2. Description of the Project

2.1 Key Elements of the Project

The Project involves the development and operation of an open cut coal mine producing thermal coal for the export market, with currently planned production of about 12 Mtpa, although actual production may vary between 10 and 15 Mtpa. A production rate of 12 Mtpa would give a mine life of approximately 17 years of coal production.

The key elements of the Project are shown in **Figure 2-1** with additional detail of the mine in **Figure 2-5** to **Figure 2-11**. They are:

- a coal mine, including:
  - an open pit up to approximately 290 m deep, producing between 10 to 15 Mtpa;
  - waste rock dumps to the north-west and south-west of the pit;
  - a mine water management system involving various water management dams;
  - an advanced dewatering borefield to draw down groundwater ahead of mining; and
  - heavy vehicle workshop and mine administration buildings;
- CPP for washing higher ash coal and a Coal Washery Waste Disposal Area;
- a 13 km long overland conveyor – to transport the product coal from the mine to the existing coal handling and rail loading facilities at the BAM;
- an 8.5 km long channel diverting Gowrie Creek to the east of the pit;
- a temporary 350 bed site construction village;
- a 14 km long road realignment, diverting the Gregory Highway and Peak Downs Highway to the north and west of the mine respectively; and
- a 7.5 km long section of electricity transmission line on an existing powerline easement to provide the coal mine with power.

2.2 Project Need

The BAM currently exports over 12 Mtpa of thermal coal and is nearing the end of its productive life. Coal from the Clermont deposit is similar in character and suited to the same markets that have traditionally been supplied by BAM. As BAM operations wind down and production ceases in 2009, Clermont Coal Mine production will ramp up, utilising the BAM product stockpiles, stacker reclaimers and train loadout facilities.

The coal is required for export to continue to meet the expanding demands of the electric-power industry in North-east Asia and elsewhere.

Mining and minerals processing activities contribute approximately 10.2% of Gross State Product or $9.4 billion per year to the State economy. Queensland activities directly and indirectly generate 86 000 full-time equivalent jobs or 7.2% of total employment in the State. At full production the Project will directly employ approximately 450 people.

An investment of approximately $440 million will be required to bring the mine to full production. The Project will contribute $505 million per annum to Gross State Product and support employment for nearly 3 800 people (direct and indirect, full time and part time) throughout Queensland. It will contribute $100 million per annum to the State in rail freight and royalties.

Many nations are planning new coal power plants to meet the increasing demand for electrical power. The project will supply high quality low sulfur coal that will produce lower sulfur dioxide emissions than many alternative coal sources and hence improved environmental quality.

As individual coal resources become depleted, it is necessary to develop other mines to maintain production and meet customer requirements. This also enables efficient and economic use of infrastructure such as railway lines and coal terminals.

The Clermont Coal Mine Project is a particularly clear example of such activities, as it will be gradually ramping up production using BAM coal handling infrastructure as production from that mine is phased out. The BAM currently exports over 12 Mtpa of thermal coal through DBCT and the production from the Project will contribute significantly to the operations of the Port, which has a current capacity of approximately 54 Mtpa. Without the Project, the Proponent would lose market share and profitability. The Government would lose revenue from royalties, freight charges and taxes. Workers and support contractors would lose employment and income. Secondary support industries and service suppliers would also suffer from a reduction in demand for their services and a resulting reduction in income.

2.3 The Coal Mine

2.3.1 Coal Resources and Coal Reserves

The coal deposit is a high quality coal resource of some 215 Mt with proved open cut reserves of 192 Mt. The coal resource is contained within the Wolfang Basin, a remnant Permian sedimentary basin located on the western margin of the Bowen Basin. The Wolfang Basin is an elongate north-south trending basin, approximately 5 km long by 1.5 km wide.

Three major coal seams have been identified within the coal sequence - the Gowrie, Prospect and Wolfang seams. The seams range from between 80 and 290 m beneath the ground surface. Cross sections of the seams are shown in **Figure 2-2**.

The major coal resource occurs within the Wolfang seam, which is approximately 40 m thick and contains 172 Mt of marketable coal. Details of the run-of-mine (ROM) and product coal are shown in **Table 2-1**. About 17% of the ROM coal will need to be washed during the life of the Project.

Table 2-1 Project Coal Seams – Life of Mine

Seam Group	ROM Coal (Mt)	Marketable Coal (Mt)
Gowrie	0.8	0.6
Prospect	4.7	4.2
Wolfang Upper	9.2	8.7
Wolfang	177.7	172.5
TOTAL	**192**	**186**

The American Society for Testing and Materials (ASTM) classification for the coal is high volatile-C bituminous. The product coal quality specifications are shown in **Table 2-2**.

Table 2-2 Project Product Coal Quality

Parameter	Value
Ash (% @ 6% moisture)	9.5
Volatile Matter (% @ 6% moisture)	27.6
Fixed Carbon (% @ 6% moisture)	56.4
Total moisture (% as received)	14.5
Total sulphur (% @ 6% moisture)	0.35
Gross Specific Energy (kcal/kg @ 14.5% moisture)	6070
Hargrove Grindability Index	56

2.3.2 Resource Utilisation

The Project will not impact on other coal, gas and mineral resources in the region. Knowledge of the local and regional geology, based on investigations undertaken by the Proponent and publicly available data (DME 1995), indicates that there are no significant coal resources outside of the Clermont resource proposed to be mined. The Proponent is also not aware of any other resources in the vicinity of the Project area. Therefore, it is considered unlikely that the transport corridor or the proposed road diversion would traverse other resource deposits. There are no significant resources of coal seam methane that will be lost by the development of the Project. The Project will be developed to minimise coal resource wastage and sterilisation. More details of this are provided in **Section 2.16**.

2.3.3 Mining Tenures

The Project consists of the Clermont Mining Leases (ML 1884 and ML 1904), and the Cement Hill MLs (ML 1787, ML 1788, ML 1995 and ML 2355) (**Figure 2-3**). The Cement Hill mining void may be used as a balancing water storage within the water management system. The Clermont MLs and the Cement Hill MLs are all held by the Proponent and managed by RTCA.

ML 1884 and ML 1904 were both granted in 1983. ML 1884 is for the purposes of mining and ML 1904 is currently for the dumping of waste rock and mine infrastructure. The Project's pit design encroaches on ML 1904. It is proposed that much of ML 1904 will be conditionally surrendered, and an application made for a new ML for mining purposes over the surrendered area. This will enable the use of the resource to be maximised and the location of mine facilities to be optimised. The south-east part of ML 1904 would initially remain (see **Figure 2-3**). If extraction of coal from the south-east part of ML 1904 is required, then Native Title interests would need to be resolved and a new ML for mining purposes granted before any extraction of coal could commence.

The Project will require access to land outside the existing Clermont MLs, primarily for the overland conveying of coal to the BAM. Most of the road diversions are on the mining leases, except for part of the Gregory Highway diversion, which is on freehold land owned by the Proponent. Land access agreements will be negotiated for areas outside the existing MLs. An application has been made for an infrastructure Mining Lease covering the conveyor corridor. The property within MLs 1884 and 1904 is either freehold or leasehold tenures held by the Proponent, with smaller areas covered by Reserve (Stock Trucking), and road reserves.

