1 INTRODUCTION

The Galilee Coal Project (Northern Export Facility – also known as the China First Project – hereafter referred to as the 'the Project') involves the development of the following:

- A new coal mine and associated infrastructure located near Alpha in the Galilee Basin, Central Queensland, and
- A rail network between the mine and the Abbot Point State Development Area (APSDA).

The project proposes to use future or existing coal terminal, stockpiling and loading facilities within the Port of Abbot Point and the Abbot Point State Development Area (APSDA), however, these facilities are the subject of other approvals processes and, as such, are not considered as part of the project. Hence, for the purposes of this Supplementary Environmental Impact Statement (SEIS), the limit of assessment is where the rail corridor intersects the boundary of the APSDA.

The project is being developed by Waratah Coal, a privately owned Australian Coal Exploration and Coal development company.

The Project has been deemed a significant project by the Queensland Coordinator-General and has Major Project Facilitation Status from the Commonwealth Government. The project is being assessed under a parallel process by the State and Commonwealth Governments. An EIS was submitted to both governments on 9 September 2011, and was placed on public review on 26 September. The EIS remained on public review for 12 weeks, with 1842 submissions received during this process.

This Supplementary EIS (SEIS) provides responses to the issues raised within the 1842 submissions as well as additional information sought by the Coordinator-General. The SEIS is provided to facilitate assessment of the project by the Queensland Coordinator-General. The requirements of the Commonwealth Government will be addressed in a separate process during 2013.

1.1 Project Description

Waratah Coal proposes to construct and operate a new coal mine, railway and supporting infrastructure to export highly volatile, low sulphur, steaming coal to international markets. Figure 1 shows the overall project concept. In the EIS Waratah Coal had proposed to utilise coal terminal, stockpiling and loading facilities being assessed as part of the North Queensland Bulk Ports (NQBP) Terminal 4 to Terminal 9 (T4-T9), the Multi-User Infrastructure Corridor (MUIC) and the Multi-Cargo Facility (MCF). Given the Queensland Government directive to defer the approval process for the expansion of Abbot Point, and the associated uncertainty over the future stockpiling and export elements at the port, the limit of the assessment for this project is now defined as the western boundary of the APSDA.

Waratah Coal proposes to mine 1.4 billion tonnes (Bt) of raw coal from its existing tenements, Exploration Permit for Coal (EPC) 1040 and part of EPC 1079, with the mine component covered by Mining Lease Application (MLA) 70454, as shown in Figure 2. The mine development involves the construction of four 9 million tonnes per annum (Mtpa) underground long-wall coal mines, two 10Mtpa open-cut pits (each with two (North and South) mining pits); and two coal preparation plants both with raw washing capacity of 28Mtpa.

The annual Run-of-Mine (ROM) coal production will be 56Mtpa to produce 40Mtpa of saleable export product coal. At this scale of operation, the capital expense of constructing the required rail and port infrastructure is economically viable over the life of the Project.

Processed coal will be transported by a new railway system approximately 453km in length[1] that runs from the Galilee Basin to the existing Port of Abbot Point. The railway component includes a state of the art, heavy haul, standard gauge railway to support 25,000 tonne (t) payload train units. The rail will initially be built to transport 60Mtpa, and will ultimately cater for a capacity of 400Mtpa to cater for other users in the Galilee Basin. As such, Waratah Coal has

1 From the western boundary of the APSDA to the beginning of the rail loop at the mine site.

undertaken the assessments to support, and are seeking approval for, a rail capacity of 400Mtpa. The final railway easement will be on average 49.5m wide[2]. In relatively flat terrain the rail will be 40m wide and in areas where cross-slope cuttings are required the width of the easement will be wider – up to a maximum width of 184m (however there are only two areas exceeding 150m). The easement includes both the rail and a service road.

Various supporting infrastructure will also be constructed as part of the project including the connection to new power and water supply infrastructure being proposed by Government for the Galilee Basin development.

The project will be developed over three years. The mine will have a life of approximately 30 years, whereas the rail will continue to operate to support other projects.

The coal mine infrastructure area is situated approximately 30km north of Alpha. To date, Waratah Coal has identified approximately 1.4Bt of coal within EPC 1040 and EPC 1079. Coal quality tests confirm that these coal reserves average less than 0.5% sulphur and possess an average calorific value of 26MJ/kg, making it a highly volatile and low sulphur product.

The project will proceed through a staged development process with first coal loads expected in the early to mid-2017. As the coal will require washing for the export market, an initial 56Mtpa of ROM coal will be required to provide 40Mtpa of export coal.

2 Average width was calculated by dividing the total area of the rail footprint (2215ha) by the length of the rail (453km).

Figure 1. Project Regional Context

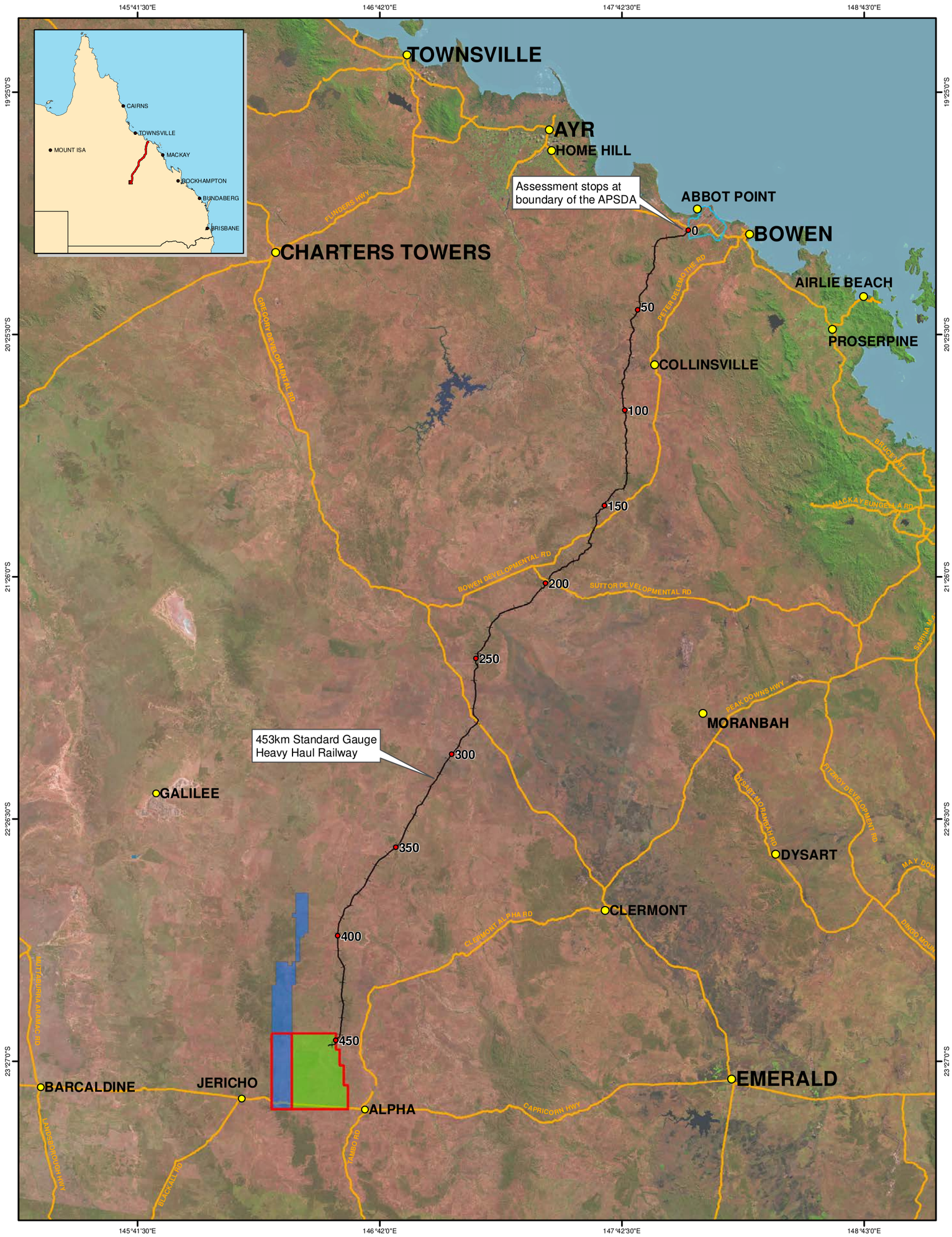
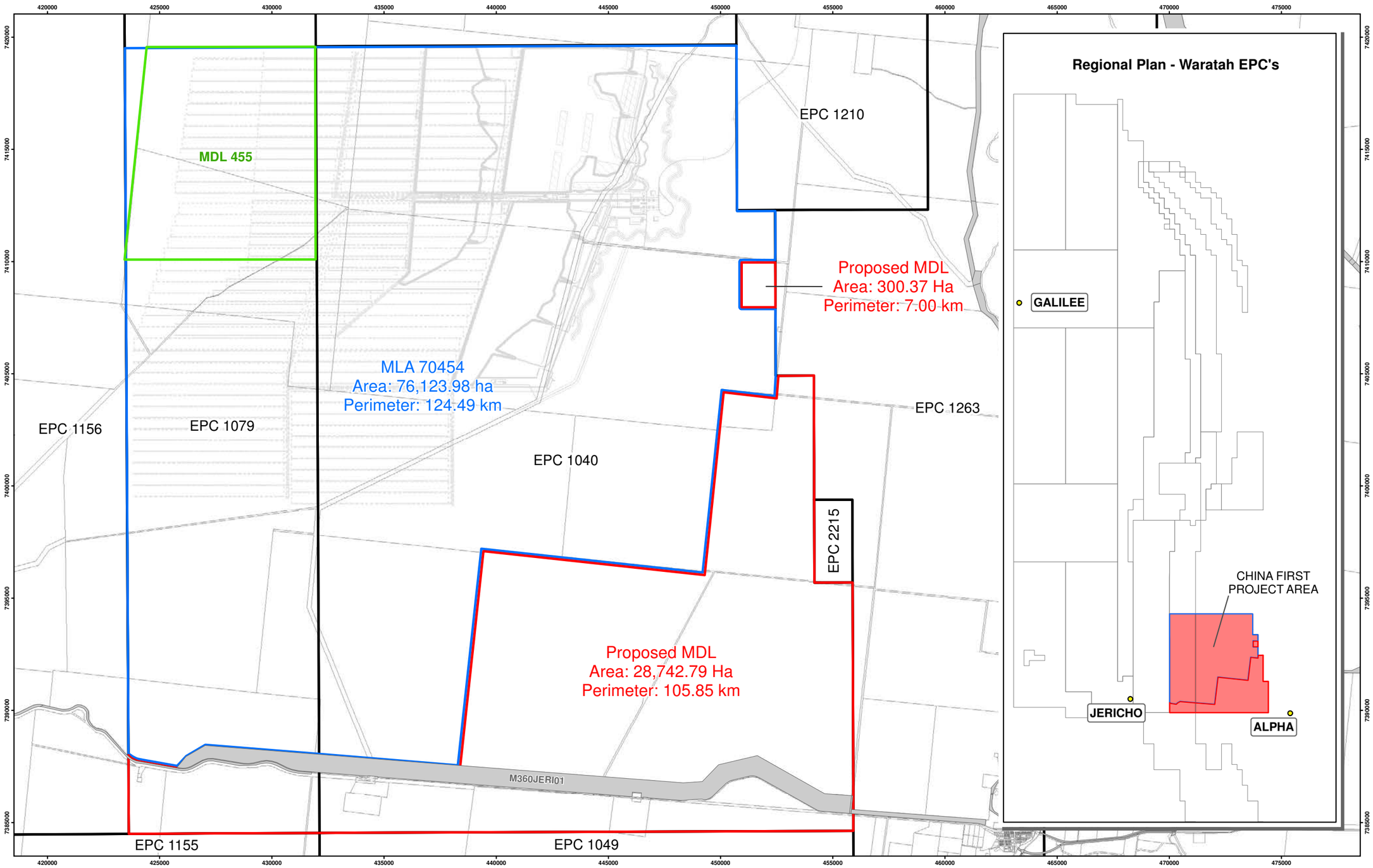


Figure 2. Mining Lease Application Area



GALILEE COAL PROJECT (Northern Export Facility)

Waratah Coal
THE NEW ENERGY IN COAL

Mineralogy House, Level 7, 380 Queen Street, Brisbane Qld 4000, Australia

Source:	Cadastral Boundaries: DERM 2012 Roads & Waterways: Geoscience Australia 2010 Mine Detail & Proposed MLA and MDL boundaries: Waratah Coal Pty. Ltd. 2012 EPC, MDL boundaries: DEEDI 2012
Disclaimer:	This plan is based on or contains data provided by others. Waratah Coal Pty. Ltd. gives no warranty in relation to the data (including accuracy, reliability, completness, currency or suiability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to and use of the data. Data must not be used for direct marketing or be used in breach of privacy laws.
File:	File: WAR20-26-SEIS0010b-FIG-15-MINE-LEASE-APPLICATION-AREA-121114 Date: 14/11/2012

0 2,000 4,000 6,000 8,000
Metres

A3 Scale 1:150,000

Coordinate System: GDA 1994 MGA Zone 55 Projection: Transverse Mercator

- Mineral Development Lease 455
- Travelling Stock Route
- Proposed Mineral Development Licence
- Proposed Mineral Lease Option 12
- Exploration Permit Coal (EPC)

NOTE:
All boundaries and areas are approximate only subject to final survey.

MINING LEASE APPLICATION AREA

1.2 Project Components

1.2.1 MINE

Waratah Coal proposes to mine 1.4Bt of raw coal from its existing tenements, EPC 1040 and part of EPC 1079, with the mine component covered by MLA 70454, as shown in Figure 2.

The mine development will involve the mining of 20Mtpa from open cut operations and 36Mtpa from underground operations for a total Run-of-Mine (ROM) coal extraction of 56Mtpa. The annual coal production of 56Mtpa ROM will be washed in two coal handling and preparation plants (CHPP) for the export market with an overall product yield of 72% to produce 40Mtpa of highly volatile, low sulphur, steaming coal to international markets. Processed coal will be transported by a new railway system that runs from the mine to the existing Port of Abbot Point and the APSDA. Due to uncertainty regarding the location of the future stockpiling and loading facilities, the limit of the assessment is the western boundary of the Abbot Point State Development Area. As such, the length of the rail alignment is 453km. The overall mine arrangement will incorporate the following operations producing raw coal:

- one open cut mine comprising two surface mining pits (North and South) in the B seam producing 10Mtpa total
- one open cut mine comprising two surface mining pits (North and South) in the C and D seam resources producing 10Mtpa total
- one long wall underground mine in the B seam producing 9Mtpa
- three long wall underground mines in the C and D seam resources producing 27Mtpa total
- raw coal stockpiles at the location of the underground mines
- haulage roads to deliver raw coal from the surface mines to crushing and stockpile facilities
- three overland conveyor systems to transport raw coal to the coal processing plants
- three raw coal stockpiles to feed the coal preparation plants while providing blending capability
- two coal preparation plants with a raw washing capacity of 28Mtpa each
- two product coal stockpiles handling product coal to rail load out facilities
- topsoil stockpiles and out of pit overburden spoil sites to create initial surface mining pit space
- water management structures including raw water and environmental dams, creek diversions, levee banks/bunds, drainage channels and sediment traps
- Tailings Storage Facilities (TSF) and coarse spoil disposal areas integrated into the mine spoil pile areas
- refueling and maintenance facilities
- access roads, power lines and other services located in a central services corridor transgressing the entire resource area
- a Mine Industrial Area (MIA) incorporating mine support activities such as, rail freight unloading and bunkering, welding shops, light vehicle servicing, specialist maintenance contractors' workshops and offices, warehousing, bulk fuel and other mine consumables storage, tyre fitting and repair, training and conference centres
- facilities including: main workshop, stores, administration buildings, a mine office, communications, security building, emergency services building, tyre bay, ancillary mining vehicle workshop, vehicle wash facilities and associated amenities
- accommodation village (adjacent to the proposed mining lease), and
- fuel, oil, and explosives storage facilities.

The surface mining method will be a combination of walking draglines for overburden removal in conjunction with truck and shovel fleets for partings removal and coal recovery.

An additional overburden removal system utilising large electric rope shovels loading onto overburden conveyors will also be used in conjunction with the draglines. This configuration offers the flexibility to create additional pit space by moving overburden over longer distances rather than through the use of walking draglines without the expense of truck and shovel fleets to achieve this.

The underground mining system is based on large scale long wall mining with each mine accessing the underground resource at 120m depth through two cross measure drifts and a ventilation shaft.

The benign structural geology of the Galilee Basin offers an opportunity to mine 7km long blocks with a 450m wide long wall face. Extraction height of the long wall faces will vary from 1.8m to 2.5m depending on the constraints of seam geology.

1.2.1.1 Mine Workforce and Accommodation

A construction workforce of approximately 2,500 contractors will be required at peak construction period. The workforce will be predominantly fly-in / fly-out (FIFO); however, expectation is there will be a portion of local workers in this project. Accommodation will be provided at a purpose built 2,500 person workers village adjacent to the site (not all of the 2,500 mine workers will be in residence at once, however, the mine construction camp will also house some of the rail construction workers). The mine development is expected to operate on a two shift, seven day rotating roster.

A proposed workforce of 2,000 (comprised of 1500 permanent employees and 500 contractors) will be required during the mine operations. The majority of the workforce for the construction and operational phases will be FIFO.

1.2.2 RAIL

Processed coal will be transported by a new railway system approximately 453km in length[3] that runs from the Galilee Basin to the existing Port of Abbot Point. The railway component includes a state of the art, heavy haul, standard gauge railway to support 25,000t payload train units. The rail will initially be built to transport 60Mtpa, and will ultimately cater for a capacity of 400Mtpa. As such, Waratah Coal has undertaken the assessments to support, and are seeking approval for, a rail capacity of 400Mtpa.

The final railway easement will be on average 49.5m wide[4]. In relatively flat terrain the rail easement will be 40m wide and in areas where cross-slope cuttings are required the width of the easement will be wider – up to 150m (with two instances exceeding this – up to a maximum width of 184 m). The easement includes both the rail and a service road.

Until recently there was a commitment to utilise coal terminal, stockpiling and loading facilities being assessed as part of the North Queensland Bulk Ports (NQBP) T4-T9 and Multi-Cargo Facility (MCF) proposals. However, given the recent Queensland Government directive to defer the approval process for the expansion of Abbot Point, and the associated uncertainty over the T4-T9 and MCF proposals, the limit of the assessment for this project is now defined as the western boundary of the Abbot Point State Development Area (APSDA).

The rail traverses the Barcaldine, Isaacs and Whitsunday Regional Council (BRC, IRC and WRC respectively) administrative areas.

A brief description of the corridor follows:

APSDA to Bogie River (0km – 38km): the route starts at the western boundary of the APSDA (the rail loop is within the APSDA site) and then proceeds in a westerly direction before crossing the foothills between Mount Aberdeen and Mount Abbot. There is a major bridge crossing of Elliot River as well as small bridging of Saltwater Creek and significant culverts through Stockyard Creek area in this section.

3 From the western boundary of the APSDA to the beginning of the rail loop at the mine site.

4 Average width was calculated by dividing the total area of the rail footprint (2215ha) by the length of the rail (453km).

Bogie River to Bowen River (38km – 99km): the route crosses Sandy Creek before climbing towards Peter Gordon Range where it crests and then travels downhill passing to the west of Collinsville, running west of the boundary of Xstrata Mining Lease. In this section the route will pass underneath two high voltage transmission lines (approximately 80m apart) stemming from Collinsville Power Station, as well crossing the Bowen and Bogie Rivers and Sandy, Oaky, Strathmore and Pelican Creeks.

Collinsville to Bowen Development Rd (99km – 163km): initially the route trends uphill from the Bowen River into the Leichardt Range, towards the upstream reaches (or head) of the Suttor River where the route traverses over undulating terrain towards the Bowen Development Road. In this section the alignment crosses the North Queensland Gas Pipeline (near the Bowen River), as well as a 4.5km stretch of the Bowen River floodplain. Bridge crossings also exist at Parrot, Sambo and Cockatoo Creeks.

Bowen Development Rd to Suttor River (163km – 229km): as the rail line descends through the Leichardt Ranges it heads in a south-west direction through open forested country and grasslands before crossing the downstream channels of the Suttor River. In this section the railway will cross the Suttor Development Road at grade and Bowen Development Road with a road-over-railway bridge. The route will also pass within 10km of the township of Mount Coolon.

Suttor River to Gregory Development Rd (229km – 280km): this section sees the route deviate to the south around the heart of the Suttor River Catchment before crossing the Gregory Development Road (road under rail bridge) near the Twin Hill Mines.

Gregory Development Rd to Belyando River (280km – 389km): the route continues in a south-west direction across relatively flat terrain with easy rolling grades avoiding most of the widespread Belyando floodplain and the Epping Forest National Park. The route avoids most of the extensive Belyando floodplain and passes more than 10km from the Epping Forest and Mezappa National Parks. The alignment will have major bridge crossings and significant culverts over Lestree Hill Creek, Sixteen Mile Creek, Mistake Creek and Lascelles Creek in this section.

Belyando River to China First Tenement (389km – 453km): the route continues south-west where it crosses the confluence of the Belyando River and its downstream tributaries. At this point the crossing of the extensive Belyando floodplain is less than 5km. The corridor then continues in a southerly direction as it parallels the existing Galilee Basin EPCs, crossing Sandy Creek in culverts and bridge structure before leading into the loading balloon at the mine site.

1.2.2.1 Changes in rail alignment and KPs since the EIS

Options 1 and 2 of the rail alignment between KP410-453 have been removed leaving the former option 3 as the sole option for this section of the rail alignment (see Figure 3). This is the option that most closely follows cadastral boundaries, and as such, is the option preferred by landowners as it minimises impacts upon those affected landowners.

There have been some minor changes to the initial option 3 alignment as requested by the landowners to better align with the property boundaries. There has also been a change in alignment between KP432-448 to accommodate the Hancock/GVK Alpha Project mine layout. This revised alignment through the Alpha and Kevins Corner Project areas has been discussed with both Hancock/GVK and the Department of Natural Resources and Mining and some further changes to the alignment through the mine area of the Alpha and Kevins Corner may be necessary once the final rail alignments, final land property boundaries and final infrastructure locations are determined.

Relatively minor changes to the rail alignment to accommodate design elements and landowner concerns have occurred in four other locations along the length of the alignment. The limit of the assessment for this project is now defined as the western boundary of the APSDA (see Figure 1).

Given that the limit of the assessment is now the boundary of the APSDA, the Kilometre Points (KPs) have been amended to reflect this. The EIS KP5 at the boundary of the APSDA is now KP0, and accordingly all other KPs along the route are now generally 5km less than those KPs described in the EIS. All work presented within this SEIS utilises the new KPs, starting from KP0 at the boundary of the APSDA, and ending at KP453 at the beginning of the rail balloon loop at the mine. (See Figure 1 and Figure 3).

1.2.2.2 Rail Development

The heavy haul railway will be of single standard gauge track configuration and initially accommodate up to 6 x 3.5km long passing loops. The exact length of the railway (currently estimated at 453km) will not be finalised until the specific route and train loadout facilities at the mine and coal terminal have been established.

The track will be of 68-75kg/m Australian Standard (AS) plain carbon continually welded rail mounted on monoblock pre-stressed concrete sleepers, spaced 650mm apart. These will be supported by a layer of deep clean ballast around 510mm deep (measured from the top of the sleepers) with shoulders of 400mm. Further refinement of track parameters will be conducted throughout the final design phase.

The corridor has been selected to accommodate 1 in 200 (0.5%) and 1 in 80 (1.25%) maximum loaded and unloaded grades, respectively, with no horizontal curves having a radius of less than 1,000m. It is expected that significantly flatter geometry beyond these limits can be achieved between the mine site and Leichhardt Ranges where the topography is relatively flat. The alignment has been modelled subject to curve compensation (0.034%) to ease grades around the smaller horizontal curve radii.

1.2.2.3 Rolling Stock

Currently two rolling stock configurations are being considered based on major coal transportation systems used in China and North America. Both train configurations are expected to deliver similar annual payloads, which is significantly more than the existing capacities of coal freight systems in Queensland.

Standard gauge coal wagons with a range of 25 - 32 t axle loads are currently in daily operation, but higher axle loads are common in iron ore operation. At this point in time, only prototype 36 t axle load coal wagons have been built. Wagon design is assumed on the basis of an enlarged AutoFlood III Aluminium Hopper Car, or alternatively enlarged C80 Gondola Car.

Motive power will be of standard diesel-electric locomotives, for example the General Electric Evolution Series locomotive, or DF Series Chinese locomotive manufactured by China Southern Rail (CSR) Group Ziyang Diesel Locomotive Co. Ltd. Use of electric traction although assessed, does not provide a cost efficient solution for this Project during the initial phases and the development phases.

It is expected that between four to five trains per day will be needed to deliver the initial 40Mtpa of product coal to the coal terminal. An allowance of six passing loops equally spaced by travel time (approximately 50 to 70km apart) will be required along the route to meet the initial annual carrying capacity of 60Mtpa.

Each train will be approximately 3.2km in length, using distributive power and Electronically Controlled Pneumatic air brakes for improved train handling and optimal fuel performance. The effective length of the receiving and departure tracks in compliance with the length of the train and a safe stopping distance is estimated at 3.5km.

Figure 3. Rail Corridor Infrastructure (Page 1 of 5)

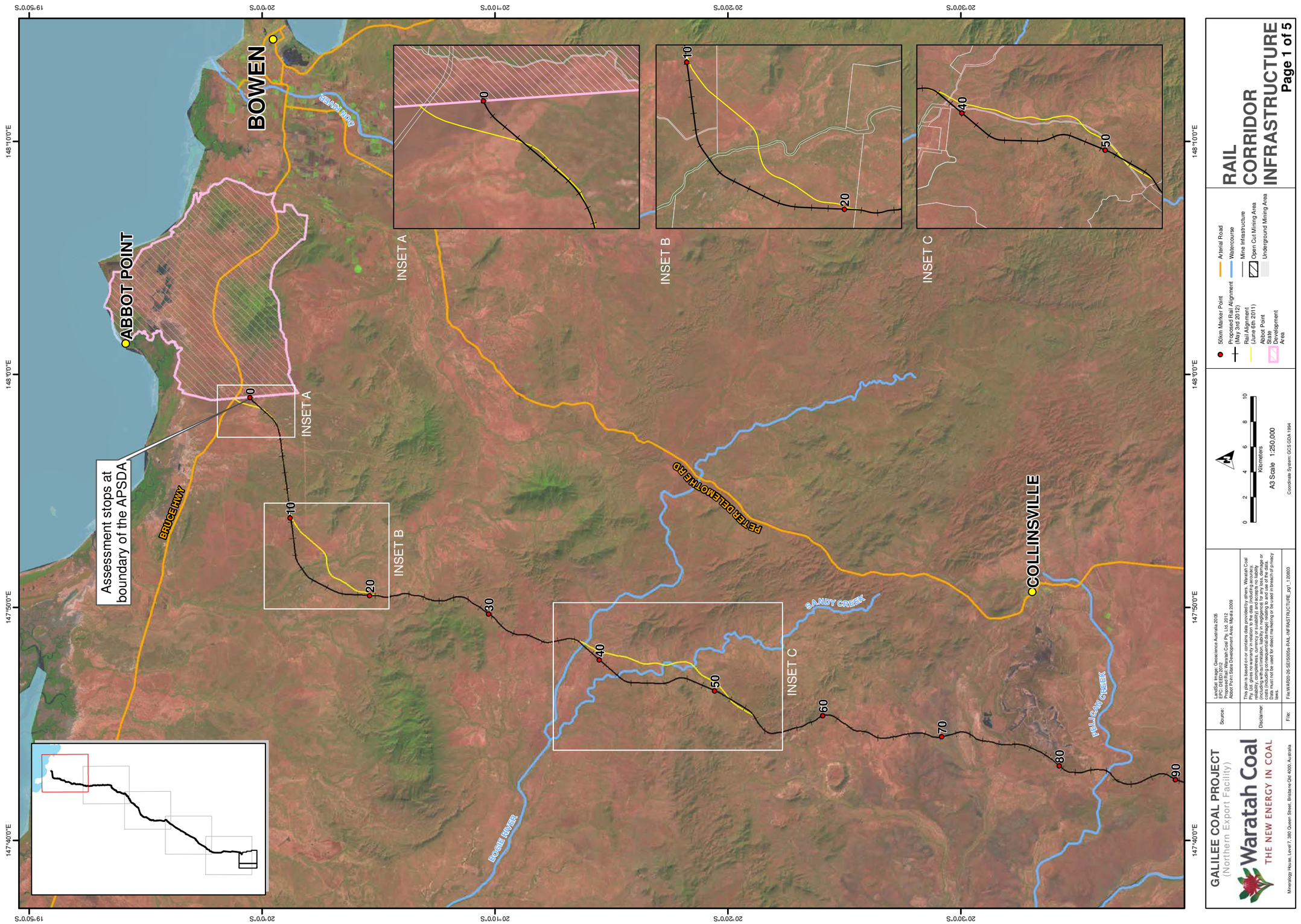


Figure 3. Rail Corridor Infrastructure (Page 2 of 5)

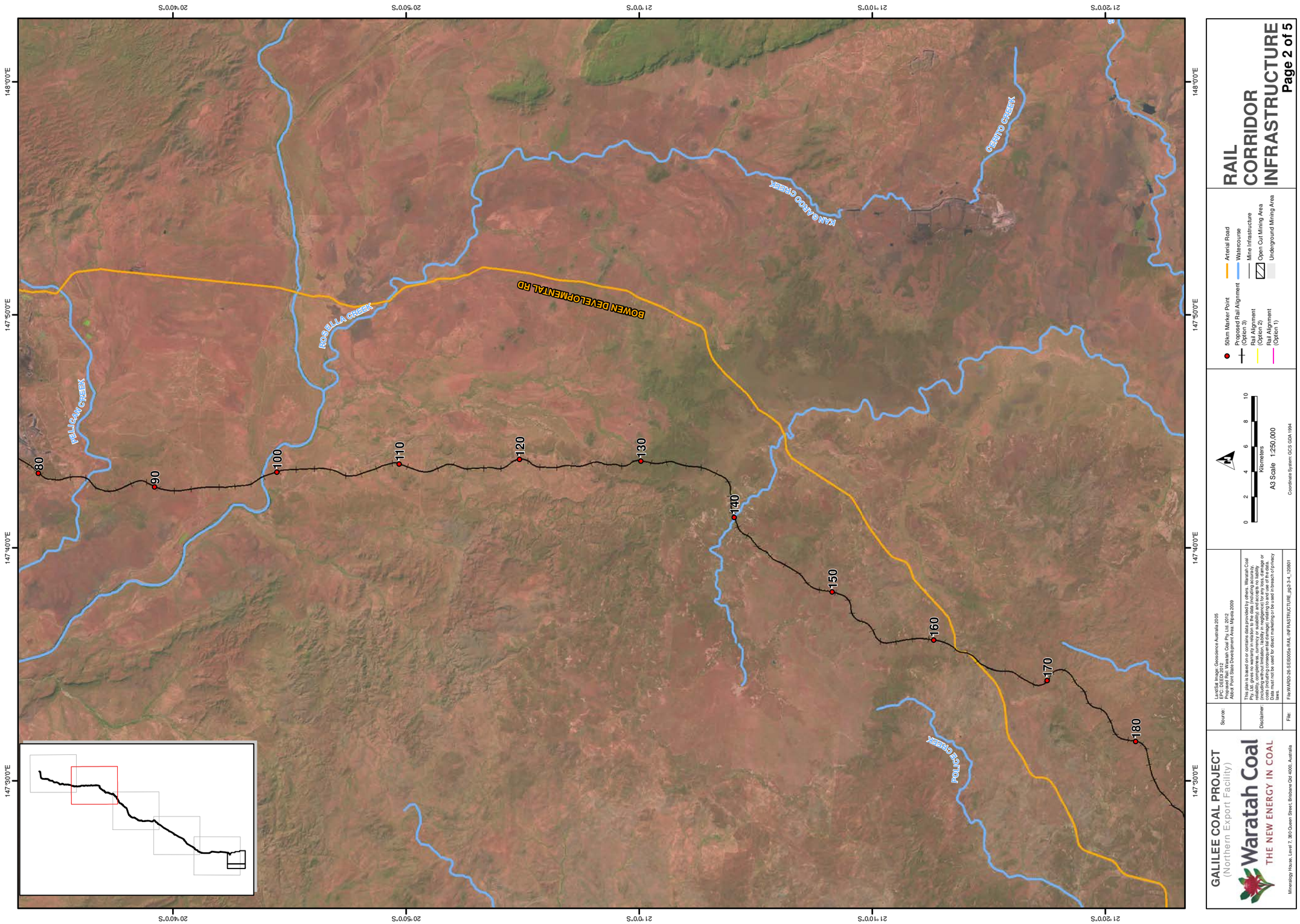


Figure 3. Rail Corridor Infrastructure (Page 3 of 5)

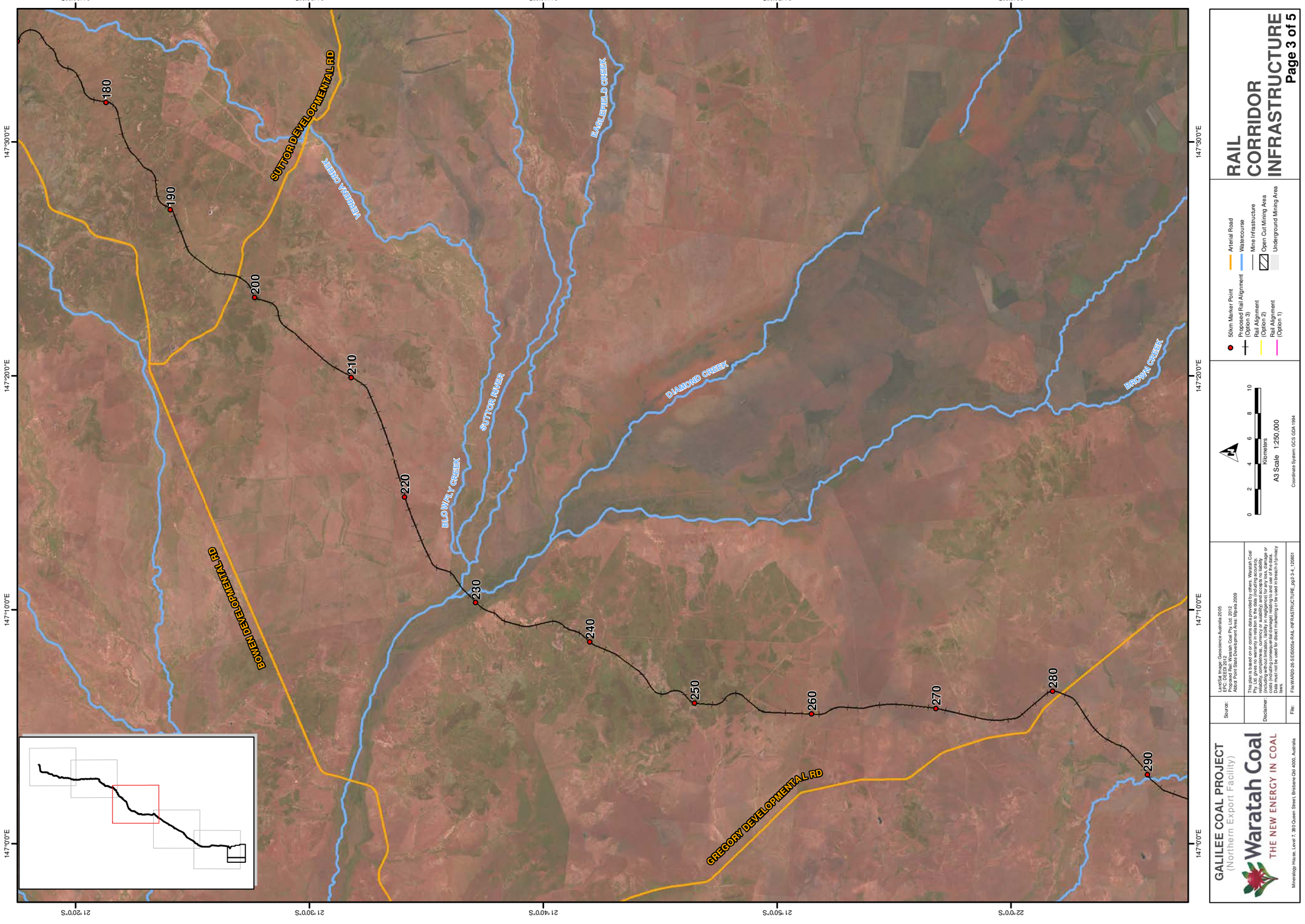


Figure 3. Rail Corridor Infrastructure (Page 4 of 5)

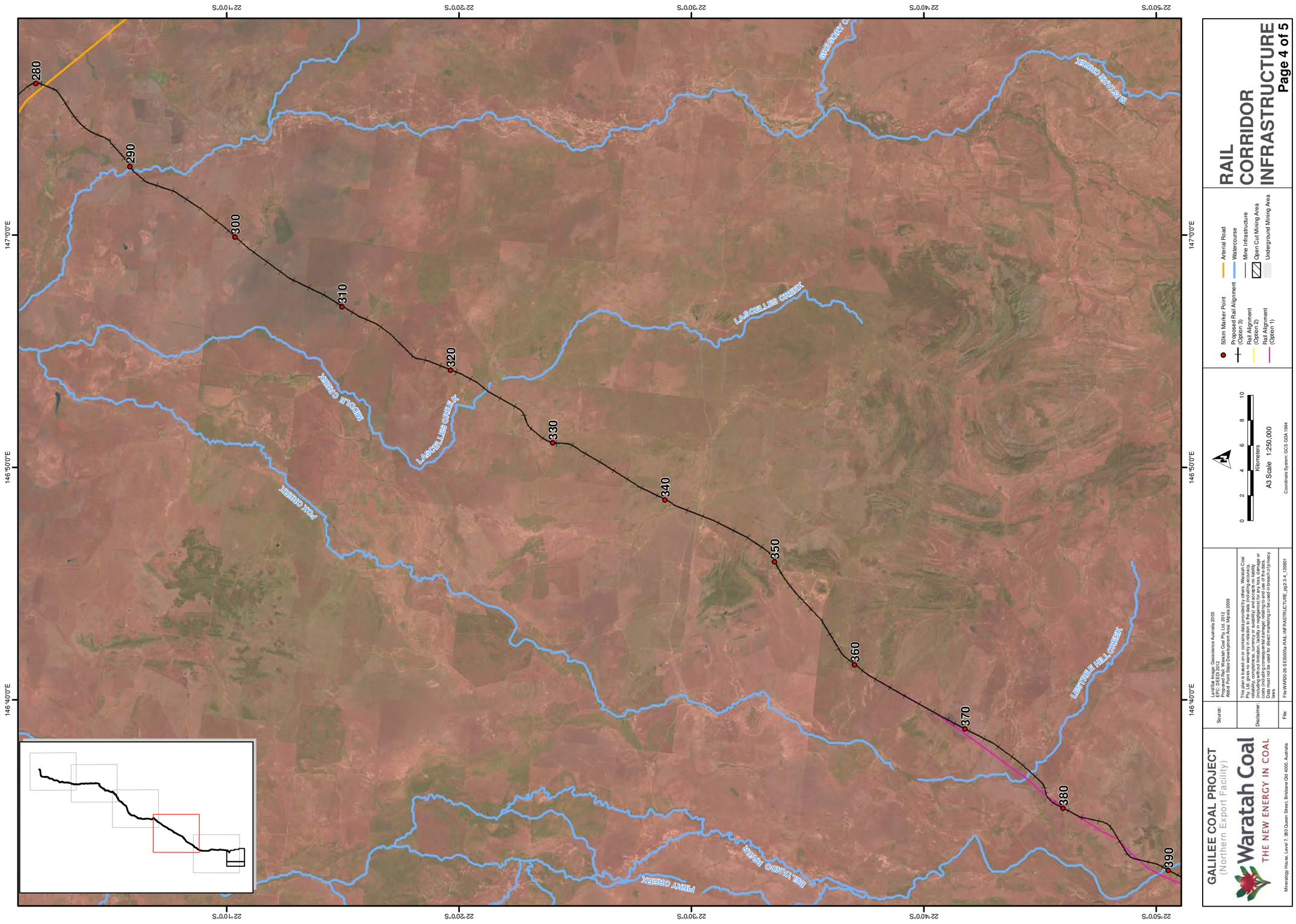
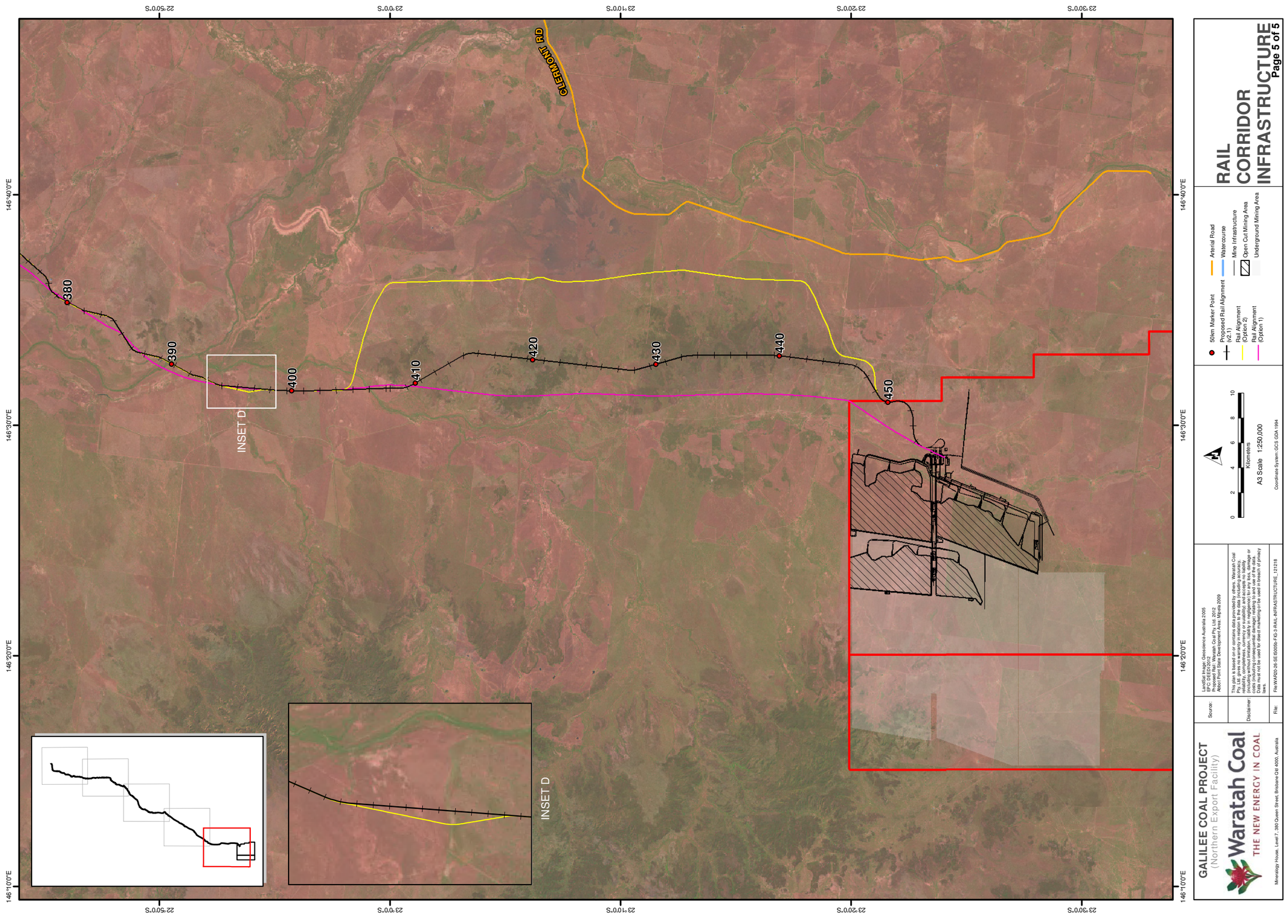


Figure 3. Rail Corridor Infrastructure (Page 5 of 5)



1.2.2.4 Rail Workforce and Accommodation

The construction of the railway will extend for a three year period and require approximately 1,000 workers. The construction workforce is expected to be based in camps at the mine site and at Merinda (near Bowen), as well as four temporary camps along the railway alignment. The temporary construction camps are each expected to accommodate from 150 to 500 workers, who are likely to work 12 hour shifts on a FIFO basis (e.g. 21 days on 7 days off).

