Vickery Coal Project

Environmental Impact Statement

SECTION 2

PROJECT DESCRIPTION

Resource Strategies

WHITEHAVEN COAL

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2 PROJECT DESCRIPTION

2.1 PROJECT AREA

As described in Section 1.1.2, open cut and underground mining activities were conducted in the Project area during the 1980s and 1990s. Three historical open cut areas (i.e. Shannon Hill, Blue Vale and Greenwood) and one underground mining area (i.e. Red Hill) associated with the historical Vickery Coal Mine are located within CL 316 (Figure 2-1). The three open cut areas have been rehabilitated with ground cover suitable for grazing and areas of woodland vegetation on the steeper slopes of the mining landforms.

The final voids associated with the Shannon Hill and Blue Vale open cuts do not hold water for any significant period following rainfall as the elevations of the voids are higher than the water table in the area. The Greenwood open cut final void does hold water as the base of the open cut is located at approximately 240 metres (m) Australian Height Datum (AHD) which is approximately 40 m lower than the pre-mining landscape (Figure 2-1). Waste emplacements associated with these open cuts have heights up to approximately 305 m AHD.

The Canyon Coal Mine is located within ML 1471 and ceased operations in 2009. It is currently in care and maintenance. The Canyon Coal Mine final landform includes a final void along the southern extent of ML 1471, and a rehabilitated waste emplacement (Figure 2-1). The final void contains a pit lake approximately 25 m below the surrounding ground level. The waste emplacement has a maximum height of approximately 285 m AHD, which is approximately 35 m above the surrounding ground level.

Some of the infrastructure associated with the historical mining activities at the Vickery Coal Mine has been retained on-site and is currently used as a Project office, workshop and truck parking area for the Whitehaven coal haulage contractor which transports coal from the Tarrawonga and Rocglen Coal Mines to the Whitehaven CHPP (shown as the existing infrastructure area on Figure 2-1). This existing infrastructure area is accessed off Braymont Road and is serviced by an existing ETL and groundwater supply bore.

A number of sealed and unsealed local roads, residential dwellings, ephemeral watercourses, farm dams and the Namoi River are located in the vicinity of the Project (Figure 2-1).

2.2 COAL RESOURCE, GEOLOGICAL FEATURES AND EXPLORATION ACTIVITIES

The Project is located in the Gunnedah Basin, in the NSW Gunnedah Coalfield, which contains sedimentary rocks, including coal measures of Permian and Triassic age. Regionally, there are two coal-bearing sequences in the Gunnedah Basin, namely:

- Early Permian Bellata Group (comprising the Maules Creek sub-basin and Mullaley sub-basin, separated by the Boggabri Ridge); and
- Late Permian Black Jack Group.

The Project coal resource is located within the Maules Creek sub-basin of the Early Permian Bellata Group. The target coal seams are contained within the Maules Creek Formation. The Maules Creek Formation is the primary coal bearing unit and consists of conglomerate, coal, lithic sandstone and mudstones.

Below the Maules Creek Formation are the Goonbri and Leard Formations, which are basal units of the Gunnedah Basin sedimentary sequence and unconformably overlie the Boggabri Volcanics. The Goonbri Formation typically contains pyritic sandstone, siltstone and inferior coal seams.

Figure 2-2 presents the indicative stratigraphy of the Project area including the target coal seams within the open cut extent, as follows:

- Gundawarra Seam;
- Welkeree Seam;
- Kurrumbede Seam;
- Shannon Harbour (upper and lower seams);
- Stratford Seam;
- Bluevale (upper and lower seams); and
- Cranleigh (upper, middle and lower seams).

Individual coal seams range in thickness from approximately 0.5 m to greater than 3 m. The coal reserve for the Project, based on the planned maximum production rate, is approximately 135 Mt of ROM coal. ROM coal generated at the Project would be processed to produce a semi-soft coking coal, a PCI coal and thermal coal product for export market.

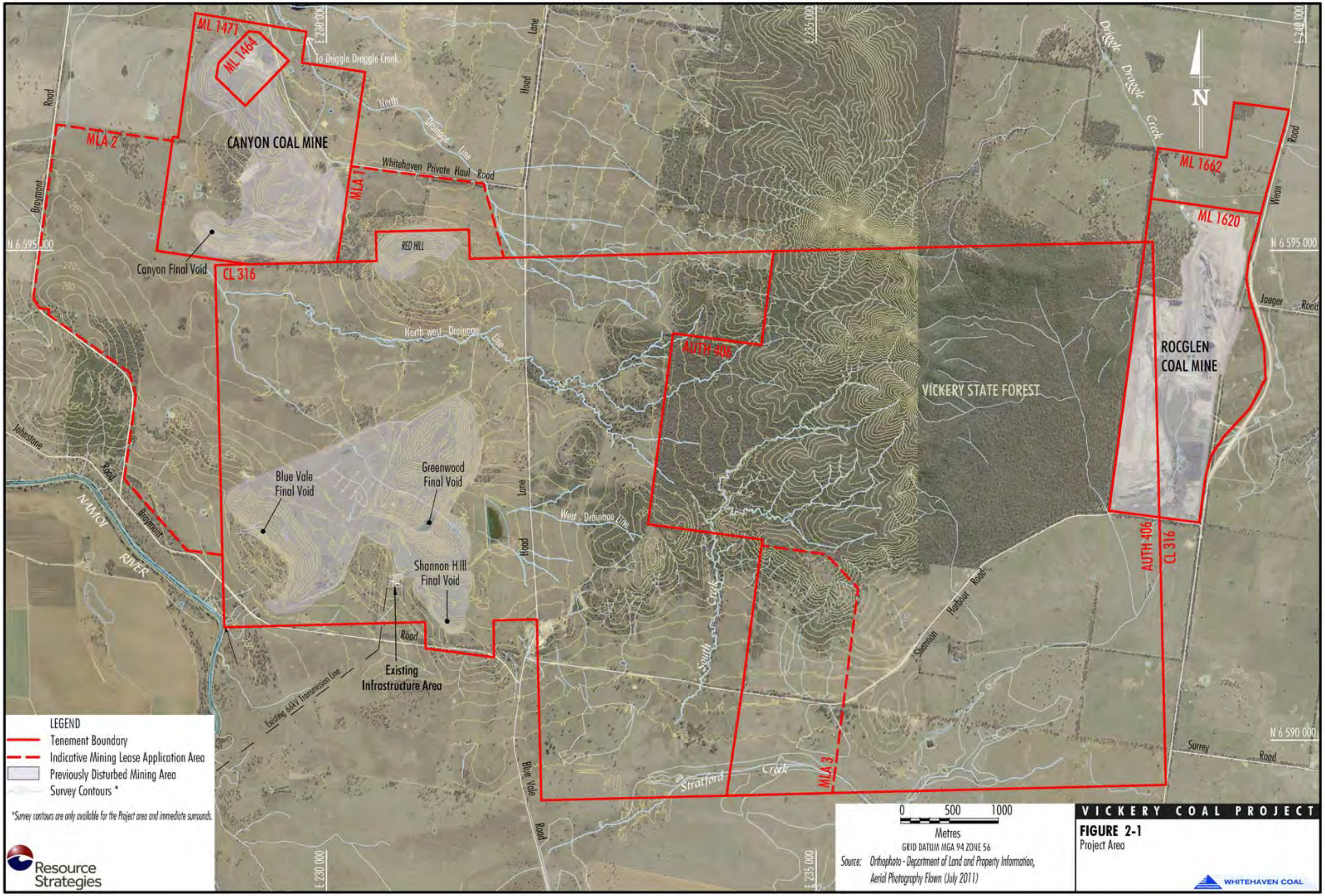

FIGURE 2-1
Project Area

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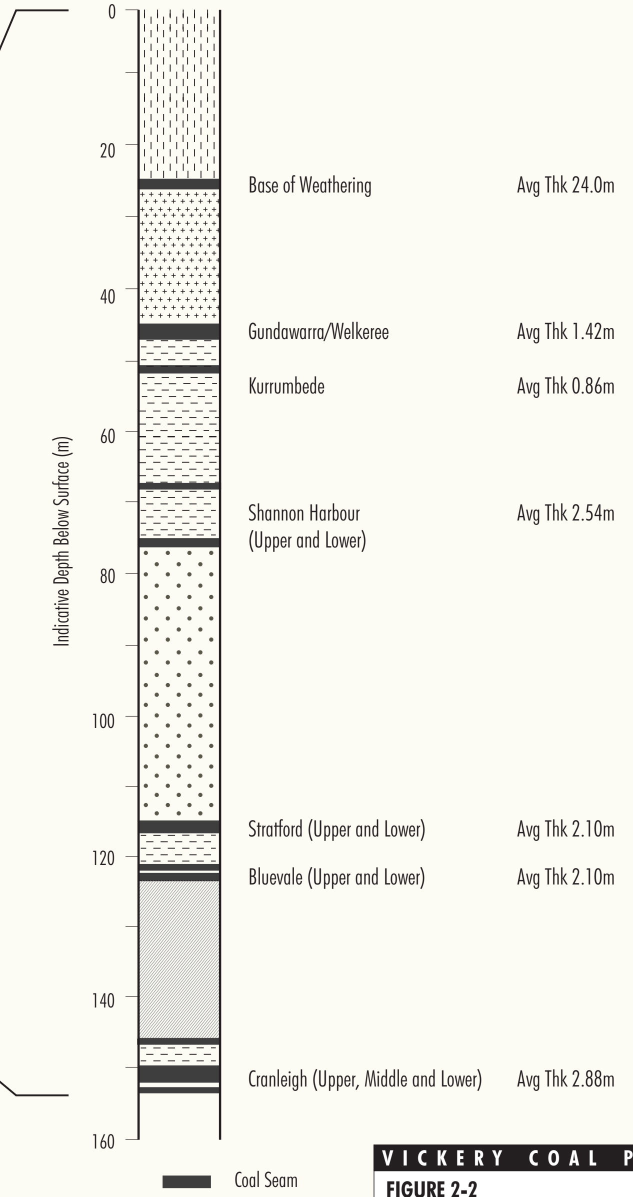
BASIN	PERIOD		GROUP/FORMATION	
GUNNEDAH	TRIASSIC	MIDDLE	Napperby Formation	
		EARLY	Digby Formation	
	PERMIAN	LATE	Black Jack Group	
		EARLY	Millie Group	
			Bellata Group	Maules Creek Formation
				Goonbri Formation
				Leard Formation
			Boggabri Volcanics	



Source: Engenicom (2012) and NSW Industry and Investment (2011)

VICKERY COAL PROJECT

FIGURE 2-2
Indicative Stratigraphy of the Project Area

Resource Strategies

WHITEHAVEN COAL

Two major fault structures are located in the Project region, namely the Boggabri Thrust (to the west of the Project) and the Mooki Thrust (to the east of the Project). The Boggabri Thrust is a north-west south-east trending structure which begins approximately 5 km west of the Project and continues to the south-east aligned with the Namoi River. The Mooki Thrust is a generally north-south trending structure which lies between the Rocky Creek Formation in the east and the Maules Creek Formation in the west.

There are many minor faults with generally north-south and east-west alignments across the Project area, including:

- Belmont Fault;
- Roseberry Fault;
- Woodlands Fault;
- Karu Fault;
- Whitehaven Fault System;
- Womboola Fault;
- Shannon Hill Fault; and
- Coalworks Fault.

Further description of the local geology and geological features in the vicinity of the Project is provided in Appendix A (Groundwater Assessment).

During the life of the Project, mine exploration activities would continue to be undertaken in the Development Application area. These activities would occur within, and external to, the open cut footprint and would be used to investigate aspects such as geological features, seam structure and coal/overburden characteristics as input to detailed mine planning and feasibility studies.

2.3 PROJECT GENERAL ARRANGEMENT

The main activities associated with the development of the Project are listed below:

- Development and operation of an open cut coal mine within CL 316, AUTH 406, ML 1471, MLA 1, MLA 2 and MLA 3.
- Use of conventional mining equipment, haul trucks and excavators to remove up to 4.5 Mtpa of ROM coal and approximately 48 Mbcm of waste rock per annum from the planned open cut.
- Placement of waste rock (i.e. overburden and interburden/partings) within external emplacements to the west and east of the planned open cut (i.e. Western Emplacement and Eastern Emplacement) and within mined-out voids.
- Construction and use of a MIA, including on-site coal crushing, screening and handling facilities to produce sized ROM coal, workshops, offices and services.
- Transport of ROM coal by haulage trucks to the Whitehaven CHPP on the outskirts of Gunnedah (approximately 20 km to the south of the Project open cut) for processing.
- Use of an on-site mobile crusher for coal crushing and screening of up to 150,000 t of domestic specification coal per annum for direct collection by customers at the Project site.
- Use an on-site mobile crusher to produce up to approximately 90,000 m^3 of gravel materials per annum for direct collection by customers at the Project site.
- Construction and use of a water supply bore, and a surface water extraction point on the bank of the Namoi River and associated pump and pipeline systems.
- Construction and use of new dams, sediment basins, channels, dewatering bores and other water management infrastructure required to operate the mine.
- Construction and use of new soil stockpile areas, laydown areas and gravel/borrow areas.
- Construction of a 66 kV/11 kV electricity substation and 11 kV ETL.
- Transport of coarse rejects generated within the Whitehaven CHPP via truck to the Project for emplacement within an in-pit emplacement area.
- Transport of tailings (i.e. fine rejects) generated within the Whitehaven CHPP via truck to the Project for emplacement within co-disposal storage areas in the open cut and/or disposal in existing off-site licensed facilities (e.g. the Brickworks Pit).
- Realignment of sections of Blue Vale Road, Shannon Harbour Road and Hoad Lane to the east and south of the open cut.
- Realignment of the southern extent of Braymont Road to the south of the open cut.

- Construction of an approximately 1 km long section of private haul road (including an overpass over the Kamilaroi Highway) between Blue Vale Road and the Whitehaven CHPP (referred to as the private haul road and Kamilaroi Highway overpass).
- Ongoing exploration, monitoring and rehabilitation activities.
- Construction and use of other associated infrastructure, equipment and mine service facilities.

Figures 2-3a and 2-3b show the maximum extent of the main Project components overlaid on recent aerial photographs.

The proposed life of the Project is 30 years. Project general arrangements for Years 2, 7, 17 and 26 are shown on Figures 2-4 to 2-7, respectively. These general arrangements are based on planned maximum production and mine progression. The mining layout and sequence shown on Figures 2-4 to 2-7 may be adjusted during the mine life to take account of localised geological features, coal market volume and quality requirements, mining economics and Project detailed engineering design.

The detailed mining sequence over any given period would be documented in the relevant Mining, Rehabilitation and Environmental Management Plan (MREMP) or Mining Operations Plan (MOP) as required by the NSW Division of Resources and Energy (DRE) (within the NSW Department of Trade and Investment, Regional Infrastructure and Services [DTIRIS]).

At the completion of Project mining activities, infrastructure would be decommissioned and final landform earthworks and revegetation would be undertaken over a period of approximately 1 to 2 years. The final landform and rehabilitation concept for the end of the Project life and progressive rehabilitation is described in Section 5.

2.4 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:

- the mine access road and Blue Vale Road realignment;
- the MIA;
- the private haul road and Kamilaroi Highway overpass;
- the north-west drainage line diversion; and
- water and electricity supply infrastructure.

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:

- construction of temporary water management infrastructure (e.g. sediment and storage dams and temporary diversions) (Section 2.9.1);
- realignment of Braymont Road (Section 2.10.2); and
- construction of internal access roads and haul roads (Section 2.10.3).