2.3.4 Mine Development and Schedule

The Project's mining schedule has been developed with the objective of maximising coal recovery and balancing economic return with the protection of the environment. Feasibility studies for the Project have been based a nominal production rate of 12 Mtpa. The mine schedule could be adjusted within the range of 10 to 15Mtpa if the market demands different coal production rates.

The commencement of operations at the mine is planned to coincide with the wind-down of operations at BAM, so that production from the Project builds up to full production as production from the BAM winds down. Current planning for the BAM has mining ceasing in 2009, at which time the existing product stockpiles, stacker reclaimers and train load-out facilities will become redundant. The owners of the BAM have agreed in principle that the Proponent can plan Project development based on the use of the otherwise redundant BAM coal handling infrastructure noted above.

The majority of the ROM coal will not require washing. This "by-pass" or "clean" coal will be crushed to < 50 mm before loading onto the conveyor as "product". This coal will "by-pass" the CPP. However, approximately 17% of total ROM production is >15% ash (the "higher ash" coal) and requires washing in the CPP.

Figure 2-4 illustrates the proposed coal production schedule for the mine life (17 years of coal production spread over 18 calendar years).

Coal production will commence in Production Year 1.

Table 2-3 Planned Annual Schedule for Product Coal Production (Mtpa)

Clermont Production Year	-1	1	2	3	4+
BAM Sales Tonnage	12	10	6.5	0	0
Project Sales Tonnage	0	2	5.5	12	12
Total Sales Tonnage	**12**	**12**	**12**	**12**	**12**

2.3.5 Mining and Rehabilitation

2.3.5.1 Mining Sequence

A conventional open cut truck and shovel / excavator mining operation is proposed. The typical depth to the top of the coal seam is approximately 150 m, with the shallowest depth to coal being about 80 m. The maximum depth of the pit will be approximately 290 m. The overall stripping ratio of overburden (bcm) to coal (ROMt) is 3.6 to 1. *In-situ* overburden densities (t/bcm) vary with material type.

Mining commences with a box-cut (an initial excavation) in the north of the resource. Mining then progresses from north to south. The main features of the mining sequence are:

- topsoil will be stripped (or stockpiled east of the box-cut), using scrapers or bulldozers, loaders / excavators and rear dump trucks;
- competent overburden will be drilled and blasted;
- the overburden will be excavated in benches using an electric rope shovel or large hydraulic excavators and loaded into rear dump trucks. Material from the box-cut will be transported out of the pit and placed in the north-west waste rock dump, which is limited to the north and west by the mining lease boundary, and by the required 50 m set-back distance to the road easement;
- the exposed coal will be drilled and blasted (or thin seams ripped by a dozer). The coal will be loaded into rear dump trucks by excavator for transport to the ROM hopper. Higher ash coal will be dumped to a stockpile and dozed to a ROM hopper for processing in the CPP. Clean coal will be directly dumped into a separate ROM hopper for crushing;
- the open pit will be developed up to approximately 290 m deep;
- in-pit dumping of waste rock will commence at or about Production Year 3, when there is sufficient space available in-pit;
- a combination of in-pit and ex-pit (i.e. external to the pit) dumping then continues with the North West Waste Dump eventually encroaching over the northern end of the in-pit dump; the maximum dump height will be approximately RL 354 m;
- the South West Waste Dump will be developed from about Year 4, by direct haul to the west of the mining areas from the upper benches of the pit;
- approximately 500 Mm^3 of waste will be disposed of in-pit and approximately 215 Mm^3 will be dumped ex-pit, based on an average swell factor for overburden to waste rock of approximately 25%;
- the north-west, south-west and in-pit dumps will be progressively shaped to their final landform, topsoiled and seeded with native grass, shrub and tree seed. The landform design will be based on a maximum slope of 17% (or 9.6 degrees). Drainage structures such as graded banks will direct runoff to sediment dams constructed at the base of the dumps, or within the rehabilitated landform; and
- a final void will remain in the south at the completion of mining. The maximum dimensions of the final void will be approximately 2.8 km in length by 2 km wide. The depth will typically be 120 m below ground level. The final void will cover an area of about 400 ha.

The proposed mine development sequence is illustrated in:

- **Figure 2-5**, which depicts the site during Construction;
- **Figure 2-6**, which depicts Production Year 1 (meaning the first year of coal production), soon after construction is completed, but prior to in-pit dumping and the removal of the Site Construction Village;
- **Figure 2-7,** which depicts the site at Production Year 3;
- **Figure 2-8**: which depicts Production Year 8, during the operational phase of mining, when the north-west dump has combined with the in-pit dump, and the south-west dump is well developed;
- **Figure 2-9,** which depicts the site at Production Year 13;
- **Figure 2-10**, which depicts Production Year 17 (the final year of production); and
- **Figure 2-11**, which shows the final rehabilitated landform.

2.3.5.2 Mine Rehabilitation

The proposed post-mine land use for disturbed areas will be a “self sustaining vegetation community” using appropriate native tree, shrub and grass species. The criteria for achieving a self-sustaining vegetation community will be developed during the operation as part of the site-specific rehabilitation trials, monitoring and research programs.

Local plant species will be included in the seed mix so as to restore elements of the pre-mining communities to the rehabilitated assemblages. The main features of the progressive rehabilitation process are:

- construction of a stable final landform consisting of north-west and south-west waste dumps and a final void at the south end of the pit;
- construction of the dumps progressively to final landform design, such that minimal reshaping is required at the end of mining. The waste dumps will be constructed by 10 m lifts on external dump faces, with a maximum working dump lift height of 30 m. Angle of repose slopes will be recontoured to a maximum angle of 17% (9.6 degrees) with drainage benches retained between the 10 m dump lifts;
- use of suitable topsoil, which will either be stockpiled until suitable recontoured areas are available, or respread immediately across available recontoured areas;
- contour ripping as an erosion control measure immediately after topsoil placement;
- seeding with an appropriate seed mix (grass, shrub and tree species) into the ripped seedbed prior to the commencement of the wet season to maximise the benefits of subsequent rainfall;
- application of appropriate fertiliser for plant establishment if required;
- respreading cleared vegetation on rehabilitated borrow pits, roadsides and laydown areas where practicable;
- construction of the permanent Gowrie Creek diversion to mimic the natural morphological characteristics of the original watercourse; and
- the final void will be fenced and/or bunded to prevent access. The final void will then collect water from groundwater ingress and direct rainfall.

The indicative program for the progressive rehabilitation of disturbed areas is described in **Section 3.7.4**, and illustrated in **Figure 2-7** to **Figure 2-11**. The indicative program includes:

- commencement of rehabilitation in Year 3 (of production), by which time the Site Construction Village will have been decommissioned and removed. Rehabilitation will have commenced on the lower batters of the northern and western part of the North West Waste Dump;
- by Year 8, a large part of the North West Waste Dump and the lower batters of the South West Waste Dump will have been rehabilitated;
- rehabilitation of the South West Waste Dump will have been completed by Year 13, and a substantial part of the North West Waste Dump would be rehabilitated – the northern and western areas of this dump by this time having established vegetation, and newer areas contoured, topsoiled and seeded;
- in the final year of production, the south-western batters of the North West Waste Dump, adjacent to the overland conveyor, will remain to be rehabilitated together with the mine industrial area (including CPP) and Coal Washery Waste Disposal Area. These areas will be rehabilitated once the conveyor and mine industrial area facilities have been removed after mining ceases; and
- all buildings, plant and equipment will be removed and dams will be left for potential future use (with background landholder approval). The levees and Gowrie Creek diversion will remain. The objective is to leave a stable and fully rehabilitated site.

