WILPINJONG COAL PROJECT

MAIN REPORT

Section Two
Project Description

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2 PROJECT DESCRIPTION

2.1 COAL RESOURCE

The Wilpinjong resource is centred on the Ulan-Bylong area in the northern sector of the Western Coalfield. The Ulan-Bylong area contains the majority of remaining unallocated and undeveloped coal resources within the coalfield. The Western Coalfield covers an area of approximately 17,000 square kilometres (km^2) and is a subdivision of the Sydney Basin in NSW (Figure 1-1). The Wilpinjong resource has been identified by the NSW Government as a long-term source of coal for NSW electricity generators (DMR, 2002a).

The Wilpinjong resource is contained in the Ulan Coal which occurs in the lower part of the Late Permian Illawarra Coal Measures (Figure 2-1). These coal measures are overlain by the Triassic Narrabeen Group (locally known as the Wollar Sandstone) and comprise mainly conglomerate and sandstone.

The Ulan Coal is divided into two sections (upper and lower) and is separated by the C-marker, CMK (Figure 2-1). The combined sections of the Ulan Coal are commonly named and herein referred to as the Ulan Seam. The Ulan Seam is approximately 15 metres (m) thick and comprises plies of good to fair quality coal, plies of poorer quality (i.e. high ash) stony coal and partings of carbonaceous claystone, claystone, tuffs and other non-coal lithologies.

The Ulan Seam dips to the north-east at around two degrees and sub-crops in the south-east of the Project area. The structure of the Ulan Seam is very uniform and no faulting has been recognised to date (WCPL, 2003). A thin north-south trending dyke extends from Wilpinjong Creek to the south at the surface for approximately 2 km. A more detailed description of the local geology is provided in Section 3.1.3.

Exploration completed within EL 6169 (Figure 1-3) has delineated an *in-situ* coal resource in the order of 523 million tonnes (Mt), including an estimated total open cut ROM coal reserve of approximately 251 Mt. A 21 year mine plan has been prepared at a mining rate of up to 13 Mtpa of ROM coal that is expected to produce approximately 147 Mt of product coal for sale to domestic electricity generators and approximately 33 Mt of product coal to export. Open cut mining operations would require the excavation of some 330 million bank cubic metres (Mbcm) of waste rock.

2.1.1 Ulan Seam

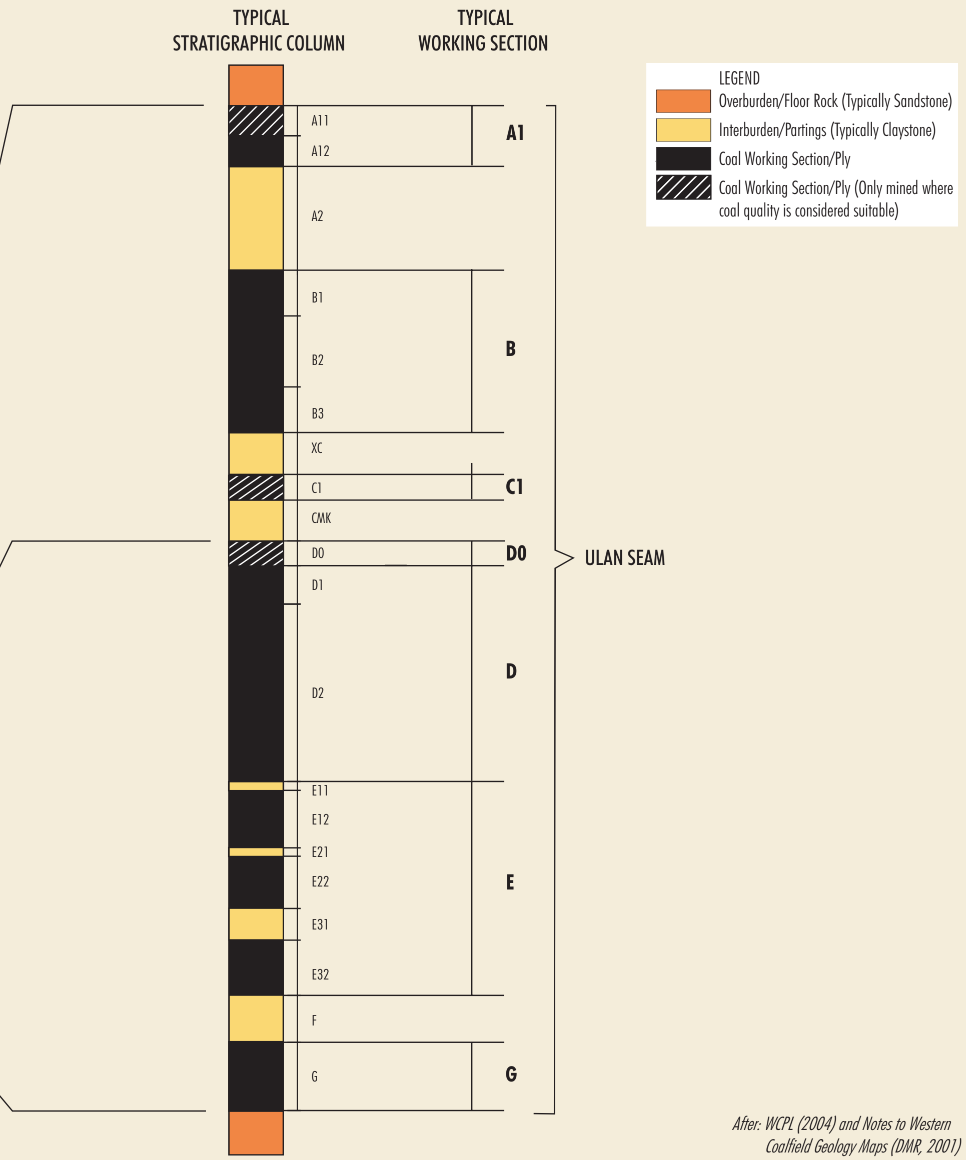
The stratigraphy of the Ulan Seam has been well defined in the area of the Ulan Coal Mines some 11 km to the north-west of the Wilpinjong resource. The Ulan Seam is laterally consistent, and the coal plies and partings defined at the Ulan Coal Mines correlate with those in the Project area. The working sections of the Ulan Seam that would be mined by the Project include A1, B, C1, D0, D, E and G (Figure 2-1). A description of the characteristics of the Project coal working sections is summarised in Table 2-1.

Table 2-1
Characteristics of the Project Coal Working Sections

Working Section	Description (Figure 2-1)
A1	The A1 working section is the upper-most coal horizon in the Ulan Seam and is divided into the A11 and A12 ply intervals. The A11 ply interval is approximately 50 cm in thickness and comprises of carbonaceous claystone overlain by a ply of mixed coal. The A12 ply interval has a thickness of around 50 cm and is predominately bright coal with relatively low ash content.
B	Apart from a relatively small area in the south of the Project area where a 1 m parting is developed between the B1 and B2 plies, the B1, B2 and B3 plies form a contiguous working section (B). The B working section is predominately mixed (dull and bright coal) with some thin stony coal bands. The working section ranges from 2.3 to 2.6 m in thickness throughout most of the resource, thinning to around 1.8 m in the south of the Project area.
C1	The C1 working section is poorly developed throughout most of the resource and comprises some 30 cm of stony coal. In the north-west of the Project area the C1 ply is thicker and is contiguous with the B working section.
D0	The D0 working section is the deteriorated top ply of the D working section and is generally around 30 to 40 cm in thickness.
D	The D1 and D2 plies make up the D working section. The D1 ply is typically around 50 cm in thickness. The D2 ply is around 2 m in thickness. The D working section varies from 1.6 to 3.0 m through most of the Project area, thinning to the south to around 1.2 m.
E	The three E plies (E1, E2 and E3) within the E working section have been subdivided into three coal intervals E12, E22 and E32 and three parting intervals E11, E21 and E31. Each coal interval is around 70 to 80 cm in thickness and the parting intervals range from 15 to 45 cm in thickness.
G	The G working section is a single ply of coal throughout most of the resource. It is separated from the overlying E working section by a tuffaceous claystone. The G working section varies from 0.7 to 1.4 m in thickness.

Source: after WCPL (2003)

PERIOD	GROUP	SUBGROUP / FORMATION / MEMBER		
TRIASSIC	NARRABEEN GROUP	DIGBY FORMATION		
PERMIAN (LATE)	ILLAWARRA COAL MEASURES	WALLERAWANG SUBGROUP	Farmers Creek Formation	
		CHARBON SUBGROUP	State Mine Creek Formation	
				Moolarben Coal Member
			Watts Sandstone	
			Denman Formation	
			Glen Davis Formation	Bungaba Coal Member
				Cockabutta Creek Sandstone Member
		CULLEN BULLEN SUBGROUP	Newnes Formation	
			Ulan Coal	Upper
				Lower
			Blackmans Flat Formation	
			Lithgow Coal	
			Marrangaroo Formation	
		NILE SUBGROUP		



After: WCPL (2004) and Notes to Western Coalfield Geology Maps (DMR, 2001)

WILPINJONG COAL PROJECT EIS

FIGURE 2-1
Stratigraphy of the Project Area

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2.2 PROJECT GENERAL ARRANGEMENT

Figure 2-2 shows the proposed development schedule for the Project. The proposed Project general arrangement is shown on Figure 2-3. Project general arrangements for Years 1, 3, 7, 9, 10, 13, 14 and 21 are shown on Figures 2-4 to 2-11, respectively. These general arrangements are based on planned maximum production and mine progression. The main activities associated with development of the Project would include:

- development and operation of an open cut mine within the MLA 1 area to produce coal for domestic electricity generation and export markets;
- selective highwall mining of the Ulan Seam within the MLA 1 area;
- a CHPP and mine facilities area;
- water management infrastructure including the relocation of Cumbo Creek;
- water supply bores and associated pump and pipeline system;
- placement of mine waste rock (i.e. overburden, interburden/partings and coarse rejects) predominantly within mined-out voids;
- placement of tailings within a combination of out-of-pit and in-pit tailings storages;
- development and rehabilitation of final mine landforms, and establishment of woodland vegetation in areas adjacent to the Project;
- a mine access road, temporary construction camp access road, internal access roads and haul roads;
- closure of Wilpinjong Road and Bungulla Road;
- re-alignment of two sections of Ulan-Wollar Road (including the relocation of two road-rail crossings);
- relocation of the existing 11 kV electricity transmission line;
- an on-site temporary construction camp to accommodate up to 100 people during the construction phase;
- a rail spur and rail loop;
- coal handling and train loading infrastructure;
- transportation of product coal to market via train; and
- Enhancement and Conservation Areas (ECAs).

The mining sequence shown on Figures 2-4 to 2-11 may vary to take account of coal market volume and quality requirements, mine economics and localised geological features. The mining sequence over any given period would be documented in the relevant Mining Operations Plan (MOP) as required by the DPI-MR. Should the mining sequence vary, the development schedule (Figure 2-2) would adjust accordingly to reflect any such changes. The Project general arrangement (Figure 2-3) may also vary to take into consideration detailed design aspects for Project infrastructure components and actual water supply requirements.

2.3 INITIAL CONSTRUCTION AND OTHER DEVELOPMENT ACTIVITIES

Initial construction activities would be undertaken generally during daytime hours up to seven days per week. Construction activities during Year 1 of the Project would be focussed on development of the following Project infrastructure components:

- on-site temporary construction camp to accommodate construction personnel and temporary access road;
- mine access road (including realignment of the intersection of Wilpinjong Road and Wollar Road, and closure of Wilpinjong Road and Bungulla Road);
- relocation of the existing 11 kV electricity transmission line;
- mine facilities area;
- CHPP and ROM coal handling areas;
- CHPP water supply storage (and initial tailings disposal area), water supply bores and associated pump and pipeline system;
- product coal stockpiles/handling area and train loading infrastructure; and
- 3.8 km long rail spur and rail loop.

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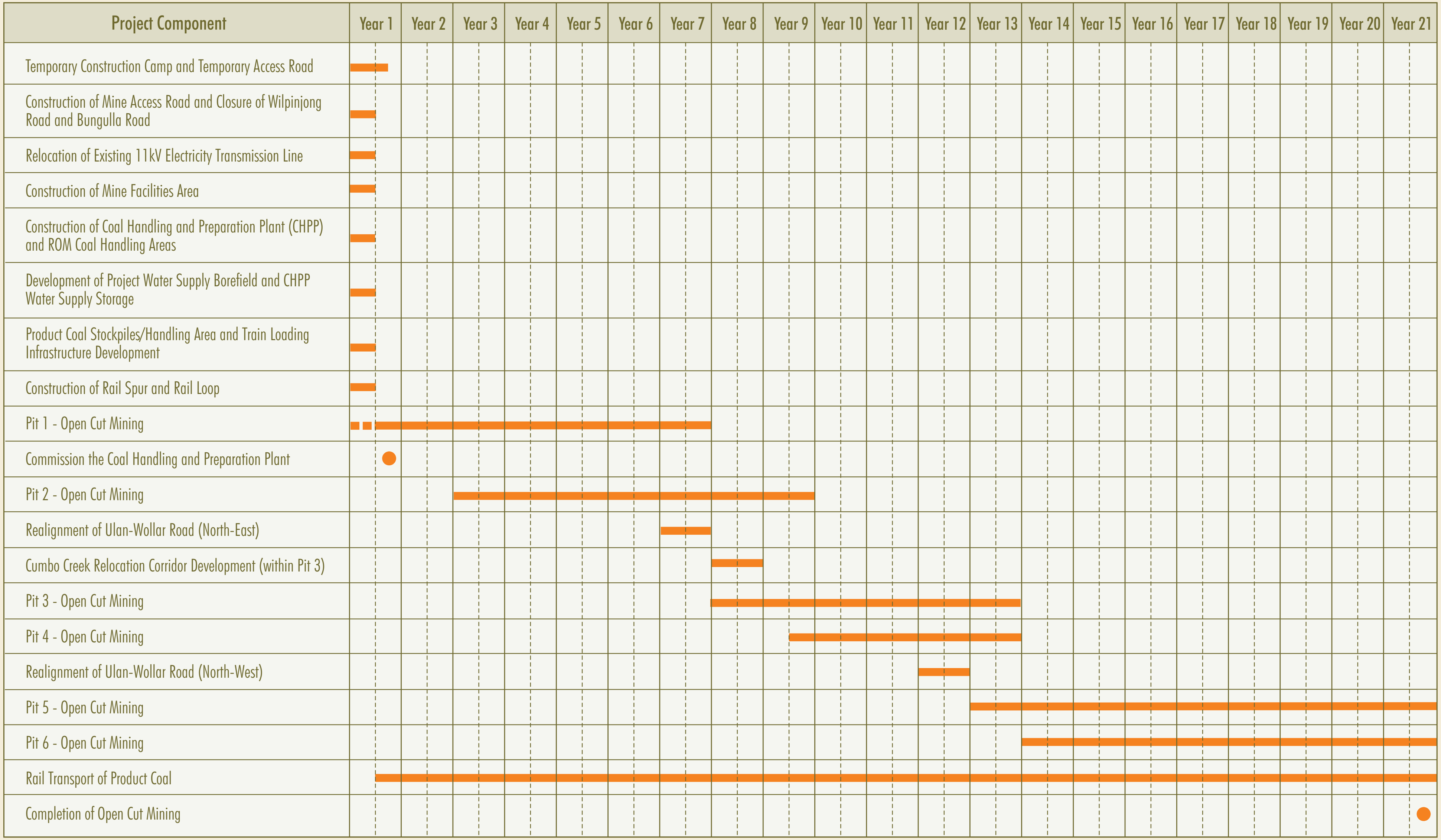
Proposed Development Schedule