2.4.1 Public Road Realignments

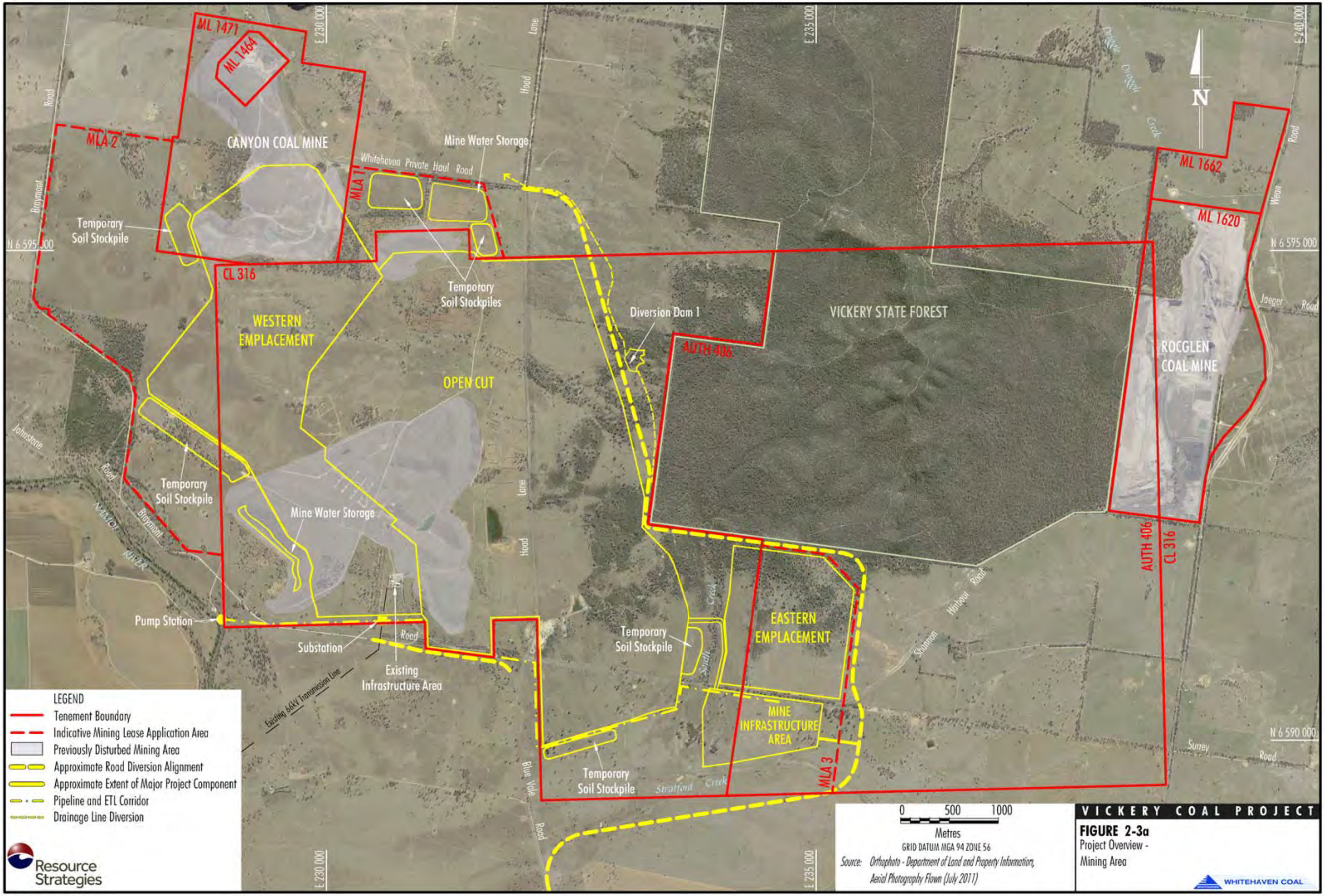
The Project would require realignment of sections of Blue Vale Road, Shannon Harbour Road and Hoad Lane where they are located within the Project disturbance area. The Blue Vale Road realignment would be constructed adjacent to the western and southern boundaries of the Vickery State Forest, and around the Eastern Emplacement and MIA to allow continued public access around the Project (Figure 2-4).

The Blue Vale Road realignment would consist of a sealed two-lane road with approximately 3.5 m wide lanes and 1 m sealed shoulders providing a 9 m carriageway.

The Blue Vale Road realignment would generally follow the existing topography, in the section to the south of the open cut and to the west of the Vickery State Forest, whereas up to 10 m of cut and fill may be required in some areas where the alignment follows the northern extent of the Eastern Emplacement. Appropriately sized culverts would be installed where the road crosses drainage lines.

Construction of the Blue Vale Road realignment would be undertaken in two stages during the initial construction of the Project. Staged construction would include:

- construction of a 3.8 km sealed two-lane road realignment around the southern extent of the open cut and the MIA, connecting Blue Vale Road from the south to Shannon Harbour Road east of the MIA; and



VICKERY COAL PROJECT

FIGURE 2-3a
Project Overview - Mining Area

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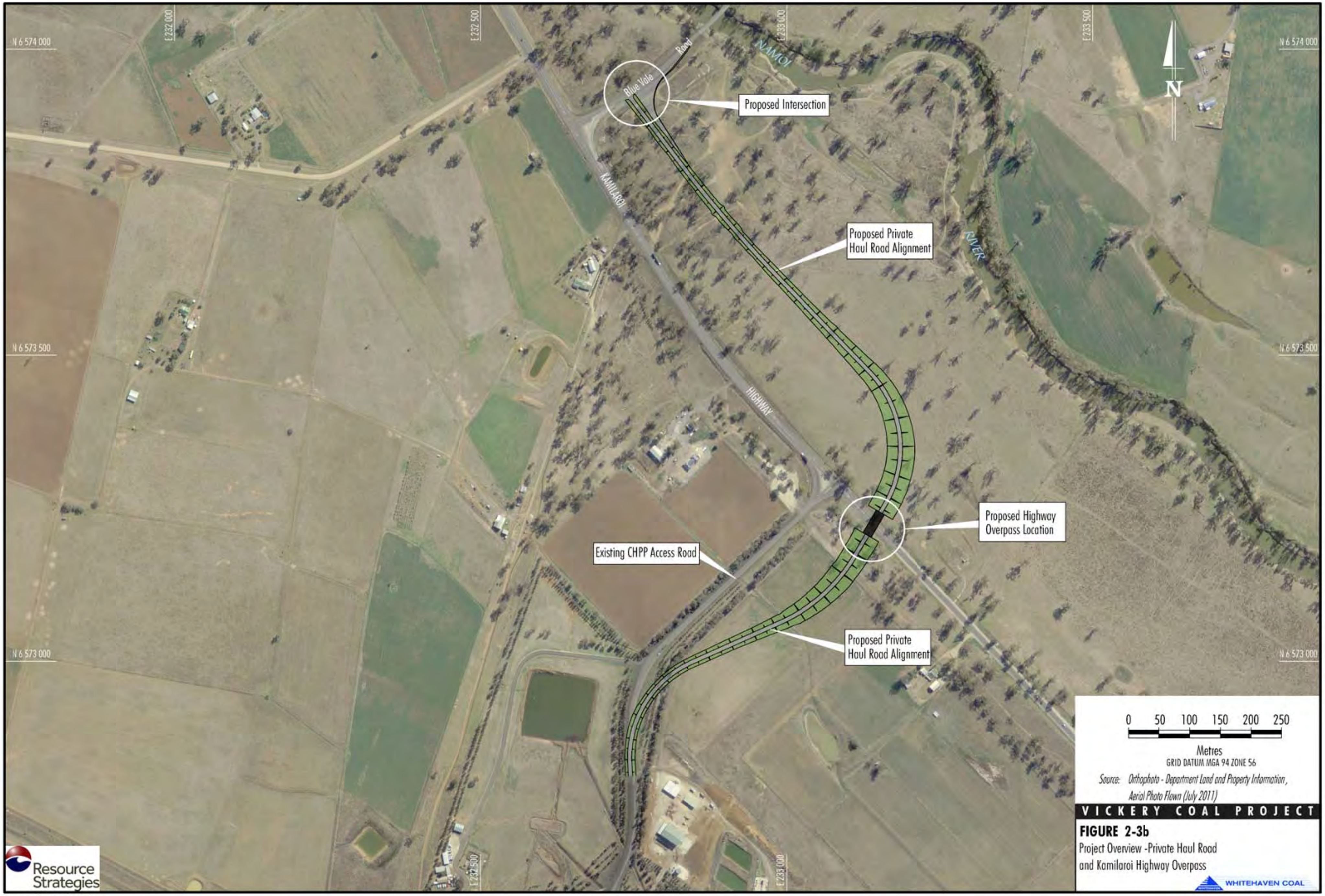

VICKERY COAL PROJECT

FIGURE 2-3b

Project Overview -Private Haul Road and Kamilaroi Highway Overpass

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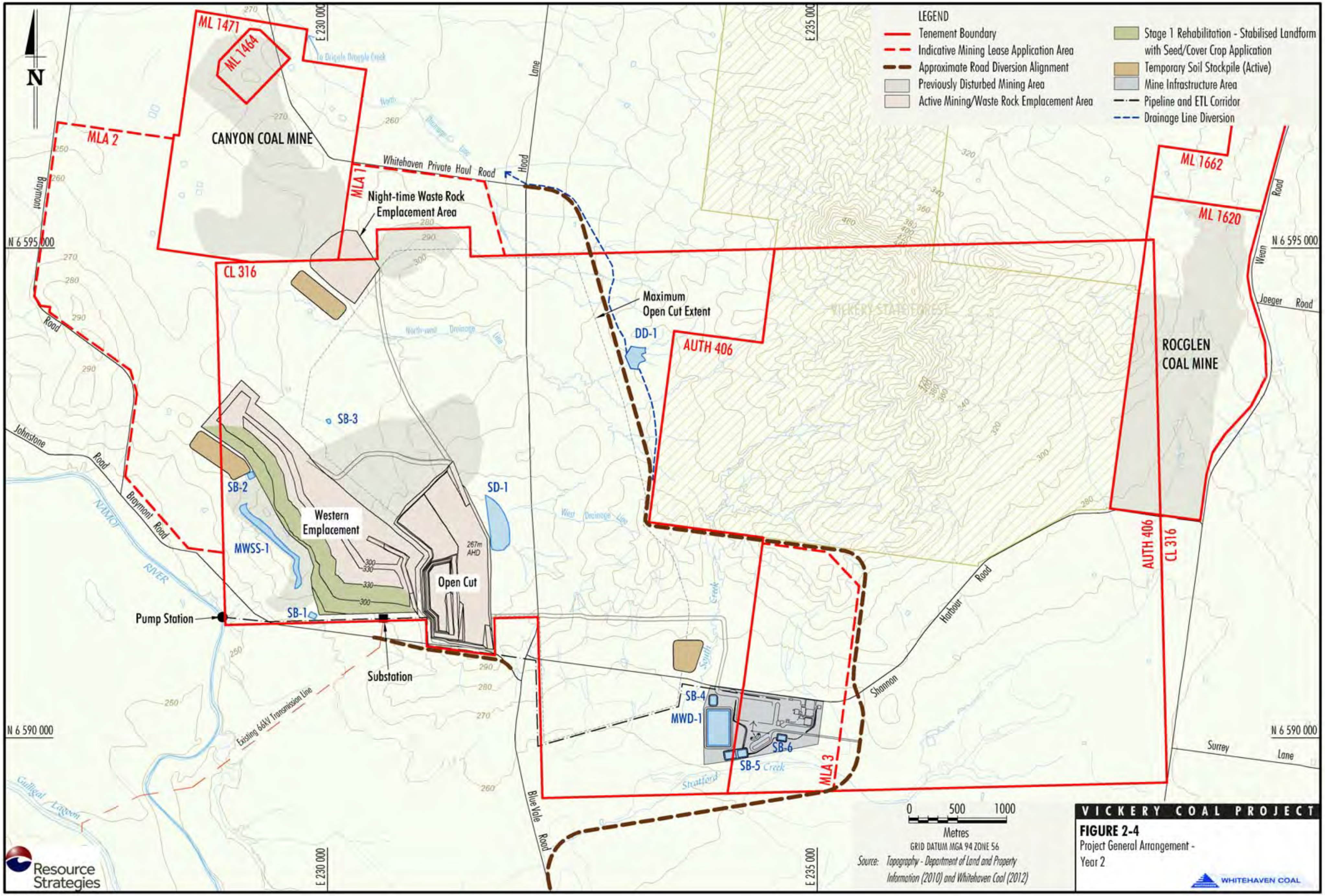

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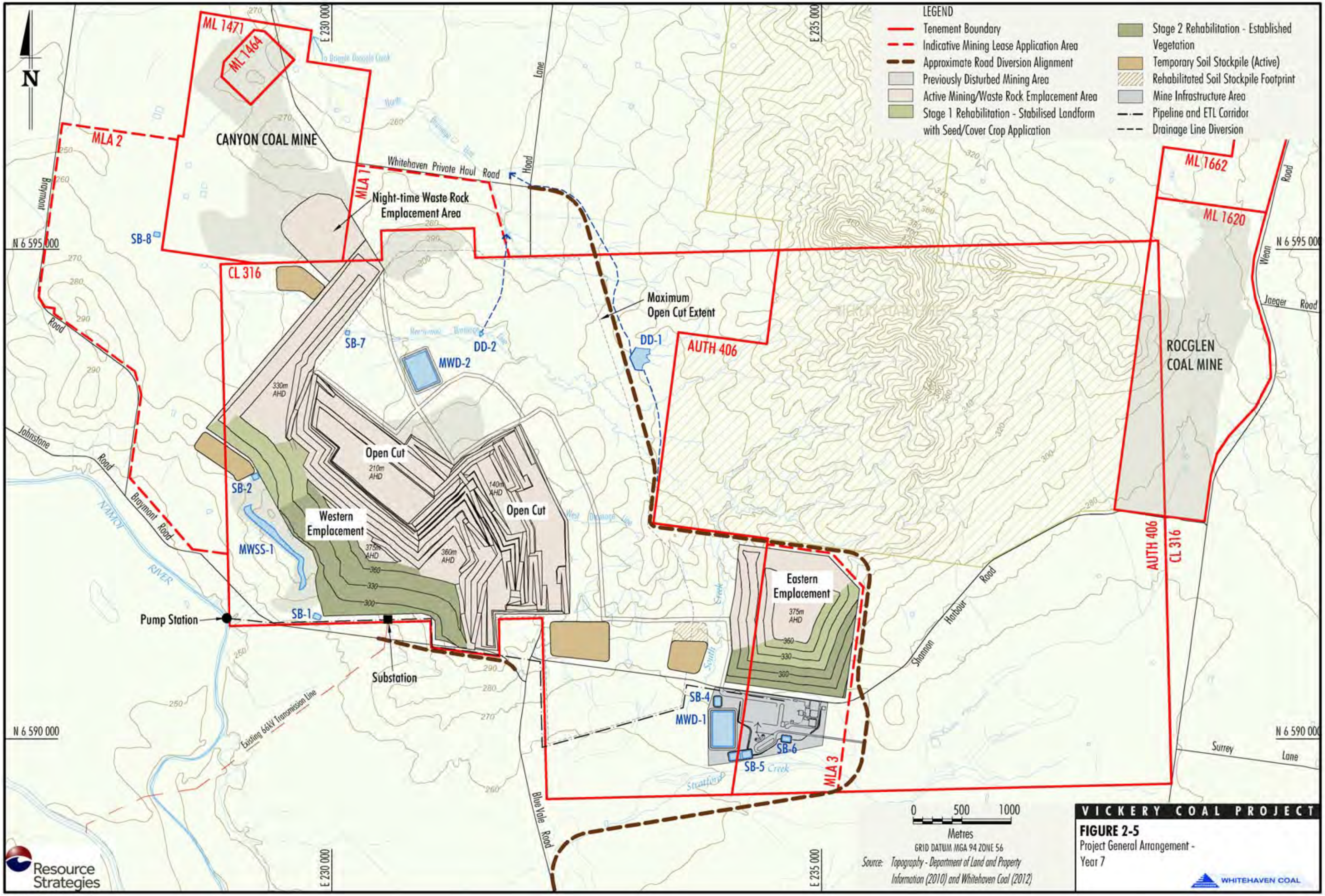

VICKERY COAL PROJECT

FIGURE 2-5

Project General Arrangement - Year 7

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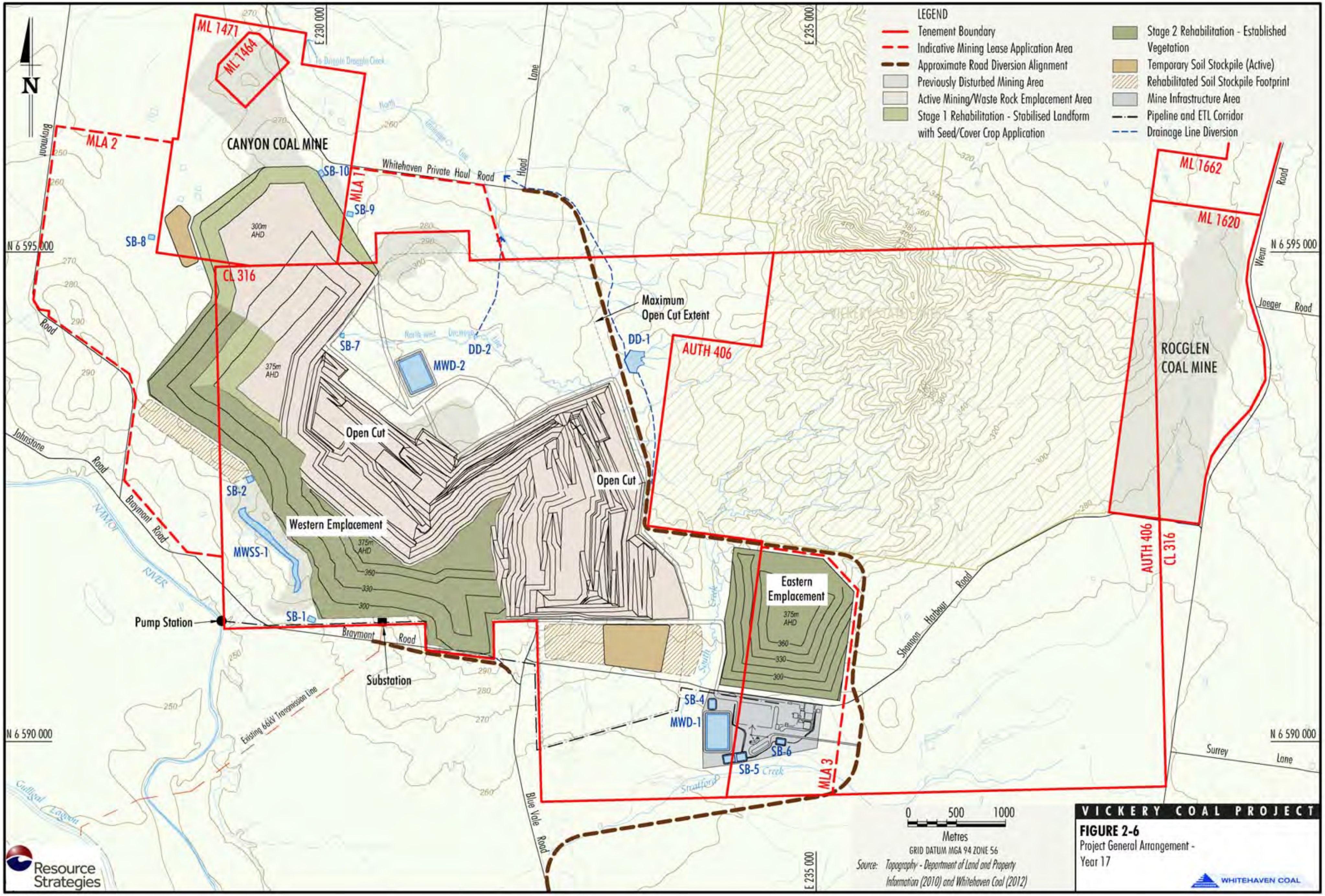

