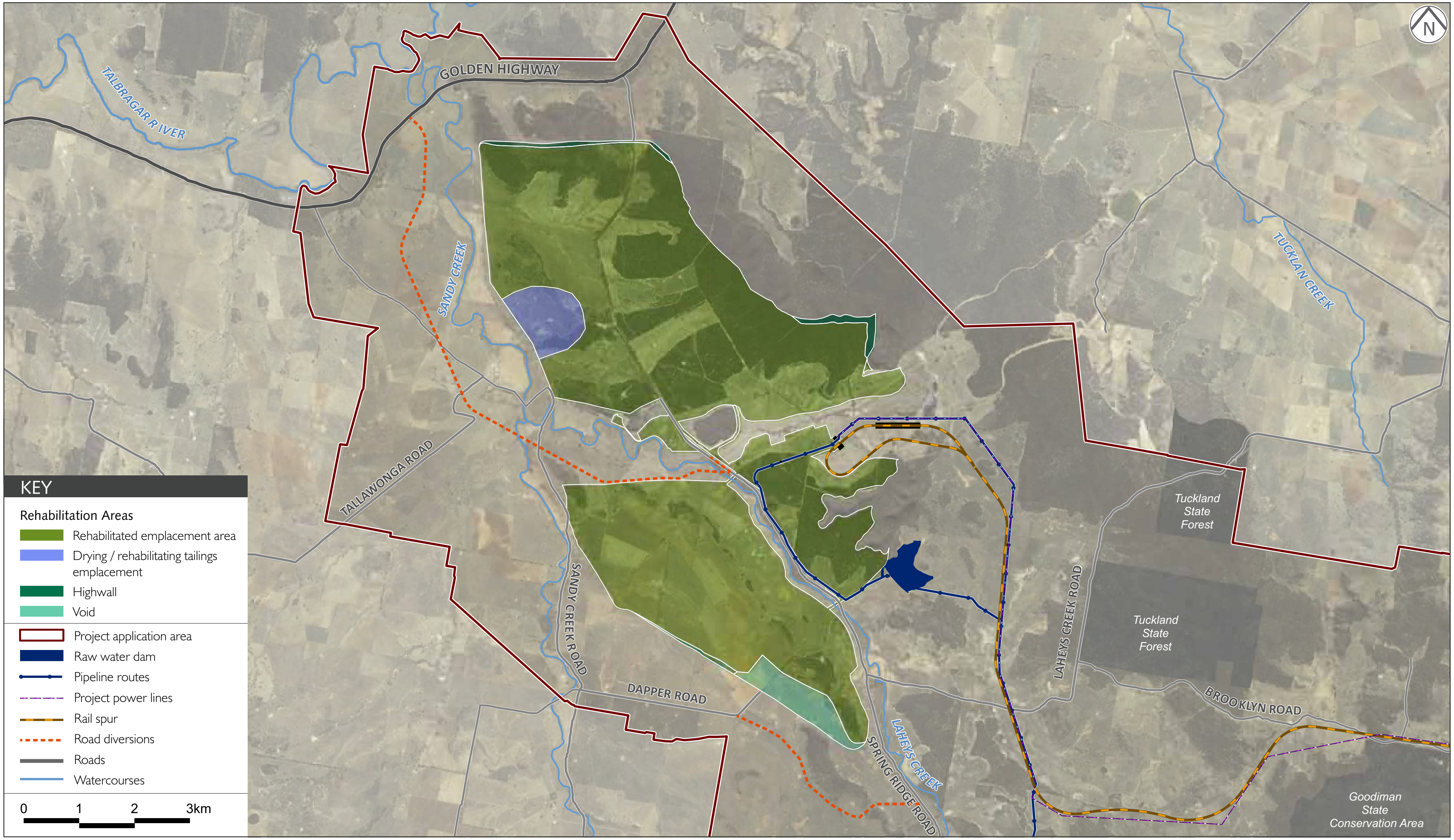

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Indicative Mine Plan - Year 21

Cobbora Coal Project - Environmental Assessment

Figure 3.9

3.5.5 Waste rock extraction and placement

Waste rock will be extracted in multiple passes. Most of the material will be blasted or ripped before an excavator or front end loader loads it into rear dump trucks. Typical blasting depths will be around 30 m, depending on the coal and geological strata. Where excavators are used, waste will be taken in 'lifts', typically 2 m to 5 m, to provide a safe and efficient work range for the excavator. Limiting the working area in this way also minimises dust generation.