Source: WCPL (2005)

WILPINJONG COAL PROJECT EIS

FIGURE 2-2
Proposed Development Schedule

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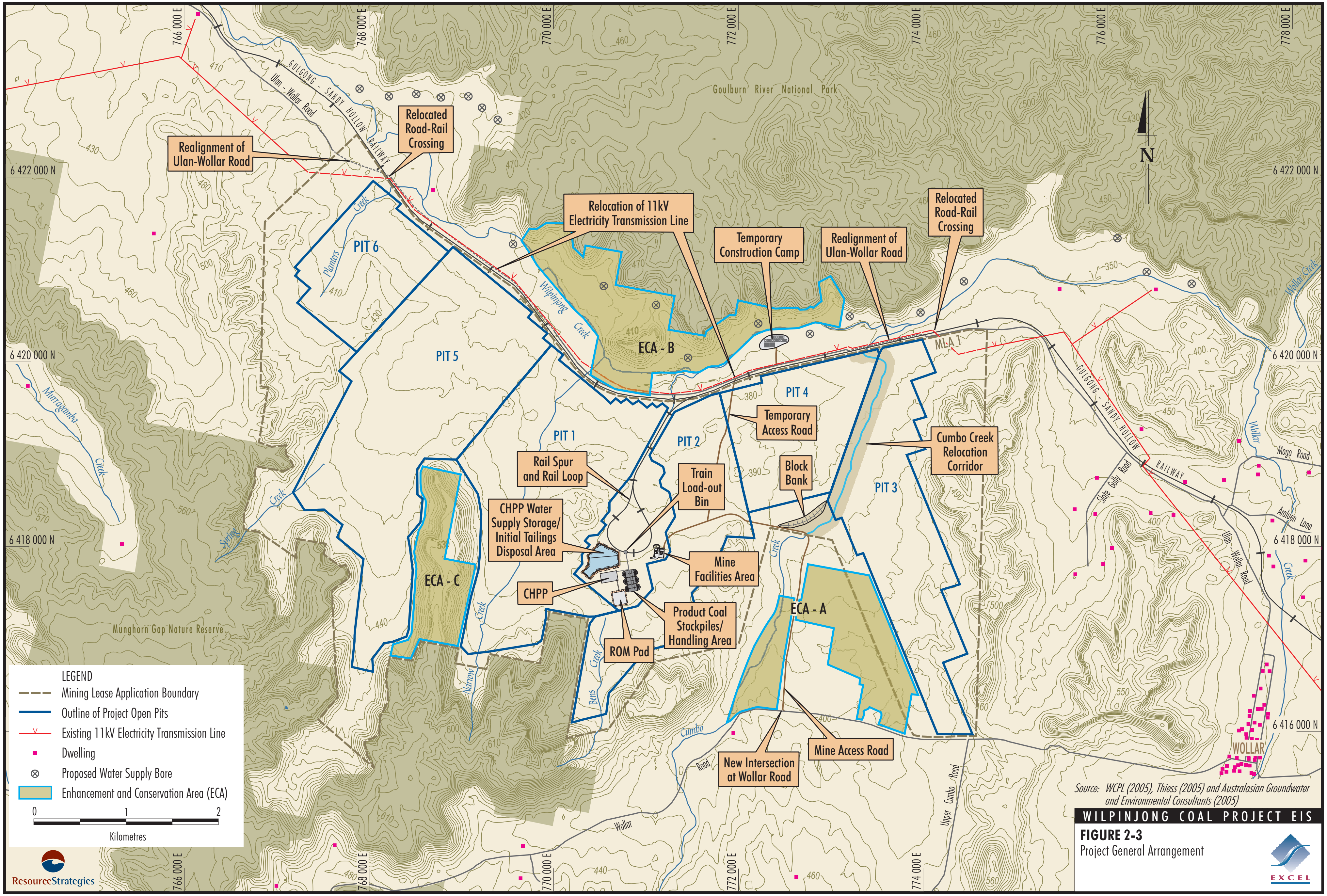

WILPINJONG COAL PROJECT EIS

FIGURE 2-3
Project General Arrangement

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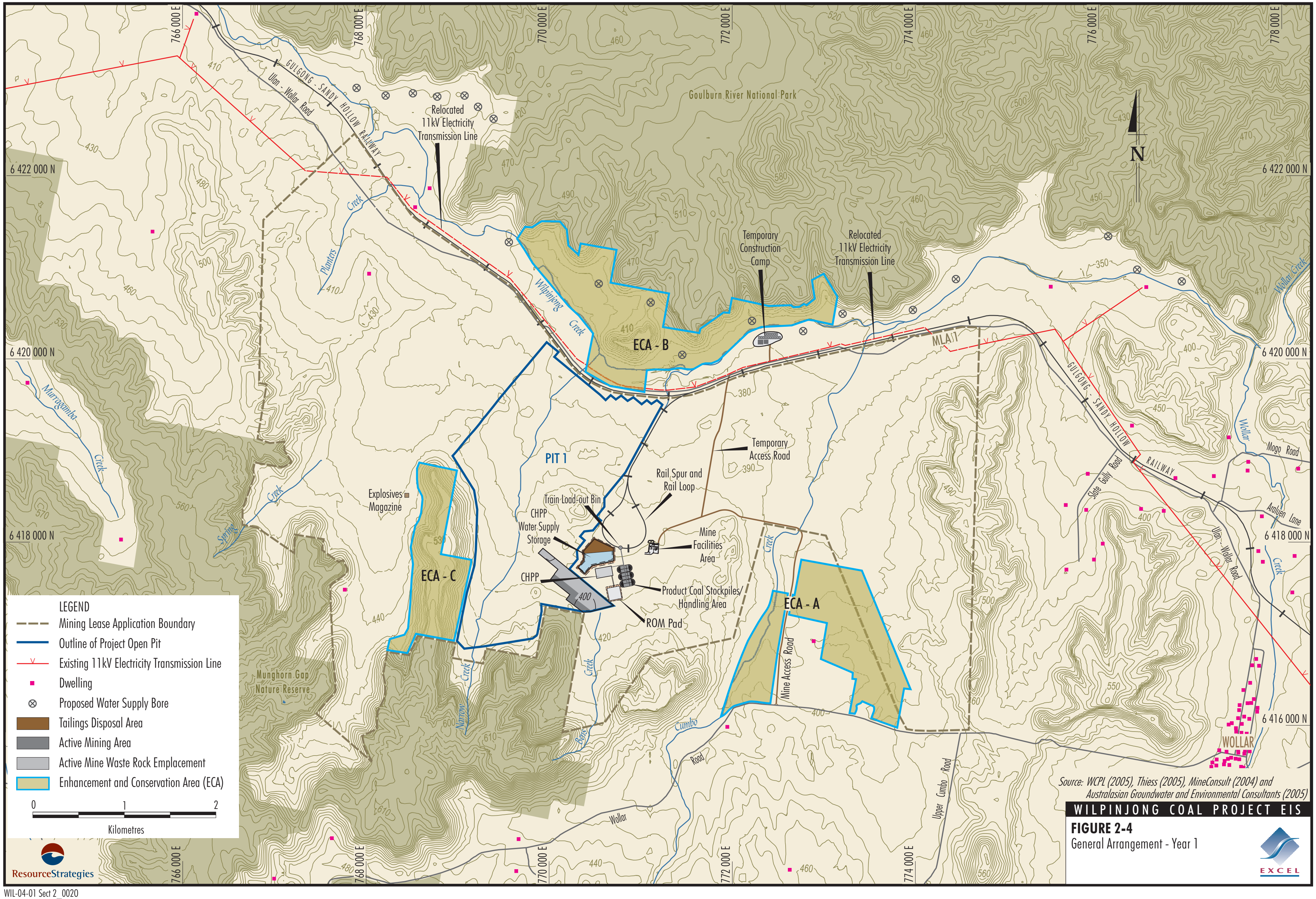

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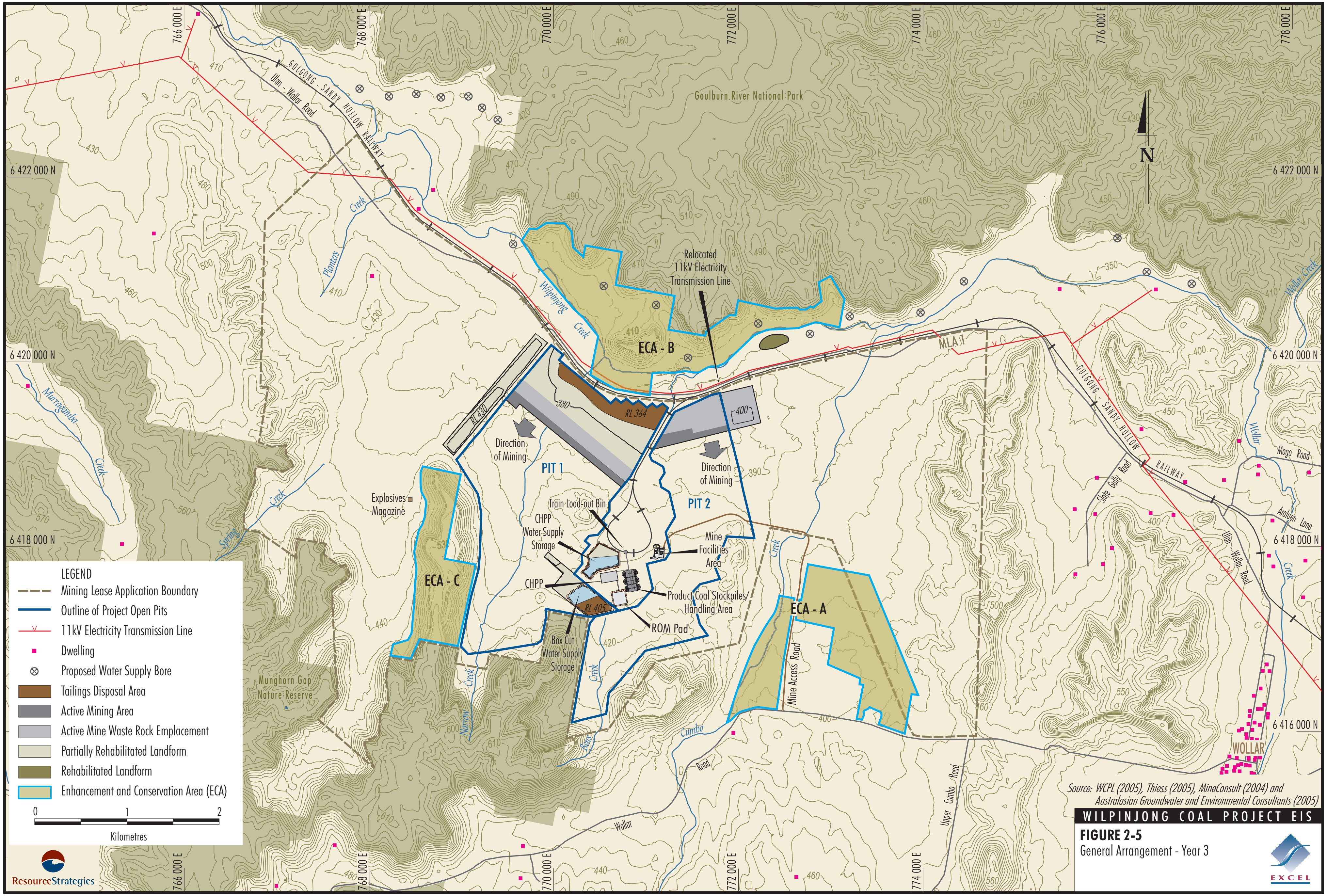
FIGURE 2-4
General Arrangement - Year 1



WILPINJONG COAL PROJECT EIS

FIGURE 2-5
General Arrangement - Year 3

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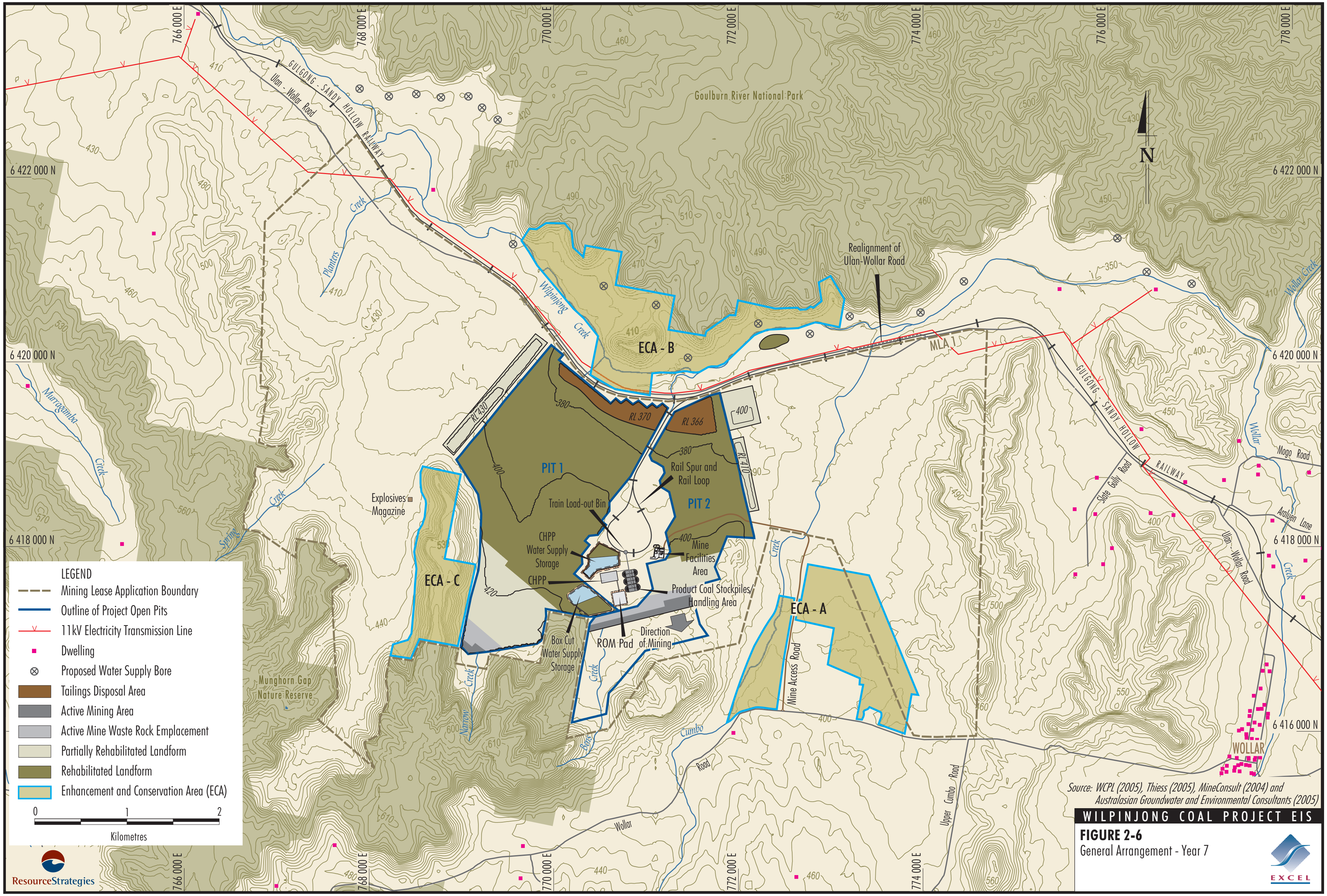