FIGURE 2-6
Project General Arrangement - Year 17

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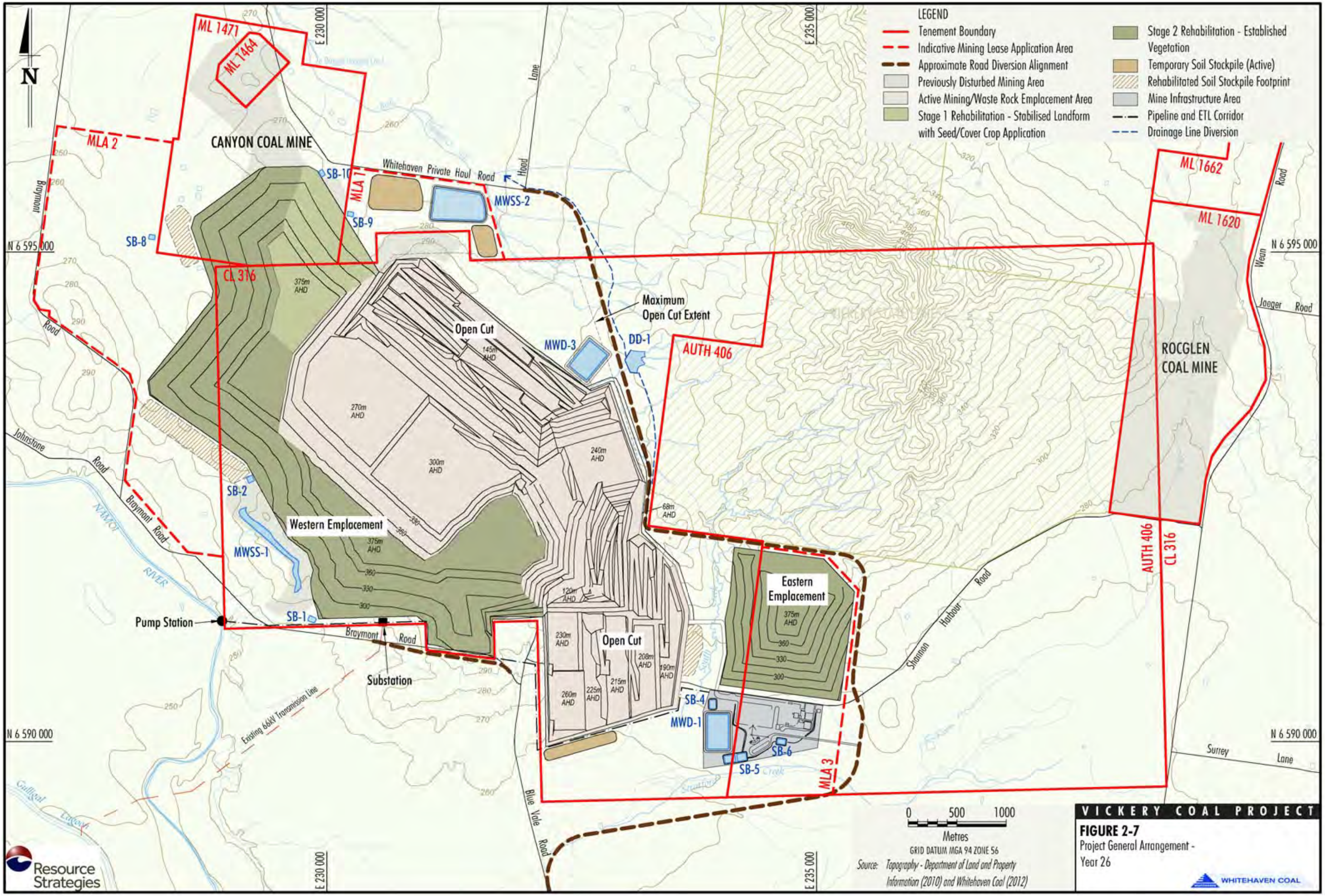

VICKERY COAL PROJECT

FIGURE 2-7
Project General Arrangement - Year 26

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- construction of a 7.9 km sealed two-lane road realignment to the east of the open cut and around the Eastern Emplacement, connecting Hoad Lane from the north to Shannon Harbour Road east of the MIA.

The first stage would allow construction traffic to access the MIA without impacting on existing traffic flows along Shannon Harbour Road. The second stage of construction would follow immediately after the first. It is anticipated that the realignment of Blue Vale Road would occur in the first year of the Project, subject to factors described in Section 2.14.

The Blue Vale Road realignment would add approximately 5 km to the travel distance along Hoad Lane and Blue Vale Road.

A small realignment of the southern section of Braymont Road would be required to allow the open cut to reach full extent within CL 316 (Figure 2-8). According to historical aerial photographs and cadastral information (Figure 1-2a of the EIS), it appears that the southern extent of Braymont Road has been realigned sometime in the 1990s, likely associated with the historical mining activities at the Vickery Coal Mine. Prior to the open cut impacting on the existing Braymont Road alignment, it would be realigned generally consistent with the historical road corridor (Figure 2-8).

Vehicles travelling to the Project from Manilla via Wean Road would either access Shannon Harbour Road via Riordan Road (an small existing, unsealed road along the southern extent of the Rocglen Coal Mine), or would turn into the Rocglen Coal Mine off Wean Road (just to the north of Riordan Road), and then travel onto Shannon Harbour Road. The preferred option would be identified once the number of movements along this route is confirmed during the first year of the Project. If Riordan Road is to be used, Whitehaven would upgrade the road to a suitable standard in consultation with the Gunnedah Shire Council.

2.4.2 Mine Infrastructure Area and Mine Access Road

The MIA would be constructed to the south of the Eastern Emplacement. The MIA would include:

- ROM coal stockpile areas;
- ROM coal handling, crushing and screening infrastructure;
- a heavy vehicle workshop and store;
- a heavy and light vehicle wash facilities;
- a hard stand to accommodate mine fleet;
- an external store/laydown compound and hazardous goods store;
- a tyre storage and change facility;
- a boilermakers workshop;
- bulk fuel, liquid petroleum gas and lube storage facilities;
- services incorporating raw water, fire water, potable water and compressed air reticulation;
- administration and bathhouse facilities;
- a first aid room and mine rescue equipment;
- light vehicle car parks;
- a helipad;
- raw water and mine water dams and sediment basins;
- sewage and water treatment facilities; and
- a waste management area.

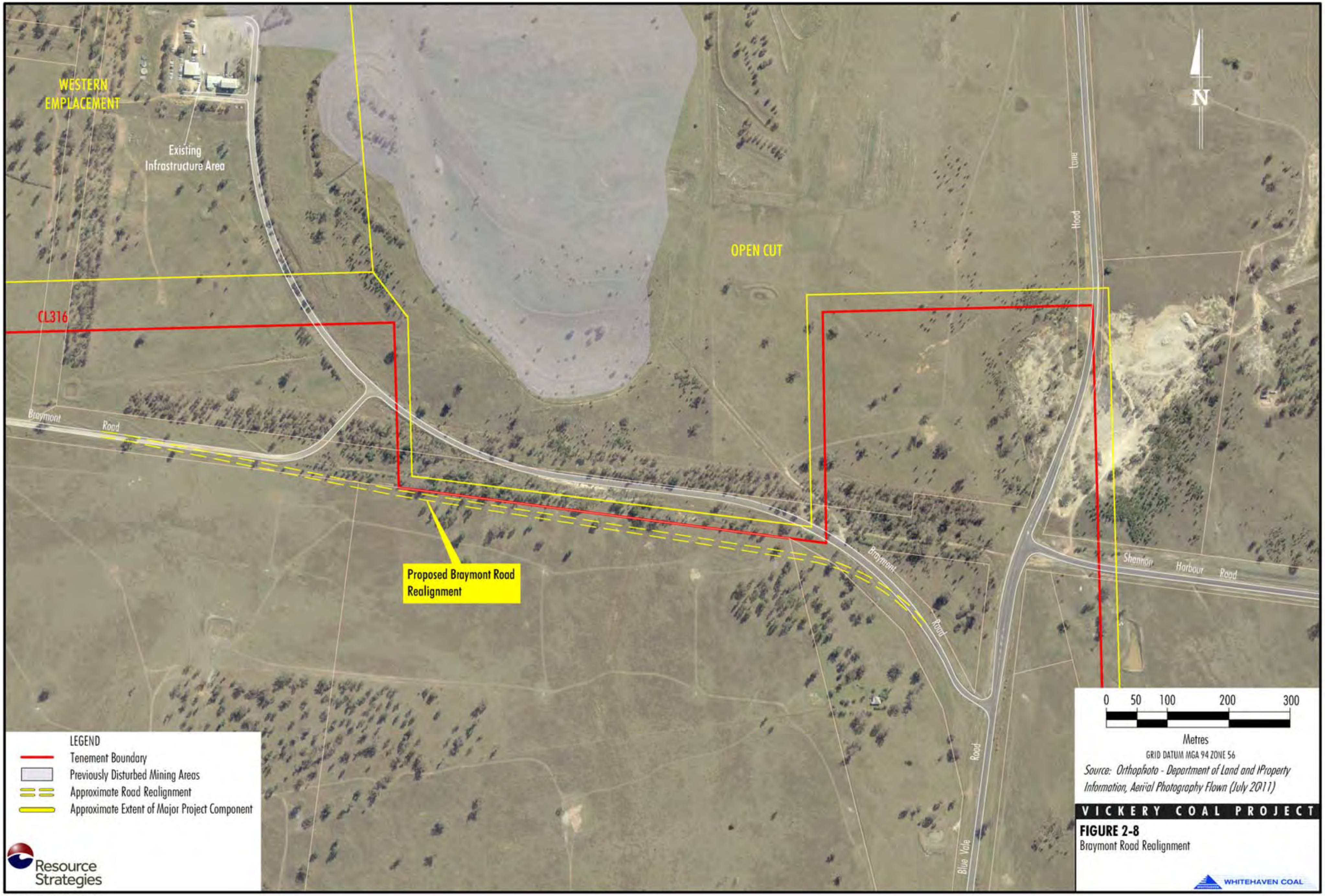
Construction of the MIA is anticipated to take approximately 12 months. A conceptual design for the MIA is shown on Figure 2-9. Further details of the operation of the coal crushing and screening facilities within the MIA are provided in Section 2.5.5.

Light vehicles and delivery vehicles would access the MIA via a new intersection connecting the existing Shannon Harbour Road with the Blue Vale Road realignment (Figure 2-9). ROM coal haulage trucks would have a dedicated MIA access road constructed off the Blue Vale Road realignment, to the south of Shannon Harbour Road (Figure 2-9).

2.4.3 Private Haul Road and Kamilaroi Highway Overpass

The proposed private haul road and Kamilaroi Highway overpass would be constructed prior to the cumulative road haulage of ROM coal along the Whitehaven ROM coal road transport route (from all Whitehaven mines) exceeding the currently approved rate of 3.5 Mtpa, pending grant of the necessary land access requirements and other approvals (e.g. relevant NSW Roads and Maritime Services (RMS) and council approvals).

A concept design for the Kamilaroi Highway overpass has been developed (Figure 2-10). The overpass is proposed to be comprised of two pillars and abutments either side of the Kamilaroi Highway, allowing for approximately 6.5 m vertical and 15 m horizontal clearance for vehicles travelling along the Kamilaroi Highway. This design has been based on a similar overpass located further north along the Kamilaroi Highway which is used for private haulage of coal by the Boggabri Coal Mine.



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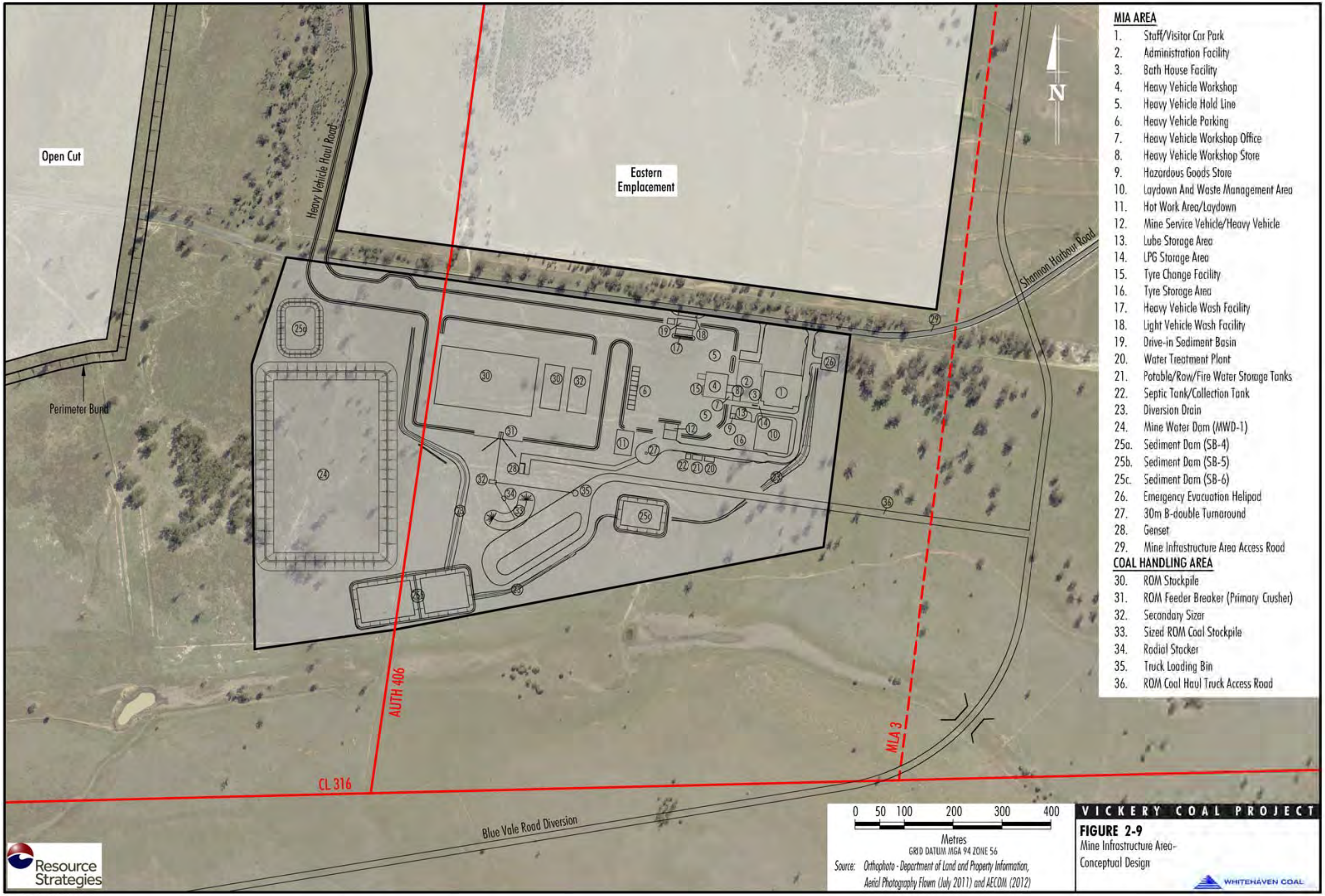