Around 60 employees are expected to run and maintain the railway network during operations. It is expected that these staff will generally reside in the Bowen area.

The construction contractor will select the location of the temporary workers villages, works depots and laydown areas prior to the commencement of construction works. It is expected that the four temporary workers villages and up to ten works depots required along the rail easement will be located within one hour's drive from the construction site. As such, it is expected that the workers villages will be located at a maximum of 100km apart; however, this may vary to suit construction and logistical requirements. The workers village at the mine site will also be used to accommodate rail line construction workers and there may be a requirement for temporary accommodation at Bowen and the surroundings towns to cater for the construction of the rail at the APSDA.

1.2.3 OTHER PROJECT COMPONENTS

1.2.3.1 Mine Water Supply and Storage

The site water management system has been investigated and designed such that there is minimal requirement for imported water. Water captured onsite will be used in underground workings, dust suppression and coal washing. Despite this there is still an annual clean water requirement during mine operation estimated at 2500ML/yr, comprising:

- 2,000ML/year for the CHPP vacuum pumps
- 350ML/year for wash downs within the Mine Industrial Area
- 150ML/year for potable and fire fighting purposes.

Potable water demands for the mine construction phase are estimated to peak at 290ML/yr. This water demand will be met through contracted potable water suppliers carting from an offsite source.

In the initial EIS submission for the Galilee Coal Project a raw water storage was proposed to be constructed on Tallarenha Creek within the MLA. This dam is no longer included in the project. Waratah Coal had also applied for an annual allocation of 2,500ML/year from the Connors River Dam Project which was being developed by SunWater. The Connors River Dam Project is no longer proceeding and SunWater is currently investigating the feasibility of a pipeline to supply water from the Burdekin River to the Galilee Basin. This pipeline is unlikely to be constructed in time for the commencement of mining at the Galilee Coal Project.

As a raw water supply of 2,500ML/year is required for the mine operation, the following raw water supply options have been identified for the mine:

1. Existing Water Supply Schemes (Regional Pipelines):
    a. Burdekin Haughton Water Supply Scheme (BHWSS)
    b. Trading with existing water allocation holders
    c. Nogoa Mackenzie Water Supply Scheme (NMWSS)
2. Unallocated Surface Water:
    a. Burdekin WRP area
3. Groundwater and Local Supply, and
4. The Great Artesian Basin (GAB).

Of these options, it is proposed to utilise an initial temporary supply of raw water from a borefield in the vicinity of the mine. Discussions with DEHP have indicated that this is a feasible option. The ultimate permanent raw water solution is proposed via a pipeline from the Burdekin River to supply coal mines in the Galilee Basin.

Additional investigations will be required to confirm the feasibility of these proposed raw water sources. A potential contingency measure for the mine raw water supply is the operation of a water treatment plant at the mine to produce low salinity water from excess mine affected water. The water balance investigations for the mine indicate that there will be sufficient excess mine affected water to provide a raw water supply of 2,500ML/year via a water treatment plant.

1.2.3.2 Rail Water Supply and Storage

Construction water for the railway will predominately be required for:

- compaction / conditioning of earthworks
- dust suppression
- weed wash down bays
- concrete works
- rehabilitation works, and
- workforce.

Preliminary estimates of the total water requirements for the three year construction of the rail indicate that approximately 10,000 Mega Litres (ML) will be required. The primary requirement for water will be for bulk earthworks with a higher demand in flood plains and towards the coast where there is a greater extent of bulk earthworks requirements. The final requirement for construction water is subject to further studies into the refinement of the rail design and future hydro-geological assessments.

Along the railway corridor, water will be sourced from existing domestic supplies where practical, including those from established townships such as Collinsville and Mount Coolon. Due to the rural and isolated nature of the railway corridor, water will also be sourced from existing surface storages such as farmer's dams and harvesting of existing turkey nest dams. Further to this, any shortfall to water requirements will be made up by tapping into potential groundwater from alluvial basins.

1.2.3.3 Rail Marshaling Yards

Marshaling yards for the maintenance, servicing and refueling of rolling stock will be located at the coal terminal end of the railway with a locomotive refueling facility located around the mine balloon loop area. This servicing facility will be of sufficient capacity to hold the entire rolling stock fleet and provide for the following functions:

- holding roads (railway lines) for trains awaiting departure
- storage roads for rolling stock awaiting repair or taken out of cycle on rotation
- roads for disconnecting and marshaling of trains
- wagon maintenance workshop
- locomotive maintenance and refueling facility
- roll by inspection facilities
- Central Control Terminal
- equipment and fuel storage
- security facilities
- water and wastewater handling and treatment
- cleaning and decontamination of rolling stock
- oil and sediment control traps
- staff and administration facility, and
- emergency response room.

1.3 Project Proponent

The project proponent is Waratah Coal, a fully owned subsidiary of Mineralogy Pty Limited. The project will be developed by China First Pty Ltd, a fully owned subsidiary of Mineralogy Pty Limited and proponent of this EIS.

Waratah Coal presently holds 19 Exploration Permits for Coal (EPC), seven Exploration Permits for Minerals (EPM) within Queensland's Galilee Basin. The total area of all granted tenements owned by Waratah Coal is 16,970km^2. All tenements and applications are within Queensland's Galilee Basin. Waratah Coal holds one granted Mineral Development Licence (MDL) 455, two MDL Applications (481 and 485) and two Mining Lease Applications (MLA) (70454 and 70489).

The contact details for Waratah Coal are as follows:

Manager Environment and Approvals
Waratah Coal
GPO Box 1538
Brisbane Qld 4001.

Waratah Coal's approach to managing environmental aspects for which it is responsible is embodied in the development and implementation of its Environmental Management System (EMS). Waratah Coal's EMS has been developed to be consistent with the internationally recognised EMS standard ISO 14001. In delivering its environmental stewardship responsibilities, Waratah Coal has developed and adopted a systematic approach to managing environmental issues across all activities.

1.4 Project Changes Since EIS Lodgment

Since lodgment of the EIS, five key changes to the project that reduce potential impacts associated with the project have occurred:

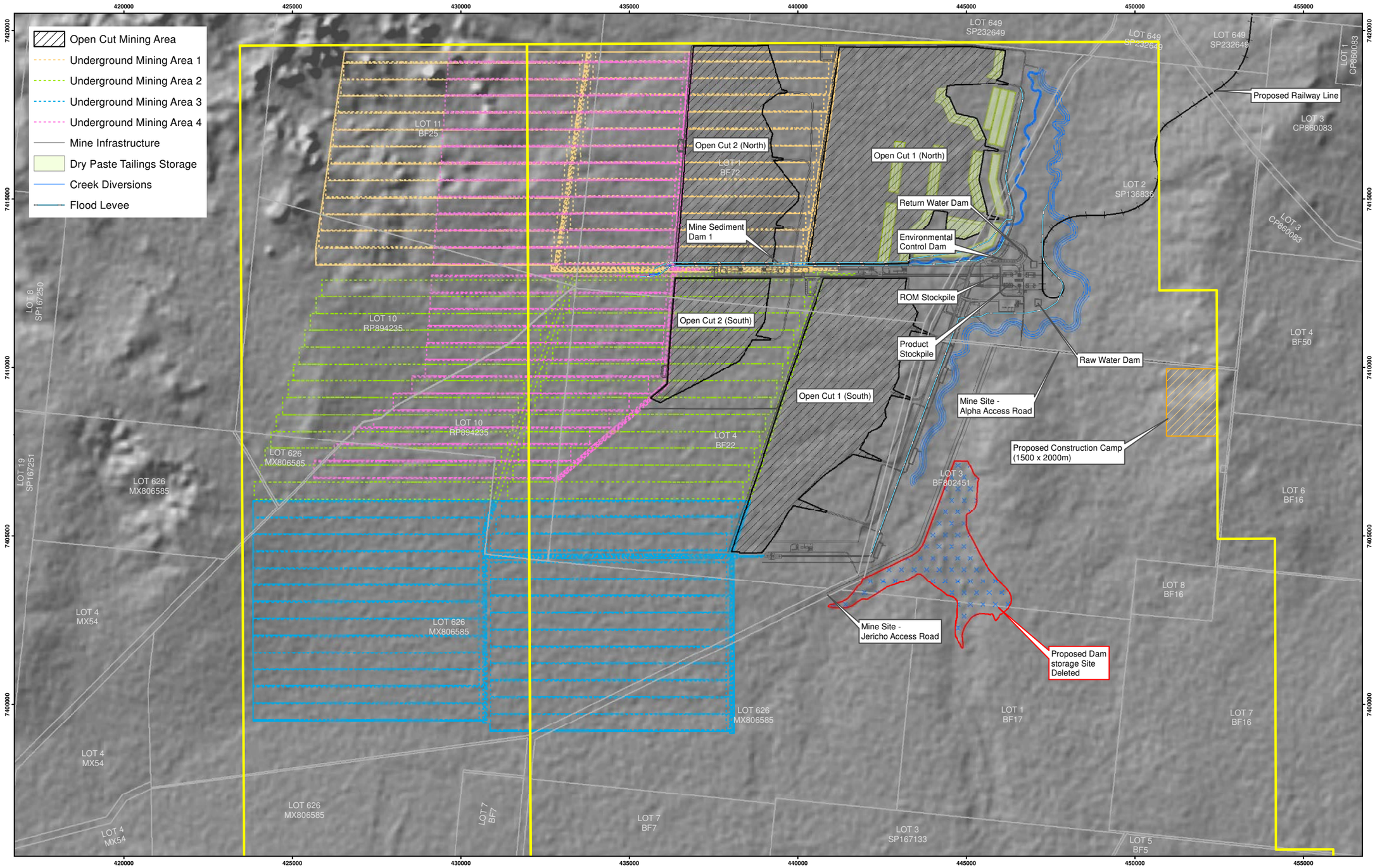
1. The proposed Tallarenha Creek Dam has been removed from consideration as a potential water source. (See Figure 4).

The Tallarenha Creek Dam has been removed as a proposed source of water for the mining operations for both environmental and water reliability reasons. More detailed water balance modeling for the mining operations has elucidated a reduction in the required clean water from 4,500ML per annum to 2,500ML per annum. This was proposed to be sourced from the Connors River Dam Project, but this project is no longer proceeding and SunWater are currently investigating the feasibility of a pipeline to supply water from the Burdekin River to the Galilee Basin. However, this pipeline is unlikely to be constructed in time for the commencement of mining at the Galilee Coal Project. As such, Waratah Coal have identified the following raw water supply options for the mine:

1. Existing Water Supply Schemes (Regional Pipelines):
    a. Burdekin Haughton Water Supply Scheme (BHWSS)
    b. Trading with existing water allocation holders
    c. Nogoa Mackenzie Water Supply Scheme (NMWSS)
2. Unallocated Surface Water:
    a. Burdekin WRP area
3. Groundwater and Local Supply, and
4. The Great Artesian Basin (GAB).

Of these options, it is proposed to utilise an initial temporary supply of raw water from a borefield in the vicinity of the mine. Discussions with DEHP have indicated that this is a feasible option. The ultimate permanent raw water solution is proposed via a pipeline from the Burdekin River to supply coal mines in the Galilee Basin.

Figure 4. Mine Infrastructure Arrangement (with former Tallarenha Creek Dam)



GALILEE COAL PROJECT (Northern Export Facility)

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THE NEW ENERGY IN COAL

Mineralogy House, Level 7, 380 Queen Street, Brisbane Qld 4000, Australia

Source:	Cadastral Boundaries: DERM 2012 EPC Boundary: Department of Natural Resources and Mines (DNRM) 2012 Mine Detail: Waratah Coal Pty. Ltd. 2012 Background Image: Shaded relief: ESRI Data & amp; Maps 2006
Disclaimer:	This plan is based on or contains data provided by others. Waratah Coal Pty. Ltd. gives no warranty in relation to the data (including accuracy, reliability, completness, currency or suiability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to and use of the data. Data must not be used for direct marketing or be used in breach of privacy laws.
File:	File: WAR20-26-SEIS0034b-FIG-2-MINE-INFRASTRUCTURE-AREA-W-DAM-121114 Date: 14/11/2012

0 1,000 2,000 3,000 4,000 5,000
Metres

A3 Scale 1:100,000

Coordinate System: GDA 1994 MGA Zone 55 Projection: Transverse Mercator

EPC1040 & Part of EPC1079

Cadastral Boundary

MINE INFRASTRUCTURE AREA (WITH FORMER TALLARENHA CREEK DAM)

Additional investigations will be required to confirm the feasibility of these proposed raw water sources. A potential contingency measure for the mine raw water supply is the operation of a water treatment plant at the mine to produce low salinity water from excess mine affected water. The initial water balance investigation for the mine indicates that there will be sufficient excess mine water to provide a raw water supply of 2,500ML per year via a water treatment plant.

2. Conventional thickening and use of a Tailings Dam is no longer proposed.

Instead, the Dry Tailings method will be used, which involves taking tailings from the thickener and utlising filter presses to dewater the tailings to produce tailings paste. The Dry Tailings are then be trucked to Tailings Storage Facilities. Waratah Coal have chosen to encapsulate these in cells developed within the box cut and open cut spoil pile areas.

Whilst being more capital and maintenance intensive, this method is considered environmentally advantageous over conventional thickening and use of a Tailings Dam for the following reasons:

- it results in a reduced environmental footprint as there is no requirement to disturb land dedicated solely to tailings storage, as already disturbed areas within the box cut and open cut spoil heaps are utilised
- there is high water recovery, resulting in significant water savings
- disposal sites are available for rehabilitation earlier than in conventional methods of tailing disposal.

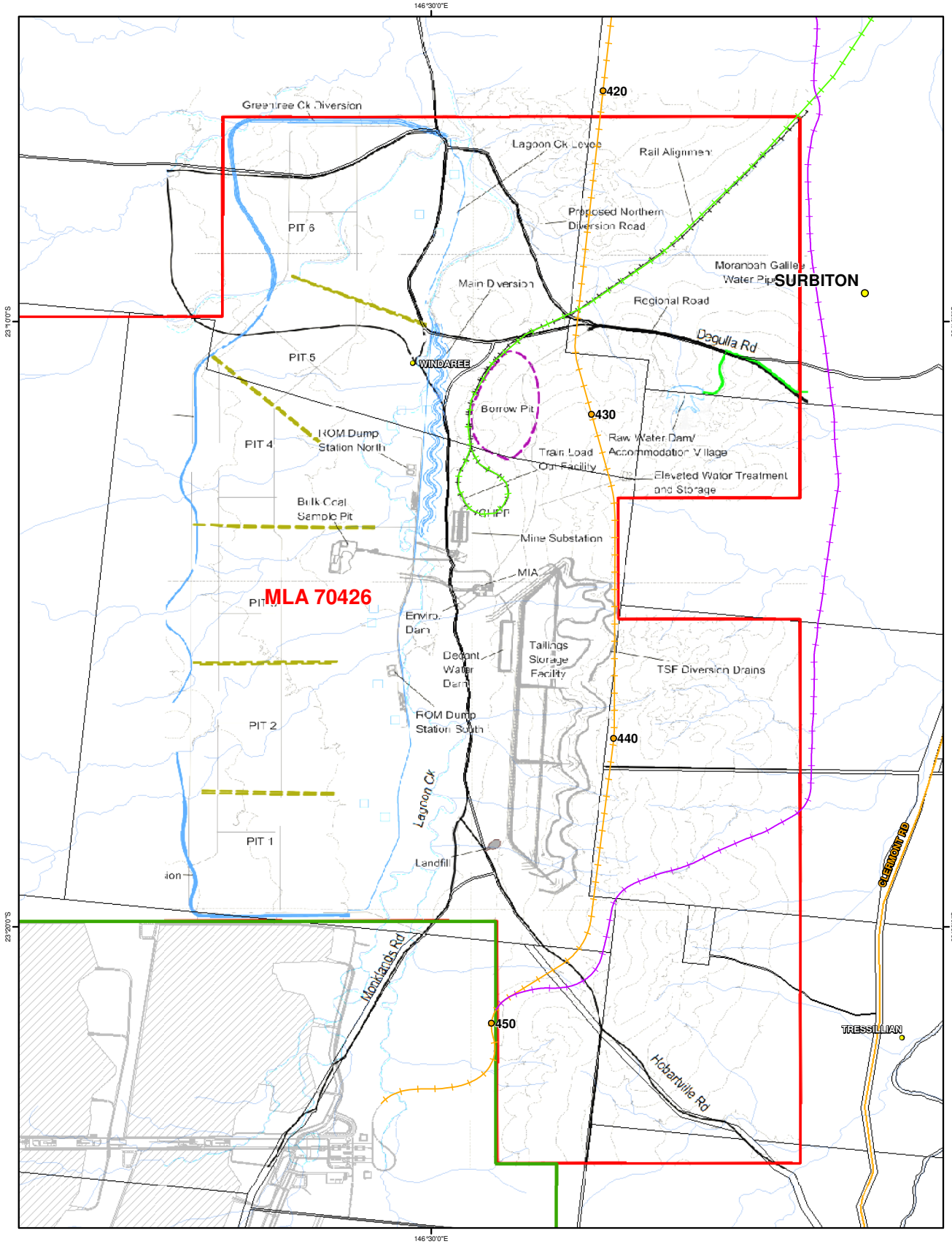
3. Changes to the proposed rail alignment. Options 1 and 2 (Between KP410-460) have been removed as options for the rail alignment, and four other minor changes to the proposed alignment have occurred (see Figure 3 (Pages 1-5)).

Options 1 and 2 of the rail alignment between KP410-453 have been removed leaving the former option 3 as the sole option for this section of the rail alignment (see Figure 3). This is the option that most closely follows cadastral boundaries, and as such, minimises impacts upon affected landowners. There have been some minor changes to the option 3 alignment as requested by the landowners to better align with the property boundaries. There has also been a change in alignment between KP432-448 to accommodate the Hancock/GVK Alpha Coal Project mine layout. Although passing close to the Alpha Coal (see Figure 5) and Kevin's Corner projects (see Figure 6), the alignment does not sterilise coal deposits of either project. The general area of the alignment is where the coal seams E and F are located. These seams will not be mined[5]. This revised alignment through the Alpha Coal and Kevin's Corner Project areas has been discussed with both Hancock/GVK and the Department of Natural Resources and Mining and some further changes to the alignment through the mine area of the Alpha and Kevin's Corner may be necessary once the final rail alignments, final land property boundaries and final infrastructure locations are determined. A detailed explanation of the route selection process in this location is also provided in the *Waratah Coal Rail Alignment through MLA 70426 and 70425* report contained in the *Appendices – Volume 2* of this SEIS. The current arrangement of the proposed alignment is shown in Figure 3 (Pages 1-5).

Relatively minor changes to the rail alignment to accommodate design elements and landowner concerns have occurred in four other locations along the length of the alignment. These are also shown in Figure 3 (Pages 1-5).

5 See the EIS reports for both the Alpha Coal and Kevin's Corner Projects where it is stated that mining these seams is uneconomic.

Figure 5. Waratah Coal 'Option 2' – Proposed rail alignment traversing around Alpha Coal (MLA 70426)



GALILEE COAL PROJECT
(Northern Export Facility)
Waratah Coal
THE NEW ENERGY IN COAL
Mineralogy House, Level 7, 380 Queen Street, Brisbane Qld 4000, Australia

Source: Cadastral Boundaries: DERM 2012 Mine Detail, Waratah proposed Railway Line, Hancock Proposed Rail Line, Option 2 Alignment: Waratah Coal Pty. Ltd. 2012 Roads: Geoscience Australia 2012 Watercourses: Vegetation Management Act Queensland Regrowth Other Watercourses Version 2.1 (DERM 2012)

Disclaimer: This plan is based on or contains data provided by others. Waratah Coal Pty. Ltd. gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to and use of the data. Data must not be used for direct marketing or be used in breach of privacy laws

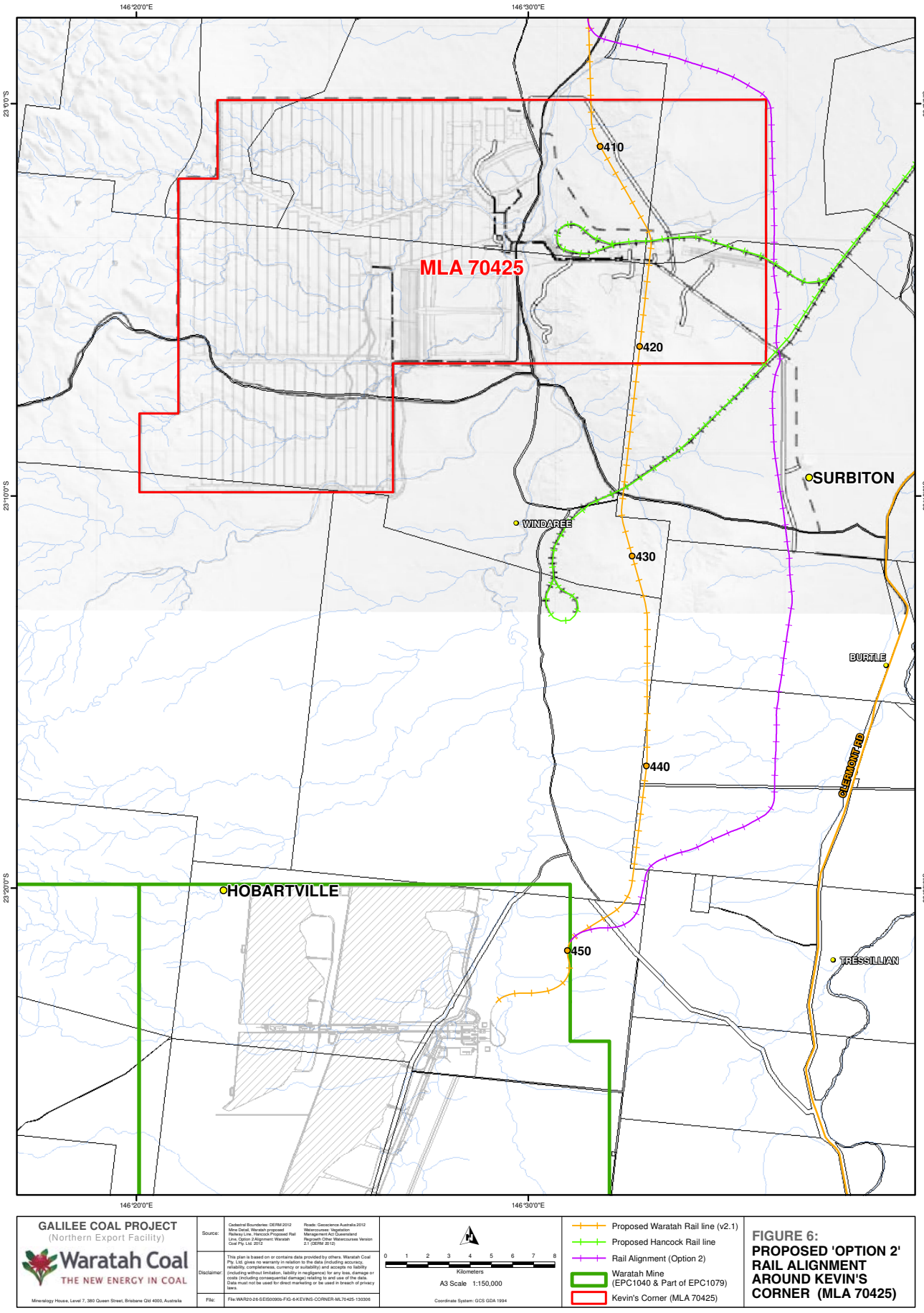
File: File:WAR20-26-SEIS0089b-FIG-5-ALPHA-ML70426-130306

0 1 2 3 4 5
Kilometers
A3 Scale 1:100,000
Coordinate System: GCS GDA 1994

Proposed Waratah Rail line (v2.1)
Proposed Hancock Rail line
Rail Alignment (Option 2)
Waratah Mine (EPC1040 & Part of EPC1079)
Alpha (MLA 70424)

FIGURE 5: PROPOSED 'OPTION 2' RAIL ALIGNMENT AROUND ALPHA (MLA 70426)

Figure 6. Waratah Coal 'Option 2' – Proposed rail alignment traversing around Kevin's Corner (MLA 70425)



4. The limit of the assessment for this project is now defined as the boundary of the APSDA (see Figure 1).

As mentioned previously, until recently there was a commitment to utilise coal terminal, stockpiling and loading facilities being assessed as part of the North Queensland Bulk Ports (NQBP) T4-T9 and MCF proposals. However, given the recent Queensland Government directive to defer the approval process for the expansion of Abbot Point, and the associated uncertainty over the T4-T9 and MCF proposals, the limit of the assessment for this project is now defined as the western boundary of the APSDA.

5. Providing cover to coal wagons to negate dust emissions from the rail.

Waratah Coal proposes to use tippler wagons (gondola) rather than the more traditional bottom dump coal wagons. With the use of tippler wagons, coal hang-up should be negligible or eliminated. Bottom dump wagons are more frequently associated with coal hang up, particularly in wet weather. In addition to the tippler wagons, Waratah Coal's solution to mitigation of coal dust is to provide a cover to the top of the wagons. It is intended these covers will be made of fibreglass. These covers have been proven in service, operating in conditions ranging from –40°C to +40°C. The railcar cover system meets the criteria for a "closed transport vehicle" specified in the United States Code of Federation Regulations (CFR), Title 49, Transportation (Subsection 173.403(c)).

In addition to significantly reducing coal dust, these commitments provide:

- Reduction in emissions from fuel consumption as using covers provides better train aerodynamics, which reduces fuel consumption, and associated emissions
- Elimination of the need to use chemicals for veneering, and
- Elimination of the need for more than 50 million litres of water required to apply the chemical veneering.

See Issue Response 12027 (in Part C – 0A – Project Description) for further details.

1.5 Project Rationale

The coal mine infrastructure area is situated approximately 30km north of Alpha. To date, Waratah Coal has identified approximately 1.4Bt of coal within MLA 70454, which is wholly contained within EPCs 1040 and 1079. Coal quality tests confirm that these coal reserves average less than 0.5% sulphur and possess an average calorific value of 26MJ/kg.

The project is intended to have an initial export capacity of 40Mtpa, with the capability to expand substantially to 100Mtpa (however expansion to 100Mtpa would be the subject of a separate approvals process). The project will proceed through a staged development process with first coal loads in 2014. As the coal will require washing for the export market, an initial 56Mtpa of ROM coal will be required to provide 40Mtpa of export coal.

The transport of the coal from the mine to international markets requires the resolution of four key logistical issues, these being:

- higher transport costs than competitors due to distances between the mine and existing Queensland coal ports infrastructure;
- congestion on the existing Queensland Rail (QR) operated narrow gauge rail infrastructure;
- congestion at the existing coal ports; and
- uncertainty over the ultimate ownership of important infrastructure as a result of the proposed privatisation of major infrastructure assets by the Queensland Governments.

In recognition of these issues and to enable coal to be exported at the minimum logistical cost, Waratah proposes to construct the new rail line with an initial capacity of 60Mtpa and an ultimate capacity of 400Mtpa.

1.5.1 PROJECT DEMAND

Over the last 15 years the rapid growth in the world's economy has resulted in a swift increase in global fuel consumption, principally in oil, coal, natural gas and other fossils fuels. In particular, the demand for coal has increased considerably due to its low price and reliable supply, compared to other fossil fuels.

Australia, being the world's leading exporter of coking and thermal coal, holds a strong position with future international coal trade as it continues to improve its inland transportation and port infrastructure to expedite coal shipments to international markets.

The Australian Bureau of Agricultural and Resource Economics (ABARE) predict that global thermal coal imports will increase by 19% over the next 5 years. The growth over this outlook is likely to be driven predominately by developing Asia (in particular China, India and Korea), which reflects their increasing economic reliance on coal-fired electricity generation which cannot be met by their domestic supplies.

In 2007, 58% of the world's exported thermal coal was imported by Asian countries, which is expected to steadily rise to 65% by 2030. Australia has large proven reserves of thermal coal, including an estimated 14Bt of inferred coal resource lying untapped within the Galilee Basin. Being well situated geographically to Asian markets, Australia is in a strong position to be a major supplier to these coal dependent countries.

In 2009, China became a net importer of thermal coal, with it importing an estimated 84 million tonnes of steaming coal, up by 137% from the previous year. The ABARE forecasts that this will further increase to 100 million tonnes by 2015.

The ABARE forecasts a steady growth in thermal coal exported from Australia to be between 6 to 9% per annum, up to 200Mtpa, by 2014-15. For Queensland this represents an excellent opportunity to expand its global market for thermal coal through the rapid development of the Galilee Basin and associated infrastructure.

1.5.2 PROJECT COSTS, BENEFITS AND TIMEFRAMES

It is estimated that the construction of the project will require an investment of AUD$6.5 billion consisting of:

- mine – AUD $4 billion
- railway – AUD $2.5 billion.

These amounts include ancillary infrastructure.

The project will realise significant economic and social benefits on a regional, state and national scale. The rail corridor will open a new multi-billion tonne coal province with opportunities for thermal coal export to world markets for both Waratah Coal, as well as other Galilee Basin proponents through welcomed third party access arrangements. It will also provide much needed new rail infrastructure in Central Queensland to ease existing congestion on the current coal haulage systems.

The project will generate considerable export income for the Australian economy with revenue of A$4.6 billion per annum, or A$85 billion over the life of the project. Commonwealth and State Government revenue will also be increased through taxes and royalties of up A$360mpa (State) and A$700mpa (Commonwealth) respectively from the project alone.

The project will assist in driving the growth of Central and North West Queensland, creating approximately 3,500 direct jobs during construction and 2,060 permanent employees for the long term operation of the mine, rail and port facilities. A flow through benefit of an additional 70,000 indirect jobs is anticipated, with the majority of these expected to occur in Queensland.

The project will generate additional expenditure to the regional economy as local suppliers, service providers and contractors participate in the project.

The project will assist progression across general regional development of both the Northern Economic Triangle and Central Queensland. There exists an opportunity for a fibre optic cable used for the railway communications systems to provide a platform to enhance broadband capacity of the region, as well as provisions for new water and power infrastructure servicing this remote area.

The project is committed to commence early engineering works in early 2014 with final construction due for completion in 2017. This schedule is based on a high level assessment of the time required for the design, supply and construction of the various project elements following a conventional contracting strategy.

1.5.3 FINANCING AND DEVELOPMENT

Waratah Coal has appointed MCC Overseas Ltd (MCC), one of the world's largest engineering and construction companies, as principle engineering, procurement and construction management contractor (EPCM) for the A$6.5 billion project. MCC will manage a syndicated group consisting of China Overseas Engineering Group (COVEC), China Communications Construction First Harbor Consultants (CCCC) and Sinocoal International Design and Research Institute (SCIEG), to design and construct one of Australia's largest coal mines along with the required export infrastructure. Waratah Coal has made a financial decision to proceed with the China First Coal Project following the completion of their Bankable Feasibility Study (BFS) by MCC, in conjunction with specialist consultants SCIEG, COVEC and CCCC. The BFS has been completed showing strong profitability, with the debt funding and equity raising well advanced. The project will see 85% of the debt funding provided from lending institutions in China, estimated to be A$5.5 billion. The remaining 15% equity (A$1 billion) is expected to be funded by cash proceeds from China's State owned enterprises and public and private investments.

Further to this, Resourcehouse has signed coal purchase and supply agreement with China Power International Holding Ltd, conditionally agreeing to take 50% of the future mine production, generating an estimated revenue of US$80 Billion USD. This speaks volumes for the strength and interest from China and other energy hungry markets in developing a new world class coal region such as the Galilee Basin.

1.5.4 CONSEQUENCES OF NOT PROCEEDING

If the project does not proceed, the cost to the Commonwealth and State would include:

- approximately 3,500 construction jobs, comprising 2,500 at the mine and 1,000 for the rail alignment
- permanent employment of approximately 2,060 jobs
- loss of export income and revenue injection into the regional economy
- loss of taxes and royalties to the Commonwealth and State
- lost opportunity of infrastructure and services development within Alpha, Bowen and the greater region, and
- the economic opportunity of developing this viable coal reserve will not be realised.

1.6 Relationship to Other Projects and Cumulative Impacts.

The construction and operation of the project is dependent on a range of additional infrastructure and services. These additional facilities and services include the following projects that are currently, or will be, the subject of separate environmental approvals.

- **Gaililee Basin Power Station** – Galilee Power proposes to construct and operate a 900MW (nett) coal-fired power station that incorporates carbon capture and storage technologies. The power station will be designed to incorporate the latest clean-coal low emission technologies. The power station will initially be constructed to generate nett 450MW, with a second 450MW module to be added as demand requires. The power station will be situated approximately 30km to the north-west of Alpha, and immediately to the east of Waratah Coal's proposed mine in the Galilee Basin, Central Queensland. The power station will utilise waste coal from Waratah Coal's tenements as power station feedstock.

- **Galilee Basin Transmission Project proposed by Powerlink Queensland** – electricity for the mine construction and operation will be supplied by this infrastructure project to a substation north of the SGCP (proposed Surbiton Hill Substation) until the Galilee Basin powerstation becomes operational
- **A 132 kilovolt feed line from the proposed Waratah/SGCP Substation to the northern boundary of MLA 70453** – a Power Allocation (Power Enquiry) has been made to Powerlink by both AMCI (Alpha) Pty Ltd and Alpha Coal Pty Ltd Coal (the proponents of the South gailiee Coal Project) and Waratah Coal seeking confirmation of an unregulated supply to both mines
- **Standalone Jetty** – Waratah Coal is proposing to construct and operate a new coal terminal, inclusive of onshore and offshore infrastructure, at the Port of Abbot Point. In May 2012 the Commonwealth Department of Sustainability, Environment, Water, Population and Communities finalised guidelines for the project.
- **Proposed Abbot Point Expansion AP-X** – On Dec 21 2012 the Deputy Premier announced that the Queensland Government was seeking registrations of interest in the proposed Abbot Point Expansion (known as AP-X). Waratah Coal has lodged a registration of interest in this proposal. The ROI process is the beginning of a new process to identify prospective capacity seekers and development proponents. Waratah Coal considers this project an alternative to the Standalone Jetty project described above

A number of similar projects are proposed in proximity to the project. These projects are in various stages of approval and / or development. Since the EIS was released, several other proponents of these projects have also released either EISs or supplementary material. This has enabled an updated assessment of the cumulative impacts of several other projects that are proposed in the Galilee Basin, as well as other rail alignments that are proposed as solutions to carry coal from the Galilee Basin to the Port of Abbot Point.

1.6.1 MINE

For the mining component of the project, the revised cumulative impact assessment has focussed on projects in the Galilee Basin as these projects have similar sizing, timing and infrastructure requirements as the Galilee Coal Project. Key issues that were considered were the geographical overlap of one or more of the projects, and the extent to which the inter-relatedness of these projects resulted in creating a significant impact on the environmental values. These environmental values include built, natural social and cultural attributes within the project area of influence.

Hence, for the purposes of the CIA of the mining component of the project, the potential environmental, social and economic cumulative and consequential impacts of other Galilee Basin projects are considered most relevant. Also, there is real potential for minimisation of cumulative impacts given the 'greenfield' nature of the Galilee Basin.

The projects considered were:

- Alpha Coal Mine
- Galilee Basin Power Station
- Kevin's Corner, and
- Carmichael Coal

1.6.2 RAIL

For the rail component of the project, the revised cumulative impact assessment considered:

- Alpha Coal Project – Rail Element
- QR National Central Queensland Integrated Rail Project
- Carmichael Coal – Rail Element, and
- Goonyella to Abbot Point Rail Project

The Queensland Government has announced that only two rail alignments (one from the northern end of the Galilee Basin and one from the southern end) will be approved, which should provide access for all projects in the area[6]. The Carmichael Coal Mine and Rail Project and the Alpha Coal project were nominated as the two preferred options.

Hence, from the southern end of the Galilee Basin, only the Alpha Coal Project rail line, the north to south alignment of the QR National Central Queensland Integrated Rail Project, or the Galilee Coal Project rail line will likely proceed. As such the Alpha Coal and the north to south alignment of the QR Integrated Rail Project have been considered primarily from a co-location of infrastructure standpoint, as it considered highly unlikely that more than one rail corridor will be built in the vicinity of Waratah Coal's proposed alignment along a north to south alignment from the southern Galilee Basin to Abbot Point.

1.6.3 CONSEQUENTIAL PROJECTS

The following proposed projects are also of note as they could be, in part, brought about as consequential impacts of the Galilee Coal Project.

- Standalone Jetty (EPBC 2012/6250)
- Proposed Abbot Point Expansion AP-X
- Gaililee Basin Power Station
- Powerlink Power Transmission Line, and
- SunWater Moranbah to Alpha Pipeline

In assessing cumulative impacts, Waratah Coal adopted a conservative approach. For example, the Cumulative Impact Assessment has assumed that the timing of the construction of the assessed projects will be concurrent with the project. Whilst this is not necessarily the case in reality, the assumption of concurrence has allowed the proponent to apply a conservative approach to impact assessment.

The methodology used to undertake the updated cumulative impact assessment was as follows:

1. Review of the potential impacts of the Galilee Coal Project as a standalone project (as detailed in the EIS and SEIS).
2. Identification of relevant projects that are either proposed or have recently been approved but not yet constructed that are located within the general vicinity of the Galilee Coal Project.
3. Review the cumulative impact assessments (where in existence) for the projects that have been identified as being of relevance for the CIA.
4. Determine the impacts of the project that have potential to interact and aggregate in time and space those of other projects.
5. Define an appropriate spatial boundary for the analysis of cumulative impacts. Where operational schedules do not overlap, the likelihood of significant cumulative impacts is less. The spatial extent of the assessment boundaries varies according to the type of impact being assessed.
6. Define the appropriate temporal boundary for the analysis of cumulative impacts. The greater the distance between projects, the lower the likelihood of significant cumulative impacts. The temporal extent of the assessment boundaries varies according to the type of impacts being assessed.
7. Assess the cumulative impacts of the project.
8. Assess the significance of the cumulative impacts.

6 In a policy statement issued by the Deputy Premier on 6 June 2012 it is stated that the government intends to support only one common user corridor from the South Galilee Basin and one from the Northern end of the Galilee Basin.

The cumulative impacts for which the contribution of the GCP was considered to have a low significance are:

- Noise and Vibration
- Waste
- Indigenous cultural heritage
- Non-indigenous cultural heritage

The cumulative impacts for which the contribution of the GCP was considered to have a low significance are:

- Land Use
- Landscape Character
- Terrestrial Ecology
- Aquatic Ecology
- Surface Water
- Groundwater
- Air Quality
- Greenhouse Gas
- Traffic and Transport

For social cumulative impacts, the contribution of the GCP was considered to have a medium to high significance.

For economic cumulative impacts, which are considered positive, the contribution of the GCP was considered to have a high significance.

1.7 Alternatives to the Project

In development of the project a series of alternatives have been examined as follows:

1.7.1 MINE

Waratah Coal proposes to mine 1.4Bt of raw coal from its existing tenements, MLA 70454 on EPC 1040 and part of EPC 1079 as an open cut and underground operation. Waratah Coal also holds MLA 70489 within EPCs 1039, 1053, 1080 and the balance of EPC 1079 that will be developed (in the future) as an underground operation.

The Galilee Basin covers up to 250,000km^2 of central Queensland, the actual coal-bearing section of the mining area is about 879.85km^2 and the resources in it are estimated to be 500Bt.

Due to the distance to market for coal from the Galilee Basin mines, there is a critical volume and quality of coal required to make each project economically viable, such that the capital costs of the rail and port infrastructure are justified.

The coal reserves for this project vary in thickness across the deposit ranging from less than 20m in the north, then increasing in thickness to greater than 100m to the south. This coal reserve encroaches on the Bimblebox Nature Reserve (BNR) which is some 8000 ha and is located in the central western side of EPC 1040. This BNR is listed as a Category C Environmentally Sensitive Area.

For the Galilee Coal Project, the reserves beneath the BNR are critical as they are the most cost effective of all reserves within the mining lease to recover, being the shallowest of all the reserves, and contributes over 30% of the coal to be mined. In addition, the coal reserves under the BNR are of superior quality compared with other coal within the mining lease. This superior coal is required for blending with the other comparatively inferior coal to give an overall coal product with an energy level of 6350k/cal, which makes the product competitive on the world coal market. The coal from the Galilee Coal Project has been presold at these energy levels.

If the BNR is not available for mining, in addition to reduction in coal quality being likely to result in the loss of the contract for the pre-sale, it is estimated that the loss in coal reserves for the open-cut operations will be over 42% (167Mt) and for the total mine operations (both open-cut and underground) almost 40%. This represents a reserve of almost 410Mt of coal which makes cost recovery to build the rail, mine and port infrastructure unlikely.

It is also worth noting that the reduction in royalties to the Queensland Treasury would be almost AUD$3 billion (based on $100/tonne coal price). Additional reductions in royalties would also result due to reduced sale prices from the comparatively inferior product that would result without the reserves from under the BNR being available for blending.

Therefore due to the nature of this coal deposit, the remote location of the Galilee Basin and the considerable amount of infrastructure required to be developed it is not economically feasible to relocate the mine area.

1.7.2 RAIL

Waratah Coal engaged specialist consultants and contractors Worley Parsons, China Overseas Engineering Group Corporation (COVEC), and Trimble Planning Solutions to conduct studies into the feasibility of the railway corridor and associated infrastructure to ensure its financial viability and design capacity will meet future demands.

During the concept study and feasibility study, various rail alignments were investigated. The following elements were considered in determining the alignment:

- Sustainability
- Capital Cost
- Environment
- Social Impacts, and
- Engineering Capabilities.

The objective of the railway development process was to identify the most technically feasible corridor between the mine site and port, that achieved the minimum rail engineering and safety requirements for a state of the art heavy haul railway, protected the environment where possible, supported local land use plans and policies, and was compatible with the small number of surrounding communities. Consideration was given to accommodating potential third party users, as was the possible integration of the new route into existing rail infrastructure systems such as the Queensland Rail (QR) operated Goonyella and Blackwater railway systems.

A research area banding a 50km to 100km wide corridor from mine to coal terminal was investigated. Initial infrastructure options for the railway were developed by Worley Parsons, which were further refined using Trimble's Quantm Alignment Planning System to manage the complex range of constraints influencing the corridor selection process.

The Quantm system is a computer-based optimisation tool that simultaneously optimises the horizontal and vertical alignment to deliver a range of alternatives that provide improved environmental outcomes, while simultaneously meeting engineering, community and heritage constraints and reducing project construction costs. Based on the user defined criteria, the system investigates millions of alignment options per scenario. This enables the planner who has local knowledge and experience to determine the most optimal outcome based on a wide range of criteria.

In refining the final corridor the project's impact to the natural environment was reduced by avoiding all National Parks, state forest, nature refuges and major wetlands. Footprint encroachment through protected vegetation was minimised through the inclusion of Regional Ecosystem mapping (Endangered and Of-concern) in the assessment. The route was further refined to ensure perpendicular crossings of major rivers and short passages across their large floodplains wherever practical. Areas of the route that traversed challenging topography, particularly the steep slopes of the Leichhardt and Clarke Ranges, were refined to more closely conform to natural contours and provide better compliance to crossings of existing constraints.

