacement areas will be designed to have a final slope of not greater then 10^{o}.

The open cut final void will be used for deposition of both coarse and fines rejects from the underground operation until completion. The area will then be covered with suitable overburden and topsoil to complete and planted with indigenous species

4.13 Workforce and Working Hours

It is estimated that the Ashton Coal Project will provide full time work for approximately 140 persons. It is envisaged that many of these employees will be sourced from the local area. The construction phase is expected to be for a period of 18 months and employ approximately 200 persons.

The open cut will operate two shifts between the hours of 7am and 10pm. Maintenance and road watering will operate over 24 hours, seven days a week.

The CPP will operate over 24 hours, 7 days a week.

The underground mine will operate 24 hours per day on a rotating shift basis.

4.14 Markets

Internationally traded coal is forecast to increase by 130Mt in the period to 2005, of which 100Mt will be thermal coal and 30Mt of metallurgical coal. It is expected most of this growth will occur in Asia. Australia is well placed to capture at least half of this increase and to retain its position as the worlds leading exporter. In addition to this increase, new capacity will be required in the Hunter Valley to replace mines closing in the foreseeable future due to resource depletion. Most potential Ashton customers have wide experience using Hunter Valley coals.

The main markets include steel producers and thermal coal consumers in Asia, principally in Japan, Korea, Taiwan, China and India. The domestic power utility, Macquarie Generation is a local consumer of thermal coals and potential exists to also enter this market.

The Ashton Mine will have the capability of producing both prime soft coking and thermal coals.

4.15 Environmental Monitoring

The proponent will be required to present results of monitoring noise, vibration, water and air quality, spontaneous combustion and subsidence. The Ashton Coal Project propose to establish comprehensive environmental reporting procedures which incorporate the principles of operating an efficient mine in an environmentally responsible manner.

4.16 Waste Management

A comprehensive Waste Management System will be developed for the construction and operation of the mine. The Waste Management System will be developed as part of the Environmental Management Plan for the site.

Construction wastes are likely to include timbers, metal, oils and fuels, batteries and general domestic rubbish. All waste will be segregated prior to either disposal or recycling.

Effluent generated from the bathhouse will be irrigated on site in accordance with the NSW EPA draft "Environmental Guideline for the Utilisation of Treated Effluent by Irrigation" 1995.

4.17 Project Energy Sources

The Ashton Coal Project will require energy in the form of electricity for fixed plant and diesel fuel for mobile plant and explosive. Electricity for site operation will be purchased from the grid. The total connected load for fixed plant is estimated to be 13.39MW with an annual electricity energy use of 117,296MWHrs.

The supply of diesel fuel will be contracted locally. Mobile plant and explosive will utilize approximately 11Mlpa of diesel fuel.