The maximum waste rock thickness will be 75 m (in area B), the minimum about 0.3 m. Waste rock will initially be hauled to three out-of-pit waste rock emplacement areas:

- Area A and C out-of-pit (AC-OOP), between mining areas A and C, which will have a maximum footprint of 460 ha and an average height of 30 m above ground level, with a corresponding maximum volume of 126 million bank cubic metres (Mbcm);
- Area B out-of-pit east (B-OOP E), next to area B to the East of Laheys Creek, which will have a maximum footprint of 270 ha and an average height of 20 m above ground level, with a corresponding maximum volume of 50 Mbcm; and
- Area B out-of-pit west (B-OOP W), next to area B, between the low wall and Laheys Creek, which will have a maximum footprint of 110 ha and an average height of 15 m above ground level, with a corresponding maximum volume of 15 Mbcm.

Waste rock will be shaped to form a surface with a final topography that meets the mine closure objectives (see Section 3.20.3).

3.5.6 Coal extraction

After the waste rock is removed, either a bulldozer or grader will clean the top of the coal seam. The coal will then be drilled and blasted or ripped with a bulldozer. Either an excavator or front end loader will load coal into haul trucks for transport to the CHPP.

Mined coal will generally be stockpiled as ROM coal requiring beneficiation (cleaning) in the CHPP or a smaller volume of 'by-pass' or product coal which does not need processing.

3.5.7 Mine sequence

Mining will initially target the Ulan Lower Seam; the first coal will be obtained from a 'box cut' in area A close to the main infrastructure area. The other seams in the sequence will be mined as the operation advances down-dip. Waste rock from the box cut may be used to build the infrastructure, haul roads and initial tailings emplacement area, the remainder will be placed in the AC-OOP emplacement. Some rock from area A will be used to establish bases for the ROM stockpile and product storage areas next to the CHPP, and for plant commissioning.

After the initial box cuts have been established during the first six months of the Project, it is expected two additional pits will be established, a second pit in area A and a pit in area B. Material from these pits will be transported to the out-of-pit waste rock emplacements AC-OOP and B-OOP W. The establishment of these three pits will allow Ulan Lower, Ulan Upper and Flyblowers Creek seams to be exposed simultaneously.

As production levels increase, additional pits (working areas) will be established using excavators configured as backhoes. These machines will move onto the working area after blasting the rock and will operate on 4 m benches, loading into rear dump trucks.

Area C will be established as a working area during Year 2, with the box cut material carted to the AC-OOP.

Development of the AC-OOP and B-OOP emplacement areas will help to mitigate noise emitted from the CHPP and rail loading operations.

Coal will be hauled via a series of in-pit ramps to the central coal haul road and on to the CHPP.

3.5.8 Production schedule

The staging of mining operations will be determined by the quality of coal excavated and blending requirements. While staging will vary over the life of the Project, it will generally accord with the production schedule used for determining the Project's potential impacts that is provided in Table 3.3. It reflects the need to develop the mine in an efficient manner, to maximise coal reserves available for mining and to provide a reliable supply of coal to the Project's customers.

Table 3.3 Indicative production schedule

Mine component	Year						
	1	2	4	8	12	16	20
Waste rock removed (Mbcm)	7.8	21	36	48	48	59	56
ROM coal extracted (Mt)	1.0	10	17	20	20	20	20
Product coal (Mt)	0.7	7.1	11.2	12	12	12	12
Strip ratio (waste rock [bcm]:ROM coal [Mt])	7.5	2.1	2.2	2.4	2.4	2.9	2.8
Coarse rejects (Mt, dry)	0.2	2.1	3.7	5.6	5.6	5.6	5.6
Tailings (Mt, dry)	0.1	0.9	1.6	2.4	2.4	2.4	2.4
Disturbance area (ha)	770	1,150	1,285	1,990	1,870	1,975	1,685

Notes: 1. Tonnages are approximate

Indicative mine disturbance areas shown in Table 3.3 illustrate that the disturbed area peaks in Year 8 and remains near this maximum for a number of years due to progressive rehabilitation. In contrast, the rehabilitated area increases progressively throughout the mine's life as described in Section 3.19.3.

3.5.9 Mine fleet

The required mining plant will vary according to the mining requirements, strip ratio, timing of scheduled and non-scheduled maintenance, and other operating requirements. Indicative mine fleets for years 1, 2, 8, 16 and 20 are presented in Table 3.4 and have been used in noise and air quality modelling (Chapters 16 and 14 respectively). The actual fleet specifications and numbers may vary from those shown in table 3.4 during the life of the Project but CHC will ensure that noise and air quality compliance requirements are met.