The EIS presented three options for the rail alignment between KPs 410-453 Since then, Options 1 and 2 of the rail alignment have been removed leaving the former Option 3 as the sole option for this section of the rail alignment (see Figure 3). This is the option that most closely follows cadastral boundaries, and as such, minimises impacts upon affected landowners. Since the EIS there have been some minor changes to the option 3 alignment as requested by the landowners to better align with the property boundaries. There has also been a change in alignment between KP432-448 to accommodate the Hancock/GVK Alpha Coal Project mine layout. Although passing close to the Alpha Coal (see Figure 5) and Kevin's Corner (Figure 6) projects, the alignment does not sterilise coal deposits of either project. The general area of the alignment is where the coal seams E and F are located. These seams will not be mined. This revised alignment through the Alpha Coal and Kevin's Corner Project areas has been discussed with both Hancock/GVK and the Department of Natural Resources and Mining and some further changes to the alignment through the mine area of the Alpha and Kevin's Corner may be necessary once the final rail alignments, final land property boundaries and final infrastructure locations are determined. See also the *Waratah Coal Rail Alignment through MLA 70426 and 70425* report contained in the *Appendices – Volume 2* of this SEIS.

The selected route ensures minimal impacts to current land-use infrastructure including townships, roads, railways and other utilities. The route avoids all major water pipelines; however, it passes under three major transmissions lines and over the North Queensland Gas Pipeline near the Bowen River. Where the route crosses existing linear infrastructure, suitable clearances have been allowed for to minimise impact to these.

1.8 Supplementary Environmental Impact Assessment Report

1.8.1 PURPOSE OF THE SUPPLEMENTARY ENVIRONMENTAL IMPACT ASSESSMENT REPORT

In accordance with Part 4 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act 1971), the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999), and the Terms of Reference (ToR) issued by the Coordinator-General on 28th August 2009, Waratah Coal Pty Ltd prepared an Environmental Impact Assessment Statement (EIS). The EIS assessed the environmental, social and economic impacts associated with the development of four 9 million tonnes per annum (Mtpa) underground long-wall coal mines, two 10Mtpa open cut pits (each with two (North and South) mining pits)and two coal preparation plants with raw washing capacity of 28Mtpa each; as well as a new heavy haul, standard gauge railway system to support 25,000 tonne (t) payload train units approximately 453km in length that runs from the Galilee Basin to the existing western boundary of the Abbot Point State Development Area.

The EIS was placed on public display from 26th September 2011 to 19th December 2011 and a total of 1842 submissions were received. This SEIS has been prepared to provide appropriate responses to those submissions and present the necessary supporting documents. The objective of the SEIS is to ensure that all of the ToR are fully responded to within the EIS and/or SEIS.

Since the lodgments of the EIS and the completion of the public notification, several State Government departments have changed, including that responsible for the evaluation of this SEIS which now rests with the Office of the Coordinator-General within the Department of State Development, Infrastructure and Planning (DSDIP).

1.8.2 STRUCTURE OF THE SUPPLEMENTARY ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The structure of the SEIS has been detailed in Table 1.

Table 1. Structure of the Supplementary Environmental Impact Statement Report

VOLUME 1
DOCUMENT NAVIGATION
This section contains a comprehensive Table of Contents ordered by both ToR category and document structure across all Volumes. A numerical index to Issue Responses has also been provided to aid in locating cross-referenced IR Numbers. Commonly used acronyms and abbreviations plus an explanation of the Issue Response header tables is also included.

PART A – REVISED EXECUTIVE SUMMARY
With the exception of five key changes detailed in Part A, there have been no major material changes to the project parameters since lodgment of the EIS in September 2011. However, a significant amount of additional technical work has been undertaken on various elements since lodgment of the EIS. Therefore, this section provides a revised project description and executive summary that bring together the work from both the EIS and the SEIS. This section is arranged as per the terms of reference for the project and, for each project element, provides a description of the existing environment, the potential impacts of the project on these values, and the proposed minimisation, mitigation and management strategies as well as Waratah Coal's commitments for future work.
1 Introduction
2 Environmental Values and Management of Impacts
3 Social Values and Management of Impacts
4 Impacts on the State and Local Economies and Management of Impacts
5 Hazard and Risk
6 Cumulative Impacts
7 Management Plans
8 Conclusions
PART B – ERRATA
This section provides a list of typographical and other errors from the original EIS.
PART C – PUBLIC REVIEW SUBMISSIONS RESPONSES
This section provides responses to submissions from the Public Review process. For ease of reader reference the submission issues have been organised into chapters of similar issues. As such, issues from a single submission may appear in a number of chapters. See *Part A, Section 1.10 Submissions* for an overview of how the submissions were organised and *Document Navigation* for an explanation of how the submissions are presented.
0A Project Description
0B Project Approvals
01 Climate and Climate Change Adaptation
02 Land
03 Nature Conservation
04 Water Resources
05 Coastal Environment
06 Air Quality
07 Noise and Vibration
08 Waste
09 Transport
10 Indigenous Cultural Heritage
11 Non-Indigenous Cultural Heritage
12 Social
13 Health and Safety
14 Economy
15 Sustainable Development
16 Hazard and Risk
17 Cumulative Impacts
18 Environmental Management Plan
19 Decommissioning and Rehabilitation

VOLUME 2 – APPENDICES
This section of the report includes all the supporting technical reports for the Public Review submissions responses contained in Part C.

1.9 Impact Assessment Process

1.9.1 OVERVIEW

The purpose of an EIS is to provide information to the relevant parties, including the community, of developments that are deemed to have the potential to cause significant environmental, social, and / or economic impacts.

The EIS was prepared and made available for public review in September 2011. The EIS addressed the ToR and described the current environment, the Project, the environmental impacts of the Project, and how Waratah Coal proposed to avoid, mitigate and / or offset these identified impacts.

The EIS process is divided into several distinct steps that are shown below.

Application (including initial advice statement)
Application submitted on 28th October 2008
↓
'Significant Project' Declaration
Declaration made on 28th November 2008
↓
Referral to Australian Government
Referred to the Minister for the Environment, Heritage and the Arts on 13th February 2009 Determined 'Controlled Action' on 20th March 2009
↓
Terms of Reference
Public Consultation of the ToR undertaken between 30th May 2009 to 29th June 2009 ToR Released on 28th August 2009
↓
Environmental Impact Statement (EIS)
Lodged 09 September 2011 Public Consultation undertaken between 26th September 2011 to 19th December 2011
↓
Evaluation of EIS including:
↓

Supplementary EIS	**Coordinator-General's Evaluation Report of EIS**
Subject document – March 2013	Pending – Expected 2013

The pink indicates the stages that have been undertaken, the green is what stage we are at now, and the blue is the final stage of the EIS process still to be undertaken. The Project will be subject to conditions from the Coordinator-General, detailed in the Evaluation Report, and will specify additional development approvals / licenses / permits that are required to be obtained by Waratah Coal. These approvals / licenses / permits will be obtained as conditioned or as required under the relevant legislation.

In addition, as detailed above, on 20th March 2009, the project was determined as a 'Controlled Action' by the Federal Minister due to the potential significant impacts on Matters of National Environmental Significance (MNES). These controlling provisions are as follows:

- Sections 12 and 15A (World Heritage Properties)
- Sections 15B and 15C (National Heritage Places)
- Sections 18 and 18A (Listed Threatened species and communities)
- Sections 20 and 20A (Listed Migratory Species), and
- Sections 23 and 24A (Commonwealth Marine Areas).

As such, it is a requirement to address the MNES and describe features of the controlling provisions potential for impacts and mitigation measures. Assessment and approvals granted under the EPBC Act will be via a parallel process to the State approval. Under a parallel process, the Australian Government conducts its own assessment of the environmental impact statement under the EPBC Act, in parallel with the assessment undertaken by the Queensland Government.

At this stage, not all MNES have been assessed to a level that would allow the Commonwealth Government to assess the project. As such this SEIS is provided to facilitate assessment of the project by the Queensland Coordinator-General. The requirements of the Commonwealth Government will be addressed in a separate process during 2013.

1.10 Submissions

1.10.1 OVERVIEW

The EIS was made available for public review from the 26th September 2011 to 19th December 2011. During this extended consultation period 1842 submissions were received from the public, advisory agencies and organisations with varying issues raised.

Submissions were categorised into submission types being:

1. Submissions from non-government organisations and 'original' letters from private individuals
2. Submissions private individuals on proforma letters (3 different types), and
3. Submissions from government agencies.

The break-down of submissions for the EIS is provided in Table 2.

Table 2. Break-down of EIS submissions

Federal (DSEWPAC)	1	
State Govt. (inc. 3 Local Govt.)	14	
NGO	36	
Private (individual)	270	
Private (Form 1)	321	**Total form letter submissions 1521**
Private (Form 2)	466	
Private (Form 3)	734	
TOTALS	**1842**	**TOTAL PRIVATE (FORM + INDIVIDUAL) 1791**

As can be seen from Table 2, a total of 1791 responses were received from private citizens, the majority of which (1521) were on one of three types of form letters hosted on the websites of environmental organisations. It should be noted that the majority of the responses categorised as NGO and private (individual) also contained excerpts from the form letters, with additional 'individual' elements resulting in them being categorised as individual type submissions.

1.10.2 SUBMISSION ASSESSMENT METHODOLOGY

Given the volume of submissions received for this project and the vast amount of duplication between submissions, responses are not given to every submission. Instead, in the interests of keeping the SEIS to a manageable size, the following methodology, which was devised in association with the Office of the Coordinator-General, was applied.

All submissions were read, summarised and categorised according to the ToR category the issue addressed (see Section 3 – ToR)[7]. The issues raised within each submission were further categorised into those issues that needed to be addressed as part of the SEIS, and those that did not. If issues were deemed irrelevant (i.e. did not need to be addressed), it was for one of the following reasons:

- The issue was not part of the Terms of Reference for this project – for example, requests to undertake an analysis of scope 3 carbon dioxide emissions
- The issue was not an issue for Waratah Coal to address – for example, questions regarding whether approval of the project would set a precedence for mining in Nature Refuges
- The issue dealt with a part of the project that is no longer proposed – for example, the port components and the Tallarenha Creek Dam, or
- The issue was not relevant to the project – for instance, some respondents submitted comments directed at the government and relevant to government policies or to other significant projects, such as the Traveston Dam project or the Alpha Coal project.

The Office of the Coordinator-General reviewed the summary and provided comments in regards to their expectations for addressing submissions.

Given the magnitude of submissions, it was suggested by the Office of the Coordinator-General that, to keep the SEIS to a manageable size, the issues and not the submissions should be addressed. That is, issues that were submitted a number of times by more than one submitter, are addressed once only, not repeated a number of times in response to each submission. The majority of issues submitted by private submitters were also the subject of submissions from government agencies. In these instances the responses to the government agencies only are given. All issues submitted by private citizens or NGOs that are not also the subjects of government submissions are also presented. In this way, all the issues received are addressed once only.

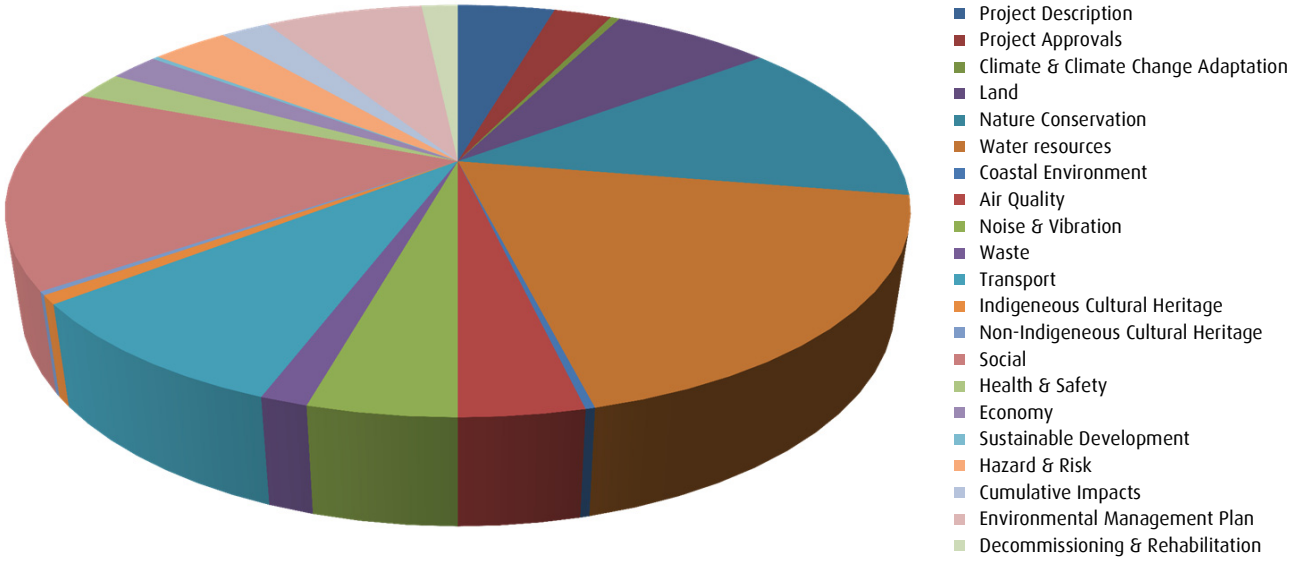
At the end of this process, Waratah Coal were left with an approved (by the Office of the Coordinator-General) list of 730 issues across 21 categories that required response. The issues and their responses are detailed in Part C of this SEIS, with supporting information contained in the *Appendices – Volume 2*.

1.10.3 SUBMISSION ISSUES SUMMARY

As mentioned above, there were 730 issues across 21 categories that required response. Categories comprised the 21 ToR categories detailed in Table 2. Figure 7 shows the breakdown of responses by ToR category. Reponses to submissions can be viewed in Part C, and supporting information is contained in the *Appendices – Volume 2* of the SEIS.

7 Coordinator-General, August 2009. *Terms of Reference for an environmental impact statement: Galilee Coal Project (Northern Export Facility).* ***http://www.deedi.qld.gov.au/cg/resources/project/galilee-coal_/tor-galilee-coal.pdf***

Figure 7. Breakdown of responses by ToR category



A summary of the major issues (in terms of amount of times raised) is given below, with commentary regarding Waratah Coals work in response to these issues.

1.10.3.1 Nature Conservation and Offsets

Concern regarding mining in the Bimblebox Nature Refuge (BNR) and the associated impacts including: habitat loss and fragmentation; loss of ecological diversity and impacts to protected species such as the black throated finch. Comprehensive supplementary flora, fauna and vegetation assessments have since been undertaken in and around the mine site.

Respondents were concerned that mining in a Nature Refuge could set a precedent for mining or other mineral development projects in other Nature Refuges. This is not considered to be a matter for Waratah Coal to address.

Respondents also questioned the use of offsets as compensation for the values within the BNR and the ability to find offsets of ecological equivalence to the BNR. The use of offsets policies are not a matter for Waratah Coal to address. However, the ability to find offsets of ecological equivalence has been addressed.

1.10.3.2 Water Resources

Both community and government provided submissions regarding water resources and allocation.

Further detail was requested regarding issues such as sources of water supply, waste water treatment and storage, impacts on groundwater and environmental considerations for surface waterways and stream diversions. Work has been undertaken on these issues.

All of the issues have been addressed in Part C and are supported by technical appendices for completed works, and position statements / papers for work still in progress in the *Appendices – Volume 2* of this SEIS.

1.10.3.3 Air Quality, Noise and Vibration

Government enquires into the modelling and information on the management and minimisation of suspended dust particles, particularly in regards to potential risks to human health. This modelling has since been undertaken. Community submissions regarding the Greenhouse Gas emissions expected from the project and requesting full life-cycle assessment (which is not a requirement of the ToR).

1.10.3.4 Social Impacts

Some individual respondents and government agencies with an interest in social matters considered the social impact assessment did not adequately address potential adverse impacts such as impacts on communities, regional centres, housing stock and affordability, employment opportunities and landowner compensation. A more comprehensive social management plan was requested that adequately addresses these issues as well as outlining Waratah Coal's contributions to hard and soft infrastructure and intentions for community consultation. This has since been delivered.

1.10.3.5 Transport

Submissions were received regarding the nature of the project as a fly-in-fly-out (FIFO) arrangement and capacity of roads to accommodate heavy vehicles and haulage routes. This work has been undertaken.

Queries were also raised over the haulage capacity, impacts on existing land uses and land owners, dust mitigation and construction timeframes of the rail aspects of the project. This work has also been addressed.

1.10.3.6 Hazard and Risk

More detail was requested regarding mitigation or management of hazard and risk. This includes fire, erosion, flood, landslide and disaster management. Further consideration to operational health and safety and emergency service requirements was also requested by government departments. Waratah Coal have committed to undertaking this consultation and work has since been undertaken on landslide, erosion, bushfire, flooding and emergency management planning.

1.10.3.7 Environmental Management Plan

Government Agencies wished to see greater detail contained in the Environmental Impact Assessment and Management Plan. This has been undertaken.

There were also requests for further description of Environmentally Relevant Activities and potential environmental impacts. This has been undertaken.

Additional studies were requested to enable setting of clear performance criteria, implementation strategies, reporting and approvals and legislative requirements. These have been completed.

1.10.3.8 Cumulative Impacts

There was concern regarding the level of cumulative impact assessment (CIA). Respondents requested a regional response to be made regarding issues such as transport, growth management and the nature and extent of potential direct and indirect social, economic and environmental impacts as a result of new mining and industry projects in the Galilee Basin. The CIA has largely been completed for each EIS element. This information is presented in this SEIS. Information regarding the CIA . A standalone CIA report which compiles all the different cumulative impacts friom each project element will be provided in March 2013.

1.11 Project Approvals

Approvals required to be obtained for the project were identified in the EIS; however, at the request of the Local and State Government agencies and the Coordinator-General, Waratah Coal has revised the list of relevant approvals as per these comments. Please refer to the Approvals Pathway in the *Appendices – Volume 2* of this SES, which outlines the approvals, the assessing authority, applicable legislation and the trigger for that particular approval.

1.11.1 RELEVANT LEGISLATION

Further to the 'Summary of Environmental Legislative Requirements' section of the EIS, Waratah Coal has also provided the following comprehensive, but not limiting, list of the Local, State and Commonwealth documents applicable to the project. These documents will be required to be assessed and complied with (where applicable) as part of the development approval process for the project. Please note that an accurate list of the relevant plans, policies, local laws and legislation will be determined prior to the lodgment of the necessary development applications – the detailed design phase is required to be undertaken before this can occur.

LOCAL GOVERNMENT	
PLANNING SCHEMES	**LOCAL LAWS**
Barcaldine Regional Council • Jericho Shire Planning Scheme • Aramac Shire Planning Scheme • Barcaldine Shire Planning Scheme	• 01 – Administration 2011 (Local Law) • 01.01 – Alteration or Improvement to Local Government Controlled Areas and Roads 2011 (Subordinate Local Law) • 01.02 – Commercial Use of Local Government Controlled Areas and Roads 2011 (Subordinate Local Law) • 01.03 – Establishment or Occupation of a Temporary Home 2011 (Local Law) • 01.04 – Installation of Advertising Devices 2011 (Subordinate Local Law) • 01.11 – Operation of Shared Facility Accommodation 2011 (Subordinate Local Law) • 01.14 – Undertaking Regulated Activities on Local Government Controlled Areas and Roads 2011 (Subordinate Local Law) • 01.15 – Carrying out Works on Roads or Interfering with a Road or its Operation 2011 (Subordinate Local Law) • 01.16 – Gates and Grids 2011 (Subordinate Local Law) • 03 – Community and Environmental Management 2011 (Local Law and Subordinate Local Law) • 04 – Local Government Controlled Areas, Facilities and Roads 2011 (Local Law and Subordinate Local Law) • 08 – Rental Accommodation Other Than Shared Facility Accommodation 2011 (Local Law and Subordinate Local Law)
Whitsundays Regional Council • Bowen Planning Scheme • Whitsundays Planning Scheme	• Accommodation Premises Local Law 2011 (Local Law) • Accommodation Premises Subordinate Local Law 2011 (Subordinate Local Law) • Administration Local Law 2011 (Local Law) • Advertising Local Law 2011 (Local Law) • Advertising Subordinate Local Law 2011 (Subordinate Local Law) • Local Government Facilities and Areas Local Law 2011 (Local Law) • Local Government Facilities and Areas Subordinate Local Law 2011 (Subordinate Local Law) • Roads Local Law 2011 (Local Law) • Roads Subordinate Local Law 2011 (Subordinate Local Law) • Application of Continuing Local Law (Tree Preservation) Interim Local Law 2011 (Interim Local Law)

LOCAL GOVERNMENT	
PLANNING SCHEMES	**LOCAL LAWS**
Isaac Regional Council • Belyando Planning Scheme • Broadsound Planning Scheme • Nebo Shire Planning Scheme	• 01 – Administration 2011 (Local Law) • 01.01 – Alteration or Improvement to Local Government Controlled Areas or Roads 2011 (Subordinate Local Law) • 01.02 – Commercial Use of Local Government Controlled Areas and Roads 2011 (Subordinate Local Law) • 01.03 – Establishment or Occupation of a Temporary Homes 2011 (Subordinate Local Law) • 01.04 – Installation of Advertising Devices 2011 (Subordinate Local Law) • 01.14 – Undertaking Regulated Activities on a Local Government Controlled Areas and Roads 2011 (Subordinate Local Law) • 01.15 – Carrying out Works on a Road or Interfering with a Road or its Operation 2011 (Subordinate Local Law) • 01.16 – Gates and Grids 2011 (Subordinate Local Law) • 03 – Community and Environmental Management 2011 (Local Law) • 04 – Local Government Controlled Areas, Facilities and Roads 2011 (Local Law)

STATE GOVERNMENT
LEGISLATION
• *Sustainable Planning Act 2009*
• *State Development and Public Works Organisation Act 1971*
• *Building Act 1975*
• *Plumbing and Drainage Act 2002*
• *Transport Planning and Coordination Act 1994*
• *Transport Operations (Road Use Management) Act 1995*
• *Transport Operations (Road Use Management: Mass, Dimensions and Loading) Regulations 2005*
• *Coastal Protection and Management Regulations 2003*
• *Land Act 1994*
• *Transport Infrastructure Act 1994*
• *Vegetation Management Act 1999*
• *Nature Conservation Act 1992*
• *Nature Conservation (Protected Areas Management) Regulation 2006*
• *Nature Conservation (Wildlife Management) Regulations 2006*
• *Nature Conservation (Wildlife) Regulations 2006*
• *Queensland Government Environment Offset Policy 2008*
• *Queensland Government Policy for Biodiversity Offsets*
• *Environment Protection Act 1994*
• *Environmental Protection Regulations 1994*
• *Water Act 2000*
• *Electricity Act 1994*
• *Mineral Resource Act 1989*
• *Aboriginal Cultural Heritage Act 2003*

STATE GOVERNMENT
LEGISLATION (CONTINUED)
• *Land Protection (Pest and Stock Route Management) Act 2002* • *Transport Infrastructure Act 1994* • *Dangerous Goods Safety Management Act 2001* • *Dangerous Goods safety Management Regulation 2001* • *Fire and Rescue Service Act 1990* • *Explosives Act 1999* • *Explosives Regulation 2003* • *Fisheries Act 1994* • *Fisheries Regulations 2008* • *Petroleum Act 1923* • *Petroleum and Gas (Production and Safety) Act 2004* • *Forestry Act 1959*
REGIONAL PLANS / POLICIES / STANDARDS
• Central West Regional Plan 2009 • Building Code of Australia 2008 • Australian Standard 1940 – Storage and Handling of Flammable and Combustible Liquids • Water Resource (Great Artesian Basin) Plan 2006 • Great Artesian Basin Resource Operations Plan • Draft Guidelines for the Assessment and Management of Contaminated Land in Qld 1998 • Environmental Protection (Water) Policy 2008 • Water Resource (Burdekin Basin) Plan 2007 • Road Closure Manual • National Electrical Code • Australian Standard 2885 – Pipelines – Gas and Liquid Petroleum – Design and Construction • Mackay, Isaac Whitsunday Regional Plan • Central Queensland Regional Plan • Central Queensland Regional Growth Management Framework 2002 (existing non-statutory)
STATE PLANNING POLICIES (SPPS)
• SPP 4/11 – Protecting wetlands of high ecological significance in Great Barrier Reef catchments • SPP 3/11 – Coastal Protection • Temporary SPP 2/11 – Planning for Stronger, More Resilient Floodplains • SPP 3/10 – Acceleration of compliance assessment • SPP 2/10 – South East Queensland Koala Conservation • SPP 2/07 – Protection of Extractive Resources and Guideline • SPP 1/07 – Housing and Residential Development including Guideline 1.0 • SPP 1/03 – Mitigating the Adverse Impacts of Flood, Bushfire and Landslide 1.0 – Guideline for SPP 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide 1.0 • SPP 2/02 – Planning and Managing Development Involving Acid Sulfate Soils 1.0 – Guideline for SPP 2/02: Planning and Managing Development Involving Acid Sulfate Soils 2.0

STATE GOVERNMENT
STATE PLANNING POLICIES (SPPS) (CONTINUED)
• SPP 1/02 – Development in the Vicinity of Certain Airports and Aviation Facilities 1.0 – Guideline for SPP 1/02: Development in the Vicinity of Certain Airports and Aviation Facilities 1.0 • SPP 1/92 – Development and the Conservation of Agricultural Land 1.0 – Guideline 1 for SPP 1/92: The Identification of Good Quality Agricultural Land 1.0 – Guideline 2 for SPP 1/92: Separating agricultural and residential land uses 1.0

COMMONWEALTH GOVERNMENT
LEGISLATION
• *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) • *Aboriginal and Torres Strait Island Heritage Protection Act 1984* • *Native Title Act 1993* • *Native Title (Indigenous Land Use Agreements) Regulations 1999*

The triggers for the abovementioned Legislation and SPPs have been further clarified in the Approvals Pathway contained in the *Appendices – Volume 2* of this SEIS, which outlines the relevant approvals, applicable legislation and SPPs triggered.

1.11.2 LOCAL APPROVALS

The project is located across three regional Councils:

- Barcaldine Regional Council
- Isaac Regional Council, and
- Whitsunday Regional Council.

The following table identifies the applicable Local Government that will be the assessing authority for the various components (predominantly for the associated infrastructure of the project of which is located outside of the Mining Lease Area (MLA) of the project.

PROJECT COMPONENT	APPLICABLE REGIONAL COUNCIL
Mine (works outside of the MLA)	• Barcaldine Regional Council
Rail (if full rail component proceeds as an alternative to the approved Hancock alignment)	• Barcaldine Regional Council • Isaac Regional Council • Whitsunday Regional Council

As such, the relevant plans, policies, local laws and legislation, as detailed in Section 5.2 of the SEIS are applicable.

We note that only development occurring outside of the MLA is deemed to be assessable under the *Sustainable Planning Act 2009* (SPA), which includes ERA's that are exempt from assessment against the Local Government planning scheme in accordance with SPA.

Please refer to the *Approvals Pathway* in the *Appendices – Volume 2* of this SEIS, which identifies the relevant approvals required to be obtained from the applicable Local Government.

1.11.3 STATE APPROVALS

The approvals required to be obtained from the respective State Government have been identified in Approvals Pathway in the *Appendices – Volume 2* of this SEIS. The extensive State-based planning approvals to facilitate the project are pending the issuing of the following approvals:

- Coordinator-General's Evaluation Report
- Environmental Authority, and
- Mining Lease.

In addition to the Approvals Pathway, Waratah Coal is aware that Environmentally Relevant Activities (ERA's) are required to be obtained from the various State Government agency department – these have been outline in *Environmentally Relevant Activities* contained in the *Appendices – Volume 2* of this SEIS.

Further to the abovementioned ERA's, please refer to *Notifiable Activities* in *Appendices – Volume 2* of this SEIS for the Notifiable Activities that Waratah Coal understand to be relevant to the project.

1.11.4 COMMONWEALTH GOVERNMENT APPROVALS

On 20th March 2009, the Commonwealth Minister declared the project to be a 'Controlled Action' pursuant of Section 75 of the EPBC Act, and the EIS process was required to undertaken in accordance with the requirements of the parallel agreement between the Australian and Queensland Governments. In accordance with this process, Waratah Coal referred the EIS to the Commonwealth. Waratah Coal has been liaising directly with the Commonwealth to ensure all Matters of National Environmental Significance are adequately addressed.

At this stage, not all MNES have been assessed to a level that would allow the Commonwealth Government to assess the project. As such this SEIS is provided to facilitate assessment of the project by the Queensland Coordinator-General only and the requirements of the Commonwealth Government will be addressed in a separate process during 2013.

2 ENVIRONMENTAL VALUES AND MANAGEMENT OF IMPACTS

2.1 Climate and Climate Change and Adaptation

2.1.1 MINE CLIMATE

Meteorological data from the Barcaldine, Emerald, Claremont and Blackall Bureau of Meteorology (BOM) weather stations was used to provide an indication of regional climate trends.

The mine site area has a sub-tropical continental climate and, in general, winter days are warm and sunny and nights are cold.

The long term monthly average temperatures within the study area are within the typical ranges for subtropical regions. Mean monthly minimum temperatures range from 19°C in the summer to 7°C in the winter. The mean maximum temperatures range from 36°C in the hottest months and drop to 25°C in winter.

There is a consistent pattern for average monthly rainfall across the mine site region of 80-120mm of rain per month during the summer months, dropping to average lows of 15-20mm during winter.

Winds direction in the area is predominantly easterly. Wind data was obtained from the BOM stations at Emerald and Barcaldine. Wind speeds at Emerald are generally moderate, whilst wind speeds at Barcaldine are generally of a lower speed than that observed at Emerald.

Relative humidity in the study area is typically higher during the summer and autumn months and lower during the spring months.

2.1.2 RAIL CLIMATE

The rail corridor has a tropical climate, with hot and wet summers, and cool dry winters. Summer has a monsoonal weather, frequently influenced by tropical cyclones and low pressure systems, which cause significant rainfall in the coastal areas. The wind direction is predominant from the east, south east and north east, influenced by the trade wind.

2.1.3 CLIMATE CHANGE ADAPTATION

A climate change risk assessment was undertaken for the project. The approach adopted for the risk assessment was consistent with AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines.

The majority of the risks to the project and workforce associated with climate change were assessed as being medium to low. However, the risk assessment identified that the projected increases in average wind speed associated with climate change may pose a potential high risk to environment and sustainability. This in turn could potentially result in minor breaches in compliance. The assessment further considered that the projected increase in the number of extreme fire risk days posed a potential high risk to the environment and sustainability.

The risks ranked as high during the assessment are considered as the most severe risks that can be accepted as part of routine operations without executive sanctions. To ensure that appropriate action is taken to address these risks they will be managed by the senior management team and monitoring and reporting will be undertaken at the executive level. The risks ranked as medium to low will be managed as part of routine operations and they will be maintained under review and reported upon at senior management level.

The project is located predominantly in a hot, arid environment that is subjected to high volume flooding and intense storms and as such the mine is designed to be immune to a flood event with an Average Recurrence Interval (ARI) of once in a thousand years, whilst the rail infrastructure has been designed to be immune to a flood event with an

ARI of one in a hundred years. More detailed design tolerances will be addressed at the detailed design stage. A key consideration will be ensuring operating tolerances include climate change projections or are able to be adapted to meet changing conditions.

Implementing appropriate workplace health and safety procedures is the other key mitigating factor to address potential impacts associated with climate change. The procedures established to address the existing conditions are expected to adequately mitigate the projected changes to the climate.

To summarise, potential impacts to the project and Waratah Coal's workforce associated with climate change will be adequately managed through appropriate design of infrastructure and the implementation of a sound workplace health and safety system. It is expected that these two factors, combined with the standard monitor, review and adapt continuous improvement management system will adequately mitigate climate change risk.

2.2 Land

2.2.1 GEOLOGY

2.2.1.1 Mine

Description of Environmental Values

The Galilee Basin covers nearly 250,000km^2 of central Queensland. The Galilee is connected to the Bowen Basin over the Springsure Shelf (south east of Alpha). In the project area, the target geology is held within the Bandanna Formation and Colinlea Sandstone, correlatives of the Bowen Basin's Group IV Permian Rangal Coal Measures.

The surface geology of the mine is dominated by unconsolidated sediments of the Cainozoic (recent geological period) origin. These sediments include unconsolidated sands, silts and clay, lateritised in part and form an extensive blanket over the mine area. Depths of these sediments vary across the site and range up to 90m in the eastern and central sections of the study area.

2.2.1.2 Rail

Description of Environmental Values

The geology of the rail alignment and the main structural features that may impact upon project construction such as fault zones and dykes following structural trends within five regional zones, are as follows:

KP0-KP20 (Coastal Plains) – The coastal plain is dominated by intrusive / extrusive rock types and recent alluvial and erosional geology with a low potential for fossils. This includes the predominantly Palaeozoic granitoid terrain from which the Tenosols and sandy soils are derived and the Quaternary mudflats and alluvial valley floors from which the cracking clays are derived. Quaternary coastal sand dunes and talus outwash surround the granitoid intrusives along the coast.

KP20-KP80 (Clarke Ranges) – The geology of the Clarke Range is comprised of granite, rhyolite, diorite and other igneous rocks ranging in origin from Carboniferous to Early Permian age (354 to 270 million years). The foothills of the range are generally low undulations before rising to very rugged and broken country.

The major structural faults and shears that occur in close proximity to and / or intersect the rail alignment include those in the Bulgonunna Volcanics region where the north-west trending fault sets dominate including the Glenore Shear zone. Further to the south-east of the rail alignment, the Millaroo Fault Zone extends through the Lizzie Creek Volcanics. It is highly unlike that fossil will be found in this area. There are numerous other faults and structures exploited by dykes that mirror the north-west trend of these zones. The combination of localised steep topography and greater prevalence of fault and fracture systems indicates a higher potential for landslip in these areas adjacent to the rail alignment. The presence of dykes indicates the potential for bars of hard ground requiring rock breaking or explosives in areas otherwise amenable to normal excavation / construction equipment.

KP80-KP120 (Bowen River Valley) – The Bowen River Valley is cut into the Lizzie Creek Volcanics including basalts, andesites, tuffs and minor acid volcanic. Further south, the Blackwater and Back Creeks Group comprising sedimentary rocks including sandstones, siltstones, shales and coal. The Hecate granite intrudes these sediments at KP90. The major structures in the area include northwest trending faults in some intrusive and the easterly dip of the Blackwater and Back Creeks Group sedimentary rocks.

The Back Creek and Blenheim groups of the Collinsville coal measures and the Blackwater Group are described as having fossiliferous content. Recorded fossil finds in these units include marine invertebrates such as bivalves and brachiopods as well as aquatic plants.

KP120-KP185 (Leichhardt Range) – The Leichhardt Range comprises sandstone, conglomerate and claystones of the Tertiary Suttor Formation to about KP150, after which the corridor intersects the Bulgonunna Volcanics until KP180. Here these are a group of Carboniferous intrusive volcanic including rhyolite and tuffs.

KP185 – KP453 (Inland Plains) – From KP185 to the mine, the alignment crosses sedimentary rocks of the Suttor Formation and alluvium of the Suttor River derived from these rock types until KP230. From KP230, the sandy alluvium derived from surrounding rock forms a sheet covering most of the landscape with outcrops of low grade metamorphic and acid igneous rocks. Tertiary sedimentary rocks and sandstones as well as siltstones of the Permian Colinlea Sandstone and sedimentary rocks of the Lower Carboniferous Drummond Group are also found in this area. The Permian and younger sedimentary rocks have fossiliferous potential; however, along the rail alignment, there is extensive Quaternary cover and therefore there is a low potential for fossiliferous geological units to occur at the surface.

The largest structure affecting the study area is the Anakie Inlier. The Post-Upper Devonian movement of the Anakie Inlier shaped the Devonian and Permian depositional basins. This controlled the major northwest trending fold axes in these basins. The adjacent basinal sediments in the southeast portion of the Project area are generally much less structurally disrupted with little faulting. These areas are characterised by very gently dipping sedimentary units.

2.2.2 SOILS

2.2.2.1 Mine

Description of Environmental Values

Soil samples were collected to assess the mine site area. The soil investigations indicate that Kandosols are the dominant soil type in the mine area with Rudosols present in areas of elevated terrain in the north-western and south-eastern portions of the site.

Kandosols are structureless, mostly well drained permeable soils although some yellow and most grey Kandosols have impeded sub-soil drainage. Most Kandosols have low fertility and land use is limited to grazing and native pastures. Grazing lands are susceptible to surface soil degradation such as hard setting and crusting even when grazing intensity is low.

Rudosols are soils with minimal soil development. These are relatively young soils where soil forming factors have had little time to pedalogically modify parent rocks or sediment. There are a wide variety of Rudosols in terms of texture and depth with many being stratified and some hypersaline. Rudosols are apedal or only weakly structured and show no pedological colour change apart from darkening of the top horizon. Commercial land use is generally limited to grazing of native pastures due to the soil properties or occurrence in arid regions, or both.

Potential Impacts

Topsoil will be removed in the creation of the open cut mining areas as well as for some of the supporting infrastructure such as the CHPPs. Topsoils at the mine were found to have low salinity, optimal pH conditions for cultivation, low cation-exchange capacity (CEC), and generally low Exchangeable Sodium Percentage (ESP). The fertility of the soils is indicated to be low and the low ESP suggest that hard setting crusts could occur which would inhibit seedling growth in the area. With amendment by nutrients and use of appropriate seed stock, the soils could be made suitable as a growth medium.

The potential for acid generation from regolith material (topsoil and subsoil) within the Project site is low.

Some soils identified in the areas of the open cut mine area, including clays subsoils,have a high erosion potential with Emerson Crumb ratings of 1 or 2; are sodic soils and exhibit a moderate to high potential for erosion due to dispersion. Where the topsoil of these areas is disturbed by the Project's activities and where the subsoils are exposed, there is a greater potential for increased erosion. Where such disturbance occurs, at creek crossings and where sediment runoff is allowed to enter these waterways, the impact of increased sediment load could impact the health of the waterways. Remedial measures will be implemented to prevent this.

During the operation of the mine, existing land uses, such as grazing may be able to continue within the mining lease in areas not directly impacted by the open cut mines and supporting infrastructure. Areas required for the operation of the mine will be disturbed and no longer available for the existing land use. The land is not considered to have high value for agriculture and as such, the mine would not be expected to have a significant impact on agriculture in the region. Dispersive soils will be buried in spoil piles to minimise erosion.

Impact to land suitability, final landforms and the appropriate mitigation measures typically include an evaluation of the future potential cropping and grazing classes of the land and limitations due to compaction of land used for roads, or use of the rehabilitated final void, stockpiles and tailings dams. Often, stockpiles and tailings dam are unsuitable land for agricultural purposes until management measures have been undertaken, whereby they may become suitable for higher classes of cropping and grazing. Final voids may be suitable for wetlands or recreational land use following rehabilitation.

Mitigation and Minimisation Commitments

Waratah Coal will prepare a topsoil management plan to minimise and manage potential impacts on soils at the Project site. The topsoil management plan will be supported by strategies delivered through the rehabilitation management plan for the mine.

The objectives of soil management are to:

- provide sufficient stable topsoil material for rehabilitation
- optimise the recovery of topsoil for rehabilitation
- identify soil resources and stripping guidelines
- identify surface areas requiring stripping (to minimise over clearing)
- manage topsoil reserves so as to not degrade the resource
- identify stockpile locations and dimensions
- identify soil movements for rehabilitation use.

The details are given in Section 9 of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.2.2.2 Rail

Description of Environmental Values

The following section provides an overview of the soil types along the rail alignment split into the five specific regions.

KP0-KP20(Coastal Plains) – soils in the coastal area are regionally mapped as Sodosols; however, site sampling in the APSDA indicates Vertosols and some Tenosols are present. Vertosols include clay soils with shrink-swell properties that exhibit strong cracking when dry and can be associated with gilgai landscape microrelief. They also form mounds and depressions in the landscape as a result of repeated shrinking and swelling of the clay blocks of subsoil. Tenosols comprise sandy to gravelly soils derived from granitoid outwash. Sodosols include sodic soils predominantly in areas subject to periodic inundation.

Soils sampled in the coastal plains included Tenosols and Vertosols on the coastal land above the inundated saline mudflats that have a pH of 5.9 to 8.6. More alkaline soils are generally associated with Vertosols and Sodosols. The soil fertility is indicated by Cation Exchange Capacity (CEC) which identifies the soil's ability to supply the plant nutrients Ca, Mg and K. The Tenosols generally have low CEC while the clay soils have generally higher CEC. This is also reflected in the individual cation analyses. Saline soils with salt scalds are apparent on periodically inundated lands adjacent to the wetlands. Salinity as indicated by the chloride and EC suggests that Tenosols generally have low salinity while the Vertosols have moderate salinities.

The topsoil availability is likely to limited in the range of <0.1m in the area of the shallow Tenosols, while the Sodosols may produce topsoils up to 0.3m thick. Cracking clays are present at several locations throughout this area, generally in very low flat plains and / or near creeks and floodplains.

The soil sodicity and / or Emerson Crumb dispersivity analyses of samples SS02 and SS06 reported high potential for erosion and indicate that soils in these areas tend to be sodic in nature and prone to dispersion and erosion.

The variable rainfall and relatively flat topography of this area can result in localised flooding occurring over the rail alignment during rain events >200mm over a 48hr period. Flooding generally occurs during summer months as a result of heavy monsoon rainfalls caused by tropical lows and rain depressions generated from cyclones crossing the north eastern Queensland coastline. This can contribute to scour and tunnel erosion in soils in this area.

Six sites were visually assessed to determine their potential for erosion. Four of the six sites (Sites SO2, SO3, SO6 and SO8) were assessed as having a high potential for erosion. The four sites were deemed to have a high potential either due to evidence of existing erosion or were considered to be susceptible to erosion due to sandy substrates with no vegetative cover. The remaining two sites were assessed as having a low potential due to minimal erosion or comprising heavily vegetated banks.

KP20-KP80 (Clarke Ranges) – dominant Chromosol, Sodosol and Vertosols soils within this area include loamy red duplex soils from KP20 to KP52, shallow stony, loamy red duplex soils from KP53 to KP58 and hard alkaline yellow soils from KP58 to KP69. The hilly areas have very shallow stony duplex soils, while valley floors have occasional small areas of dark clays and / or red-brown clays,hard alkaline yellow and crusty loamy soils that are generally consistent with the area being mapped as Chromosol soils with some cracking clays in valleys. However, the dominant soils are loamy red duplex soils of shallow to moderate depth (up to 0.3m). In some areas yellow loamy duplex soils are locally dominant, although these are often closely associated, particularly on lower slopes with mottled yellow duplex soils.

Between approximately KP70 and KP80, the alignment traverses an area bordering Sodosol / Vertosol soil areas. The landform in this section of the alignment includes moderate to strongly undulating lands with some hills. Dominant soils are described as grey loamy and standard loamy duplex soils associated with alluvial plains which are more consistent with Sodosol soils. From approximately KP77 to KP79, the dominant soils are shallow sands, sandy or

loamy duplex soils which are more consistent with the Sodosol or Tenosol soils (weakly developed soils). Based upon the mapped soil types and observations from soil sampling, topsoil is expected to be in the range of 0.1m to 0.3m.

The area dominated by Chromosol soils are generally low salinity but often also low fertility soils. Though some clays around river valleys have high CEC and greater potential for agriculture (SS15), they also have low Mg content.

From approximately KP20 to KP80, the Chromosols in areas of higher relief are likely to have low to high erosion potential. While these soils generally contain high organic matter and lower proportions of sand / silts, the higher relief increases the potential for erosion in some areas. In the lowland portions of this area, the erosion potential will generally be lower, except where creeks with periodic high flows which can scour the soil profile. Where sampled, Emerson Crumb tests identified Chromosols as having moderate erodibility on the surface and at depth and are anticipated to have lower potential for erosion than other areas.

The Sodosols had near neutral pH and low salinity. Some had low Exchangeable Sodium Percentage (ESP) and are considered to be generally less prone to erosion than the Chromosols. Topsoil depths are anticipated to be in the order of 0.1 to 0.3m in Chromosol areas and up to 0.6m deep in Sodosol areas.

Six sites were visually assessed to determine their potential for erosion. Five of the six sites were described as having a low potential for erosion due to a combination of predominantly clayey substrates, vegetative cover and low energy stream flows. Site SO9 would likely have a high potential for erosion due to sandy banks and a rocky stream bed indicating the potential for high energy flows capable of severe scouring.

