Soil stripping would be required for all drilling sites and ventilation shaft construction areas, as well as the Reject Emplacement Area, Brine Storage Area and ROM coal storage area extension. The remaining facilities, ie. access tracks and power lines, would be constructed or installed above the soil which would be retained in-situ.

2.4.9.4.2 Soil Categories and Stripping

Soils were sampled on the basis of landform units identified by stereoscopic interpretation of the four geological formations over which the soil occurred (Napperby Formation, Garrawilla Volcanics, Pilliga Sandstone, Purlawaugh Formation). A total of 16 landform units were identified on the Mine Site within the four geological formations. Selective soil stripping would also be undertaken when installing the pipeline between the mine site and the Namoi River.

Napperby Formation

- Napperby Formation Drainage Line.
- Napperby Formation Lower and Mid-Slopes.

Garrawilla Volcanics

- Garrawilla Volcanics Drainage Line.
- Garrawilla Volcanics Floodplain.
- Garrawilla Volcanics Upper Slopes.

Purlawaugh Formation

- Purlawaugh Formation Crests.
- Purlawaugh Formation Major Drainage Line.
- Purlawaugh Formation Floodplain
- Purlawaugh Formation Lower Slopes.
- Purlawaugh Formation Mid-Slopes.
- Purlawaugh Formation Upper Slopes.
- Purlawaugh Formation Upper Drainage Lines.

Pilliga Sandstone

- Pilliga Sandstone Crests.
- Pilliga Sandstone Drainage Line.
- Pilliga Sandstone Lower and Mid-Slopes.
- Pilliga Sandstone Upper Slopes.

Figure 2.11 identifies the locations of these formations and sampled location(s) of the 16 landform units. An analysis of the chemical and physical properties of the soils of the 16 landform units completed by GCNRC (2009a) has determined that with appropriate controls implemented, all of the soils could be stripped and stockpiled prior to surface disturbing activities and replaced following completion of these activities. Soil stripping associated with

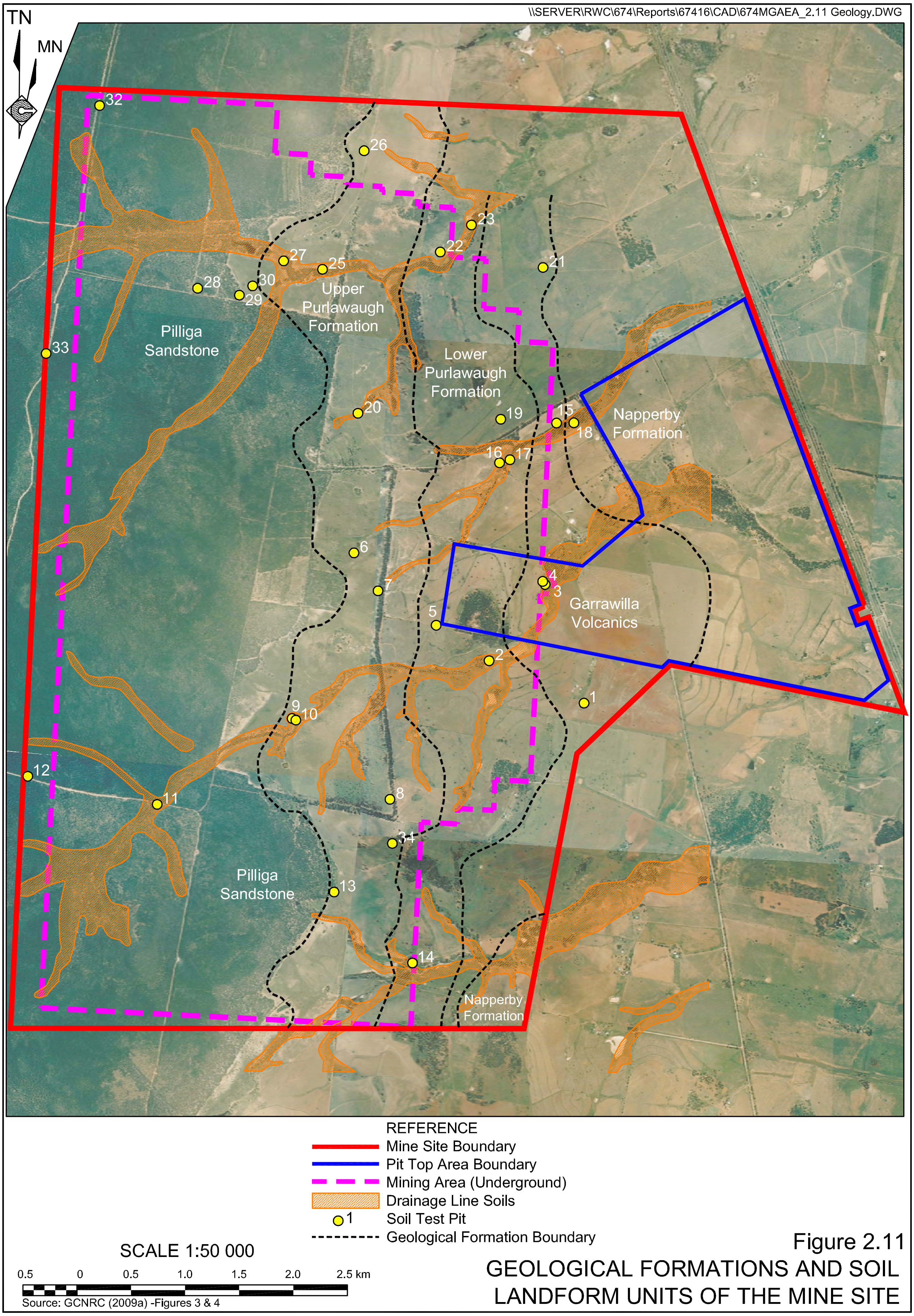

Figure 2.11
GEOLOGICAL FORMATIONS AND SOIL LANDFORM UNITS OF THE MINE SITE

the proposed Longwall Project would be generally restricted to topsoil from drill sites, ventilation shaft areas and access roads. The topsoil would be stripped no deeper than the depths identified by GCNRC (2009a) using mainly a bulldozer and either a front-end loader or backhoe to place the soil in stockpiles.

GCNRC (2009a) does note, however, that the physical or chemical characteristics of some of the soils may make them susceptible to impacts as a result of subsidence. Section 2.8 provides a more detailed description of each of the soils of the 16 identified landform units and the potential impacts associated with subsidence on 14 of the 16 landform units.

2.4.9.5 Soil Stockpiling Methods

All soils within the areas to be disturbed would be stockpiled in wind rows immediately adjacent to the area of disturbance. The wind rows would not exceed 2m in height with the surfaces to be left with a ‘rough’ surface to assist in runoff control, seed retention and germination. The stockpiles would be seeded using a pasture cover crop to reduce erosion potential and assist in the maintenance of the biological viability of the soil resource. This stabilisation would be undertaken as soon as practicable after the construction of the stockpile to minimise erosion.

Following stockpile construction, the operation of machinery on the stockpiles would be avoided in order to prevent compaction and maintain soil aggregation.

2.4.9.6 Construction of Access Roads and Service Corridors

As illustrated on **Figure 2.10**, a number of access tracks across the Mine Site would be aligned along pre-existing access tracks. However, in order to access the pre-drainage and goaf gas drainage sites along the length of each longwall panel, an access road and service corridor would be constructed along the tailgate of each panel, roughly 30m to the west of each retained chain pillar.

The alignment of each access track and services corridor would be defined as described in Section 2.4.9.2 and construction would be completed as follows.

- Archaeological or ecological sites of significance would be identified and marked with the alignment of the corridor revised if possible to avoid these locations.
- Vegetation would be cleared, as described in Section 2.4.9.3, to create a road and services corridor approximately 10m wide.
- The cleared surface would be graded and compacted.
- Access track and services corridors that traverse drainage lines would be constructed with shallow crossings or using pipelines to maintain natural drainage and reduce erosion hazard.

Excluding the upgrading of pre-existing tracks across the Mine Site, approximately 80km of access road and service corridor would be required throughout the life of the mine. Based on a road and services corridor with a width of 10m, up to 80ha of the Mine Site[4] would be disturbed to provide access to ventilation and drainage infrastructure throughout the life of the mine.

[4] A small portion of each access road and services corridor would coincide with disturbance associated with pre-drainage and goaf gas drainage. As such, the value of 80ha is likely to be an absolute maximum.

2.4.9.7 Construction of Ventilation Shafts

Shafts of up to 6m in diameter would be constructed. The preferred construction technique would be "blind bores", ie. bores constructed from the surface into the underground workings to depths of between approximately 170m and 320m below surface. The technique involves the drilling of the shaft to the coal seam prior to the development of the roadways in the coal with these roadways connected to the base of the shaft after their final completion. It may be necessary to initiate small blasts within the shaft, particularly when the harder volcanic units are encountered. Such blasts are routine for shaft construction and cause few effects because of their size and depth below the surface. In any event, all blasts would satisfy DECC blasting criteria (see Section 4B.7.3.7). **Figure 2.12** presents the arrangement of the Ventilation Shaft Area during construction and operation.

The construction area for each Ventilation Shaft would be approximately 5ha and incorporate the following component areas.

- Drill rig foundation and shaft drilling zone.
- General equipment laydown area.
- Casing laydown area.
- Stores and container area.
- Parking area.
- Generator, compressor and fuel storage area.
- Spoils handling area.
- Water and drill spoil settlement pond(s).
- Sediment dam.

At each ventilation shaft construction site, vegetation clearing and soil stripping and stockpiling would be undertaken as described in Sections 2.4.9.3 and 2.4.9.4. Where practicable, even within the construction area, trees that can be retained in-situ (without jeopardising the drilling operations or personnel safety) would be retained. The water and drill cuttings pond(s) would be lined with an impermeable black plastic which would eventually be removed prior to pond backfilling and rehabilitation of each Ventilation Shaft Area.

During shaft drilling, a specifically designed bailing bucket would be used to dewater the shaft, with the water pumped to the water storage pond. The bailing bucket would be used in preference to a pumping system due to the impact of drilling fines and muds on the operations of pumping systems. Drilling fluid would be discharged into the settlement ponds. The end product does not have any toxic or harmful chemicals and can be treated for solids and discharged into the environment via a sediment basin. Each drill pad would be designed and constructed such that any overflow from sediment basins or sumps would be retained on the drill pad itself, ie. no run-off would be discharged to local drainage or impact on undisturbed vegetation.

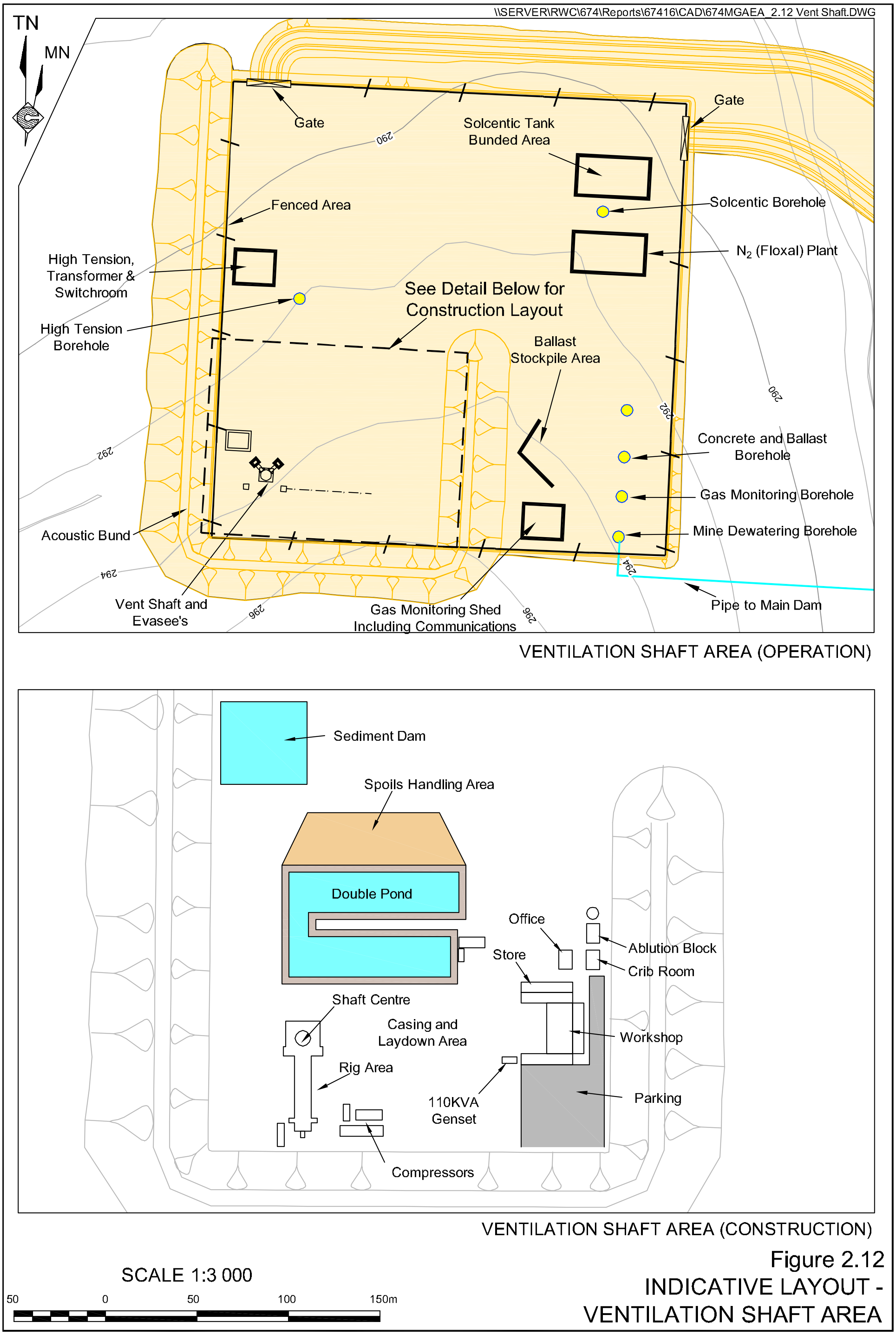

Figure 2.12
INDICATIVE LAYOUT - VENTILATION SHAFT AREA

The waste rock removed during the drilling would be stockpiled within the spoils handling area. This material would be used in conjunction with subsoil to construct the acoustic bund wall around the Ventilation Shaft Area as well as in the backfilling of the water and drill cuttings settlement ponds. Any run-off from these stockpiles would be directed to drill pad sediment basins or sumps, with overflow from these prevented from discharging from the drill pad.