2.3.6 Blasting

Blasting will be required for both coal and overburden. No throw blasting will occur. The range of blast size for the Project will be between 150 000 – 300 000 bank cubic metres (bcm) for coal blasts and between 500 000 – 850 000 bcm for overburden.

Initiation delays for blasts will most likely range between 42 and 65 milliseconds. Stemming depths for blasts will typically be 5 to 5.5 m for a 270 mm hole and 3.5 m for a 171 mm hole.

An explosives contractor will provide explosives and most likely undertake all blasting activities. The preferred option for the storage and supply of bulk explosives is for the explosives contractor to store the unmixed chemicals at an existing approved facility just outside the BAM mining lease, and then transport them to the Project site for mixing prior to placing in blast holes.

Over the life of the mine, the amount of bulk explosive used per annum will typically be in the range of 18 000 to 28 000 tonnes.

The Proponent does not intend to store bulk explosives on site, but there will be a magazine for the storage of detonators and boosters, located as shown in **Figure 2-5**.

2.3.7 Mine Equipment

The majority of the heavy mining equipment such as shovels, dozers, excavators and haul trucks will be of overseas manufacture.

Heavy equipment will be transported to site by road in large components and assembled on site. The number of each type of mining equipment proposed to be used is shown in **Table 2-4**.

Table 2-4 Indicative Mine Equipment

Mine Activity	Equipment at 12 Mtpa Production	
	Item	**Number**
Waste Rock Removal	Rope Shovel (43 m^3)	1
	Hydraulic Excavator (28 m^3)	3
	Rear Dump Truck (236 t)	32
	Overburden Drill	3
	Tracked Dozer	2
	Rubber Tyred Dozer	1
Coal Extraction	Hydraulic Excavator (25 m^3)	1
	Front End Loader	1
	Rear Dump Truck (196t)	6
	Coal Drill	1
	Tracked Dozer	5
	Rubber Tyred Dozer	2
Haul Road Maintenance	Grader	4
	Water Cart	2
Soil & Clay Removal	Scrapers to remove 3.46 Mm^3 of soil and clay during construction phase	

2.3.8 Mine Facilities and Infrastructure

Mine facilities and infrastructure includes roads, dams, administration buildings, potable water treatment plant, sewage treatment plant (STP), heavy-vehicle workshop, change-house and warehouse. The majority of buildings will be made of steel-frame on a concrete slab with a steel colour-bonded exterior. The administration office is likely to consist of a concrete slab with a steel frame, plasterboard and external cladding. The electricity substation will consist of a concrete base and steel pre-fabricated components.

The buildings and equipment for the mine site will be sourced predominantly from within Queensland with minor components shipped from overseas.

Components of the coal preparation plant bins, feeders, crushers, and conveyor will be manufactured off-site. The STP and the water treatment plant will be constructed of modular type units commissioned on-site.

The Proponent does not propose to use a permanent fuel farm during operations. During the operational phase fuel will be stored in four mobile refuelling stations with a capacity of approximately 50 000 L each. They will be replenished each day from the Clermont township depot. Mining equipment will be serviced and maintained at the heavy vehicle workshop.

2.3.8.1 Site Access and Haul Roads

The Gregory Highway will be diverted along the southern and western boundary of the mining leases (**Section 2.10**). A 1 km access road will be constructed to the mine industrial area from the diverted Highway. Access to the site will initially be from the existing Gregory Developmental Road until the realigned Gregory Highway is completed.

Mine haul roads will be at least 30 m wide and two-way with a design speed of 60 km/hr. The maximum grade of the haul roads will be 10% with a maximum cross fall of 3%. Safety berms will be constructed in areas where required.

2.3.8.2 Sewage Treatment

A package STP will be used during the construction and operational phases. The STP will have an initial capacity for 350 equivalent persons (EP).

During operations the demand on the STP will be greatly reduced, as the number of workers on site at any one time will be significantly less than during the construction phase. A gravity sewerage reticulation system will be required to service the CPP, workshop and office area. This will discharge to the site's STP.

Effluent from the STP will drain to the on-site evaporation ponds. Effluent production will reduce as the number of workers reduce, when the mine becomes operational. The STP effluent during the operations phase may be of sufficient quality to be re-used in the process water system. The reuse or disposal of treated sewage effluent would follow the interim "Guideline for Reuse or Disposal of Reclaimed Wastewater" (DNRM, 1996), to protect the health and wellbeing of people on and off the Project area.

2.4 Coal Handling and Processing

The coal handling and processing system is shown schematically in **Figure 2-12, Figure 2-13** and **Figure 2-14**.

2.4.1 By-Pass Coal

After being hauled from the mine pit to a dedicated by-pass coal ROM dump station using haul trucks, the by-pass coal will be dumped in a dedicated 750 t hopper.

The by-pass coal will then be primary sized via a feeder breaker to <250 mm at nominal rate of 2 500 tonnes per hour (tph). It will then be sent directly to the secondary crusher to be sized to <120 mm, followed by a roller screen and tertiary crushing of oversize to < 50 mm. The ash content in ROM by-pass coal varies from 4 to 15%. The estimated annual operating time for bypass coal handling facilities is 4 260 hours per year (Production Year 3 onwards).

2.4.2 Higher Ash Coal

Higher ash coal will be hauled from the mine to a higher ash coal ROM stockpile of approximately 60 000 t capacity. It will be reclaimed by a dozer to a dedicated 150 t hopper. There will be no direct dumping to the hopper from the haul trucks.

Following primary crushing, the coal will then be conveyed to a secondary crusher that will size the coal to <150 mm. Finally, the coal will undergo tertiary crushing to a size of <50 mm. The estimated annual CPP operating time for higher ash coal will be 4 200 hours per year (from Production Year 3 onwards).

The coal will then be washed in the CPP. The CPP will comprise a Dense Medium Cyclone (DMC) circuit for coarse coal (**Figure 2-13**), and a Spirals Circuit for fine coal (**Figure 2-14**). The plant will be designed to wash 500 t/h of higher ash coal.

The CPP will use approximately 0.4 kg of magnetite and 20 g of anionic flocculant per tonne of coal feed. At any one time, about 84 t of magnetite and 2 tonnes of flocculant will be stored on site.

The CPP will use water from the process water dam.

2.4.3 Product Coal

The washed coal from the CPP will be combined with the by-pass coal in a 2 000 t hopper to produce a single product, which will be loaded onto the overland conveyor belt for the 13 km trip to the BAM coal stockyard and train load-out facilities. Product will be railed via the existing BAM spur line to ship loading facilities at the DBCT.

2.4.4 BAM Coal Handling Facilities

A new 2 000 t surge bin will be constructed at the BAM end of the overland conveyor. The existing BAM stockyard facilities comprise two 3 250 t/hr luffing and slewing rail mounted bucket wheel stacker/reclaimer systems and a product stockpile of 650 000 t capacity.

The design rate for the Project product coal stacking at BAM on either of the stacker/reclaimer systems is 2 500 t/hr. The reclaim rate for the Project product coal will be set at 3 250 t/hr.