KP80-KP120 (Bowen River Valley) – sodosols mapped in the area includes loamy duplex soils with mottled yellow-brown subsoils. These were present in the undulating lands on tributaries while small alluvial areas have grey loamy duplex soils. Tenosols are present as thin soils on sandstone ridges. Dominant soils in the valley floor include dark clays of moderate depth, with older terraces and levees having deep sandy or sandy loam with 0.3m to 0.6m A horizons with a clear change to reddish brown clay or sandy clay. Gilgai microrelief is present on the deep clays. On the southern undulating slopes that rise to the south, more thin loamy duplex soils are present. This area is usually strongly dissected by many small streams and nearly all soils have a gravel-strewn surface and are often eroded.

From approximately KP80, the rail alignment traverses Sodosol mapped areas until it reaches about KP120 where the alignment traverses an area bordering Tenosol / Sodosol / Kandosol soil mapped areas.

Soils are described as sandy to loamy duplex soils and some shallow sands on the moderately undulating lands consistent with the Sodosol and Tenosol mapped areas with deep sandy or sandy loams on the alluvial floodplains more consistent with Kandosol soils (soils which lack a strong texture contrast and have a weakly structured B horizon).

Soils in these areas generally have a pH from 6.9 to 7.9, with low CEC indicating generally low fertility. The deep clays in the river valleys have higher CEC. The soils are generally low salinity soils with low Electrical Conductivity (EC) and low to medium ESP. However, the clay soils at Rosella Creek (a tributary of the Bowen River) were saline with a high ESP indicating some salinity is present in soils in the valley floors. These valley floor clay soils can also be sodic and therefore susceptible to dispersion, as indicated by high ESP and / or low Ca:Mg ratios.

Some clay soils had high Emerson Crumb results indicating low potential for erosion, while others had lower results. This indicates that while clays are widespread throughout the valley floors, the erosion potential of these soils will vary over their extent in the alignment.

From a review of aerial photography and on-site observations, areas around creek lines appear to be subject to erosion. However, the erosion potential can vary along the alignment within individual soil types. The most susceptible soils for erosion are sodic or dispersive clays and loamy soils. Topsoil availability in areas is not subject to excess salinity or sodicity and is generally considered to be between 0.1m to 0.2m; however, some sandy loams on alluvial terraces may have topsoils up to 0.6m deep.

KP120-KP185 (Leichhardt Range) – the rail alignment traverses mainly Tenosol with small areas of Kandosol. The landscape varies throughout this portion of the alignment from level plains to strongly undulating elevated land. Dominant soils on the level plains are loamy yellow earths with areas of loamy red earths and cracking clays. Dominant soils on the strongly undulating elevated areas may include shallow stony gritty leached sands or sandy loams more consistent with Tenosols.

Soils in this area include acidic soils with very low CEC and ESP. Several samples had very low exchangeable calcium and low Mg, indicating low fertility soils. This was further enforced by poor growth on stony soils. The soils are generally low salinity soils with EC of <150 µs/cm, low chloride and low to very low ESP with the exception of Sodosols where soils recorded a very high EC of 2240 µs/cm, chloride of 3020 mg/kg and very high ESP of 54.2.

Kandosols in the generally low relief areas between KP125 and KP185 are considered to have generally low to moderate erosion potential. The higher erosion potentials are expected locally in alluvial areas with higher sand or silt contents. Emerson Crumb results indicate that some soils in the valley floors have moderate dispersion potential and will be susceptible to erosion after disturbance, while others are generally stable.

Tenosols from KP160 to KP185 are generally shallow soils in areas of moderate to high relief and are anticipated to have moderate to high erosion potential. The Tenosols were non-dispersive; however, the stoniness of these soils combined with the shallow bedrock would be unsuitable for stripping and susceptible to erosion. The Tenosols encountered in sampling had nil to minimal (0.05m) topsoil.

Five waterway sites were visually assessed for their erosion potential. Three of the five sites were assessed as likely having a high erosion potential. Evidence of erosion was observed at Sites SO20 and SO24, while Site SO21 was described as sandy banks with moderate flow. The remaining two sites were assessed as having a moderate to high erosion potential comprising sandy substrates with high proportions of vegetation likely to reduce the potential for erosion.

KP190-KP453 (Inland Plains) – from approximately KP185 to KP210, the alignment traverses areas mapped as Sodosols. The landscape varies from the gently undulating to low hilly lands from about KP185 to KP195 to level or gently undulating plains from approximately KP197 to KP220. Dominant soils on the hilly land are shallow stony gritty leached sands or sandy loams more consistent with Tenosol soils. The soils of the sloping plains consist of loamy duplex soils more consistent with Sodosol soils to loamy yellow, red and grey earths and cracking clays on the lower areas associated with Vertosol soils (from approximately KP210 to KP300). Landforms include level to gently undulating alluvial plains from approximately KP215to KP225, KP252 to KP269 and KP277 to KP356 with more strongly undulating lands from KP226 to KP251.

Soils described on the more strongly undulating slopes are dominated by sand and gravelly loamy duplex soils and sandy red earths more consistent with Sodosol or Kandosol soils. Dominant soils within the more level or gently undulating land include deep grey clays and cracking clays consistent with Vertosol soils and loamy duplex soils, sandy red and yellow earths more consistent with Sodosol or Kandosol soils.

From approximately KP300 to KP415, the alignment traverses areas predominantly soils mapped as Kandosols with a section of Vertosols from KP360 to KP370. The landform in this section of the alignment varies from level plains to undulating lands with the exception of some strongly undulating land from approximately about KP405 to KP407.

Dominant soils on the level plains to undulating lands include sandy and loamy red and yellow earths, loamy duplex soils consistent with Kandosol, Chromosol or Sodosol soils and grey deep clays consistent with Vertosol soils. The dominant soils on the strongly undulating land are shallow stony loams with small areas of stony red earths consistent more consistent with Rudosol soils.

From approximately KP415 to KP453, the soils are mapped as Kandosol soils. Land forms consist of very gently to level undulating plains. Dominant soils are sandy or loamy red and yellow earths with some areas of sandy surfaced duplex soils, associated with deep red sands that form low dunes. This is consistent with the mapped Kandosol soil

description. These soils are generally neutral or near neutral pH with low salinity. The soils mostly have low CEC and ESP indicating lower fertility with the exception of some areas in the alluvial valleys. Sodicity as indicated by ESP is generally low although some clays soils have elevated sodicity.

The Emerson Crumb results suggest that the soils have the potential for erosion through dispersion. They also generally have low Ca:Mg ratios. However, the generally lower topography results in overall lower potential erosion impact from rainfall runoff.

Topsoil depth varies along this area of the rail alignment. Deeper topsoils of 0.25-0.6m thickness were observed although, generally they are approximately 0.3m thickness which are expected in areas of heavy clay soils, while the sandy soils exhibit shallower topsoil depth of up to 0.15m.

2.2.2.3 Acid Sulfate Soils

The majority of the rail corridor is located in areas with a low to nil probability of encountering Acid Sulfate Soils (ASS). A review of the CSIRO's ASRIS broad scale soils mapping (mapped at a scale of 1:2,000,000) indicates that the rail alignment at Abbot Point may contain ASS. The CSIRO's Australian Soil Resource Information System broad scale mapping also indicates that sections where rail may need to traverse the APSDA includes areas which may contain ASS, however as the limit of the assessment for this EIS/SEIS is the western boundary of the APSDA, these are outside of the scope of this EIS/SEIS.

Potential Impacts

The main potential impacts include changes to agricultural land capability and increased risk of erosion in areas of construction and / or operation. In addition, some soils encountered will be sodic or dispersive which may affect excavation conditions and therefore construction and operational methodologies at the mine.

Mitigation and Minimisation Commitments

To ensure appropriate management of soils is conducted during the construction and operation of the rail, Waratah Coal commits to doing the following:

- identify specific access areas and determine goals for rehabilitation of disturbed land to minimise areas that will have lower land use quality post-mining
- manage lay down areas in a manner that will not result in a reduction in land quality
- prepare and implement erosion control measures and continue to monitor and maintain the measures implemented
- ESCPs will be developed and put in place prior to the commencement of construction works for all areas of the rail that may cause erosion
- topsoil management measures will be documented, monitored and maintained with a reconciliation of top soil excavation and rehabilitation maintained. Excess topsoil will be used in project areas with topsoil deficits. Waratah Coal will source further top soil (if required) from local suppliers in the project area
- prior to construction carry out soil sampling at waterways to better identify erosion risk and put in place appropriate management measures
- prior to construction undertake soil resistivity surveys of high risk areas, record the current salinity status of these areas and implement measures to ensure no further significant salinisation occurs due to the project activities.

Specific details with reference to management strategies for soils are given in *Element 4* of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.2.3 LAND USE AND TENURE

2.2.3.1 Mine

Description of Environmental Values

The mine site and adjoining areas have historically and are currently used for cattle grazing. The Bimblebox Nature Refuge, which lies within the mine footprint is managed to provide for both nature conservation and cattle grazing. New mines are proposed both to the immediate north (Alpha Coal Mine) and south (South Galilee Project) of the mine site with other mines proposed further north (e.g. Kevin's Corner Mine and Carmichael Coal Mine). The properties adjoining the mine site are predominantly large rural holdings used for grazing cattle on freehold and leasehold land.

The current land tenure of the mine is shown in Figure 8. A total of fifty-two separate allotments intersect EPC 1040 and EPC 1079 (with 36 lots covering the mine fooprint). Of these, the predominant land tenure type is leasehold which comprised approximately 60% of existing tenure types. Freehold land comprises approximately 25% of tenure type with the remaining 15% held as either forest reserve or easements. Four distinct parcels of freehold land exist within the mine footprint, while an additional three parcels of freehold land are located just south-west of the footprint, but within the proposed Mining Lease boundary.

Other infrastructure located approximately to the Mine's footprint include the 275kV powerlines that run through the middle of the mine footprint, the Central Highlands railway line trends east to west and runs parallel to the Capricorn Highway located south of the proposed mining lease and a stock route is present in the southern portion of the mine site, outside of the proposed mining lease, and follows the general alignment of east west railway line and Capricorn Highway.

The mine site is also located within the Central Highlands sub-region of the Central Queensland Regional Plan. The major industries in this area are crop production, cattle grazing and coal mining with cattle grazing being the largest land use. The plan recognises the importance of resource extraction by stating that "coal mining will remain a key economic driver of the region over the next twenty years" and that "access to the region's coal reserves needs to be maintained".

The Project site and immediate surrounds were assessed to identify potential land suitability and 'Good Quality Agricultural Land' (GQAL). Agricultural land is defined as land used for crop or animal production, but excluding intensive animal uses (i.e. feedlots and piggeries). GQAL is land which is capable of sustainable use for agriculture, with a reasonable level of input, and without causing degradation of land or other natural resources.

Based on the results of soil sampling the land within the mine footprint would be considered class C GQAL (Figure 9), which is described as being "land that is suitable only for improved pastures or native pastures". There is some Class D land in the south-east of the study area but this will not be impacted by the mine. Class D land is described as "non-agricultural land, being land not suitable for agricultural uses due to extreme limitations". The suitability of beef cattle grazing on the Project site is also mostly limited by nutrient deficiencies within the soil. Water erosion and poor water availability, primarily due to the shallow nature of the soil, are also considered limiting factors within some soils.

Figure 8. Mine Land Tenure

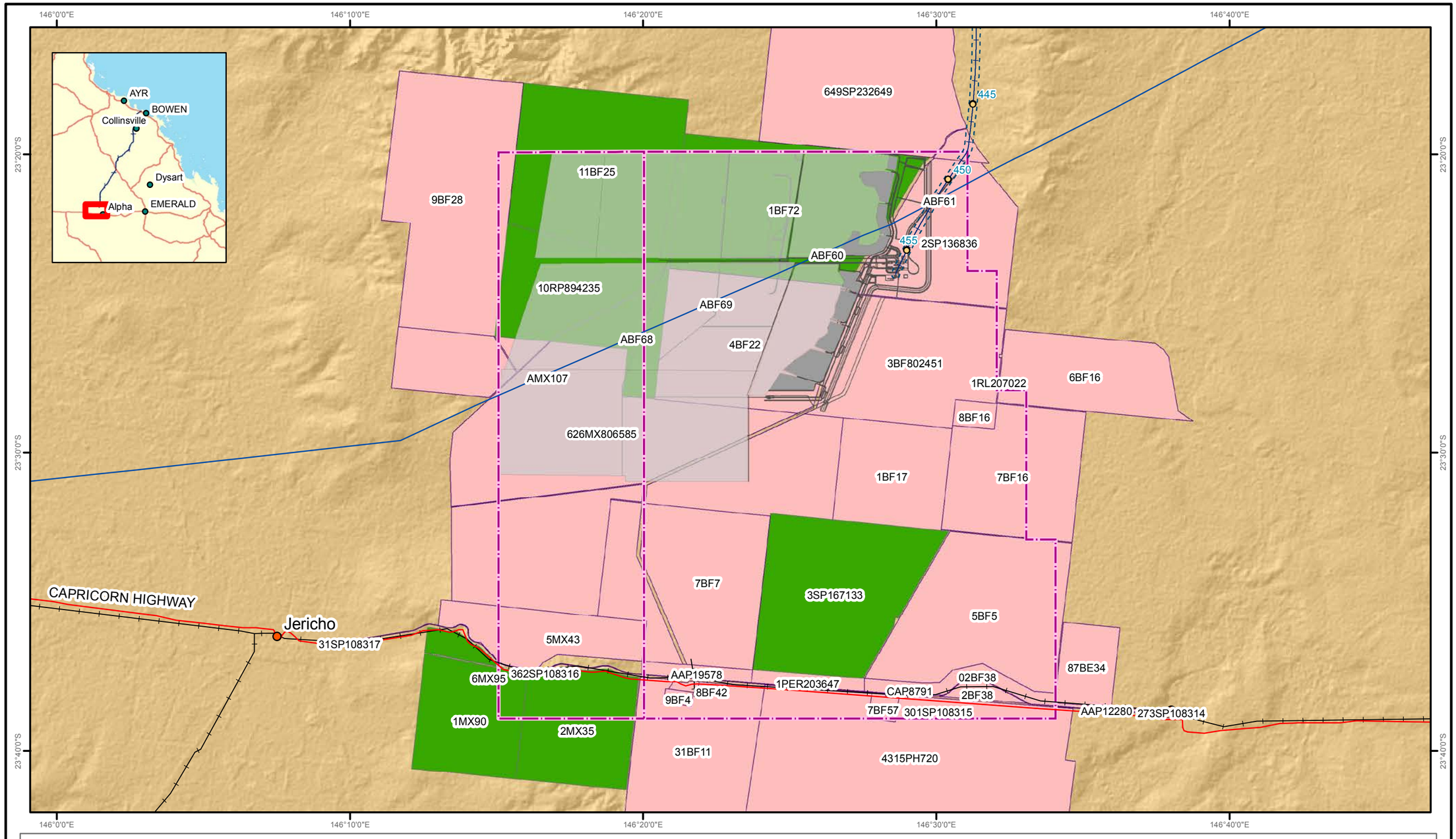
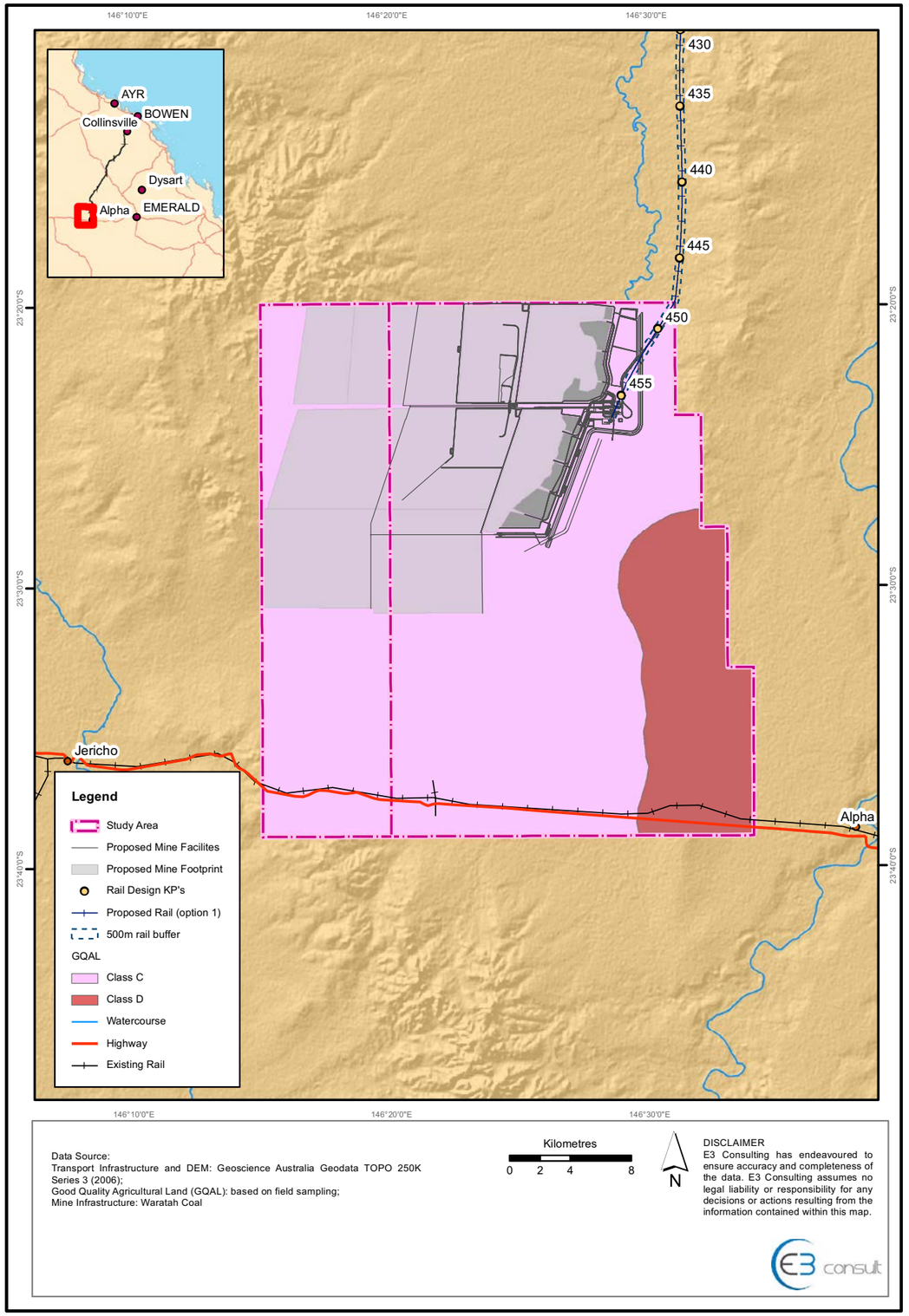


Figure 9. Good Quality Agricultural Land



Potential Impacts

The development of the Mine will significantly change existing land use in the immediate area. The majority of the area within the proposed Mining Lease area has been typically used for broad scale cattle grazing on native and introduced pastures, and also grazing within bushland in some parts. This is consistent with much of the surrounding land use.

During the operation of the mine, existing land uses, such as grazing may be able to continue within the proposed mining lease in areas not directly impacted by the open cut mines and supporting infrastructure. Areas required for the operation of the mine will be disturbed and no longer available for the existing land use. The land is not considered to have unique agricultural values compared to surrounding areas and as such, the mine would not be expected to have a significant impact on agriculture in the region. It is important to note that agricultural land uses on surface areas above underground mines is not expected to be significantly affected by mining operations.

The post-mining landform will be rehabilitated to a stable landform and where possible capable of uses similar to those prior to disturbance, namely beef cattle grazing on Class C GQAL (i.e. "land that is suitable only for improved pastures or native pastures"). Where there is Class D GQAL ("non-agricultural land, being land not suitable for agricultural uses due to extreme limitations"), such as in the south east of the mine footprint, this will be the desired level of rehabilitation.

Based on DEHP's (2010) Strategic Cropping Land (SCL) trigger mapping and on review of the field data there is no SCL present within the mine site.

The Regional Ecosystems (REs) that currently exist within the Project footprint will be re-habilitated to retain their bushland values, if disturbed. The REs are listed as Least Concern under the VM Act and do not form part of any threatened ecological community identified under the EPBC Act. The rehabilitation works will include the use of endemic species associated with each of the REs.

The largest area of grazed bushland is located on the property "Glen Innes", also known as the Bimblebox Nature Refuge (BNR). BNR is located within the mine footprint, and directly overlies the areas identified as Underground Mine (UG)2, UG4 and Open Cut (OC)2 South. The BNR is composed of remnant semi-arid woodlands with an understory of native shrubs, forbs and native and exotic grasses consisting predominantly of Poplar Box (*Eucalyptus populnea*) and Silver-leaved Ironbark (*Eucalyptus melanophloia*) open woodland (REs 10.5.12, 10.5.5). The BNR also contains the Near Threatened flora species, Large-podded Tick-trefoil (*Desmodium macrocarpum*). The BNR is identified as containing 'Special biodiversity values' and is of value as a 'Wildlife refugia'. It is mapped as being of State Significance within the Desert Uplands Biodiversity Planning Assessment.

Approximately half of the BNR would require clearing to construct the proposed associated infrastructure and open cut mines. The potential impacts on the BNR associated with grazing due to the construction of the mine include:

- direct spatial reduction in extent. It is estimated that approximately 4,017ha of vegetation will be cleared within the BNR as a result of the Project construction
- increased edge effects within the BNR (through reducing the edge to area ratio and moving the edge) including the potential to increase the abundance of Buffel Grass (and other weeds) and the associated potential for increased fire intensity
- potential for dust to reduce the health of retained vegetation in the vicinity of the clearance footprint potential for temporary facilities, materials and equipment to damage areas outside the construction footprint.

Mitigation and Minimisation Commitments

The mitigation measures associated with the ecological values of the BNR and the other broader mosaic of remaining bushland are addressed in the *Terrestrial Ecology* section (Section 8) of the *Draft Mine EM Plan*, contained in *Appendices – Volume 2* of this SEIS. In terms of grazing, which is the dominant land use within the BNR, the management of stock within the existing and rehabilitated bushland areas will form part of the broader conservation strategy for the post-mining land use. Where existing bushland is disturbed and subsequently rehabilitated, it is expected that stock will be excluded from grazing these areas until ongoing monitoring has shown the rehabilitation can withstand grazing pressures.

See also the *Rehabilitation and Decommissioning* Section (Section 9.6.3) of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.2.3.2 Rail

Description of Environmental Values

The predominant land use within the footprint of the rail alignment is classified as 'for production from relatively natural environments' based on Queensland Land Use Datasets. Discrete parcels of land are found along the alignment and are classified as, 'Water or Production from Agriculture' (Dry Land and Irrigated) land use purposes which potentially encroach or abuts the corridor in various locations. Some areas along the rail alignment have been identified as set aside for conservation purposes. The rail alignment has been designed to avoid these areas.

The majority of land tenure within the rail alignment is zoned as rural and administered by the relevant Planning Schemes for the Barcaldine, Isaac and Whitsunday Regional Councils. A total of 46 separate allotments intersect the rail corridor. Around 92% of the proposed easement traverses leasehold, With the remaining 9% being split between freehold and easements. Freehold title only exists for the first 14km from the western boundary of the APSDA land and also in parts between KP70 and K89.

Potential Impacts

The proposed rail alignment will result in permanent sterilisation of approximately 21km of Class A or B Good Quality Agricultural Land (GQAL) suitable for cropping (just under 5% of the length of the alignment). The rail alignment intercepts Strategic Cropping Land (SCL) for about 2.5km (about 0.5% of its length).

The main potential impacts of the proposed rail will include changes to agricultural land capability and increased risk of erosion in areas of construction and / or operation. In addition, some soils encountered will be sodic and / or dispersive and this may affect excavation conditions for portions of the rail. Further, areas of geological shear zones, faulting and / or with dykes were identified that may impact upon rail construction. Potential impacts to the topography, geology, soils and landform of the project and management strategies and commitments to mitigate these impacts have been identified. Further detailed investigations are required to fully evaluate some potential impacts. This will delineate areas of potential impacts and assess the appropriate scale of mitigation or management.

Mitigation and Minimisation Commitments

Waratah Coal aims to work with each property owner to:

- Align the railway along property boundaries as much as possible
- Develop plans and fund any necessary infrastructure changes (eg. fencing, access roads, cattle creeps, stock yards and watering points)
- Provide the services of a farm management consultant, if requested
- Provide compensation through one-off payments based on the area within the railway corridor
- Provide contracting opportunities to impacted graziers when possible (e.g. fencing and weed control), and

- Engage with property owners in a meaningful and effective manner (as discussed in Section 7 of the *SIMP* in the *Appendices – Volume 2* of this SEIS).

A major concern of property owners, particularly in the Bowen-Collinsville-Mt Coolon areas, is the risk of fire. The Rail EMP will include strategies to minimise the risk of fire. The fire reduction strategies may provide some opportunity for property owners to earn some off-farm income (eg. vegetation control within the railway corridor).

Wagons will be covered, thereby reducing the potential impacts of coal dust on pasture (i.e. sterilisation of pasture from coal dust).

2.2.4 TOPOGRAPHY AND LANDSCAPE CHARACTER

2.2.4.1 Mine

Description of Environmental Values

Mine site topography is characterised as gently undulating plains occurring across the majority of the mine area with strongly undulating to hilly land in the north-east corner of the study area. Ground level rises gently to the west up to 400m Australian Height Datum (AHD) culminating in the outcrops of the Great Artesian Basin.

Potential Impacts

The mine site comprises level to gently undulating topography falling from low hills to small creeks. The opencut mining activities will result in topographical changes to the mine area during mine operation and post-mining through the removal of existing topography during stripping of overburden and mining and the creation of new topographic highs through the placement of spoil and construction of dams. Changes to the waterways and the width of the floodplain will also occur as a result of mining and creek diversions.

The underground mining activities will result in surface subsidence that will develop progressively within each longwall block and present on the surface as a series of trough-like depressions. The maximum subsidence (i.e. in the centre of the longwall mining panels) will range from 1.6m for standalone mines to 3.2m in areas of cumulative subsidence where underground mine 4 lies above underground mine 1. See Figure 10.

Longitudinal tension cracks of 2.5mm to 20mm may occur within the longwall panels parallel to the chain pillar areas where the depth of cover between the surface and the underground mines is less than 180m. See Figure 11.

Depressions in the surface as a result of subsidence can lead to ponding if unmanaged. However, the longwall mining panels are aligned longitudinally with the natural fall of the land, which drains freely to the east and is sufficient to minimise subsidence troughs.

Figure 10. Predicted Subsidence Contours

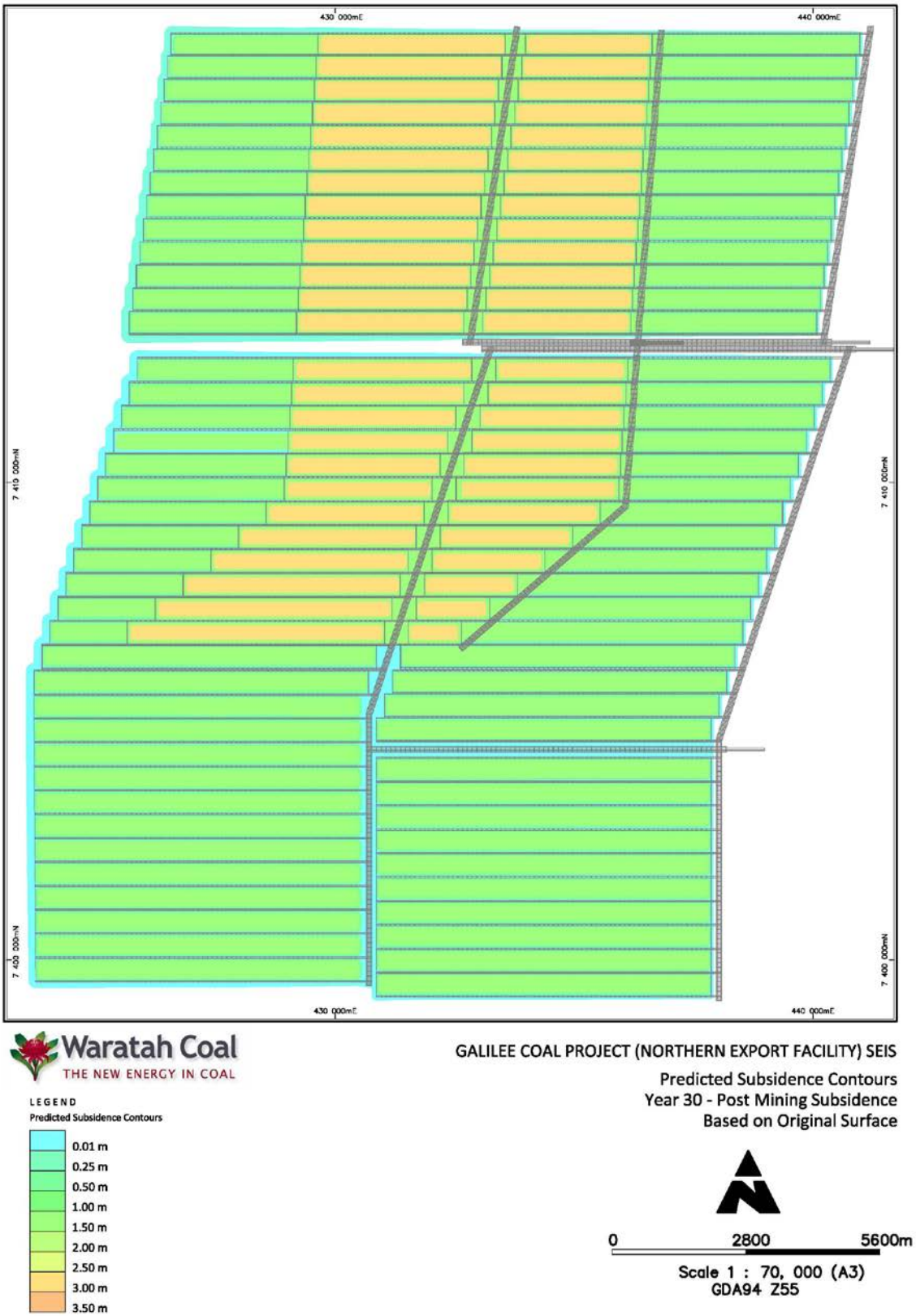
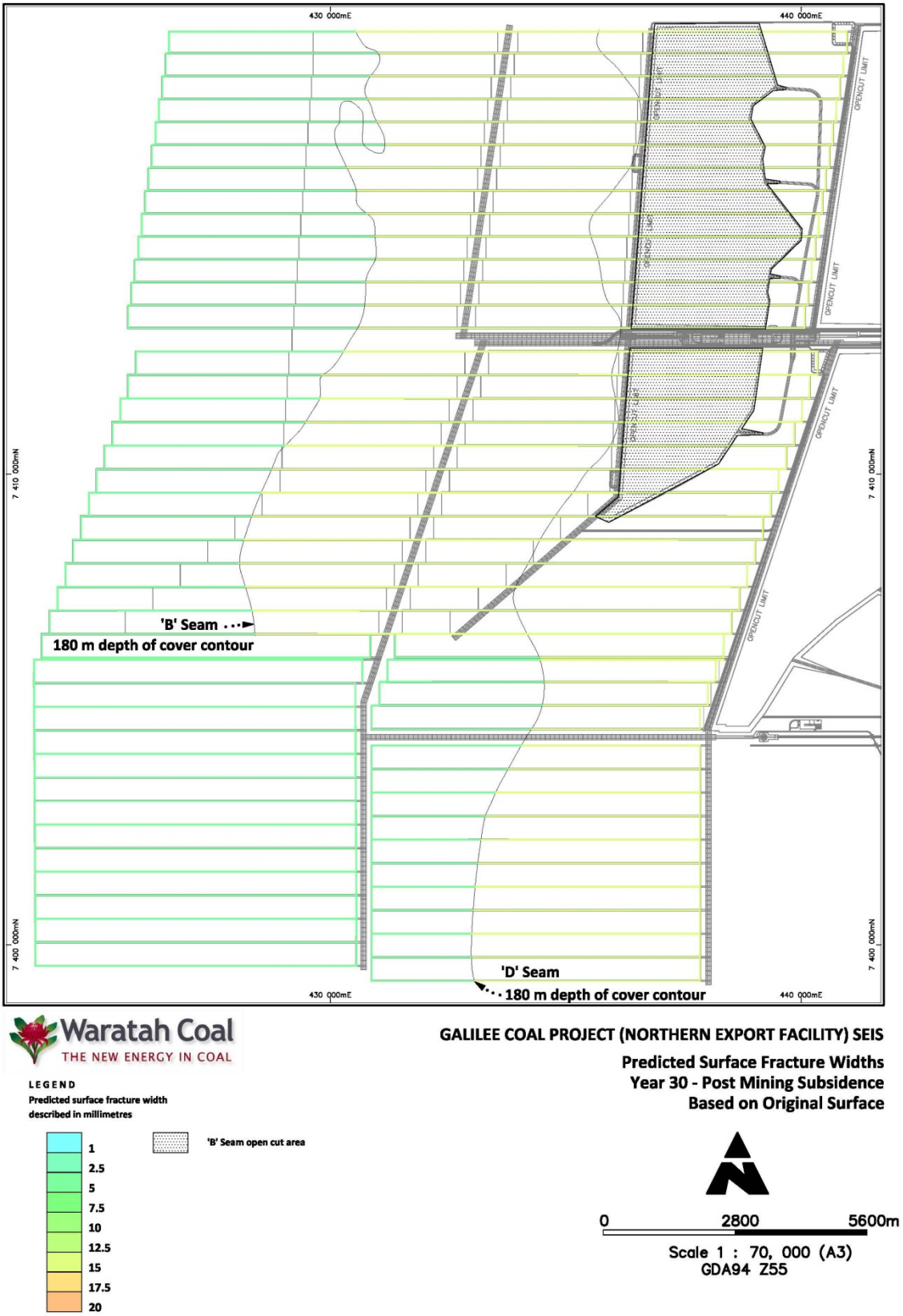


Figure 11. Predicted Surface Fracturing



Mitigation and Minimisation Commitments

Following decommissioning, infrastructure areas will be returned to the pre-mining landform, where practicable. Where this is not practicable, bench cuts will be removed, any steep grades reduced and the landform returned to a profile similar to landforms in the region.

Land used for infrastructure components will be returned to improved pasture grazing land or dry land cropping land as occurred pre-mining, and will generally be able to be used for beef cattle grazing or potentially for fodder cropping if the water pipeline is left commissioned.

Appropriate surface water management structures (contour banks, drains and settlement ponds) will be constructed. The site will be rock raked to remove all surface rocks to a size of less than 0.5m and ripped to a depth of at least 1m. Fertiliser and pasture / tree seed will be applied to assist establish grassland post–mine land use.

Water storage dams will either be retained for agricultural use or rehabilitated. If not retained as water storages, water storage dams will be rehabilitated and returned to land consistent with pre-mining land uses such as low intensity beef cattle grazing.

Rehabilitation will also vary depending on the storage history. Dams that have contained saline water may require remediation. The membrane liner of the dam and any saline material inside the dam will be removed during rehabilitation and will be disposed of by appropriate methods, in accordance with the management of saline overburden material.

Sediment control basins associated with managing water flow from the final rehabilitated surface will be retained following mine closure.

A single final void will remain after completion of mining for each pit. To address the potential impacts, a number of key actions are proposed as part of the final void management strategy, these include:

- progressive rehabilitation of open cut areas
- design of mine plan to minimise final voids
- shaping of landforms compatible with existing topography
- battering of final void slopes
- benching and revegetation of final void slopes where possible
- construction of safety bunds around final voids
- preparation of a Land Management Plan, and
- preparation of the MCP.

The banks of the final void (i.e. the high wall, low wall and end walls) will be reshaped to achieve long term geotechnical stability. Ramps will be levelled to similar grades as the surrounding wall slopes.

The final slope gradients of each void, including the outer boxcut spoil slopes, low wall of the final voids, and high wall slopes will be assessed and recommended by a suitably qualified person based on the risk of long term geotechnical instability.

The voids will be externally drained so that water from the overburden piles drains away from the voids. Final void modelling will be conducted to establish the required parameters for long term void stability and water quality.

These studies will be undertaken during the life of the mine, and include detailed research and modelling. In the final five years of mine life, the capability of the void to support endemic flora and fauna will be ascertained.

Final voids are unlikely to be suitable for agricultural use, and will be investigated for alternative beneficial uses such as wetlands. Final voids can be used for rejects and tailings disposal if longwall mining persists after the completion of open cut mining.

At the end of the mine life, the final voids remaining will be bunded and fenced to inhibit access to the area. The integrity of the bund will be the responsibility of the subsequent landowner.

A Final Void Plan (FVP) will be developed in consultation with relevant Government Agencies prior to completion of mining in the first pit. The Plan will be based on the final void modelling and will detail the design parameters for each final void. The FVP will include assessment of groundwater hydrology and properties, surface water hydrology and pit wall stability. The Plan will include measures to minimise potential impacts associated with the final void and for monitoring and management of potential impacts of the void over time. Options for the final post-mine use of the void will also be included in the FVP.

Remedial works for longitudinal surface cracks parallel to the chain pillar areas where the depth of cover between the surface and the underground mines is less than 180m may include ripping, recompacting, seeding of tension cracks and reshaping.

Depressions in the surface resulting from subsidence will not occur over the majority of the subsided areas as the longwall mining panels are aligned longitudinally with the natural fall of the land, which drains freely to the east. However, in flatter areas, reshaping of any internally draining areas to create external drainage will be done by the construction of contour drains and appropriate rehabilitation measures.

Waratah Coal will prepare a subsidence management plan in accordance with the DRNM *Guideline: Watercourse Subsidence – Central Queensland Mining Industry* in liaison with DRNM.

See also the *Longwall Mining Subidence* report and the *Rehabilitation and Decommissioning* Section (Section 9.6.3) of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.2.4.2 Rail

Description of Environmental Values

The following sections describe the topography of the rail alignment in the five zones of the 453km.

Kilometer Point (KP) 0-KP20 (Coastal Plains) – the topography of the coastal plain ranges from wetlands and residual clay plains to flat, weathered granite and granitic hills. The rail alignment tracks westward for 5.6km from the coal terminal along relatively flat terrain between 5m and 15m Australian Height Datum (AHD) with some isolated areas below the 5m AHD contour associated with creek crossings.

KP20-KP80 (Clarke Ranges) – elevations in this area range from around 100m AHD to over 1,000m AHD; however the rail alignment reaches maximum elevations of about 200 m. The topography includes the granite hills of Mt Abbot (1056 m), Mt Aberdeen (910 m), Mount MacKenzie (514 m), Pine Hill (624 m), and Highlanders Bonnet (487 m).

KP80-KP120 (Bowen River Valley) – the topography of this area reflects the Bowen River Valley's erosional impact upon the underlying geology with the topography falling from 233m AHD to 150m AHD in the centre of the valley before climbing up to 350m as the valley gives way to the Leichhardt Range.

KP120-KP185 (Leichhardt Range) – the topography of the Leichardt Range inclines from 250m to 516m AHD and includes Bulgonunna Peak (516 m). The intrusive rock types form areas of higher relief with radial drainage to the Suttor Formation which surrounds them. The area is also dissected by tributaries of the Suttor River that eventually drain to the southwest, into the Belyando and subsequently the Burdekin catchment.

KP185-KP453 (Inland Plains) – the topography comprises undulating plains crossing the Suttor River Valley at 190m to 220 m, rising up to 250m on areas of outcrop before dropping back to about 230m on sandy cover. The topography

then steadily rises to the west reaching about 250m to 290m across the Belyando River valley and rising to 300m to 320m adjacent to the Permian Sandstones. It finally reaches 330m at the end of the rail alignment. The generally low undulating topography indicates a low potential for landslip in this area.

Potential Impacts

Through the Clarke and Leichhardt Ranges, the topographical features such as rocky outcrops and steeply sloping ground can present an increased potential for landslip. Further, major rivers and tributaries may affect the extent of clearing required during construction, the type of equipment required to undertake construction and the amount of time that disturbed construction areas are in use. In these areas, there is greater potential for landslips to occur in the areas of steeper topography between if construction works are not managed properly.

Mitigation and Minimisation Commitments

Site rehabilitation works from construction activities have been designed to leave the landscape compatible with existing surrounding land uses. No major changes to topography will occur.

2.2.5 LAND CONTAMINATION

2.2.5.1 Mine

Description of Environmental Values

A search of each property within the proposed Mining Lease Application has been completed. See *Phase 1 Environmental Site Assessment – Desktop Study* contained in *Appendices – Volume 2* of this SEIS.

Seventeen lots cover the MLA. A search of the EMR and the CLR did not identify any properties listed on either of these registers. However, during an inspection of the mine site, Lot 1 BF72, containing an Above Ground Storage Tank (AST) and cattle stockyard was observed. This lot was selected for a PSI with targeted soil sampling. The hydrocarbon impacts to soils based upon site observations of staining and the clay content of the soils present suggest a low potential for significant impacts. Based upon the extent of observed staining, distance to the nearest creeks and prior experience of spills / leakage from similar sized ASTs, the potential for impacts to penetrate more than a few centimeters below ground is considered low. It is therefore considered that the impact is unlikely to comprise serious or material environmental harm and presents a low risk.

Outside of the MLA, but within or adjacent to the study area (i.e. EPC1040 and part of EPC1079), desktop searches revealed that five lots along an existing rail line recorded a land use of "Transport Terminal" and one lot adjacent to the rail line recorded a land use as "Transformer." One of the "Transport Terminal" lots was listed on the Environmental Management Register (EMR) (possible high level of Arsenic).

The lot listed on the EMR (Lot 273 SP108314) was selected for Preliminary Site Investigation (PSI) with targeted soil sampling. This lot was representative of other rail line lots in the area. The transformer lot was not assessed further as it was not listed on the EMR. Further, due to the dangers of working in a live electrical facility and because it was located about 30 km south of the mine site, the site was considered to pose a low risk to the Project.

Potential Impacts

The following potential impacts may arise from identified contaminated or potentially contaminated land as a result of construction and operation works associated with the mine:

- there is a low potential for significant contaminated soils to be encountered during earthworks which could lead to contamination being spread across the site
- the identified hydrocarbon impact may be delineated by completing a Stage 1 and Preliminary Stage 2 Environmental Site Assessment (ESA)

- the anticipated extent of hydrocarbon impact is considered to be unlikely to be a significant impact under the *Environmental Protection Act 1994* (EP Act) and excavation, land farming and validation of hydrocarbon impacted soils may be undertaken on Lot 1 BF72 under a remedial plan
- should the extent of the impact be greater than anticipated, then the site may be listed on the EMR and a site management plan (SMP) / remediation action plan (RAP) prepared to control the remediation and validation of the impact
- demolition of site buildings has the potential to impact soils with hazardous materials if not appropriately assessed and managed, and
- spills and leaks from various contaminating sources such as, petrol and other chemicals stored on site during operations should be managed properly. These sources may have the potential to leach and migrate into sensitive receptors such as waterways and permeate into the existing soil profile.