VICKERY COAL PROJECT

FIGURE 2-9
Mine Infrastructure Area-
Conceptual Design

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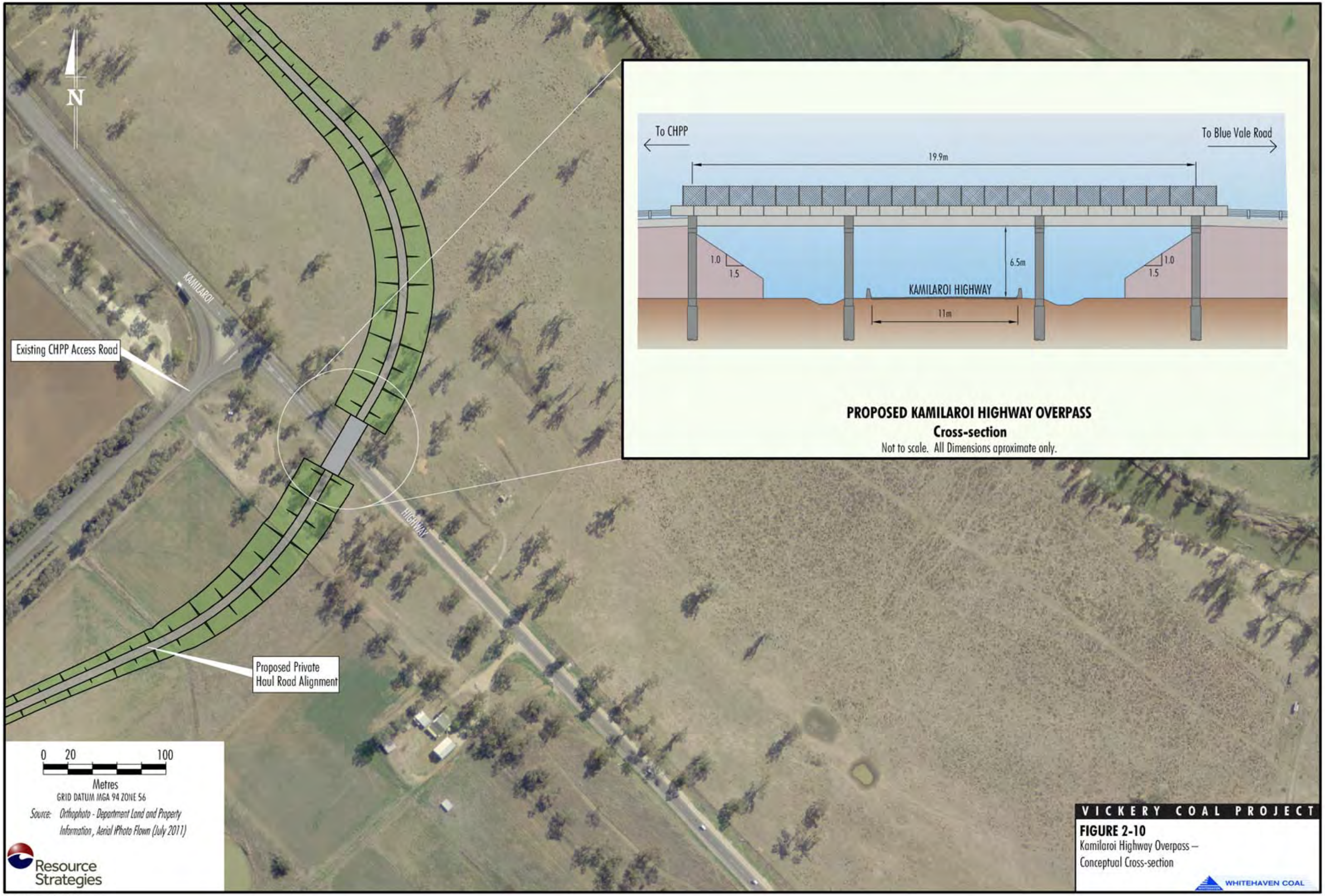

VICKERY COAL PROJECT

FIGURE 2-10
Kamilaroi Highway Overpass – Conceptual Cross-section

WHITEHAVEN COAL

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Whitehaven would develop the detailed design of the overpass in consultation with the RMS and Gunnedah Shire Council. The detailed design process would also involve the development of a works authorisation deed and a construction traffic management plan with the RMS. The construction traffic management plan would include management measures to be implemented during the construction phase, including the identification of alternative routes should temporary closure of the Kamilaroi Highway be required.

The overpass would be constructed by suitably qualified contractors, endorsed by the RMS.

Management of the private haul road and Kamilaroi Highway overpass would remain the responsibility of Whitehaven during the life of the Project. Following closure of the Project, the infrastructure would be decommissioned to the satisfaction of the RMS and the Gunnedah Shire Council, unless otherwise agreed to at the time.

Further details on the operation of the private haul road and Kamilaroi Highway overpass are provided in Section 2.6.3.

2.4.4 North-west Drainage Line Diversion

The primary up-catchment diversion structure for the Project would be the north-west drainage line diversion. It would be used to prevent runoff that flows west from the Vickery State Forest entering the open cut. The north-west drainage line diversion would be constructed at the same time as the Blue Vale Road realignment. Further detail on the operation of the north-west drainage line diversion and other water management infrastructure is provided in Section 2.9.1.

2.4.5 Raw Water and Electricity Supply Infrastructure

A pump station, including a submersible pump within the Namoi River, would be constructed on the eastern bank of the Namoi River (Figure 2-4). The pump station and associated pipeline would be used to extract licensed water for use as make-up water at the Project when required during dry periods. The operation of the Namoi River pump station is discussed further in Section 2.10.6.

A new substation, 11 kV ETL and buried raw water supply pipeline would be constructed within a corridor between the Namoi River pump station and the MIA (Figure 2-3a). The corridor would intersect an existing 66 kV ETL that services the existing infrastructure area.

A new 66 kV/11 kV substation would be constructed at the intersection point. A new 11 kV overhead ETL would then be installed in the corridor from the substation to the MIA and the pump station. This ETL would provide electricity to the Project. The operation of the ETL and substation is discussed in Section 2.10.5. The operation of the Namoi River pump station and water pipeline is discussed in Section 2.10.6.

Diesel powered electricity generators would be used during the construction phase of the Project, or until such time as the ETL is commissioned and supplying power.

2.5 MINING OPERATIONS

Project mining operations would be conducted up to 24 hours per day, seven days per week.

2.5.1 Open Cut Extent

The Project includes open cut mining within the Maules Creek Formation. Up to seven coal seams of the Maules Creek Formation would be mined, with the Cranleigh Seam generally defining the base of the open cut. Depth from the existing ground level to the base of the open cut would vary from approximately 100 m in the west to 250 m in the east (i.e. approximately 190 m AHD in the west to approximately 70 m AHD in the east).

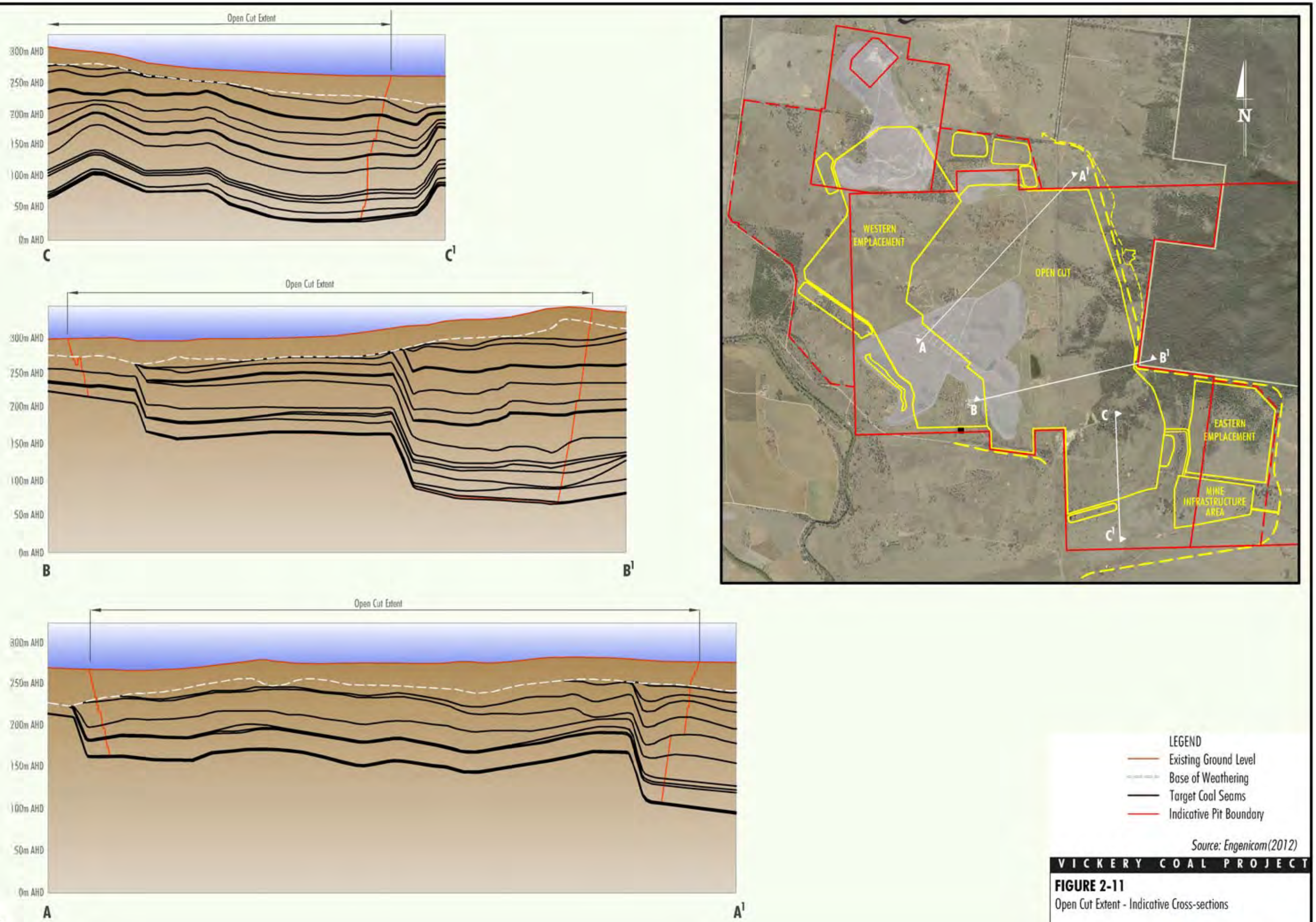
The open cut would commence in the west and be developed to the east with waste rock progressively emplaced behind the advancing open cut face once sufficient space is available. Constraints to the open cut extent include:

- uneconomic open cut strip ratios in the east;
- the target coal seams sub-crop to the west;
- CL 316 limiting extraction to the north; and
- CL 316 and alluvium associated with the Namoi River flood plain limiting extraction to the south.

Indicative cross-sections of the open cut extent are shown on Figure 2-11.

2.5.2 Indicative Mine Schedule

An indicative mine schedule for the Project is provided in Table 2-1.



LEGEND
Existing Ground Level
Base of Weathering
Target Coal Seams
Indicative Pit Boundary

Source: Engenicom (2012)

VICKERY COAL PROJECT

FIGURE 2-11
Open Cut Extent - Indicative Cross-sections

Resource Strategies

WHITEHAVEN COAL

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Table 2-1
Indicative Mine Schedule

Project Year	Waste Rock (Mbcm)	ROM Coal (Mtpa)
1*	16.0	0
2	25.0	1.45
3	38.0	3.80
4	48.0	4.10
5	47.0	4.10
6	44.0	4.20
7	44.0	4.50
8	43.0	4.50
9	42.0	4.50
10	45.0	4.50
11	41.0	4.50
12	47.0	4.50
13	44.0	4.50
14	47.0	4.50
15	47.0	4.50
16	43.0	4.50
17	45.0	4.50
18	38.0	4.50
19	45.0	4.50
20	45.0	4.50
21	49.0	4.50
22	45.0	4.50
23	45.0	4.50
24	49.0	4.50
25	40.0	4.50
26	51.0	4.50
27	39.0	4.50
28	39.0	4.50
29	39.0	4.50
30	39.0	4.50

* Assumed Project commencement date is 1 January 2014.

The staging of the open cut mining operations would be determined by the requirements of the coal market, product specification and/or blending requirements. As these requirements are likely to vary over the life of the Project, the development sequence of the open cut and coal extraction rates may also vary.

2.5.3 Vegetation Clearing and Soil Stripping

Progressive vegetation and soil clearing would be undertaken ahead of the advancing open cut mining operation. Specific vegetation clearance procedures are described in Section 4.9.

Soil stripping would be undertaken progressively and stockpiling procedures would aim to minimise soil degradation prior to its use for progressive rehabilitation. The indicative locations of temporary soil stockpile areas that would be used and then rehabilitated during the mine life are shown on Figures 2-4 to 2-7. Additional temporary soil stockpiles may be constructed on unused areas of the waste rock emplacements. Specific soil management, stockpiling and re-application procedures are described in Section 5.5.2.

A fleet of dozers, scrapers and a water cart would typically be used for vegetation clearing and soil stripping activities.

2.5.4 Overburden/Interburden Drill, Blast and Removal by Excavator

Drill and blast techniques would be used for the removal of competent overburden and interburden material for the open cut. A mixture of ammonium nitrate and fuel oil (ANFO) (dry holes) and emulsion blend (wet holes) explosives would be used. Blast sizes would typically range from:

- intermediate interburden blasts with a maximum instantaneous charge (MIC) of approximately 1,365 kilograms (kg); and
- deep overburden/interburden blasts with a MIC of approximately 2,275 kg.

The number of blasts per week would typically be five, however, up to six blasts per week may occur on some occasions.

Blast designs and sizes would vary over the life of the Project and would depend on factors such as the depth of coal seams, the design of benches and the proximity to sensitive receivers and infrastructure.

Following blasting, the overburden and interburden would be removed by excavator and haul truck for placement in the out-of-pit mine waste rock emplacements, or as infill in the mine void.

As the open cut mining operations advance towards Braymont Road, Blue Vale Road, the Blue Vale Road realignment and Hoad Lane, sections of these roads would be temporarily closed for short intervals (i.e. approximately 15 minutes) during blast events that are within 500 m of the public roads.

Further information regarding waste rock management is provided in Section 2.8.1.

2.5.5 Coal Mining and On-site ROM Coal Handling

Up to 135 Mt of ROM coal would be mined during the life of the Project.

Coal mining would involve excavators loading ROM coal into trucks for haulage to the ROM coal handling area at the MIA via internal haul roads. ROM coal would be either dumped directly into a hopper feeding the crushing and screening facility, or dumped on an adjacent ROM coal stockpile for later re-handling by front end loaders. The capacity of the ROM coal stockpile would be approximately 250,000 t.

The coal crushing and screening facility at the MIA would include a ROM coal feeder breaker (primary crusher) and a secondary sizer (secondary crusher) which would produce nominal 200 and 50 millimetre (mm) sized ROM coal, respectively. Sized ROM coal would be conveyed to the either a 1,000 t sized ROM coal load-out bin for loading into on-highway haul trucks (Section 2.6) or to a sized ROM coal stockpile with a capacity of approximately 20,000 t via a radial stacker.

Figure 2-12 illustrates the key stages in the ROM coal handling process. Figure 2-9 shows the indicative layout of the MIA, including the coal crushing and screening facilities.

2.5.6 On-site Production of Domestic Coal

Up to 150,000 t of ROM coal per annum would be selectively hauled to an on-site mobile crusher at the MIA for crushing and screening to produce domestic specification (15 to 35 mm) coal. The mobile crusher would be operated during daytime hours only (i.e. 7.00 am to 6.00 pm).

2.5.7 On-site Production of Gravel Materials

Up to 90,000 m^3 per annum of gravel material would be produced by crushing and screening suitable overburden (excavated from within the open cut extent) in the on-site mobile crusher at the MIA.

On-site gravel crushing and screening operations would be conducted during daytime hours only (i.e. 7.00 am to 6.00 pm).

2.6 SIZED ROM COAL TRANSPORT TO THE WHITEHAVEN CHPP

2.6.1 Sized ROM Coal Transport

Sized ROM coal would be transported from the MIA to the Whitehaven CHPP by a haulage contractor using a fleet of on-highway haulage trucks (e.g. approximately 42 t capacity B-Doubles). Sized ROM coal transport would occur up to 24 hours per day, seven days per week.

2.6.2 Whitehaven Haul Route

The existing Tarrawonga and Rocglen Coal Mines (both Whitehaven owned) currently transport sized ROM coal along the approved Whitehaven ROM coal road transport route (referred to as the Whitehaven haul route) (Figure 1-1 of the EIS). Sized ROM coal from the Project would be loaded onto haulage trucks which would then travel along the existing Whitehaven haul route between the MIA and the Whitehaven CHPP. The route would commence on the realigned section of Blue Vale Road near the MIA, and then travel along the existing Blue Vale Road to the Namoi River (a distance of approximately 19 km). This section of the haul route would be entirely on public roads.

On the western side of the Namoi River the existing Blue Vale Road continues for approximately 250 m before its intersection with the Kamilaroi Highway. The existing route then heads south-east along the Kamilaroi Highway for approximately 750 m before entering the Whitehaven CHPP via the existing private access road. (Figure 2-3b). As part of the Project a new section of private haul road and highway overpass would be constructed in this area.

2.6.3 Private Haul Road and Kamilaroi Highway Overpass

The private haul road and Kamilaroi Highway overpass would be constructed prior to the cumulative road haulage of ROM coal along the Whitehaven ROM coal road transport route (from all Whitehaven mines) exceeding the currently approved rate of 3.5 Mtpa, pending granting of the necessary land access requirements and other approvals (e.g. relevant RMS and council approvals).

The new private haul road and Kamilaroi Highway overpass would intersect with Blue Vale Road approximately 100 m prior to its intersection with the Kamilaroi Highway (Figure 2-3b). The private haul road would run parallel to the Kamilaroi Highway before crossing the highway south of the Whitehaven CHPP access road.