Table 3.4 Indicative mine fleet (including ancillary equipment)

Indicative equipment	Task	Year				
		1	2	8	16	20
Excavator (600 t)	Waste rock removal	2	2	4	5	5
Excavator (250 t)	Coal and partings mining	3	4	7	6	6
Haul truck (220t)	Haul and dump waste rock	11	11	21	26	26
Haul truck (190t)	Haul and dump coal and partings	11	12	25	26	26
Drilling rigs	Blast hole drilling	2	2	4	4	4
Front end loader	Coal re-handle	1	1	1	1	1
Bulldozers	Mining bench preparation and dump maintenance/rehabilitation	11	13	22	23	23
Grader	Road maintenance	2	3	5	5	5
Water cart	Dust suppression	3	3	6	6	6

Additional supporting plant will include light vehicles, generators, pumps, cranes, fuel trucks and service vehicles.

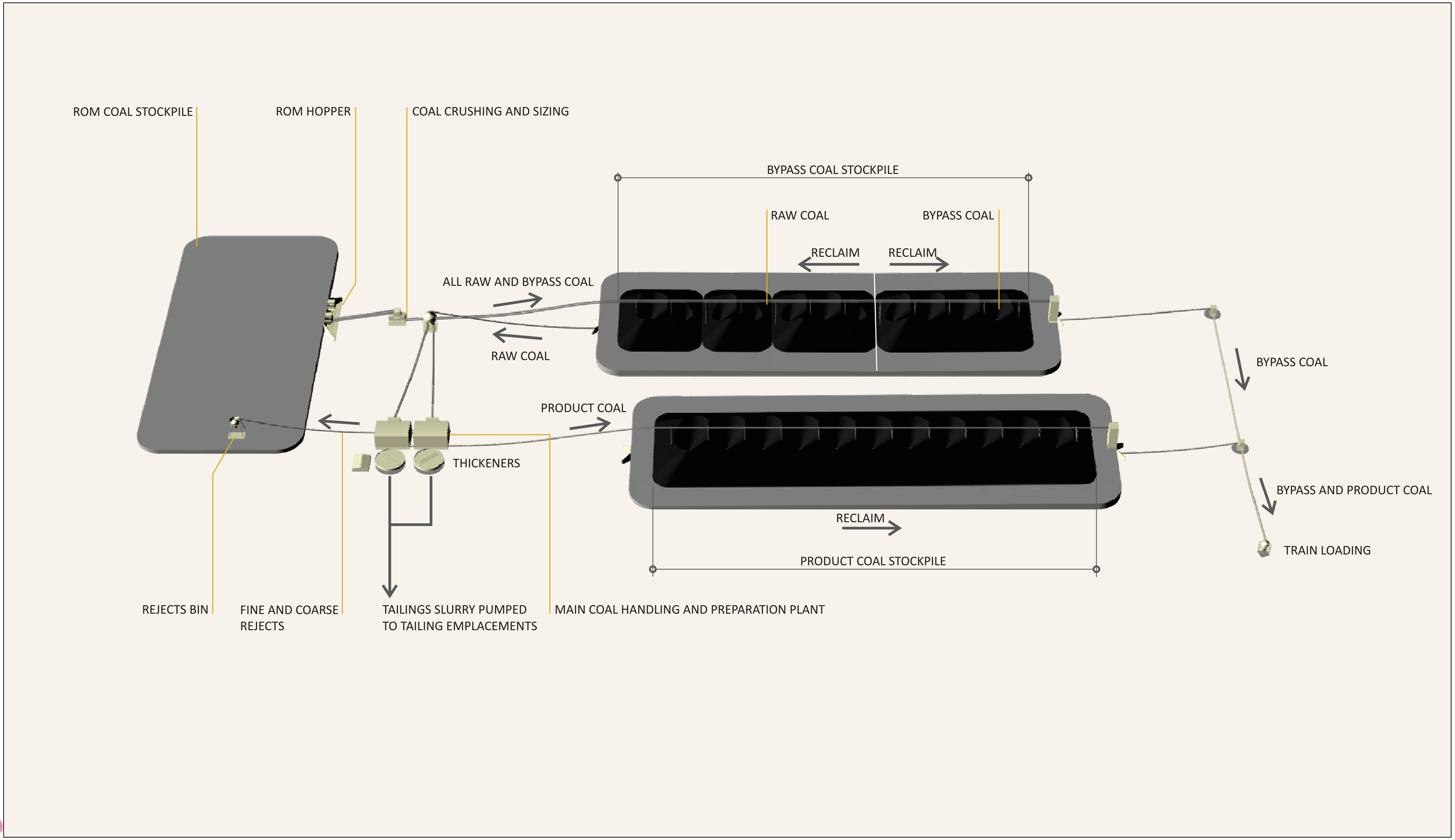
3.6 Coal preparation

The need to beneficiate (clean) the ROM coal arises because the in situ coal contains non-coal material, which is typically rock from above, below and within the coal seam, as well as other mineral matter dispersed within the coal. The preparation process reduces the mineral content (ash) of the coal, thereby improving its combustion properties and reducing the quantity of ash remaining when it is burnt at a power station. The proposed coal preparation processes are widely used in coal production.