Mitigation and Minimisation Commitments

General control strategies to minimise the potential impact of the mine construction and operation on soil and groundwater are identified in the *Draft Mine EM Plan* contained in the *Appendices – Volumes 2* of this SEIS, however, other measures include:

- contaminated material will be removed and placed in an appropriate area for remediation. This material will be kept separate from any material used for rehabilitation activities
- chemical storage will comply with Australian Standards and Material Safety Data Sheets (MSDS) requirements. MSDS for products kept on site will be readily available to employees and contractors
- smaller quantities of chemicals, fuels and oils will be stored in self-bunded pallets, within a bunded area in the workshop, or in a bunded container on the site. Bulk quantities of fuel should be stored in double skinned tanks (self-bunding)
- coal stockpiles, workshop areas, chemical stores, fuel tanks and waste disposal / storage areas will be located on hardstand or compacted soil. As runoff from these areas may be contaminated, runoff will be collected using appropriate drainage and water management structures and managed within the mine water management system
- waste products (e.g. oil / water separator waste, sludges and residues), will be contained within weatherproofed, sealed and bunded areas to ensure stability of the waste containment receptacles and prevent any leakages or spills causing environmental harm to soils, surface water or groundwater. Regular inspections will be carried out of the tanks, bunds and storage areas to ensure integrity
- obtain an approval and a disposal permit by the DEHP (Contaminated Land Unit) for the removal of contaminated soil, in accordance with the EP Act
- remove contaminated soils in accordance with a DEHP approved RAP
- prepare and implement procedures for the remediation of contaminated soil spills that may occur during transport
- standard procedures for the storage,handling, disposal and spill response for potentially hazardous waste materials should be described in Standard Operating Procedures (SOPs) as part of the Project EMS
- in the event of a large spill, sites will be investigated, managed and remediated in accordance with the requirements of the contaminated land provisions of the EP Act and the QLD DEHP Draft Guidelines
- if during any site earthworks or excavation, offensive or noxious odours and / or evidence of gross contamination not previously detected is observed, site works are to cease in that area and action taken to immediately abate the environmental harm. The area will be isolated through high visibility fencing and appropriate signage so that other activities may continue elsewhere within the remediation site without representing additional risks
- store all fuels, oils and chemicals in containers less than 200L, either in a bunded area with capacity of at least 110% of the largest container, or in a fenced and roofed compound

- install tank level indicators on fuel oil tanks for monitoring of fuel oil levels
- maintain fuel oil tanks to ensure safe and effective operation of all components
- design fuel tanks in accordance with AS 1692:2006 'Steel tanks for flammable and combustible liquids' to minimise the potential for failure of the diesel storage vessel
- maintain contractor management procedures that require contractors to provide MSDS and apply for approval prior to bringing new chemicals on site, and
- all staff will be trained as part of their site induction in appropriate handling, storage and containment practices for chemicals, fuel and other potential contaminants as relevant.

2.2.5.2 Rail

Description of Environmental Values

A total of 46 lots intersect with the rail alignment, of these, four lots were listed on the Environmental Management Register (EMR). One property in the southern section of the Rail Corridor (Lot 5 RU81) was listed on the EMR for the notifiable activities of operating a livestock dip or spray race facility and storing petroleum products or oil. Three properties in the northern section of the Rail Corridor (Lot 1 SB279, Lot 5088 SM101 and Lot 618 PH2106) were listed on the EMR for the notifiable activities of operating a livestock dip or spray race facility and / or storing petroleum products or oil. All four properties identified on the EMR contained areas of 'Endangered' regional ecosystems and ecosystems considered to be 'Of Concern'.

Site inspections of the railway corridor also identified the presence of numerous cattle dips.

Potential Impacts

The potential impacts of construction and operation of the rail with reference to land contamination are:

- leaching of contaminants to groundwater or via overland flow to surface waters
- mobilisation of contaminants if not appropriately managed
- where the project construction intersects areas of extractive resources, there is potential for mobilisation of contaminants from the elevated levels of minerals, elements or compounds in the resource material
- demolition of buildings in the rail alignment has the potential to impact soils with hazardous materials if not appropriately assessed and managed
- spills and leaks from various contaminating sources such as, petrol and other chemicals stored on site during construction and operations should be managed properly.

Mitigation and Minimisation Commitments

To manage the risks and mitigate any impacts, during the construction phase Waratah Coal will conduct a preliminary contaminated land assessment prior to any activity within a EMR listed site and avoid disturbing known contaminated land sites. If contaminated land is identified, undertake further investigations as necessary and develop a remediation plan. If during any site earthworks or excavation, offensive or noxious odours and / or evidence of gross contamination not previously detected is observed, site works are to cease in that area and action taken to immediately abate the environmental harm. The area is to be isolated through high visibility fencing and appropriate signage so that other activities may continue elsewhere within the remediation site without representing additional risks.

Chemical and hazardous Goods Storage during Construction and Operation will comply with Material Safety Data Sheet (MSDS) requirements. MSDS for products will be kept on site and readily available to employees and contractors. Smaller quantities of chemicals, fuels and oils are to be stored in self bunded pallets, within a bunded

area in the workshop, or in a bunded container on the site. Bulk quantities of fuel will be stored in double skinned tanks (self bunding). Waste products (e.g. oil / water separator waste, sludges and residues), will be contained within weatherproofed, sealed and bunded areas to ensure stability of the waste containment receptacles and prevent any leakages or spills causing environmental harm to soils, surface water or groundwater. Regular inspections are to be carried out on the tanks, bunds and storage areas. An approval and a disposal permit will be obtained from the DEHP (Contaminated Land Unit) for the removal of contaminated soil, in accordance with the EP Act, if required. Contaminated soils would be removed in accordance with a DEHP approved Remediation Action Plan (RAP).

The Emergency Management Plan will include standard procedures for the storage,handling, disposal and spill response for potentially hazardous waste materials used on site. Procedures will be prepared and implemented for the remediation of contaminated soil spills that may occur during transport. In the event of a large spill, the site would be investigated, managed and remediated in accordance with the requirements of the contaminated land provisions of the EP Act and the QLD EPA Draft Guidelines.

With respect to Land Contamination (fill), Waratah Coal will ensure that all fill material brought on to the site meets the requirements of:

- National Environmental Protection (Assessment and Site Contamination) Measure, and
- Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (1998)

All fill material will be virgin excavated natural material (i.e. soil, aggregate) and that the site source of the imported fill is not listed on the Environmental Management Register / Contaminated Land Register (EMR / CLR).

Other commitments to minimise risks associated with existing contamination and to minimise the risk of causing contamination from the construction and operation of the rail, include:

- where possible the project footprint will be re-aligned to avoid areas of potential or identified contamination
- where contamination is present within the project footprint, Waratah Coal will enter into agreements with the owner of the contamination to assess and appropriately manage or remediate the contamination
- any building / structures to be demolished will be assessed for hazardous material content with preparation of demolition management plans for the appropriate demolition and disposal of the hazardous materials
- where the project footprint cannot be re-aligned, DEHP compliant Stage 1 and 2 ESAs will be undertaken to assess the scale and extent of contaminant impacts
- where contamination is identified it will be managed and / or remediation under the Environmental EP Act with DEHP approved SMPs and / or RAPs in order to make the sites suitable for the proposed use
- Waratah Coal will appoint a third party reviewer to assess all contaminated land assessment and remediation work, and
- any notifiable activities that are required for the project will be implemented and managed in accordance with relevant guidelines and legislation once construction commences and also during the operational phase. The notifiable activities may include:
    - storing hazardous contaminants
    - petroleum product or oil storage, and
    - chemical storage.

Specific details with reference to management strategies for contamination are given in Element 2 of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.2.6 DECOMMISSIONING AND REHABILITATION

2.2.6.1 Objectives

The rehabilitation objectives for the mine have been identified and can be split into short-term and long-term objectives. These short and long-term objectives are identified below.

Short-Term

Short-term rehabilitation objectives for the mine are:

- to minimise clearing / vegetation disturbance consistent with operational requirements
- to schedule operations including overburden/interburden emplacement and shaping, and revegetation to minimise visual exposure
- to rehabilitate areas of disturbance no longer required for mining related operations
- to apply soil (topsoil / subsoil) to the final landform based on material availability and postmining land use
- to stabilise all earthworks, drainage lines and disturbed areas in order to minimise erosion and sedimentation, and
- to control vermin, feral animals and noxious weeds.

Long-Term

The long-term aim is to rehabilitate the land to a low maintenance, stable and safe landform that blends with the surrounding topography and maximises the return of agricultural land suitability comparable to pre-mining levels. These long-term aims include:

- continuation and/or restoration of biodiversity and ecological integrity of areas affected by mining or agriculture within the mining lease
- preservation of downstream water quality for ecological and existing beneficial uses
- establishing a low maintenance, geotechnically stable landform commensurate with agricultural and nature conservation land uses
- blending the created landforms to appear as a natural extension with the surrounding landforms
- providing habitat for fauna and corridors for fauna movement within the final landform, and
- monitoring rehabilitation success in terms of physical and biological parameters.

In addition to the EM Plan, the MCP will describe the specific operational activities required to be undertaken in order to complete rehabilitation and decommissioning of the Project.

2.2.6.2 Rehabilitation Strategy

The mine site has been divided into four management areas. These are:

- in pit and out of pit waste dumps
- final voids
- mine infrastructure, and
- subsidence areas.

Proposed completion criteria have been prepared for each area.

Areas that are disturbed by mining activities will be rehabilitated to a safe and stable landform with a self-sustaining vegetation cover. Rehabilitation of disturbed land will commence typically within two years of the areas becoming available for rehabilitation. In some situations; however, the commencement of progressive rehabilitation activities may be delayed or not be possible. To achieve the desired rehabilitation objectives, rehabilitation will be conducted so that:

- an appropriate mix of native and introduced plant species are utilised to achieve a mosaic of grazing and bushland areas to support post-mine land uses that are consistent to that currently in place
- landscaping and rehabilitation works will where practicable include endemic native species of local provenance, and where suitable will also make use of conservation significant flora species or species that can provide habitat opportunities for conservation of significant fauna
- the potential for erosion is reduced
- the potential for environmental impacts associated with the release of dust is minimised
- the quality of surface water released from the site is unlikely to result in harm to the downstream environmental values
- the quality of surface water released from the site is unlikely to result in negative impacts to the downstream beneficial users of the resource.

A Rehabilitation Management Plan (RMP) will be developed to incorporate the control strategies and monitoring programs identified in the EM Plan. The RMP will be prepared in consultation with relevant Government Departments and will take into consideration Government Policy objectives at the time of preparation.

2.2.6.3 Completion Criteria

Preliminary completion criteria (or closure criteria) for the rehabilitation of the Project have been proposed. The completion criteria have been replicated from the success criteria identified for the nearby Alpha Coal Project to enable consistency in monitoring and reporting by the proponent, and assessment by DEHP. Whilst the Rehabilitation Element, Indicator and Criteria will be consistent with the Alpha Coal rehabilitation program, specific sub-criteria will be developed specific to the mine. These sub-criteria will be developed based on the monitoring of progressive rehabilitation and the success criteria will be reviewed every three to five years.

Mitigation and Minimisation Commitments

Mine closure rehabilitation success criteria will be agreed upon with DEHP and will include measures for:

- an ongoing and progressive rehabilitation of the disturbed areas against the agreed criteria will occur throughout the life of the mine, and
- final voids will be designed to a standard whereby they are safe, stable and sustainable.

2.3 Nature Conservation

2.3.1 SENSITIVE ENVIRONMENTAL AREAS

2.3.1.1 Mine

Description of Environmental Values

The predominant land use across, and around, the study site is cattle grazing. A significant proportion of the study site has been cleared of native vegetation and is maintained as cleared pasture for cattle grazing (e.g. Kiaora in the north, and Hobartville in the east). A large part of this area has been subject to blade ploughing and the introduction of exotic pasture grasses. In these areas, Buffel Grass (*Pennisetum ciliare*) is dominant.

In contrast, a notable area of woodland habitats (including native remnant and native regrowth) has been retained throughout study site (e.g. Glen Innes within the central sector, and parts of Cavendish and Lambton Meadows in the west). Generally, these areas are also subject to cattle grazing, though it is apparent, that there are differences in grazing management practices implemented throughout these remnant woodland areas (e.g. differences in stocking rates, retention native pasture, and weed control). Woodland habitats are dominated by eucalypts, principally Silver-leaved Ironbark (*Eucalyptus melanophloia*) and Poplar Box (*Eucalyptus populnea*), and support a diversity of native grasses, though introduced taxa are also supported (e.g. Buffel Grass).

Within the central sector of the study site Glen Innes station supports the Bimblebox Nature Refuge, gazetted in 2003 under the Nature Conservation (Protected Areas) Regulation 1994 (SL 2003 No. 82). The majority of its 7,912ha supports Silver-leaved Ironbark and Poplar Box woodland.

The study site is located within the Belyando River catchment, which is part of the larger Burdekin River catchment and the study site itself is transected by a variety of seasonal watercourses. The Spring Creek system drains the north-west sector of EPC1040, in an area which supports a variety of mesas and plateaus and vegetation types, including bloodwood open woodlands (dominated by *Corymbia trachyphloia*) and woodlands dominated by Lancewood (*Acacia shirleyi*). The Spring Creek system drains east and north, part of which connects with the Lagoon Creek system (off-site and to the north).

The Lagoon Creek system drains generally northwards through the extent of the study site. The system includes:

- Pebbly Creek-draining east across the central sector of the site (through the Cavendish and Glen Innes properties)
- Beta Creek-which drains northwards through the southern central part of the site (through the Lambton Meadows property)
- Tallarenha Creek–draining northwards through the south-eastern part of the site, and
- Salt Bush Creek-draining north through the eastern areas from the south-eastern sector of the study site.

Both Beta and Tallarenha Creeks join within the central-eastern part of the site to form Lagoon Creek, where it continues to drain in a northerly direction through the north-western corner of the study site. River Red Gum (*Eucalyptus camaldulensis*) is a relatively common feature along these waterways, particularly from about the confluence of Beta and Tallarenha Creeks and northwards (where *Eucalyptus tessellaris* is often a co-dominant within riparian areas). Within these areas, large hollow-bearing trees can be a relatively common feature.

Threatened Ecological Communities and Regional Ecosystems

Field surveys have confirmed that no Threatened Ecological Communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) occur within the study area. Minor occurrences of Brigalow dominant and co-dominant Regional Ecosystems (REs) were found to be present (i.e. RE 10.3.3 and RE 10.4.3) but these REs are not included within the EPBC Act definition of the Threatened Ecological Community "Brigalow (*Acaciaharpophylla* dominant and co-dominant)".

Nineteen Regional Ecosystems (REs) prescribed under the *Queensland Vegetation Management Act 1999* (VM Act) occur across the site.

Conservation Areas

The central sector of the study site is contains the Bimblebox Nature Refuge, gazetted in 2003 under the Nature Conservation (Protected Areas) Regulation 1994 (SL 2003 No. 82). The majority of its 7,912ha supports Silver-leaved Ironbark and Poplar Box woodland.

Potential Impacts

Threatened Ecological Communities and Regional Ecosystems

Under Section 5A of the Queensland EP Act clearing of REs classified as least concern and of concern for mining activities is exempt from the provisions of the VM Act. No endangered REs as prescribed under the VM Act occur within the mining footprints. However, one RE classified as Endangered under the DEHP Biodiversity Status classification occurs within the open cut footprint. The estimated clearing extent is 35.79ha of RE 10.4.3. Another 3.23ha of this RE occurs above the underground mining areas, so could be subject to impacts from subsidence. The proportion that this impact (assuming that the 3.23ha overlying the underground areas will be impacted) would represent is 0.22% of that which occurs in the Bioregion.

Table 3 gives the break-down of the amounts of VM Act protected vegetation to be cleared to facilitate the open cut mines, and the amounts which may be affected by subsidence from underground mining activities.

As can be seen from Table 3, the open cut mines will require disturbance to 16,519.99ha, of which, 4,877.49ha (29.5%) is covered by REs classified as Least Concern under the VM Act. The remaining 11,642.50ha (70.5) is comprised of pasture grass and other areas already cleared of native vegetation.

A further 25,598.10ha may potentially be affected by subsidence as a result of underground mining operations. Of this area, 12,462.34ha (48.7%) are covered by REs classified as Least Concern (LC) under the VM Act. A further 197.42ha (0.8%) is covered by vegetation that is classified as Of Concern (OC) subdominant under the VM Act. This 197.42ha is comprised of:

- 116.65ha of mixed polygon made up of RE 10.10.1 (LC)/10.10.4 (LC)/10.10.3 (OC) (at ratios of 80%/10%/10% respectively)
- 80.76ha of a mixed polygon made up of RE 10.10.5 (LC)/10.10.4 (LC)/10.10.7 (OC)/10.10.1(LC) (at ratios of 40%/30%/20%/10% respectively).

The remaining 12,938.34ha (50.5%) overlying the areas potentially subject to subsidence are comprised of pasture grass and other areas already cleared of native vegetation.

Table 3. Amounts of vegetation (ha) to be cleared or potentially affected by subsidence within the Mining Lease Application Area (VMA status)

	ENDANGERED DOMINANT	ENDANGERED SUBDOMINANT	OF CONCERN DOMINANT	OF CONCERN SUB-DOMINANT	LEAST CONCERN	NON-REMNANT	TOTAL
Open Cut	0	0	0	0	4877.49 (29.5%)	11,642.50 (70.5%)	16,519.99 (100%)
Underground (subsidence)	0	0	0	197.42 (0.8%)	12,462.34 (48.7%)	12,938.34 (50.5%)	25,598.10 (100%)

Based on the DEHP Regional Ecosystem Mapping (Version 6.1)

Table 4 gives the amount of REs contained within the open cut and underground mining footprints, and the area of these REs as a percentage of these Desert Uplands Bioregion.

Table 4. Percentage area of REs to be impacted as compared with REs in the Desert Uplands Bioregion

RE LABEL	TOTAL OPEN CUT (ha)	TOTAL SUBSIDENCE (ha)	% OF THE DESERT UPLANDS	DESERT UPLANDS BIOREGION (ha)
10.10.1	0	170.536	0.186	91,739.28
10.10.3	0	11.665	0.525	2,220.91
10.10.4	0	443.596	0.629	70,530.11
10.10.5	0	32.304	1.399	2,309.72
10.10.7	0	16.152	0.684	2,362.80
10.3.12	74.369	0	0.226	32,853.64
10.3.14	0	17.825	0.012	144,101.89
10.3.27	1,173.61	983.668	1.951	110,571.79
10.3.28	127.978	469.53	0.098	610,798.04
10.3.3	37.1845	30.641	0.214	31,742.12
10.4.3	35.791	3.23	0.216	18,028.79
10.5.1	0	999.669	0.113	882,467.38
10.5.10	0	250.137	0.633	39,515.92
10.5.12	342.949	884.824	0.867	141,547.88
10.5.4	0	6.027	0.008	79,210.53
10.5.5	3,002.56	8.014.54	1.172	940,367.59
10.7.3	67.504	189.767	0.256	100,560.18
10.7.5	8.438	108.575	0.442	26,458.19
11.5.5	7.109	0	0.308	2,309.72
Total	**4,877.49**	**12,632.69**	**0.526**	**3,329,705.48**

Conservation Areas

The BNR, listed in Schedule 5 of the Nature Conservation (Protected Areas) Regulations 1994, occupies an area of 7,912ha within EPC 1040. The BNR would be impacted by mine construction and operation through both direct vegetation clearing and subsidence. The level of impact associated with subsidence is currently unknown. The area to be cleared to facilitate the open cut mines and supporting infrastructure is 4,017ha. An additional 3,422ha will be subject to subsidence from the underground mining activities. As a result of this impact the Nature Refuge status of the property is likely to be removed.

Mitigation and Minimisation Commitments

A biodiversity enhancement program focusing on the re-establishment of Desert Upland ecological systems will be developed and implemented through the life of the mine and for five years post cessation of mining activities.

Waratah Coal has also committed to producing a subsidence management plan, which will be prepared prior to the commencement of underground mining operations. The plan will be developed in consultation with DEHP and will be risk based, flexible, responsive and capable of dealing with unexpected changes or uncertainties.

Specific mitigation, management and control strategies to achieve biodiversity enhancement are set out in Section 8 of the draft Mine EM Plan in the *Appendices – Volume 2* of this SEIS.

Waratah Coal have also developed a *Biodiversity Offset Proposal* (see *Appendices – Volume 2* of this SEIS) to detail their approach to providing offsets for unavoidable impacts of the project on biodiversity values. As part of this, Waratah Coal has committed to voluntarily offset the BNR at a ratio of 1:2. Based on an impact area of 7,912ha an offset area of approximately 15,824ha is proposed to be secured as a Nature Refuge under the NC Act. In addition, Waratah Coal is committed to extinguishing any Waratah Coal mining tenements as part of the establishment of the Nature Refuge.

Specific measures for mitigation and commitment are given in Section 8 of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.3.1.2 Rail

Description of Environmental Values

Threatened Ecological Communities and Regional Ecosystems

The proposed rail corridor is located within the Brigalow Belt North bioregion and Desert Uplands bioregion. At the broad scale, the proposed rail corridor transects cleared pasture lands, eucalypt and acacia woodlands and narrow strips of riparian vegetation.

Four threatened ecological communities listed under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) are expected to be impacted by the rail corridor.

Three endangered Regional Ecosystems (RE) and 16 of concern REs are expected to be impacted by the rail corridor, totalling an area of approximately 136ha.

Conservation Areas

The proposed rail does not impact upon any conservation areas.

Potential Impacts

Four threatened ecological communities listed under the EPBC Act are expected to be impacted by the rail corridor (Table 5).

Table 5. Rail impacts on EPBC Act listed threatened ecological communities

ECOLOGICAL COMMUNITY	EPBC ACT STATUS	CLEARING AREA (ha)
Brigalow (*Acaciaharpophylla* dominant and co-dominant)	E	30.02
Weeping Myall Woodlands	E	23.42
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E	1.94
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	E	21.36

Three endangered REs and 16 of concern REs are expected to be impacted by the rail corridor, totalling an area of approximately 136ha (Table 6).

Table 6. Rail impacts on endangered and of concern regional ecosystems

RE	DESCRIPTION	VM ACT CLASS	CLEARING AREA (ha)
11.3.1	*Acaciaharpophylla* and / or *Casuarina cristata* open forest on alluvial plains	E	9.37
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acaciaharpophylla* or *A. argyrodendron* on Cainozoic clay plains	E	23.21
11.4.9	*Acaciaharpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains	E	2.56
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	OC	18.26
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains	OC	25.18
11.3.33	*Eremophila mitchellii* open woodland on alluvial plains	OC	2.25
11.3.4	*Eucalyptus tereticornis* and / or *Eucalyptus* spp. tall woodland on alluvial plains	OC	24.08
11.4.5	*Acacia argyrodendron* woodland on Cainozoic clay plains	OC	4.81
11.4.6	*Acacia cambagei* woodland on Cainozoic clay plains	OC	0.53
11.4.11	*Dichanthium sericeum*, *Astrebla* spp. and patchy *Acaciaharpophylla*, *Eucalyptus* coolabah on Cainozoic clay plains	OC	2.29
11.5.10	*Melaleuca tamariscina* shrubland on Cainozoic sand plains / remnant surfaces	OC	2.19
11.9.10	*Acaciaharpophylla*, *Eucalyptus populnea* open forest on fine-grained sedimentary rocks	OC	7.76
11.11.13	*Acaciaharpophylla* or *A. argyrodendron*, *Terminalia oblongata* low open forest on deformed and metamorphosed sediments and interbedded volcanics	OC	5.02
11.11.16	*Eucalyptus cambageana*, *Acaciaharpophylla* woodland on old sedimentary rocks with varying degrees of metamorphism and folding	OC	1.47
11.12.10	*Corymbia clarksoniana* woodland on igneous rocks	OC	2.61
11.12.14	*Lophostemon* spp. woodland on igneous rocks	OC	1.18
11.12.15	*Allocasuarina torulosa*, *Livistona drudei* woodland on igneous rocks	OC	1.58
11.12.16	*Acacia* spp. low woodland on igneous rocks.	OC	1.58
11.12.18	Montane shrubland on igneous rocks	OC	0.39
		Total (ha)	**136.32**

Mitigation and Minimisation Commitments

In refining the final corridor, the project's impact to the natural environment was reduced by avoiding all National Parks, state forest, nature refuges and major wetlands. Footprint encroachment through protected vegetation was minimised through the inclusion of Regional Ecosystem mapping (Endangered and Of-concern) in the route selection assessment. The route was further refined to ensure perpendicular crossings of major rivers and short passages across their large floodplains wherever practical. Areas of the route that traversed challenging topography, particularly the steep slopes of the Leichhardt and Clarke Ranges, were refined to more closely conform to natural contours and provide better compliance to crossings of existing constraints.

Further to that, the vertical alignment for the proposed rail has been engineered, allowing the areas of cut and fill to be deduced and giving a project footprint that is, on average, 49.5m wide.

Specific measures and commitments to minimise and mitigate impacts on sensitive environmental areas are given in Elements 5 – 8 of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

The *Biodiversity Offset Proposal* in the *Appendices – Volume 2* of this SEIS outlines the residual impacts from the construction and operation of the project's rail component that are required to be offset under Queensland Government legislation.

2.3.2 TERRESTRIAL FLORA

2.3.2.1 Mine

Description of Environmental Values

There are no EPBC Act listed flora species that were identified as occurring within or having ranges that overlap the mine area.

One conservation significant flora species, the Large-podded Tick-trefoil (*Desmodium macrocarpum*) (listed as Near Threatened under the NC Act) has been recorded from 19 locations within the MLA area. Of the 19 locations, 18 are records from the Bimblebox Nature Refuge, and a single record exists from Monklands. Eleven of the records are located within the open cut mining footprint, seven are from within the underground mining footprint and the single record from Monklands station occurs outside of both the underground and open cut mining footprints

While not recorded, the species *Micromyrtus rotundifolia* (listed as Vulnerable under the NC Act) and *Acacia spania* (listed as Near Threatened under the NC Act) both have the potential to occur in vegetation communities of the study area.

Potential Impacts

Potential direct and indirect impacts associated with construction of the mine on the Large-podded Tick-trefoil include:

- direct loss of individuals through clearing activities. Approximately 95 individuals will be removed to facilitate the open cut mines.
- reduction in the long term viability of the local population. Although there is no known study on the long term viability of the Large-podded Tick-trefoil, population reduction and increased spatial isolation of plant populations generally result in decreasing genetic variation
- direct loss of potential habitat
- Potential to impact 39 specimens by subsidence from the underground mines
- potential to affect health and viability of plants outside the mine clearance and potential subsidence footprints through:
    - increased edge effects and associated potential to increasing the abundance of Buffel Grass and fire intensity
    - potential for dust to reduce the health of plants and associated vegetation retained outside the construction footprint
    - potential for temporary facilities, materials and equipment to damage plants and associated vegetation outside the construction footprint.

Mitigation and Minimisation Commitments

The *Biodiversity Offset Proposal* contained in the *Appendices – Volume 2* of the SEIS makes provision for areas of offsets containing suitable habitat for the Large-podded Tick-trefoil. A Species Management Plan (SMP) will be developed for Large-podded Tick-trefoil prior to construction works. It is intended that suitable translocation sites be identified within offset areas if possible and regeneration areas will be identified, and that propagated and / or removed individuals are planted at several sites.

Waratah Coal commits to:

- Developing Species Management Plans (SMPs) will be developed for species as agreed to in consultation with DEHP
- rehabilitation and subsidence management plans will be developed in consultation with DEHP and will include specific measures in relation to improving habitat linkage in both riparian and terrestrial systems
- a Weed Management Plan (WMP) will be developed as part of the Biodiversity Management Plan (BMP) prior to the commencement of activities at the site. The WMP will describe the management strategies for weed species listed under the LP Act or Local Government requirements for weeds not listed under the LP Act
- trees, shrubs and other vegetation will only be removed where required (and appropriate approvals sought where necessary). Vegetation outside mining and infrastructure areas will where ever possible remain undisturbed
- where possible, infrastructure will be placed in areas to minimise the disturbance of existing native vegetation. Existing tracks and cleared areas will be utilised, where possible
- cleared areas will be progressively rehabilitated in accordance with the Project rehabilitation strategies, including the incorporation of revegetation works in the ESCP
- cleared vegetation will be managed in a manner consistent with the waste hierarchy, and
- species used in rehabilitation will where possible be taken from the species listed to be agreed with DEHP.

Specific measures to ameliorate impacts on flora at the mine site are detailed in Section 8 of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.3.2.2 Rail

Description of Environmental Values

The review of Queensland Herbarium HERBRECS, Wildnet and EPBC Act Protected Matters databases identified 34 Threatened or Near Threatened plant species that are known to occur or have ranges that overlap with the proposed rail corridor. These include:

- Thirty one species listed under the *Nature Conservation Act 1992* (NC Act), comprising three Endangered, ten Vulnerable and eighteen Near Threatened species, and
- nine species listed under the EPBC Act including one Endangered and eight Vulnerable.

However, only black ironbox (*Eucalyptus raveretiana*) was observed and recorded during the field survey. Black ironbox was observed at seven locations during the assessment. In all instances the plants were observed within the beds or banks of watercourses. Several age classes are represented at these locations and specimens generally range from 0.5 – 8m in height in the channel and up to 25m along the banks.

A total of 200 Least Concern native flora species were recorded during the surveys. Additionally 16 non native flora species were identified. Of these, eight are declared weeds under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act).

Potential Impacts

Potential direct and indirect impacts associated with construction and operation of the rail corridor on listed flora species include:

- direct loss of individuals through clearing activities
- reduction in the long term viability of the local populations by removing individual plants, population reduction and increased spatial isolation of plant populations
- direct loss of potential habitat, and

- potential effects on health and viability of plants outside the clearance footprint through:
  - increased edge effects and associated potential to increasing the abundance of weed species and fire intensity
  - potential for dust to reduce the health of plants and associated vegetation retained outside the construction footprint, and
  - potential for temporary facilities, materials and equipment to damage plants and associated vegetation outside the construction footprint.

Detailed survey is required to confirm the presence or absence and potential presence of each of the threatened flora species along the proposed rail corridor prior to alignment finalisation. It is anticipated that Threatened and Near Threatened flora species recorded during detailed corridor survey will generally be able to be avoided by alignment refinement. There may however, be some individuals and populations which are unavoidable. Generally this would relate to species with restricted habitat niches from which the rail corridor may not be able to deviate. For example, the Vulnerable Black Ironbox occurs as a dominant and co-dominant canopy species along a number of watercourses between KP 0 – KP 95. These watercourses will need to be crossed by the rail corridor and it is likely that some individual trees and seedlings will need to be displaced to facilitate construction.

Mitigation and Minimisation Commitments

A number of mitigation measures are proposed and outlined, including (but not limited to):

- detailed flora surveys will be conducted of all remnant vegetation areas within the corridor prior to finalisation of the alignment
- minimise the clearance of remnant vegetation to that necessary for construction
- clearing along the proposed rail corridor should be limited to the amount necessary to undertake earthworks and will aim to minimise the construction corridor width where possible, and
- a detailed Rehabilitation Plan will be developed that includes a detailed rehabilitation monitoring and evaluation plan including monitoring schedule (e.g. quarterly monitoring of areas under rehabilitation). Suitable completion criteria and indicators to measure the progress of rehabilitation may include 70% of cover of native and introduced species within each stratum as occurring on adjoining reference sites of the same land type. At least two reference sites within the same sub-catchment should be established within each RE being rehabilitated to provide benchmarking of rehabilitation progress and completion

A Species Management Plan will be developed for Black Ironbox and any other significant flora species which may potentially be impacted by the proposed rail. These plans will include:

- proposed management measures including those identified for construction and operation of the rail infrastructure
- a monitoring and evaluation program for the community / species, and
- offset commitments relating to the community / species.

Where impacts are unavoidable to significant flora values these will be compensated for through delivery of offsets (refer to *Biodiversity Offset Proposal* in *Appendices – Volume 2* of this SEIS).

To manage potential impacts on flora associated with the construction and operation of the rail, Waratah Coal commits to:

- finalising a Biodiversity Offset Strategy in consultation with DEHP and Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)
- develop a Fire Management Plan in accordance with the relevant local planning policies, the relevant State planning policy and in consultation with the Rural Fire Service
- develop and a Weed and Pest Management Plan in consultation with Biosecurity Queensland and the various regional councils

- conduct a detailed flora survey of all remnant vegetation areas within the corridor prior to finalising the alignment with the purpose of identifying the presence of significant flora species as listed under Commonwealth and State legislation. Where significant species are identified, all practicable measures will be implemented to avoid or limit impacts
- develop a Species Management Plan in accordance with Commonwealth and State requirements for vegetation offsets, DEHP's Back on Track Species Prioritisation Framework and other relevant management and / recovery plans to reduce the impacts on significant flora species
- develop a Significant Community / Species Management Plans in accordance with Commonwealth and State legislation for those values or species where unavoidable impacts will have a significant impact on their habitat, and
- develop and implement a ESCP in accordance with the relevant local planning policies and the relevant State planning policy.

Specific measures to ameliorate impacts on flora at the mine site are detailed in *Element 5* of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.3.3 TERRESTRIAL FAUNA

2.3.3.1 Mine

Description of Environmental Values

A total species richness of 297 native fauna species have been identified in surveys of the study site. This total is comprised of 40 mammals, 57 reptiles, 15 frogs, and 185 bird species. Seven introduced fauna species, were also identified as being present, these being the House Mouse (*Mus musculus*), Dog (*Canis familiaris*), Feral Cat (*Felis catus*), Rabbit (*Oryctolagus cuniculus*), Pig (*Sus scrofa*), Cattle (*Bos taurus*) and Cane Toad (*Rhinella marina*) were recorded during the EIS and SEIS surveys.

Of these, a total of 10 fauna species are listed as threatened or conservation significant under the EPBC Act and/or NC Act, as follows:

- Koala (*Phascolarctos cinereus*) – Vulnerable EPBC Act and Special Least Concern NC Act
- Little Pied Bat (*Chalinolobus picatus*) – Near Threatened NC Act
- Brigalow Scaly-foot (*Paradelma orientalis*) – Vulnerable EPBC Act and NC Act
- Cotton Pygmy Goose (*Nettapus coromandelianus*) – Near Threatened NC Act
- Freckled Duck (*Stictonetta naevosa*) – Near Threatened NC Act
- Black-necked Stork (*Ephippiorhynchus asiaticus*) – Near Threatened NC Act
- Square-tailed Kite (*Lophocitinia isura*) – Near Threatened NC Act
- Squatter Pigeon (southern) (*Geophaps scripta scripta*) – Vulnerable EPBC Act and NC Act
- Black-chinned Honeyeater (*Melithreptus gularis*) – Near Threatened NC Act
- Black-throated Finch (southern) (*Poephila cincta cincta*) – Endangered EPBC Act and Vulnerable NC Act.

Migratory species visit the study area periodically. However, the mine footprint and adjoining areas do not include significant or uncommon habitat values and the site is not considered to constitute a critical resource to any migratory species.

Potential Impacts

A suite of potential direct and indirect impacts that have potential to impact on environmental values have been identified within the project development footprint (see Figure 12), and include:

- direct loss of habitat and resources as a result of vegetation clearing
- habitat fragmentation as a result of vegetation clearing which results in direct loss of fauna movement opportunities, though also indirect degradation of retained habitats
- habitat degradation associated with land subsidence following underground mining
- direct mortality impacts to terrestrial fauna
- alteration of fauna behaviour and habitat use resulting from disturbances associated with construction and operational activities (e.g. impacts associated with light, dust, noise and vibration)
- introduction of exotic weed and pest species to retained habitats
- alteration to fire regimes to retained habitats.

Habitat Loss

The construction phase will necessitate vegetation clearing and land disturbance for the establishment of infrastructure including roads, construction camps, workshops, creek diversions, sediment basins, etc. Vegetation clearing and land disturbance will also occur progressively during the operational phase, including the development of open cut pits, spoil dumps etc. The proposed clearing footprint for both the construction and operational phases requires a total area of land disturbance of 16,520ha (see Figure 12). This clearing footprint includes approximately 4,877ha of remnant vegetation.

The majority of the proposed clearing footprint (approximately 70%) comprises previously cleared lands of comparatively low habitat values for native fauna. Within this landscape, several Near Threatened fauna species have been recorded (i.e. Cotton Pygmy Goose and Black-necked Stork). These records are linked to the presence of water bodies, all of which are constructed dams. There are no intrinsically special or notable habitat features associated with these water bodies, though they contribute to a network of water bodies which support these species within the wider area encompassing the study site.

The findings of the field surveys and habitat assessments indicate that the key habitat areas on the study site are associated with remnant vegetation on the Bimblebox Nature Refuge, western parts of Lambton Meadows, a large habitat patch on Saltbush, and habitats within the Spring Creek area in the north-western corner of the study site. Whilst riparian habitats along Lagoon Creek are degraded, these are likely to be locally important in regard to fauna movement opportunities into and out of the study site.

The proposed clearing footprint will significantly impact on two of these areas, i.e. Bimblebox Nature Refuge and riparian habitats of Lagoon Creek. Data reviews identify that approximately 85% of the total species richness recorded on the study site has been recorded on the Bimblebox Nature Refuge. Combined with the results of the previous surveys, species richness would be expected to reach approximately 95% of total species records for the study site. Within the context of bioregional data, these findings are indicative of “high” fauna species richness.

Whist riparian habitats of Lagoon Creek are degraded; there are habitat values for a variety of fauna. In regard to threatened fauna species, there is a record of the Near Threatened Little Pied Bat within the northern extent of these riparian habitats. It is possible, that these riparian habitats also support values for other threatened fauna, including Koala, Black-chinned Honeyeater, and Square-tailed Kite.

Habitat Fragmentation and Loss of Connectivity

Whilst the clearing footprint will result in a reduction of habitat (i.e. habitat loss), it does not create any isolated habitat "islands" as such, though it does impact on habitat connectivity (e.g. riparian corridors or linear strips of vegetation that connect two or more habitat or vegetation patches). A loss or reduction in habitat connectivity can include both direct and indirect effects including:

- direct habitat loss
- mortality of wildlife during construction and operation due to collisions with vehicles
- fragmentation and degradation of the remaining habitat
- disruption of movements, dispersal and behaviour due to the creation of both physical (lack of habitat) and behavioural (not wanting to cross open areas)
- alteration of breeding behaviour through decreased dispersal to attract mates
- decreased genetic and biological viability of fragmented populations
- edge effects to the remaining habitat including altered microclimatic conditions, changes to microhabitat structure, incursion of weeds and feral animals and increases in pollution.

The general interface between habitats of the Bimblebox Nature Refuge and riparian habitats of Lagoon Creek is likely to be of local ecological significance in terms of a habitat linkage between remnant woodland to the west (through Bimblebox Nature Refuge, Lambton Meadows and beyond) and those riparian habitats extending north along Lagoon Creek to the habitat mosaic to the north-east of the Project area and south along Tallarenha Creek to the habitat that straddles Eureka Road. Whist riparian habitats of Lagoon Creek are generally degraded, they support a level of habitat connectivity, and opportunities for wildlife movement into, though, and beyond the study site. The clearing footprint will remove a significant section of the interface and the section of riparian habitat extending north wards along Lagoon Creek.

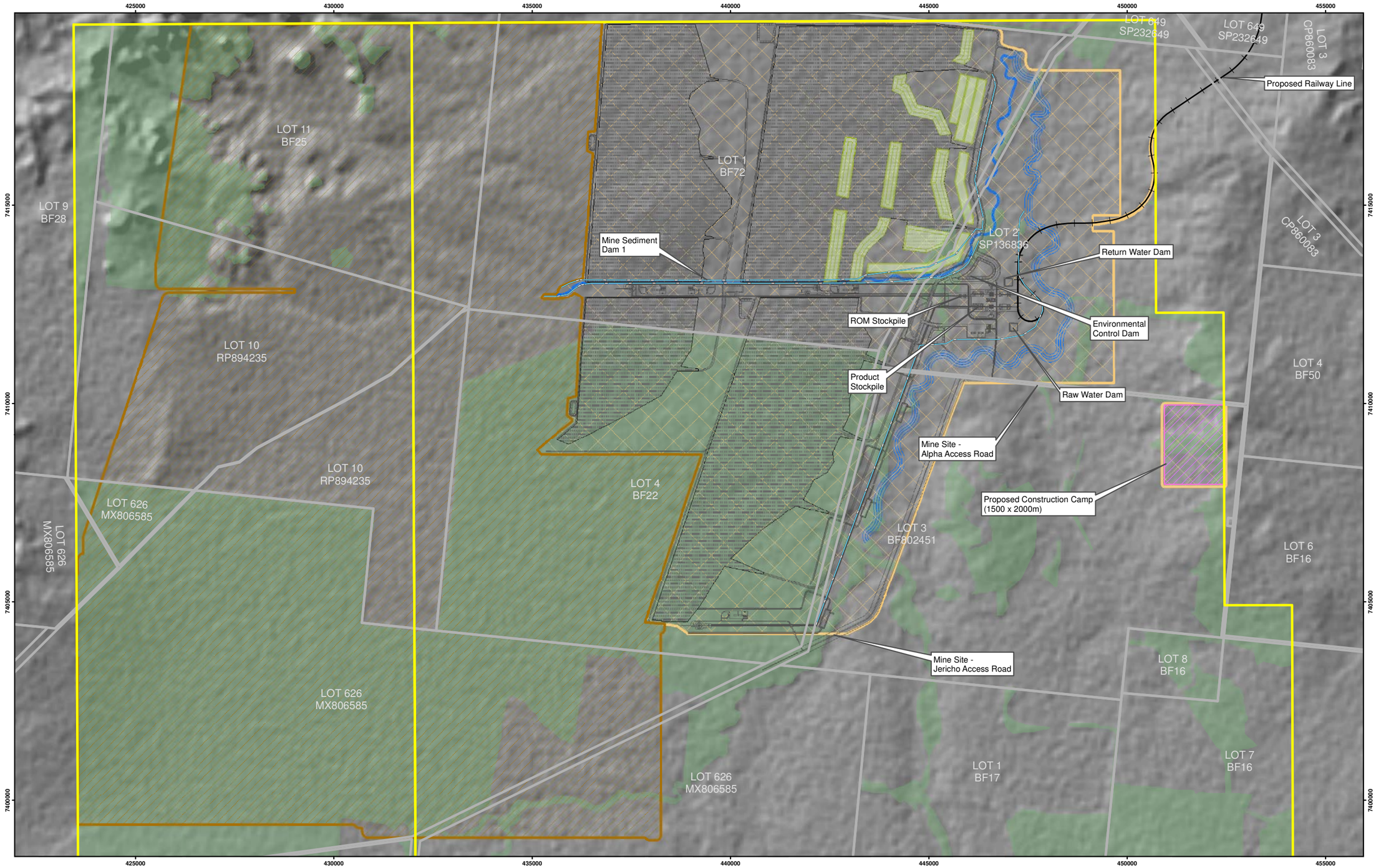
Habitat Degradation

Potential impacts which may result in degradation of retained habitat arising from construction and operational phase include the following:

- alteration of local surface and groundwater hydrology which may be linked to large-scale landform modification associated with open-cut mining operations and supporting infrastructure (e.g. creation of creek diversions, and large sediment and tailings dams), and land subsidence following underground mining, etc.
- creation of 'new"habitat edges will render retained habitats vulnerable to weed invasion, increases in dust exposure, light spill and wind-throw, etc.
- habitat degradation associated with land subsidence
- invasion of exotic weed species
- introduction of pest animal species
- alteration to fire regimes.

The location and extent of both the project disturbance (clearing) footprint and the predicted subsidence footprint associated with underground mining operations are shown at Figure 12 Beyond the direct impacts of habitat clearing, there is a suite of threats which may impact on the values of habitat to be retained on the MLA area. The key sources of degradation are the open cut and underground mining operations, and whilst there is overlap between the suites of potential impacts generated by each of the two mining strategies, there are likely to be some distinct differences in terms of intensity (scale), extent and duration, and the extent to which such impacts can be managed.