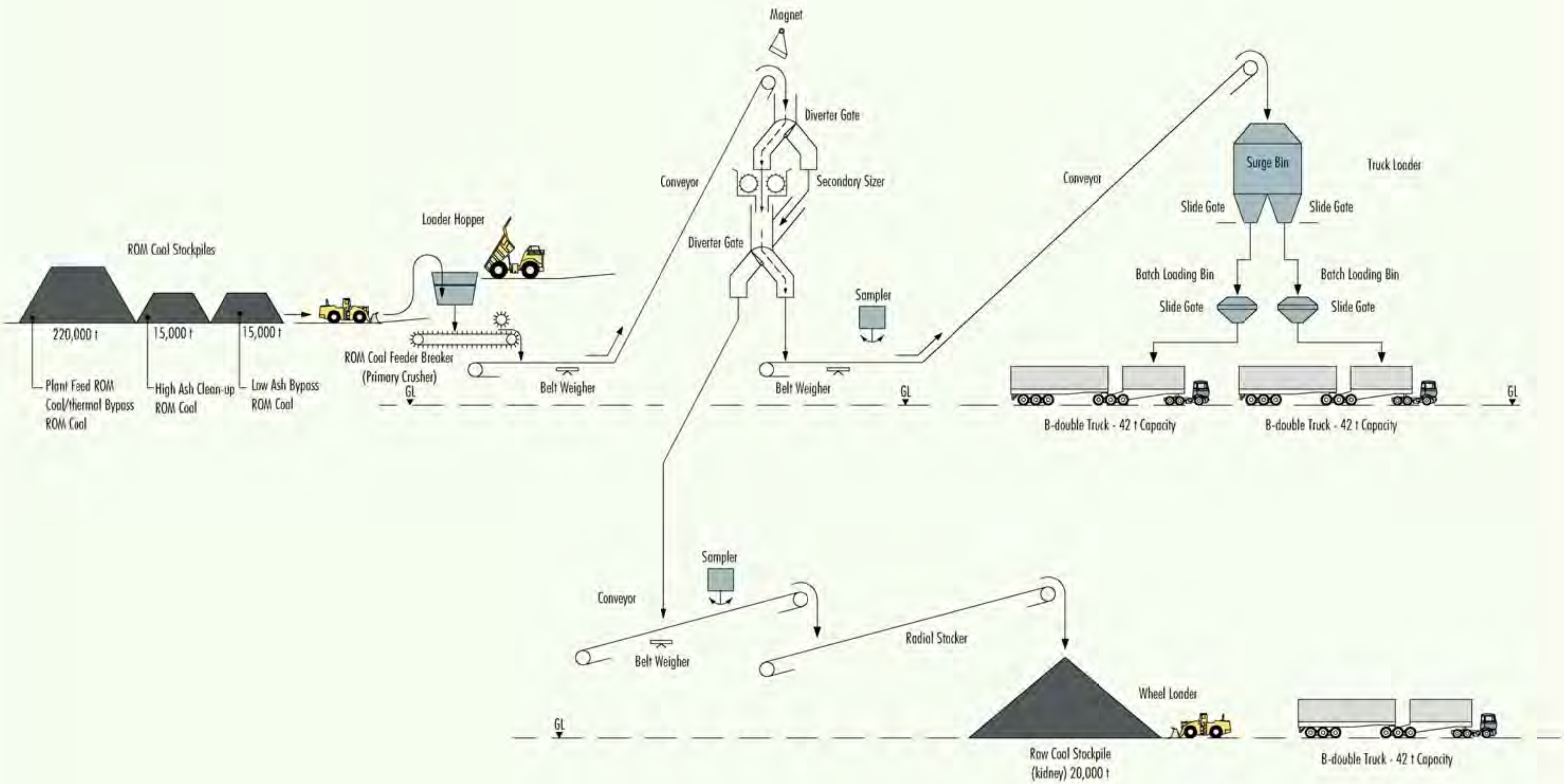

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FIGURE 2-12

ROM Coal Handling Schematic

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The new section of private haul road and Kamilaroi Highway overpass would allow haulage trucks to travel between the MIA and the Whitehaven CHPP without interacting with traffic travelling on the Kamilaroi Highway.

Associated benefits of the private haul road and Kamilaroi Highway overpass would also include a reduction in heavy vehicle interaction with other vehicles on the Whitehaven CHPP access road and improved ROM coal transport efficiency through a reduction in travel time between the Project and the Whitehaven CHPP.

Access to the private haul road and Kamilaroi Highway overpass would be restricted to contractor haulage trucks and Whitehaven vehicles. Appropriate signage, gates and fencing identifying the road as a private access road would be installed to prevent unauthorised access. Fencing would also prevent livestock from straying onto the road.

Appropriate screens would be installed along the overpass to manage potential truck lighting impacts to neighbouring residences, and to act as barriers to prevent material falling onto the highway below.

2.7 COAL PROCESSING, LOADING AND TRANSPORT AT THE WHITEHAVEN CHPP

2.7.1 Whitehaven CHPP

The Whitehaven CHPP and rail load out facility is located approximately 5 km west of Gunnedah and currently processes ROM coal from the surrounding Whitehaven coal mining operations (namely the Tarrawonga, Rocglen and Sunnyside Coal Mines). The Whitehaven CHPP operates in accordance with Development Consent (DA 0079.2002). The consent period is valid for a period of 20 years and expires in December 2022.

All sized ROM coal received is stockpiled in either ROM coal stockpiles for processing at the Whitehaven CHPP, or in product stockpiles for bypass loading at the rail loadout facility. Up to 3 Mtpa of sized ROM coal is approved to be processed in the CHPP and the rail loadout facility is approved to handle up to 4.1 Mtpa of product coal.

Further details of the existing Whitehaven CHPP operations are provided in Attachment 3.

Sized ROM coal from the Project would be loaded onto trains (i.e. bypass) or crushed, screened and washed at the existing Whitehaven CHPP before being loaded onto trains for rail transport to Newcastle and export markets. No change to the approved Whitehaven CHPP operations would be required as a result of the Project. No change to the existing Whitehaven CHPP rail movements would be required for the Project.

2.7.2 Access to Suitable Rail Capacity

Whitehaven has entered into long-term arrangements with the Australian Rail Track Corporation (ARTC) for rail track access from Whitehaven's operations to the Port of Newcastle. Whitehaven has commenced negotiations with the ARTC to increase Whitehaven's rail capacity to the Port of Newcastle over the coming years. These agreements are anticipated to be finalised pending confirmation of port development projects and associated capacity availability.

Expansion plans of capacity on the single track section between Narrabri and Muswellbrook (incorporating both the Gunnedah rail system and the Hunter Valley rail system) are described in the ARTC's *Hunter Valley Corridor 2012-2021 Capacity Strategy Consultation Document* (ARTC, 2012).

Potential options to increase rail capacity between Narrabri and Muswellbrook include the realignment of the Liverpool Range rail line, increasing axle loads from 25 t to 30 t beyond Dartbrook to increase the carrying capacity of each train, construction of the Werris Creek bypass, reconfiguration of the track arrangement at Scone, construction of new loops to allow for increased train lengths, lengthening of two existing passing loops and extension of passing loops into passing lanes (ARTC, 2012).

2.7.3 Domestic Coal and Gravel Materials Transport

As described in Sections 2.5.6 and 2.5.7, up to 150,000 t of domestic specification coal and 90,000 m^3 of gravel would be directly collected at the mine facilities area by customers.

On-site domestic coal and gravel collection would be conducted during daytime hours only (i.e. 7.00 am to 6.00 pm).

2.8 WASTE ROCK AND COAL REJECT MANAGEMENT

2.8.1 Waste Rock Quantities and Emplacement Strategy

Approximately 1,269 Mbcm of waste rock would be mined over the life of the Project (Table 2-1).

Waste rock (including overburden and interburden) would be used to in-fill the mine void behind the advancing open cut, as well as being placed in the two out-of-pit mine waste rock emplacements (i.e. the Western and Eastern Emplacements).

In the first 2 years of the Project, the waste rock would be trucked from the open cut to the southern-most portion of the Western Emplacement (Figure 2-4). This would enable the open cut to progress sufficiently to allow in-filling of the mined out section behind the working area after approximately Year 2.

Construction of the Eastern Emplacement would commence after Year 2, and is anticipated to be fully developed by Year 7 (Figure 2-5).

Both the Western and Eastern Emplacements would both be constructed to maximum heights of 375 m AHD (approximately 100 m above the nearby floodplains and approximately 100 m lower than the maximum height of the range in the Vickery State Forest) (Figures 2-5 to 2-7).

The waste rock emplacements would be progressively shaped by dozers for rehabilitation activities (i.e. final re-contouring, topsoiling and revegetation) (Section 5).

Integrated Pro-active Noise Management

Noise impacts associated with the mining operations during the early years of the Project would be managed through the development of the southern and western extents of the Western Emplacement during daytime operations to shield night-time operations. The Western Emplacement would be developed in two-levels during the initial years of the Project, with the lower bench being at least 30 m below the top of the emplacement such that the upper bench provides shielding of the mining operations to the private receivers to the south-west (Appendix C).

Mining fleet operating on the Western Emplacement would be relocated from the western and top areas of the emplacement to the lower benches on the eastern side during evening and night-time to further mitigate noise impacts (Appendix C).

In addition to the above, assessment of potential noise impacts associated with the Project (Appendix C) identified the need for further pro-active noise management strategies during adverse weather conditions to mitigate potential noise impacts at private receivers. Adverse conditions would be identified through a combination of noise and meteorological monitoring and meteorological forecasting, where noise monitoring indicates the trend in actual noise levels at a location and meteorological monitoring and forecasting indicates the likelihood that the current trend will continue or intensify over the ensuing period (Appendix C).

When these conditions are identified, mine operators would relocate the majority of the mining fleet from the main Western Emplacement areas in the south-west and move them to a specific dumping area in the north of the emplacement (Figure 2-4).

This strategy is anticipated to be implemented approximately 14% to 35% of the time in evening period (depending on the season) and approximately 20% to 44% of the time at night (depending on the season). These meteorological conditions are expected to occur less frequently in summer and more frequently in winter when temperature inversions are more likely to take place (Appendix C).

The integrated pro-active noise management strategy would be used during all stages of the Project to assist with the management of noise.

The integrated pro-active noise management strategy is illustrated on Figure 2-13.

Waste Rock Geochemistry

An assessment of the geochemical characteristics of the waste rock material associated with the development of the Project is provided in the Geochemistry Assessment (Appendix L) prepared by Geo-Environmental Management (GEM). A summary of the findings of the assessment is provided below.

Geochemical tests were conducted on 107 overburden and interburden samples from six boreholes distributed across the proposed open cut area. The test work included pH, electrical conductivity (EC), acid base accounting, net acid generation tests, a sodicity assessment, and element enrichment and solubility testwork.

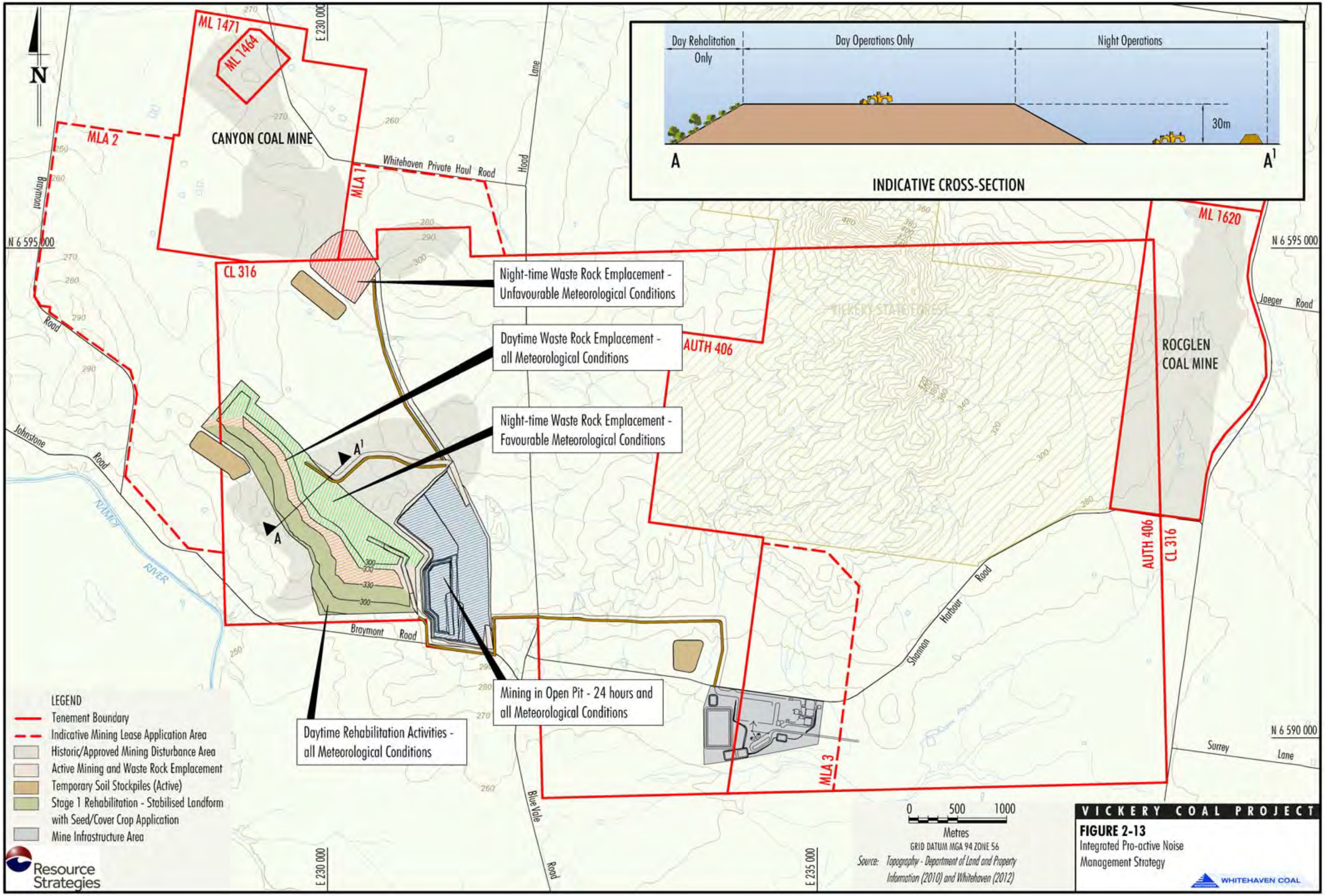

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FIGURE 2-13
Integrated Pro-active Noise Management Strategy

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The Geochemistry Assessment (Appendix L) concluded that the overburden and interburden generated from the proposed open cut extent would generally be expected to have a low sulfur content and be non-acid forming (NAF).

A small quantity of overburden, typically identified as non-continuous units adjacent to some coal seams, was identified as containing increased sulfur concentrations but with low acid generating capacity. These materials are anticipated to only produce acidic conditions with left exposed to the atmosphere for a number of years.

Some interburden material (typically mudstone) was identified as containing increased sulfur concentrations and a high acid generating capacity which would have the potential to generate acidic conditions in a shorter period of time (within weeks of exposure to the atmosphere). In order to manage these materials, Whitehaven would identify and emplace them so that they are covered with at least 15 m of NAF material.

The testwork results also showed that the overburden and interburden materials would typically be alkaline and non-saline (Appendix L).

A sub-set of samples was selected by GEM for exchangeable cation analysis and determination of exchangeable sodium percent in order to assess the potential sodicity risk (i.e. risk of being dispersive). The sodicity test results indicated that the majority of the overburden and interburden material is expected to be non-sodic or slightly sodic, with a relatively small amount of material expected to be moderately to highly sodic. If these moderately to highly sodic materials were left exposed on the dump surfaces or final pit walls they may become dispersive (Appendix L).

Sodic materials would either be covered by a sufficient quantity of non-sodic material to cap the waste rock emplacement and prevent sodic materials being exposed on final landforms or treated with gypsum to decrease its erosion potential.

2.8.2 Coal Rejects

It is estimated that up to 400,000 t of coal reject material (coarse and fine rejects) would be generated through the processing Project ROM coal at the Whitehaven CHPP at the maximum production rate.

Coarse rejects generated at the Whitehaven CHPP would be returned via truck to the Project for emplacement via co-disposal with waste rock within in-pit emplacement areas. Minor volumes of coarse rejects that are generated on-site at the Project from domestic coal (and gravel material) crushing and screening would also be emplaced on-site.

Coarse rejects currently generated by the Whitehaven CHPP were assessed as part of the Geochemistry Assessment (Appendix L) and generally found to be non-saline with a relatively low to moderate total sulfur content and generally expected to be NAF.

Tailings (fine rejects) generated at the Whitehaven CHPP would continue to be disposed in accordance with existing approvals at the Brickworks Pit. Once the existing approval at the Brickworks Pit expires, dried tailings would be returned to the Project via truck for co-disposal with waste rock within in-pit emplacement areas.

Fine rejects currently generated by the Whitehaven CHPP were assessed as part of the Geochemistry Assessment (Appendix L). These materials were generally found to be slightly to moderately saline with a low to moderate total sulfur content and generally expected to be NAF.

Based on the results of the geochemical characterisation of coal seams from the Project area, it is expected that the ROM coal from the Project would have a moderate sulfur content and there is potential for the coarse and fine rejects generated at the Whitehaven CHPP through the processing of Project coal to be potentially acid forming (PAF) (Appendix L).

To manage acid generation potential, coal reject material would be placed or co-disposed with overburden within the in-pit emplacement areas. A coal rejects geochemical verification program would be used during the mine life to confirm the acid forming and geochemical characteristics, and adjust the rejects placement strategy as necessary.