The initial ventilation shaft would be constructed opposite LW2 concurrently with the mining of the West Mains (see **Figure 2.10**) during which time mine ventilation would be provided from surface fans located within the box cut for the three mine drifts. As the underground mine develops to the west, two additional ventilation shafts and surface fan/s would be constructed from surface into the West Mains. Ventilation shafts and fans would also be constructed from surface into the rear of approximately every third or fourth longwall panel (see **Figure 2.10**). These facilities would only be providing / exhausting relatively small quantities of air ($25m^3/s$ – $30m^3/s$) and are likely to be of a maximum diameter of approximately 1m to 1.5m with surface disturbance of a significantly less impact than for the main fan facilities (<1ha). While the additional ventilation shafts and surface fans would be positioned based on the ventilation requirements of the mine, the locations presented on **Figure 2.10** provide an illustration of the likely locations. The layout and construction of the additional ventilation shaft and fan areas would be the same as for the initial site.

The location and number of surface ventilation locations is based on a conservative assessment of ventilation requirements and is therefore likely to provide for more ventilation capacity than may be required, ie. the number of surface ventilation points, and therefore area of surface disturbance is unlikely to exceed that illustrated on **Figure 2.10**. **Figure 2.10** provides for ventilation from the West Mains from Maingates 2, 7 and 8, and rear of panels LW2, LW5, LW9, LW12, LW14, LW19 and LW21. Therefore, on the basis that each West Mains ventilation shaft area would disturb up to 5ha and each rear of panel ventilation shaft area up to 0.25ha, up to 17ha of the Mine Site would be disturbed to accommodate the ventilation requirements of the Longwall Project of the life of the mine.

Access to the locations of the ventilation shafts and fans would utilise existing farm tracks where possible, with any road upgrade (or construction) undertaken as described in Section 2.4.9.5).

2.4.9.8 Surface to In-seam Pre-Drainage Drilling Sites

Surface to In-seam (SIS) pre-drainage requires a number of small diameter SIS boreholes to be drilled into and then along the length of the coal seam. The SIS boreholes are drilled from surface inbye of each longwall panel as illustrated on **Figure 2.13a**. Once drilled into the Hoskissons Coal Seam, the SIS boreholes would be split into two or three small diameter lines (see **Figure 2.13a**) to increase the capacity for gas desorption into the boreholes and therefore drainage from the seam. The effective length on these boreholes may extend to 2km, however, the current pre-drainage proposal for the Longwall Project provides for a maximum length of 1.5km. **Figure 2.13a** also illustrates the surface disturbance associated with each "SIS Borehole Drill Site". An area of approximately 80m x 80m would be required for each SIS Borehole Drill Site (0.64ha), however, as with other surface drilling sites, mature trees and other vegetation would be retained where practicable within each site. Each drill site would be designed and constructed such that any overflow from sediment basins or sumps would be retained on the drill pad itself, ie. no run-off would be discharged to local drainage or impact on undisturbed vegetation. Any run-off from stockpiled material would be directed to the drill site sediment basins or sumps, with overflow from these prevented from discharging.

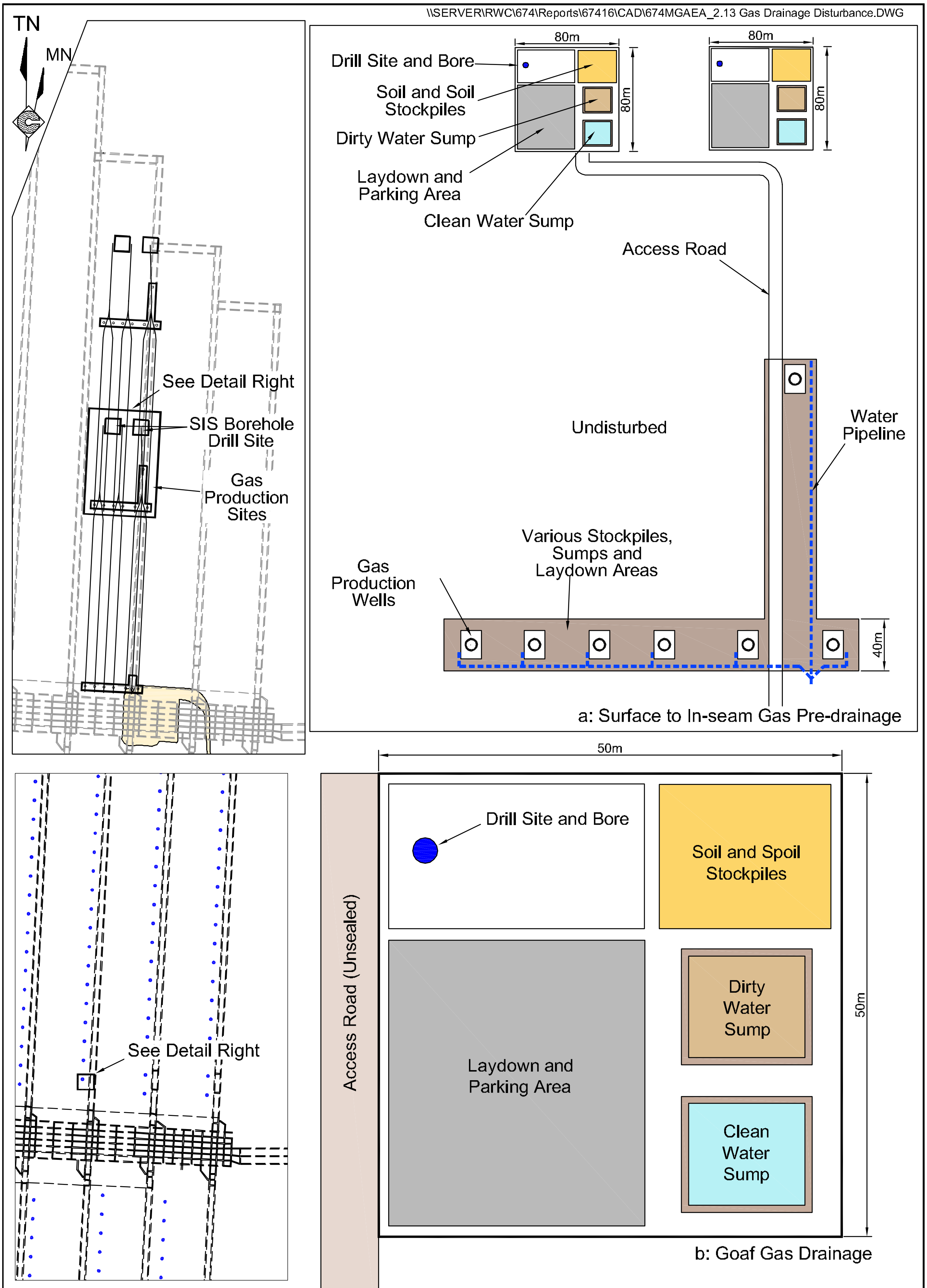

Figure 2.13
SURFACE DISTURBANCE ASSOCIATED WITH GAS PRE-DRAINAGE

At the outbye extremity of each set of SIS boreholes, a pump well would be constructed to intersect each SIS borehole. A pump at the top of each well would be used to extract the gas and water accumulating in the SIS boreholes. **Figure 2.13a** identifies the general arrangement of the "Gas Production Sites", as well as the general surface disturbance associated with each site. The current pre-drainage arrangement provides for seven pump wells at each Gas Production Site (see **Figure 2.13a**), requiring an area of approximately 2.9ha.

Apart from the shorter eastern longwall panels (LW1, LW2, LW24 and LW26), it is anticipated that the length of the blocks would require three sets of Surface to In-seam (SIS) production wells along the length of the longwalls. Only two sets of SIS production wells would be required for the shorter eastern longwall panels. The footprint of disturbance in each case would be reflect that illustrated on **Figure 2.13a**, ie. requiring an area of approximately 3.5ha.

It is noted that a number of the longwall panels LW9 to LW13 and LW20 to LW23 lie very close to the northern or southern boundary of the Mine Site. For these longwall panels, and to ensure that all surface disturbance relating to SIS production wells remains on the Mine Site, the SIS drill sites may need to be drilled up-dip.

As noted in Section 2.4.5.3.1, it is considered likely that once underground mining progresses beyond LW2 or LW3, gate road development will be sufficiently advanced ahead of longwall mining to enable conventional underground in-seam pre-drainage to be undertaken. Given the approximate area of surface disturbance required for this method of pre-drainage would approximate 0.5ha (3ha less than the SIS drilling surface disturbance requirements), the areas of surface disturbance illustrated on **Figure 2.10** are likely to far exceed the areas actually disturbed over the life of the mine. However, for the purpose of this *Environmental Assessment*, the total area of disturbance assumes that SIS drilling would be undertaken for the life of the mine. Therefore, on the basis that three SIS Drill Sites and accompanying Gas Production Sites would be required for Longwall Panels LW3 to LW24, and two would be required for LW1, LW2, LW25 and LW26, the total area of disturbance would be up to 259ha. It is worthy of note that this represents an absolute maximum area of disturbance as the Proponent would reduce, or consolidate with areas of disturbance associated with other activities (eg. access roads), the area of disturbance.

2.4.9.9 Goaf Gas Drainage Drilling Sites

As noted in Section 2.4.5.3.2, gas concentrating in the goaf of the underground workings would be removed via a vacuum pump attached to the top of a cased 250mm internal diameter borehole, located towards the edge of the completed longwall panel and at approximately 200m intervals. The boreholes would be drilled from surface and would therefore require the creation of a drill pad of approximately 50m x 50m. Within the drill pad, provision would be made for the drill site itself, two small sumps and storage of vehicles and drilling materials (see **Figure 2.13b**). An access track would also therefore be cleared and maintained for as long as the goaf gas drainage vacuum pump is required to operate (see Section 2.4.9.5).

At each drill site, vegetation clearing and soil stripping and stockpiling would be undertaken as described in Sections 2.4.9.3 and 2.4.9.4. At most locations, there would be no need to clear any trees and groundcover would be retained over any areas not required for drilling or access requirements. Two small sumps (5m x 5m) for recycling and storage of water and drilling waste would be constructed with each sump lined with an impermeable plastic liner which would

eventually be removed prior to sump backfilling and rehabilitation of each drill site. Drill spoil collected and consolidated within the two sumps would be removed as necessary and ultimately used, in conjunction with stockpiled subsoil to backfill the sumps of the drill site. Each drill site would be designed and constructed such that any overflow from sediment basins or sumps would be retained on the drill pad itself, ie. no run-off would be discharged to local drainage or impact on undisturbed vegetation. Any run-off from stockpiled material would be directed to the drill site sediment basins or sumps, with overflow from these prevented from discharging.

As the longwall mining operation progresses to the west, and the slope of the surface increases, some of the drill sites are likely to be located adjacent to ephemeral drainage lines. To prevent runoff from significant rainfall events flowing through the disturbed areas of each drill site, upslope catch banks would be constructed parallel to contour at each of these sites. These catch banks would divert overland flows away from, and discharge the water down-slope of the drill sites.

2.4.9.10 Power Line Installation

A power line easement and access track would be constructed and maintained to each main and tailgate ventilation surface fan, although these would only be extended as each new shaft and surface fan is constructed. As far as practicable, these easements would be aligned to avoid disturbance to any substantial trees within the 30m wide surface corridor. **Figure 2.10** provides the indicative alignment of the power lines to the ventilation shaft areas.

2.4.9.11 Longwall Assembly Site

The longwall assembly area would comprise a flat hardstand constructed by cut and fill methods to the north of the current Pit Top Area infrastructure (see **Figure 2.2**). The area of 2.5ha comprises cleared paddocks and would not result in the clearing of any trees. Topsoil and subsoil would be initially stripped and stockpiled for use in the rehabilitation of the longwall assembly area. The excavated 'cut' material would be preferentially used to build up the 'fill' section of the area, however, this may be supplemented by material excavated from drift construction.

2.4.9.12 ROM Coal Pad Extension

Figure 2.2 also identifies the proposed 2.2ha extension to the ROM Coal Pad and realigned road which runs around the northern areas of the Pit Top Area. The ROM Coal Pad extension would be constructed using material excavated from drift to provide a hard and flat surface. The realigned road would similarly be elevated above natural topography using material excavated from drift construction.

2.4.9.13 Reject Emplacement Area

The proposed coal screening and washing process (see Section 2.5.3) would generate both coarse and fine reject material. This reject would be transferred from the coal handling and processing facilities of the Pit Top Area to a Reject Emplacement Area (see **Figure 2.1**). An area of up to 25ha has been allocated to the west of the box cut for the storage and management of this reject material. Further detail on the generation, transfer and management of the reject material is provided in Section 2.5.4.