WILPINJONG COAL PROJECT EIS

FIGURE 2-6

General Arrangement - Year 7

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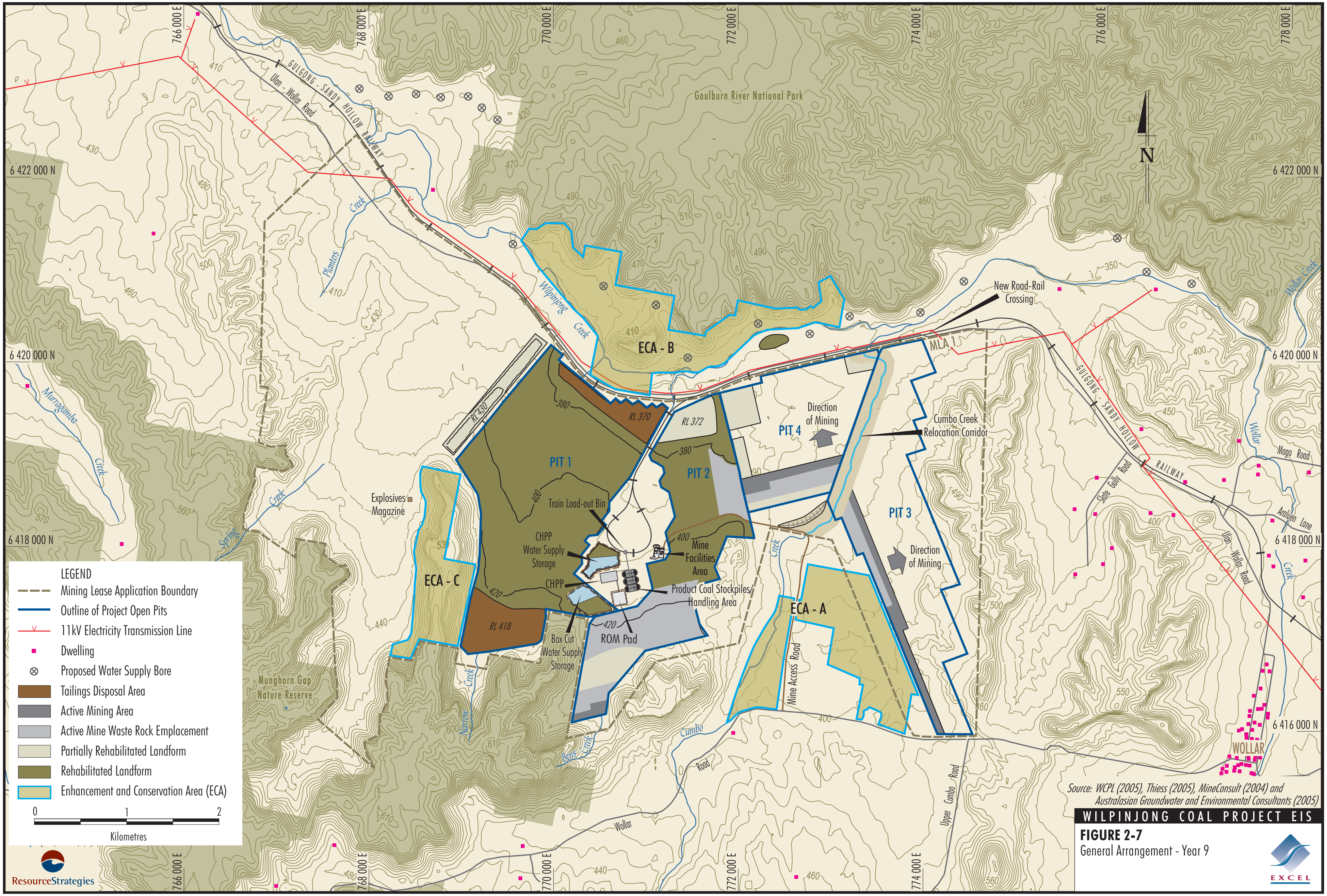
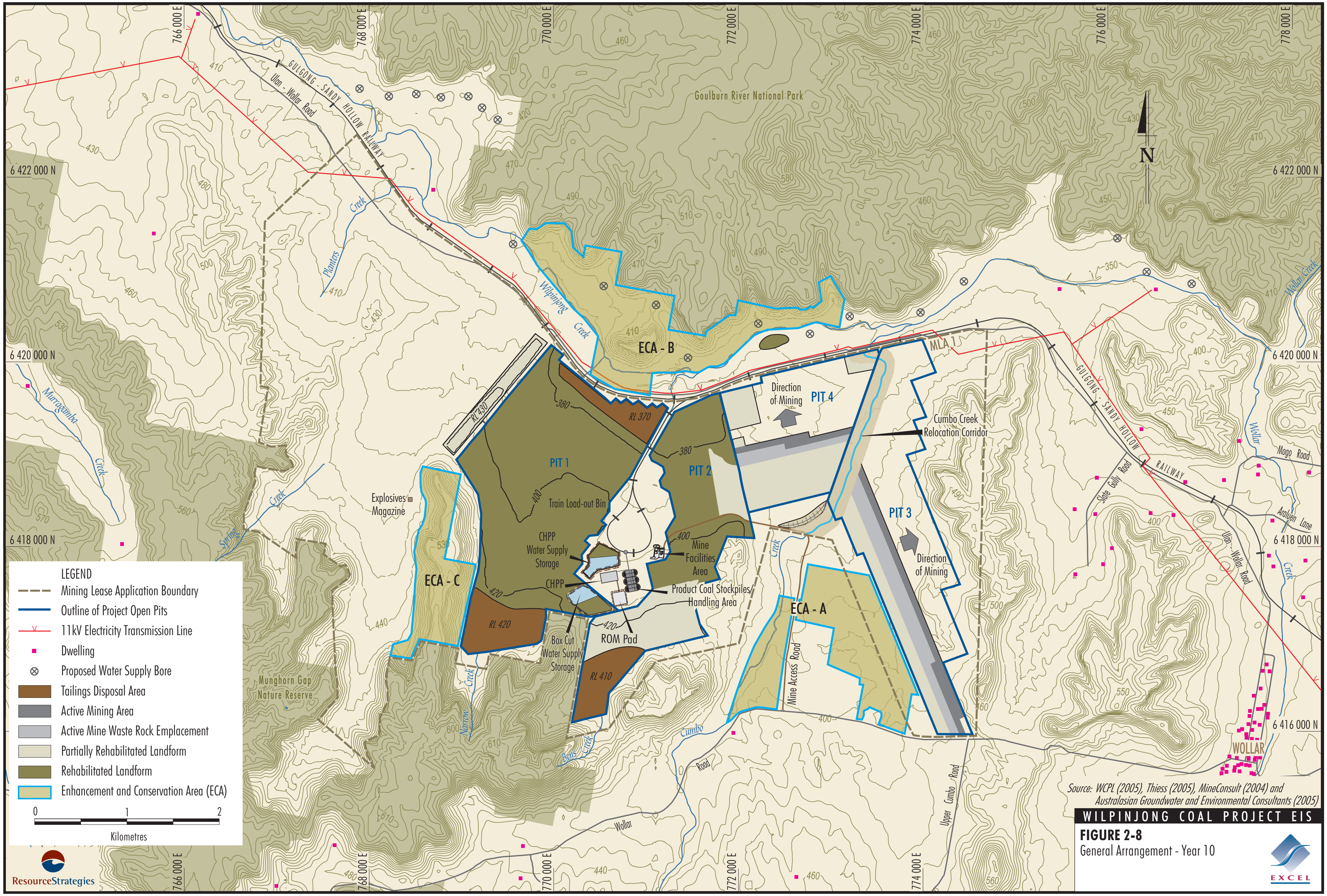


FIGURE 2-7
General Arrangement - Year 9



WILPINJONG COAL PROJECT EIS

FIGURE 2-8

General Arrangement - Year 10

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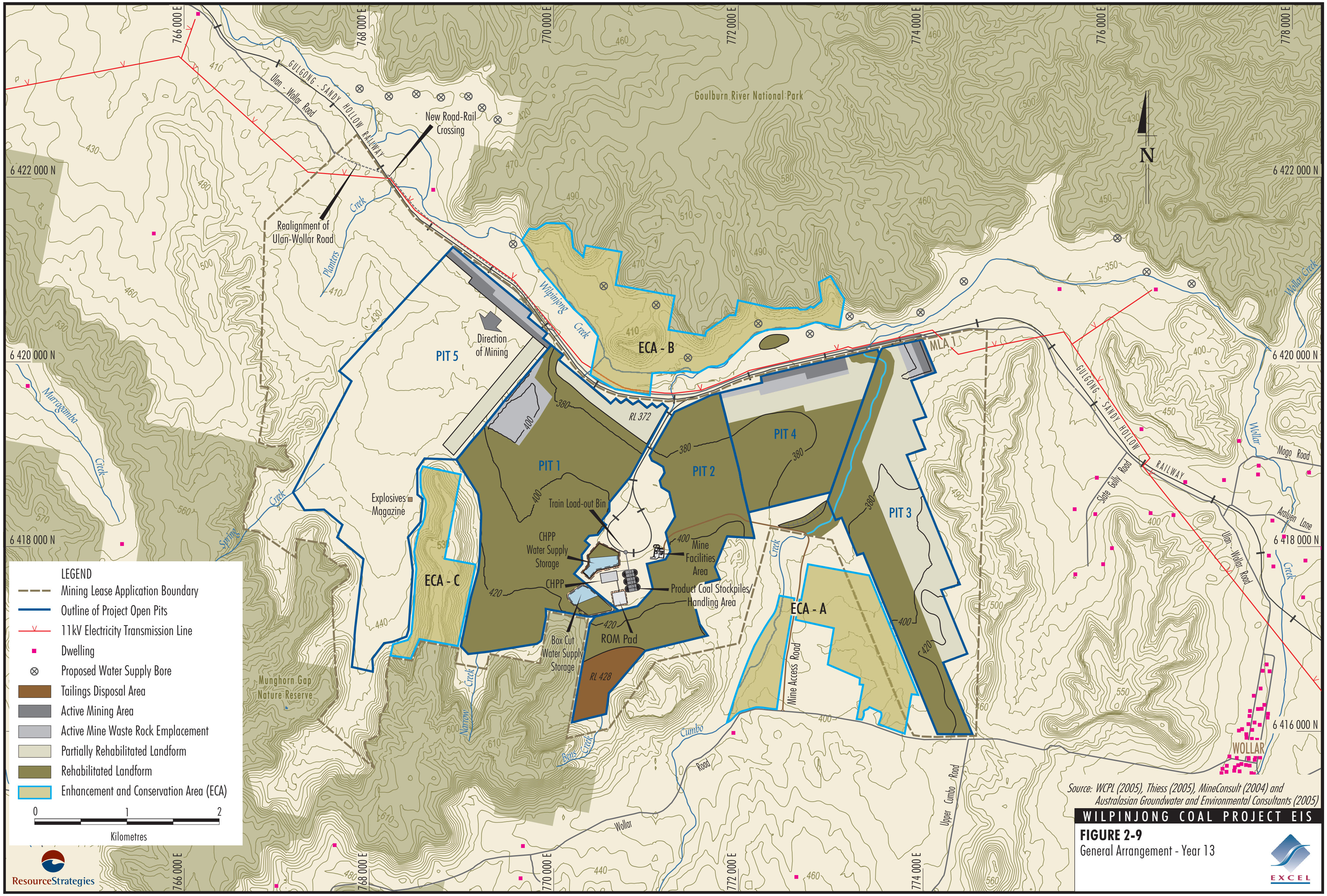