The existing capacity of the train load-out bin at BAM is 2 870 t. The train load-out rate for the Project product coal will be 4 200 t/hr.

2.4.5 Dust Suppression

Dust suppression will be provided at dump hoppers and transfer points. Dust suppression will be applied through actuation of solenoid control valves connected to a fogging spray bar.

2.4.6 Coal Processing Waste Circuit

The approximate annual throughput and solids/water mass balance for the CPP is shown in **Table 2-5**.

Table 2-5 Coal Preparation Plant – Throughput and Mass Balance

Heading	Approximate Annual Throughput
ROM Feed ‘Higher ash’ Coal	2.00 Mt
Washed Product Coal	1.57 Mt
Coal Washery Waste (coarse and fine rejects)	0.43 Mt
Make-up Water Demand (assuming 60% return from coal washery waste disposal area)	408 ML
Water Flow to Coal Washery Waste Disposal Area	1068 ML

Approximately 100 t/h of ‘fine and coarse’ reject material will be removed during the washing process. The fine and coarse reject material will be pumped as a slurry for co-disposal in the Coal Washery Waste Disposal Area (**Figure 2-14**).

2.4.6.1 Rejects Handling

Coarse rejects will discharge from the rejects drain and rinse screen via a pipe to the rejects hopper. If in the case of an emergency the coal washery system becomes unavailable, a slide gate in the rejects hopper will allow rejects to be discharged onto the ground against a concrete bund wall for later collection and disposal.

A variable speed feeder located beneath the hopper will control the flow of coarse rejects to the centre of the rejects sump. These coarse rejects will be combined with the fine spirals rejects and thickener underflow for pumping to the coal washery waste disposal area. Additional water will be obtained from the desliming cyclone overflow for level control to the pumping system and from clarified water if required.

2.4.6.2 Coal Washery Waste Tailings Thickener

The remainder of the desliming cyclone overflow from the plant, not required for rejects pumping, will be directed to the 18 m diameter coal washery waste thickener. If the rejects pumping system is not operating then the spirals rejects will also gravitate to the thickener. Flocculant will be added and the slurry discharged into the feed well of the thickener.

Clarified water will overflow from the thickener into the clarified water tank and will be pumped back to the preparation plant by the clarified water pump to be used as process water. Thickened coal tailings will be raked to the centre well and pumped by the thickener underflow pump to the rejects pumping system.

2.4.6.3 Coal Washery Waste Disposal Area

The coal washery waste material (rejects) has an average *in situ* bulk density of 1.5 t/m^3, a solids density of 2.2 t/m^3 with an emplaced moisture of 30%. The co-disposed waste material can be stacked. Based on the current production schedule, the estimated coal washery waste production over life of mine is 9.7 Mt. This equates to a total required storage for the Coal Washery Waste Disposal Area of 6 446 000 m^3. The coal washery waste area footprint will eventually cover around 60 ha, and will require a number of lifts in order to store the estimated volume of coal washery wastes.

The CPP will require 275 m^3/hr of water for its operations drawn from the process water dam. This volume will be made up of 115 m^3/hr of make-up water and 160 m^3/hr of water returned from the coal washery waste disposal area.

A slurry of coal washery waste (rejects) and water will be pumped from the CPP to the Coal Washery Waste Disposal Area. The Coal Washery Waste Disposal Area will be located to the west of the CPP and be sized to contain the wastes generated over the life of the operation.

The slurry will be disposed to a series of disposal cells. Decant water from the Coal Washery Waste Disposal Area will be decanted from the cells and flow to the process water dam and then be pumped back to the CPP. The material remaining in the disposal cells is stable and can be trafficked after a relatively short period of time.

2.5 Water Management

2.5.1 System Overview

The overall site water balance indicates that the site has a surplus of water. A number of storages will be required. The locations of the components of the water management system are shown in **Figure 2-5** to **Figure 2-11**. A schematic of the water management system is shown in **Figure 2-15**.

Each element serves a specific purpose within the overall Site Water Management System. The key elements of the water management system for the Project are:

- the separation of run-off from undisturbed and disturbed areas;
- the diversion of Gowrie Creek and the construction of a levee to protect the pit from flood flows;
- an advanced dewatering borefield located in the vicinity of the pit, with water pumped to the Advanced Dewatering Dam, which stores groundwater for mine demands or for discharge from the site;
- a Workshop Dam, Environmental Dam, Process Water Dam, Raw Water Dam and Coal Washery Waste Disposal Area that interact for supply to the CPP and environmental control of the runoff from the industrial area;
- a series of sediment dams which control runoff from waste rock dumps and other disturbed areas;
- a Pit Water Dam which stores water that has accumulated in the pit (runoff and groundwater seepage) and runoff from disturbed areas. This water can be re-used in the CPP via the Process Water Dam; and
- a Mine Water Dam which stores surplus water from the Pit Water Dam and is able to release water to Gowrie Creek when release criteria are met.

There is also potential to connect the Site Water Management System to Cement Hill by installing an above-ground 200 mm diameter poly-pipe for transferring water between the Clermont MLs and the Cement Hill MLs via an existing water pipeline easement through cleared land.

2.5.2 Separation of Runoff

The majority of the existing mining area is drained by Gowrie Creek. An 8.5 km long section of Gowrie Creek will be diverted to the east of the coal deposit to allow the development of the mine pit.

The diversion will ensure that upstream runoff from Gowrie Creek is diverted away from the Pit. A levee bank will protect the pit from Gowrie Creek flood water, and maintain the separation of flood flow.

The site water management system will collect rainfall runoff from all disturbed areas, including, but not limited to, the mine pit, haul road, waste rock dumps and the industrial/processing areas. Runoff from undisturbed areas of the ML will be diverted via clean water diversion drains and bunds away from disturbed areas. Water will not be discharged from the ML without adequate treatment.

2.5.3 Advanced Dewatering

There is a substantial amount of groundwater in the Tertiary Basalt and Tertiary Sedimentary sequences above the coal deposit. Advanced dewatering is required prior to mining in the area of the initial box-cut to reduce the risk of slope stability failures and to allow the deposit to be mined safely. Dewatering will be undertaken over the life of the mine.

A borefield will be established initially, in the vicinity of the box-cut. The bores will be relocated as the pit extends southward. The groundwater from the borefield will be pumped to a 200 ML Advanced Dewatering Dam. Initially, it will also be able to provide water for the BAM while it is still in production, via an existing pipeline. This water will also be made available for use by others in feasible and sustainable projects (**Section 4**). Any surplus water will be released to the Gowrie Creek Diversion.

The Advanced Dewatering Dam will be relocated during the mine life to accommodate the expansion of the pit.

2.5.4 Coal Process and Industrial Area

The Coal Washery Waste Disposal Area will cover approximately 60 ha and contain coarse and fine rejects from the CPP. Decant water from this area will drain to the Process Water Dam from where it will be pumped back to the CPP.

The Process Water Dam will store water for use in the CPP. The Process Water Dam will also receive water from either the Pit Water Dam or the Mine Water Dam, when top up water is required. The Process Water Dam will store rainfall runoff from the Coal Washery Waste Disposal Area. This water will be used preferentially to meet CPP demand.