2.4.9.14 Brine Storage Ponds

As noted in Section 2.4.8.4, a site water balance prepared for the Longwall Project reflecting the results of the groundwater modelling, operational water requirements and the treatment of raw groundwater producing 80% raffinate and 20% brine, predicts that after 3 to 4 years of operations, additional brine storage would be required to that provided by Dams A2, A3 and B. The volume of surplus brine is predicted to gradually increase throughout the life of the mine. The footprint for the Brine Storage Area identified on **Figure 2.2** covers an area of approximately 160ha, which with an average storage depth of 5m would provide sufficient storage capacity of approximately 8 000ML, sufficient for the predicted brine generated over the life of the Longwall Project[5].

Acknowledging the uncertainty associated with mine in-flow predictions, the Proponent would progressively construct brine storage ponds within the nominated area. Each cell would provide sufficient capacity for several years predicted brine generation and would provide the Proponent with flexibility to modify the brine management to reflect observed mine in-flows and brine generation.

- In the event that mine in-flows are significantly less than predicted, the total footprint area would be reduced to reflect the lower volumes of brine that would be generated.
- Similarly, in the event that a beneficial use for either the raw groundwater of brine is identified (reducing the reliance on either brine generation or storage), the total footprint area would be reduced.
- In the event that mine in-flows are significantly greater than predicted, the depth of each brine storage pond would be increased to ensure that the total footprint area would not be increased.

Based on the current predictions for mine dewatering and brine generation, **Figure 2.14** displays the layout and typical sections through the brine storage ponds of the Brine Storage Area. Given the uncertainty over mine dewatering requirements, a conceptual layout for the brine storage ponds has been provided for brine production for the Life of Mine, with the size of each cell increasing to accommodate the increasing volume of water generated by the mine throughout this period.

Each brine storage pond would be constructed with a storage depth of approximately 5m and 0.5m freeboard. The cell walls would be constructed with a slope of no greater than 3:1 (H:V). A sequential process of topsoil removal would be adopted, with subsoil recovered from the floor of each cell used to construct the perimeter walls. The topsoil would be used to stabilise the outer slopes of the cell walls (which form the perimeter of the Brine Storage Area). Surplus topsoil would be stored in dedicated stockpiles around the perimeter of the Brine Storage Area.

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[5] This area accounts for the proposed construction of the Brine Storage Area as a series of progressively constructed cells (which would reduce the total storage capacity due to the volume of earth required to construct each cell wall).

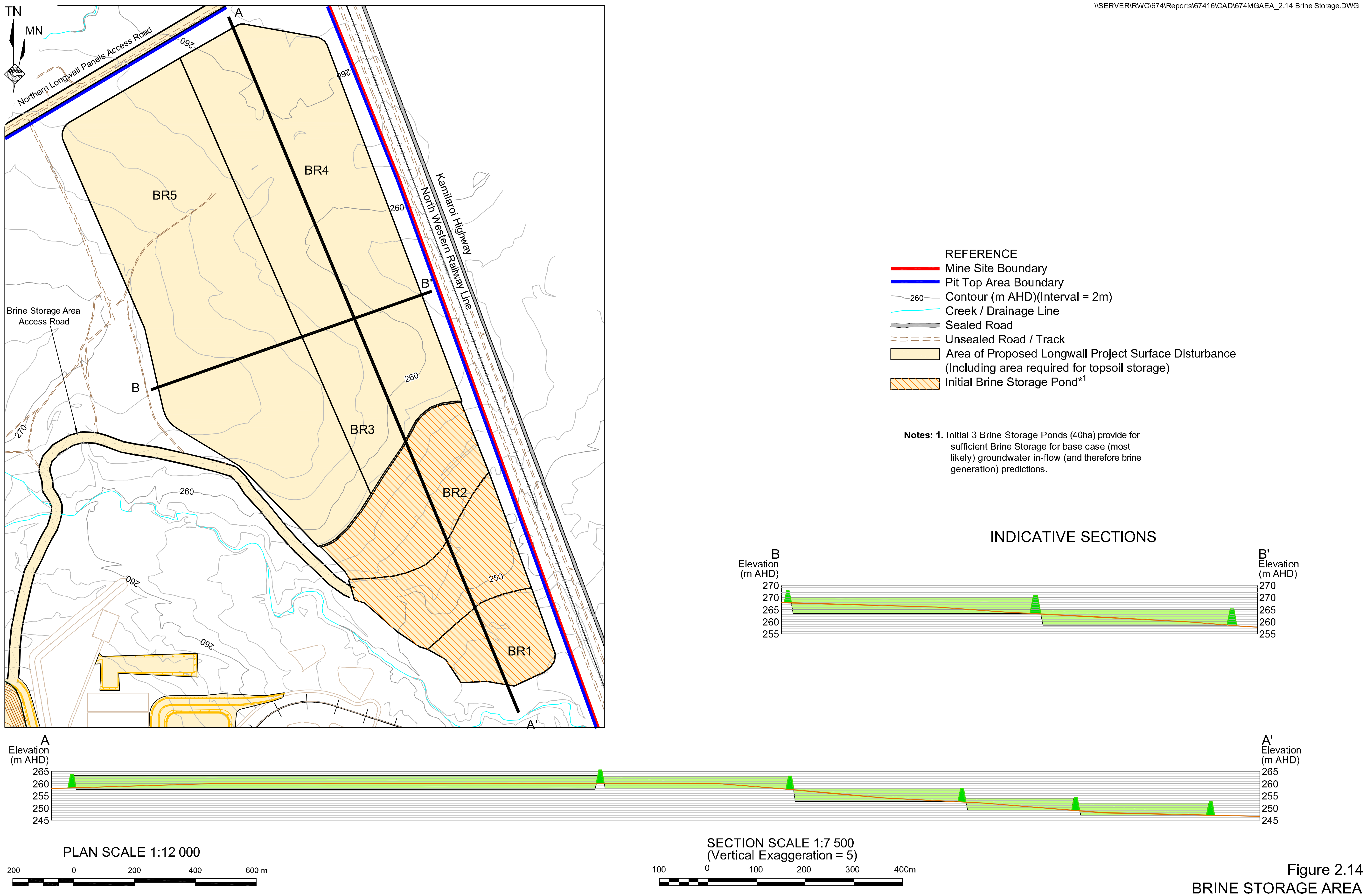

Figure 2.14
BRINE STORAGE AREA

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As the water to be held within the evaporation / storage ponds would be saline in nature, the ponds would be constructed to be effectively impermeable. Based on the South Australian publication "*EPA Guidelines – Wastewater and Evaporation Lagoon Construction (EPA 509/04)*", a permeability of $1x10^{-9}$m/s would be the maximum allowable level of material used to construct the floor and walls of the evaporation / storage ponds. To achieve this level of permeability, the Proponent would first compact a layer of clayey material, of at least 300mm thick, obtained from in-situ material over the constructed cell wall. Care would be taken to ensure that any rocks and/or coarse or sharp material is removed or compacted within the cell batter. An impermeable plastic liner (similar to that used to line Dams A1, A2, A3 and B within the rail loop) would then be laid over the cell floor and inner walls.

Based on the predicted mine dewatering requirements and existing storage facilities available within the rail loop (346ML), it is anticipated that the first storage cell would not be required for between 4 and 5 years, with construction commencing approximately 6 to 12 months prior to the cell being required. Additional cells would be designed and constructed to store the anticipated volume of brine to be generated over the following 2 to 5 years and similarly would be constructed approximately 6 to 12 months prior to the cell being required.

Observed mine in-flows and water use on the Mine Site would be monitored and compared to the predictions and assumptions used in the preparation of the site water balance. These observations would be used to validate the in-flow predictions and recalculate the necessary storage capacity of the Brine Storage Area. The size and design of the brine storage ponds would be modified as required (within the Brine Storage Area footprint) to accommodate the re-calculated water balance for the Longwall Project.

2.4.9.15 Water Pipeline between the Mine Site and Namoi River

Two pipelines, each of 300mm in diameter, would be laid within a trench approximately 1.2m deep within the alignment described in Section 2.4.8.3. Beneath the roads and railway line traversed by the pipeline corridor, the pipelines would be installed with the aid of an under-road / rail boring machine. The boring machine would also be used to install the section of the pipelines that would traverse beneath Kurrajong Creek – Tributary 1. The two pipelines would enable the Proponent to either pump water from the Namoi River to the Mine Site, or raffinate from the Mine Site to the Namoi River. Each pipeline would be installed with leak detection equipment, such as flow meters pressure gauges placed at regular intervals along the length of the pipeline.

An excavator would be used to dig and fill in the trench with emphasis placed upon separating the topsoil. Efforts would be made to avoid disturbing mature vegetation along the route, however, this would be unavoidable over parts of the corridor (especially along the road easement which runs parallel to the Mine Site which is only 10m to 12m in width and heavily vegetated in parts). The in-filled trench would be allowed to revegetate naturally as the soil excavated would be replaced immediately following the placement of the pipes.

2.4.9.16 Subsidence Monitoring Lines

In accordance with the recommendations of DGS (2009), the Proponent would install subsidence monitoring survey pegs between 10m and 15m apart, both along longitudinal lines line extending in-bye and out-bye from each longwall panel starting and finishing point, as well as two transverse subsidence lines across the northern and southern panels.

To establish each subsidence monitoring line, an access track the width of a light vehicle would be required (~3m). It is estimated that up to 100km of access tracks would be required, with the majority of these utilising pre-existing tracks created for pre-drainage or goaf gas drainage access. Only the transverse subsidence lines are likely to require additional disturbance to that described in the previous sections, 20 000m x 3m = 6ha. Given the conservative nature of the estimated disturbance described in the preceding sections, it is considered that this area is already incorporated into estimates of surface disturbance.

2.4.9.17 Summary of all Surface Disturbing Activities

Based on the proposed mine design, ventilation and gas drainage requirements, and additional disturbance associated with other activities associated with the Longwall Project, **Table 2.10** provides the anticipated maximum area of disturbance associated with the Longwall Project. In total, approximately 700ha would be disturbed to varying degrees. Further discussion on the extent of disturbance of native vegetation within this area is provided in Section 4B.4.5.

Table 2.10
Indicative Areas of Disturbance for Surface Facilities Required for the Longwall Project within the Mine Site

Component	Area (ha)
Ventilation Fan Sites	17
SIS Pre-drainage Site (Development and Production)	259*
Goaf Gas Drainage Sites	100
Internal Power Lines	57
Internal Access Roads and Service Corridors	80
Longwall Assembly Site	2.5
ROM Coal Storage Extension	2.2
Reject Emplacement Area	25*
Brine Storage Area	160*
Total	**698.7**
Note *: This refers to the maximum area of disturbance	

2.5 COAL PROCESSING AND REJECT MANAGEMENT

2.5.1 Introduction

As part of the resource evaluation completed for the proposed Stage 2 operations, a comprehensive review of coal quality and washability was undertaken. Based on this review, it has been determined that all coal mined from the underground operation would be subject to processing, albeit simple crushing and/or coal washing to achieve a high yield of the ROM to product coal.

The following subsections describe the modifications to Pit Top Area infrastructure, the coal processing and stockpiling operations and the management of the coarse and fine reject that would be generated by the processing operations.

2.5.2 Modifications to Approved Coal Handling and Preparation Facilities

As illustrated on **Figure 2.15**, the ROM coal pad would be extended to the north to provide for the increased stockpile requirements and additional infrastructure required to accommodate the increase in coal production from 2.5Mtpa to a maximum of 8.0Mtpa. The ROM coal pad extension would increase the size of the pad from approximately 2ha to approximately 4.2ha and would, in combination with the elevation of the ROM coal drift conveyor and stacking system, increase the ROM coal storage capacity to 400 000t.

The coal conveyor and stacking system would be upgraded to accommodate the increased volume of ROM coal produced annually. The coal processing circuit would also be modified from that approved for the Stage 1 operations, principally to incorporate a washing circuit for the larger sized coal (>16mm) and by-pass system for the <16mm sized coal.

Finally, as a consequence of adding a washing circuit to the coal handling and preparation facilities, both coarse reject (stone and oversize [>50mm] coal) and fine reject (<0.5mm material) would be produced. The Proponent proposes to progressively develop a Reject Emplacement Area over a maximum area of 25ha to store the coarse and fine reject material.

2.5.3 Coal Handling and Preparation Facilities

Figure 2.16 identifies the following components of the coal handling and preparation facilities, together with a flow chart mapping the process from the ROM coal. **Figure 2.17** provides a detailed illustration of the washing and dewatering circuit of the Coal Preparation Plant (CPP).

Crushing and Screening

- Drift conveyor to deliver primary sized (<200 mm) ROM coal from Pit Bottom to the surface. The conveyor would deliver coal at a rate of up to 3 500t per hour.
- An overhead ROM coal stacking system with a travelling tripper[6] which would tip ROM coal from a height of 13m above the base of ROM coal pad. The ROM coal pad would have a storage capacity of 400 000t.
- Two ROM coal reclaim tunnels would deliver the ROM coal from the ROM coal pad at a rate of up to 1 000t per hour to a rotary breaker.
- The rotary breaker, would reduce the coal from <200mm to <125mm at a rate of 1 000t per hour.
- From the rotary breaker, the <125mm coal would be conveyed to a dry screen for separating the >16mm coal for washing through the CPP and the <16mm coal which would by-pass the CPP and be transferred directly to the product coal stockpile pad.

[6] The travelling tripper allows the ROM coal to be tipped from the conveyor at any point along the stacking system.