FIGURE 2-9
General Arrangement - Year 13

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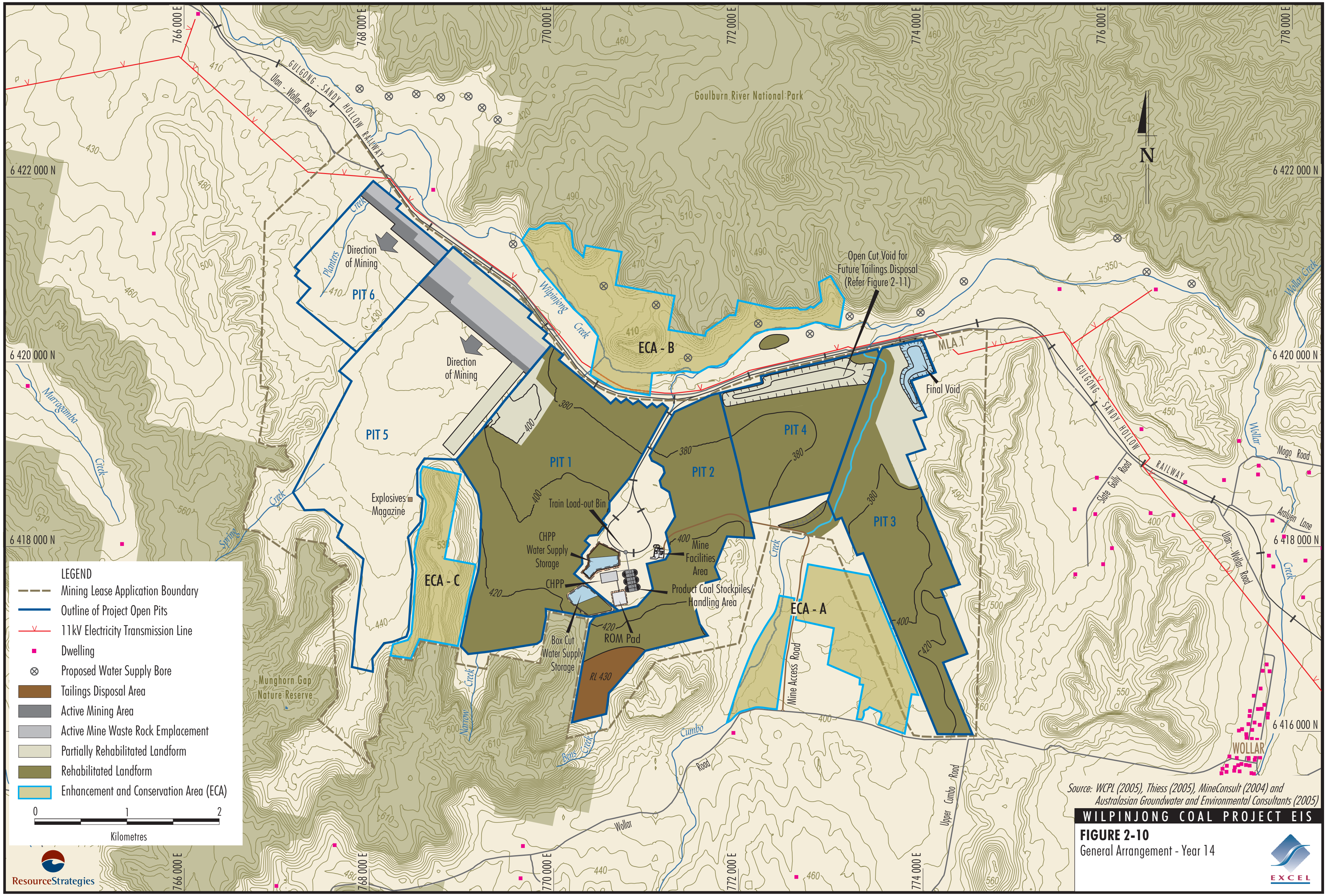
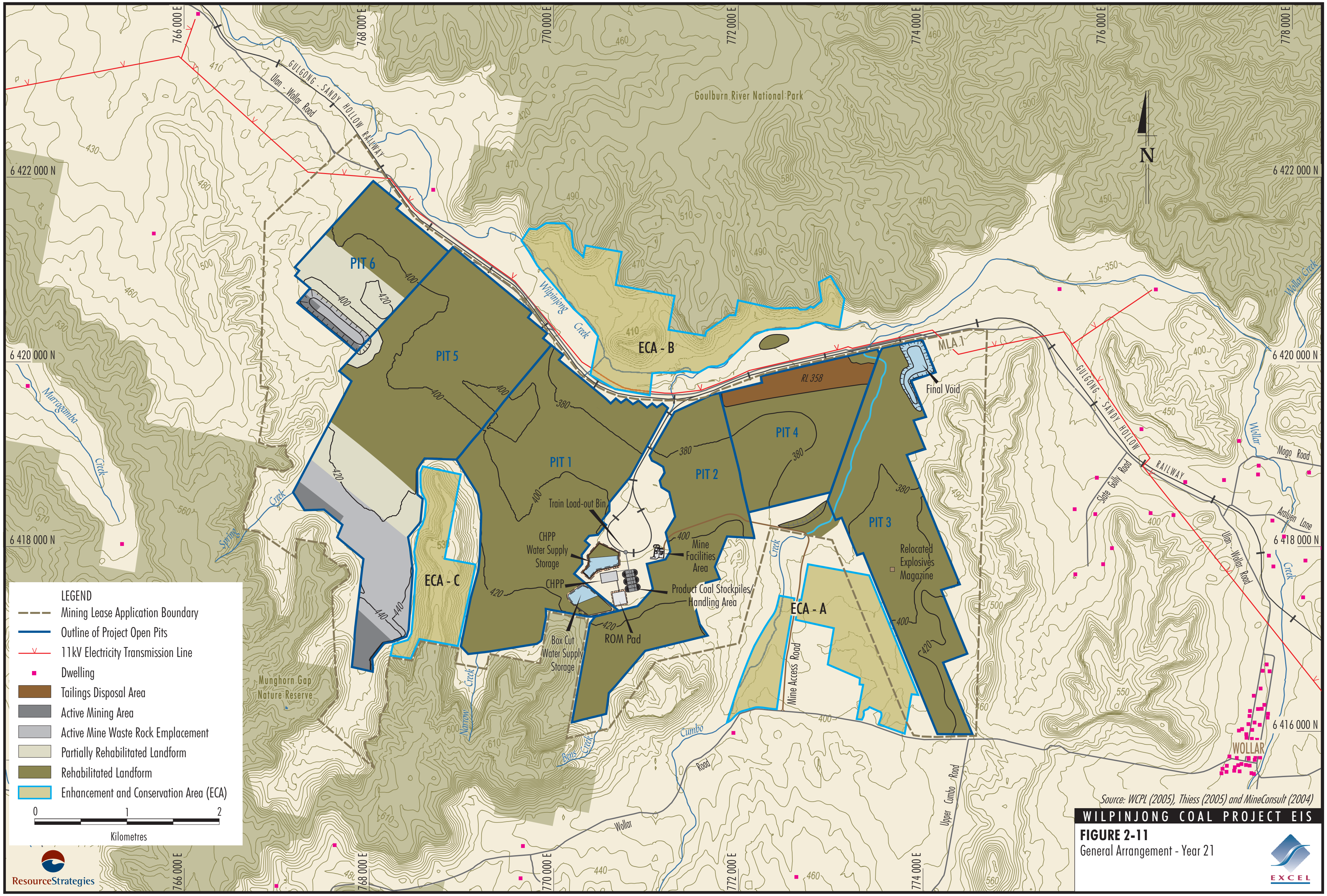


WILPINJONG COAL PROJECT EIS

FIGURE 2-10

General Arrangement - Year 14



WILPINJONG COAL PROJECT EIS

FIGURE 2-11

General Arrangement - Year 21

Infrastructure that is required to support the Project would also be progressively constructed in parallel with mining operations throughout the life of the Project. Other Project development activities would include:

- realignment of two sections of Ulan-Wollar Road (including the relocation of two road-rail crossings);
- relocation of Cumbo Creek (Section 2.9.1); and
- construction of internal access roads and haul roads (Section 2.10.2).

The above activities are described in more detail below.

2.3.1 Temporary Construction Camp and Temporary Access Road

An on-site temporary construction camp would accommodate up to 100 people. The temporary construction camp would be located to the north of the Project on WCPL-owned land and would comprise:

- up to 25 demountables;
- mess area;
- recreation area; and
- ablution facilities.

All items would be constructed in accordance with local government requirements, including sewerage and other waste disposal systems. Potable water would be trucked to the site and a water supply reticulation system would service the appropriate areas across the construction camp. Electricity demand would be met by using the existing 11 kV supply system, supplemented with on-site diesel generator-sets when required.

The primary access to the Project would be provided from the south via the mine access road (Section 2.3.2). However, an existing access track and road-rail crossing from the north off Ulan-Wollar Road (Figure 2-3) would also be temporarily utilised during the construction phase to provide for direct access for employees transiting between the temporary construction camp and the Project site and to avoid unnecessary traffic movements through Wollar.

The majority of the construction works would be completed in the first six months of the Project. The construction camp would be utilised until the CHPP is fully commissioned. The temporary access road would be closed upon decommissioning of the construction camp.

2.3.2 Mine Access Road/Closure of Wilpinjong Road and Bungulla Road

The primary access to the Project would be provided from the south via construction of an unsealed two-lane mine access road connecting the mine facilities area to Wollar Road (Figure 2-3). Existing public roads which pass through the Project disturbance area including Bungulla Road and Wilpinjong Road would be closed for public access.

Warning and restricted access signs would be posted at intervals along the mine access road. Separate parking areas for heavy and light vehicles would be provided adjacent to the mine facilities area. Road shoulders and guardrails would be installed where required in accordance with Section 6 of the RTA *Road Design Guide* (RTA, 1996).

The mine access road geometry has been designed to comply with the *Rural Road Design – Guide to Geometric Design of Rural Roads* (Austroads, 2003). The mine access road would be constructed generally along the alignment of Wilpinjong Road; however realignment of the intersection of Wilpinjong Road with Wollar Road would be required to improve visibility. A minor road deviation would also be required to avoid a heritage site (Site 9 – Wilpinjong Road Stone Embankment) (Section 4.11).

A low level floodway crossing would be installed for the mine access road across Cumbo Creek and one of its tributaries. These works would be scheduled during periods of no or low flow in Cumbo Creek so as to minimise the potential for flow interruptions.

The intersection of the mine access road and Wollar Road would be designed as a "Type B" intersection incorporating a "Type AUR" right turn treatment from Wollar Road (with an auxiliary turn lane) and a "Type BAL" left turn treatment from Wollar Road (a basic left turn treatment), in accordance with the Section 4 of the RTA *Road Design Guide* (RTA, 1996). The intersection would also be designed in accordance with the *Guide to Traffic Engineering Practice: Part 5 – Intersections at Grade* (Austroads, 1988). Intersection pavement design would be prepared in accordance with *Pavement Design: a Guide to the Structural Design of Road Pavements* (Austroads, 1992). Approximately 100 m of the mine access road would be sealed on the approach to the intersection with Wollar Road.

A minor realignment of the mine access road would be temporarily required prior to Year 7 of the Project as mining within Pit 2 progresses (Figures 2-5 and 2-6). A portion of the mine access road would be moved to the south to accommodate mining in Pit 2 before being relocated back to its original alignment across the re-profiled mine waste rock emplacement.

2.3.3 Relocation of the Existing 11 kV Electricity Transmission Line

The existing 11 kV electricity transmission line is shown on Figure 3-1. The extent of the open cut operation in the north of the Project area would require the relocation of approximately 9 km of the existing 11 kV electricity transmission line to the immediate north of the Gulgong-Sandy Hollow railway (Figure 2-3).

2.3.4 Mine Facilities Area

A mine facilities area would be constructed within an area that does not contain recoverable coal to the immediate south-east of the Project rail loop (Figure 2-3).

The mine facilities area would contain a workshop, storage building, office buildings, muster area and a range of service facilities. Construction of the mine facilities area would take approximately six months. Further details are provided in Section 2.10.1.

2.3.5 Coal Handling and Preparation Plant and ROM Coal Handling Areas

A CHPP would be constructed to facilitate the sizing, screening and washing of ROM coal to meet domestic and export market coal specifications. The CHPP would be situated to the south of the Project rail loop as shown on Figure 2-3.

The CHPP would include coal sizing, screening, de-sliming and washing circuits. The CHPP would be constructed during the first six months of Year 1 (Figure 2-2). Once fully commissioned, the CHPP would have a washing capacity up to 8.5 Mtpa. The operation of the CHPP is described in Section 2.5.

ROM coal handling areas would be constructed to the south of the rail loop and would comprise a ROM pad and access ramps, retaining wall and dump hopper. ROM coal would be conveyed via an overland coal feeder to the CHPP.

2.3.6 Project Water Supply Borefield and CHPP Water Supply Storage

Construction water (e.g. water used for dust suppression and moisture conditioning of earthworks) would be supplied from the early development and commissioning of the Project water supply borefield and/or by advance dewatering from temporary bores within open pit limits.

The Project water supply borefield would be developed to the north and north-east of the Project open pits (Figure 2-11). The Project water supply borefield would comprise a network of up to 19 individual bores. The number of bores and operational management requirements of the borefield to meet the Project water supply make-up requirements would be determined during the detailed design of the Project water supply system. A Water Supply Borefield Plan (WSBP) (Section 5.1.2.5) would be developed in consultation with relevant authorities.

Water extracted from the water supply bores would be reticulated to the CHPP water supply storage. For bores located north of Wilpinjong Creek, the delivery pipelines would cross Wilpinjong Creek at selected locations via buried trenches and follow the rail spur and rail loop corridor to the CHPP water supply storage.

Trench excavations for the delivery pipelines would be scheduled to occur during periods of no or low flow in Wilpinjong Creek so as to minimise the potential for flow interruptions. Excavated spoil would be temporarily stockpiled and used to backfill the trenches immediately following laying of the pipe. Backfill material would be compacted to minimise post-placement settlement. Temporary erosion and sediment control structures would be installed in accordance with the Project Erosion and Sediment Control Plan (ESCP) (Section 5.1.2.2).

The CHPP water supply storage would comprise a conventional 'Turkey's Nest' structure with capacity to hold some 200 million litres (ML) of water. Some tailings would be placed in a partitioned section of the CHPP water supply storage during excavation of the initial box cut.

Water stored in the CHPP water supply storage would include mine water from a number of sources (Section 2.9.2) and would be used to meet the make-up demand of the CHPP.

2.3.7 Product Coal Stockpiles/Handling Area and Train Loading Infrastructure

Product coal stockpiles/handling area and train loading infrastructure required for the Project includes (Figure 2-3):

- a product coal conveyor from the CHPP to the product coal stockpiles;
- a product coal handling and reclaim system; and
- a train load-out conveyor to the train load-out bin.

Further details are provided in Section 2.6.

2.3.8 Rail Spur and Rail Loop

The Project would include construction of a rail spur from the Gulgong-Sandy Hollow railway and rail loop with an approximate total rail length of 3.8 km (Figure 2-3). The design and construction of the rail spur and rail loop would be undertaken in accordance with the requirements of the Australian Rail Track Corporation (ARTC) who manage the Hunter Valley Coal rail network in NSW. Construction of the rail spur and rail loop would take approximately six months.

Light and heavy vehicle rail crossings would be installed to provide access to the inside of the rail loop. A rail service road would be constructed adjacent to the rail spur and rail loop for its entire length. Lay-by areas along the rail service road would also be installed where required to allow maintenance activities to occur without affecting access.

2.3.9 Realignments of Ulan-Wollar Road

The extent of the Project open pits in the north of the Project area would require the realignment of two sections of Ulan-Wollar Road (Figures 2-7 and 2-9). The realigned sections would be approximately 3 km in length in the north-west and approximately 800 m in length in the north-east. Realignment of Ulan-Wollar Road would occur in the north-east prior to development of the Cumbo Creek relocation corridor (approximately Year 8) and in the north-west prior to mining operations commencing in Pit 5 (approximately Year 13).

The realignments would involve the construction of an unsealed two-lane road to the immediate north of the Gulgong-Sandy Hollow railway. The realigned road sections would be designed and constructed in consultation with the MWRC. Consideration would be given to the soil types (e.g. potential dispersiveness associated with podzolic soils) during the detailed design of the realigned road sections to construct a stable road pavement and to minimise erosion potential.

The realignments would also require the relocation of two road-rail crossings. The road-rail crossings (including active control treatments) would be designed and constructed in consultation with ARTC and the MWRC.

2.4 OPEN CUT OPERATIONS

2.4.1 Mine Schedule

The proposed mine schedule for the Project is provided in Table 2-2, based on the planned maximum production (i.e. subject to coal market volume and quality requirements, mine economics and localised geological features). Open cut operations would be conducted 24 hours per day, seven days per week for 21 years. Mining would be carried out using open cut methods at a rate of up to 13 Mtpa of ROM coal with an average stripping ratio of 1.3 (bcm waste rock):1(t ROM coal). General arrangements which match the proposed schedule in Table 2-2 for Years 1, 3, 7, 9, 10, 13, 14 and 21 are shown on Figures 2-4 to 2-11.