The CHPP will be next to the rail loop in an area that will minimise the distances to haul the coal. It will be able to treat about 20 Mtpa of ROM coal to produce the planned 12 Mtpa of product coal. The CHPP's main components will be:

- ROM coal stockpile;
- truck dump station with primary sizer;
- secondary and tertiary crushing plant;
- crushed ROM stockpile;
- coal washing modules;
- reclaim tunnels;
- conveyors;
- product coal stockpiles; and
- control and monitoring instrumentation.

The coal preparation process is shown schematically in Figure 3.10.



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Coal Preparation Schematic

Cobbora Coal Project - Environmental Assessment

Figure 3.10

3.6.1 ROM coal handling

Haul trucks carrying ROM coal from the mine will generally discharge the coal directly into a ROM hopper in the CHPP area. Alternatively, ROM coal will be discharged to a nominally 500,000 t ROM coal stockpile that will be used to even out the effects of surges in production or inclement weather on the continuity of supply to the CHPP. When required, coal will be transferred from the stockpile to the hopper using a front end loader or a front end loader and trucks.

Coal from the hopper will be crushed through a series of sizing stations to nominally 50 mm diameter then conveyed to the raw coal stockpile.

Where the ash content of ROM coal meets the customer's product coal specifications, or where beneficiation will not substantially improve the ash content, the coal (referred to as 'bypass' coal) will be mined as cleanly as possible, crushed and placed directly in the bypass coal stockpile and then loaded directly onto a train.

3.6.2 Coal handling and preparation plant

ROM coal will be crushed in stages to achieve a maximum diameter of nominally 50 mm (as discussed above) and then processed as two size fractions. The cut (particle) size that separates the two fractions will be defined during detailed design. Coarse and fine coal will then be directed to separate cleaning circuits.

The coarse and fine ROM coal will be cleaned by accelerated gravity separation which relies on the coal having a lower density than non-coal material.

The coarse ROM coal will be placed into a fluid referred to as dense medium, which is a suspension of very small particles of magnetite (an oxide of iron) in water. The overall density will be closely controlled by adjusting the proportion of magnetite in the suspension. The separated coarse product coal will be drained and rinsed to remove the magnetite and then dewatered in a centrifuge before being discharged onto the product conveyor.

Reject materials will be drained and rinsed, then conveyed to the rejects bin and loaded onto trucks for cartage back to the mining area. The magnetite will be recovered through draining, rinsing and magnetic separators, then recycled back to the process.

In the fines coal circuit, the fine ROM coal will be mixed with water and pumped through classifying cyclones to remove very fine particles (ie tailings, which are mostly clays and other very fine mineral particles) and then fed to spiral separators. The spirals facilitate a simple gravity separation by taking advantage of the differential centrifugal effects on the coal and non-coal particles. After thickening in cyclones, the fine coal product stream will be dewatered in centrifuges before discharge to the product conveyor. Rejects from the spirals will be thickened in cyclones before being combined with coarse rejects or, alternatively, combined with the thickened tailings.

A thickener will be used to remove some of the water from the tailings. The water will be recycled in the CHPP. Flocculants and coagulants will be added to improve the settling characteristics of the very fine particles. Chemicals may also be added to control pH.

The tailings will be pumped to tailings emplacements in the mining area.

3.6.3 Product coal stockpiles

Product coal will be conveyed from the CHPP to a stockpile which will have a maximum capacity of 1 Mt. Stockpiles will be managed using a skyline conveyor system and a bulldozer that will push stacked coal away from the stacking line, providing additional stockpile capacity.

3.6.4 Reclaim conveyor

Product (or bypass) coal will be fed to the reclaim conveyor beneath the product/bypass stockpile. More than one feeder will be able to operate at a time so that coal can be blended during reclaiming. Bulldozers will push coal toward the feeders when the trains are being loaded. Product coal reclaimed via the feeders will be conveyed to the load-out bin at the rail loop.