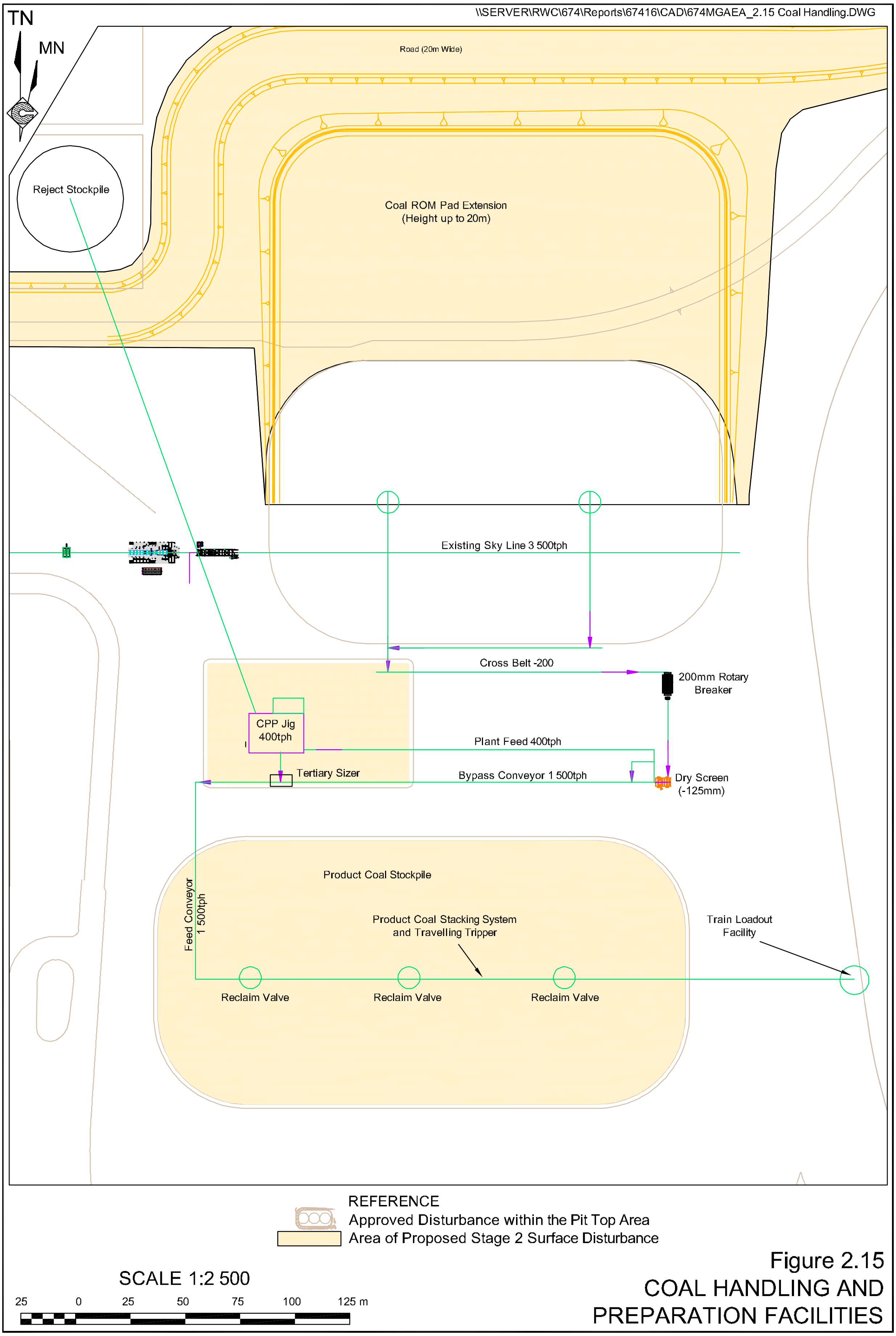

Figure 2.15
COAL HANDLING AND
PREPARATION FACILITIES

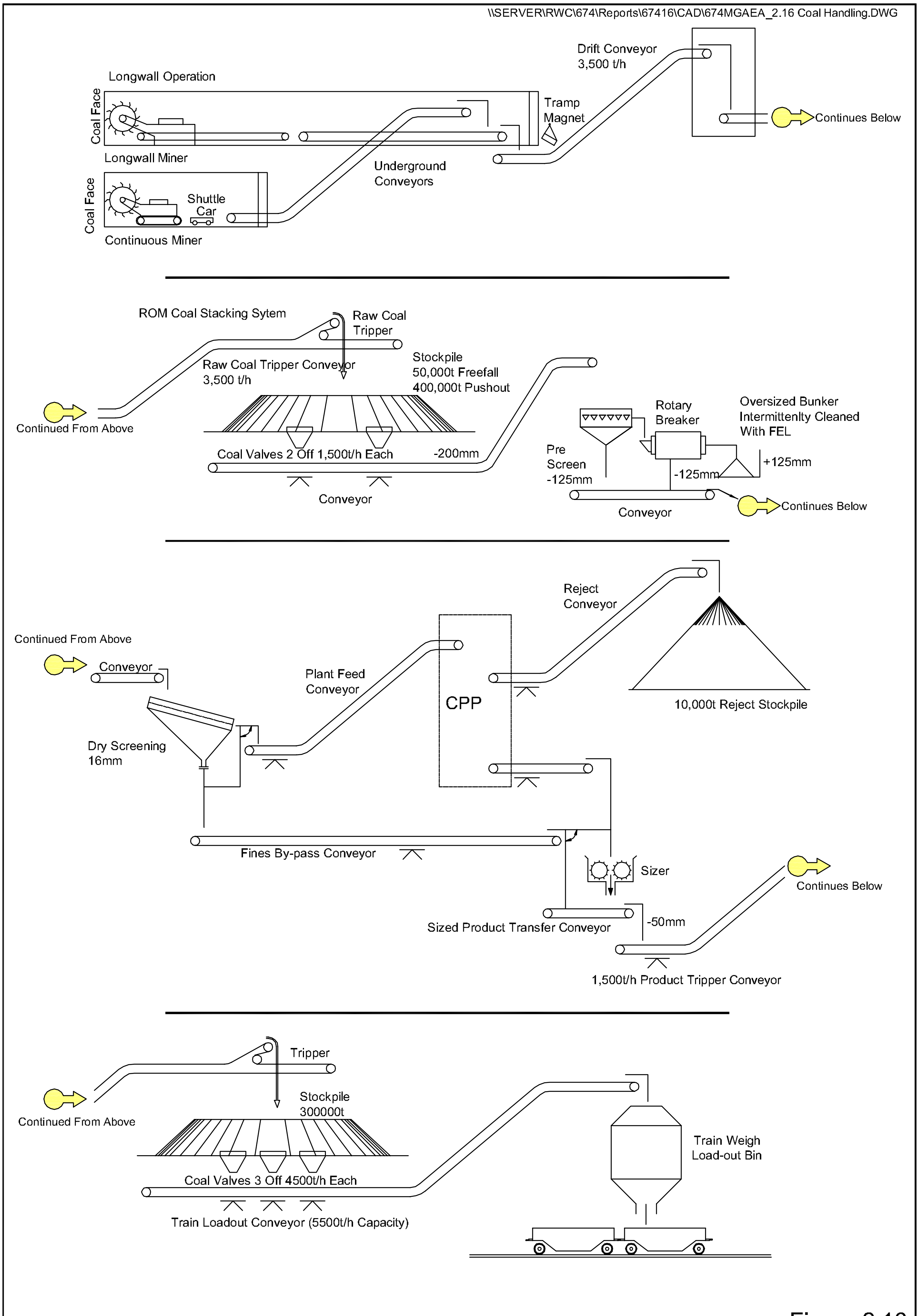

Figure 2.16
MINING / PROCESSING FLOWSHEET

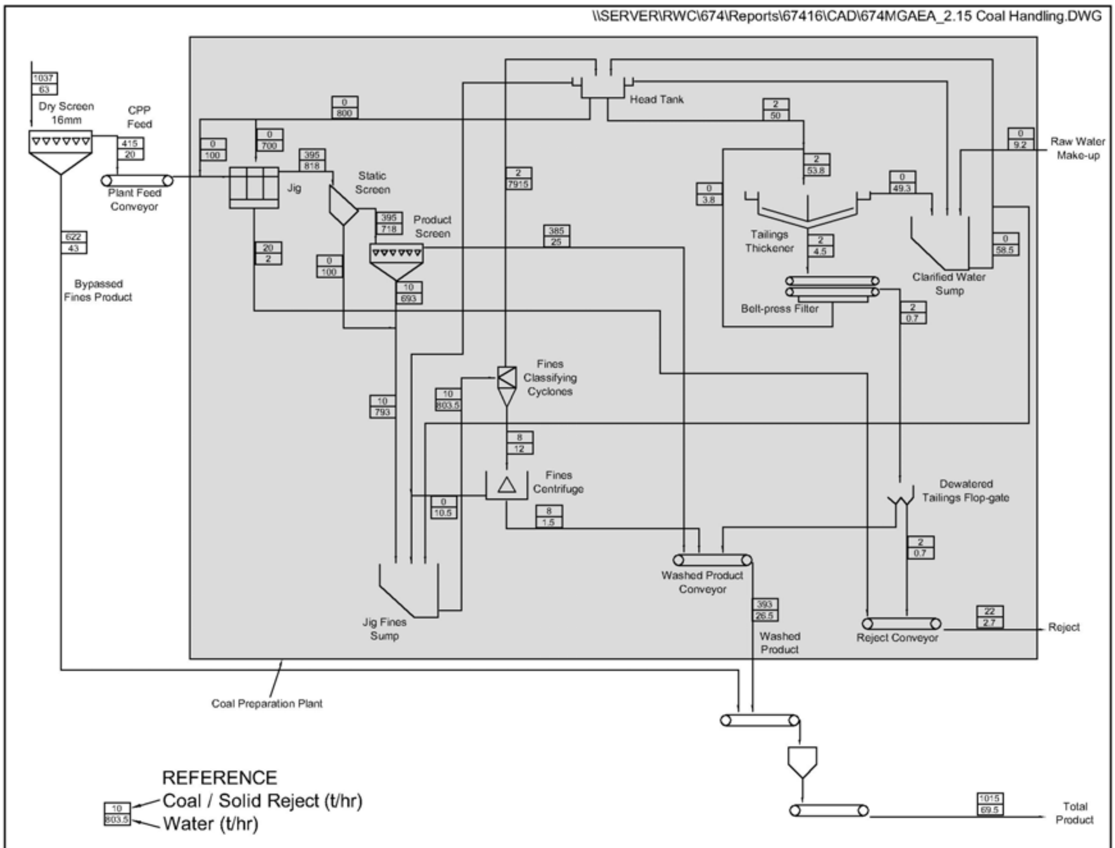

Figure 2.17
COAL PREPARATION PLANT FLOW SHEET

Coal Preparation Plant (Washing)

- Water would be added to the >16mm coal within a jig washing plant ("the jig") with the >50mm coal and other reject screened off by a tertiary sizer and sent to the reject pile prior to loading to trucks and placement within the Reject Emplacement Area. The jig would wash the coal at a rate of approximately 435t per hour.
- The washed coal would then pass over a static screen and then a final product screen before being re-introduced to the by-pass conveyor for delivery to the product coal stockpile pad.
- The water and fines mixture ("fines") from the jig would report to the jig fines sump and would be separated within classifying cyclones into <0.1mm ("ultra-fine reject") and >0.1mm material.
- The >0.1mm material would be dewatered within a fine coal centrifuge with the water returned to the washing circuit and the dewatered fines conveyed for inclusion with the washed product coal.
- Water containing the ultra-fine reject would overflow from the classifying cyclone and report to a head tank. From the head tank, the water would either be introduced to the jig or sent to a tailings thickener to thicken the ultra-fine reject which would be sent to a belt-press filter for final dewatering and generation of filter cake. A bleed line from the head tank to the thickener ensures ultrafine material does not continually recirculate and build up within the plant.

- The filter cake would then be conveyed, via a flop-gate to a conveyor for transport to either a product or reject stockpile. Any remaining water would be captured at the flop-gate and delivered to the washed product conveyor to maintain product coal moisture.

Product Coal Stacking

- Both the by-pass circuit and CPP circuit would deliver coal to an overhead coal product stacking system above the product coal storage pad. A travelling tripper would allow for the discharge of coal (from a height of 20m above the floor of the pad) at any point along the length of the stockpile. The capacity for the product coal storage pad would be increased from 100 000t to 350 000t with dozer push.
- A product reclaim tunnel would be constructed beneath the product coal storage pad, incorporating three reclaim valves spaced approximately 80m apart. From the reclaim tunnel, trains would be loaded using a fully automated, batch weighing system at a rate of approximately 5 500t per hour.

Reject Stockpile Management

- The coarse reject and filter cake would be conveyed to a conical stockpile west of the ROM coal pad. The reject would be regularly loaded by front-end loader to trucks for placement within the Reject Emplacement Area to the west of the coal handling and preparation facilities.

2.5.4 Management of Processing Reject

2.5.4.1 Reject Quantities and Characteristics

The coal preparation process is expected to remove up to 5% of the total ROM feed as reject, which would be predominantly rock from the floor of the workings. About 90% of this would be coarse reject (16mm to 125mm) with the remainder being filter cake produced by the dewatering and thickening of the ultra-fine reject that is not blended with the coal products. The two reject streams would be mixed prior to conveying and stockpiling within the Reject Pile (see **Figure 2.15**). Consequently, there would be no requirement for a separate fines disposal facility, and the combined reject would be a clean, low moisture gravel-sized material well suited to the construction of the Reject Emplacement Area by conventional “earthmoving” procedures.