In-pit co-disposal areas would be capped to sufficiently reduce oxygen diffusion and water infiltration into the coal reject material. The capping material would provide a suitable growth medium to support successful long-term revegetation.

2.9 WATER MANAGEMENT

The Project Water Management System would be progressively developed as water management requirements change over the life of the Project. A detailed description of the Project Water Management System is described in the Surface Water Assessment (Appendix B).

2.9.1 Project Water Management System

The Project Water Management System has been developed to comply with accepted best practice principles form mine site water management. The objectives and design criteria of the Project Water Management System are to:

- protect the integrity of local and regional water resources;
- separate runoff from undisturbed, rehabilitated and mining affected areas;
- design and manage the system to operate reliably throughout the life of the mine in all seasonal conditions, including both extended wet and dry periods;
- provide a sufficient source of water for use in mining operations, including in extended dry weather periods;
- provide sufficient storage capacity in the system to store, treat and discharge runoff as required, including in extended wet weather periods;
- develop facilities required for the long-term functioning of the Water Management System as soon as practicable and to minimise the number of facilities that will be subsumed by mining activities during the Project life;
- avoid the requirement for water to be pumped wherever possible; and
- minimise the number of licensed discharge points.

To effectively develop a Water Management System that addresses the above objectives and design criteria, runoff has been classified into four distinct categories including:

- Undisturbed Area Runoff – runoff from catchments that have not been disturbed by mining activities. Undisturbed Area Runoff may be diverted around mining activities to downstream receiving waters.
- Rehabilitated Mine Area Runoff – runoff from rehabilitated mine areas that have established stable vegetation cover. This runoff is expected to have similar water quality characteristics to Undisturbed Area Runoff. The Water Management System has been designed to allow runoff from these areas to be discharged without control.
- Disturbed Area Runoff – runoff from active spoil emplacement areas and areas under active rehabilitation. The Water Management System has been designed to capture this runoff and to:
  - either transfer it to the mine Water Management System for re-use in mine operations; or
  - discharge off-site after retention for sufficient time to allow settlement of sediment to achieve the required water quality (50 milligrams per litre [mg/L]).
- Mine Water – water collected in the mine pit as a result of runoff from the pit itself or active mine emplacement areas reporting to the pit; and runoff from the MIA. As this water is likely to be high in coal dust and possibly have elevated salinity levels it is unlikely to be suitable for uncontrolled release. The Water Management System is designed to contain and re-use this water on-site.

A predictive assessment of the performance of the Water Management System over a range of climatic scenarios is presented in Appendix B and the results are summarised in Section 2.9.3.

The progressive development of the Water Management System is described and illustrated in Appendix B. The Water Management System accounts for the ongoing development of the open cut and mine areas, as well as progressive rehabilitation of available sections of the waste emplacements. Figure 2-14 provides a schematic of the Project Water Management System.

Water captured and stored on-site would also be used to irrigate emplacement areas for revegetation establishment when available and required (Appendix B and Section 5).

The post-mining water management would incorporate some aspects of the operational Water Management System (i.e. some storages and water management structures would be retained as permanent features) (Section 5.5.6).

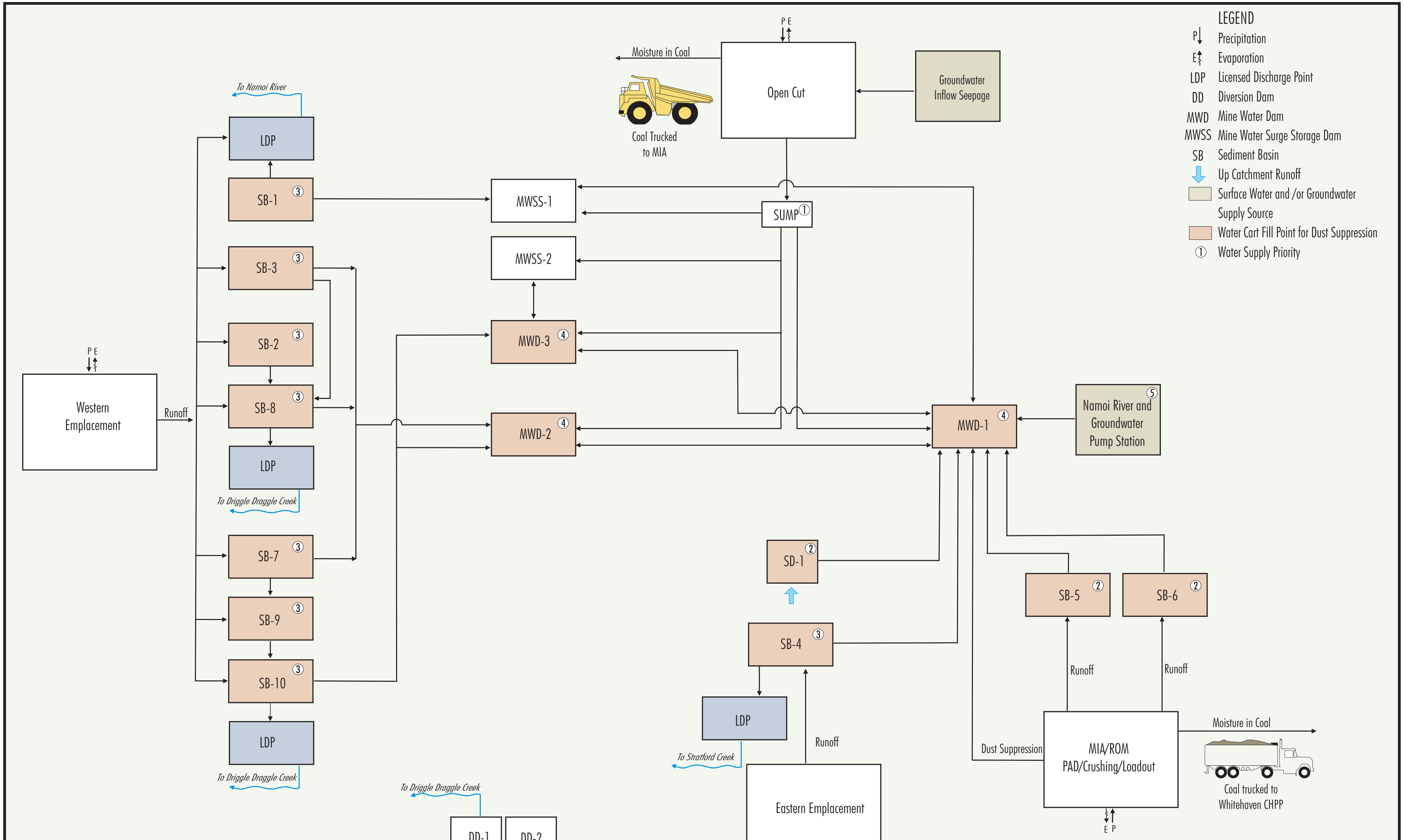

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FIGURE 2-14

Project Water Management Schematic

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Up-catchment Runoff Control

Temporary and permanent up-catchment diversion dams/bunds/drains would be constructed over the life of the Project to divert runoff from undisturbed areas around the open cut and waste emplacements.

The design capacity of up-catchment diversion works would depend on the size of the catchment, the design life of the up-catchment diversion and the potential consequences of a breach. On this basis, the design capacities would range from the peak flow generated by the 1 in 2 year average recurrence interval (ARI) event through to that generated by the 1 in 100 year ARI event.

Up-catchment 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 rock fill.

The primary up-catchment diversion structure would be the permanent north-west drainage diversion to prevent clean up-catchment runoff flowing west from the Vickery State Forest entering the advancing open cut. The diversion system would consist of a 80 megalitre (ML) diversion dam (DD-1) and two contour drains (one upslope of DD-1 and one downslope) that would run in a northerly direction parallel to the Blue Vale Road realignment and ultimately discharging into a tributary of Driggle Draggle Creek (referred to as the 'north drainage line') (Figures 2-4 to 2-7).

Water captured in DD-1 would either be pumped from the storage for use as mine make-up water (in accordance with harvestable rights), or would overflow into the contour drain and be diverted by gravity around the Project mining area.

A smaller temporary up-catchment diversion dam (DD-2) would be constructed further west along the north-west drainage line to capture any clean runoff from the undisturbed catchment downstream of DD-1. Runoff captured in DD-2 would be pumped to the north and released into the north drainage line when not required for use on-site (Appendix B). DD-2 would be mined through after approximately Year 20.

Surface Water Runoff Collection

Surface water runoff from the waste rock emplacements would be separated through the use of contour banks and collection drains.

Runoff from active waste rock emplacement areas would be directed towards sediment basins or the open cut.

Prior to Year 2, the majority of runoff from partially rehabilitated areas on the Western Emplacement would be directed to one of two sediment basins (SB-1 or SB-2). Runoff from active areas of this emplacement would be directed towards the open cut or a third sediment basin (SB-3) where practicable (Figure 2-4). The sediment basins (SB-1, SB-2 and SB-3) would capture runoff from active and partially rehabilitated areas via batter drains and drop structures, and would only be discharged via proposed licensed discharge points at times when stored water exceeded dust suppression requirements (and in compliance with release conditions specified in an Environment Protection Licence [EPL] for the Project).

As expansion of the Western Emplacement progress between Year 2 and Year 17, additional sediment basins SB-7, SB-8, SB-9 and SB-10 would be constructed to capture runoff from active dumping areas (Figure 2-6).

At Year 17 runoff reporting to SB-1 and SB-2 would be from fully rehabilitated areas and as such would be able to be released from SB-1 and SB-2 via a licensed discharge point (Figure 2-7). Runoff from partially rehabilitated areas of the Western Emplacement, and the backfilled open cut area would be directed to sediment basins SB-8, SB-9 and SB-10 via batter drains and drop structures (Figure 2-7) and would be discharged via the proposed licensed discharge point at times when stored water exceeded dust suppression requirements, and in compliance with release conditions specified in an EPL for the Project.

Runoff from active areas of the Western Emplacement would report to the open cut after Year 17.

Runoff from the Eastern Emplacement would be directed to sediment basin SB-4 via batter drains and drop structures, and similarly, would only be discharged via the proposed licensed discharge point at times when stored water exceeded dust suppression requirements, and in compliance with release conditions specified in an EPL for the Project.

Runoff from the MIA including hardstand areas and ROM coal stockpiles would be captured in sediment basins SB-5 and SB-6 and would be re-used on-site. Runoff from undisturbed areas would be allowed to report off-site.

Open Cut Water Storage and Dewatering

Mine-affected water captured in the open cut, comprising runoff and infiltration from active mining and emplacement areas and groundwater inflows, would be allowed to settle in in-pit collection sumps. Where the potential for higher open cut groundwater inflows is identified during the life of the Project, advance dewatering may also be conducted using appropriately licensed temporary bores ahead of the open cut mining operation.

Mine-affected water collected in-pit would be pumped to one of the three Mine Water Dams (MWD-1, MWD-2 and MWD-3) over the life of the Project (Figures 2-4 to 2-7). During extended wet weather periods, mine-affected water collected in the open cut would be transferred to one of two mine water surge storages (MWSS-1 or MWSS-2) to allow continued open cut dewatering.

MWSS-1 would be located within the final void of the rehabilitated Blue Vale open cut (located immediately west of the Western Emplacement) (Figure 2-4), and would be created by constructing an embankment across the south-eastern end of the void and a bund across the north-western edge of the void. This would provide approximately 1,000 ML of surge storage for the life of the Project.

MWSS-2 would be located to the north of the open cut and would be constructed in approximately Year 24 of the Project to provide an additional 500 ML surge storage capacity in the later years of the mine life.

MWSS-1 and MWSS-2 would be used in the event that the periodic Project water balance analysis indicates that it is required to minimise the volume of water stored in-pit (i.e. to minimise the potential interruptions to open cut operations).

Flood Bunds

The MIA has been designed such that the majority of the infrastructure is located outside of the extent of a 1 in 100 year ARI flood extent associated with Stratford Creek (Appendix B).

The southern edge of the proposed open cut is located entirely out of the predicted extent of a 1 in 100 year ARI flood event associated with Stratford Creek. A permanent flood bund around the southern extent of the open cut would be constructed to prevent inundation of the open cut during operations and post-mining.

The permanent flood bund would be designed to a height that would provide protection against the peak flood height associated with a Probable Maximum Precipitation rainfall event. The width and geometry of the permanent flood bund would be such that it is stable under these extreme flow conditions (Appendix B).

The permanent flood bund would consist of an engineered clay fill core, which would be excavated into the natural surface. Rock fill armouring would be placed on the southern side of the clay fill core. The bund would then be topsoiled for revegetation.

Further details regarding the design, function and construction of the permanent flood bund are provided in Appendix B.

2.9.2 Water Consumption

The average total water demand for the Project is estimated to be 1,179 megalitres per annum (ML/annum) (Section 2.9.3), which is equivalent to approximately 3.2 megalitres per day (ML/day) on average. The primary water use at the Project would be for dust suppression on internal haul roads and at the coal crushing and screening facility. Water would also be required for washdown of mobile equipment and other minor non-potable uses.

The sources of water used at the Project would be supplied according to the following priority (excluding potable water supplies) (Appendix B):

1. Groundwater inflows to the open cut and associated dewatering.
2. Water storages containing runoff from active and rehabilitated areas.
3. Water storages containing runoff from up-catchment areas.
4. Licensed groundwater and surface water extractions.

Whitehaven currently holds a total of 1,355.2 ML of water access licences (WALs) specifically for the Project (as a combination of groundwater, river general security and river supplementary licences). Details of the quantity and licensing arrangements for groundwater and surface water extractions for the Project are provided in Attachment 5. The suitability of the current licensing arrangements to meet the anticipated water demand is summarised in Section 2.9.3 and described in Appendix B.

Whitehaven holds additional WALs for its other mining operations in the region.

2.9.3 Simulated Performance of Project Water Management System

A predictive assessment of the performance of the Water Management System (including supply and containment) is presented in Appendix B. The key findings of the assessment are summarised in Table 2-2 including the anticipated water use for dust suppression, predicted make-up requirements for the Project maximum production rates, water supply sources and storages for containment of mine water for a range of different climatic scenarios.

The results presented in Table 2-2 are based on the average, minimum, 10th, 50th, 90th and maximum percentile (%ile) statistics over all 110, 30-year model simulated 'realisations'. Realisation 1 uses climatic data from 1899 to 1928; realisation 2 uses data from 1900 to 1929; and so on. The model records results on each day of each realisation and then ranks these to calculate the 10%ile and 90%ile as well as average, minimum and maximum.

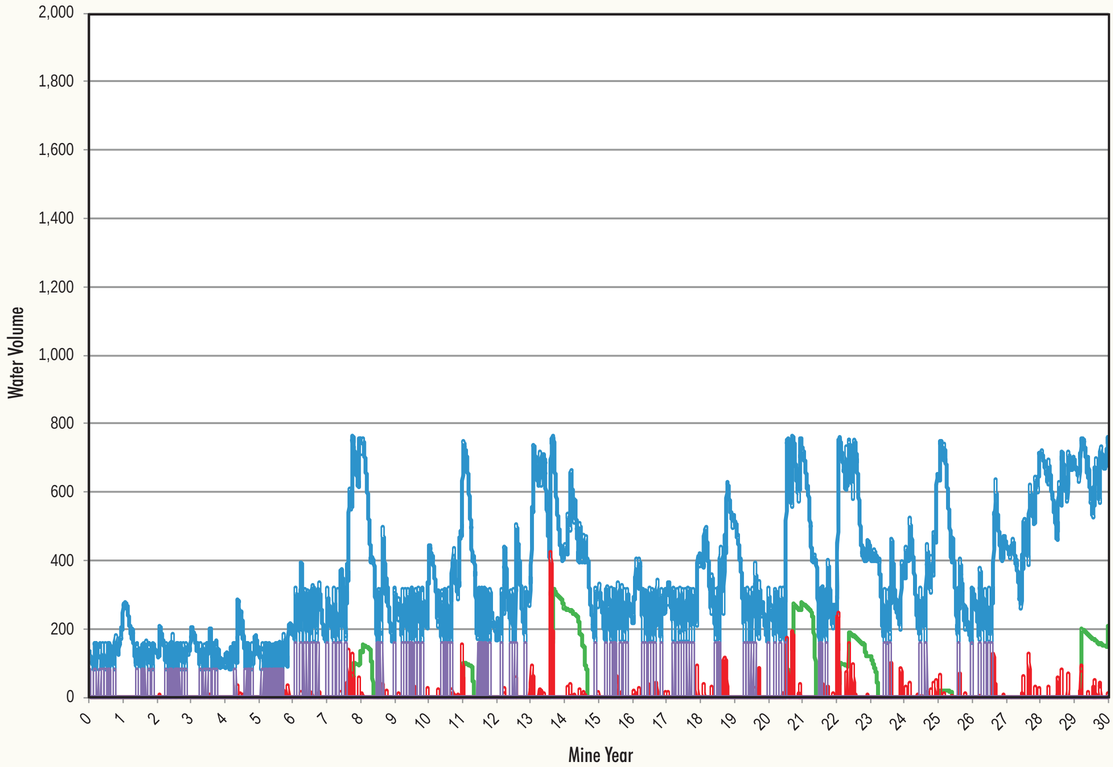
Figures 2-15a and 2-15b illustrate examples of the simulated performance of the Water Management System over four different climate sequences from the water balance model:

- the 1920-1949 example represents a 'dry' climate sequence during which the Water Management System would be expected to perform adequately, with minimal requirement to store water in the open cut.
- the 1930-1959 example represents a 'wet' climate sequence during which the Water Management System performs adequately, but with an increased requirement to store significant quantities of water in the MWSSs and in the open cut (e.g. simulated years 25 to 28).
- the 1940-1969 and 1950-1979 examples represent 'intermediate' climate sequences during which higher than average rainfall occurs earlier in the mine life when less water would be required to be stored within the open cut (due to the smaller disturbed area catchments).