A small Workshop Dam will be constructed to receive runoff that may contain greases and oils from the vehicle washdown and workshop areas. A lined Raw Water Dam will receive water from the Advanced Dewatering Dam, and will be used for the supply of water for the fire and washdown system, to the potable Water Treatment Plant (WTP), and for the vehicle washdown areas. The Raw Water Dam will effectively be a turkey's nest dam.

Stormwater runoff from the industrial area will be directed to the Environmental Dam. The dam will have a capacity of approximately 35 ML. A PVC/HDPE liner may be used to line the dam because of the dam's proximity to the pit. In the event that the capacity of the Environmental Dam is exceeded, excess runoff will be routed to the Pit Water Dam.

2.5.5 Sediment Control

There will be a number of sediment dams which will be used to settle out suspended solids in runoff from disturbed areas including waste rock dumps. Sediment dams will overflow to nearby creeks.

2.5.6 Mine Water Management

Mine water consists of rainfall runoff to the pit floor and seepage into the active pit. This water will be pumped to the Pit Water Dam.

Water from the Pit Water Dam will be transferred to the Mine Water Dam to recreate the storage capacity needed for the next rainfall runoff event and will generally operate at a low level. Water may also be used to meet processing demands and dust suppression demands while available.

The Mine Water Dam will store surplus water until a suitable release opportunity occurs. The dam will have a capacity of 2 000 ML with a wall height of less than 8 m.

2.5.7 Water Supply

The site will be self sufficient in water, sourcing supplies from both surface water run-off and groundwater.

2.5.7.1 Process Water

Process water will be supplied to the CPP via the Process Water Dam. Raw water will only be used if the return water from the Coal Washery Waste Disposal Area (supplied via the Process Water Dam) does not meet the plant requirements. Water demands of the CPP will be 275 m^3/hr, and about 60% of that demand is likely to be supplied from the Coal Washery Waste Disposal Area.

A separate pipeline from the Raw Water Dam will supply the water for fire, hosedown and dust suppression. This supply will be kept at a constant pressure and will be reticulated through the CPP and materials handling areas. There is an adequate water supply for fire fighting requirements during the construction and operational phases.

2.5.7.2 Potable Water

Potable water will be provided to the workshop and administration areas and to the Site Construction Village while it is operational. A dedicated package WTP will be constructed on site to treat the raw water, supplied from the Raw Water Dam. Potable water will be stored in a tank prior to its distribution.

Potable water will be monitored regularly to test for water quality. It will be used for human use, including drinking, hygiene and sanitation. Potable water will comply with the “Australian Drinking Water Guidelines” as published by the National Health and Medical Research Council (1996).

2.6 Diversion Channel

The majority of the existing site is drained by Gowrie Creek, which flows in a southerly direction through the Clermont MLs and discharges into Wolfang Creek 1.5 km downstream of the mining leases boundary. An 8.5 km long section of Gowrie Creek will need to be diverted to the east of the pit, to allow the mine development because the creek crosses the Project coal reserves. The coal reserves would be sterilised if the creek is not diverted, and excessive sterilisation will subsequently marginalise the Project. An 8 km long western flood levee will be constructed to prevent floodwaters from the Gowrie Creek diversion entering the pit. A 1.5 km long eastern flood levee is necessary to direct floodwaters to the south. The alignment of the proposed creek diversion is shown in **Figure 2-10**. A rock weir will be constructed near the southern (downstream) end of the creek diversion to trap sediment and dissipate energy during flow events.

The diversion is designed to accommodate the 1% Annual Exceedance Probability (AEP) flood event, plus 0.5 m of freeboard. The 8.5 km diversion channel will incorporate a low flow channel that is 3 m wide at the base, 8.5 m wide at the top and 0.7 m deep, with a longitudinal slope of 0.2%. The channel bank slopes will be 1:4.

The main channel has a base width of 30 m and side slopes of 1:15. The depth varies depending on existing ground levels. The channel excavation volume is approximately 200 000 m^3. This material will be used to construct the levee banks.

The stream diversion has been designed to:

- separate creek flow from upstream catchments from local drainage on the MLs;
- protect the pit from flooding;
- balance cut and fill;

- provide a stable channel;
- limit or eliminate any increase in upstream flooding as a result of the diversion;
- maintain similar flow velocities in Gowrie Creek downstream of the diversion;
- develop a sinuous low flow channel in order to reduce the potential for erosion and scour; and
- provide a low flow channel with similar length and gradient to the existing creek.

The design parameters for the levees are outlined in **Table 2-6**.

Table 2-6 Levee Designs

	Length (km)	Typical height (m)	Maximum height (m)	Top width (m)	Levee batter slopes	Fill volume (m^3)
Western levee	8.0	2.0	4.0	3.0	4:1	170 000
Eastern levee	1.5	1.7	3.0	3.0	4:1	30 000

2.7 Overland Conveyor

The combined single product (washed coal and by-pass coal) will be loaded directly onto a 3 000 tph overland conveyor belt for the 13 km trip to the BAM.

The conveyor route commences within ML 1904 and terminates within the BAM. The proposed alignment for the overland conveyor follows the southern boundary of the Gregory Developmental Road reserve for the first half of its length to minimise the dissection of existing properties (**Figure 2-1**). The alignment then deviates westwards to the existing BAM stockpile area.

Between the existing Clermont and Blair Athol mining leases, the conveyor will be located on leasehold land, except where it crosses road reserves.

The conveyor will cross the realigned Gregory Highway (and stock route) and the Blair Athol Connection Road (a local government road). Embankments will be constructed either side of these roads to support the suspended conveyor. The conveyor overpass will provide clearance of 6.5 m for the conveyor above the road. The conveyor embankments will not encroach on the 60 m wide Highway reserve. The conveyor will be fully enclosed where it crosses the Highway and the Connection Road. The conveyor crosses the Blair Athol-Clermont railway line within the Blair Athol Mining Lease.

The specifications of the overland conveyor are shown in **Table 2-7**.

Table 2-7 Overland Conveyor Details

Description	Specification
Conveyor length	13 km
Conveyor belt width	1400 mm
Conveyor capacity	3000 t/hr
Conveyor belt speed	5.5 m/s
Minimum conveyor corridor width	30 m
Width of conveyor frame	1880 mm
Height of top of conveyor frame	2150 mm
Clearance from ground to underside of conveyor	500 mm

The conveyor will be covered on top and on its northern side. The conveyor will also have a cover on its southern side in the vicinity of the Old Blair Athol homestead. A cross section of the overland conveyor and a typical view including a road overpass are shown in **Figure 2-16**.

The conveyor corridor will be 30 m wide and will be fenced both sides with 2 m high chainlink security fence. A light vehicle access road of 6 m wide gravel pavement will be constructed on the north side of conveyor.

2.8 Coal Transport

2.8.1 Train Movements

The product will be railed via the existing BAM spur line to ship loading facilities at the DBCT over a distance of 280 km. The total amount of coal railed will remain at approximately 12 Mtpa (see **Table 2-3**). The average number of train movements to the DBCT will remain at about 1 410 per annum.

2.8.2 Port Capacity

The DBCT is located near Mackay. It commenced operations in 1983 as a common-user facility. At present, DBCT handles the products of 10 northern Bowen Basin mines.

At present, there are approximately 150 ship movements per annum of coal from the BAM. There will be no change in the total number of shipping movements due to the Project, because production from the Project will be increased to 'balance' the reduction in output from the BAM, to reach the planned production of approximately 12 Mtpa. Hence, the Port will be able to handle the Project's demand.