3.6.5 Coal handling and preparation plant reject material

At full production about 8 Mt of CHPP reject material will be produced annually. Coarse reject material will be about 70 to 75% (on a dry weight basis) of these rejects with tailings making up the remainder. Therefore at full production, about 5.6 Mt (dry weight) of coarse rejects and 2.4 Mt (dry weight) of tailings will be emplaced in the mining area annually.

i Course rejects management strategy

Most coarse reject material will be buried in the waste rock emplacements. It will be covered with waste rock and topsoil or suitable top dressing so that rehabilitation objectives are met. Some rejects will be used to construct the tailings emplacement embankments and to cap the tailings during rehabilitation.

ii Tailings management strategy

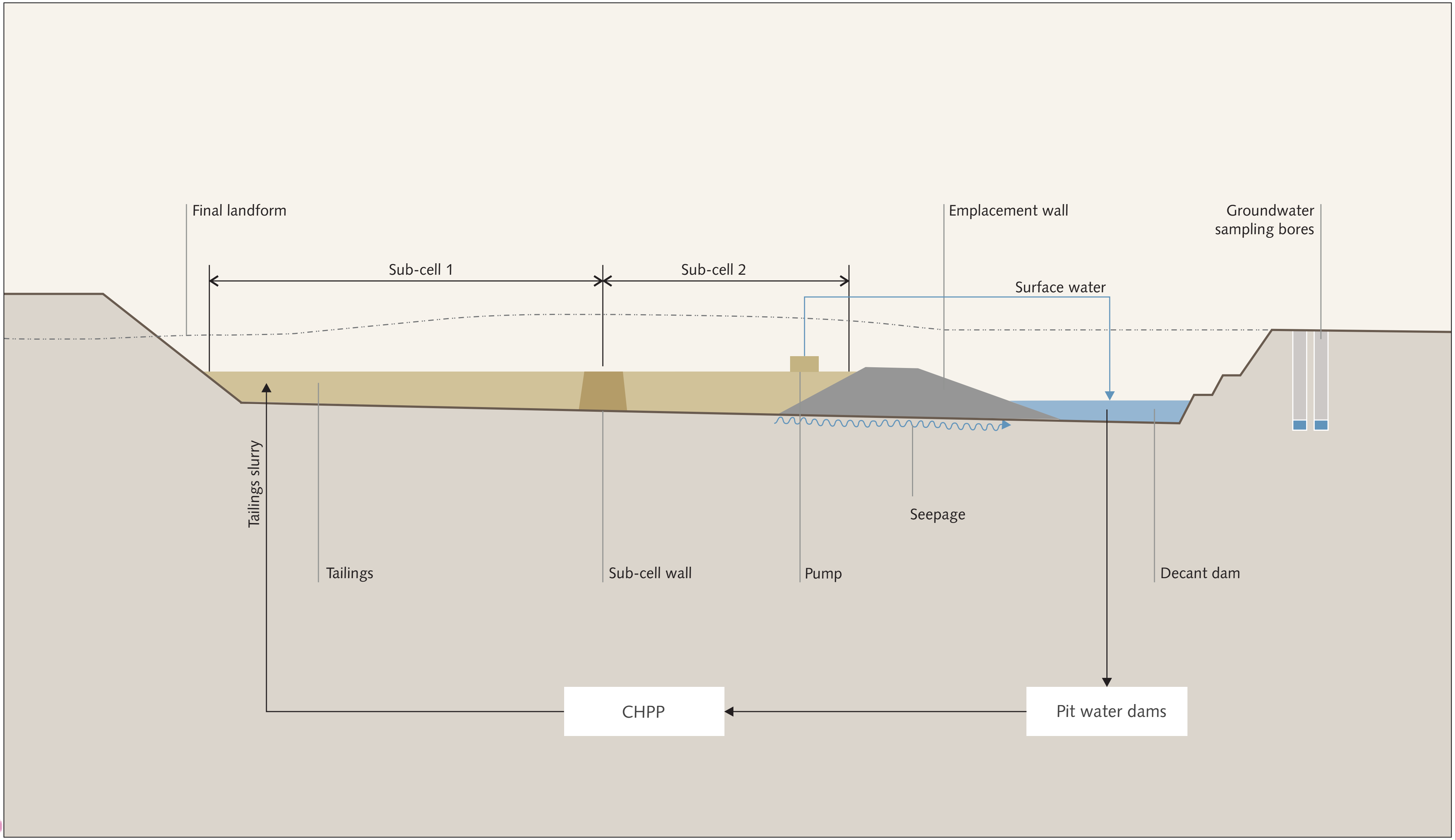
Tailings will be thickened as described in Section 3.6.2 and pumped to the active tailings emplacement area (TEA) TEA1, TEA2 or TEA3, for further dewatering and consolidation through seepage and surface evaporation. The tailings pumped from the CHPP will be about 35% solids (by volume) and within about two days the tailings will consolidate to around 55% solids. The expected tailings placement rate is summarised in Table 3.5.