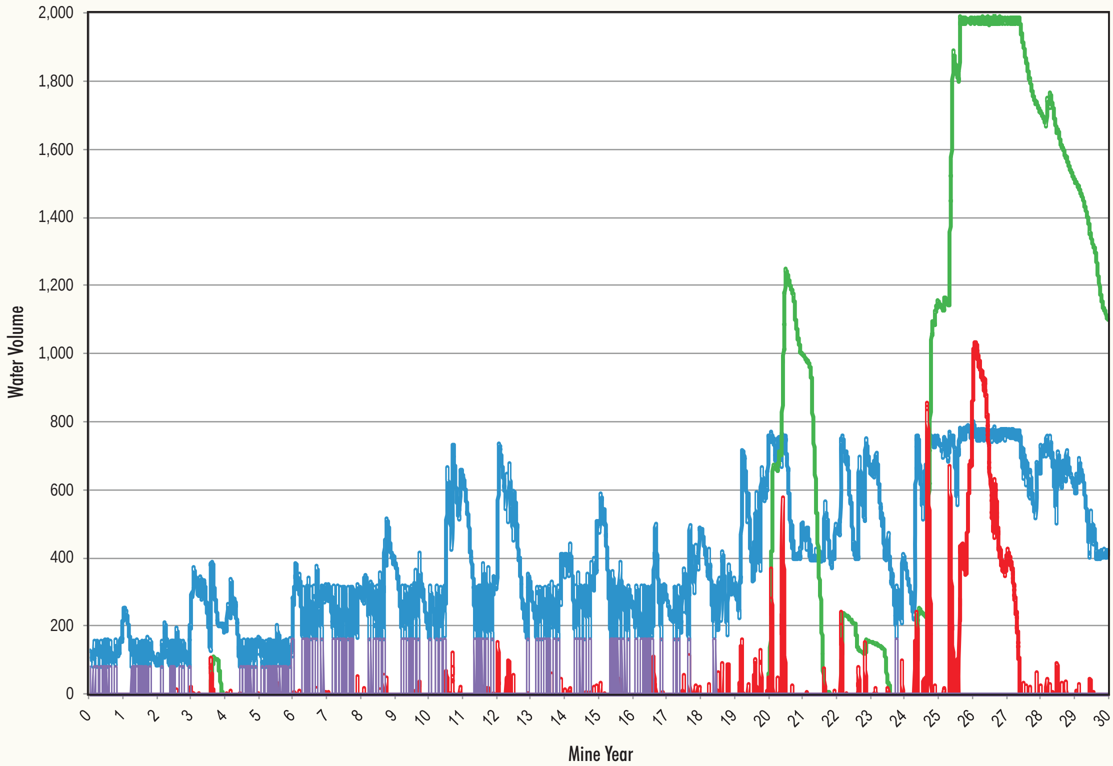
Table 2-2
Project Water Management System Performance

	Total Volume (ML) over 30 Year Mine Life (for different climate scenarios)						Annual Average (ML/annum)
	Average	Minimum %ile	10%ile (low rainfall)	50%ile (median rainfall)	90%ile (high rainfall)	Maximum %ile	
Water Use:							
Total Water Use	35,367	36,488	36,214	35,394	34,557	34,186	1,179
Licensed Extraction (external sources)	14,793	17,900	16,400	14,750	12,910	11,500	493
Runoff Reporting to:							
Open Cut	16,834	15,033	15,629	16,597	18,635	19,241	561
MIA	3,973	3,718	3,806	3,961	4,164	4,417	132
Western Emplacement	7,008	5,742	6,183	6,834	8,035	9,047	234
Eastern Emplacement	615	344	415	602	819	1,228	21
Rehabilitated Catchments	3,485	2,118	2,779	3,434	4,264	5,293	116
Transferred to Mine Water Dam from:							
Open Cut	17,104	15,184	15,827	16,821	19,105	19,611	570
MIA	3,971	3,718	3,804	3,961	4,160	4,417	132
Western Emplacement	2,904	2,492	2,654	2,895	3,166	3,373	97
Eastern Emplacement	110	56	81	106	146	176	4
Rehabilitated Catchments	1,522	1,168	1,353	1,543	1,673	1,787	51

Source: After Appendix B.



Climate Sequence 1920 -1949



Climate Sequence 1930 -1959

LEGEND
- Water Stored in Mine Water Dams
- Water Stored in Mine Water Surge Storage
- Water Stored in Open Cut
- Top-up Water Required

Source: After Appendix B

VICKERY COAL PROJECT

FIGURE 2-15a
Water Storage Requirement for Different Climate Scenarios

Resource Strategies

WHITEHAVEN COAL

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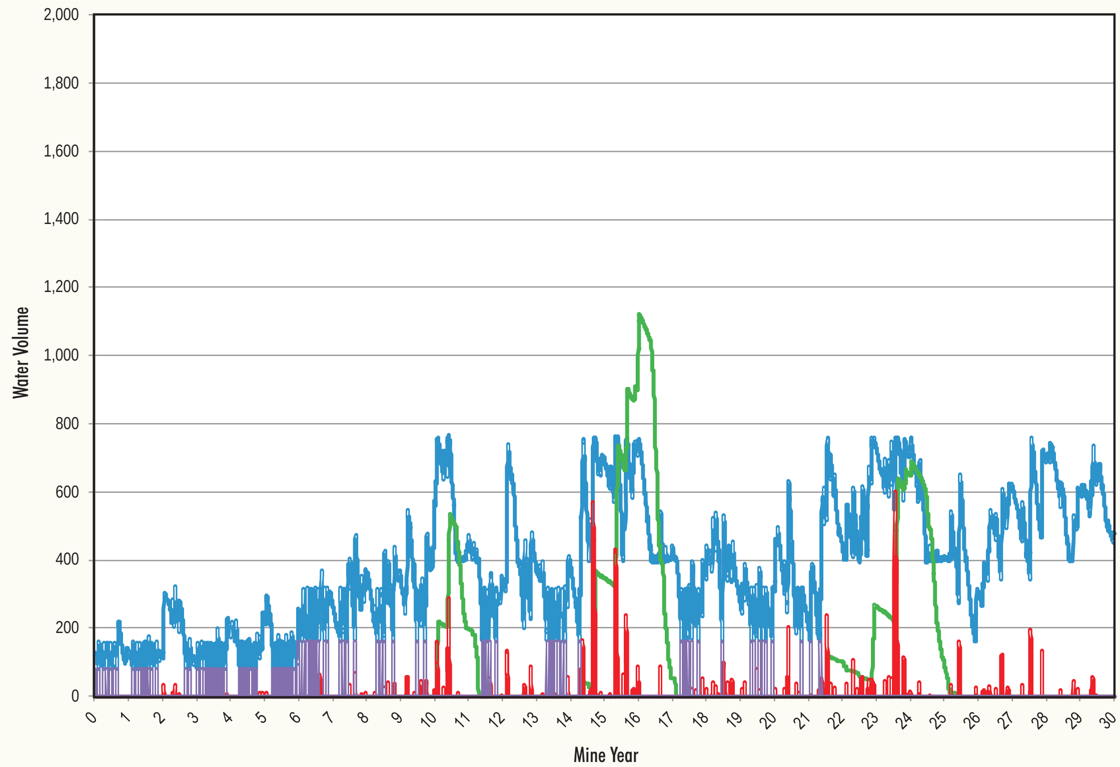
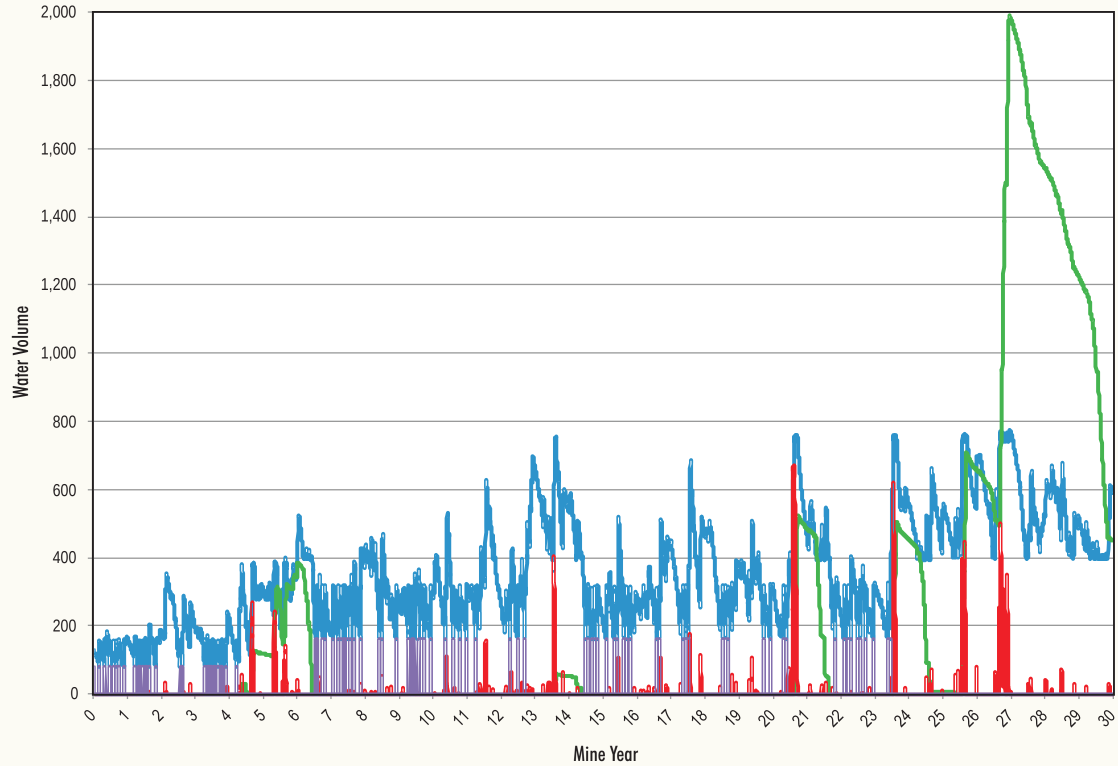


Climate Sequence 1940 -1969



Climate Sequence 1950 -1979

LEGEND

- Water Stored in Mine Water Dams
- Water Stored in Mine Water Surge Storage
- Water Stored in Open Cut
- Top-up Water Required

Source: After Appendix B

VICKERY COAL PROJECT

FIGURE 2-15b

Water Storage Requirement for Different Climate Scenarios

Resource Strategies

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As shown on Figures 2-15a and 2-15b, there is likely to be little requirement to store water within the open cut for an extended length of time, unless extremely high rainfall is encountered during the later stages of the mine life. If such a climate sequence occurred, up to 1,000 ML of water may be required to be stored within the open cut for a period of up to two years. This would be achieved by partitioning off a section or sections of the open cut.

Figure 2-16 illustrates the predicted volume of water that would be stored in the Water Management System over the life of the mine, calculated for all 110, 30-year climate scenarios assessed in the water balance model. Figure 2-16 shows that all mine affected water could be stored within the MWDs and MWSSs for 90% of climate scenarios. As previously discussed, there is only a small likelihood that water would be required to be stored within the open cut towards the end of the mine life (illustrated by the maximum storage requirement [orange line] being greater than the proposed MWD and MWSS storage volume [black dashed line] on Figure 2-16) (Appendix B).

Figures 2-15a and 2-15b also show the periods when external 'top-up water' would be required. This water would be obtained using Whitehaven's WALs (e.g. from the Namoi River and groundwater bore). For the purposes of the Project water balance modelling, it has been assumed that this water would be obtained on a 'campaign' basis whereby 25 to 100 ML would be transferred into the Water Management System when total water in the system falls below a specified level (Appendix B).

The average top up water requirement (licensed extraction from external water sources such as the Namoi River) would be 493 ML/annum (Table 2-2).

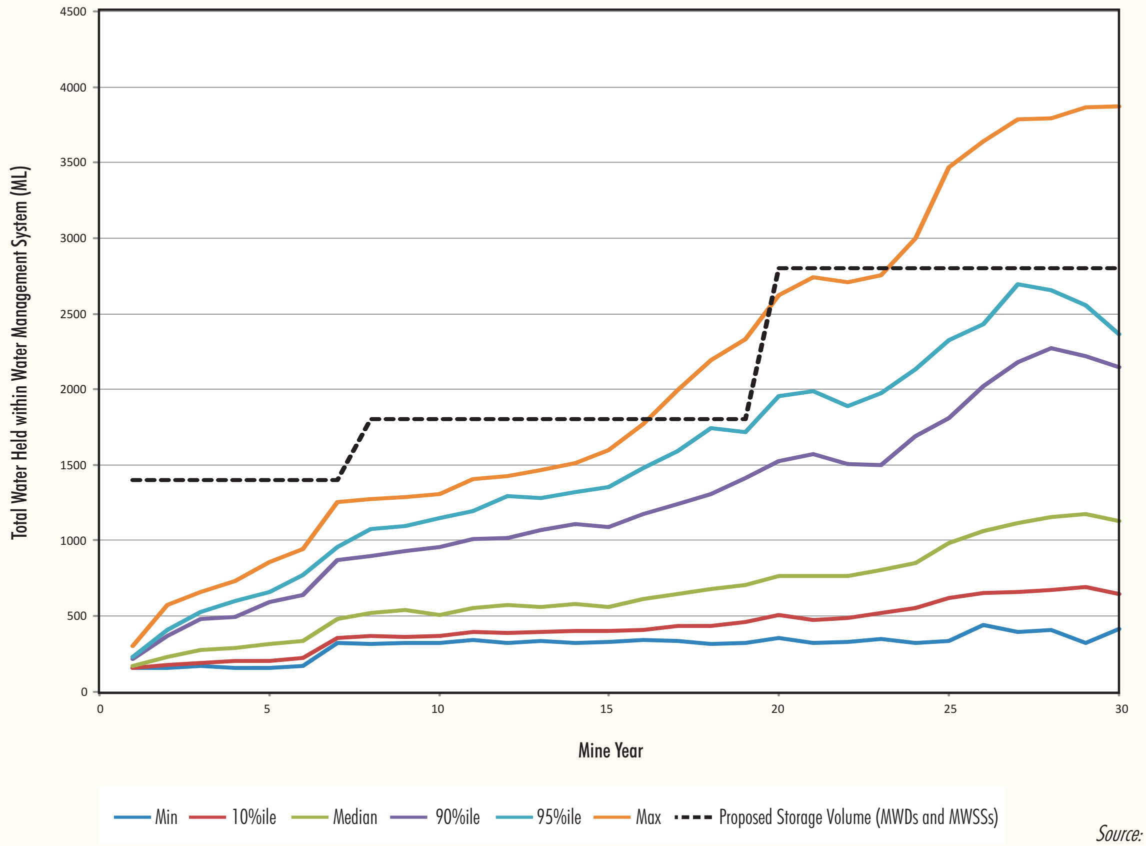
Figure 2-17 shows the anticipated median water requirement and 90%ile water requirement (i.e. during very dry scenarios) from external water sources over the life of the mine. It is anticipated that the external surface water demand would peak in Year 7 of the Project (Figure 2-17). Thereafter the demand is anticipated to reduce progressively as the disturbed area catchments increase and more runoff would be captured within the Water Management System.

Evens & Peck (2013) conducted a review of Available Water Determinations (AWD) for the Lower Namoi Regulated River Water Source of the Namoi Unregulated Rivers Extractive Management Unit. The AWD for this water source has ranged from full allocation (i.e. 1 ML per unit share) to less than 0.1 ML per unit share since 1977. The median allocation has been 0.68 ML per unit share. Details of the AWD are presented in Appendix B.

If median AWD are assumed, Whitehaven would be able to extract up to 732 ML of water from the Namoi River (i.e. the Lower Namoi Regulated River Water Source) using existing general security WALs currently held for the Project (Appendix B). As shown on Figure 2-17, this volume of water would be sufficient to meet the median external water demand for the Project for the majority of the mine life.

Should this volume not be sufficient to satisfy the external water demand at a particular stage of the Project (e.g. during peak demand during Year 7 of the Project, or during dry periods when AWD are lower), shortfalls in external water availability would be mitigated by:

- transferring any available allocation from WALs held for Whitehaven's other mining operations (in accordance with the relevant trading rules);
- purchasing additional WALs from the market if necessary to maintain operations;
- using the continuous water accounting 'carry over' provisions of the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003* to retain water in Keepit Dam for subsequent years;
- using available storage capacity in the Water Management System to store water when it is available (particularly during the initial 15 years of the Project) such that the maximum water storage requirement would not be exceeded (Figure 2-17);
- using available allocation from groundwater WALs held for the Project; and
- adjusting operations to reduce water demand.