Table 2-2
Proposed Mine Schedule

Year	Open Cut Waste Rock (Mbcm)	Open Cut ROM Coal (Mtpa)	CHPP Rejects (Mtpa)	Product Coal (Mtpa)	
				Domestic	Export
1	1.0	1.5	0.4	0.9	0.2
2	5.5	9.5	2.7	5.6	1.2
3	7.7	13	3.4	7.6	2.0
4	11.0	13	3.4	7.8	1.8
5	11.2	13	3.4	8.3	1.3
6	9.3	13	3.5	8.1	1.4
7	13.8	13	3.3	7.9	1.8
8	12.9	13	3.3	7.5	2.2
9	19.5	13	3.6	7.4	2.0
10	14.3	13	3.6	7.6	1.8
11	19.1	13	3.5	7.3	2.2
12	18.5	13	4.0	7.4	1.6
13	17.1	13	4.0	7.4	1.6
14	15.6	13	4.1	7.5	1.4
15	19.2	13	3.7	8.2	1.1
16	22.7	13	3.6	7.3	2.1
17	26.5	13	3.7	7.2	2.1
18	23.8	13	4.0	7.6	1.4
19	25.0	13	4.2	7.4	1.4
20	26.4	13	4.0	7.4	1.6
21	9.8	5.6	1.8	3.2	0.6
Total	**329.9**	**250.6**	**71.2**	**146.6**	**32.8**

Source: WCPL (2005)

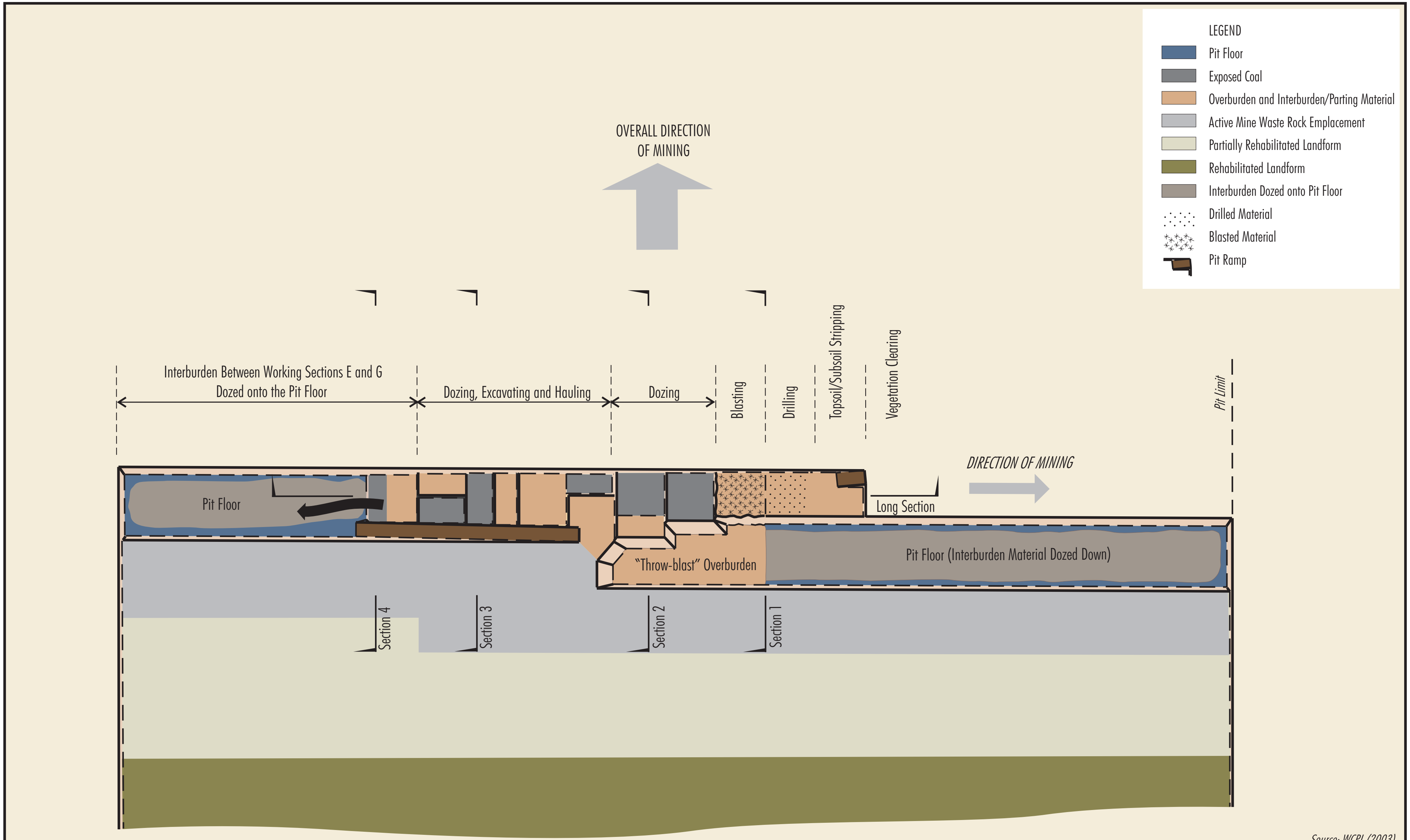
Six pits have been delineated to extract the open cut mineable reserves over the 21 year Project life as shown on Figures 2-4 to 2-11. A description of the Project open cut mining sequence is provided in Section 2.4.2.

2.4.2 Mining Sequence

Mining is scheduled to commence with the development of an initial box cut in the south-eastern section of Pit 1 (Figure 2-4). Waste rock material excavated would be used in the construction of various mine and rail infrastructure components. After completing this excavation, mining operations would relocate to the northern end of Pit 1, leaving the initial excavation available for the box cut water supply storage and disposal of tailings (Figure 2-5).

The general sequence of open cut mining operations for the Project would be as follows (Figures 2-12 and 2-13):

1. Vegetation clearing and topsoil/subsoil stripping (Section 2.4.4). Stripped topsoil and subsoil would be used directly in progressive rehabilitation or placed in temporary stockpiles.
2. Drilling and blasting of overburden, with some waste rock "throw blast" into the adjacent mined-out strip (Section 2.4.5).
3. Dozer pushing of blasted overburden into the adjacent mined-out strip to expose the upper ply of the Ulan Seam (Section 2.4.6). Exposed coal would then be selectively mined and hauled by trucks to the ROM coal stockpiles (Section 2.4.7).
4. Interburden/parting material would then be ripped, pushed or excavated and hauled to expose the underlying working sections of the Ulan Seam (Sections 2.4.6 and 2.4.7).
5. Progressive rehabilitation of the mine waste rock emplacements (Section 5.2).



Source: WCPL (2003)

WILPINJONG COAL PROJECT EIS

FIGURE 2-12
Conceptual Mining Method (Plan View)

Not to Scale

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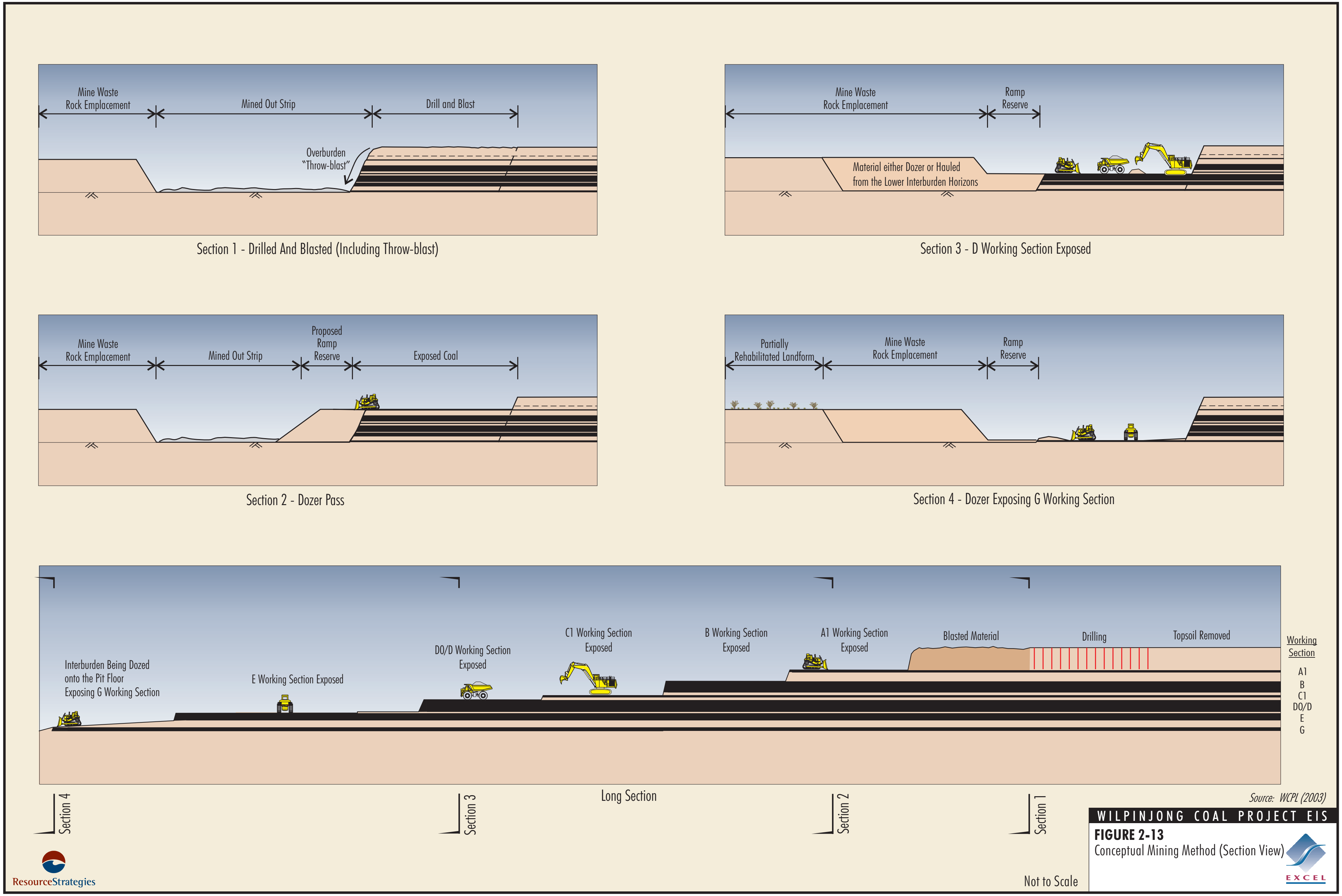

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2.4.3 Mine Fleet

The proposed mine equipment fleet for the Project is provided in Table 2-3. The mine equipment fleet may vary to take account of plant availability in addition to coal market volume requirements and mine economics.

2.4.4 Vegetation Clearance and Topsoil/Subsoil Stripping

Some 290 ha of vegetation would be progressively cleared over the life of the Project. Specific vegetation clearance procedures would be developed for the Project and are discussed in Section 5.1.2.7.

A soil survey undertaken for the Project (Appendix M) has determined that there is sufficient topsoil resource available for rehabilitation works. Recommended topsoil stripping depths range from 0 to 30 cm, depending on the soil type. Subsoils across the Project disturbance areas would also be suitable for selective use as a subsoil medium for plant growth (Appendix M). Trials of various surface treatments (including subsoil and topsoil depths) would be undertaken during the Project life (Section 5.2.7).

Where topsoil/subsoil cannot be used directly for progressive rehabilitation, they would be stockpiled separately and seeded with grasses to maintain soil viability. Soil management, stockpiling and re-application procedures for the Project are detailed in Sections 4.1.2 and 5.2.4. A description of the soil resources within the Project area and recommended management measures is presented in Appendix M.

2.4.5 Overburden Drilling and Blasting

Overburden material that is not able to be efficiently ripped and excavated by mobile plant would be drilled and blasted with some overburden material being "throw blast" into the adjacent mined-out strip (Figure 2-13). Overburden material would typically be drilled in 5 to 8 m benches. A mixture of ammonium nitrate and fuel oil (ANFO) (dry holes) and emulsion blends (wet holes) would be used at an average powder factor of approximately 0.2 kilograms per bank cubic metre (kg/bcm).

Blast sizes would typically be around 280,000 bcm in volume. Actual numbers of blasts in any week would be dependent on mine production. It is estimated, however, that an average of one blast per week would be required. Blasting would only occur during daylight hours.

Table 2-3
Proposed Mine Equipment Fleet

Mobile Plant	Primary Purpose	Number of Plant	
		Year 1	Years 2-21
Excavator (186 t)	Overburden Excavation/Loading, Coal Mining/Loading	2	4
Haul Truck (91 t)	Overburden/Coal/Rejects Haulage	1	1
Haul Truck (136 t)	Coal Haulage	5	9
D8 Dozer	Excavator Support	1	2
D10 Dozer	Overburden Ripping/Pushing, Waste Rock Management	1	2
D11 Dozer	Overburden Ripping/Pushing, Coal Mining	2	2
D11 Dozer	Product Coal Handling	1	1
D11 Dozer	Overburden Ripping/Pushing	1	2
Front End Loader	Product Coal Handling	2	2
Grader	Overburden Contouring, Road Grading	1	1
Water Truck (20 kL)	Dust Suppression	1	2
Drill	Overburden Drilling	1	1
Water Pump	Pit Dewatering	2	4

Source: Thiess (2004)

Prior to each blast an assessment of wind direction and speed would be made. During unfavourable conditions blasts would be modified or delayed, where practicable, to minimise the potential for excessive dust migration from the site.

Wollar Road, Ulan-Wollar Road and the Gulgong-Sandy Hollow railway would be temporarily closed during blast events within 500 m of the road or railway, as discussed in Sections 4.12.1 and 4.13.

2.4.6 Overburden and Interburden/Parting Material Removal and Handling

Excavators and dozers would be used to remove overburden material not "throw blast" into an adjacent mined-out strip. Haul trucks would be used to haul the material to mine waste rock emplacements. The locations of the mine waste rock emplacements as the mining operations progress are shown on Figures 2-4 to 2-11. Section 2.8 describes the mine waste rock emplacement management procedures for the Project.

2.4.7 Coal Mining and Handling

Open cut coal mining would typically involve excavators loading haul trucks for haulage to the ROM pad and dump hopper. A fleet of up to nine haul trucks would typically service coal haulage requirements. Where direct feed to the dump hopper is not possible due to operational constraints, coal would be dumped on an adjacent ROM coal stockpile for later re-handling. The ROM coal stockpile would have a capacity of up to 350,000 t.

The open pit limits in the north of the Project area are approximately 40 m south of the Gulgong-Sandy Hollow railway and more than 100 m south of Wilpinjong Creek (Figure 2-3). The top batter of the highwall would be laid back at an angle of 1:1 before being battered down at an angle of 65 to 70 degrees. The open cut would be relatively shallow (i.e. up to 55 m). Notwithstanding, an assessment of highwall stability would be undertaken prior to commencement of mining operations.

As open cut operations reach pit limits, there may be opportunities to recover additional coal through highwall mining of selected plies of the Ulan Seam. The highwall mining operation would enable WCPL to recover coal which otherwise would be sterilised. Highwall mining beyond the pit limits would involve only partial extraction of the coal resource. Sufficient coal would remain *in-situ* between the mined panels so that no significant subsidence would occur to the land surface above those areas highwall mined.

2.4.8 Open Cut Dewatering

Excavation of the open cut would form a sink in the groundwater system towards which groundwater would flow.

Sumps would be excavated in the floor of active open cuts to manage the quantities of inflows expected to report to mine workings. Water that accumulates in the sumps would be used for dust suppression over Project haul roads and active mine waste rock emplacement surfaces and used for water supply for the CHPP.

Where the potential for high groundwater inflows from the Ulan Seam is identified, advance dewatering may be conducted using temporary bores ahead of the open cut mining operation.

During mining operations any direct groundwater inflows from alluvium exposed in the highwall of the open cut would be intercepted prior to it reaching the floor of the open cut and pumped back to the nearest creek. This would be achieved by the installation of sumps and a pump/pipe system on a bench of the open cut (as is the current practice for similar circumstances at other mines in the Hunter Valley). These areas would be sealed during the backfilling of the completed open cuts. This would be achieved by the selective placement of more weathered materials against the alluvium intersect as the open cut excavation is backfilled with waste rock. These materials would be sourced from pre-stripping operations. If necessary, placement methodologies for these materials (i.e. placement in thinner layers and trafficked with mine fleet) would be developed to achieve the desired degree of compaction.

As discussed in Section 2.9.1, the block bank at the head of the Cumbo Creek relocation corridor would include a sub-surface cut-off wall to divert sub-surface flows into the new creek alignment.