Table 3.5 Tailings placement volume

Year	Tailings placement (Mbcm)							
	1	**2**	**3 to 4**	**5 to 8**	**9 to 12**	**13 to 16**	**17 to 20**	**21**
Tailings production	1.49	1.84	6.01	14.5	14.5	14.5	14.6	1.82
Cumulative tailings production	1.49	3.33	9.34	23.9	38.4	53.0	67.5	69.3

Notes: 1. Tailings volume based on 55% solids (by volume) following consolidation and a settled bulk density of 1.2 t/m^3.

The Project will use two main tailings pond designs. Initially, a valley-type emplacement (TEA1) will be used and then tailings will be placed in impoundment-type emplacements (TEA2 and TEA3) shown schematically in Figure 3.11. In TEA1, a primary embankment will be constructed and tailings placed upslope of the primary embankment. Impoundment-type emplacements will be used in flat areas where embankments are required on all sides. Each tailings emplacement area will contain a number of smaller sub-cells. The tailings emplacement schedule will rotate tailings placement through the sub-cells. This will maximise drying and consolidation of tailings.



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Tailings Emplacement Schematic

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Figure 3.11

The tailings emplacements will be within the envelopes shown in Figures 3.2 to 3.8. Their exact configuration will be determined as part of detailed design. All tailings emplacements will be fully engineered structures with oversight by DTRIS and the Dam Safety Committee (DSC).

Once each tailings sub-cell is full, the tailings will be left to dry and then covered and rehabilitated as described in Section 9.4.1. The schedule for the use, drying and rehabilitation of the tailings emplacements areas is provided in Table 3.6.

Table 3.6 Tailings placement schedule

Tailing emplacement area	Emplacement type	Mine year[1]		
		Emplacement operation	Drying	Rehabilitation
TEA 1	Valley	1 to 5	6 to 10	11 to 12
TEA 2	Impoundment	6 to 13	10 to 18	15 to 21
TEA 3	Impoundment	14 to 21	18 to 26	18 to 29

Notes: 1. filled sub-cells will be closed and drying started while other sub-cells within the emplacements continue to be filled.

iii Tailing emplacement area 1

The initial emplacement area, TEA1, will be a valley-type emplacement constructed on the existing land surface approximately 2 km north of the main infrastructure area (Figures 3.2 to 3.4). The primary embankment will be constructed of waste rock and coarse rejects. It will be used until about Year 5 when it will be subsumed into the mining area, allowed to dry and then covered (see below). Approximately 13 Mbcm of tailings will be placed in TEA1 to a total depth of about 30 m.

Diversion drains or embankments will be used to prevent runoff entering the emplacement. Water on the surface of the tailings will be drained to decant ponds and will be pumped to the pit water circuit (see Section 3.13.4). It is not planned to line the emplacement as fine tailing particles will quickly fill the pores and interstitial spaces in the underlying materials, minimising seepage.

Any seepage from the tailings will be collected in subsoil drains within the primary embankment. These subsoil drains will direct water to a decant dam downslope and to the north of TEA1. A pumping system will return water from the decant pond to the pit water circuit.

iv Tailing emplacement areas 2 and 3

After TEA1 is full, the tailings will be placed in the impoundment-type emplacements, TEA 2 (from about Year 6 to Year 13) and TEA 3 (from about Year 14 to Year 21). These emplacements will be constructed in mining area A (see Figures 3.5 to 3.8). The base of the embankments will be placed directly onto the mined-out area or on waste rock that has been placed and compacted in a manner that ensures that overlying tailings emplacements and embankments, are stable. At mine closure, the total thickness of any underlying waste rock, emplaced tailings, the final emplacement cap, overlying waste rock (including the capillary barrier) and topsoil will be below the proposed final landform height (see Section 3.20.4).

About 29 Mbcm of tailings will be placed in TEA2 to a depth of about 40 m and about 27 Mbcm of tailings will be placed in TEA3 to a depth of about 30 m. The emplacement embankments will be constructed of compacted waste rock and coarse rejects.

The embankments will be raised above the surrounding mining area so surface runoff will not be able to enter the emplacements. Any seepage will be directed to decant ponds by drains progressively placed through the tailings profile as the emplacements are filled. Pontoon pumps in the decant ponds will return decant water to the pit water system.

Any water seeping through the base of the emplacements will generally flow along the undisturbed base of the mined-out area to the sumps used to dewater the mining area. This pit water will be pumped to the CHPP. Any water seeping into fractures in the base of the mining areas will mix with the underlying Permian aquifers. However, the water quality of the seepage is expected to be similar to that in the Permian aquifers and no impact to groundwater is predicted from un-recovered seepage (see Section 7.5.4). Groundwater monitoring bores will be installed down-gradient of the tailings emplacements and groundwater levels and quality regularly monitored.

There is not predicted to be significant acid and metalliferous drainage from the tailings (see Section 6.4). However, any tailings which are potentially acid forming will be placed so that they will be below the post-mining water table preventing the oxidation of sulfur and acid generation.