Based on a recoverable coal resource of approximately 170 million tonnes and a 30 year mine life, the total reject to be accommodated in the Reject Emplacement Area would approximate 8.2 million tonnes. Assuming a conservative dry density of 1.5tonnes/m^3, the total volume of the reject to be managed within the Reject Emplacement Area would approximate 5.7 million m^3.

2.5.4.2 Reject Emplacement Area Location, Design and Construction

The proposed location of the Reject Emplacement Area (see **Figure 2.2**) is on the north-facing side of a low ridge immediately to the west of the box cut for the mine drifts. The Reject Emplacement Area would be bounded on the north by Kurrajong Creek, and on the south by the crest of the ridge. The proposed location of the Reject Emplacement Area falls gently at about 1.5° from the ridge to the bank of Kurrajong Creek over a distance of about 600m.

The area allocated to the Reject Emplacement Area is approximately 25ha, although it would be developed progressively throughout the life of the mine and the entire area may not be required for the management of reject material. The emplacement would be constructed against the slope of the ridge, rising to a maximum of 15m above the natural surface level.

The Reject Emplacement Area would be constructed as a series of elongated (north-south oriented) cells in a westerly direction. Each cell would be approximately 20m wide to accommodate the truck operating requirements. Prior to placing waste, the emplacement footprint would be progressively stripped of topsoil and subsoil to a depth of about 400mm, with the stripped material being either stockpiled for later use in the rehabilitation of the emplacement, or placed directly on completed sections of the emplacement or at other locations on the Mine Site where rehabilitation may be required. The coal reject may generate saline leachate and testing of the reject would be undertaken to determine the propensity of the material to generate saline, or otherwise contaminated leachate. In the event that the testing indicates the reject has a propensity to generate saline leachate, or leachate with elevated concentrations of other contaminants, the base of each cell would be constructed to be effectively impermeable. To achieve a permeability of $1x10^{-9}$m/sec or less, the Proponent would either:

- compact a layer of clayey material (at least 300mm thick) over the base of each cell, taking care to ensure that any rocks and/or coarse or sharp material are removed or compacted within the cell batter; or
- in the event insufficient in-situ material of suitable impermeability is not available, additional clay would be imported or an impermeable plastic liner used.

Shallow piezometers (lysimeters) would be installed down-slope of the Reject Emplacement Area to monitor salinity levels and confirm no leaching of saline material.

A comprehensive drainage system would be constructed prior to the commencement of the initial cell and all subsequent cells (see **Figure 2.18**). The surface water system would include:

- diversion drains to the east and south of the Reject Emplacement Area to prevent clean runoff from entering the area;
- catchment drains at the western and northern perimeter of each cell to capture runoff from the active area of the Reject Emplacement Area; and
- a storage basin (SB3) at the northern end of each cell from where the collected water would be pumped back to the main mine water management ponds for re-use and/or treatment as appropriate.

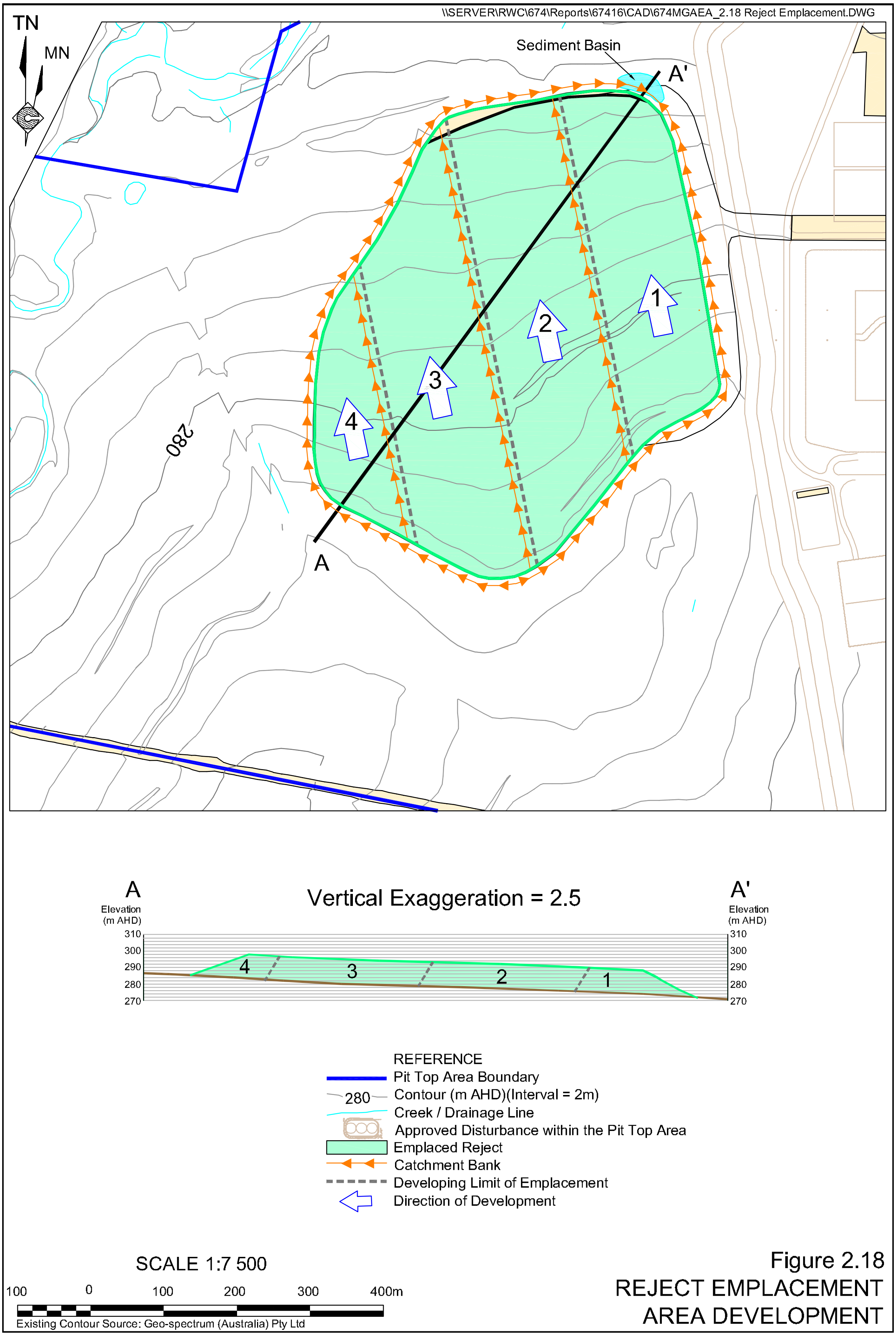

Figure 2.18
REJECT EMPLACEMENT AREA DEVELOPMENT

Reject would be paddock-dumped within the active Reject Emplacement Area cell and then spread by dozer to form a typical lift thickness of about 1.5m. Each lift would be compacted by a combination of track rolling by the dozer and trafficking by the reject delivery haul trucks. The initial eastern batter of the Reject Emplacement Area, as well as the progressive development of the northern and southern batters, would be created with a slope of 14° (4H:1V) as this would form the final face of the landform once the Reject Emplacement Area is completed. The active western batter would be maintained at angle of repose (>30°) until the final cell is completed when the external batter would be reduced to 14°.

2.6 TRAIN LOADING AND COAL TRANSPORTATION

The Proponent forecasts that with the use of the 5 500t/h capacity overhead load-out facility, a 72 wagon train with a capacity of 5 400t would be loaded and despatched in approximately 90 minutes upon arriving at the rail loop. The Pit Top Area rail loop could accommodate longer trains, which would reduce the number of rail movements generated by the Longwall Project.

The operation and timing of trains along the North Western Branch Railway Line is determined by the Hunter Valley Coal Chain Logistics Team, and as such, the Longwall Project requires 24 hour, 7 days a week train operation to ensure the flexibility to operate within the train paths allocated to the haulage contractor. While daytime loading would be preferable, it may not always be possible.

At the proposed maximum mining rate of 8Mtpa and an average train capacity of 5 400t, an average of five trains would be loaded and despatched each day of the week[7]. The Proponent anticipates the number of loaded trains despatched daily would vary from three to seven, and occasionally eight per day. The rate of despatch would vary to meet shipping arrival schedules at Port Newcastle.

2.7 SERVICES

2.7.1 Potable, Ablutions and Fire Fighting Water Requirements

All potable water required for ablutions and related uses would be imported to site on a regular basis and stored in small water tanks located adjacent to the relevant surface infrastructure.

2.7.2 Operational Water Requirements

Operational water would be required primarily for dust suppression both underground and within the Pit Top Area, as well as within the CPP washing circuit.

[7] This accounts for coal rail unavailability for periods during the year.

Based upon operational experience during Stage 1 of the Narrabri Coal Mine, consideration of water requirements at similarly sized underground mines and the completion of a water balance analysis of the CPP, the Proponent estimates the annual water requirements would be as follows.

- Underground dust suppression and other requirements - up to 465ML.
- Coal handling and processing (including sprays on conveyors, screens and crushers, dust suppression on stockpiles and coal washing. - up to 100ML.
- Other surface water usage (dust suppression, ablutions, wash pad etc.) - up to 42ML.

In addition to the above operational water requirements, between 54ML and 101ML of water is expected to be lost via evaporation from water storages each year.

Up to 607ML of water would be required by the Longwall Project each year, which equates to 1.67ML per day. A proportion of this water would be recycled through capture and re-use underground make, the Proponent estimating this would represent between 25ML and 298ML each year. The remaining water would be sourced from a range of sources including.

- Groundwater in-flow and capture within the box cut - 27ML.
- Harvesting of surface water runoff from the industrial and processing areas of the Pit top Area (SB1) - 71ML[8].
- Harvesting of surface water runoff from the remaining sediment basins and dams on the Pit Top Area - 100[8].
- Groundwater treated through a Water Conditioning Plant - 50ML to 1 800ML[9].
- Water harvested from the Namoi River under licence - Yet to be established.

The Proponent holds two licences to account for the water inflows to the mine that are pumped to the surface, namely:

i) WAL AL811436 for groundwater extraction from the Intake Beds of the Great Artesian Basin of up to 244ML per year [10]; and

ii) 90BL254679 for groundwater extraction from the Gunnedah Basin of up to 818ML per year.

A more detailed analysis of the site water balance has been prepared by WRM Water and Environment (WRM, 2009), which is reproduced in full as Part 3 of the *Specialist Consultant Studies Compendium*. Section 4B.3 provides a summary of this balance which considers both the potential for water deficit and surplus over the entire mine life, based on over 110 years of rainfall records for the area.

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8 Refers to surface water harvest available during median (50^{th}%ile rainfall) year.
9 Assumes 80% of dewatered groundwater is recovered as raffinate from the Water Conditioning Plant.
10 3.65ML of the allocation under WAL AL811436 accounts for the predicted loss in groundwater within the Intake Beds of the Great Artesian Basin groundwater source associated with the proposed Longwall Project.

2.7.3 Electricity

Permanent mains power is supplied via a spur line from a new 66kV power line located to the east of the Kamilaroi Highway. The 66kV of the spur line is converted to 11kV for use at the site offices, buildings and the crushing / sizing plant within a substation on the Pit Top Area. An additional electrical transformer to meet the load requirements for the Longwall Project would be installed within the substation (see **Figure 2.2**).

The 11kV power line would be extended through the Central Corridor and to the tailgate ventilation locations progressively as the mine is developed (see **Figures 2.2** and **2.10).**

Power would also be provided to the underground mine workings as required initially from the substation with all cables placed via the transport drift. Provision has been made at each ventilation shaft location to provide the power underground via boreholes within the shaft compounds.

Annual power usage once the mine achieves its maximum production level of 8Mtpa would be in the order of 49 megawatt hours.

Lighting on the Pit Top Area would typically comprise soft lighting oriented to minimise visual intrusion to the surrounding landholders.

2.7.4 Communications

On-site communications would be by a combination of mobile phones and land phone/fax lines installed to service mine management and contract staff in the Pit Top Area. Two-way radio communication would be used between surface equipment operators. The primary means of communication in the underground mine would be by telephone with the additional use of the PED underground communication system whose infrastructure would be placed along the construction access roads and services corridor (see Section 2.4.9.5).

2.7.5 Fuel

Fuel storage and refuelling facilities for the mobile equipment would comprise one 50 000L WorkCover - approved self-bunded fuel tank and an adjacent refuelling bay, located adjacent to the surface buildings.

During the initial 12 months of the Stage 2 mine, during which construction of the Coal ROM Pad extension, CPP, longwall unit assembly area and Ventilation Shaft Area would be ongoing, it is estimated fuel use would be approximately 3 300kL.

Annual diesel fuel usage for the mine once construction is complete would be approximately 2 000kL.

2.7.6 Explosives

While it is unlikely that explosives would be required during Stage 2 mining, and therefore no requirement for their storage on site, an explosives magazine would be maintained within the Pit Top Area to provide storage for explosives in the event an emergency required their use.

2.8 WASTE MANAGEMENT

2.8.1 Nature of Wastes

The principal wastes that would be generated throughout the life of the Longwall Project can be categorised as production and non-production wastes.

The following production wastes would be generated on the Mine Site.

- Mined rock from the development of the ventilation shafts and gas drainage boreholes. The management of the mined rock from the ventilation shafts and gas drainage boreholes is described in Sections 2.4.9.7 and 2.4.9.8.
- Coarse and fine reject generated by the CHPP. Management of coarse and fine reject generated by the CHPP is described in Section 2.5.4.
- Brine generated by the Water Conditioning Plant. The management of brine is described in Sections 2.4.8.4 and 2.4.9.14.