The DBCT has two berths, each with a shiploading capacity of 7 200 tonnes per hour. The Stage 6 expansion of the terminal, which included an additional berth and shiploader, was completed in 2003 and has increased DBCT's capacity to 54 Mtpa.

A report from the Public Works Committee of the Legislative Assembly of Queensland (Report No. 36, 1997) indicted that the staged expansion of the DBCT was intended to match the development of new or expanding mines with a small amount of excess capacity to cater for unexpected tonnage.

The expansion was aimed to facilitate the continued growth of the Bowen Basin coal producing region and to meet the increased demand from customers. Hence, the Port is capable of handling the cumulative longer-term demands for coal handling capacity from regional coal export proposals.

2.9 Site Construction Village

A Site Construction Village with up to 350 beds will be provided on the Clermont Mining Leases for the construction phase workforce (see **Figure 2-5**). The village will include:

- sleeping quarters;
- canteen, kitchen and crib preparation;
- mess hall, recreational areas (including wet mess) and sporting facilities;
- offices and training room; and
- ablution facilities and laundry.

Initial access to the Site Construction Village will be from the existing Gregory Developmental Road. When the Gregory Highway is realigned, access will be via the mine access road. The Site Construction Village will only be required during the construction phase.

During the operational phase, the majority of the mine workforce is expected to seek housing in the town of Clermont and surrounding districts. The supply of accommodation in the town of Clermont and surrounding districts is discussed in **Section 2.14.2**.

2.10 Road Realignment

The existing Peak Downs Highway, Gregory Developmental Road and Gregory Highway pass directly over the coal deposit and therefore these State-controlled roads require realignment.

The proposed realignment of the roads is shown in **Figure 2-1**. Typical cross sections of the road to be constructed are shown in **Figure 2-17**.

The Peak Downs Highway diversion will require major creek crossings at Teatree Creek and Gowrie Creek.

2.11 Transmission Line Connection

Power supply to the site will be via a new 7.5 km 66 kV line, within an existing easement, connecting to the existing BAM 66 kV line that originates at the Copperfield substation near Clermont. The route of the powerline is shown in **Figure 2-1** and follows an existing powerline easement held by the Proponent. A substation near the CPP will provide power distribution for the CPP, mine facilities and infrastructure, and mine equipment.

An electricity provider will supply the connection into the site. The proposed installed power for the Project is shown in **Table 2-8**. Approximately 3 MW of power will also be required for the conveyor head end drives at the BAM.

Table 2-8 Installed Power

Project Area	Load (MVA)
Coal Handling and Processing	5.65
Tail End Conveyor Drive	1.18
Shovel	1.71
Industrial Area	0.59
TOTAL	**9.13**

(assumes a 0.85 power factor for all loads)

2.12 Construction

2.12.1 Schedule

Following the issue of environmental and mining approvals, and a decision of the CCJV to proceed with the Project, construction would commence with the dewatering of the box-cut and construction of some water dams. The construction period from the start of the box-cut dewatering until initial coal production is expected to be approximately 33 months.

The construction schedule for the Project is shown in **Table 2-9**, wherein Year 1 represents the year in which coal production commences (therefore, Year –1 is the year before production commences). Construction will typically be undertaken during daylight hours and box-cut development will occur on a seven day, 24 hour basis.

Table 2-9 Indicative Construction Schedule

Schedule	Activity
Start of Year -3	Environmental and Mining Approvals
Start of Year -3	CCJV approvals
Start of Year -3	Commence box-cut dewatering. Construct some holding dams.
Start of Year -2	Start construction of Site Construction Village.
Start of Year -2	Start construction of realigned Peak Downs Highway / Gregory Highway.
Mid Year -2	Start overburden removal at box-cut.
Mid Year -2	Start construction of mine infrastructure.
Start of Year 1	Start coal production.

The Gowrie Creek diversion and flood control levees are to be constructed in two stages. Stage 1 will involve the construction of the northern half of the diversion channel (including a temporary settlement pond at the downstream end of the channel), the northern half western levee, and all the eastern levee. It will be completed by the end of Year -2. Stage 2, involving the remainder of the diversion channel and western levee, and the permanent settling basin at the down stream end of the diversion will be constructed by Year –1.

2.12.2 Material Volumes and Equipment

The indicative types and quantities of construction materials required for the Project are shown in **Table 2-10**.

Table 2-10 Construction Phase Material Quantities

Construction Material	Estimated Quantity (tonnes)
Steel	4 780
Concrete	7 410
Conveyor Belt	1 300
Road Base (gravel)	156 400
Total	169 890

Raw materials for concrete and road base will sourced from the site. It is likely that a temporary concrete batch plant will be established during the construction phase.

Fuel used during the construction phase will be stored in bunded facilities within the construction laydown area. Construction equipment will be serviced and maintained at the site workshop.

The indicative number and type of construction equipment required is shown in **Table 2-11**.

Table 2-11 Indicative Construction Equipment

Type of Equipment	Indicative Number in Construction Fleet
Earth Scraper	2
Excavator	2
Front End loader	4
Dump Truck	5
Grader	2
Crane	2
Water tanker	1
Concrete trucks/pumps	2
Concrete Batch Plant	1

2.12.3 Transport of Plant and Equipment

Construction equipment will be transported by road to the site, on standard or over-dimensional loads. Large items of mining equipment that cannot be divided into smaller components, and the larger coal crushing and handling equipment requiring construction off-site, will be transported on State roads under permit and, where necessary, accompanied by safety escorts.

For the purposes of this impact assessment it is not possible to accurately determine the point of origin of these loads, as some items may not necessarily be purchased new. Deliveries during construction will be limited to items such as mining equipment, building supplies, fuel, concrete, steel and items for the construction of a crushing plant, coal handling conveyors, workshops, administration buildings and sundry plant.

Transport of personnel, not housed in the Site Construction Village, will be undertaken by private vehicles and by buses.

2.13 Fire Protection System

The fire protection system on the Project will consist of:

- fire water and dust suppression pipeline servicing the CPP and materials handling facilities from the clarified water tank and pumping system;
- external, 65 mm diameter fire hydrants appropriately spaced around the buildings and CPP according to relevant Standards, Statutory and Local Council requirements;
- internal, 65 mm diameter fire hydrants appropriately spaced within the CPP according to relevant Standards, Statutory and Local Council requirements;
- standard 19 mm diameter x 36 m long hose reels along conveyor gantries spaced at 60 m intervals;
- portable fire extinguishers consisting of dry chemical powder, carbon dioxide and wet chemical types installed in designated areas of the site as per relevant Standards, Statutory and Local Council requirements;
- sub-fire indicator panels with automatic detection and alarm system for fault detection in the switchrooms; and
- a fire water line running the length of the conveyor with 65 mm diameter hydrant valves spaced along the conveyor at appropriate intervals.

2.14 Workforce

2.14.1 Construction Phase

The construction phase will provide opportunities for local employment in construction, transport, and the supply of goods and services. Employment on the Project is expected to peak at approximately 565 jobs during the construction phase (including box-cut development). The box-cut workforce may comprise company employees or contractors, or a combination of both. **Table 2-12** shows the relationship between the ramp-up in the Project workforce and the ramp-down in the BAM workforce.