The results of surface water modelling indicate that there would be sufficient on-site storage capacity available in the open cut voids and other water supply storage areas to provide secure containment for all mine water (i.e. groundwater inflows and incident rainfall-runoff to operational areas) and tailings (Appendix A).

The Project water management system is described in Section 2.9.

2.4.9 Final Voids

Final voids would remain at the north-eastern extent of Pit 3 and at the southern extent of Pit 6 (Figure 4-1).

The surface catchment of the final voids would be reduced to a practicable minimum by the use of upslope diversions (Section 2.9.1) and contour drains around their perimeter. The surface water assessment presented in Appendix A indicates that in the long-term the final voids would form localised sinks in the local groundwater table.

2.5 ROM COAL RECLAIM, HANDLING AND PREPARATION

Until the CHPP is fully commissioned, ROM coal would be passed through the coal sizing and screening circuit of the CHPP prior to being stacked in the product coal stockpile areas. The CHPP would be fully commissioned in the second half of Year 1 of the Project.

The CHPP would operate up to 24 hours per day, seven days per week with a design capacity of approximately 1,200 tonnes per hour (tph) ROM coal feed. A description of the CHPP operation is provided below and shown on Figures 2-14 and 2-15.

2.5.1 Coal Sizing and Screening Circuit

ROM coal would be reclaimed at a rate up to 1,200 tph from the ROM dump hopper to the primary sizer. The primary sizer would operate with a top particle size output of 300 millimetres (mm).

Raw coal from the primary sizer would be conveyed to the secondary sizer with a top particle size output of 120 mm prior to being directed to a 50 mm aperture roller screen. The underflow from the roller screen would be directed to the plant feed conveyor while the overflow would be directed to the tertiary sizer for further size reduction to minus 50 mm nominal. Raw coal discharged from the tertiary sizer would be directed onto the plant feed conveyor (Figure 2-14).

Until the CHPP is fully commissioned, raw coal discharged from the coal sizing and screening circuit would be conveyed and stacked in the product coal stockpile area for reclaim via the train load-out conveyor onto trains to market. Following commissioning of the Coal Preparation Circuit, bypassing to the product coal stockpile area would continue to be facilitated by diverting the coal through a bypass chute before directly transferring the raw coal onto the product conveyor.

2.5.2 Coal Preparation Circuit

The Coal Preparation Circuit would comprise a de-sliming unit and a single module of 1,100 tph capacity dense medium cyclones and spirals. A description of the operation of the Coal Preparation Circuit is provided below.

De-Sliming

Raw coal would be discharged from the plant feed conveyor into the de-sliming screen feed chute where it would be slurried with process water and fed directly onto a de-sliming screen. Slimes and water collected as underflow from the de-sliming screen (fine coal) would be pumped to the de-sliming cyclone feed sump (fine coal circuit). The de-slimed oversized fraction from the de-sliming screen (coarse coal) would be fed into a launder and flushed by dense medium into the dense medium cyclone feed sump (coarse coal circuit).

Coarse Coal

Mixed dense medium and coarse coal from the dense medium cyclone feed sump would be pumped into a dense medium cyclone. Product coal and dense medium would be directed onto the product drain and rinse screen. Magnetite would be added to the product drain and rinse screen as required to maintain the correct medium levels.

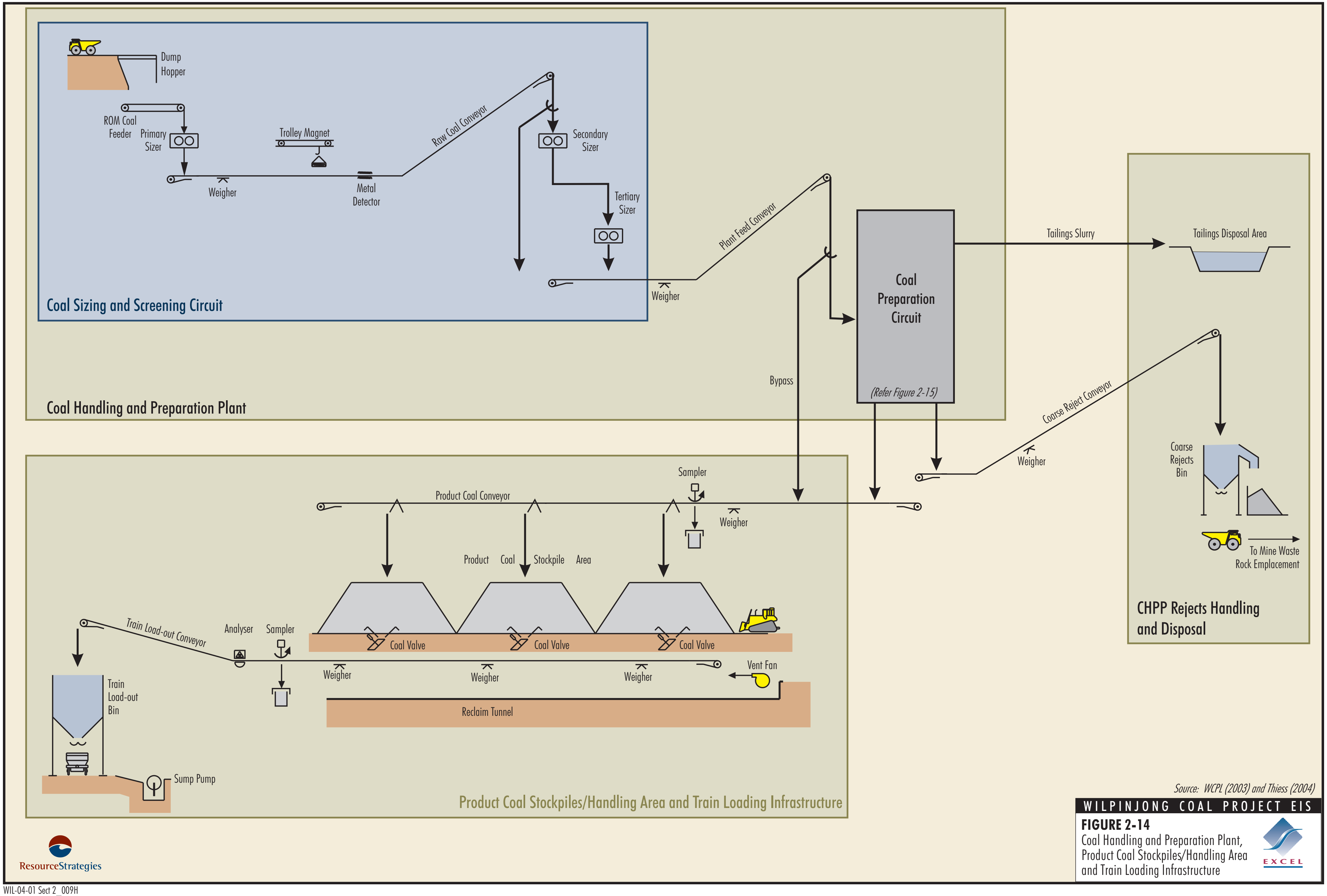

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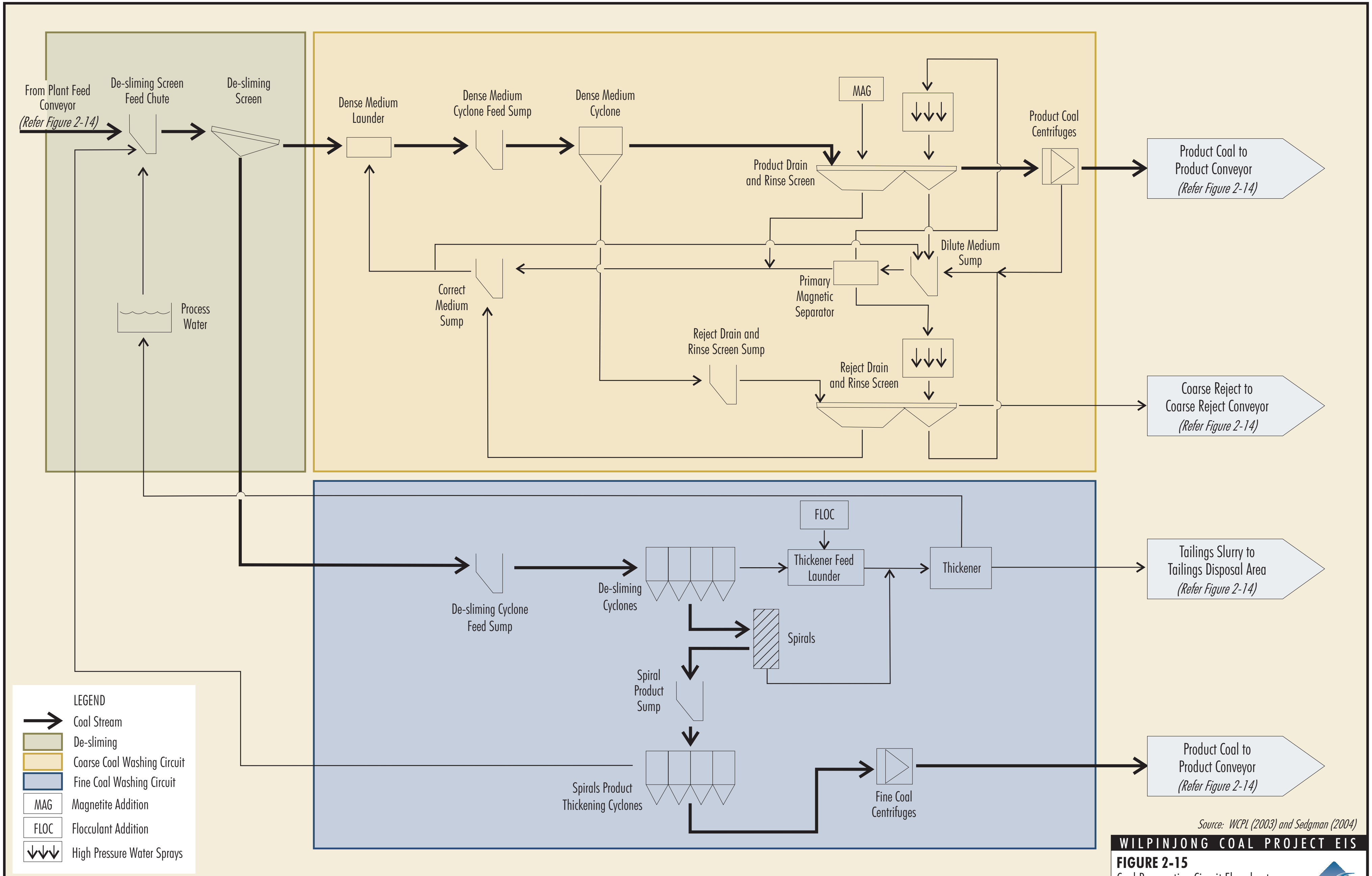
FIGURE 2-14
Coal Handling and Preparation Plant, Product Coal Stockpiles/Handling Area and Train Loading Infrastructure



Source: WCPL (2003) and Sedgman (2004)

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FIGURE 2-15
Coal Preparation Circuit Flowsheet

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Medium drained from the coal on the first section of the screen would be re-circulated to the correct medium sump. Adhering medium would be rinsed from the coal by high pressure water sprays on the final section of the screen before discharging into the product coal centrifuges. The centrifuges would discharge product coal directly onto the product conveyor.

Reject material and dense medium would underflow from the dense medium cyclone into the reject drain and rinse screen sump before being directed onto the reject drain and rinse screen. Medium drained from the reject material on the first section of the screen would be re-circulated to the correct medium sump. Adhering medium would be rinsed from the reject material by high pressure water sprays on the final section of the screen before discharging onto the reject conveyor.

Coarse rejects would be conveyed to a reject bin for removal by truck. An overflow chute on the reject bin would allow excess material to pass to an adjacent stockpile.

The product coal centrifuge effluent would drain to the dilute medium sump to enable recovery of any adhering medium (magnetite). The rinse from the product and reject drain and rinse screens would also drain directly to the dilute medium sump. Rinsed medium in the dilute medium sump would be combined with the correct medium, bleed and pumped to the primary magnetic separator.

Concentrate from the primary magnetic separator would gravitate directly towards to correct medium sump while the effluent would be used as rinse water on the reject drain and rinse screen.

Fine Coal

The fine coal reporting as de-sliming screen undersize into the de-sliming cyclone feed sump would be fed to the de-sliming cyclones. The cyclones would classify the fine coal feed, with the underflow gravitating to the fine coal spirals and overflow reporting directly to the tailings thickener.

Fine coal spirals would beneficiate the fine coal into rejects and fine product. The fine coal reject would flow by gravity to the thickener while the fine coal product would be laundered to the spiral product sump before being pumped to the spirals product thickening cyclones. The cyclone overflow would be re-circulated to the de-sliming screen feed chute to assist in the dilution of the raw coal prior to de-sliming.

The cyclone underflow would report to the fine coal centrifuges. The centrifuges would discharge product coal directly onto the product conveyor.

The de-sliming cyclone overflow would be directed to a tailings thickener. Flocculant would be added to the tailings thickener feed launder to assist settling of the tailings prior to discharging into the thickener. Clarified water would overflow the thickener for re-use as process water. Thickened tailings would be collected and raked to the centre of the thickener for pumping as slurry to the tailings disposal areas.

2.6 PRODUCT COAL STOCKPILING, RECLAIM AND TRAIN LOADING

Product coal would be conveyed to a skyline stack-out with diverter ploughs to push the product coal off the conveyor belt to the product coal stockpile area (Figure 2-14). Product coal would be reclaimed from the product coal stockpile area via the reclaim tunnel and train load-out conveyor which would deliver coal to a train load-out bin above the rail loop.

The product coal reclaim system would be able to blend coal from multiple reclaim points to achieve the required coal quality. The train loading infrastructure would be designed to load trains at a rate of 4,000 tph. Each train would therefore take approximately two hours to load.

2.7 COAL TRANSPORT

Product coal would be loaded on to nominal 8,500 t trains 24 hours a day, seven days per week via the train loading infrastructure, rail spur and rail loop. Product coal would then be transported by rail to either the Bayswater/Liddell rail unloader or the Port of Newcastle located approximately 155 km and 260 km from the Project rail spur, respectively (Figure 1-1).

Based on a 8,500 t capacity train, an average of four trains would be loaded each day. The maximum number of trains loaded per day would be six, based on a two hour loading period and a two hour clearance and arrival of a new train on the rail spur and rail loop. This would correspond to a maximum of 12 train movements in any one day (i.e. six arrivals and six departures).

WCPL does not propose to haul coal along public roads. All coal would be hauled on internal roads on WCPL-owned land and transported externally by rail.

2.8 MINE WASTE ROCK AND CHPP REJECTS/TAILINGS MANAGEMENT

The development of the Project open cut mine would result in the generation of waste rock, CHPP coarse rejects and CHPP tailings (including fine rejects and slimes). Management practices for these materials are described below. Geochemical characteristics are further described in Appendix C.

2.8.1 Overburden and Interburden/Parting Materials

Approximately 330 Mbcm of waste rock material would be generated during the life of the Project. Overburden and interburden/parting material would be removed to uncover the various plies of the Ulan Seam using open cut mining methods as described in Section 2.4.

Overburden and interburden/parting materials would typically comprise sandstone and claystones respectively. The overburden and interburden/parting materials are expected to be non-saline and non-acid forming (Appendix C). As such no special handling requirements for overburden are considered necessary (Appendix C).