Non-production wastes would include:

- general domestic-type wastes from the on-site buildings and routine maintenance consumables (see Section 2.8.2);
- oils and grease, including potentially contaminated water from the maintenance workshop, washdown pad and fuel storage areas (see Section 2.8.3); and
- sewage (see Section 2.8.4).

2.8.2 Domestic-type Wastes and Routine Maintenance Consumables

All paper and general wastes originating from the surface facilities area, together with routine maintenance consumables from the daily servicing of equipment, such as grease cartridges, would be disposed of in 205L drums and 240L mobile garbage bins located adjacent to the various buildings. These bins would generally be collected regularly and the contents placed in large waste storage receptacles or dumpsters positioned adjacent to the maintenance workshop to await removal by a licensed industrial waste collection contractor. Industrial waste collection would be undertaken fortnightly, or more frequently, if required.

Separate collection systems would be employed for recyclables such as paper and cardboard, drink containers (cans and PET bottles) and ferrous and non-ferrous metals, each of which would be despatched off site at appropriate intervals.

2.8.3 Oils and Grease

Routine maintenance of the more mobile mining and earthmoving equipment would generally be undertaken in the maintenance workshop within the Pit Top Area, while underground equipment would be subject to minor maintenance in-situ and brought to the surface for more substantial maintenance. Major equipment maintenance would be undertaken at facilities away from the mine.

Within the maintenance workshop, waste oils and grease would be collected and pumped to bulk storage tanks by oil evacuation pumps. All parts and packaging would be collected and transferred to the maintenance workshop for disposal or recycling.

Waste oils and grease would be stored appropriately at the maintenance workshop and collected by a licensed waste recycling contractor as required for recycling.

2.8.4 Sewage

The Proponent maintains toilet and ablution facilities within the mine facilities area for the site workforce and visitors. These facilities incorporate self irrigating eco-cycle septic sewage system(s) approved by Narrabri Shire Council and regularly serviced as required by Council and the manufacturer. The treated septic system water is used to irrigate on the landscaped areas around the site office.

The existing facilities are considered adequate for the increased workforce that would be required for the Stage 2 (longwall) operations.

2.9 TRAFFIC

2.9.1 Stage 2 Construction Period

During the Stage 2 construction period, the traffic generated above the normal operational traffic traveling to and from the mine would include both light vehicles and heavy vehicles.

The full-time equivalent construction workforce of 75 persons would generate approximately 90 light vehicle movements per day. The incoming components for the coal preparation plant, shaft boring equipment, etc. would be delivered largely on standard semi-trailers or B-doubles and low loaders. Some components of the longwall equipment would be delivered by road whilst most would be delivered by rail. Daily heavy vehicle movements would vary from 0 to 20 per day.

It is not expected that there would be many oversize loads, however, whenever necessary, they would be escorted as required during the approved periods of the day. Oversize loads would vary from 0 to 4 per day.

2.9.2 Stage 2 Operations

The indicative vehicle movements during Stage 2 operations are provided in **Table 2.11**. This represents an increase in traffic to the Mine Site of approximately 40%, with the existing internal roads and intersection with the Kamilaroi Highway sufficient to manage the predicted traffic levels.

Table 2.11
Indicative Vehicle Movements During Mining Operations[1]

Activity	Vehicle Type	Estimated Average Daily Vehicle Movements	
		Average	Maximum
Equipment / supplies deliveries	Semi-trailer, rigid truck, occasional low loader	4	10
Workforce[2]	Passenger vehicles	256[3]	300
Miscellaneous	Various light vehicles	20	40
TOTAL	Heavy	4	20
	Light	276	370

[1] One round trip = 2 movements [2] Assumes 211 employees [3] Assumes 1.7 employees/vehicle

Occasional low loaders would be used during operations to transport earthmoving equipment to and from site and longwall components requiring off-site servicing.

2.10 HOURS OF OPERATION AND MINE LIFE

2.10.1 Hours of Operation

The proposed hours of operation are proposed to remain as approved under PA 05_0102 and presented in **Table 2.12**.

Table 2.12
Proposed Hours of Operation

Activity	Hours/Days
Surface Facilities Construction	
Vegetation clearing / soil removal	7:00am to 10:00pm / 7 days
Surface Infrastructure construction	7:00am to 10:00pm / 7 days
Reject emplacement area development	7:00am to 10:00pm / 7 days
Raw materials / supply delivery	7:00am to 10:00pm / 7 days
Ventilation Shaft Construction	24 hours / 7 days[1]
Gas drainage bore construction	24 hours / 7 days
Mining Operations	
Pit Bottom Area development	24 hours / 7 days
Underground mining	24 hours / 7 days
Gas drainage	24 hours / 7 days
Ventilation fan operation	24 hours / 7 days
Crushing, screening, washing and stockpiling	24 hours / 7 days
Rail loading and transportation	24 hours / 7 days
Surface maintenance	24 hours / 7 days
CPP reject disposal	24 hours / 7 days[2]
Raw materials / supply delivery	7:00am to 10:00pm / 7 days

Note: 1 Operations initially for 4 months then at approximately 5 year intervals
2 Reject disposal activities would generally be restricted to 7:00am to 10:00pm, 7 days per week. However, it is possible that the proportion of reject material generated by the CPP may exceed the predicted average 5% level for short periods. To account for these periods of elevated reject production, contingent hours of operation would be 24 hours / 7 days (when inversion conditions do not prevail).

2.10.2 Mine Life

The 170Mt of coal recoverable from the 26 longwall panels and associated development roadways would support a mine for a period of approximately 30 years based upon an annual production rate of up to 8.0Mt.

2.11 EMPLOYMENT

2.11.1 Construction

The workforce throughout the 60 week Stage 2 construction period is expected to be in the order of 75 full time equivalent persons. At times, in excess of 100 persons would be involved in construction activities on site.

2.11.2 Operations

The projected mine workforce assumes an average coal production rate of up to 8.0Mtpa and the projected three-shift underground mining and surface coal crushing / sizing operations. All plant and equipment operators would be multi-skilled. The mining workforce would be employed directly by the Proponent, with some specialist services contracted. Based upon the operation of three continuous miners in conjunction with the longwall unit, the Proponent estimates that the Longwall Project would provide employment for 211 persons, comprising 186 mine workers and 25 staff.

A number of technical, professional and mine support service personnel would also be expected to visit the Mine Site on an “as needs” basis including cleaners, rubbish removal contractors, specialist tradespersons and sales representatives, environmental, mine planning and geotechnical consultants, as well as the Proponent’s senior management personnel.

The Stage 2 mine workforce would comprise a core workforce that would be employed by the Proponent as part of Stage 1 mining operations. This workforce would be supplemented by additional personnel, preferentially with experience in coal mining (and preferably longwall mining) or related industries. The experienced personnel would be supplemented by suitable local persons. The Proponent would continue to support employment of local district personnel, with arrangements for training and certification put in place to ensure suitable applicants can acquire the necessary skills. The local indigenous community would continue to be encouraged to be involved in this program.

2.12 SAFETY/SECURITY MANAGEMENT

2.12.1 Introduction

The Proponent currently implements procedures and controls to protect the safety of its own or contracted employees, visitors to the mine, the public in general, as well as local landowners and land users as part of the Stage 1 construction and operation activities. These measures would be continued to ensure the security of the mine facilities and equipment from unauthorised access or use for the Longwall Project.

It is the Proponent's policy that each person employed on, or visiting the, Mine Site is provided with a safe and healthy working environment and, to achieve this, the Proponent would maintain its recruitment, induction and training program to achieve the following objectives.

- To ensure compliance with statutory regulations and maintain constant awareness of new and changing regulations.
- To eliminate or control safety and health hazards in the working environment in order to achieve the highest possible standards for occupational safety.
- To ensure the suitability of prospective employees through a structured recruitment procedure.
- To provide relevant occupational health and safety information and training to all personnel.
- To develop and constantly review safe working practices and job training.
- To conduct regular safety meetings and provide an open forum for input from all employees.
- To provide effective emergency arrangements for all employees, and general public protection.
- To maintain good morale and safety awareness through regular employee assessment and counselling (if required).
- To ensure all contractors adopt the Proponent's policy objectives and maintain safety standards at all times while working on its premises.
- To develop public awareness of the safety standards and objectives at the proposed Stage 2 of the Narrabri Coal Mine.

Central to all aspects of site security and safety at the proposed Stage 2 of the Narrabri Coal Mine would be:

- the adoption of a pro-active approach to employee and public safety;
- strict compliance at all times with the requirements of the:
  - *Coal Mine Health and Safety Act 2002;*
  - *Coal Mine Health and Safety Regulation 2006 ;*
  - *Dangerous Goods Act 1975;*
  - *Occupational Health and Safety Act 2000 (and Regulation 2001);*
  - all other relevant legislation and Australian Standards;
  - WorkCover Authority; and
  - Department of Primary Industries - Minerals.
- the prioritisation given to addressing any safety issues identified by an Inspector or Mine Safety Officer or authorized government official (as specified in the *Coal Mine Health and Safety Act 2002*); and
- an Occupational Health and Safety Policy to cover all component activities at the mine.

The Proponent is required under the *Coal Mine Health and Safety Act 2002*, to develop and implement a Health and Safety Management System and a Major Hazard Management Plan for the Narrabri Coal Mine.

2.12.2 Safety/Security Measures

The Proponent would continue to implement the following measures in association with the development of the Longwall Project.

i) Erection and maintenance of temporary fencing around the additional areas of surface disturbance associated with the Longwall Project, eg. ROM Coal pad extension, CPP and Longwall Unit Assembly Area. A security fence would also be erected around the various components related to the initial and subsequent ventilation shafts. Internal agricultural fencing would also be maintained to enable the continuation of agricultural activities in those areas not designated for mining-related activities.

ii) Signage would be maintained along the Mine Access Road as it enters the property advising visitors to sign in, office location and personal protective equipment requirements.

iii) Position security/warning signs at strategic locations around or within the Mine Site indicating the presence of construction operations. The signs would be positioned to alert employees/visitors entering the Pit Top Area and passing motorists.

iv) Employee induction in safe working practices and regular follow-up safety meetings and reviews.

v) Ensure all crushing and conveying equipment at all times complies with all relevant requirements and standards.

vi) Strictly complying with all mining lease, planning approval and licence conditions.

vii) Establishment and demarcation of construction areas within the Mine Site in accordance with Section 87 of the *Coal Mine Health and Safety Regulation 2006*.

2.13 REHABILITATION AND DECOMMISSIONING

2.13.1 Introduction

Disturbance on the Mine Site requiring rehabilitation may be classified as that required for:

- the long-term operation of the mine, eg. box cut, the surface facilities and rail infrastructure of the Pit Top Area, the Ventilation Shaft Areas, the Reject Emplacement Area and the Brine Storage Area;
- areas temporarily disturbed during the progressive development of the mine, eg. longwall unit assembly area, access roads and gas drainage sites; or
- the repair on impacts resultant from subsidence.

The following subsections address the proposed rehabilitation for each category of disturbance.

2.13.2 Disturbance Associated with Long-term Mine Components

2.13.2.1 Objectives

The Proponent's rehabilitation objectives for those areas of mine-related surface disturbance within the Pit Top Area and Ventilation Shaft Areas that would be in place for the entire mine life can be defined in the short term and long term.

- In the short term, ie. during the construction and establishment phase, the objectives would be to stabilise all earthworks, drainage lines and disturbed areas no longer required for mine-related activities in order to minimise erosion and sedimentation, and to reduce the visibility of the activities from adjacent properties and the local road network.
- In the longer term, ie. with respect to closure, the Proponent's objectives are to provide a low maintenance, stable and safe landform that blends with the surrounding topography and which maximises the return of agricultural land with an agricultural land suitability comparable to the existing levels.

2.13.2.2 Site Establishment and Construction Activities

Areas disturbed as part of site establishment and construction activities and not required for ongoing operations, eg. batters of fill slopes created for the extension of the ROM Coal Pad, would be stabilised as soon as possible following disturbance. Surface stabilisation would be achieved through sowing a pasture seed mix relevant to the season in which planting occurs. **Table 2.13** lists the indicative components of both a winter and summer pasture seed mix together with typical fertiliser application rates. The actual seed mix would be based on seed availability at the time.

2.13.2.3 Decommissioning Activities

On cessation of mining and processing activities, many of the structures and facilities would be decommissioned and removed from site prior to final rehabilitation of the Pit Top Area and Ventilation Shaft Areas, including:

- the Coal Processing Plant and associated infrastructure;
- various fuel storages, workshops and offices;
- infrastructure related to the box cut and drifts;
- surface infrastructure related to the ventilation shafts; and
- roads not to be maintained in the final landform.

Table 2.13
Winter and Summer Pasture Species Seed Mixes

Summer			Winter		
Pasture Species	**Rate (kg/ha)**	**Fertiliser**	**Pasture Species**	**Rate (kg/ha)**	**Fertiliser**
Grasses					
Bombatsi Panic	1 – 2	Di-ammonium Phosphate (DAP) 250kg/ha	Phalaris (Sirolan or Holdfast)	1 -2	Di-ammonium Phosphate (DAP) 250kg/ha
Green Panic *[2]	2 – 4		Wallaby Grass	0.3 - 1	
Rhodes Grass *[2]	1 – 2				
Purple Pigeon Grass	1 – 2				
Legumes *[1]					
Subterranean Clover	4 - 5		Subterranean Clover	4 - 5	
			Barrel (Sephi) medic	2 – 4	
			Snail (sava) medic *[2]	3 – 5	
			Woolly Pod Vetch	4 – 6	
			Serradella (Elgara)	1 – 2	
			Lucerne	0.5	

*[1] Inoculated with appropriate rhizobia
*[2] Specific Soil Conservation Application

There may be potential, however, for a future land owner to retain some items of surface infrastructure such as storage sheds and workshop buildings. Retention of any items would be negotiated with the future land owner at the time.