Table 2-12 Workforce requirements over time

	2004	2005	2006	2007	2008*	2009	2010	2011
Clermont construction (peak)	0	20	205	135	125	0	0	0
Clermont boxcut development	0	0	0	225	350	0	0	0
Clermont operations	0	0	10	50	90	450	450	445
Project Total	**0**	**20**	**215**	**410**	**565**	**450**	**450**	**445**
Blair Athol - operations	200	200	200	200	175	90	<10	<10

* numbers prior to coal production commencing

The workforce skills required for construction will include heavy equipment operators, boilermakers, carpenters, scaffolders and electricians. The majority of the construction phase workforce will be accommodated in the Site Construction Village. Locally sourced workers are likely to reside at their existing place of residence.

2.14.2 Operational Phase

The Project will employ around 450 workers during the peak operational phase. Production and maintenance staff will work 12 hour shifts on a continuous 24 hour 7 day roster. The peak daytime workforce will be about 180.

A 125-room Township Village will be established in Clermont to accommodate some of the continuous roster workforce. When off-roster, this portion of the workforce will reside at their home base (which is likely to be in coastal communities or large regional centres). The balance of the operational workforce will be based in the township of Clermont and surrounding districts.

2.15 Decommissioning

The decommissioning and final rehabilitation of the Project is discussed in **Section 3.7**.

On the completion of mining, infrastructure will be treated as follows:

- mine roads will remain for use by the subsequent land holder, if required;
- water dams will remain if required by the subsequent land holder and approved by regulators; otherwise, the dam walls will be breached;
- buildings, plant and equipment will be removed and the surface rehabilitated. This will include the CPP, workshop, offices, storage tanks and coal handling facilities; and
- concrete pads will be covered with benign waste rock, topsoiled and revegetated.

2.16 Project Alternatives

2.16.1 No Project

Without the Project, the Proponent would lose market share and profitability. The Government would lose revenue due to royalties, freight charges and taxes. Workers and support contractors would lose employment and income. Secondary support industries and service suppliers would also suffer from a reduction in demand for their services and a resulting reduction in income. There would be a significant decline in Clermont's population after the BAM closes.

2.16.2 Alternative Locations

The exploitation of other resources in the Bowen Basin is less attractive than the current proposal due to the need for additional infrastructure, increased costs, generally lower resource quality and generally higher development and operational costs.

2.16.3 Stand Alone Project Option

The Project is integrated with some of the BAM infrastructure including some coal handling facilities and rail loop. Initial feasibility studies considered the Project as a 'stand alone' project with the following coal transport options:

- conveyor belt from the Project to a new rail siding and train loadout facility north west of the Project;
- a new rail loop that would terminate within the northern part of the Project mining lease; and
- a new rail loop that would extend from the railway line leading to the BAM and would terminate in the western section of the Project lease.

The integrated Project with the BAM reduces the capital costs and the area of disturbance by utilising the existing facilities at the BAM.

2.16.4 Coal Production Rate

Three scenarios of coal production rate were considered, ranging from gradual increase in production rate over the first six years to full production after one year. An increase over two years was the favoured option as it optimised the feasibility of the project and allows coal from the Project to replace the BAM product in the marketplace. In addition, the favoured option:

- minimises potential delays caused by infrastructure teething problems;
- allows lower intensity of operations and resulting impacts because of lesser time pressure;
- reduces required number of construction workers and local housing and infrastructure impacts;
- maximises certainty of coal supply capability;
- minimises disruption to schedules due to weather or unforseen operational factors; and
- allows monitoring to identify potential problem areas and timely corrective action response.

2.16.5 Mining Options

Coal mining generally involves one of two techniques - open-cut or underground mining. Open cut was the preferred mining option for the Project as:

- the coal seams are relatively shallow (between 80 and 250 m beneath ground surface);
- the main Wolfang Seam coal seam is up to 40 m thick in some locations;
- open cut method has significantly higher resource recovery; and
- it is more cost effective.

2.16.6 Mining Techniques

The two main methods for the removal of overburden above a coal deposit are by dragline or by truck and shovel. Each method has its own advantages and disadvantages. Truck and shovel was chosen due to:

- overburden properties and depth;
- pit layout and available space; and
- cost effectiveness.

2.16.7 Alternative Dump Locations

During the pre-feasibility studies, the option of a second waste rock dump in the north-east or south-west of the Project site was considered. The South-West Waste Dump was chosen because it:

- avoided the disturbance of grave sites in the north-east of ML 1884 (grave sites – see **Section 8**);
- reduced potential noise and dust at sensitive receptors; and
- was more cost effective.

2.16.8 In-Pit Crushing and Conveying

The financial costs and benefits of in-pit crushing are being considered. This in-pit crushing and conveying (IPCC) option would involve most of the top 45 m of overburden material being crushed in a mobile in-pit crusher and conveyed to the dump(s) (both in-pit and ex-pit dumps).

There would be approximately 12 fewer trucks required, although the number of trucks required to move coal would be the same. The footprint and final configuration of the dumps and pit would be generally the same.

Further investigation is planned by RTCA in the detailed feasibility studies to determine if the cost-benefits of this option warrant the adoption of IPCC. If IPCC is adopted, the effect on noise and dust emissions will be assessed.

2.16.9 Coal Preparation Plant

About 17% of total ROM production must be washed. If there was no CPP to wash the coal, the product coal would be of a lower value and/or there would be reduced coal recovery.

2.16.10 Conveyor Coal Handling System

Three options for conveyor coal handling were considered to accommodate the potential operational issues associated with the overland conveyor, bypass coal stream or higher ash coal stream becoming inoperable.

Alternative 1:

- out of pit receival and crushing of bypass coal;
- out of pit receival, 60 000 t storage, crushing and washing of higher ash coal;
- surge storage of combined bypass and washed coal in a single product bin on the Clermont site;
- overland conveying of combined bypass and washed product to the BAM; and
- surge storage of product coal at the BAM end of the overland conveyor.

Alternative 2:

- out of pit receival, crushing and surge storage of bypass coal;
- out of pit receival, crushing, washing and surge storage of washed coal;
- overland conveying of combined bypass and washed product to the BAM; and
- surge storage of product coal at the BAM end of the overland conveyor.

Alternative 3:

- out of pit receival with additional ROM surge capacity and crushing of bypass coal;
- out of pit receival, crushing and washing of higher ash coal;
- overland conveying of combined bypass and washed product to the BAM; and
- surge storage of product coal at the BAM end of the overland conveyor.

Alternative 1 was selected as it provides sufficient surge storage to allow normal “trip” occurrences.

2.16.11 Preferred Road Realignment

The Clermont mining leases cover a section of the Peak Downs Highway, the Gregory Highway and the Gregory Developmental Road, and the intersection of these three roads. In order for the Project to proceed it is necessary to divert the Peak Downs Highway and the Gregory Highway around the Clermont mine leases. Three road options were considered, as described below, and shown in **Figure 2-18**:

- Option 1: Peak Downs Highway diverted to the east of the site and Gregory Highway diverted further west of the site, with the intersection moved approximately 2.8 km to the south of the mining lease boundary (90 degree intersection, just south of the air strip);
- Option 2: Peak Downs Highway diverted to the east of the site and Gregory Developmental Road diverted around the western boundary of the site, with the intersection moved approximately 1 km to the south of the mining lease boundary; and
- Option 3: Peak Downs Highway diverted to the north of the site, intersecting with the Gregory Developmental Road near the north-west boundary of the site. The Gregory Highway diverted along the western boundary of the site.