Figure 12. Mine disturbance footprint



GALILEE COAL PROJECT (Northern Export Facility)

Waratah Coal
THE NEW ENERGY IN COAL

Mineralogy House, Level 7, 380 Queen Street, Brisbane Qld 4000, Australia

Source:	Cadastral Boundaries: DERM 2012 Roads & Waterways: Geoscience Australia 2010 Mine Detail: Waratah Coal Pty. Ltd. 2012 Remnant Vegetation: Vegetation Management Act Regional Ecosystems Vers 6.1 2012
Disclaimer:	This plan is based on or contains data provided by others. Waratah Coal Pty. Ltd. gives no warranty in relation to the data (including accuracy, reliability, completness, currency or suiability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to and use of the data. Data must not be used for direct marketing or be used in breach of privacy laws.
File:	File: WAR20-26-SEIS0025b-FIG7-1a-MINE-DISTURBANCE-FOOTPRINT-121114 Date: 14/11/2012

0 1,000 2,000 3,000 4,000 5,000
Metres

A3 Scale 1:85,000

Coordinate System: GDA 1994 MGA Zone 55 Projection: Transverse Mercator

- EPC1040 & Part of EPC1079
- Open Cut Mining Area
- Mine Infrastructure
- Creek Diversions
- Dry Paste Tailings Storage
- Flood Levee
- Probable Clearing Footprint
- Mine Subsidence Footprint
- Remnant Vegetation

MINE DISTURBANCE FOOTPRINT

For example, the creation of new habitat edges as a result of vegetation clearing is primarily associated with progressive open-cut mining operations and not underground mining operations. Creation of 'new"habitat edges will render retained habitats susceptible to weed invasion, increases in dust exposure and tree wind-throw, etc. Whilst acknowledging there are other potential impacts associated with open cut operations, with the application of best practice management strategies, impacts associated with dust and weeds (and other operational impacts such light, noise, erosion and sediment control) can be successfully managed to minimise long-term degrading impacts to retained habitats.

In contrast, potential impacts to retained habitats associated with land subsidence are primarily associated with progressive underground mining operations and not open-cut mining operations. Subsidence due to underground (longwall) mining can cause deformation of ground surfaces. This can affect natural water flow regimes and water quality, alter groundwater hydrology and subsequently generate changes to the condition and extent of a species' habitat and to the ecological function of both flora and fauna communities. The resultant impacts can be temporary or long term.

Surfaces directly above extracted underground openings usually subside in the form of a trough, the area of which extends beyond the limits of the underground opening. The amount of subsidence and associated parameters, and the shape of the subsidence trough, are influenced greatly by the size of the panel, the dip of the seam, changes in seam thickness, topography, the existence of remnant pillars or partial extraction, extraction of more than one seam, changes in geology and the interaction due to adjacent extraction (including above and below).

Predictive modeling has been undertaken for this aspect of the project. The analysis demonstrates that surface subsidence will develop progressively within each longwall block and will present on the landform surface as a series of trough like depressions. The maximum subsidence (i.e. in the centre of the longwall panels) will range from 1.6m in standalone mines to 3.2m in areas of cumulative subsidence resulting from the operations in both the B-seam and D-seam subsidence (where underground mine 4 lies above underground mine 1). See Figure 10.

Longitudinal tension cracks of 2.5mm to 20mm are predicted to occur at the edge of the longwall mining panel, parallel to the chain pillar areas, where the depth of cover between the surface and the underground mines is less than 180m. See Figure 11.

The primary impact to fauna habitat values will be linked to the extent and degree of degradation of the woodland tree canopy. As no underground coal mines currently exist in the Galilee Basin, there is no precedence to use as a guide to the expected impacts on ecological values from subsidence. There are relatively few published studies of the impacts of subsidence on native vegetation, and those that are available, have typically described local and specific issues (Frazier et al., 2010[8]), mostly from the NSW coalfield areas. The potential consequences of subsidence on vegetation are likely to be indirect and heterogeneous (Frazier et al., 2010). Possible changes to near-surface regolith and soil that could affect vegetation include:

- Soil fractures causing changes to the hydrological properties of soils, which could promote local dessication
- Soil fractures could act as macropores that increase hydraulic connectivity
- High flow in fractures could lead to increased erosion
- The availability of groundwater for vegetation may be markedly changed in areas where shallow groundwater systems are within two metres of the surface.

In addition root-ball disturbance could arise from the soil rupture and shaking associated with subsidence.

As mentioned above, fracturing will only occur longitudinally parallel to the chain pillar areas where depth of cover between the surface and the mine is less than 180m. Furthermore, given the alluvial nature of the surface material in the MLA area, the cracking is not expected to exceed 20mm.

8 Frazier P, Jenkins R, Trotter T. 2010. *Monitoring the Effect of Longwall Mine Subsidence on Native Vegetation and Agricultural Environments.* (ACARP C15013). Report prepared for ACARP January 10 by Ecological Australia.

Remedial works for longitudinal surface fractures from subsidence may include ripping, recompacting, seeding of the cracks and reshaping.

Depressions in the surface from subsidence can lead to ponding if unmanaged. Ponding to a depth deeper greater than 1.25m and areas that remain inundated for long periods of time can result in short-term loss of individual trees or longer-term reduction in foliar condition. Vegetation associated with the Bimblebox Nature Refuge, Lambton Meadows and local creek systems would be at greatest risk to the effects of ponding. However the longwall mining panels are aligned longitudinally with the natural fall of the land within the MLA, which drains freely to the east and is sufficient to minimise subsidence troughs. In flatter area, reshaping of any internally draining areas will be done by the construction of contour drains and appropriate rehabilitation measures.

Waratah Coal will develop a subsidence management plan to mitigate and manage the effects of subsidence on hydrology and native vegetation as much as possible. For residual impacts, Waratah Coal will provide offsets in accordance with the State and Commonwealth offsets policies.

Mitigation and Minimisation Commitments

A Fauna Management Plan (FMP) will be developed which details species specific SMPs, the practical strategies and actions which will be implemented and can be monitored, to address the issues and protocols for both common and threatened fauna.

The FMP will give specific regard to the protection and management of habitat values for those threatened fauna species recorded on the study site. The plan will include, but not be limited to, the following information:

- management strategies for the protection of those habitat resources and maintenance of resources and conditions to support the longer-term site usage of each species
- identification of potential conflicts between the objectives of the threatened species management plan and those of other plan strategies (e.g. bushfire management, extraction site rehabilitation; offset management) and the strategies to eliminate or mitigate potential impacts to threatened species arising from such conflicts.

A further and important objective of the FMP is to identify the monitoring program to assess fauna occurrence within retained habitats. Importantly the monitoring events would be undertaken in a systematic and standardised manner to ensure replicability, and include a component which is consistent with the site-based survey approach implemented for the Project survey program.

Section 8 of the *Draft Mine EM Plan* in the *Appendices – Volume 2* of this SEIS gives further information on the management strategies and measures which will be implemented in relation to mitigation of the potential impacts to fauna species in the study area.

The *Biodiversity Offset Proposal* contained in the *Appendices – Volume 2* of the SEIS makes provision for areas of offsets containing suitable habitat for the 10 threatened and conservation significant species listed above.

Waratah Coal commits to:

- a Fauna Management Plan (FMP) will be prepared for the site
- cleared areas will be progressively rehabilitated in accordance with the Project rehabilitation strategies, including the incorporation of revegetation works in the ESCP
- a DEHP accredited spotted / catcher will be on-site immediately prior to vegetation clearance to inspect habitat trees (i.e. trees with hollows, fissures or with substantial food resource, mature trees or stag trees) to determine the presence of significant fauna and to implement a relocation plan for any fauna found
- native vegetation removal will be conducted only after clearance surveys have been conducted

- Project persons operating vehicles in and adjacent to the Project site will be made aware of the presence of this threatened species and the potential for it to be encountered on vehicle tracks.
- a Pest Management Plan will be developed as part of the BMP prior to the commencement of activities at the site. The BMP will describe the management strategies for pest species listed under the LP Act, quarantine requirements or Local Government requirements for pest species not listed under the LP Act
- SMPs will be developed for species as agreed to in consultation with DEHP.

A key component of managing impacts to ecological values and providing connectivity between the newly disturbed areas and existing woodland habitat or riparian linkages will be the development of subsidence management plans. DEHP (DERM at the time of writing) has created draft *Watercourse Subsidence Guidelines for the Central Queensland Mining Industry* (Version 7) which details the information to be provided in a Subsidence Management Plan. The Subsidence Management Plan (SMP) will follow these guidelines. There are currently no guidelines for Subsidence Management Plans for vegetation communities not associated with watercourses. To minimise impacts from subsidence on this type of native vegetation and associated fauna habitat, the SMP will include for Adaptive management measures for vegetation communities (i.e. will allow for mitigation measures to be adapted as new information comes to light) to be developed as part of a wider rehabilitation management framework.

The plans will include detailed measures to mitigate potential direct and indirect subsidence impacts to the vegetation and the fauna communities that lie above the longwall panels but also those communities downstream of the works that may be impacted through altered flow regimes or drawdown. Maintaining the woodland communities within the subsided areas will be imperative for linkages between these habitats and lagoon Creek, Beta Creek, Tallarenha Creek and the Saltbush woodland.

The overall aim of the Subsidence Management Plans (SMPs) will be to:

- incorporate landholder, community and government concerns during mine planning and approvals process as well as ongoing SMP stakeholder consultation
- implement risk management plans for sensitive or important social and environmental features
- implement enhanced monitoring, reporting and review program
- incorporation of monitoring, mitigation, rehabilitation of subsidence effects in mine planning, as well as operational and post mine closure situations with particular emphasis on ongoing sequential rehabilitation.

The SMP will include detailed measures to mitigate potential direct and indirect subsidence impacts to the vegetation and the fauna communities that lie above the longwall panels and also those communities downstream of the works that may be impacted through altered flow regimes or drawdown. Maintaining the woodland communities within the subsided areas will be imperative for linkages between these habitats and Lagoon Creek, Beta Creek, Tallarenha Creek and the Saltbush woodland.

2.3.3.2 Rail

Description of Environmental Values

Habitat for 21 EPBC Act and/or NC Act listed threatened fauna species is expected to be impacted by the rail corridor.

Potential Impacts

Habitat for 10 EPBC Act listed threatened fauna species is expected to be impacted by the rail corridor (Table 7). Impacts on threatened fauna habitat are not cumulative as some species occur within the same area.

Table 7. Rail impacts on EPBC Act listed threatened fauna species

COMMON NAME	SCIENTIFIC NAME	EPBC ACT STATUS	CLEARING AREA (HA)
Ornamental Snake	*Denisonia maculate*	V	185.29
Black-throated Finch	*Poephila cincta cincta*	E	89.55
Brigalow Scaly-foot	*Paradelma orientalis*	V	593.65
Northern Quoll	*Dasyurushallucatus*	E	291.41
Striped-tailed Delma	*Delma labialis*	V	402.13
Yakka Skink	*Egernia rugosa*	V	1,122.32
Dunmall's Snake	*Furina dunmalli*	V	105.28
Red Goshawk	*Erythrotriorchis radiatus*	V	486.49
Australian Painted Snipe	*Rostratula australis*	V	7.86
Koala	*Phascolarctos cinereus*	V	854.23

Habitat for 20 *Nature Conservation Act 1992* (NC Act) listed threatened fauna species is expected to be impacted by the rail corridor (Table 8). Impacts on threatened fauna habitat are not cumulative as some species occur within the same area.

Table 8. Rail impacts on NC Act threatened fauna species

COMMON NAME	SCIENTIFIC NAME	NC ACT STATUS	CLEARING AREA BRIGALOW BELT BIOREGION (HA)	CLEARING AREA DESERT UPLANDS BIOREGION (HA)
Ornamental Snake	*Denisonia maculata*	V	185.29	-
Black-throated Finch	*Poephila cincta cincta*	E	89.55	13.66
Brigalow Scaly-foot	*Paradelma orientalis*	V	593.65	15.68
Spotted-tailed Quoll	*Dasyurus maculatus maculatus*	E	291.41	-
Striped-tailed Delma	*Delma labialis*	V	402.13	-
Yakka Skink	*Egernia rugosa*	V	1,122.32	15.68
Dunmall's Snake	*Furina dunmalli*	V	105.28	-
Red Goshawk	*Erythrotriorchis radiatus*	V	486.49	17.52
Australian Painted Snipe	*Rostratula australis*	V	7.86	-
Koala	*Phascolarctos cinereus*	SLC	854.23	-
Little Pied Bat	*Chalinolobus picatus*	NT	854.23	-
Common Death Adder	*Acanthophis antarcticus*	NT	99.59	-
Rough Frog	*Cyclorana verrucosa*	NT	47.85	-
Cotton Pygmy Goose	*Nettapus coromandelianus*	NT	7.86	-
Freckled Duck	*Stictonetta naevosa*	NT	7.86	-
Black-necked Stork	*Ephippiorhynchus asiaticus*	NT	7.86	-
Grey Goshawk	*Accipiter novaehollandiae*	NT	489.69	-
Square-tailed Kite	*Lophoictinia isura*	NT	407.91	-
Glossy-black Cockatoo	*Calyptorhynchus lathami*	V	76.87	-
Black-chinned Honeyeater	*Melithreptus gularis*	NT	407.91	-

Potential direct and indirect impacts on fauna are likely to include the following:

- loss of habitat such as mature vegetation, hollow-bearing trees and fallen logs, and therefore loss of nesting, refuge and foraging resources
- mortality
- habitat fragmentation and loss of connectivity (disturbance to fauna movement corridors)
- barrier effects
- edge effects.

Mitigation and Minimisation Commitments

To manage potential impacts on terrestrial fauna associated with the construction and operation of the rail, Waratah Coal commits to:

- finalising a Biodiversity Offset Strategy in consultation with DEHP and DSEWPaC
- develop a Fire Management Plan in accordance with the relevant local planning policies, the relevant State planning policy and in consultation with the Rural Fire Service
- develop and a Weed and Pest Management Plan in consultation with Biosecurity Queensland and the various regional council's
- conduct a detailed fauna survey of all remnant vegetation areas within the corridor prior to finalising the alignment with the purpose of identifying the presence of significant fauna species as listed under Commonwealth and State legislation. Where significant species are identified, all practicable measures will be implemented to avoid or limit impacts
- develop a Species Management Plan in accordance with Commonwealth and State requirements for vegetation offsets, DEHP's Back on Track Species Prioritisation Framework and other relevant management and / recovery plans to reduce the impacts on significant fauna species. Where habitat for significant fauna species is identified, all practicable measures will be implemented to limit the impact
- develop a Significant Community / Species Management Plans in accordance with Commonwealth and State legislation for those values or species where unavoidable impacts will have a significant impact on their habitat
- develop and implement a Soil and Erosion Management Plan in accordance with the relevant local planning policies and the relevant State planning policy.

Details on the specific mitigation measures are proposed and outlined in *Element 6* the *Draft Rail EMP* (contained in the *Appendices – Volume 2* of this SEIS).

2.3.4 FRESHWATER AQUATIC FLORA AND FAUNA

2.3.4.1 Mine

Description of Environmental Values

The waterways in and around the study site have been subject to a range of modifications and pressures including the damming of creeks for stock irrigation, riparian vegetation clearing for agricultural purposes and the trampling of bed and banks through cattle access to creeks. Causeways are present on a number of waterways, though in most cases, these represent a localised disturbance that only affects bed and bank stability and adjacent turbidity levels.

There is a relatively large causeway on Lagoon Creek that has created potential refugial habitat for aquatic flora and fauna in this system during dry spells. There are also a number of farm dams in the area and the aquatic ecological surveys revealed that these appear to host the most diverse and unique macrophyte assemblages.

Macrophyte diversity and cover was generally low in the waterways sampled. Emergent forms, particularly those belonging to family *Cyperaceae*, dominated the taxa list. These findings conform to expectations with regards to the extreme hydrological variation within ephemeral streams generally not being conducive to the growth of submerged and floating macrophytes.

The fish fauna of the study area is of limited diversity and is composed exclusively of potadromous species, which is expected based on the inland location of the study area and the ephemeral nature of the waterways sampled. None of the species sampled were of conservation or fisheries significance and, based on advice from local landholders and the fact that the waterways are remote and are not publicly accessible, fishing activity in and around the study areas is limited. The fish species recorded were similar to those recorded in other studies carried out in the vicinity of the study area.

The macro-crustacean community of the study area is also of limited diversity compared to the diversity known to occur in the Burdekin Catchment as a whole, but is also consistent with the findings of previous studies.

The macroinvertebrate fauna matched that recorded in most other studies carried out in the same vicinity in terms of diversity and, largely, in terms of the dominant taxa present. Diversity was highest in Lagoon Creek and lowest in dam and lagoon habitat. Stream sites characterised by turbid water and/or subject to the effects of cattle access and riparian vegetation clearing had a lower than expected macroinvertebrate diversity. Most sites hosted mainly pollution-tolerant macroinvertebrate taxa. This was in line with results from other studies carried out in the same vicinity and is not surprising given that resident macroinvertebrate fauna are likely to be adapted to cope with the variety of water quality conditions that go with changes that occur naturally under the ephemeral waterway hydrological cycle.

Potential Impacts

There is potential for the following activities to impact upon the habitat of aquatic flora and fauna.

Clearing and Stockpiles

The clearing of vegetation and construction of mine infrastructure (open cut areas, dams and supporting infrastructure) has the potential to increase sediment deposition in streams offsite. Overburden dumps have the highest potential to impact surrounding streams in the event of large storm events prior to full rehabilitation. Potential impacts include:

- siltation of watercourses and aquatic habitat
- irregular and unstable land forms due to gully, channel and bank erosion
- adverse ecological effects from de-silting streams
- reduced ecology and aesthetic value of streams and riparian vegetation
- increased turbidity in the streams
- clogged drainage infrastructure and increased localised flooding, silting and bank damage to trench works and drainage structures
- increased downtime during construction after storm events while these areas are rehabilitated.

Chemical and Water Storage

Inappropriately stored and handled chemicals and other hazardous substances have the potential to impact surface waters in and around the mine site during construction and operations. Chemical spills or low-level exposure of the aquatic environment to chemicals (e.g. run-off from machinery, including potential vehicle accidents), would most likely involve hydrocarbon products such as fuels and lubricants. Fuels and chemicals will be stored, transported,handled and used in accordance with relevant legislation, regulations, standards and guidelines. As such, the risk of spillage would be low.

Impacts to aquatic environments during mining operations could also result from seepage or discharge of water containing salts, metals and other potential pollutants from dams and sediment basins located on site. Discharge could occur through failure of dam walls or overflow of dam spillways into surrounding drainage areas which then make their way into adjacent streams or seepage through the walls and base of the dams into unconfined aquifers which transport the contaminants to surface waters.

Subsidence

The potential maximum impacts of longwall mining subsidence on surface drainage, flooding and waterway stream flow characteristics are likely to include:

- Channelization of overland flows along longwall panels
- Creation of in-stream waterholes within subsidence troughs where waterways and drainage gullies cross longwall panels
- Channelization of Pebbly Creek along longwall panels resulting in diversion of the creek away from its' existing alignment
- Significant reduction in stream flows in Spring Creek and Lagoon Creek due to interception of overland flows and stream flows in subsidence ponding areas
- Sediment deposition within subsidence ponding areas resulting in decreased sediment inflows to downstream waterways, and
- A range of potential other impacts to waterway stability, geomorphology and riparian vegetation.

Diversions

The diversion of Malcolm, Lagoon and Saltbush Creeks has the potential to impact the flow regime and geormorphic characteristics of the watercourses including:

Increased flow rates due to constriction of the floodplain through the diverted reaches.

Increased flow velocities in the diverted reaches leading to increased erosion and sediment load to downstream waterways.

Increases in upstream flood levels caused by constriction of the floodplain through the diverted reaches. Existing and planned infrastructure such as roads and rail will need to undergo design reviews to ensure they will not be affected by flooding.

Increase in downstream flood levels and velocities due to increased flow rates caused by the constriction of the floodplain through the diverted reaches.

Flooding Effects

It is likely that floodplain encroachment, diversion of flows or impacts associated with drainage structures (i.e. culverts, bridges, etc.) may impact on the waterway system as a result of changed flood behaviour. It is therefore crucial that the existing flow conveyance is managed and this can be achieved by incorporating appropriate creek diversion and waterway management practices into the design for the development of the mine site. This may include implementing sediment and erosion control measures and appropriately designed hydraulic structures (culverts, bridges, etc.).

It is intended that Lagoon, Malcolm and Saltbush Creeks will be diverted to reduce impacts to the mine site and overall environment. The creek diversions will include an appropriately engineered design to ensure that a positive outcome is achieved for the environment.

Impacts to the waterways may include (but are not limited to) scour and sedimentation as a result of increased velocities. It is therefore essential that appropriate scour protection measures are incorporated into the design where scour is likely to occur. Possible changes to flood levels may also occur as a result of waterway encroachment, diversion of flows or impacts associated with drainage structure design (e.g. culverts, piers, abutments etc.). Waterway crossings are likely to be required for mine access roads as well as the rail connection. It is essential that mine infrastructure is located with due consideration for flooding.

Ground subsidence caused by the underground longwall mines has the potential to affect the stability and flow characteristics of the waterways flowing through the underground mining area. Subsidence management strategies have been identified to ensure that these impacts will be monitored and managed progressively during the life of the underground mine.

Development of hydrologic and hydraulic models has already been undertaken to demonstrate that the proposed mine will not adversely affect the hydraulic characteristics of the waterways flowing through the mine lease area.

Mitigation and Minimisation Commitments

Clearing, stockpiles and subsidence

Soil erosion monitoring will be undertaken on both grazing and agricultural catchments and "before-subsidence" catchments to quantify the level of soil erosion which may take place during the subsidence process. This will be used to inform the Erosion and Sediment Control Plan.

The Subsidence Management Plan will detail the types of remedial works, which may include ripping, re-compacting and seeding of all tension cracks and reshaping any internally draining areas to be externally draining by the construction of contour drains and topsoiling and seeding any disturbed areas. These works will extend to blanketing and compacting of some water courses post-subsidence, preventing inflow of runoff into underground mining areas and maintain environmental surface flows. Materials which have been investigated for use in compacted blankets include silty alluvium and clay.

Some re-alignment of water courses and minor earthworks will be necessary, but the work done so far allows these activities to be well planned prior to subsidence in any particular area. The natural fall of the mining area drains freely to the north and is sufficient to minimise subsidence troughs. In the flatter areas, reshaping of any internally draining areas to externally draining areas will be done by the construction of contour drains and appropriate rehabilitation measures.

On the cessation of subsidence in any one area and completion of remedial works, it is planned that the land will be returned to grazing and original land activities. Yield trials will verify the maintenance of original land productions.

Chemical and Water Storage

A mine water management system has been designed that will facilitate segregation of clean, dirty and contaminated water streams, and capture and re-use of dirty and contaminated water to meet site water demands, and to only allow water movement off-site in a 1:1000 year ARI event. Plans have been prepared that show the location and size of proposed water storage dams and the operating strategy for the dams has been described. Water balance modelling has been undertaken to demonstrate the performance of the mine water management system under a wide range of climate conditions.

The water balance modelling of the proposed site water management system demonstrates that adequately sized water containment dams combined with maximum on-site reuse of water and additional enhanced evaporation technologies (e.g. sprinklers or fan evaporators) will prevent uncontrolled discharge of contaminated water. No controlled release of poor quality mine affected water is proposed for the Galilee Coal Mine.

It should be noted however there will be some uncontrolled discharge associated with sediment control structures during prolonged wet periods. This water is expected to be of dischargeable quality as these sediment control structures will receive runoff from rehabilitated spoil areas.

Diversions

The watercourse diversions have been designed in accordance with Queensland Government and ACARP guidelines for watercourse diversions. The impacts of these diversions on flooding conditions outside of the MLA will be negligible. Lagoon Creek is proposed to be diverted within the proposed Alpha Coal Mine immediately downstream of the Galilee Coal Mine.

Flooding Effects

Development of hydrologic and hydraulic models has already been undertaken to demonstrate that the proposed mine will not adversely affect the hydraulic characteristics of the waterways flowing through the mine lease area.

Several other management measures have been identified to reduce potential impacts – see Section 10 of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS for more details. Waratah Coal will undertake the following commitments with relation to surface water throughout the life of the project:

- implement an erosion and sediment control plan prior to the commencement of construction activities on site
- construct, monitor and maintain all sediment and erosion control devices throughout the construction phase of the project
- undertake all monitoring and sampling techniques in accordance with the DEHP's Water Quality Sampling Manual and applicable Australian Standards
- obtain and operate in accordance riverine protection permits and / or relevant guidelines (as required) for all in stream works as part of construction
- construct all creek diversions with an appropriate establishment period prior to the commencement of operations
- design and operate a site water management system to ensure containment and reuse of contaminated water on site
- design and operate a site water management system with a focus on clean water diversion through the use of creek and drainage diversions such that existing downstream water users are not adversely impacted
- rehabilitate disturbed areas as soon as practicable to minimise sediment mobilisation to receiving waters
- design and operate hazardous dams as regulated structures in accordance with regulatory requirements
- undertake additional baseline water quality modelling prior to the commencement of operations
- design and operate a site water management system to minimise demand on external water resources
- not release contaminants from the site water management system that have the potential to cause environmental harm
- operate and monitor the site water management system in accordance with the site's environmental authority
- develop and implement a receiving environment management plan prior to the commencement of operations
- design and maintain creek diversions to achieve equilibrium with existing water course
- design and construct flood levees for the protection of people and infrastructure with a 1 in 1000 year ARI flood level of immunity
- operate and maintain flood protection levees as regulated structures
- implement a monitoring program for creek diversions to assess long term performance for relinquishment at the cessation of operations
- investigate all substantiated water related complaints and implement corrective actions as necessary.

2.3.4.2 Rail

Description of Environmental Values

Twenty sites along the rail corridor, most of which were in the Burdekin catchment,have been assessed for aquatic ecological values over two studies conducted in 2012 as part of the SEIS. Four aquatic habitat types are present within the proposed rail corridor – estuarine, lacustrine, palustrine and riverine. The dominant aquatic environment within the proposed rail corridor is freshwater riverine habitats. In addition, several wetlands listed as Great Barrier Reef Wetland Protection or management areas were located within or adjacent to the rail.

Habitat condition

Targeted surveys found that the waterways in the rail corridor project area were generally in good condition, though there was some evidence of erosion, riparian vegetation clearing, understory disturbance and exotic weed occurrence at a number of sites. However, this was expected given that the adjacent land use to most of the waterways sampled was light grazing.

Fish community

Fish fauna consisted primarily of potadromous species; however, a number of catadromous and anadromous species were recorded, which has important implications for maintenance of fish passage for spawning for these species.

The exotic fish Gambusia (*Gambusia holbrooki*) and Tilapia (*Oreochromis mossambicus*) were also recorded.

1,411 fish belonging to 19 species were recorded from the 2012 studies. Studies undertaken in 2010 previously recorded 5,675 fish belonging to 28 species. Eastern Rainbowfish (*Melanotaenia splendida*) and Spangled Perch (*Leiopotherapon unicolor*) were the most widely recorded species. A total of 1,344 individuals from 52 macro invertebrate taxa were recorded in by the 2012 surveys.

Macro-crustacean Community

The macro-crustacean community was of limited diversity when compared with the diversity known for the Burdekin Catchment as a whole, but this was consistent with the findings of earlier studies in the project area vicinity.

Macroinvertebrate Community

The macroinvertebrate community diversity was within the expected range for Central Queensland waterways for samples of macroinvertebrates taken from edge habitats. For composite habitat sample, diversity was often higher than expected.

Turtles

Whilst the studies did not target aquatic vertebrates other than fish, turtles were caught as by-catch. Only two species were captured, the Saw-shelled Turtle (*Wollumbinia latisternum*) and Krefft's Turtle (*Emydura maquaria kreffti*). Both of these species are potentially vulnerable to increased turbidity and disturbance to the riparian zone due to their partial reliance on macrophytes and algae as a food source and the use of reed beds as a nursery area for juveniles. As such, there is potential for clearing of riparian vegetation and reed beds and generation of turbid plumes associated with construction of the rail to affect these species. However, such impacts would likely be highly localised and / or short lived, so significant impacts on these turtle populations are considered unlikely.

Macrophyte community

Macrophyte diversity and cover was generally low in the waterways sampled. Both studies recorded emergent forms particularly those belonging to the *Cyperaceae* family as most common. However, a number of submerged macrophytes were recorded. Submerged macrophytes are potentially vulnerable to increases in turbidity so this has implications for any increases to turbidity associated with the construction of the rail.

No exotic or noxious macrophytes were recorded, although several are known to occur in the study area.

Potential Impacts

Construction Phase

Construction works that have the most potential to impact on aquatic ecosystems include:

- bridge construction
- disturbing and stockpiling soils
- piling and culvert works for stream crossings
- use of potentially contaminated / low quality water for dust suppression and other site activities
- storage of oil, fuel and chemicals on site.

Potential impacts arising from construction of the rail include:

- loss of habitat
- fauna mortality
- decreased water quality
- changes to hydrology.

If properly managed the impacts to surface water resulting from the works are expected to be minimal.

Operation Phase

There is little available information specifically addressing the effect of operational rail lines on water quality; however impacts to aquatic ecosystems may occur if site runoff is not managed correctly. The train loads are proposed to be covered, hence removing the potential for ongoing coal dust contamination of ecosystems adjacent to or intercepting the rail alignment.

Major incidents releasing contaminants into streams have the greatest potential to impact on aquatic fauna if spill response efforts are not carried out in a timely manner.

Mitigation and Minimisation Commitments

Measures include:

- incorporating fish passage into design
- culverts located within the main channel of rivers and creeks are to be depressed below the natural surface to facilitate fish passage in accordance with the *Queensland Fisheries Act 1994*
- align railway to avoid broad diverse riparian vegetation assemblages, high value habitat nodes
- design watercourse crossings to be elevated and minimise dissection of contiguous ecotonal vegetation corridors and high value habitat nodes and corridors in highly fragmented landscapes
- wildlife underpasses are to be incorporated into the design of bridges and culverts crossing waterways.
- maintain water quality in accordance with criteria determined in consultation with DEHP and included in the water quality monitoring program.
- the development and implementation of ESCPs for the rail alignment. The ESCP will detail control measures to be implemented, construction details, dimensions, materials to be used, expected outcomes and staging of erosion and sediment control until construction is complete. The ESCP is to be signed off by the appropriate authority prior to the commencement of works and include the following principles:
    - minimisation of the construction footprint at all phases
    - timing of major earth works to coincide with low rainfall and low flow periods as far as practical
    - staged clearing of vegetation

  - wash down of plant and equipment at appropriate handling facilities
  - locate stockpiles of excavated materials away from the watercourses and install appropriate runoff and sediment control measures
- where possible, and where water is present, vibrocorers are to be used in preference to hammer pile drivers to reduce re-suspension of bottom sediments
- a storm water management plan for each component of the construction is to be developed and implemented. These should consider the use of storm water tanks and re-use of grey water
- prior to construction works occurring within the confines of a watercourse (i.e. piling for bridge crossings) sediment sampling is to be carried out to identify potential contaminants
- stabilise and rehabilitate disturbed ground as soon as practical.
- develop and implement a program to monitor and control terrestrial and aquatic weed growth
- managing cattle access to the water in consultation with land owners.
- avoid isolating waterbodies and allow mobile fauna to move away from areas of impact.
- revegetate understorey and midstorey vegetation following construction.

Specific details with reference to management strategies for aquatic flora and fauna are given in *Element 7* of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.4 Water Resources

2.4.1 SURFACE WATER AND WATERCOURSES

2.4.1.1 Mine

Description of Environmental Values

The majority of the mine lease area drains to the Belyando/Burdekin River basin via Lagoon Creek which flows in a generally northerly direction through the northern parts of the mine lease area. Waterways that feed Lagoon Creek within the mine lease area include Tallarenha Creek, Beta Creek, Malcolm Creek, Pebbly Creek and Saltbush Creek. Spring Creek rises in the north-western corner of the mine lease area and discharges across the northern mine lease boundary before flowing into Lagoon Creek to the north of the mine.

The south-western corner of the mine lease area drains to the Cooper Creek basin via an un-named tributary of Jordan Creek which flows in a generally westerly direction into Jordan Creek approximately 10km to the west of the proposed mine lease. See Figure 13.

There is minimal use of surface water within the Mining Lease Application (MLA). A number of small farm dams intercept overland flows.

The waterways that flow within the MLA are highly ephemeral. Stream gauging data for the catchment to the east of the MLA (Native Companion Creek) indicates that stream flows occur 30% of the time. Anecdotal information for the waterways within the MLA suggests that these waterways are even more highly ephemeral than the adjacent Native Companion Creek.

Water Quality

Water quality testing revealed that total concentrations of some of the metals measured were above guideline levels, but of these, only aluminium exceeded guideline levels based on dissolved concentrations, suggesting that apart from aluminium, the bioavailability of metals is currently limited in the waterways sampled. It should be noted that total and dissolved Aluminium concentrations were high at the majority of sites monitored. Also, most sites recorded low alkalinity levels indicative of soft to moderately hard water. This would reduce the capacity of local waterways to buffer the toxic effects of elevated Aluminium and other metal concentrations.

Organic contaminants, including pesticides, were generally at concentrations less than the Limits of Reporting (LOR). Results from the study do, however, indicate nutrient enrichment of waterways in and around the project area. Further, EC, pH, turbidity and dissolved oxygen were routinely outside of the recommended range. Based on the fact that a number of parameters regularly recorded values outside their recommended guideline ranges, it is likely that more locally relevant water quality objectives will need to be developed for the project area in order for the potential impacts of the project on aquatic ecosystems to be assessed properly.

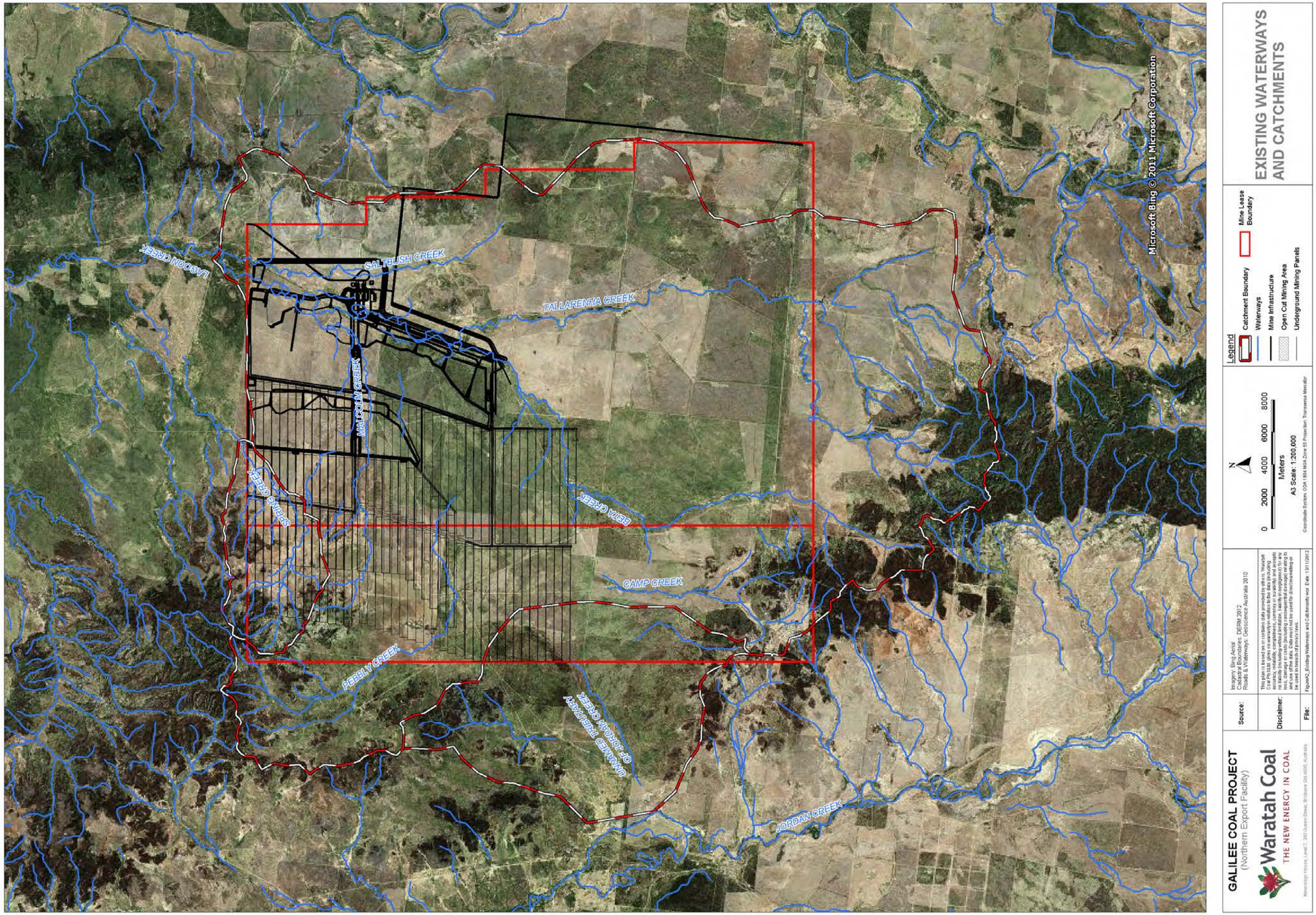
This study assessed water quality in relation to all relevant Environmental Values (EVs) for waterways of the project area that have associated trigger values in relevant guidelines. To that end, water quality data were compared against guidelines for stock drinking water as well as those for ecosystem protection. The study found that total and/or dissolved Aluminium concentrations occasionally exceeded stock watering guidelines, apart from that, the water quality of the waterways sampled generally complied with the requirements for stock watering.

Potential Impacts

The construction and operation of the mine has the potential to have a significant impact on waterways in the region. The activities with the highest risk of causing impacts include:

- the clearing of vegetation and topsoils from work sites and stockpiling of overburden on site resulting in sediment movement though overland flow
- the storage of chemicals on site (e.g. hydrocarbons, detergents and degreasers) during construction and operations and the movement of these to streams
- the storage, seepage and overtopping of potentially contaminated water in dams and basins at the mine
- the construction and operation of underground mines which may result in subsidence impacting drainage in the immediate area
- construction and operational phase water demands
- the construction of creek diversions, and
- potential effects on flooding levels in the region resulting from the creek diversions and operation of the mine.

Figure 13. Local site waterways



Subsidence

The potential maximum impact of underground mine subsidence and the open cut mining operations on stream flows in the waterways discharging from the mine was assessed using the mine water balance model . The potential maximum impacts of longwall mining subsidence on surface drainage, flooding and waterway stream flow characteristics are likely to include:

- Channelization of overland flows along longwall panels
- Creation of in-stream waterholes within subsidence troughs where waterways and drainage gullies cross longwall panels
- Channelization of Pebbly Creek along longwall panels resulting in diversion of the creek away from its' existing alignment
- Significant reduction in stream flows in Spring Creek and Lagoon Creek due to interception of overland flows and stream flows in subsidence ponding areas, and
- Sediment deposition within subsidence ponding areas resulting in decreased sediment inflows to downstream waterways
- A range of potential other impacts to waterway stability, geomorphology and riparian vegetation.

Clearing and Stockpiles

The clearing of vegetation and construction of mine infrastructure (open cut areas, dams and supporting infrastructure) has the potential to increase sediment deposition in streams offsite. Overburden dumps have the highest potential to impact surrounding streams in the event of large storm events prior to full rehabilitation. Potential impacts include:

- siltation of watercourses and aquatic habitat
- irregular and unstable land forms due to gully, channel and bank erosion
- adverse ecological effects from de-silting streams
- reduced ecology and aesthetic value of streams and riparian vegetation
- increased turbidity in the streams
- clogged drainage infrastructure and increased localised flooding, silting and bank damage to trench works and drainage structures
- increased downtime during construction after storm events while these areas are rehabilitated.

Chemical and Water Storage

Inappropriately stored and handled chemicals and other hazardous substances have the potential to impact surface waters in and around the mine site during construction and operations. Chemical spills or low-level exposure of the aquatic environment to chemicals (e.g. run-off from machinery, including potential vehicle accidents), would most likely involve hydrocarbon products such as fuels and lubricants. Fuels and chemicals will be stored, transported,handled and used in accordance with relevant legislation, regulations, standards and guidelines. As such, the risk of spillage would be low.

Impacts to aquatic environments during mining operations could also result from seepage or discharge of water containing salts, metals and other potential pollutants from dams and sediment basins located on site. Discharge could occur through failure of dam walls or overflow of dam spillways into surrounding drainage areas which then make their way into adjacent streams or seepage through the walls and base of the dams into unconfined aquifers which transport the contaminants to surface waters.

Construction and Operational Phase Water Requirements

Water will need to be sourced for a number of construction activities including:

- dust suppression on cleared construction areas
- moisture adjustment for compaction of engineered fill
- concrete mixing
- construction accommodation village potable water requirements.

Water will also be required during the operational phase for activities such as:

- washing coal
- dust suppression
- underground mining
- overburden drilling
- potable water for the workers village.

Preliminary investigations suggest approximately 6,400 megalitres / year will be required for ongoing operational requirements at the mine site. Based on preliminary water balance modelling onsite water from aquifer pre-drainage, in-pit groundwater, pumping and rainfall runoff into pit voids will meet all low-quality water demands. Options for sourcing an additional 2,500 megalitres / year of raw water to meet the mine's clean water demands include a pipeline from the Burdekin River, groundwater extraction from local aquifers, or desalination of excess mine affected water..

Diversions

The diversion of Malcolm, Lagoon and Saltbush Creeks has the potential to impact the flow regime and geormorphic characteristics of the watercourses including:

- Increased flow rates due to constriction of the floodplain through the diverted reaches
- Increased flow velocities in the diverted reaches leading to increased erosion and sediment load to downstream waterways
- Increases in upstream flood levels caused by constriction of the floodplain through the diverted reaches. Existing and planned infrastructure such as roads and rail will need to undergo design reviews to ensure they will not be affected by flooding
- Increase in downstream flood levels and velocities due to increased flow rates caused by the constriction of the floodplain through the diverted reaches.

It is likely that floodplain encroachment, diversion of flows or impacts associated with drainage structures (i.e. culverts, bridges, etc.) may impact on the waterway system as a result of changed flood behaviour. It is therefore crucial that the existing flow conveyance is managed and this can be achieved by incorporating appropriate creek diversion and waterway management practices into the design for the development of the mine site. This may include implementing sediment and erosion control measures and appropriately designed hydraulic structures (culverts, bridges, etc.).

It is intended that Lagoon, Malcolm and Saltbush Creeks will be diverted to reduce impacts to the mine site and overall environment. The creek diversions will include an appropriately engineered design to ensure that a positive outcome is achieved for the environment.

Impacts to the waterways may include (but are not limited to) scour and sedimentation as a result of increased velocities. It is therefore essential that appropriate scour protection measures are incorporated into the design where scour is likely to occur. Possible changes to flood levels may also occur as a result of waterway encroachment, diversion of flows or impacts associated with drainage structure design (e.g. culverts, piers, abutments etc.).

Waterway crossings are likely to be required for mine access roads as well as the rail connection. It is essential that mine infrastructure is located with due consideration for flooding.

Ground subsidence caused by the underground longwall mines has the potential to affect the stability and flow characteristics of the waterways flowing through the underground mining area. Subsidence management strategies have been identified to ensure that these impacts will be monitored and managed progressively during the life of the underground mine.

Mitigation and Minimisation Commitments

Clearing, stockpiles and subsidence

Soil erosion monitoring will be undertaken on both grazing and agricultural catchments and "before-subsidence" catchments to quantify the level of soil erosion which may take place during the subsidence process. This will be used to inform the Erosion and Sediment Control Plan.

The Subsidence Management Plan will detail the types of remedial works, which may include ripping, re-compacting and seeding of all tension cracks and reshaping any internally draining areas to be externally draining by the construction of contour drains and topsoiling and seeding any disturbed areas. These works will extend to blanketing and compacting of some water courses post-subsidence, preventing inflow of runoff into underground mining areas and maintain environmental surface flows. Materials which have been investigated for use in compacted blankets include silty alluvium and clay.

Some re-alignment of water courses and minor earthworks will be necessary, but the work done so far allows these activities to be well planned prior to subsidence in any particular area. The natural fall of the mining area drains freely to the north and is sufficient to minimise subsidence troughs. In the flatter areas, reshaping of any internally draining areas to externally draining areas will be done by the construction of contour drains and appropriate rehabilitation measures.

On the cessation of subsidence in any one area and completion of remedial works, it is planned that the land will be returned to grazing and original land activities. Yield trials will verify the maintenance of original land productions.

Chemical and Water Storage

A mine water management system has been designed that will facilitate segregation of clean, dirty and contaminated water streams, and capture and re-use of dirty and contaminated water to meet site water demands, and to only allow water movement off-site in a 1:1000 year ARI event. Plans have been prepared that show the location and size of proposed water storage dams and the operating strategy for the dams has been described. Water balance modelling has been undertaken to demonstrate the performance of the mine water management system under a wide range of climate conditions.