Following the removal of surface infrastructure from the drift portals within the box cut, the entries would be sealed in accordance with appropriate guidelines and the void backfilled. Similarly, the infrastructure associated with the ventilation shafts would be removed and the shafts sealed in accordance with guidelines.

Any potentially hydrocarbon-contaminated material would either be removed or bio-remediated on site.

2.13.2.4 Final Landform and Land Use

With the exception of the area associated with the rail loop and Reject Emplacement Area, the final landform within the Pit Top Area, and other sites of long-term disturbance would be similar to that which currently exists. **Figure 2.19** displays the features of the indicative final landform within and adjacent to the Pit Top Area.

With the exception of the rail loop and a section of the perimeter amenity bund wall adjacent to Kurrajong Creek Road, all land disturbed during the life of the mine would be returned to a land capability / agricultural land suitability similar to the existing levels. This would be achieved principally through the re-instatement of a comparable soil profile across those areas disturbed throughout the life of the Longwall Project. Given this commitment, the Proponent intends that the bulk of the areas disturbed would be returned to land of comparable agricultural potential as its original state.

The intention to retain the rail loop may influence the succeeding land use depending upon land use around the Pit Top Area at that time.

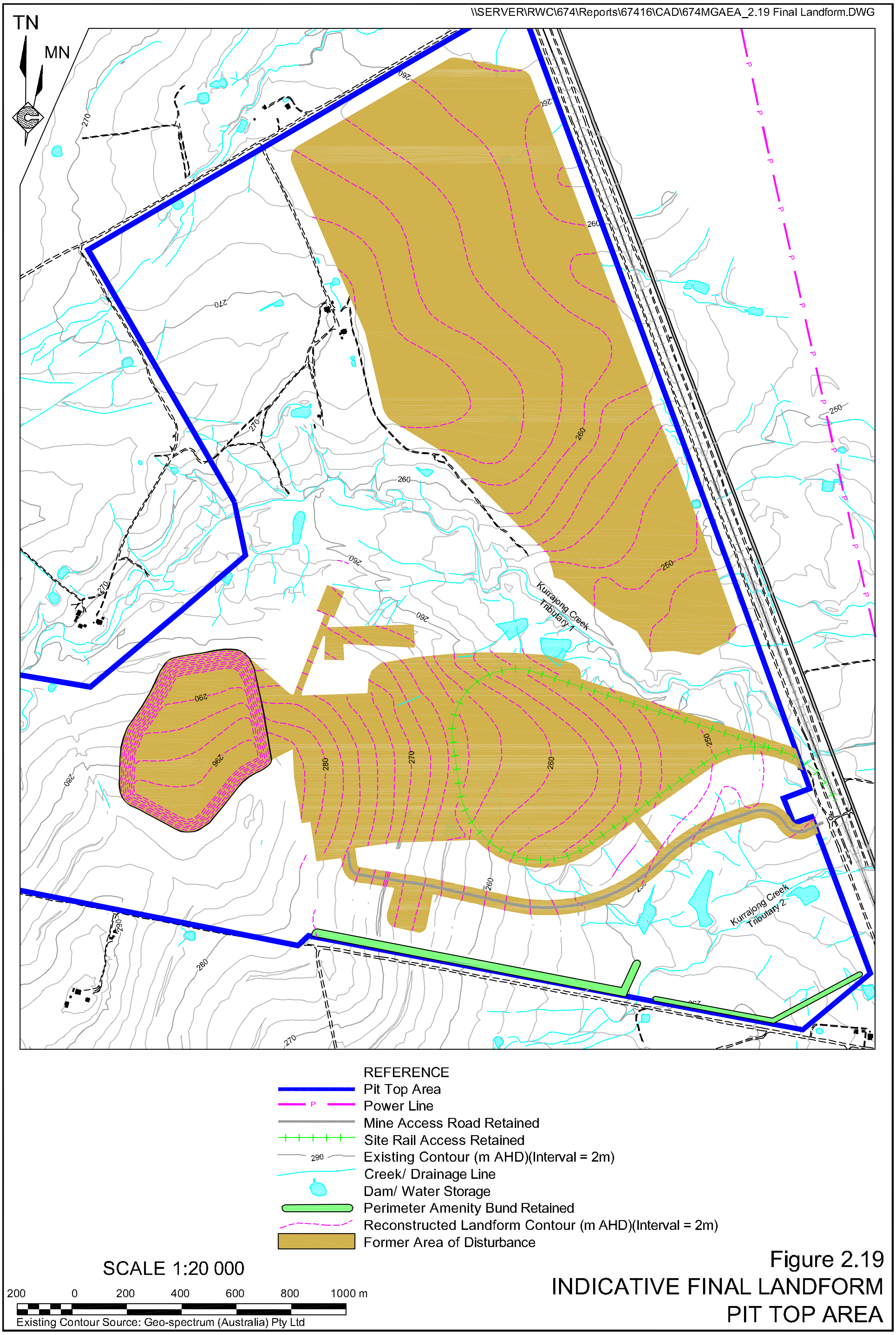

Figure 2.19
INDICATIVE FINAL LANDFORM
PIT TOP AREA

2.13.2.5 Proposed Rehabilitation

Since mine closure would not occur until the cessation of coal mining, this section only provides a conceptual closure plan which would be further developed in consultation with the relevant government authorities closer to the time of closure. This approach would ensure that the closure plan addresses the most relevant requirements and methods, applicable at that time.

The additional disturbance of the surface topography within the Pit Top Area for the Stage 2 Longwall Project would be an extension of Coal ROM Pad, establishment of a longwall unit assembly area and construction of the Reject Emplacement Area and dams within the Brine Storage Area. The rehabilitation of these areas of disturbance is described as follows, within the context of the overall rehabilitation of the entire Pit Top Area.

Box Cut and Drifts

The drift entries would be sealed and the box cut backfilled to replicate the pre-mining landform. The material used to backfill the box cut would be sourced from the perimeter amenity bund.

Rail Loop

There is potential for the rail loop to be considered valuable infrastructure for the future land owner and hence retained on closure. In the unlikely event the rail loop is not to be retained, the cutting would be filled with material excavated from the footprint of the nearby ROM and product stockpile area and the entire disturbance footprint would be reprofiled to recreate a similar topography to that which currently exists, ie. undulating and sloping to the east.

ROM Coal and Product Coal Stockpile Areas

The cut and fill disturbance within the ROM Coal Pad, Product Coal Stockpile Area and longwall unit assembly area would be profiled to ensure it has safe and stable slopes on construction. These slopes would be shaped to create a more undulating landform, more consistent with the surrounds. Should additional material be required to create the desired slope, this would be sourced from material excavated from other site components.

Perimeter Amenity Bund

With the exception of the sections of the perimeter amenity bund adjacent to or near Kurrajong Creek Road, the perimeter amenity bund would be removed with the material used to backfill the box out. The retained section of bund would be well vegetated and would act as a wind break for future agricultural activities and fauna habitats. Most surface water structures around the margins of the areas disturbed would also be retained to allow for continued water management across the Pit Top Area following mine closure. The dams likely to be retained are displayed on **Figure 2.19**.

Mine Access Road

The retention or removal of the sealed Mine Access Road would be dependent on the final land use of the site and the requirements of the future land owner. All internal minor roads and tracks would be removed and pre-mining topography re-instated.

Dams A to D

It is not proposed to modify the proposed rehabilitation strategy for the Evaporation / Storage Ponds within the rail loop from that presented in the Environmental Assessment of the Stage 1 Narrabri Coal Project (RWC, 2007). A summary of the proposed rehabilitation of these dams is as follows.

- The black plastic liner within each pond would be removed and transported to a waste disposal facility.
- The salinity level of the compacted clay floor beneath the liner would be analysed to confirm that no contamination has occurred as a result of breaches in the liner.
- Any evidence of saline contamination would trigger the implementation of a Salinity Contamination Contingency Plan (to be developed in consultation with relevant government agencies). Confirmation of no saline contamination would allow the area to be rehabilitated to its prescribed final landform ie. the evaporation / storage ponds would be backfilled and a landform comparable with the existing landform would be created.

Reject Emplacement Area

As the permanent 14º external batters of each cell of the Reject Emplacement Area are formed, they would be progressively capped with the previously stripped subsoil and topsoil. As far as practicable, the soil to be respread would be taken directly from soil stripping in advance of the next cell of the Reject Emplacement Area. On completion of each cell to the nominated 15m height, the top surface would be profiled to create a series of transverse (ie. east-west) drainage swales and respread with topsoil. These drainage swales would collect runoff and direct it down to a permanent drain around the perimeter of the Reject Emplacement Area leading to the collection pond. The completed surfaces of the Reject Emplacement Area would be revegetated with a fast growing cover crop to stabilise the landform, with pasture species ultimately sown to enable a return to agriculture over this area once mining is completed. This method of progressive completion of the final landform would allow the reject to be progressively capped to minimise infiltration by rainfall, and would allow permanent rehabilitation and revegetation to also be carried out progressively, avoiding the need to stockpile large quantities of topsoil for extended periods.

Brine Storage Area

The brine stored within the various ponds within the Brine Storage Area would be re-injected into the longwall goaf through the disused goaf gas drainage holes towards the completion of mining. Progressively re-injecting brine into the goaf of the completed longwall panels would ultimately result in the removal of all brine within the brine storage ponds. Rehabilitation of the remaining pond structures would be almost identical to that of Dams A to D, that is:

- the black plastic liner of each pond would be removed and transported to a waste disposal facility;
- the salinity level of the compacted clay floor beneath the liner would be analysed to confirm that no contamination has occurred as a result of breaches in the liner; and

- on confirmation that there remains no contamination, the pond walls would be pushed in to fill in the ponds, the area re-profiled as illustrated in **Figure 2.19**, topsoil would be respread over the created landform and the areas revegetated with pasture species.

Ventilation Shaft Areas (including Tailgate Fan / Exhaust Sites)

All remaining infrastructure, eg. fans, evasees, storage sheds, fuel storages, etc., would be decommissioned and removed from the Mine Site. The shafts would be filled in (or sealed) by a method approved by the relevant government agency and the surrounding bund wall removed. The material from the surrounding bund walls would either be pushed into the shafts, or used to backfill the sumps and profile the areas. Where appropriate, the remaining areas would be deep-ripped to promote plant growth.

Previously stockpiled soil and cleared vegetation material would then be spread over the profiled landform (which would be similar to that which currently exists with a central raised area) and the area revegetated with appropriate pasture or native vegetation species (depending on the vegetation which occurred within each area in the pre-mining environment). Reliance would be placed upon natural regeneration in the smaller disturbed areas, whereas direct seeding of native species would be undertaken in areas within native vegetation communities.

Access Tracks and Service Corridors

It is proposed to progressively close, rip and provide for natural revegetation of the minor tracks on site once they are no longer required for operational purposes. Any vegetation cleared would be re-spread across the track to prevent access and assist in promoting natural regeneration.

The various access and service tracks required throughout the life of the mine would only be rehabilitated at the end of the mine life and then once they are not required for access for monitoring, etc. Following the cessation of all mining-related activities, all remaining tracks, etc. (not required for ongoing maintenance / management of the land would be ripped and allowed to naturally regenerate.

2.13.2.6 Monitoring and Maintenance

The Proponent’s commitment to effective rehabilitation would involve an ongoing monitoring and maintenance program for the life of the mine.

The areas of the Pit Top Area which have been progressively rehabilitated to date (as part of site stabilisation activities) are, and would continue to be, regularly inspected and assessed against the short and long term rehabilitation objectives outlined in Section 2.13.2.1. During regular inspections, aspects of rehabilitation to be monitored would involve:

- evidence of any erosion or sedimentation from areas with establishing vegetation cover;
- success of initial pasture / cover crop establishment;
- adequacy of drainage controls; and
- general stability of the rehabilitation site.

Where rehabilitation success appears limited, maintenance activities would be initiated. These may include re-seeding and where necessary, re-topsoiling and/or the application of specialised treatments such as composted mulch to areas with poor vegetation establishment. Tree guards would be placed around planted seedlings should grazing by native animals be excessive. If drainage controls are found to be inadequate for their intended purpose or compromised by grazing stock or wildlife, these would be replaced and/or temporary fences installed to exclude grazing of native vegetation by native or domestic fauna.

Should areas of excessive erosion and sedimentation be identified, remedial works such as importation of additional fill, subsoil or topsoil material or redesigning of water management structures to address erosion would be undertaken.

2.13.3 Temporary Disturbance Associated with the Progressive Development of the Mine

2.13.3.1 Introduction and Objectives

Drilling and borehole construction associated with pre- and goaf gas drainage would require areas above the underground mining area to be progressively disturbed. Access roads/tracks and power lines constructed between these sites would also be required resulting in further surface disturbance. As gas drainage for each longwall panel is completed, the bores and gas drainage infrastructure would become redundant. All infrastructure would be removed and areas of disturbance rehabilitated should they not be needed for any other reason, eg. end-of-mine brine disposal.

The following objectives have been adopted when developing the rehabilitation procedures for those temporary areas of disturbance associated with gas drainage.

- To locate each gas drainage site in such a way that minimises the amount of disturbance to native vegetation or sites of heritage significance and hence rehabilitation requirements.
- To retain soil and vegetation resources for use in the rehabilitation of each site.
- To produce a stable final landform conforming with the vegetation type of the surrounding area.