Option 3 is the preferred option due to:

- overall cost;
- minimal effect on properties not owned or controlled by the Proponent;
- minimise the potential impact on existing flood levels due to the construction of the new roads;
- simplify the changes to existing stock routes; and
- avoids difficult ground conditions (black soils) and flood plain to the east of the site.

2.16.12 Preferred Road Intersection Design

Three main options for the intersection of the Gregory Developmental Road and the Peak Downs Highway were considered:

- Option 1: Tee intersection, with the Peak Downs Highway carrying the through traffic;
- Option 2: Tee intersection, with the Gregory Developmental Road carrying the through traffic; and
- Option 3: Three leg roundabout at the intersection between the Peak Downs Highway and the Gregory Developmental Road.

Currently, Option 1 is favoured by the Proponent. Option 2 is being investigated further at the request of DNR. Option 3 is considered to be not viable because of high construction and land acquisition costs.

2.16.13 Conveyor Alignment

Two overland conveyor alignments were reviewed (**Figure 2-18)**. Option 1 was selected as the preferred option based on the following:

- less impact on the BAM operations;
- reduces the need to clear vegetation; and
- avoidance of the combined intersection of the conveyor, Blair Athol Connection road, powerlines and the existing rail line outside the BAM mine lease.

Alternatives to conveying coal to the BAM (such as transport of all coal by road) were not evaluated as they are not considered to be viable due to cost.

2.16.14 66 kV Power Supply

A range of options for the supply of 66 kV power to the Clermont Mine site and hence the overland conveyor were reviewed.

The four options considered were:

- Option 1: the head-end of the conveyor supplied by the existing 66/11 kV substation in the BAM power system, the balance of power to the Clermont mine site from a tee off the existing BAM 66 kV overhead power line;
- Option 2: the head-end of the conveyor supplied by the existing 66/11 kV substation in the BAM power system, the balance of power to the Clermont mine site would also be supplied from the existing BAM power system via an overhead 66 kV power line run within the overland conveyor easement;
- Option 3: the head-end of the conveyor supplied by the existing 66/11 kV substation in the BAM power system, the balance of power to the Clermont mine site would also be supplied from the existing BAM power system starting at pole 34 on the existing 66 kV spur line and then via an overhead 66 kV power line run within the overland conveyor easement; and
- Option 4: the head-end of the conveyor supplied by the existing 66/11 kV substation in the BAM power system. The balance of power to the Clermont mine site would be supplied via a new dedicated 66 kV feeder from the 66 kV bus off the 132/66 kV substation at Clermont town.

Option 1 was the preferred option due to lowest capital cost, acceptable system losses, and acceptable voltage drops in the 66 kV network.

2.16.15 Surplus Groundwater

Currently, the Project is the only definite user of groundwater from the advanced dewatering borefield (apart from some use by the BAM while that mine still operates). While surplus groundwater will be made available for projects by others for feasible and sustainable uses, any proposal for fully using the surplus must take into account:

- the decline in volume over time (from nearly 4000 ML per annum in the first three years of the Project to about 1500 ML per annum in the second half of mine life);
- interruptions to supply as mine demands would take priority in periods of dry weather;
- the surplus would need to be accepted regardless of the prevailing climate, (ie. in periods of wet weather);
- the surplus will cease at the end of coal production.

The quality of the groundwater is suitable for irrigation purposes and as a source of water for a potable water treatment plant (**Section 4.3.2**). Irrigation by neighbours is an option for a beneficial use, subject to feasibility and sustainability considerations. Assuming an average annual irrigation rate of 8 ML/ha for cotton and 4 ML/ha for forage crops, 200 ha and 400 ha respectively of arable land would be needed to use 1 600 ML per annum.
Potential users would need to consider the financial viability of any investment in irrigation, taking into account anticipated gross margins and the ability to recover costs of irrigation infrastructure (including provision of dams to act as buffer water storage) within the period during which surplus water was available.

A very limited amount of small-scale irrigation of forage crops currently occurs in the Clermont district, including irrigation by a Project neighbour using water from the Cement Hill final void. The Proponent is discussing options for supplementing the supply to this land holder. Surplus groundwater could be utilised in similar low-cost irrigation arrangements, but the total volume used would be unlikely to be a significant proportion of the surplus.

Clermont township sources its water from Theresa Creek Dam, south of Clermont. In severe drought conditions, supply in the Dam can drop to a level that threatens the security of supply. In such situations surplus groundwater may be able to assist in supplementing the town supply (although there is a risk that such drought conditions may also eliminate the surplus as more make-up water would also be needed for mine operations).

For the purposes of environmental impact assessment in this EIS, it has been assumed that surplus water would be released to Gowrie Creek and impacts have been assessed on this basis. Modelling of this release indicates that about 95% of the surplus groundwater would flow via Wolfang Creek, into Sandy Creek where it would soak into the creek bed (**Section 4.2.3**). The effect of the release would therefore be to recharge the Sandy Creek alluvial aquifer and increase security of supply to users of that aquifer. Water would also be available to be withdrawn from the creek for agricultural uses, or for use by the council (e.g. for watering parks and gardens).

2.16.16 Location of Dams

The Pit Water Dam will be shifted several times over the life of the mine as the pit expands. The locations chosen will be constrained by issues such as cost (minimising the number of moves reduces the cost but may involve longer channels, greater pumping costs and changing the design of diversions), available space and the water demands of the Project.

Current plans are for the location to be south of the pit at each stage. More detailed studies are proposed and the final locations will be confirmed in the Plan of Operations for each stage.

The location of the Mine Water Dam has been moved to the east of its original proposed location to avoid an area of *Trioncinia retroflexa* and bluegrass community.

2.16.17 Construction Phase Village

Two alternatives for locating the village for the construction phase workforce were considered:

- a temporary construction village on site; and
- a temporary construction village in Clermont.

A Site Construction Village located on the Clermont Mining Leases was selected as the preferred alternative in order to optimise the logistics of managing a large workforce engaged on short-term tasks while minimizing the potential for interference with a settled community.

2.16.18 Operational Phase Village

A 125-room village will be established to accommodate some of the continuous roster workforce throughout the operations phase. Clermont was selected as the preferred location for this village (the Township Village) instead of a location on the Mining Leases.

Clermont provides a more attractive residential and social setting for long-term employees. In addition, the Mining Lease is severely constrained for locations that would provide reasonable separation distance between the village and mining activity over the whole mine life.

A location within Clermont has yet to be selected for the Township Village. Therefore a description of the village and an assessment of its impacts are not included in this EIS. The Proponent and the Belyando Shire Council have agreed to work together to determine an appropriate site. The Council has indicated that availability of land is unlikely to be a constraint and there are several potential sites for consideration.

When evaluating options for Township Village accommodation, the Proponent may consider use of part or all of the existing Blair Athol Joint Venture Single Persons Quarters. Part of this otherwise vacant 64-room facility is currently leased to the Council for use as a hostel for remote-area students. Were this option to be pursued, the Proponent would assist in the provision of suitable alternative arrangements.

When a site has been selected, in consultation with Belyando Shire Council, the Proponent will submit a Development Application under the IP Act for the Township Village.