3.7 Train loading

Product coal from the product stockpile will be transferred by conveyor to an overhead loading bin and transferred to trains. Trains will be loaded using a telescopic chute.

3.8 Rail spur

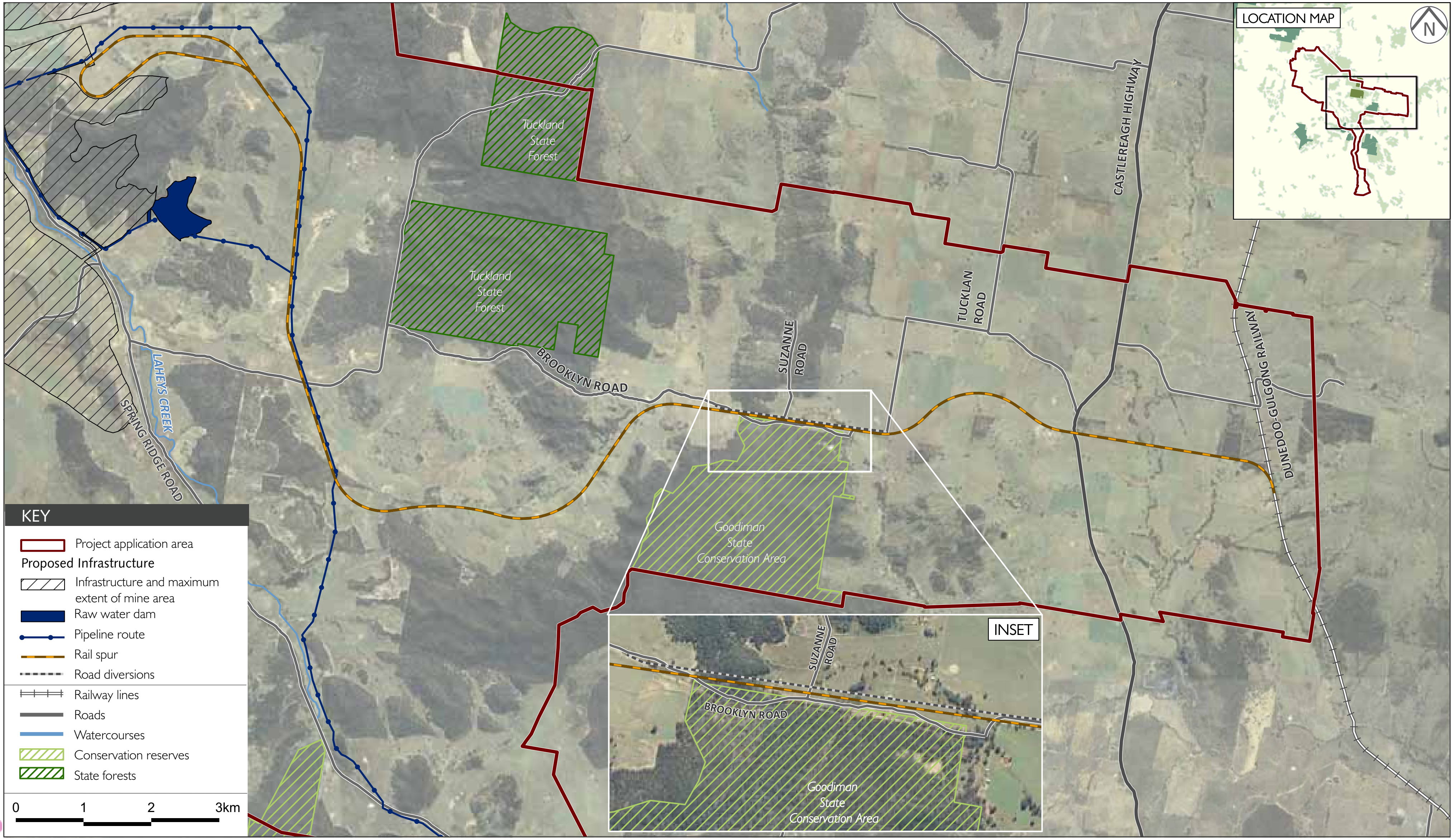
The rail spur will be some 28 km long and meet Australian Rail Track Corporation Ltd (ARTC) track design standards. The spur will have a single loop at the train loading facility and will join the Dunedoo–Gulgong Railway near Tallawang Figure 3.112.

The rail turnout will allow access to the rail spur from Dunedoo–Gulgong Railway from the south. Loaded or empty coal trains will access the rail spur only in this direction. Signalling at the turnout and along the rail spur will be controlled from the ARTC Network Control Centre North at Broadmeadow.