2.13.3.2 Final Landform and Land Use

Each site would be rehabilitated such that the final landform would be very similar to that which currently exists.

The final land use of each site would correspond to that of the surrounding land. That is, where gas drainage sites are located within agricultural land, the site would be rehabilitated to provide for agriculture, however, where the surrounding land is dominated by native vegetation, the site would be revegetated to provide for native vegetation re-establishment.

2.13.3.3 Proposed Rehabilitation

Once gas drainage requirements are completed and there is no other identified ongoing need for the site, each site would be rehabilitated as follows.

Infrastructure Decommissioning, Bore Sealing and Capping

The gas drainage vacuum pump, generators and any other infrastructure would be removed from the site. Each bore hole would then be backfilled and capped in accordance with the EDG01 guideline "*Borehole Sealing Requirements on Land: Coal Exploration*".

Sump Decommissioning and Backfill

Water retained within the sump(s) adjacent to each borehole site would be allowed to evaporate. Any consolidated drill cuttings and fines would be excavated, the plastic liner removed and the sump backfilled using the consolidated drilling spoil stockpiled during the bore construction phase. The surface of the backfilled sumps would be covered with the topsoil and subsoil stripped and stockpiled during site establishment, lightly scarified and covered with any stockpiled leaf litter and/or broken material.

Drainage Control

Any upstream diversion banks or downstream catch banks would be pushed over and profiled to natural surface level. The profiled surface would then be ripped or lightly scarified and covered with available soil, leaf litter and/or broken vegetation.

Other Cleared Surfaces

Where cut and fill works were required, these areas would be re-excavated to return the site to its natural slope. This and the remaining cleared surfaces of the drill site would be ripped or lightly scarified and the remaining stockpiled soil and broken vegetation spread over the area. Re-seeding with pasture or native tree and shrub species would be undertaken depending on the proposed final land use, ie. agriculture or native vegetation.

Access Tracks

Unless required for future access to monitor or manage subsidence-related impacts, the tracks constructed to access each gas drainage site would be progressively closed and rehabilitated. The tracks would be ripped using the tynes of a bulldozer (or similar) and previously cleared topsoil and vegetation (if any) would be pushed over the ripped surface. No seeding is considered necessary as natural regeneration of vegetation from seed in the topsoil and the surrounding environs is expected.

2.13.3.4 Monitoring and Maintenance

Once the access roads are closed and rehabilitated, access to these sites may not be available. As such, the access tracks would only be closed and rehabilitated once periodic monitoring illustrates that the sites are stable and the designated vegetation is becoming established.

2.13.4 Subsidence Areas

2.13.4.1 Objectives

The primary objective of subsidence rehabilitation is to ensure that any cracking or surface deformation resulting in changes to local drainage patterns is identified promptly and remediated as soon as possible after the impacts are identified.

2.13.4.2 Final Landform and Land Use

As noted in Section 2.4.6, the likely surface cracking would typically be less than 20mm to 190mm (19cm). As such, where surface cracking occurs, the final landform and land use would be almost identical to that of the pre-subsidence environment.

2.13.4.3 Proposed Rehabilitation

Surface Cracking

Given the relatively deep soil profile above the longwall panels, and the predicted cracking widths remaining below 20cm, it is expected that many of these cracks would be in-filled naturally through action of wind, water and soil movement. Should natural processes not completely fill each crack, the ground surrounding each crack would be ripped or graded to in-fill the crack. Notably, the locations of the gas drainage sites and access roads have been located to approximate the alignment of cracking expected. This would minimise the potential for areas to be disturbed simply to access areas of subsidence-related surface cracking, thereby minimising disturbance of native vegetation principally to repair cracking.

In the event that more significant cracks occur which cannot be simply filled in through surface ripping, these may need to be filled with additional material sourced from within the footprint of the Reject Emplacement Area or nearby gas drainage drill site.

Once the cracks have been in-filled, these would be profiled to natural topographic levels and covered with available leaf litter or broken vegetation.

Local Drainage

Surface subsidence may also impact on local drainage patterns with ponding or re-direction of channels within local creeks and tributaries possible.

In the case of ponding, no further work would be undertaken unless the ponding significantly affects downstream flows and vegetation. Should this occur, the advice of a qualified hydrologist would be sought to identify the most affective way of re-establishing more natural flow patterns.

Should subsidence result in the re-direction of creek or tributary flows, once again the advice of a qualified hydrologist would be sought to identify the most affective way of re-establishing more natural flow patterns.

2.13.4.4 Monitoring and Maintenance

Impacts of subsidence would be monitored in accordance with a Subsidence Management Plan to be prepared for the Mine Site. An overview of the proposed monitoring component of this plan is presented in Section 4B.1.7.

2.13.5 Noxious Weed Management

The Proponent is keen to avoid any noxious weed infestations and would take the necessary precautions to prevent the excessive growth of weeds within the rehabilitated areas and the long term soil stockpile areas. When appropriate, campaign weed spraying would be undertaken prior to the stripping of topsoil and periodic visual inspections would be undertaken of disturbance areas. The appropriate noxious weed control or eradication methods and programs would be undertaken in consultation with I&I NSW-Agriculture and/or the local Noxious Weeds Inspector.

2.13.6 Surrounding Land Management

The land owned by the Proponent beyond the areas proposed to be disturbed would be leased to surrounding landowners for agricultural purposes.

The Proponent would implement the principles of responsible land ownership and ensure that feral animals and weeds are managed appropriately across its entire land holding. Cooperation with adjoining land owners would be a regular feature of the ongoing land management within the Mine Site.

2.14 CONSIDERATION OF ALTERNATIVES

2.14.1 Introduction

The Director-General's Requirements issued for the Longwall Project (**Appendix 2**) require that the *Environmental Assessment* provides a description of feasible alternatives considered in developing the project reflecting the requirement to describe alternatives in Schedule 2(3) of the *Environmental Planning and Assessment Regulation 2000* which refers to "*an analysis of any feasible alternatives to carrying out of the proposed development or activity, having regard to its objectives, including the consequences of not carrying out the development or activity*". The following alternatives were considered by the Proponent during the planning stages for the Longwall Project but were rejected in favour of the components incorporated earlier in this section.

The consideration of feasible alternatives to the activities proposed relate principally to:

- mining methods, ie. longwall mining vs continuous miner vs top coal caving; and
- gas management, ie. the method of draining and dispersing the gas.

The “no development” option, ie. the consequences of not developing the proposed Longwall Project, are discussed in Section 6.4 (as part of a justification for the proposal).

2.14.2 Mining Methods

Continuous Miner Method

One option considered by the Proponent was to continue the development of the Narrabri Coal Mine as a continuous miner operation, which in effect is the “no development” option. This mining method has the advantage of reducing the environmental impact of the mine as:

- there would be no measurable surface subsidence;
- there would be no requirement to undertake goaf gas drainage (reducing the area of surface impacted by these activities);
- ventilation requirement would be reduced, which would also reduce the area of surface disturbance on the Mine Site; and
- the requirement for a coal preparation plant (and Reject Emplacement Area) would be avoided as better quality coal could be specifically targeted by the continuous miners operated underground.

The continuous miner method has a number of major disadvantages which include the following.

- The volume of coal able to be mined on an annual basis (2.5Mtpa) would be insufficient to meet market requirements committed to by the Proponent, which could jeopardise coal contracts and therefore the viability of the mine.
- The continuous miner method is a higher cost per tonne method than longwall mining. To mine using this method would increase the cost of the coal to the customer and thereby potentially affect market competitiveness.
- The continuous miner method would leave a far greater proportion of the coal, thereby not maximising the resource and in doing so sterilising the remaining resource.

It was on the basis of these disadvantages that the Proponent indicated its intention as part of the Stage 1 proposal to progress to a longwall operation at the Narrabri Coal Mine. As discussed in Section 1.4.4, the progression to the Longwall Project has been accelerated as all the required geological, geotechnical and other underground information has been obtained.

Therefore, assuming the additional impacts associated with the Longwall Project can be adequately mitigated or offset, the longwall mining method offers a more cost effective method and better utilisation of the resource.

Top Coal Caving Method

The top coal caving mining method has also been considered by the Proponent. This mining method provides for the extraction of the caved section of coal which forms behind the longwall unit as it retreats within each longwall panel. An advantage of this mining method is that by recovering the caved coal, the mineable resource would almost double, ie. up to 9m of coal could be recovered as opposed to the 4.2m recovered by longwall mining alone. There are several disadvantages associated with this method, however, and they include.

- By removing additional coal, the impacts of surface subsidence and on the local groundwater aquifers would be increased.
- By recovering the majority of the coal seam, including the lower quality coal near the roof of the Hosskisons Coal Seam, a far larger and more complex coal handling and preparation plant would be required. This would require additional area to construct and operate, increase the volume of waste generated and increase the annual water requirement of the mine.
- This mining method has not been attempted within the Hoskissons Coal Seam (nor the Gunnedah Basin), and while longwall mining has not been undertaken within the Hoskissons Coal Seam either, longwall mining is a more common mining method which has been undertaken in a variety of coal seams that could be considered equivalent.

On the basis of the additional infrastructure and disturbance associated with the top coal caving method, and given the compatibility of the longwall mining method to future progression to top coal caving, the Proponent has decided to collect more information on the nature of the Narrabri Coal Mine underground conditions before potentially proposing progression to a top coal caving method.

2.14.3 Gas Management

Coal emissions include CO_2, CH_4, CO and nitrous oxides, all of which need to be reduced to sufficiently low concentrations to ensure safe working conditions underground. As noted in Section 2.4.5, these gases would be initially pre-drained from the coal seam prior to longwall mining, removed from the underground atmosphere by ventilation during mining and drained from the collapsed goaf within the completed longwall panels. These gases are all greenhouse gases and as part of this proposal would be dispersed to the atmosphere either from vacuum pumps installed on the drainage units or from the ventilation fans.

The Proponent investigated several options for managing the gas and ventilated air as follows.

- Gas Flaring. CH_4 is a flammable gas and if contained in high enough concentration within the gas to be drained from a mine, can be pumped to a central location and flared. This converts the CH_4 to CO_2 which is approximately 21 times less effective as a greenhouse gas and would therefore reduce the greenhouse gas emissions of the Mine Site. The required concentration to effectively flare CH_4 needs to exceed 40%, which is well above the CH_4 concentration of the gas within the Hoskissons Coal Seam which, while variable, averages approximately 10%.

The Proponent would continue to undertake analyses of the gas composition underground and should CH_4 concentrations amenable to flaring be identified, this option would be revisited.

- Sale of gas to Eastern Star Gas. The Proponent made initial enquiries with Eastern Star Gas, a company which operates a coal seam gas extraction operation within a borefield to the northwest of the Mine Site, regarding their interest in acquiring the drained gas as part of their gas generation activities. As for (1) above, the low CH_4 concentration of the gas made the construction of the required infrastructure to acquire the gas unfeasible and this option was not investigated further.
- Power generation and destruction of CH_4 by the installation and operation of one or more Ventilation Air Methane (VAM) units. Thermal or catalytic oxidation VAM units destroy methane in concentrations from about 0.3 to 0.9% CH_4 with each unit able to operate with approximately $17m^3/s$ of gas mixture. The Proponent commissioned Mr Roy Moreby – an Underground Mine Environmental Engineer, to consider the potential installation and implementation of one or more VAM units as part of the mine's gas drainage and ventilation strategy. Mr Moreby concluded it would be likely that the methane concentration in ventilation air reporting to main exhaust shafts would be below the 0.3% CH_4 threshold for VAM units for most, but perhaps not all of the mining area. It is possible that CH_4 concentrations within the mine may increase such that the VAM mixture may increase above the critical 0.3% CH_4 percentage.

  On the basis of these outcomes, mine air would initially be ventilated direct to the atmosphere via the ventilation fans, however, further research would be undertaken to determine whether the operation of one or more VAM units may be feasible in the future.

While the potential to utilise or destroy CH_4 would continue to be investigated, direct dispersion to the atmosphere remains the most practical option.

2.14.4 Brine Management

Several alternative uses or disposal methods for the accumulated brine have been considered by the Proponent during the preparation of this *Environmental Assessment*.

Alternative Uses for the Brine

In particular, several commercial salt producing operators were contacted by the Proponent to ascertain whether it would be feasible to either, transfer the brine to an existing operation, or have a small salt production plant constructed and operated on the Mine Site.

The discussions determined that transferring the brine from the Mine Site to an operating salt production facility would not be feasible given the fact that the brine, whilst concentrated saline solution would still be liquid.

It was also established that further detail would be required on the groundwater chemistry before more detailed plans related to the establishment of a salt production plant on the Mine Site could be considered. The variable nature of the groundwater chemistry is also a constraint on this method of using the brine.

Alternative Disposal for the Brine

Transporting the brine from the Mine Site for disposal elsewhere, eg. into the ocean as is undertaking by desalination plants, is not a feasible alternative due to liquid state of the brine.

The only feasible alternative to disposing of the brine through re-injection would be to allow evaporation to gradually concentrate and remove the water. The concentrated salt could then be excavated and disposed of off-site. However, given the volume of brine anticipated to be stored on the Mine Site, this could take many years which would result in an ongoing environmental liability being retained on the Mine Site.

The above notwithstanding, the Proponent recognises that advances in technology may occur over the 28 year mine life of the Longwall project. The Proponent would continue to investigate possible alternative use or disposal methods for the brine over the life of the mine.

The Proponent has committed to initiating a study by a recognised firm of engineering consultants to investigate the technical and economic viability of alternative methods of use or disposal of the brine produced. It is proposed an initial report would be completed within 3 years of the receipt of project approval with commitments to further reports, if required, beyond that date.