Following the removal of topsoil and subsoil, a combination of “throw blast”, dozer push and truck/excavator operations would be employed to remove overburden to expose the underlying plies of the Ulan Seam. Except during the construction of the Cumbo Creek relocation corridor (Section 2.9.1) and initial development of the open cuts, overburden material would be placed adjacent to and behind the advancing open cut (Figure 2-12). Interburden/parting material would either be ripped by dozer and loaded onto haul trucks using an excavator for placement in-pit behind the advancing open cut, or ripped and pushed by dozer directly into the adjacent mined-out strip in the bottom of the pit (Figure 2-12).

Overburden material would also be placed along selected boundary areas of each open pit to act as a safety bund (i.e. to prevent accidental access). In some areas these bunds (once they are revegetated) would assist in reducing direct views to open cut workings from publicly accessible locations. These bunds would also assist in flood mitigation. Bunds would be constructed up to 5 m above the existing surface level and would remain as a permanent landscape feature or be integrated into the rehabilitated final landforms.

Native vegetation would be planted on the bunds to integrate with the vegetation character of the surrounding landscape setting.

The mine waste rock emplacements behind the advancing open cut would be constructed to approximate the pre-mining topography. Final landforms would be designed with an allowance for the long-term settlement of mine waste rock. Mine waste rock emplacements would be shaped by dozer prior to the commencement of rehabilitation activities (i.e. re-profiling, re-application of topsoil/subsoil and revegetation). Section 5.2 further describes these activities.

2.8.2 Coarse Rejects

Approximately 47 Mt of coarse reject material would be produced over the life of the Project. Coarse reject material would primarily comprise sandstone and claystones (predominantly as gravel and cobble sized fragments) and minor quantities of coal. The coarse reject material produced from the CHPP during the Project is expected to contain some sulphur and is likely to have some capacity for acid generation (Appendix C). The coarse reject material would be non-saline (Appendix C).

The coarse reject material would be hauled from the CHPP rejects bin back to the open cut voids for backfilling or placement with overburden.

To manage acid generation potential, coarse reject material would be dispersed throughout the overburden within the mine waste rock emplacements with the aim of producing a mix with a sulphur content that has an acid producing potential less than the acid neutralising capacity of the overburden. A blend ratio of at least 2:1 (overburden:coarse rejects) would be used (Appendix C). The total tonnage of coarse rejects produced over the life of the Project would be approximately one-seventh of the total mine waste rock produced therefore there would be scope to increase the blending ratio, if required.

Where possible, coarse rejects would not be placed within 5 m of the final landform surface so there is sufficient coverage by non-acid forming overburden to provide a barrier to oxygen movement through the rehabilitated profile (Appendix C).

2.8.3 Tailings

Approximately 24 Mt of tailings (dry weight) would be produced over the life of the Project. The tailings produced from the CHPP would consist of fine rejects and slimes from the thickener. Initially, tailings would be placed in a partitioned section of the CHPP water supply storage. Subsequently, tailings would be pumped as slurry to designated tailings disposal areas in the open cut voids from where supernatant waters would be recovered for re-use in the CHPP.

The tailings material produced from the CHPP during the Project is expected to contain some sulphur and is likely to have some capacity for acid generation (Appendix C). On the basis that the geochemical behaviour of tailings would reflect a composite blend of the various coal plies on a mass basis, Project tailings would be expected to be potential acid forming (low capacity) and be moderately saline (Appendix C).

Where practicable, tailings disposal areas would be saturated during the operational phase by maintaining a water cover. Where this is not practicable (e.g. for reasons of settling density and/or water recycling), the surface area of the tailings without a water cover would be kept to a minimum and managed so as they are periodically covered by fresh tailings to maintain saturation levels.

Once the tailings disposal areas are near-filled, they would be progressively capped with overburden material to a minimum depth of cover of 2 m prior to final profiling and rehabilitation.

Final landforms would be designed with an allowance for the long-term settlement of tailings.

2.9 WATER MANAGEMENT

The water management strategy for the Project is based on the containment and re-use of mine water as well as the control of sediment that may be potentially carried with runoff from disturbed areas (such as mine waste rock emplacements) prior to rehabilitation. The key components of the strategy are:

- Separation of undisturbed area runoff from disturbed area runoff by upslope diversions.
- Collection and re-use of surface runoff from disturbed areas.
- Capture and on-site containment of mine water, comprising groundwater inflows and incident rainfall-runoff to operational areas.
- Re-use of contained mine water for dust suppression over active surfaces (e.g. haul roads, mine waste rock emplacements).
- Recycling of mine water associated with the CHPP and tailings disposal areas.
- Consumption of contained waters in the Project water supply system.

The water management strategy for the Project is detailed in Appendix A. Details of the surface water and groundwater monitoring programmes to be undertaken for the Project are provided in Sections 5.1.3.6 and 5.1.3.7, respectively.

2.9.1 Water Management System

The Project water management system controls waters generated from construction/development and operational areas while diverting upstream water around such areas.

The water management system includes both permanent structures that would continue to operate post closure (e.g. the Cumbo Creek relocation) and temporary structures that would only be required until the completion of rehabilitation works (e.g. sediment control structures).

The water management system is shown in schematic form on Figure 2-16 and would be progressively developed as water management requirements change over time. A detailed description and assessment of the Project water management system under a range of simulated climatic sequences (based on historic rainfall data) is provided in Appendix A.

As discussed in Section 5.1.2.4, a Site Water Management Plan (SWMP) would be developed for the Project.

Upslope Diversion Works

Both temporary and permanent upslope diversion bunds/drains and temporary interception dams would be constructed over the life of the Project, so as to divert runoff from undisturbed areas around the open cut and mine waste rock emplacement areas to off-site drainages. Permanent upslope diversion bunds/drains would remain around the two final voids.

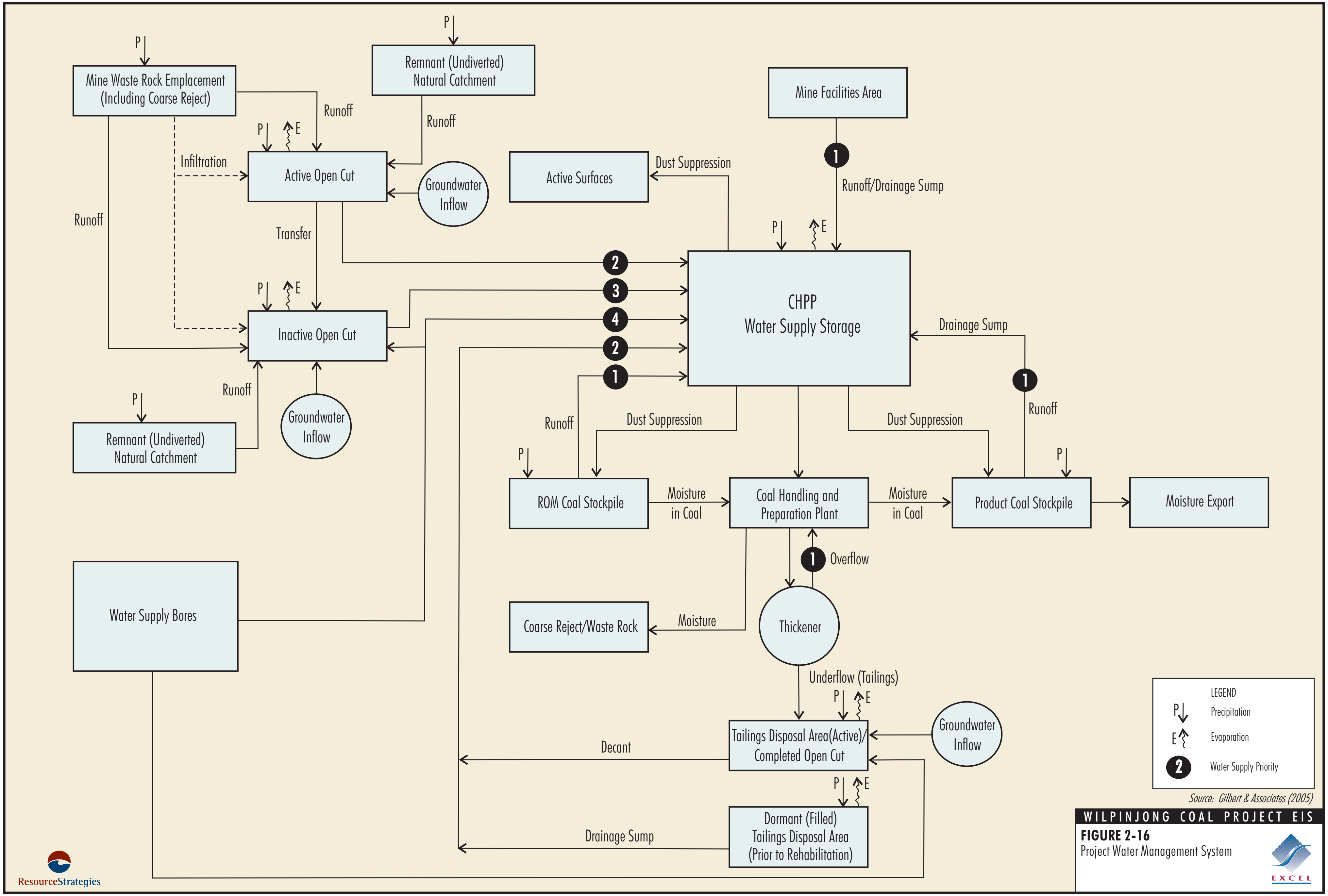

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FIGURE 2-16
Project Water Management System

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Toe drains and isolation bunds would be constructed around the perimeter of any temporary out-of-pit mine waste rock emplacements and other areas disturbed by mining to collect and convey drainage from these areas to containment storages.

Upslope diversion works would be designed in consultation with DIPNR. The design capacity of these upslope diversion works would depend on:

- the size of the upslope catchment;
- the design life of the upslope diversion; and
- the consequences of a breach.

Dependent on the above, the design capacity would range from the peak flow generated by the 1 in 2 year average recurrence interval (ARI) through to that generated by the 1 in 100 year ARI.

Upslope diversions would be designed to be stable (non-eroding) at the design flows. Stabilisation of the upslope diversion works would be achieved by design of appropriate channel cross-sections and gradients and the use of channel lining with grass or rockfill as required. The conceptual layout and extent of the proposed upslope diversion works is provided in Appendix A.

The Cumbo Creek relocation corridor would provide for the diversion of upslope runoff and flows in Cumbo Creek. Further details of the Cumbo Creek relocation works are provided separately below.

Floodplain Water Management

Flood bunds may be necessary along some sections of the down slope (northern) end of open cut voids to mitigate against inflows from major flooding in Wilpinjong Creek and backflow up tributary drainages (e.g. Cumbo Creek). Given that the open pit limits for the open cut mining operation are set-back from the Gulgong-Sandy Hollow railway embankment, any flood bunds would not impede active flood flows and would have negligible effect on floodplain storage in Wilpinjong Creek (Appendix A).

The required level of any flood bunds would be determined by a flood study prior to mining in the northern limit of Pit 1 to assess appropriate flood bund levels. A preliminary consideration of flood potential in Wilpinjong and Cumbo Creeks indicates that only limited flood mitigation works are likely to be necessary (Appendix A).

System Inflows

Groundwater inflows to the open cut would need to be removed to facilitate on-going safe and efficient mining. Groundwater inflows to the open cut are predicted to vary over the Project life (Appendix B). In some areas, advance dewatering via temporary bores may be used to minimise the rate of inflows to the open cut.

Water removed from active mine workings would be contained in one or more water supply storages for use in the CHPP and for dust suppression. The open cut workings would become sinks for incident rainfall, infiltration through mine waste rock emplacements and rainfall-runoff. Sumps would be excavated in the floor of the active open cut as part of routine mining operations to facilitate efficient dewatering operations and to minimise interruption to mining.

Surface runoff from mine waste rock emplacements (prior to rehabilitation) and supernatant water from tailings disposal areas would be intercepted and diverted to containment storages for re-use in the water management system.

Water Consumption

Water would be required to operate the CHPP, for washdown of mobile equipment, dust suppression on haul roads and for dust emission control sprays in the ROM and product coal stockpile areas. Some water would also be used for fire fighting and other minor non-potable water uses.

The CHPP water demand would vary in accordance with coal production. The demand for dust suppression would vary with climatic conditions and with the length of haul roads that would need to be watered. Potable water would be imported via tanker.

The water consumption requirements and water balance of the system would fluctuate with climatic conditions and as the extent of the mining operation changes over time.

Cumbo Creek Relocation

The Project would include the relocation of Cumbo Creek. Any works in close proximity to the existing creek alignment would be scheduled to coincide with drier periods so as to minimise the interruption of flows in Cumbo Creek. The relocation would comprise the construction of a block bank and sub-surface cut-off wall across Cumbo Creek upstream of Pit 4 to direct surface and sub-surface flows into a relocation corridor constructed adjacent to Cumbo Creek (Figure 2-7). The relocation corridor would be constructed in Year 8, once the underlying coal has been mined.

A typical section of the Cumbo Creek relocation corridor is shown on Figure 2-17. The corridor would comprise a low flow path within a high flow flood path. Alluvium from alluvial/colluvial deposits associated with the drainages within the open pit limits would be excavated as part of mining operations and relocated to the low flow path to provide natural creek bed material and help minimise erosion during high flow events. Below the relocated alluvium, the invert of the creek would be lined with an engineered low permeability zone (comprising more weathered mine waste rock selectively placed and compacted to engineering specifications) to reduce the potential for leakage of flows to the underlying mine waste rock emplacement. The low permeability zone would be supported on an engineered bridging/transition zone (comprising more weathered mine waste rock selectively placed and compacted as part of ROM operations). The bridging/transition zone would be supported by mine waste rock (ROM placed).

The relocation works would be subject to detailed geotechnical, hydrological and hydraulic design.

The low flow path would be designed to convey flows up to the 1 in 10 year peak flood discharge. Larger flows would be allowed to flow over the adjacent land surface (i.e. high flow flood path). Containment landforms would be formed on both sides of the high flow flood path to act as a flood levee between the Cumbo Creek relocation corridor and the mine workings to reduce the risk of flood water entering the mine area during the Project life.

The actual design flow capacity of the high flow flood path would be determined as part of detailed design studies using a risk analysis approach incorporating a comparative assessment of the integrity of the original and reconstructed creek under high flow conditions.

The corridor would be revegetated with native riparian vegetation to enhance stability during high flow events. The Cumbo Creek relocation corridor would be constructed 12 months prior to being commissioned to allow vegetation elements time to commence establishment and provide stability.