Source: After Appendix B

VICKERY COAL PROJECT

FIGURE 2-16
Probability of Total Volume of Water Held in the Mine Water Storages over the Life of the Mine

Resource Strategies

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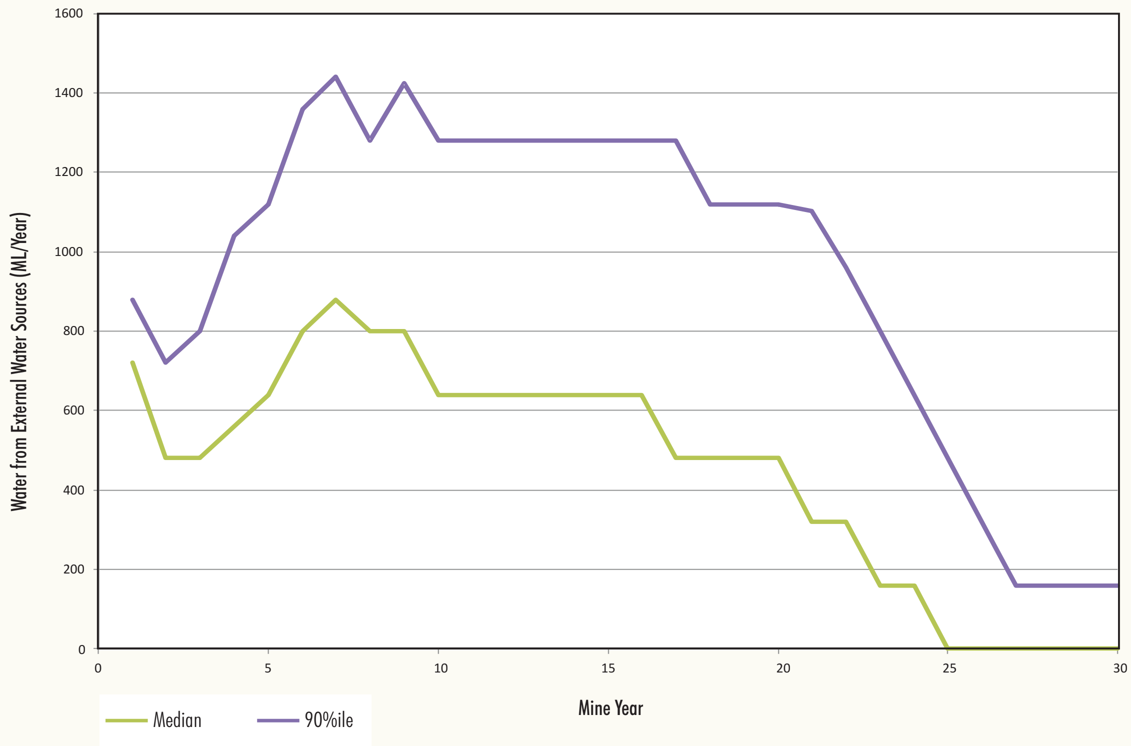


Source: After Appendix B

VICKERY COAL PROJECT

FIGURE 2-17
Median and 90%ile External Water Requirement over the Life of the Mine

Resource Strategies

WHITEHAVEN COAL

2.10 INFRASTRUCTURE AND SERVICES

2.10.1 Mine Infrastructure Area

The MIA is described in Section 2.4.2 and shown on Figure 2-9.

2.10.2 Public Road Realignments

The proposed realignment of sections of Blue Vale Road, Shannon Harbour Road, Hoad Lane and Braymont Road are shown on Figure 2-4. A description of these road works is provided in Section 2.4.1.

2.10.3 Access Roads and Internal Roads

Access to the existing infrastructure area would be via the existing private access road off Braymont Road (Figure 2-8). Access to the MIA would be via Shannon Harbour Road during the construction phase, and then via the realigned section of Blue Vale Road once it has been constructed (Figure 2-9).

The Project would involve the progressive development of unsealed internal haul roads between the open cut operations, waste emplacements and ROM stockpiles. Haul roads would be regularly watered to minimise dust generation potential.

Internal access roads for light vehicles would also be constructed progressively within the Project mining area as required.

2.10.4 Private Haul Road and Kamilaroi Highway Overpass

The private haul road and Kamilaroi Highway overpass are described in Section 2.6.3.

2.10.5 Electricity Supply and Distribution

A 66 kV ETL currently provides power to a 66 kV/11 kV substation at the existing infrastructure area. As described in Section 2.4.5, at the commencement of the Project, a new 66 kV/11 kV substation and 11 kV powerline would be constructed to provide power to the MIA and pump station (Figure 2-3a).

The maximum electricity consumption for the Project when fully operational would be approximately 43,000 megawatt-hours per annum.

Appropriate ground clearance beneath the power lines would be maintained throughout the Project in accordance with Essential Energy's easement requirements.

2.10.6 Raw Water Supply and Potable Water

A pump station and raw water supply pipeline would be installed to provide make-up water as part of the Water Management System. The pump station would be located on the bank of the Namoi River and the raw water pipeline would follow Braymont Road and the southern section of the open cut to the MIA (Figure 2-3a).

The pump station would include a submersible pump within the Namoi River. The conceptual design of the Namoi River pump station is shown on Figure 2-18. A groundwater bore would also be constructed adjacent to the raw water pipeline to extract a licensed groundwater supply if required.

Potable water would be supplied and transported by a local contractor.

2.10.7 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 system to maintain contact with personnel during operations and/or mobile phones.

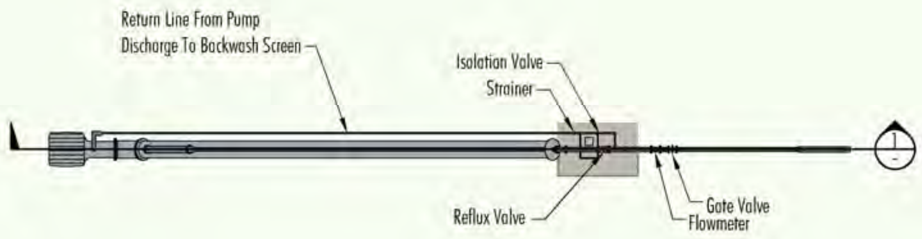
Data communications would be facilitated by a broadband connection service from the telecommunication line.

2.11 WASTE MANAGEMENT

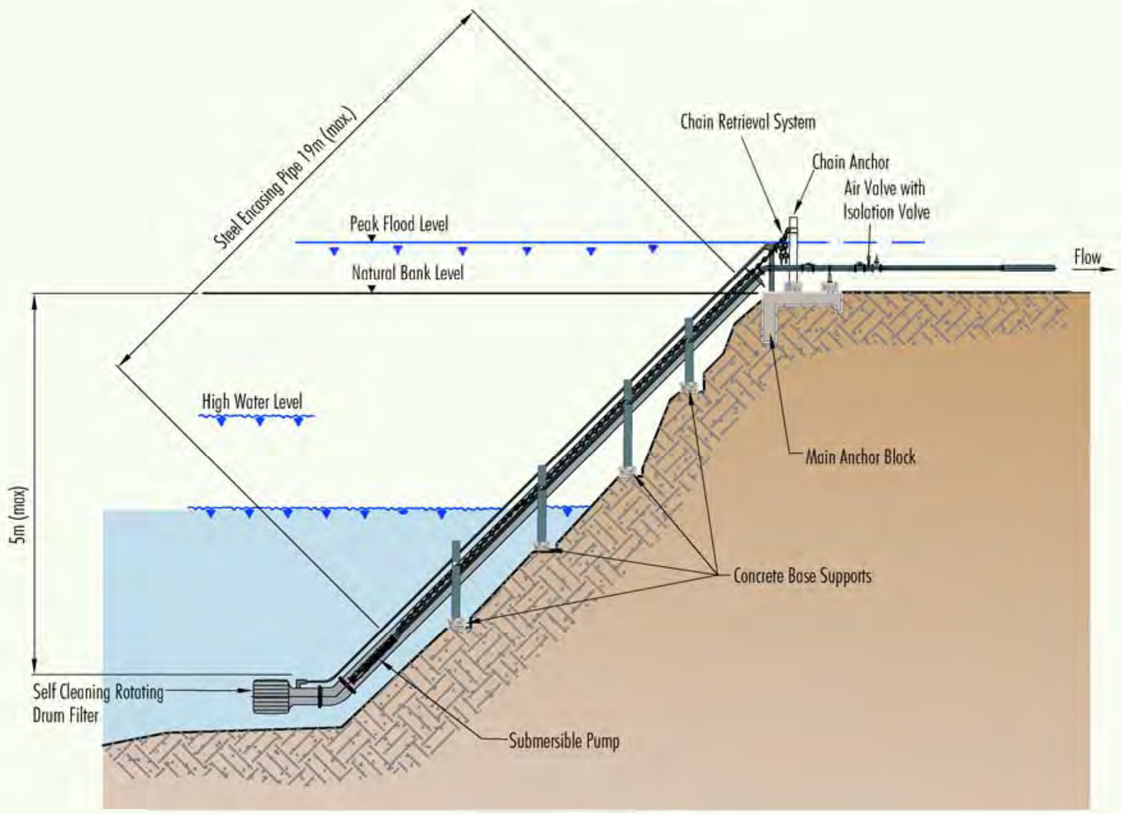
The key waste streams generated by the Project would comprise:

- waste rock, coarse rejects and fine rejects (as described in Section 2.8);
- recyclable and non-recyclable general wastes;
- sewage and wastewater; and
- other wastes from mining and workshop related activities (e.g. used tyres and waste hydrocarbons).

General waste minimisation principles (i.e. reduce, re-use and recycle) would be applied at the Project to minimise the quantity of wastes that require off-site disposal.



GENERAL ARRANGEMENT PLAN



SECTION 1

VICKERY COAL PROJECT

FIGURE 2-18
Namoi River Pumping Station -
Conceptual Design

WHITEHAVEN COAL

Resource Strategies

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All general domestic waste (e.g. general solid [putrescibles] waste and general solid [non-putrescible] waste as defined in *Waste Classification Guidelines Part 1: Classifying Waste* [NSW Department of Environment and Climate Change (DECC), 2008]) and general recyclable products would be collected by an appropriately licensed contractor and disposed of at municipal waste disposal facilities (such as the Narrabri or Gunnedah waste management facilities). Whitehaven would maintain a register of waste collected by the licensed waste contractor.

Sewage and wastewater from on-site ablution facilities would be collected and treated in biocycle sewage treatment system and serviced by a licensed waste disposal contractor on an as-needs basis. Treated effluent would be irrigated at a small wastewater disposal area in accordance with the *Environmental Guidelines: Use of Effluent by Irrigation* (NSW Department of Environment and Conservation [DEC], 2004).

Used tyres from mining equipment would be stockpiled prior to being safely disposed of in the backfilled mine void as the open cut advances.

Waste hydrocarbons would be collected, stored and removed approximately every three months by licensed contractors.

2.12 MANAGEMENT OF DANGEROUS GOODS

The transportation, handling and storage of all dangerous goods at the Project would be conducted in accordance with the requirements of the *Storage and Handling of Dangerous Goods – Code of Practice 2005* (WorkCover, 2005).

Transport

Dangerous goods required for the Project would be transported in accordance with the appropriate State legislation.

Hydrocarbon Storage

Hydrocarbons used during construction and operation would include fuels (diesel and petrol), oils, greases, degreaser and kerosene.

Hydrocarbon storage facilities (including a 400,000 litre [L] capacity diesel storage facility) would be operated in accordance with the requirements of Australian Standard (AS) 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids*.

Procedures would be developed at the Project for the handling, storage, containment and disposal of workshop hydrocarbons (i.e. oils, greases, degreaser and kerosene). Workshop hydrocarbon spills and leaks would also be contained by a purpose-built oil/water separator which would be inspected and maintained on a regular basis. Spill kits would be maintained on the Project site.

Explosives Storage

Detonators, bulk explosives and explosive products (e.g. emulsion, prill and diesel) used for the Project would be stored at the existing blasting contractor's compound, located approximately 5 km north of the Project, or stored on-site in appropriate facilities in accordance with AS 2187.2:2006 *Explosives – Storage, Transport and Use – Use of Explosives*. AS 2187.1:1998 *Explosives – Storage, Transport and Use* 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 initially be stored to the west of Hoad Lane, within the proposed open cut extent, and would be relocated to another appropriate location in the Project area once the open cut progresses east.

Explosives required for the Project would include initiating products and detonators, ANFO and emulsion explosives. Explosives would be transported and used in accordance with the existing safety and operational procedures at the Project.

Chemical Storages and Material Safety Data Sheets

The management and storage of chemicals at the Project would be conducted in accordance with Whitehaven's prescribed management procedures, Australian Standards and codes.

No chemicals 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 an MSDS.

2.13 WORKFORCE

At full development, the Project operational workforce would in the order of 250 full time on-site personnel plus additional contract personnel.

The operational hours at the Project would generally be 24 hours a day, seven days a week.

Nominal Project start and finish shift times at full development would be as follows:

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

Construction/development activities (e.g. construction of the MIA and service facilities) would require an additional construction workforce of up to approximately 60 people full time plus additional contract personnel.

Construction/development activities would generally be restricted to daylight hours (i.e. 7.00 am to 6.00 pm).

2.14 CONTINGENCY PROJECT DEVELOPMENT SCHEDULE

Table 2-1 presents the indicative mine schedule for the Project. It represents the base-case schedule for the construction and operation of the Project over the 30 year mine life. As shown in the table, the ROM production rate would ramp-up to approximately 4 Mtpa in Year 4, and by Project Year 7, it would reach the planned maximum of 4.5 Mtpa. It would then remain stable for the rest of the mine life.

The progressive Project ramp-up to 4.5 Mtpa shown in the base-case schedule is contingent on several factors, including market conditions and coal processing and transport capacity becoming available at the Whitehaven CHPP.

As described in Section 2.7.1, the Whitehaven CHPP currently processes up to 3 Mtpa of sized ROM coal and dispatches up to 4.1 Mtpa of product coal from its rail loadout facility. This coal is sourced from the existing Tarrawonga, Rocglen and Sunnyside Coal Mines. Whitehaven's project development strategy for the Gunnedah area includes the expansion of the Tarrawonga Coal Mine, which would involve the coal produced at Tarrawonga being processed and railed from the adjoining Boggabri CHPP and rail loadout facility. This would mean that Tarrawonga coal would no longer be processed at the Whitehaven CHPP and would 'free-up' processing and rail loadout capacity for sized ROM coal for the Project. Adjustments to the coal production rates at the Rocglen and Sunnyside Coal Mines would also be used to 'free-up' Whitehaven CHPP capacity for the Project.

Approval for the Boggabri CHPP and rail facilities under the EP&A Act has been granted, however, approvals for the planned extension to the Tarrawonga Coal Mine are pending. Once the required approvals are obtained, the necessary infrastructure will need to be constructed and commissioned.

In order to accommodate possible changes in market conditions and/or potential delays in the commissioning of the Boggabri and Tarrawonga coal processing and rail facilities, Whitehaven has developed a contingency development schedule for the Project which involves a more gradual ramp-up in the ROM coal production rate during the initial years of the mine life.

Should the contingency Project development schedule be required, mining operations in the initial years would be at a reduced rate (i.e. 2 Mtpa or less) and would only occur in the western portion of the Project mining area. In addition, rather than immediately commencing construction of the MIA following Project approval, the existing Vickery infrastructure area (Section 2.1) would be upgraded to include ROM coal crushing and screening facilities, a truck loadout facility and associated mining and water management infrastructure (Figure 2-19). These facilities would be temporary as they are located partially in the proposed Western Emplacement area and partially within the planned open cut. Once the open cut development encroaches on this location, the MIA would be constructed and commissioned on the eastern side of the Project area.

Source: *Orthophoto - Department of Land and Property Information, Aerial Photography Flown (July 2011) and AECOM (2012)*

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VICKERY COAL PROJECT

FIGURE 2-19

Temporary Infrastructure Area - Conceptual Design

WHITEHAVEN COAL

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Under the contingency Project development schedule, the progression of mining activities during the initial years would be generally consistent with that shown on Figure 2-4. However, the south-east extent of the Western Emplacement would need to be adjusted slightly to standoff the existing Vickery infrastructure area and access road. A smaller mining fleet would be used under the contingency scenario given the lower mining rate and shorter haul distances (i.e. no requirement to truck waste rock and ROM coal from the open cut to the Eastern Emplacement and MIA, respectively).

The slower initial mining rate and delayed construction of the MIA and Eastern Emplacement would mean that construction of the Blue Vale Road realignment would not be required until approximately Year 7 (i.e. when the open cut intersects the existing Blue Vale Road alignment). However, under the contingency Project development schedule, the private haul road and Kamilaroi Highway overpass would still be constructed as soon as possible in the mine life (i.e. when all necessary approvals are in place). Assessment of the contingency Project development schedule has been conducted to compare the noise, air quality and surface water impacts associated with it against those for the base-case Project schedule presented in Table 2-1. Due to the smaller mining fleet and lower ROM coal production rate, the air quality and noise impacts associated with the restricted ramp-up base-case Project schedule are predicted to be less than those for the scenario presented in Table 2-1 (Appendices C and D).

The management of surface water within the temporary infrastructure area has been assessed and is discussed in the Project Surface Water Assessment (Appendix B).