The water balance modelling of the proposed site water management system demonstrates that adequately sized water containment dams combined with maximum on-site reuse of water and additional enhanced evaporation technologies (e.g. sprinklers or fan evaporators) will prevent uncontrolled discharge of contaminated water. No controlled release of poor quality mine affected water is proposed for the Galilee Coal Mine.

It should be noted however there will be some uncontrolled discharge associated with sediment control structures during prolonged wet periods. This water is expected to be of dischargeable quality as these sediment control structures will receive runoff from rehabilitated spoil areas.

Diversions

The watercourse diversions have been designed in accordance with Queensland Government and ACARP guidelines for watercourse diversions. The impacts of these diversions on flooding conditions outside of the MLA will be negligible. Lagoon Creek is proposed to be diverted within the proposed Alpha Coal Mine immediately downstream of the Galilee Coal Mine.

Flooding Effects

Development of hydrologic and hydraulic models has already been undertaken to demonstrate that the proposed mine will not adversely affect the hydraulic characteristics of the waterways flowing through the mine lease area.

Several other management measures have been identified to reduce potential impacts – see Section 10 of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS for more details. Waratah Coal will undertake the following commitments with relation to surface water throughout the life of the project:

- implement an erosion and sediment control plan prior to the commencement of construction activities on site
- construct, monitor and maintain all sediment and erosion control devices throughout the construction phase of the project
- undertake all monitoring and sampling techniques in accordance with the DEHP's Water Quality Sampling Manual and applicable Australian Standards
- obtain and operate in accordance riverine protection permits and / or relevant guidelines (as required) for all in stream works as part of construction
- construct all creek diversions with an appropriate establishment period prior to the commencement of operations
- design and operate a site water management system to ensure containment and reuse of contaminated water on site
- design and operate a site water management system with a focus on clean water diversion through the use of creek and drainage diversions such that existing downstream water users are not adversely impacted
- rehabilitate disturbed areas as soon as practicable to minimise sediment mobilisation to receiving waters
- design and operate hazardous dams as regulated structures in accordance with regulatory requirements
- undertake additional baseline water quality modelling prior to the commencement of operations
- design and operate a site water management system to minimise demand on external water resources
- not release contaminants from the site water management system that have the potential to cause environmental harm
- operate and monitor the site water management system in accordance with the site's environmental authority
- develop and implement a receiving environment management plan prior to the commencement of operations
- design and maintain creek diversions to achieve equilibrium with existing water course
- design and construct flood levees for the protection of people and infrastructure with a 1 in 1000 year ARI flood level of immunity
- operate and maintain flood protection levees as regulated structures
- implement a monitoring program for creek diversions to assess long term performance for relinquishment at the cessation of operations
- investigate all substantiated water related complaints and implement corrective actions as necessary.

2.4.1.2 Rail

Description of Environmental Values

The rail alignment traverses four different catchments, the Belyando, Suttor, Bowen / Bogie and Don. A relatively small part of the northern end of the alignment (closest to the boundary of the Abbot Point State Development Area) falls within the Don Catchment. This section describes the Bowen / Bogie Catchment (approximately KP25 to KP135), the Suttor Catchment (approximately KP135 to KP265) and the lower reaches of the Belyando Catchment (approximately KP265 to KP453). All three are sub-catchments of the Burdekin with the Belyando and Suttor forming

part of the Upper Burdekin and Bowen / Bogie the Lower Burdekin. Characteristics for the three catchments have been described together as topography, land uses and climate are similar between catchments.

Topography varies over the catchments with the areas south of Collinsville characterised by low relief floodplains with minor undulating slopes across the Suttor River floodplain. North of Collinsville the terrain becomes steeper across the Leichardt and Clarke Ranges before traversing low lying coastal areas as the alignment approaches Abbot Point.

The Bowen River is cut into the Lizzie Creek volcanic including basalts, andesitic, tuffs and minor acid volcanic and further to the south the Blackwater and Back Creeks Group comprising sedimentary rocks including sandstones, siltstones, shales and coal. Dominant soils in the river valley include dark clays at depth with sandy loam overlying these clays. In the Suttor catchment, the alignment crosses sedimentary rocks of the Suttor Formation and alluvium of the Suttor River derived from these rock types. Dominant soils on the hilly land are shallow, gritty leached sands or sandy loams. The soils of the sloping plains consist of loamy duplex soils to loamy yellow, red and grey earths and cracking clays on the lower areas.

The dominant land use within both catchments is agriculture (grazing) in relatively natural environments such as semi cleared paddocks. In the Bowen / Bogie catchment, an operating coal mine is located adjacent to the rail alignment (near Collinsville).

Riparian Condition

Lower Belyando Catchment

Riparian areas in the catchment generally consisted of a layer of mature Eucalypts including ironbarks species one or two trees thick directly on the banks of the streams. These are surrounded by a layer of saplings and shrubs before the landscape opens up into grazing paddocks. Soils were mostly clays and fine sediment.

Suttor Catchment

Riparian vegetation density varied across the sites. Most sites had larger tree species (10-35% >10m tall) although two sites had extensive large trees. Four sites had <10% large trees. The majority of sites had some undisturbed vegetation with trees with fairly regular vegetation along both banks; however, four sites had highly disturbed riparian vegetation communities. Only one site had with regular riparian vegetation. All sites except for one, which was heavily cleared with grasses as the only dominant vegetation,had extensive coverage of trees <10 m, shrubs and grasses. Most sites had limited to slight shading.

All streams sampled contained flowing water during the wet season with WQ25, WQ26 and WQ28 (Suttor River, Verbena and Logan Creeks respectively) all flooding at the time of sampling. Streams that hadn't broken their banks were relatively narrow (< 10m wide).

Bowen / Bogie Catchment

Riparian vegetation density was varied across the sites. Most sites had larger tree species (10-35% >10m tall) although two sites had very limited large trees. One of those sites also had several trees within the stream itself. The majority of sites had undisturbed vegetation with trees regular vegetation along both banks. Site WQ10 had undisturbed riparian vegetation communities. All sites except for one, which was heavily cleared with grasses as the only dominant vegetation,had extensive coverage of trees <10 m, shrubs and grasses. Most sites had limited to moderate shading depending on stream width.

No sites had banks that were overtopped; however many showed signs of recent flooding such as scattered debris and flattened vegetation. This may have been a result of Cyclone Ului. Soils in the catchment were course compared to the upland catchments (predominantly sands and pebbles.

Morphology

Lower Belyando Catchment

The streams in the lower reaches of the Belyando catchment were predominantly remnant channels that were flat, low or moderate banked streams. At a number of locations it was not possible to observe the main channel due to the high quantity of water within the stream. In these locations flood channels were observed. The streams ranged from 3m to 60m wide although most streams had an observed floodplain that extended up to 25m either side of the centre of the stream. Site WQ32 had a floodplain of over 2km wide. Most streams sampled had flowing and pooled water although two streams had significant flowing water (glides >65%) and over half the streams had extensive runs. All streams except for those with high flows also had large pools that covered extensive areas. The majority of the streams had no in stream aquatic plant growth except for site WQ31 that had significant emergent aquatic plants.

Silt was the dominant particle observed at the majority of sites. All the streams had limited bedrock. Erosion varied across the streams with the vast majority having moderate to severe erosion. The majority of streams had partly or very restricted flows due to non-vegetated mid channel bars. Only one site had unobstructed base flows.

Suttor Catchment

The streams on the Suttor catchment were predominantly remnant channels that were flat or two staged (stepped) banked streams. Like the lower reaches of the Belyando, at a number of locations, due to the high quantity of water within the stream, it was not possible to observe the main channel, and in these locations, flood channels were observed. The streams ranged from 3m to 2km wide although most streams had an observed floodplain that extended from 40m to 400m either side of the centre of the stream. Site WQ25 had a floodplain of over 6km wide. Most streams sampled had flowing and pooled water although two streams had significant flowing water (rapids and riffles >65%) and all the streams had extensive runs. Most streams had almost no pools. The majority of the streams had no in stream aquatic plant growth except for site WQ22 that had some submerged aquatic plants.

Silt was the dominant particle in the southern area of the catchment while sand was the dominant sediment in the upper reaches of the catchment. All the sites except WQ24 had limited bedrock. Erosion varied across the streams with the majority having either a stable substrate and / or moderate deposition. Only site WQ24 had observed erosion. The majority of streams were partly to very restricted at base flow with this either being a non-vegetated side channel bars in the upper reaches and vegetated mid channel bars in the lower reaches.

Bowen / Bogie Catchment

The streams on the Bowen / Bogie catchments were highly varied in stream shape. Sites WQ14, WQ15 and WQ16 were high and steeped banked streams while the remainder was remnant channels that were broad banked. The streams ranged from 2m to 80m wide. Most streams sampled had flowing and pooled water although two streams had significant flowing water (including rapids and riffles) and three sites had extensive runs. The majority of the streams had no in stream aquatic plant growth except for site WQ16 that had moderate aquatic plants.

Sand was the dominant particle in the catchment. All the sites except for site WQ14 had limited bedrock. Erosion varied across the streams with the majority having either a stable substrate and / or moderate / severe deposition. Only site WQ12 had observed erosion. The majority of streams were moderately restricted at base flow by either non-vegetated side channel bars or vegetated mid channel bars.

Potential Impacts

During construction and operation of the rail corridor there are a number of mechanisms that have the potential to impact on surface water quality including:

- increased sediment loads due to surface disturbance and vegetation clearing
- pesticides used for weed control

- use of potentially contaminated / low quality water for dust suppression and other site activities
- storage of oil, fuel and chemicals on site
- construction and operational phase water demands
- changes to stormwater regimes
- changes to the local hydraulic regime resulting from the rail alignment through watercourses and floodplains.

Mitigation and Minimisation Commitments

Waratah Coal will undertake the following commitments with relation to surface water values throughout the construction and operation of the rail:

- implement an erosion and sediment control plan prior to the commencement of construction activities
- construct, monitor and maintain all sediment and erosion control devices throughout the construction phase of the project
- undertake all monitoring and sampling techniques in accordance with the DEHP's Water Quality Sampling Manual and applicable Australian Standards
- obtain and operate in accordance riverine protection permits and / or relevant guidelines (as required) for all in stream works as part of construction
- rehabilitate disturbed areas as soon as practicable to minimise sediment mobilisation to receiving waters
- undertake additional baseline water quality modelling prior to the commencement of construction
- not release contaminants associated with construction activities that have the potential to cause environmental harm
- investigate all substantiated water related complaints and implement corrective actions as necessary.

Specific details with reference to management strategies for hydrology and water quality are given in *Element 3* of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.4.2 GROUNDWATER

2.4.2.1 Mine

Description of Environmental Values

Alluvial Aquifers

Alluvium is present throughout the mine site study area associated with drainage channels. Of 254 registered groundwater bores located in the wider study area, only 18 are recorded as being screened within alluvium. Mean Electrical Conductivity (EC) where EC has been recorded is 1385 µS/cm suggesting that shallow groundwater in alluvial aquifers is generally slightly brackish.

Tertiary Aquifers

Tertiary groundwater within the study area is dominated by sodium cations and chloride anions. The Tertiary aquifers within the study area are generally slightly brackish, pH neutral, contain low concentrations of trace metals, and in a few instances show elevated nutrient concentrations. The likely cause of the increased nutrient loading may be due to farming practices or general nitrogen movement in shallow systems.

Permian Aquifers

Water of the Permian aquifers is dominated by chloride anions, sodium and potassium cations and is classified as sodium – chloride waters. The pH of Permian aquifers is near neutral ranging from slightly acidic to slightly alkaline. Trace metals occur in low concentrations. The water quality within the Permian aquifers is likely to reflect the age of

the water and the characteristics of the aquifer material. The Permian aquifers are most permeable in and around the various coal seams.

Great Artesian Basin and Associated Aquifers

The base of the GAB is defined by the Lower Triassic Dunda Beds and Rewan Formation, a thick aquitard that lies beneath the Clematis Sandstone, the most easterly outcropping aquifer in the GAB. The Clematis Sandstone is part of the GAB recharge beds known as the Eastern Recharge Zone. This zone is 60-70km wide between Barcaldine and the GAB boundary which lies about 20km east of Jericho.

Landowners' bores located in the Great Artesian Basin (GAB) and associated aquifers reported water quality dominated by sodium and potassium cations and chloride and bicarbonate anions. These are classified as sodium – calcium and chloride-sulfate-bicarbonate waters and are characterised by neutral to slightly acidic pH, and slightly elevated levels of trace metals. The cation-anion results reflect reports by GABCC (2009), which state that the GAB aquifers are generally sodium bicarbonates with chloride and minor carbonate.

Potential Impacts

Great Artesian Basin

The western edge of the underground mine plan is close to the boundary of the Clematis Sandstone and the Dunda Beds, but the GAB boundary is obscured by Quaternary cover sediments. This means that the mine's footprint is designed to pass beneath the GAB's basal aquitard but will not lie beneath the GAB's basal aquifer. The aquitard has a thickness of about 300m near the mine site but thins to the west until it pinches out about 40km from the mine site. The low permeability of the aquitard is likely to protect the groundwater source in the Clematis Sandstone from mining depressurisation effects.

There are mapped recharge springs 30-40km to the west of the GAB boundary within the recharge zone and also to the west of the recharge zone, in the Barcaldine Spring Complex. However, these are not the discharge springs that are protected under the EPBC Act which lists the *"community of native species dependent on natural discharge of groundwater from the Great Artesian Basin"* as an endangered ecological community. Given the distance of the recharge springs from the mine site, and the protective buffer offered by the Rewan / Dunda aquitard close to the mine site, it is unlikely that any of the springs will lose natural yield.

It is likely that drawdown in the deepest mined coal seam on the western edge of the underground mines will extend approximately to Jericho and will pass beneath the Clematis Sandstone outcrop, but it is unlikely that there will be any impact on the overlying aquifer and highly unlikely that there will be any impact on the recharge springs. There will be no effect on discharge springs hundreds of kilometres away.

Drawdown and Water Levels

The inflow of groundwater into the open cut pits and longwall panels will lower the elevation of the water table in the shallow aquifer and the potentiometric surface of the deeper groundwater system. A cone of depression will establish around the mine and will recover slowly with time after mining is completed.

The modelling predicts a broad drawdown extent that extends about 20km from the area of active mining to the north (for 1m drawdown), 10km to the south, and 15km to the east. The western extent (towards the GAB) does not leave the mine lease and the 1m drawdown contour aligns with the GAB geological boundary.

The depth to the water table is variable across the mine site, generally being 20-60m below ground. The water table is shallower along the drainage lines, as evidenced by typical depths of 18-20m at the town water supply bores at Alpha. Beneath the ephemeral creeks along the eastern edge of the mine site, the water table is likely to be beyond the range of vegetation roots. As a result of the naturally depressed water table, no groundwater dependent ecosystems were identified in proximity to the mine. If mining-induced drawdown were to occur in alluvial

sediments, the natural leakage from creeks to the alluvial aquifer could be enhanced but only if the water table or a perched water table intercepts the creek bed.

The average salinity of groundwaters is about 2,500 mg/L but very saline instances are recorded in the DNRM database (up to 60,000 µS/cm). The water is generally suitable for irrigation or livestock watering although some saline aquifers will not be suitable for these uses. Dewatering of the groundwater systems will result in the loss of this groundwater, at least temporarily. The water quality environmental values within the mine footprint area might be affected by mixing fresher water with more saline water.

Impact of Subsidence

When underground mining is undertaken, a fractured zone is developed above the mined panels which manifests as subsidence of the land surface. Above the underground mined seams it is likely that the fractured zone will extend to the land surface in places. This is expected to promote enhanced rainfall infiltration for a time, but it is probable that the higher infiltration rates will be short-lived as the cracks will infill with sediment after one or more rainfall events. Apart from intercepting more rainfall, there will be a freshening effect on groundwaters in or above the fractured zone due to the introduction of low-salinity rain water.

The formation of the fractured zone will be accompanied by increases in the permeability and porosity of overburden materials. This will promote higher mine inflows and lower groundwater heads.

Lower hydraulic gradients will occur also in the infilled open cut pits due to the higher permeability of waste rock compared to natural host rock. Enhanced rainfall recharge is likely on the spoil, with the introduction of fresh rain water counteracted by leaching of minerals from the waste rock.

Groundwater Contamination

Groundwater contamination will not occur *in situ* but could occur from coal rejects disposal and leaking disposal facilities. The risk of groundwater contamination from spills and leaks (from chemical, fuel and oil storage and handling at workshops and mine operations infrastructure) is low due to the naturally depressed water table.

The potential for impacts from surface storages of rejects, waste, fuel, oil and chemical storages are considered to be low because:

- groundwater levels around the mine are generally deeper and will become deeper due to drawdown around the mine
- appropriately constructed storage and handling will result in low potential for leakages or spills
- the assessment of potential for acid generation and heavy metals impacts from the mine overburden and coal reject indicate a low potential for these impacts.

Mitigation and Minimisation Commitments

The following management and mitigation measures will be implemented to minimise potential impacts on the environmental values of groundwater as a result of construction activities:

- permits will be sought where appropriate for the taking of groundwater
- maintenance of the established groundwater monitoring network
- establishment of a protocol for water balance metering of groundwater volumes pumped from the underground goaves and water pumped from the open cut pits
- regular downloading of water level data from the dataloggers in the monitoring network bores
- storage of water level and water quality in a database

- regular analysis of groundwater data by a qualified hydrogeologist
- establishment of trigger levels at landowner's bores that are likely to be impacted by mining
- in the event of a trigger being breached, a preliminary evaluation will be made by Waratah Coal to determine if further investigation, notification or mitigation is required
- in the event of material impact on a bore in terms of quantity or quality, Waratah Coal will implement an agreed make-good procedure that will either improve the existing supply or provide an alternative supply
- maintenance of a complaints register
- annual analysis and reporting of responses measured in the monitoring network
- annual assessment of the comparison between actual groundwater responses and predicted groundwater responses
- in the event of significant disagreement between actual and predicted responses, instigation of an update to the groundwater model that includes recalibration to the current data set in accordance with National Modelling Guidelines.

Waratah Coal will undertake the following commitments with relation to groundwater throughout the life of the project:

- a groundwater monitoring network and program will be commissioned prior to mining to establish background groundwater level and quality conditions providing a basis for mine impact assessment
- the groundwater monitoring bore network and program will be configured to facilitate assessment of potential impacts to surrounding groundwater users and other sensitive areas
- the groundwater monitoring network and program will be modified over time to cater for evolving mine influence during operation and post closure
- a data base of surrounding groundwater users potentially influenced by the mine will be established including relevant bore details as available
- records of any complaints (including basis for the complaint and actions taken) from surrounding groundwater users will be maintained for internal and potential third party / regulatory use
- groundwater monitoring will be conducted in accordance with recognised standards (i.e. AS/NZS 5667.11:1998)
- groundwater monitoring data will be maintained in an appropriate data base with data being reviewed within two weeks of receipt and validated by a qualified and experienced hydrogeologist to facilitate timely response to any issues or potential issues identified
- a formal review of all groundwater monitoring data will be conducted annually by a qualified and experienced hydrogeologist and will include recommendations for any modifications to the program and ameliorative measures considered necessary.

Specific measures to ameliorate impacts on groundwater at the mine site are detailed in Section 10 of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.4.2.2 Rail

Description of Environmental Values

KP0 – KP225 Undeclared Groundwater Area

A large undeclared groundwater area is intersected by the rail alignment between KP0 and KP225. In this area, aquifer systems predominantly occur in unconfined and confined weathered and fractured granite / igneous systems. Shallow unconfined and confined tertiary aquifers in shale, sandstone and clay strata are also likely to exist in the southern portion of this undeclared groundwater area. DEHP records indicate that groundwater in the Suttor

Formation appears as an unconfined aquifer in the coarse sandstones with water levels between 10m to 80m below ground level (bgl). Shallow alluvial unconfined aquifers in alluvial leads may occur in river valleys; however specific data does not exist for these aquifers.

Limited data is available with reference to yields and water quality. Yields of between 1 and 5.6L/s and a range in salinity between 400 and 1,300mg/L total dissolved solids (TDS) occurs in the granite aquifers (SKM, 2009). Limited static water level data exist for bores within the area. The data available indicates water levels from 5 to 30mbgl.

The conceptual hydrogeological model for the granitic aquifers comprises rainfall recharge onto areas of outcrop in the south and west of the undeclared groundwater area between KP125 and KP165 likely to be associated with the Mount Coolon range. Groundwater recharge from these zones would be expected to flow down a topographic gradient in a westerly direction via natural groundwater flow paths to the alluvial leads and to deeper weathered or fractured granite aquifers.

The hydrogeological model for the shallow unconfined tertiary aquifers comprises rainfall recharge across the entire area of the aquifers and also via infiltration from alluvial leads in river valleys. Direction of flow of these aquifers is likely to follow surface gradients. The alluvial leads are recharged via infiltration of rainfall and stream water in times of flow / flood. Flow direction in these leads will be towards the structural base of the alluvial lead and then in the downstream direction in river valleys. Where the rivers are effluent to the leads, some flows away from rivers may occur, whilst in areas where the alluvials are influential to the river flows, the flows will be towards the river.

KP225 – KP453 Highlands Groundwater Management Unit

The rail alignment crosses the Highlands GMU between KP225 and KP453. The aquifer systems in this area are comprised predominantly of tertiary shale, sandstone (including the Suttor Formation) and clay strata. The depth to the top of these aquifers ranges from 10 – 150m bgl and static water levels range from 10 to 80mbgl. Semi-confined Permian aquifers are likely to exist at greater depth within the area.

Data from the tertiary aquifers indicate a range in yield of between 0.3 to 13L/s and a range in salinity of 200 to >10,000mg/L TDS. Some of these values exceed the ANZECC and ARMCANZ (2000) guidelines for livestock drinking water of 2,000mg/L; however, guidelines for total dissolved solids are not specified for ecosystem protection.

The conceptual hydrogeological model for the rail component comprises of rainfall recharge to tertiary aquifers in areas east of the boundary of the Great Artesian Basin and percolation from surface water bodies during periods of flow. The semi confined Permian aquifers are recharged via both surface rainfall in recharge zones and leakage from the shallow unconfined tertiary aquifers.

Potential Impacts

The main potential impacts with respect to groundwater are related to shallow near surface groundwater that could be impacted by the following railway construction activities:

- storage and handling of fuels / chemicals / raw materials, and
- bridge construction.

Impacts to local groundwater regimes may also occur where groundwater is within the construction zone in the upper 1m of the surface or where bridge construction entails deeper construction in areas of shallow groundwater that requires dewatering of construction areas. If managed properly it is unlikely that the construction or operation of the railway will have any significant impact on groundwater resources.

Mitigation and Minimisation Commitments

To minimise potential impacts to groundwater, Waratah Coal commits to:

- developing ESCPs prior to the commencement of construction to reduce impacts on groundwater
- implementation of management plans and containment structures for potential contaminants
- remediation of groundwater contamination should it be caused by the project
- geotechnical assessment of the rail alignment to assess areas where construction requirements (i.e. excavation or blasting) have potential for impacts to groundwater
- site specific investigation of the areas identified from geotechnical review, and
- entering into agreements with surrounding landowners regarding monitoring of impacts and make good provisions where impacts occur.

Specific details with reference to management strategies for groundwater are given in *Element 4* of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.5 Air Quality

2.5.1 MINE

Description of Environmental Values

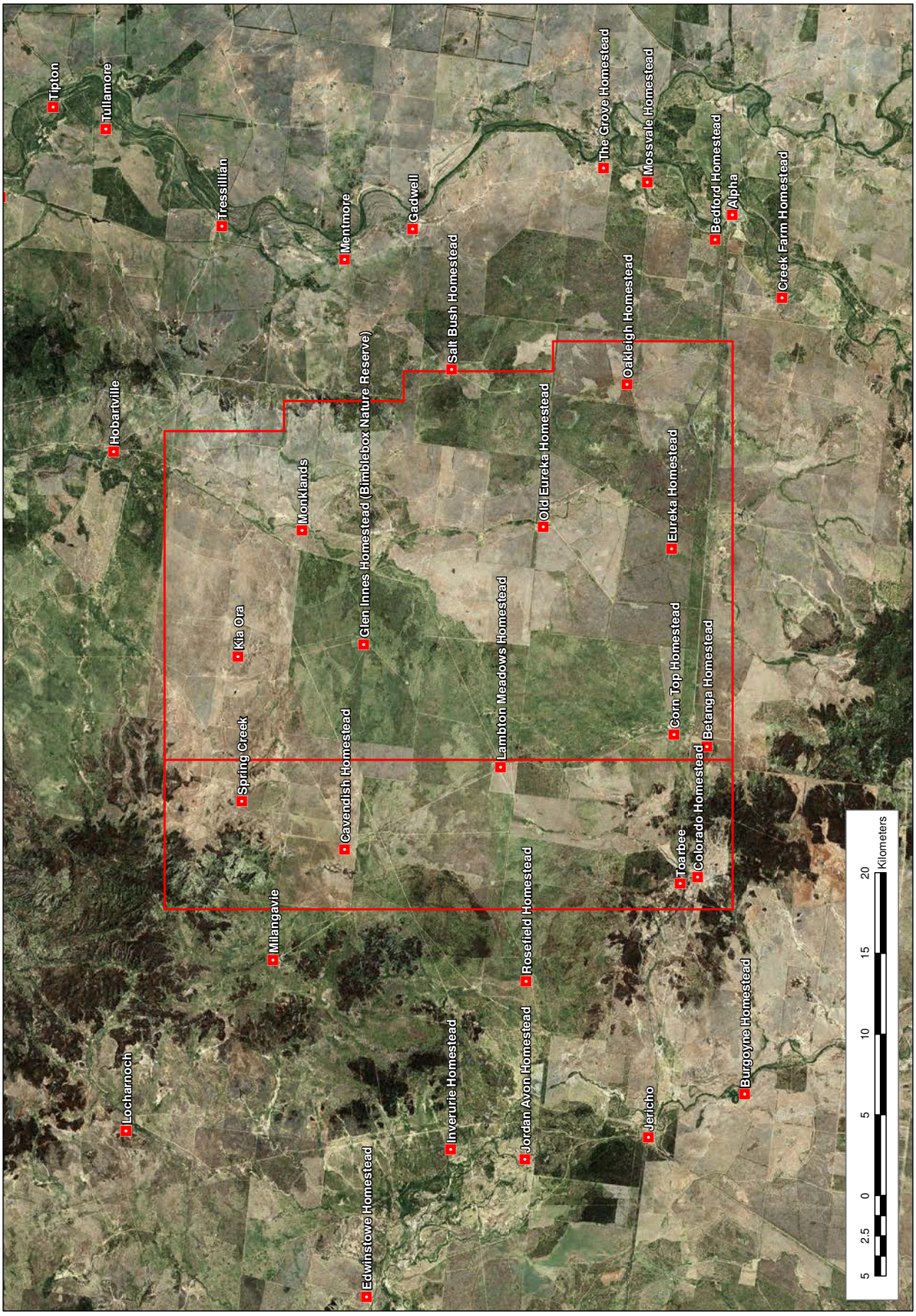
Dust is the main potential air contaminant likely to be emitted from the Coal Mine. Pollutants such as sulfur dioxide (SO_2), oxides of nitrogen (NO_X) and volatile organic compounds (VOCs) are potential air contaminants associated with the combustion of diesel fuels at the mining site but are considered to be emitted in insufficient levels to result in measurable adverse air quality impacts at nearby sensitive locations.

The Project site is situated within a rural setting, with a number of coal mines proposed for development in the area. Sensitive receptors occur near to the Project site and are shown at Figure 14.

The estimated background levels for dust were:

- 26µg/m^3 for 24-hour average particulate matter with an aerodynamic diameter less than ten microns (PM_{10}) levels (70th percentile of 24-hour concentrations, averaged during 2006-2009)
- 22µg/m^3 for annual average PM_{10} levels (annual average concentrations, averaged during 2006-2009)
- 5.2µg/m^3 for 24-hour average particulate matter with an aerodynamic diameter less than ten microns ($PM_{2.5}$) levels (20% of PM_{10} values, based on Midwest Research Institute, 2006)
- 4.4µg/m^3 for annual average $PM_{2.5}$ levels (20% of PM_{10} values, based on Midwest Research Institute, 2006), and
- 44µg/m^3 for annual average Total Suspended Particulate (TSP) levels (twice PM_{10} values, based on Midwest Research Institute, 2006).

Figure 14. Mine sensitive receptors and EIS Study Area boundary



The impacts to air quality from the activities at the mine have been assessed against guidelines for TSP, PM_{10} and $PM_{2.5}$ defined in the Environmental Protection (Air) Policy 2008 (EPP (Air)) for the protection of environmental values. Dust deposition rates have also been assessed against relevant guidelines.

Air dispersion modelling has been used to predict ground-level concentrations of pollutants and rates of dust deposition, based on 2008 meteorological data for the mine region and estimated emission rates for the mine's activities. The modelling assessment used a suite of modelling tools to estimate air quality impacts. First, The Air Pollution Model (TAPM) and CALMET were used in combination to generate a fine-resolution, three-dimensional meteorological fields for 2008; and then CALPUFF was used to simulate the transport, dilution and deposition of emissions from the sources in the atmosphere.

Emission rates were estimated using methodologies sourced from National Pollutant Inventory and USEPA published emission estimation methodologies. To assess worst case conditions, emissions were estimated for year 19 of the mine's life, as this represents peak emissions. The major sources of emissions were waste handling by the draglines, the transport of waste to the out of pit waste dumps,hauling of coal and wind erosion of exposed areas.

The proposed mitigation measures will ensure air pollutants across both construction and operational phases of the Project will not diminish or degrade the ambient air quality to the extent that it will adversely impact human health and ecological health of terrestrial flora and fauna.

Waratah will be able to sustain mining activities in accordance with its commitment principles through the introduction and continuous review of dust management and mitigation systems during the construction and operational phases of the mine.

Potential Impacts

Construction of the Mine will include the development of:

- internal road network, including light-vehicle access roads, heavy-vehicle haul roads and a site access road
- overland conveyors and transfer stations
- the coal handling preparation plants and associated stockpiles
- tailings storage facilities
- administrative buildings
- equipment workshop facilities
- 275kV electricity transmission line, electrical power substations and associated facilities
- a water supply pipeline
- on and off-site water retention dams
- 2,000 person accommodation village
- onsite airstrip, and
- cut and cover operations for the underground mines.

The emissions associated with the development of the open cut mines have been considered as part of the ongoing operation of the mine.

Emissions from construction activities will be primarily dust related, with some minor emissions of combustion pollutants, such as NO_X, due to diesel and petrol combustion in vehicles and construction equipment.

Construction emissions will be minor in comparison with emissions from the operation of the mine. In addition, the emissions will be temporary in duration and the location of emissions will change. Therefore these emissions have not been estimated (with the exception of the cut and cover operations), and their impacts have not been modelled.

The impacts of construction activities will be managed through the EM Plan which will implement the following dust mitigation strategies:

- water sprays on unsealed roads
- restricting vehicle speeds on unsealed haul roads to reduce dust generation and keep vehicles to well-defined roads
- minimise haul distances between construction sites to spoil stockpiles
- treat or cover stockpiled material to prevent wind erosion
- regularly clean machinery and vehicle tyres to prevent wheel entrained dust emissions
- route roads away from sensitive receptors wherever practical
- minimise topsoil and vegetation removal, and revegetate disturbed areas as soon as possible, and
- ongoing visual monitoring of dust on a daily basis, with ramping down of activities in the instance of high dust emissions.

In addition dust emissions during construction can be managed by considering the coordination of the construction schedules. Ensuring that there are no delays in construction activities will decrease the amount of time that disturbed land remains exposed for wind erosion.

The following pollutants will be released to the atmosphere from the operational mining activities:

- SO_2
- NO_X
- carbon monoxide (CO)
- VOCs
- particulate matter with an aerodynamic diameter less than ten microns (PM_{10})
- particulate matter with an aerodynamic diameter less than two and half microns ($PM_{2.5}$), and
- TSP.

Air quality impacts were assessed in the air quality assessment that supported the environmental impact assessment using dispersion modelling for the operational phase of the mine for the following pollutants of interest:

- $PM_{2.5}$
- PM_{10}, and
- TSP (including dust deposition).

The low sulfur content of Australian diesel, in combination with the fact that mining equipment is widely dispersed over mine sites, makes it unlikely that the SO_2 goals will be exceeded off-site, even in mining operations that use large quantities of diesel. For this reason, no detailed study was required to demonstrate that emissions of SO_2 from the China First Mine will not significantly affect ambient SO_2 concentrations. Similarly, NO_X, CO and volatile organic compound emissions from the mine's activities are too small and too widely dispersed to require a detailed modelling assessment.

Odour may rise from fuel burning of vehicles or equipment or explosive usage, but it is not expected to reach significant levels in the ambient air to cause amenity impacts. Hence the potential impacts were not quantitatively evaluated in the air quality impact assessment.

Mitigation and Minimisation Commitments

The following commitments are made in relation to the preservation of air quality values for the Project:

- the Project will achieve and maintain the level of dust control outlined in the Environmental Authority
- preparation of a reactive Air Quality Management Plan and Dust Management Plan for the operational mine
- preparation of a detailed Mine Rehabilitation Plan
- use of industry best practice techniques to reduce dust emissions from the site
- the Project will meet the Ambient Air Monitoring program requirements
- the Project will investigate all substantiated dust complaints
- the Project will implement corrective action resulting from complaints investigations as required, and
- all monitoring and sampling techniques will be consistent with the DEHP's Air Quality Sampling Manual and applicable Australian Standards.

Specific measures to ameliorate impacts on air quality at the mine site are detailed in Section 4 of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

Greenhouse Gas Emissions and Abatement

Desktop studies have been used to identify the likely greenhouse gas emission sources from the Project. Emission estimates have been based on the mine operating at full capacity, where 56Mtpa ROM and 40Mtpa saleable coal is produced from the mine per annum.

Studies projected that the mine will produce 2.3Mt Carbon Dioxide equivalents (CO_2-e) per annum, with scope 1 and 2 emissions contributing approximately 48% and 52% of total emissions, respectively. The bulk of the annual scope 1 greenhouse gas emissions are associated with fugitive methane emissions released during open cut mining (31%) and during underground mines (26%). The remainder is predominately associated with diesel consumption for mining equipment (26%). The majority of total scope 1 emissions are CO_2 emissions and CH_4 emissions, with negligible amount of N_2O emissions.

The emissions intensity of the mine is 0.06t CO_2-e/t saleable coal, which is approximately equivalent to the average emissions intensity of existing Australian coal mines that have both open cut and underground operations, and is less than the average emissions intensity of all coal mines (0.079t CO_2-e/t saleable coals).

Greenhouse gas emissions generated by the project will have to be annually reported under the requirements of the *National Greenhouse and Energy Reporting Act 2007* (NGER Act), and Waratah Coal will be a direct participant in the emissions scheme included in the Carbon Pollution Reduction Scheme (CPRS) as it is currently proposed. It is further expected that Waratah Coal will assess the energy efficiency of the project and identify measures to improve energy efficiency, under the Energy Efficiency Opportunities (EEO) Program.

Technical assessments undertaken during the EIS process suggest that the project can most effectively reduce its annual emissions through improvements in energy efficiency. Waratah Coal is committed to undertaking ongoing internal measurement and monitoring of emissions, in addition to mandatory reporting under NGER Act and the EEO Program. The focus of the monitoring program will be to identify sources with the greatest potential for emissions reductions. Greenhouse gas emissions may also be offset through investment in third party projects that reduce emissions below a demonstrated baseline, for example, through forestry agreements, renewable energy and partnerships such as with Australia Carbon Trust.

2.5.2 RAIL

Description of Environmental Values

DEHP monitor ambient air levels across major populated districts across the state. These levels are assessed to comply against the National Environmental Protection (Ambient Air Quality) Measure and the EPP (Air). Due to the general remoteness of the rail, there is no regulatory ambient air quality monitoring stations in the near vicinity. The closest DEHP air quality monitoring station is located at West Mackay. West Mackay is located in a light industrial area, which often observes high levels of dust, attributed to local industries.

Existing emission sources for the length of the rail result from agricultural land use practices, occasional impacts from biogenic emissions, regional dust storms and fires, and are expected to be relatively low.

Estimating existing background dust level for the rail from the West Mackay Station data is a conservative approach, as air quality emissions are substantially higher across the region of Mackay due to light industry, and are not representative of background air quality along the rail.

For the purposes of the EIS and SEIS assessment, and considering the predominantly rural environment within the study area, the estimated background levels for dust are:

- 26µg/m^3 for 24-hour average PM_{10} levels (70th percentile of 24-hour concentrations, averaged during 2006-2009)
- 22µg/m^3 for annual average PM_{10} levels (annual average concentrations, averaged during 2006-2009)
- 5.2µg/m^3 for 24-hour average $PM_{2.5}$ levels (20% of PM_{10} values, based on Midwest Research Institute, 2006)
- 4.4µg/m^3 for annual average $PM_{2.5}$ levels (20% of PM_{10} values, based on Midwest Research Institute, 2006), and
- 44µg/m^3 for annual average TSP levels (twice PM_{10} values, based on Midwest Research Institute, 2006).

Potential Impacts

Air quality indicators (under the EPP (Air)) potentially adversely affected by the Project's rail activities (construction and operation) are:

- dust particles (as PM_{10}), and
- dust particles (as total suspended particulates).

Primary sources of dust emission include:

- clearing of vegetation and topsoil
- excavation and transport of earth material
- blasting
- vehicles travelling on unpaved roads
- vehicles and machinery exhausts, and
- activities from temporary hard rock and gravel quarries situated along the alignment.

Dust impacts during the operational phase of the Project were assessed and the results indicate that dust impacts drop very quickly with the distance from the rail and dust generated from coal wagons will not lead to exceedances of the guidelines at sensitive residential locations.

Mitigation and Minimisation Commitments

In managing potential air quality impacts and implementation to various control measures in the reduction of dust emissions associated with the operation phase of the proposed rail easement, Waratah Coal will meet air quality objectives by:

- Providing covers for their coal wagons
- Using rotary coal wagons rather than bottom dump wagons
- Using state-of-the-art locomotives that have been designed to comply with current and future emission standards
- Managing locomotive speed and train performance requirements along the rail easement (operational efficiencies reduce fuel emissions)
- implementation of control measures for dust load such as coal moisture regulating systems, coal loading systems designed to minimise exposed areas and coal spillage
- managing locomotive speed along the rail easement
- installation and maintaining of dust monitoring equipment at sensitive locations along the proposed corridor
- co-operative collaboration with other proposed large-scale mining developments across the region. A requirement to manage dust emissions to levels below the adopted air quality guidelines is necessary from all parties, and
- continue ongoing consultation with the community.

The short term dust emissions associated with construction have not been quantified. These emissions are to be effectively managed through a dust management plan for construction.

Greenhouse Gas Emissions and Abatement

In minimising the amount of Greenhouse Gases (GHG) generated by construction and operation of the rail, further to the mitigation and minimization commitments provided above, Waratah Coal commits to:

- developing ongoing processes for minimising energy consumption and GHG emissions within the Project, by investigating the use of renewable energy sources in the operation of the proposed rail easement
- measure and report GHG emissions in compliance with the National Greenhouse and Energy Reporting System, and
- working with government on developing measures to address GHG emissions.

2.6 Noise and Vibration

2.6.1 MINE

Description of Environmental Values

The project has the potential to generate noise and vibration impacts on nearby sensitive receivers. Activities at the project vary in location and nature throughout the mine life, and therefore noise levels at sensitive receivers will also vary throughout the mine life. The closest sensitive receptors identified in the noise and vibration impact assessment undertaken for the project are shown in Figure 14 and described in Table 9, in order of distance from the 20 year pit limit.

Table 9. Location of noise sensitive receptors

RECEPTOR	CLOSEST DISTANCE TO 20YR PIT (KM)
Kiaora	Inside Pit
Monklands	1.10
Hobartville	4.70
Lambton Meadows	8.85*
Cavendish	10.20*
Salt Bush	12.65*

RECEPTOR	CLOSEST DISTANCE TO 20YR PIT (KM)
Eureka	14*
Corntop	17.25
Skye	18
Alpha	29.3
Jericho	31

It is important to note that the Hobartville homestead will be acquired as part of the Alpha Coal Project and is not considered in the management strategies as a sensitive receptor

Kiaora and Monklands will also be acquired or relocated to offset air and noise impacts. As such, these receptors will no longer be relevant to the Project.

Baseline noise levels were monitored at four sites relevant to the mine site during the EIS assessment, for a minimum of seven days each, in accordance with:

- Australian Standard AS1055.1-1997 *Acoustics – description and measurement of environmental noise, Part 1: General procedures*, and
- the *Queensland Noise Measurement Manual* (3rd Edition, 1 March 2000).

The monitoring was undertaken in the autumn months between 13 and 21 April 2010, and in winter between 2 and 9 July 2010. Rating Background Levels (RBL) for daytime, evening and night-time periods determined from the monitoring program, and the $LA_{eq,1hr}$ noise levels, are shown in Table 10.

Table 10. Rating background noise levels

MEASUREMENT LOCATION	RATING BACKGROUND NOISE LEVEL (minLA_{90}-DBA)			AMBIENT NOISE LEVEL (AL) $LA_{eq,1hr}$ – DBA		
	Day	Evening	Night	Day	Evening	Night
Monklands	34	25	<15	44	39	32
Corntop	29	17	<15	39	35	23
Lambton Meadows	29	22	<15	37	31	23
Cavendish	35	34	22	43	47	36

Operational noise criteria for the project were determined in accordance with the Queensland Ecoaccess Guideline Planning for Noise Control based on the noise levels in Table 10.

No background vibration monitoring was undertaken, as there were no recognised sources of background vibration in the vicinity of the proposed mine site.

Potential Impacts

From the assessment conducted, noise impacts from mine operations would be expected at locations Eureka, Lambton Meadows, Salt Bush and Cavendish without any noise treatment (with no impacts at Kiaora, Monklands and Hobartville since they are expected to be acquired or moved). Attenuation is required regarding:

- crushers associated with OC2 at the source (partial enclosure) or modification of the proposed earthworks to include a berm between the OC2 crushers and Eureka, or a combination of the two. (for residence at Eureka), and
- crushers associated with OC1, OC2 and the underground mines at the source (partial enclosures) and / or the combination of shielding from spoil dumps or stockpiles (for residences at Lambton Meadows, Salt Bush, Cavendish).

Blasting will require detailed investigation to achieve the 115dB criterion for air blasts at Hobartville, if it remains a residential receptor. This would be in the form of adjustment to the stemming height, through shielding from spoil dumps or stockpiles and / or modification of the design of the firing of the blast charges. Blasting will be designed and managed by a blasting contractor, who will control blast overpressure and vibration in accordance with the Project limits, through a detailed management plan.

Mitigation and Minimisation Commitments

The following commitments are made for the Project:

- on-going noise and vibration monitoring will continue to be carried out in accordance with the requirements of EP Act, the EPP (Noise), Environmental Protection Regulation 2008, and the Environmental Authority
- the Project will investigate all noise and vibration related complaints, and
- corrective actions resulting from complaints investigations will be implemented.

Section 5 of the *Draft Mine EM Plan* in the *Appendices – Volume 2* of this SEIS gives the management strategies and measures which will be implemented in relation to mitigation of noise and vibration in the study area.

2.6.2 RAIL

Description of Environmental Values

Noise

Noise monitoring was conducted in accordance with the Australian Standard AS1055.1-1997 *Acoustics – Description and measurement of environmental noise, Part 1: General procedures*, and the *Queensland Noise Measurement Manual* (3rd Edition, 1 March 2000). Properties for monitoring were selected to represent potentially affected residences nearest to the proposed rail alignment. Baseline noise levels were monitored for a minimum period of seven days at seven sites.