No rail level crossings will be required on public roads.

3.9 Locomotive provisioning facility

Allowance has been made for a locomotive provisioning facility if required by ARTC. It would occupy a 0.75 ha area within the balloon loop and provide fuel and servicing requirements for locomotives transporting coal from the Project, and amenities for the train crews. It would be owned and operated by a third party.



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Rail Spur

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Figure 3.12

Its main components would be:

- self-bunded diesel storage tank (about 100,000 L) constructed and operated in accordance with Australian Standard 1940 – The Storage and Handling of Flammable and Combustible Liquids (AS 1940-2004), with two fuel tankers a day transporting diesel by road to the tank;
- oil storage tank (about 5,000 L) to store engine oil for train maintenance (and bunded to capture spills);
- sand tank (about 40 m^3) to store the sand used to provide trains with traction;
- oil-water separator to treat oily water;
- storage shed (about 6 m by 6 m);
- maintenance gantry to provide access to trains for maintenance purposes such as windscreen cleaning and repair;
- water storage tank (1,000 L) — the water will be used for train maintenance and to supply the toilet and wash system on the trains;
- access road suitable for use by B-double vehicles; and
- ancillary mechanical and electrical equipment, such as pumps and lighting.

3.10 Coal transport

Coal will travel by rail to the Project's customers, primarily Bayswater, Liddell, Eraring and Vales Point power stations (Figure 3.13). Bayswater and Liddell power stations are in the Upper Hunter Valley near Muswellbrook. Eraring and Vales Point power stations are on the NSW Central Coast. Some coal may also be transported to other domestic customers or to Newcastle for export.

Coal will not be transported to Mt Piper or Wallerawang power stations. Extensive rail upgrades would be required to transport coal from the Project south of Gulgong. It is unlikely these would occur in the life of the Project.

At full production, the Project's power station customers will typically require four return train trips a day (eight train movements), seven days a week, from the mine. There may also be one more domestic train or an export coal train return trip to the Port of Newcastle each day. The trains will be mainly 7,800 t to 8,800 t loaded capacity and 1,370 m to 1,500 m long. About 20% of the trains will deliver coal to the two Hunter Valley power stations (Bayswater and Liddell), the remainder will travel on to the Central Coast with a minority going to Newcastle port.

The customers will select rail hauliers to transport coal from the Project to their power stations while CHC will select rail hauliers to transport coal to the port. The rail hauliers will provide rolling stock and will operate the coal trains. This will include negotiating rail access agreements with ARTC and RailCorp.

Coal will not be transported along the rail line south of Gulgong through Mudgee.

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Coal Transport Route

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Figure 3.13

3.11 Roads

3.11.1 Mine access

The mining and infrastructure areas will be in the northern part of the PAA and generally be accessed by a new road from the Golden Highway in the north or from the existing Spring Ridge Road to the south (light vehicles only). Some access will be required to non-active mine areas for non-mining activities such as surveys, rehabilitation and ongoing management.

3.11.2 Internal roads

Internal roads will minimise the need for mine traffic to use local public roads. Haul trucks will travel on designated roads between the mine faces and the ROM stockpile. Haul road bridges will be used to cross Spring Ridge Road and haul trucks will not cross public roads at grade (ie at the same level as vehicles on the public road). Haul roads will be extended as the mine progresses. They will be watered as required to control dust emissions.

Service, delivery and light vehicles will be segregated from haul traffic as far as possible when outside the mining areas. A light vehicle road will connect the main infrastructure area and CHPP.

3.11.3 Local roads

Parts of the existing road network will require upgrade, modification, closure and/or realignment. The required realignments will take into account topography, existing environmental constraints, land ownership and titles, flooding and the location of the mine and associated infrastructure, and the need to maintain access to Crown land, among other constraints. The roads and associated structures will be designed and constructed in accordance with council and RMS requirements (generally Austroads).

The following road sections will be closed:

- a section of Spring Ridge Road (about 7 km) north of the mine gate;
- a section of Sandy Creek Road (about 6 km) north of the Spring Ridge Road diversion;
- a short section (1.3 km) of Sweeny lane Road on eastern side of the Spring Ridge Road diversion;
- Danbar Road (1.7 km) in the mining area;
- a short section of Dapper Road;
- a short section of Brooklyn Road where the rail spur will be constructed; and
- short sections of Tallawonga Road where it is crossed by the Spring Ridge Road diversion.

Replacement roads and road realignments for construction and operations traffic movements will be:

- realignment of a section of Spring Ridge Road, which will join the Golden Highway about 4 km west of the existing intersection and reconnect to Spring Ridge Road on the southern side of the main infrastructure area. This road will provide northern site access;