Based on the planned mining schedule, the Cumbo Creek relocation corridor would be constructed in Year 8. The detailed design of the corridor would be developed in the SWMP and Cumbo Creek Relocation Plan (CCRP) (Sections 5.1.2.4 and 5.1.2.6) in consultation with the relevant authorities, based on the principles and approach to be adopted as follows (Appendix A):

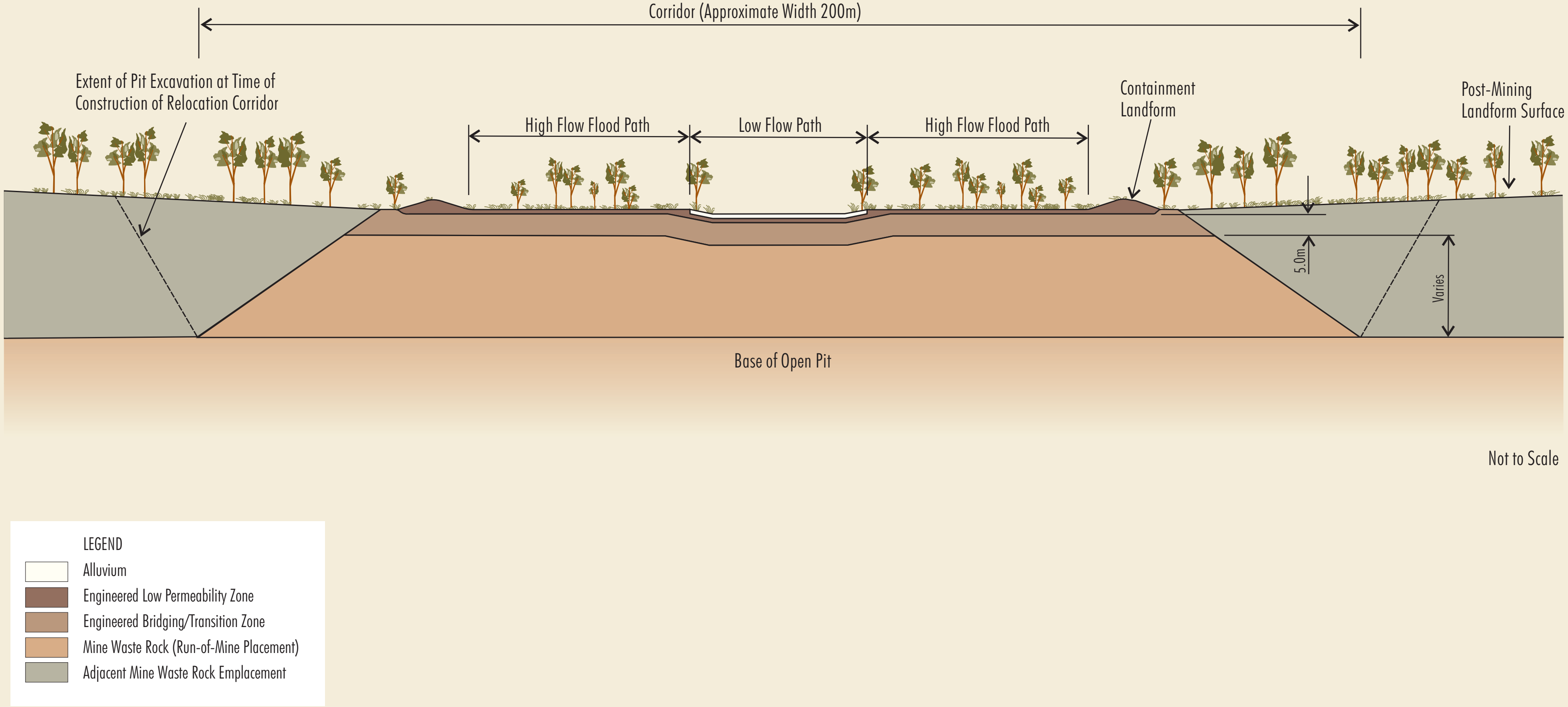
- Consideration would be given to the development of pools and riffle zones within the low flow path to provide for aquatic habitat.
- The alignment of the low flow path within the corridor would be designed to simulate the existing alignment of Cumbo Creek as far as practicable.
- The low flow path geometry and geomorphology would be developed such that flow velocities and boundary shear stresses developed under design flood flow conditions would be similar to those in the existing Cumbo Creek under similar flows and would not exceed critical values for long-term stability.

The approach for the detailed design of the Cumbo Creek relocation is provided in Appendix A.

Reconstructed Creek Features over Rehabilitated Landforms

A pattern of creek features (i.e. flow paths) would be formed over the rehabilitated landforms comparable to the pre-mine regime (i.e. in similar locations to the existing Planters, Spring, Narrow and Bens Creeks). These reconstructed creek features would convey upslope runoff across the Project area to Wilpinjong Creek.

Detailed design of the creek features would form part of the MOP (Section 5.1.1.1).



Source: Allan Watson Associates (2004)

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FIGURE 2-17
Cumbo Creek Relocation Corridor (Typical Section)

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2.9.2 Site Water Supply

The main water usage for the Project would be associated with the washing of ROM coal in the CHPP. Other water supply requirements include water for dust suppression on haul roads and other non-potable water uses. A small potable supply would also be required to service the construction camp and for drinking water and ablution facilities in the office and crib areas (Section 2.10.4).

The peak total make-up water demand including the operation of the CHPP at 8.5 Mtpa and accounting for recycling of water from the tailings thickener is estimated to be approximately 6.2 ML/day (Appendix A).

Where practicable, Project water supply would be prioritised as follows (Figure 2-16):

1. Recycling of water from the tailings thickener overflow. Capture of incident rainfall and runoff across the mining operational areas (i.e. CHPP, mine facilities area, ROM and product coal stockpile areas).
2. Recovery of supernatant waters and seepage collected from tailings disposal areas. Dewatering of active open cut mining areas including groundwater inflows, incident rainfall and infiltration/runoff from adjacent mine waste rock emplacements. Advance dewatering via temporary bores (Section 2.4.8).
3. Dewatering of inactive open cut mining areas including groundwater inflows, incident rainfall and infiltration/runoff from adjacent mine waste rock emplacements.
4. Licensed groundwater extractions from Project water supply borefield to the north of the open cut mining operations.

The majority of the Project make-up water supply requirements would be met by dewatering of the open cut mining areas and the Project water supply borefield. Mine water would be suitable for use in the CHPP and for dust suppression purposes (Appendix A). The groundwater quality in the Ulan Seam aquifer (Appendix B) is considered suitable for use in the CHPP. Further details of the Project water supply borefield are provided in Section 2.9.3.

A predictive assessment of the performance of the Project water supply system is presented in Appendix A. The simulated water supply reliability[1] is 95% (Appendix A). The predictive assessment indicates that from Year 11 of the Project there is unlikely to be a need to source water from the Project water supply borefield, with demand being met by mine water sources alone (i.e. Project water supply priorities 1, 2 and 3 described above).

2.9.3 Project Water Supply Borefield

A series of up to 19 production bores would be installed to the north of the open cut operations (Figure 2-3) as part of the Project water supply system. The production bores would operate at between approximately 1 litre per second (L/s) and 3 L/s to extract groundwater from the Ulan Seam and underlying Marrangaroo Sandstone using electric submersible pumps. An electricity spurline from the existing 11 kV electricity transmission line would supply electricity to the borefield.

The Project borefield would be developed and commissioned during Year 1 of the Project life. A WSBP (Section 5.1.2.5) would be developed in consultation with relevant authorities and would include the expected annual groundwater extractions from individual bores.

2.10 INFRASTRUCTURE AND SERVICES

2.10.1 Mine Facilities Area

The mine facilities area would be constructed on a hardstand located within an area that does not contain recoverable coal to the south-east of the Project rail loop. The mine facilities area would contain a workshop, storage building, office buildings (including a crib shed, bathhouse and first aid room), muster area and a range of service facilities (i.e. potable water, sewerage, electricity, fire services and hydrocarbon management). Car parking areas in the mine facilities area would be sealed.

1 Expressed as a volume of water supplied divided by volume required.

2.10.2 Internal Access Roads and Haul Roads

Following the initial construction activities as described in Section 2.3, access to the Project would be provided via a mine access road connecting the mine facilities area to Wollar Road.

Existing public roads within the vicinity of the Project area including Bungulla Road and Wilpinjong Road would be closed for public access. Internal access roads would be progressively constructed as required as the mine progresses.

The Project would require the progressive construction of internal haul roads between the open cut operations, mine waste rock emplacements and ROM coal stockpiles. Haul roads would be regularly watered to minimise dust generation potential.

2.10.3 Electricity Supply and Distribution

The estimated maximum power supply requirement for the Project when the CHPP is fully operational is 9 MVA, requiring a 66 kV supply system. Development of a 66 kV power supply to the Project is subject to separate approvals.

Until such time as the 66 kV power supply is commissioned, the Project power demand would be met by using the existing 11 kV supply system, supplemented with on-site diesel generator-sets when required. Power would be transferred either by overhead cable or underground cable where necessary. Standard electrical safety laws and practices (including vehicle clearance considerations) would apply.

2.10.4 Potable Water

Potable water would be provided by a 35,000 litres (L) storage tank which would be located in the mine facilities area. Potable water would be provided from town water supply delivered by tanker truck. A potable water supply reticulation system would service the appropriate areas around the site (e.g. office buildings, crib rooms and maintenance areas).

2.10.5 Communications

Two communications systems would be required for the Project including:

- fixed telephone providing both outside call and office intercom capability; and
- a dedicated frequency two-way mobile radio system to maintain contact with personnel during operations and/or mobile phones.

Data communications would be facilitated by a broadband connection service via the fixed telecommunication lines.

2.11 MANAGEMENT OF CHEMICALS AND WASTES

2.11.1 Dangerous Goods

Transportation

Hazardous reagents and explosives required for the Project would be transported in accordance with the appropriate regulations under the *Road and Rail Transport (Dangerous Goods) Act, 1997*. These regulations apply versions of the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG Code) (DTRS, 2000).

Handling and Storage

Hydrocarbon Storages

Hydrocarbons used on-site for the Project would include fuels (i.e. diesel and petrol), oils, greases, degreaser and kerosene.

Diesel and petrol usage would be approximately 13 ML and 10,000 L respectively per annum. A fuel dispensing facility would be installed with a 20,000 L diesel storage capacity. An oil storage facility would also be installed comprising of 1,000 L oil storage pods with dispensing pumps and flow meters. Hydrocarbon storage facilities would be designed, located, constructed and operated in accordance with Australian Standard (AS) 1940-1993 *The Storage and Handling of Flammable and Combustible Liquids*.

Waste hydrocarbons would be collected, stored and removed by licensed waste transporters on a periodic basis. Workshop hydrocarbon spills and leaks, and truck washdown areas would be contained by purpose built oil/water separator systems which would be inspected and maintained on a regular basis.

Explosives Storages

Explosives required for the Project would include initiating products and detonators, ANFO and emulsion explosives. The explosives would be used in accordance with AS 2187.2-1993 *Explosives – Storage, Transport and Use – Use of Explosives*. AS 2187.2-1993 details the requirements for the safe storage, handling and land transport of explosives, safe storage distances from other activities and bunding requirements.

The explosives magazine would be initially located in the west of the Project area as shown on Figure 2-4. As mining progresses into Pits 5 and 6 later in the Project life, the explosives magazine would be relocated to another appropriate location in the Project area (Figure 2-11).

Materials Safety Data Sheets and Chemical Storages

No chemical or hazardous material would be permitted on-site unless a copy of the appropriate Material Safety Data Sheet (MSDS) is available on-site, or in the case of a new product, it is accompanied by a MSDS.

All chemicals brought on-site for use in the mining operations would be recorded in an inventory register which would identify the type of product, dangerous goods class, liquid class, hazchem class and the quantity held on-site. The inventory register would also identify the compatibility of materials and the emergency response procedures in the event of a spill.

Chemical storages would be provided within the workshop and storage buildings and would be separated according to chemical type and storage requirements.

2.11.2 Liquid and Non-Liquid Wastes

Liquid and Non-liquid wastes, as defined in the *Environmental Guidelines, Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (EPA, 2004) that would be generated by the Project including the quantity and type are provided in Table 2-4.

Section 1 Part 1 of the *Protection of the Environment Operations Act, 1997* states:

> ***Waste Facilities***
>
> *…*
>
> *(3) The following premises are not waste facilities for the purposes of this item:*
>
> *….*
>
> *(e) mines referred to in this Part where the only waste disposed of is tailings, waste rock or inert waste generated on the mine …*

Section 3.3.1 of the *Environmental Guidelines, Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (EPA, 2004) also states:

> ***3. Water containing larger quantities of nutrients.***
>
> *Waste water satisfying the definition of 'effluent', which 'means:*
>
> *(a) waste water from sewage collection or treatment plants …*
>
> *is not considered as a 'waste' when determining whether a 'waste facility' license is required for the irrigation (disposal to land) of these liquids.*

All solid and hazardous waste generated by the Project would be removed from site and disposed of by a licensed contractor. As such, the Project site would not be a "waste facility" under the *Protection of the Environment Operations Act, 1997.*

2.11.3 Recyclable and Non-Recyclable Domestic Waste

Recyclable and non-recyclable domestic waste from office buildings and workforce areas would be collected regularly and managed by waste disposal contractors. A register of waste collected by contractors for disposal would be maintained. Where licensed contractors handle waste, those contractors would be required to comply with their own license agreements with the DEC. Waste would be disposed of at a DEC approved waste facility that is licensed under the *Protection of the Environment Operations Act, 1997*.

Table 2-4
Liquid and Non-Liquid Wastes Generated by the Project

Waste	Waste Type[1]	Quantity of Wastes for Disposal	Management Method
Non-Liquid			
Virgin excavated material that does not contain sulphidic ores (i.e. mine waste rock including overburden, interburden and coarse rejects)	Inert	330 Mbcm (overburden/interburden) 47 Mt (coarse rejects)	Refer Sections 2.8.1 and 2.8.2.
Building and demolition wastes (except asbestos wastes), asphalt wastes and tyres	Inert	As required	Disposed of on-site (i.e. mine waste rock emplacements).
Biosolids (i.e. sewage)	Inert	As required	Disposed of on-site (i.e. tailings disposal areas).
Workshop wastes (i.e. oil filters, rags, oil absorbent material)	Solid	As required	Stored in dedicated bins. Removed from site and disposed of by a licensed contractor.
Dangerous goods (i.e. hydrocarbon wastes)	Hazardous	As required	Refer Section 2.11.1.
Food waste	Solid	As required	Refer Section 2.11.3.
Office and packaging waste	Inert	As required	Refer Section 2.11.3.
Liquid			
Tailings (fine rejects and slimes)	Non-controlled Aqueous Liquid	24 Mt (dry basis)	Refer Section 2.8.3.
Sewage effluent	-	As required	Refer Section 2.11.4.

[1] Classified in accordance with Schedule 1 Part 3 of the *Protection of the Environment Operations Act, 1997.*

2.11.4 Sewage Treatment and Effluent Disposal

Sewage would be treated in an on-site sewage treatment plant. The sewage treatment plant would be designed and installed in accordance with the requirements of the MWRC and DEC. Treated wastewater would be irrigated on vegetated and garden areas around the mine facilities area and conform to the draft *Environmental Guideline for the Utilisation of Treated Effluent* (DEC, 1995).

2.12 WORKFORCE

2.12.1 Construction

It is anticipated that up to 250 people (with an average of approximately 200 people) would be employed during the initial construction phase (i.e. Year 1) of the Project.

Nominal shift times for construction staff would be between 7.00 am to 6.00 pm up to seven days per week.

2.12.2 Operations

Upon the commencement of mining in Year 1 up to 84 people would be employed. In the order of 162 people would be employed at peak production including a mixture of direct WCPL employees and contractors. The Project would operate 24 hours per day, seven days per week.

Nominal shift start and finish times during mining operations would be as follows:

- Administration Personnel – 7.00 am to 5.00 pm weekdays.
- Open Cut (Day) Personnel – 6.30 am to 7.00 pm.
- Open Cut (Night) Personnel – 6.30 pm to 7.00 am.