A noise model of the rail corridor and surrounding area, including the noise sensitive receptor locations, was constructed using SoundPLAN software. The graphical noise contours generated by the model represent the envelope of results for noise propagation in all directions (i.e. summary of typical worst-case noise propagation in all directions relative to the noise source). Noise contours were interpolated from predicted grid noise levels that were calculated at a height of 1.6m above local ground level. Point source receptors were also located at a height of 1.6m above ground level, representing mid-window height. The model ground terrain was based on elevation data sourced from the DEHP and was assigned to be 100% absorptive in the model which is consistent with predominant forested grass-land.

The source noise data used to model noise emissions during the typical operation of train movements were based on measured noise levels and library data files from relevant EIS documentation and manufacture specifications. Noise spectra were included in addition to the overall levels.

For the development of the model, each coal train was assumed to haul approximately 20,000t of coal to the coal terminal. Daily average calculations assumed 14 movements per day (seven up and seven down) initially for a 40Mtpa capacity, with 134 movements per day for the ultimate capacity of 400Mtpa. These movements would be at a time of choice for the mining operations and could be any time during the day or night.

The proximity of noise sensitive receptors to the proposed railway corridor alignment are provided in Table 11.

Table 11. Distance from residential receives to proposed rail alignment

RESIDENTIAL RECEIVER	APPROXIMATE DISTANCE FROM PROPOSED RAIL (km)	RESIDENTIAL RECEIVER	APPROXIMATE DISTANCE FROM PROPOSED RAIL (km)
Monklands	2.4	**Birralee**	5.3
Hobartville	4.2	**Colinta Holdings**	0.6
Skye	3.6	**Collinsville**	10.3
Forrester	4.8	**Bakara**	0.1
Riverview	6.0	**Glenalpine**	0.6
Riverview	0.7	**Eton Vale**	3.6
Weetalaba (Abandoned Homestead)	1.5	**Lenore**	1.6
Abandoned House	0.7	**Colinta Holdings**	0.8
Warrigal	3.3	**Merinda**	12.0
Havilah	11.1	**Thursto**	4.8

The predicted noise levels at residences nearest to the proposed rail alignment are outlined in Table 12.

Table 12. Predicted noise levels at residences

RESIDENTIAL RECEIVER	PREDICTED NOISE LEVELS AT RESIDENCES (DBA)		
	Initial Capacity (40Mtpa) LA_{eq}, 24hr	Ultimate Capacity (400Mtpa) LA_{eq}, 24hr	Pass-by Max LPA
Monklands	21	31	28
Hobartville	34	43	41
Skye	23	33	29
Forrester	23	33	29
Riverview	15	25	17
Riverview	32	41	42
Weetalaba (Abandoned Homestead)	26	36	34
Abandoned House	37	47	48
Warrigal	26	36	27
Havilah	<0	<0	<10
Birralee	15	25	19
Colinta Holdings	34	44	43
Collinsville	<0	<0	<10
Bakara	47	57	66
Glenalpine	33	43	44
Eton Vale	21	31	26
Lenore Station	29	38	38
Colinta Holdings	30	40	40
Merinda	<0	<0	<10
Thursto	18	28	15

Vibration

Vibration levels associated with coal train pass-by shave been examined for residential locations located within 200m of the proposed rail corridor. The only receptor within 200m of the rail corridor is Bakara. Vibration levels have been predicted based on levels sampled near Queensland Rail coal freight operations in South-East Queensland.

Predicted levels at Bakara are presented in Table 13 based on measured ground vibration levels at a position 20m from the nearest rail line during the passby of a loaded diesel-hauled coal train.

Table 13. Predicted vibration levels

RESIDENTIAL RECEIVER	DISTANCE TO RAIL LINE	GROUND VIBRATION	
		Peak Particle Velocity (mm/s)	Dominant frequency
Coal train vibration samples	20m	0.2 (wagons) 0.3 (locomotives)	5-20 Hz
Bakara	80m	<0.1	
AS2670.2 1990 Comfort Criterion		0.18 0.1	2 Hz ≥8 Hz

Potential Impacts

There is only limited potential for significant construction noise emissions at the nearest receptors due to the nature of the construction activities, the allowable time for construction per day and the large intervening distance between the sources and the receptors. Key activities producing noise and vibration during construction that are likely to impact on sensitive receptors will be identical or less than those during the operational phase.

Noise from construction and operational activities has the potential to cause an environmental nuisance at any sensitive or commercial place.

The predicted levels comply with the vibration levels recommended to achieve human comfort. It is concluded that no adverse human comfort vibration impacts would result at Bakara, or any other residential location, during coal train pass-bys.

Mitigation and Minimisation Commitments

To manage potential impacts of noise and vibration, Waratah Coal will implement the following commitments.

With respect to the noise of train pass-bys during operations along the rail corridor, the following mitigation measures will be considered for implementation at Colinta Holdings, Bakara, Hobartville, Riverview, Lenore Station, Salisbury Plains and Glenapline stations:

- develop and implement a Noise and Vibration Management Plan (NVMP) for the construction and operation of the rail
- upgrading of the residential buildings to ensure that the internal sleep disturbance criterion is achieved. This may include upgrade of the bedroom facades (particularly the windows) along with the installation of some form of mechanical ventilation to ensure that the ventilation requirements of the BCA could be achieved with external windows and doors closed (not applicable for Hobartville, Riverview, Lenore Station, Salisbury Plains and one of Colinta Holdings)
- relocation of the residence or some other form of change of use for the residences so they would no longer be noise-sensitive locations, and
- attenuation of the rail noise through the use of noise barriers adjacent to the rail. Heights and their locations would be determined during the detailed design of the rail.

Specific details with reference to management strategies for noise and vibration are given in *Element 11* of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.7 Waste

2.7.1 WASTE GENERATION

2.7.1.1 Mine

Construction

During the construction of the mine, the major infrastructure components include:

- site preparation works including the establishment of overburden and topsoil stockpiles
- CHPP including coal stockpile areas
- railway turning loops and coal load out facility
- water management structures including dams, levee banks and sediment traps
- haulage and access roads, and
- ancillary infrastructure including mine office, communications, services, and associated amenities.

Site Preparation Works: The excavation of the overburden will comprise topsoil, clay and a variety of rock material. Each will be stored in distinct stockpiles to ensure reuse of materials where practicable. The topsoil material (with appropriate sediment and erosion controls implemented) will be used in the progressive rehabilitation of the mine. Clay material extracted, and where deemed to be suitable by permeability testing, may be used to construct mine levee banks. Geotechnical investigations indicate that the majority of the rock material is Non Acid Forming (NAF) material. It is anticipated that there will be minimal waste generation during these works, as the NAF material can be used to construct mine structures including tailings storage facilities, mine levee walls and the Overburden Emplacement Facility.

CHPP: Waste generated during the construction of the CHPP will include general building waste such as surplus spoil from site when re-profiling the pad area, surplus concrete from footings, and steel off cuts from the sheet metal used in construction.

Railway Turning Loops and Coal Load Out Facility: Waste generated during the construction of the railway turning loops will include materials described in the construction of the rail alignment including surplus spoil, ballast, concrete sleepers and steel off cuts from the track and fittings. The predominant waste streams generated from the construction of the coal load out facility will be general building waste including surplus spoil from preparation of the infrastructure pad area, nonferrous and ferrous metals from construction of the conveyor frames and associated structures, surplus cement / concrete and to a lesser extent, packaging material. In order to minimise the extent of general building waste generated during the construction phase of the Project, where feasible and practicable, Waratah Coal will prefabricate materials off-site, with transportation and drop-off at designated points along the rail alignment. By procuring construction materials to the specifications and quantities necessary, general building waste from the Project will be considerably reduced.

Water Management Structures: It is expected that the majority of the excavated material from the water management structures will have the potential for reuse in construction of other Project components such as haulage or access roads. It is anticipated that a separate area adjacent to the borrow pit will be designated for the storage of unsuitable material. The quantity of surplus material is not yet able to be determined.

Haulage and Access Roads: Waste streams are expected to consist predominantly of green waste from clearing, surplus spoil and fill material, and limited hydrocarbon / oils from plant equipment during grading and compaction works. The majority of the spoil material will be stockpiled for reuse during rehabilitation of the mine site, while surplus fill will be used in other areas of the Project during construction including the pad area of the mine offices and amenities.

Workers Village, Mine office and Associated Amenities: Waste streams anticipated to be generated during the construction of this mine infrastructure will predominantly occur during the early works phase where vegetation will be cleared, and the surface profile stripped in preparation of the sub-grade / pad areas and installation of foundations and footings. General building waste including excess concrete, bricks, ferrous and nonferrous metal off cuts and surplus electrical cable associated with the establishment of services are also expected. Stormwater runoff will also be generated from the construction area. An appropriate Erosion and Sediment and Control Plan (ESCP) will be implemented to ensure that clean stormwater is diverted around the site boundary, and any sediment laden runoff is captured in catch drains. Stormwater and grey water / sewage will be generated during all phases of the Project and are discussed separately in below. Waste packing material will also be generated for office furniture, equipment and supplies associated with the mine site offices and amenities.

Operation

Aside from tailings and overburden wastes, the operation of the mine site is likely to generate the following wastes:

Workers Village: A workers village will be constructed to cater for a maximum of 2,000 personnel. The workers village will include accommodation, kitchens, dining halls, wet messes, and recreational facilities. The predominant waste streams are likely to include black water, grey water, grease trap waste (from kitchen operations), recyclables and general domestic waste including food scraps. The black and grey water will be diverted to the mine site sewage treatment facilities (STF) with a capacity sufficient to cater for peak personnel volumes. A contractor will manage the STF and be responsible for the quality of the water post treatment so it can be used for irrigation / dust suppression purposes within the Project.

Mine Office: Waste streams will comprise predominantly paper and cardboard recyclables. Printer toner cartridges will be segregated for collection and recycling. Some general domestic waste including food scraps will be disposed of consistent with the workers village.

Maintenance: Extensive plant and equipment will be used at the mine. This will result in frequent servicing requirements. Waste streams associated with such activities will include regulated waste (tyres and rubber off cuts) and hazardous material such as waste oil, lubricants, coolant and oily rags. Scrap metal may also be generated from broken machinery.

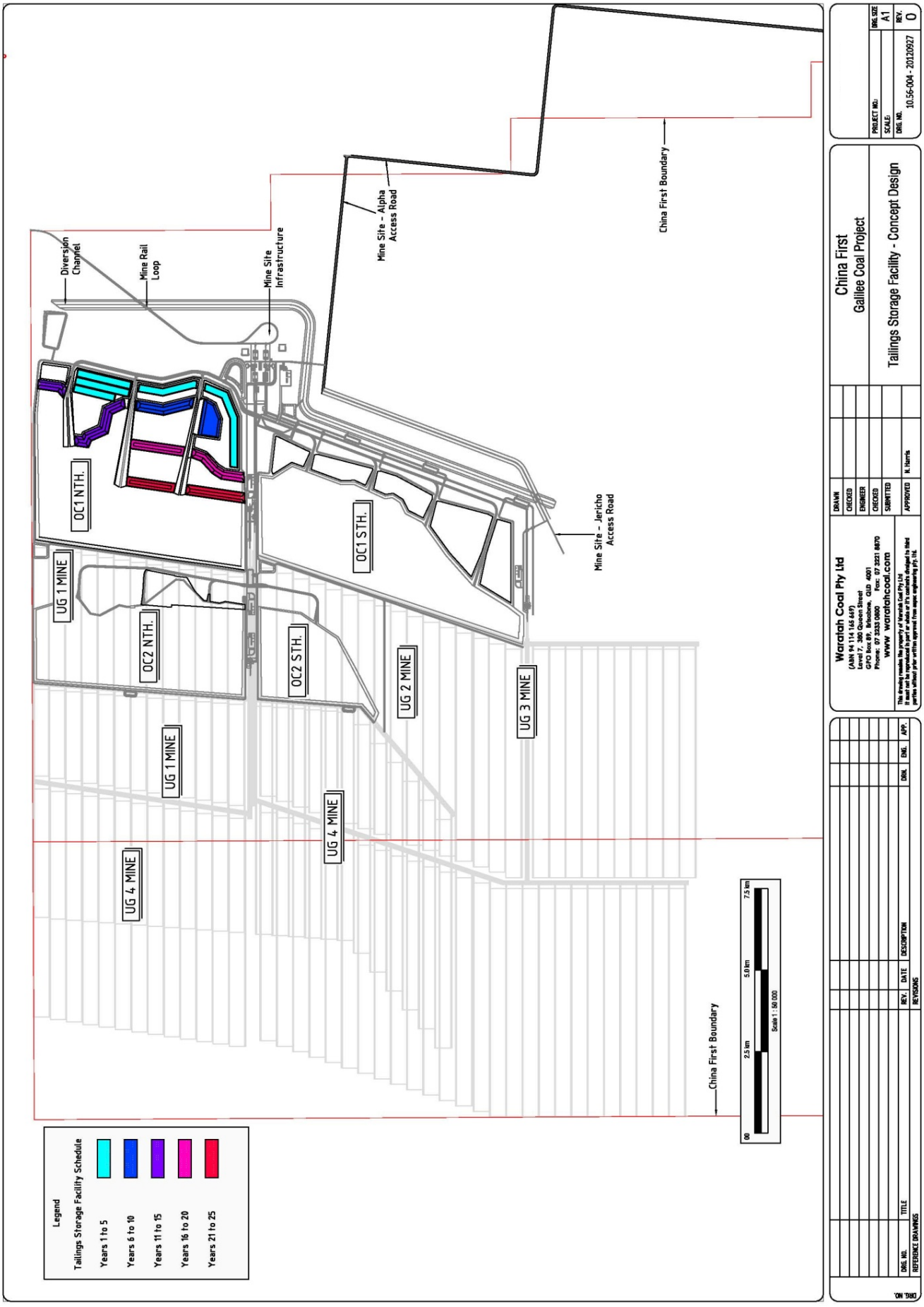
Mining Waste

Mining waste includes overburden, and coarse rejects and tailings produced in the wash plants. Coarse rejects sizing will be -50mm and the tailings will consist of a fine, silty sand (-2 to +0.125mm). The open cut mines will have an average annual overburden volume of 305Mtpa.

Dried rejects will be transported from the surge bins to containment cells in the spoil piles. Tailings will be dewatered by filter pressing and then trucked to clay lined containment cells in the spoil piles.

The proposed Tailings Storage Facility (TSF) for the China First Coal Project will be encapsulated in cells developed within the box cut and spoil pile areas. The location of the initial cells will be adjacent to the lox lines of the initial box cut, approximately 2km to 5km from the CHPP. The area can be generally described as flat terrain with alluvial clay soil profiles. Figure 15 shows the overall site layout.

Figure 15. Tailings storage facility – concept design



Potentially Acid Generating Material

Overburden

Geological logging of drill cores has not detected any oxidisable pyrite and all cores are NAF. Overburden material is benign and poses not risk to the immediate or downstream environment.

All spoil piles will be reshaped, topsoiled and seeded for appropriate vegetation growth.

Coarse Rejects

Dewatered coarse rejects will be transported from the rejects bin to containment cells in the spoil piles. Rejects will be track compacted and encapsulated in an impervious clay blanket, to prevent oxidisation.

Tailings

Tailings will be filter pressed to remove moisture and then trucked to clay lined containment cells in the spoil piles. Dried tailings will be track compacted and capped with impervious clay. In the unlikely event that the tailings pH falls below 5.0, the tailings surface will be lime dosed, prior to sealing.

2.7.1.2 Rail

Construction

During the construction of the rail alignment, the major infrastructure components will include:

- site preparation works (including accommodation camps and laydown areas / depots)
- construction of the rail alignment itself
- construction of the rail maintenance facility
- construction of maintenance roads will be located within the railway easement along the length of the railway.

It is anticipated that the largest volume of waste will be associated with the construction of the railway track, rather than the ancillary activities associated with the construction or the long term operation of the rail alignment. Therefore it is estimated that the key points of waste generation during construction of the railway include the following.

General Alignment: Vegetation clearing and surplus earthwork / spoil material are likely to form the major portion of waste generated. The footprint is approximately 22.2Mm^2. The volume of expected vegetative waste has not been estimated as detailed vegetation assessments to determine vegetative cover are currently being undertaken. The preferred corridor traverses through diverse terrains ranging from relatively sparse rural land to the undulating slopes of the Leichardt and Clarke Ranges.

The railway alignment will be constructed at or near the natural surface where possible, and has been designed to minimise and balance the quantities of earthwork material. Waste will be minimised by reuse of material where possible throughout the rail alignment. Construction selected fill material for the rail embankments (approximately 3,420,000m^3) will be sourced from material recovered from excavation of the railway cuttings (approximately 17,240,000m^3).

Based on the preliminary assessment of the corridor alignment, excess earthwork material (referred to as dump material) will be approximately 340,000m^3. Some of this material comprises topsoil that will be stripped along the entire railway. This material will be stockpiled and spread on the outer edge of the railway and used for rehabilitation works.

The remainder of the dump material is comprised of both unusable cut beyond the layer of topsoil (such as cuttings through black soils), together with surplus usable cut (beyond the general fill requirements). It is expected that this material will be either stockpiled in spoil heaps along the railway, used to backfill borrow pits and quarries, or as a last resort,hauled to a suitable dump site (either a landfill or new dump pit by agreement with landowners or local council).

Ballast material (approximately 1,000,000m^3 bulk cubic metres) will be sourced from existing and new quarry sites. Significant quantities of surplus ballast material are therefore not expected due to design specifications.

Remote and temporary camps: It is estimated that there will be up to four remote construction camps, located approximately 100km apart. These will be temporary structures for construction teams working in remote areas along the extent of the rail alignment during track laying. The camps will generate putrescibles and sewage waste with putrescibles waste expected to form the major waste stream.

A construction workforce of 1000 people split over several camps is considered necessary for the railway development. It is likely that mobile toilet and shower systems, and hence sewage and grey water will be managed via the use of a pump out system directed to a primary septic tank and collection well, prior to removal by the designated contractor. Sewage waste will then be treated via connection with municipal sewage waste infrastructure. Office waste including paper, toner and ink usage are expected to be minimal due to the primary operations orientated around general day to day living activities. It is understood that minor servicing will be undertaken and hazardous waste (waste oil, lubricants, hydraulic fluid, etc.) will be generated. Spill kits will be located within the designated plant service area with the personnel trained in emergency response management to ensure a prompt response to such incidents.

Concrete Batch Plant: A concrete batch plant will be located near Collinsville and will service the rail corridor for the manufacture of culverts and bridge structures (at this stage it is envisaged that the concrete rail sleeper will be procured from offshore). Waste generation is likely to include turbid and highly alkaline wastewater as well as dust emissions associated with the concrete batching plant. The plant will be designed such that clean stormwater will be diverted away from contaminated areas and directed to the stormwater discharge system. The wastewater collection system will be designed to collect process wastewater from:

- agitator washout
- plant and yard wash down
- concrete batching area
- slump stand
- contaminated stormwater, and
- any additional wastewater from the batching plant operation.

The process wastewater will be directed to a settling pond (or series of ponds) so the water can be reused in the concrete batching process to minimise the volume of wastewater to be discharged under a trade waste license. The dry sediment will be removed from the ponds and depending on the levels of contaminants, will either be land farmed and re-used throughout the Project where practicable, or disposed of at a licensed waste facility.

Mechanical Workshop: It is understood that all plant and equipment will be serviced off site for major servicing requirements. There will be capability onsite for minor servicing in the event of plant breakdown or tyre blowouts. The potential for the generation of small quantities of regulated waste including tyres, hydraulic fluids, coolants and oils is likely. The onsite vehicle maintenance contractors will be responsible for all waste generated. The vehicle maintenance contractor will be required to store any dangerous goods or hazardous substances in accordance with Australian Standard 1940: *Storage and handling of Flammable and Combustible Liquids* (AS1940) with appropriate spill kits readily available and located near the designated storage area. All waste will be transported by a licensed contractor to an approved waste disposal facility.

Bridge, Culvert and Retaining Walls: Currently 12 bridges, 359 culverts totalling approximately 14km in length and three retaining walls with a total face area of 892m^2 are proposed for the preferred corridor. It is anticipated that the majority of waste generated will be construction material comprising predominantly excess concrete / cement and surplus steel and reinforcement off cuts. In order to minimise the extent of general building waste generated during the construction phase of the Project, where feasible and practicable, Waratah Coal will prefabricate materials off-site with transportation and drop-off at designated points along the rail alignment. By procuring construction materials to the specifications and quantities necessary, general building waste from the Project will be considerably reduced.

Construction Emission Sources: Air emissions during the construction phase of the rail easement will be primarily dust related. Emissions of combustion-related pollutants, such as nitrogen oxides and volatile organic compounds from diesel construction equipment and vehicles are expected to be minor. Dust emission sources include clearing of vegetation and topsoil, excavation works, blasting, transportation movements, and temporary activities associated with quarries along the proposed alignment

Operation

During the operation of the rail, the waste streams generated are anticipated to be significantly reduced in comparison to the construction phase of the Project. There will be a reduced workforce and demand for raw construction materials. Points of waste generation during the operation of the rail alignment are likely to be associated with:

Track maintenance: It is anticipated that waste generated during track maintenance will comprise predominantly vegetative waste associated with clearing of overgrown weeds and shrubs, concrete from broken sleepers, surplus ballast, and steel from damaged or broken track or fittings. It is anticipated that organic herbicides will be used along the extent of the rail alignment to manage weeds, and therefore some waste in the form of empty containers will be generated. All containers will be triple rinsed for recycling.

Operation of the maintenance facility for rail operations: This facility is expected to generate several waste streams due to its multiple purposes in servicing plant and equipment as well as providing facilities for track and signalling workers. The major portions of the waste are likely to comprise hazardous solids and liquids including waste oil, lubricants, coolant, oily rags and putrescibles waste including general domestic waste and sewage and grey water from ablutions. Hazardous substances will be stored within the facility, and in the event of spills, spill cleanup material will also be required to be managed.

Maintenance of Access Roads: During maintenance of access roads within the easement of the rail corridor, generated waste will predominantly consist of spoil and excess fill material from road surface re-profiling / regrading.

Operational Emission Sources: Potential emissions during rail operations (coal transportation) will primarily come from locomotive exhausts. This in part settles on rail easements. Where combustion related pollutants, such as nitrogen oxides and VOCs from diesel construction equipment and vehicles will minimally contribute as a primary emission source. Odour may rise from fuel burning of vehicles or equipment or explosive usage, but it is not expected to reach significant levels in the ambient air.

2.7.2 WASTE MANAGEMENT AND COMMITMENTS

2.7.2.1 Mine

Environmental harm could occur in an around the mine site if wastes are not managed properly. Sensitive receptors including residences and ecosystems surrounding the Project site could be detrimentally impacted if waste streams entered waterways and groundwater systems and then flowed off-site. Similarly, air emissions have the potential to impact sensitive receptors off-site. The following waste streams from the Project have the potential to impact on the above mentioned environmental values:

- solid waste (other than mineral waste) including regulated waste, general waste and sewage
- waste water from the mining operations and processing plant, and
- air emissions including particulates, fumes and odour from the Project during construction and operation.

Waratah Coal will:

- develop and implement a detailed waste management guideline utilising the principles of the waste management hierarchy
- work with local councils to determine the current landfill capacities and accepted waste types and will work with councils to assist with the planning of expansion and upgrade of landfills to ensure wastes generated from the mine can be accommodated if required
- encourage the procurement of pre-fabricated materials where practicable
- encourage local businesses to take advantage of opportunities for re-use and recycling, if available or initiate opportunities, if unavailable. Regularly review the waste management plan including the marketability of wastes and the results of waste audits to improve waste management
- establish contracts with companies encouraging sustainable waste management practices
- a register of all chemicals stored on the China First Mine site will be maintained
- the storage and handling of flammable and combustible liquids will be in accordance with AS 1940 – Storage and handling of Flammable and Combustible Liquids
- all regulated waste will be appropriately disposed of to a facility licensed to receive such wastes and, where required, be tracked, and
- as part of the staff awareness and induction program, re-use and recycling will be encouraged.

See also the Waste Management Section (*Section 7*) of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.7.2.2 Rail

Wastes will be stored or transported for offsite disposal. It is recognised that improper storage or disposal of waste may impact the environmental values recognised in the Environmental Protection (Waste Management) Policy 2000, namely:

- the life, health and well-being of people
- the diversity of ecological processes and associated ecosystems, and
- the land use capability.

To manage potential impacts associated with the creation and management of waste, Waratah Coal will implement the following commitments:

- undertaking actions that will reduce potential impacts through a proactive rather than reactive approach to waste generation and minimisation
- preparing a project specific Waste Management Plan (WMP) to be incorporated into the rail EMP. The EMP will be prepared in accordance with legislative requirements and any conditions imposed by the Coordinator-General
- where practicable and possible,have materials prefabricated to reduce waste streams from the construction of the Project, and
- carrying out waste management in a manner that will have the most benefit to the local community. This includes:
    - throughout the life of the rail Waratah will work with the regional councils and other relevant groups to determine existing capacities and accepted waste types of their landfills and where required assist with the planning of expansion and upgrade of landfills to ensure wastes generated from the Project can be accommodated
    - when sourcing waste contractors preference will be given to local businesses employing sustainable waste management practices, and
    - work with local businesses so that they can take advantage of opportunities for re-use and recycling.

Specific details with reference to management strategies for waste are given in *Element 12* of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

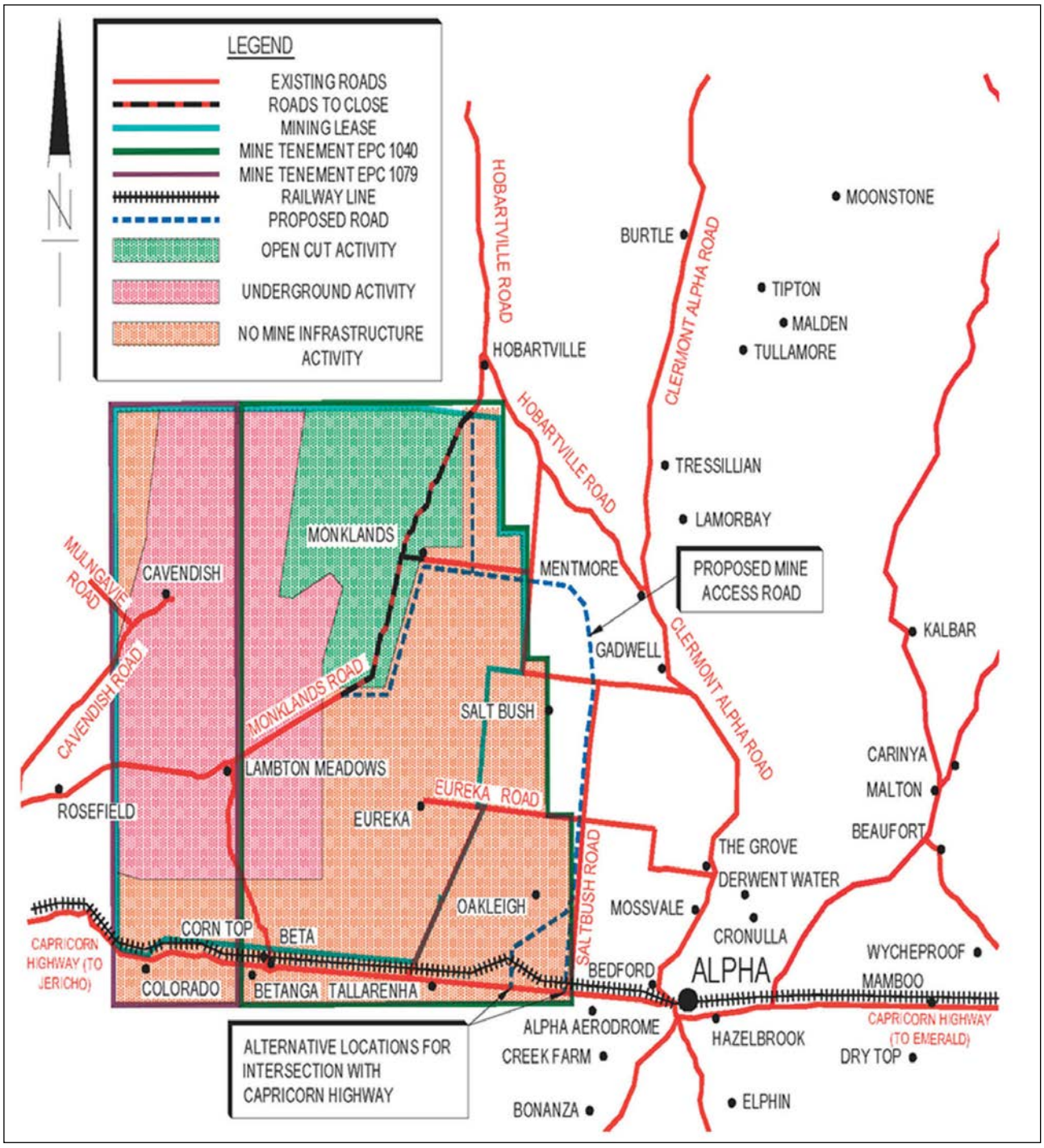
2.8 Transport

2.8.1 TRANSPORT METHODS AND ROUTES

2.8.1.1 Mine

The regional transport network in the vicinity of the mine that will be subject to construction and operation traffic is illustrated in Figure 16. The majority of these roads are administered by BRC, the exceptions being the Capricorn Highway and Clermont-Alpha Road, which are state controlled roads managed by Department of Transport and Main Roads (DTMR).

Figure 16. Regional transport network at the mine site



A brief description of these public roads is as follows:

- **Capricorn Highway (DTMR)** – a state strategic fully sealed two lane carriageways, with sealed shoulders and overtaking lanes throughout. It is a moderately trafficked highway with 100km/hr speed limits except through townships. It generally runs east to west from Rockhampton to join the Landsborough Highway at Barcaldine
- C**lermont-Alpha Road (DTMR)** – a single lane carriageway that connects the Capricorn Highway at Alpha with the township of Clermont. This road generally heads in a northerly direction and is sealed for the first 35km from Alpha and within approximately 7km of Clermont

- **Hobartville Road (BRC)** – a 17m wide formed unsealed route connecting Hobartville Homestead with the Clermont-Alpha Road. This section is approximately 19km long and generally able to accommodate bi-directional traffic
- **Monklands Road / Jericho-Degulla Rd (BRC)** – a local access route connecting Hobartville Homestead and the Capricorn Highway east of Jericho, via Lambton Meadows Station. This 12m wide unsealed road passes through the middle part of the proposed mining lease
- **Saltbush Road (BRC)** –an unsealed local road that connects the Capricorn Highway 7km west of Alpha with Eureka Road to the north. This 10km section of road is approximately 15m wide and generally provides adequate space for passing traffic
- **Eureka Road (BRC)** – an east to west running local access route from Saltbush Road to Eureka Station. This 15m wide unsealed route passes through the proposed mining lease
- **Cavendish Road (BRC)** – an unsealed route connecting Cavendish Station with the township of Jericho. A small section of this route passes through the western portion of the proposed mining lease, and
- **Mulngavie Road (BRC)** – a local access route stemming from Cavendish Road which runs in a northerly direction. Part of this unsealed route traverses the proposed mining lease boundary.

In addition to those roads documented above, a select number of unnamed council roads exists in the vicinity of the proposed mine. These roads, as illustrated in Figure 16 operate within dedicated road reserves and generally exist in both a formed and unformed state.

The nearest major road to the proposed mining lease is the Clermont-Alpha Road. From Alpha the mine site is most effectively accessed via Hobartville Road, then Monklands Road.

Following a review of the existing local road network, it is proposed to upgrade the existing Saltbush Road to provide a direct connection between the mine and the Capricorn Hwy. This road would provide a more direct access route from Alpha than via the Clermont-Alpha Road which follows the Alpha Creek alignment.

Potential Impacts

Construction and Operational Usage

Mine generated traffic will consist of several categories including Drive in Drive out (DIDO); state, regional and local staff; specialist contractors; and servicing of development. These trips will be distributed throughout the road network on a local, regional, state, interstate and over dimensional level. These trips will in some cases be assigned to the road network based on standard assignment principles, most notably DIDO trips; however larger and over dimensional vehicles will be assigned to the road network based on road condition and level of maintenance.

The following categorisation has been used to define distribution and assignment:

- **Local** mine generated trips will generally include staff and support service vehicles based in the towns of Jericho and Alpha. It is fully expected that these trips will be heavily orientated to the Capricorn Highway
- **Regional** mine generated trips will generally include support services and some DIDO generated trips. These trips will generally be distributed to the east and west on the Capricorn highway and will include the towns of Emerald and Barcaldine
- **State** mine generated will generally include service and support orientated trips, and will generally be orientated to the east of Emerald and include Rockhampton and Gladstone

- **DIDO** Drive In/Drive Out mine generated traffic will generally include drive in drive out trips which generally includes staff accommodated on site who will travel from Rockhampton and Gladstone in the east and to a lesser extent Mackay. The average commute time to mine activities is 4.5 hours; in consideration of a standard deviation from the mean this would place these DIDO trips at the far extremities of likely DIDO movements. It would also appear economically beneficial to fly from these points of origin in most cases
- **Interstate** mine generated trips will be heavily orientated to the main primary road network, routes generally encompassing the Capricorn Highway before using the Bruce Highway the Gregory Highway and the Landsborough Highway, and
- **Over Dimensional** mine generated trips will generally commute from Mackay to the north and Rockhampton and Gladstone to the east. Due to the nature and size of the vehicles it is expected that those trips generated by the development from Mackay will not use the Clermont Alpha Road. These vehicles and associated loads will specifically require drivers to use only well maintained and sealed roads.

Construction

The total truck requirements will be approximately 18,654 trucks over the three year construction of the site. This equates to an average of 18 trucks per day. It is noted that this equates to 36 vehicle movements per day, with loaded and unloaded vehicle movements per trip. It is assumed that all equipment provided to the site is dedicated to the site for the term of its use. As such, items such as mobile cranes and forklifts will be located on-site and not transported to and from the site as required.

Approximately 75% of these trips will be from the local area. These will consist of material deliveries from local quarries and suppliers for materials and infrastructure components. The remainder will be distributed from the wider region, state wide (including ports) and national.

As such, 14 vehicles per day are expected to be local, while four heavy vehicle movements per day will continue beyond the local area.

During the construction it is estimated that there will be approximately 2,500 staff on site. It is assumed that construction will take place under 12 hour shifts. It is further noted that during the later construction period that there will be a total of 4,500 staff operating at the site for a short period of time as construction and operation activities overlap. In order to ascertain an approximation of staff generated traffic the following parameters have been assumed:

- it is assumed 95% of staff will be accommodated on site
- 5% of workers (including subcontractors) will access the site utilising private vehicles, with an average car occupancy for passenger vehicles of two persons
- on-site accommodated staff will consist of 90% Fly In Fly Out (FIFO) and 10% DIDO, and
- peak hour movements account for approximately 40% of daily traffic.

The traffic generation also takes into account the expected roster and shift systems which would result in:

- 60% of workers rostered on
- two shifts of 12 hours each, with 70% of rostered staff on day shift and 30% on night shift.

As such, the maximum staff accessing the site for a shift on a given day will be 208. This will generate:

- long distance /shared driving – DIDO trips generally have an occupancy of two persons per vehicle based on observations for DIDO trips on the Peak Downs Highway, and
- 208 workers utilising 92 cars and 3 buses, equivalent to 184 vehicular movements.

This is considered a worst case scenario as it assumes that shift workers, admin staff and sub-contractors all arrive and depart the site during the same peak hour, which is unlikely to occur. A strong emphasis will also be placed on maximising multi-use transport such as buses.

Based on the above assessment of construction (non site staff) vehicles trips it is estimated that there will be an average of 14 Heavy Goods Vehicles trips per day attracted to the development site during the construction phase. Based on a 70% roster of staff, it is estimated that there will be approximately 3 bus trips and 89 private vehicle trips per day generated by the development site during the construction phase. This equates to 6 bus movements and 178 private vehicles per day movements.

The daily traffic volume generated by the site is expected to equate to 0.01 vehicle movements per day for each member of staff employed at the mine. These traffic volumes are expected to be distributed as follows:

- 80% to the immediate local area (Alpha and surrounds)
- 30% to continue to Emerald and beyond
- 15% to Jericho, and
- 5% north of the mine site.

Of the mine generated traffic, 5% (approximately five vehicles per day) are expected to continue through Barcaldine toward Longreach. Additionally, 30% is expected to pass through Emerald to the east, while 5% will head north via the Gregory Highway; these are primarily expected to consist of long distance heavy vehicle movements, servicing the site from major regional centres near the coast and interstate. The location of regional centres such as Rockhampton and Gladstone, and to a lesser extent Emerald, Blackwater and Dingo all to the east are likely to see the majority of trips attracted eastward, it is also noted that most northerly trips will also head via emerald before turning north.

Operation

The total truck requirements will be approximately 93,087 trucks over the first 25 years operation of the site. This equates to an average of 11 trucks per day, or 22 vehicle movements per day, with loaded and unloaded vehicle movements per trip. It is assumed that all equipment provided to the site is dedicated to the site for the term of its use. As such, items such as excavators and dump trucks will be located on-site and not transported to and from as required.

A larger portion of operational traffic will be from non-local sources, with basic material requirements (such as road base and structural materials) reduced from the construction stage and an increased focus on more specialist requirements, such as fuel and explosives, which are sourced from further destinations. This will result in approximately 3 vehicles per day (vpd) from local and 8vpd from non local sources, however, it is anticipated that bulk items such as fuel will be transported via 95,000L fuel tanker wagons in the new fuel trains on the new heavy haul train line.

It is expected at least 95% of the 2,000 man work-force will be accommodated on site, with up to 5% accommodated off site. Approximately 60% on shift, 40% off and also a 70/30 split between day and night shift. Staff will be transported from the airfield to the accommodation centre and mine site internally via communal transport mainly buses seating between 16 and 50 passengers based on demand.

Of the 95% of staff to be accommodated on site, it is assumed that approximately 10% will commute via a DIDO basis. The remaining on site accommodated staff are expected to commute on a FIFO basis.

The remaining 5% of staff are expected to stay locally and will commute on a daily basis to the mine. The local based staff are expected to be employed within the administration and servicing of the development. It is expected that offsite local resident staff will commute with an average occupancy per vehicle of two staff members. It is expected that this will equate to approximately 60 trips per day.

To summarise:

- it is assumed 90% of staff will be accommodated on site
- 10% of workers (including subcontractors) will access the site utilising private vehicles, with an average car occupancy for passenger vehicles of two persons, and
- peak hour movements account for approximately 40% of daily traffic.

The traffic generation also takes into account the expected roster and shift systems which would result in:

- 70% of workers rostered on, and
- two shifts of 12 hours each, with 70% of rostered staff on day shift and 30% on night shift.

This is considered a worst case scenario as it assumes that shift workers, admin staff and sub-contractors all arrive and depart the site during the same peak hour, which is unlikely to occur.

The daily traffic volume generated by the site is expected to equate to 0.26 vehicle movements per day per for each member of staff employed at the mine. These traffic volumes are expected to be distributed as follows:

- 80 % to Alpha
- 15 % to Jericho, and
- 5 % north of the mine site.

Of the traffic generated by the mine 30% is expected to continue through Alpha to Emerald, largely consisting of heavy vehicles and possibly mine workers who may DIDO between rostered periods.

All coal outputs will be transported from the mine site to the coal terminal via rail. Additionally, the overburden will remain within the mining lease area. Therefore, heavy vehicles to and from the mine will be primarily to supply the site with equipment, services and resources to undertake the daily mining operations.

The local distribution of heavy vehicles travelling to and from the mine site will be 100 % to the Capricorn Highway, with:

- 15 % to the west
- 85 % to the east, including:
    - 45 % terminating at Alpha
    - 30 % continuing eastbound on to Emerald and beyond, and
    - 10% to travel north primarily via the Gregory Highway, and
- the Clermont Alpha road will not be utilised by Heavy Vehicles, due to the existing conditions and in general the lack of northbound trips. Hauliers and heavy vehicle mining trip providers will be explicitly advised not to utilise this route as part of the mines future road user management plan.

Mitigation and Minimisation Commitments

The following commitments are made in relation to traffic for the Project:

- road works identified in the control strategies will be implemented to mitigate the traffic impacts of the project
- a privately-operated transport service will transport the workforce between the accommodation village and the mine
- continue to work with DTMR to ensure a practical solution to intersection upgrades, and
- promote safe driving over long distances (fatigue management) in consultation with the local road action group.

Specific details with reference to management strategies for traffic are given in Section 6 of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.8.1.2 Rail

Operation of the rail will not impact upon the local transport network.

The construction of the railway over a three year period is expected to have a temporary impact on the local transport network. Currently state controlled roads intersected by the railway carry light traffic volumes, with the exception being the Bruce Highway. Parts of these roads will be used as supply routes for materials from quarries, goods and services from regional townships, as well as for transport of workers from accommodation camps. Consequently, this may increase traffic on these roads by up to 157 Vehicles Per Day (VPD). These figures are considered suitable for assessment without considering future traffic growth, as the traffic impacts are only expected to occur during the temporary construction phase.

Heavy vehicle impacts to the external road network will predominately concentrate along haul routes to quarry sites. This will increase traffic by up to 87VPD and result in a significant proportional increase in traffic on background conditions and a more substantial increase in ESAs, given the high percentage of trucks, albeit from a low base.

In accordance with DTMR guidelines, the capacity of local roads was assessed through consideration of Level Of Service (LOS). For a 100km/hr two lane rural road, a LOS A is achieved where maximum daily traffic volume is less than 4,000 vehicles. Only the Bruce Highway is expected to carry this magnitude of traffic, with construction traffic expect to marginally increase on current volumes of 2,600VPD. As such, the provision of adequate two-lane, two-way carriageways will retain a LOS A on all roads used by railway construction traffic, including the Bruce Highway. All other non-State controlled roads are expected to operate with less than 60 vehicles per hour (vph), including development traffic.

Road Intersections

As with LOS, road intersections are generally not likely to experience any significant congestion where traffic volumes are less than 100 vehicle per hour (vph). As such, existing configured intersections are expected to be suitable to cater for railway generated construction traffic. The exception to this may be intersections along the Bruce Highway, between the site and traffic sources such as workers villages, quarries and the rolling stockyard.

Rail Crossings

The proposed railway will impact a number of existing infrastructure transport corridors including:

- Major State Controlled Roads and Railway Lines:
  - Gregory Development Road – Kilometrage 280km
- Minor State Controlled Roads and Local Authority Roads:
  - Strathalbyn Road (WRC) – Kilometrage 39km
  - Tabletop Road (WRC) – Kilometrage 62km
  - Curringa Road (WRC) – Kilometrage 69km
  - Strathmore Road (WRC) – Kilometrage 71km
  - Bicentennial Nation Trail Road (WRC) – Kilometrage 71km
  - Bowen Developmental Road (TMR) – Kilometrage 163km
  - Glenavon Road (WRC) – Kilometrage 193km
  - Suttor Developmental Road (TMR) – Kilometrage 197km

- Stratford Road (WRC) – Kilometrage 208km
- Avon Road (IRC) – Kilometrage 257km
- Clermont Laglan Road (IRC) – Kilometrage 342km
- Albro Pioneer Road (IRC) – Kilometrage 389km
- Surbiton Wendouree Road (BRC) – Kilometrage 410km
- Degula Road (BRC) – Kilometrage – 423km
- Hobartville Road (BRC) – Kilometrage 445km.

Private Property Roads

There are approximately 190 existing tracks that have been identified as crossing the rail line.

Potential Impacts

Due to the remote nature of the majority of the railway, environmental impacts of increased traffic to nearby sensitive receivers such as residences, stock and roadside vegetation, is expected to be minimal. The exception to this may be along designated haul routes through townships, such as Collinsville and Mount Coolon. The potential environmental impacts and other roadside issues resulting from rail construction traffic may include:

- **Road Noise** – some construction activities may generate elevated noise levels on background levels, mainly resulting from heavy vehicle movements to and from quarries. Excessive environmental noise can be a displeasing annoyance and distraction to the activity and balance of human and stock life. The intensity of roadside noise may temporarily impact residences within 500m of either the railway, or along construction haulage routes (particularly through townships)
- **Dust and Weed Contamination** – routes used for construction traffic may contribute to dust contamination, particularly along unsealed roads during the dry season. This may present a health and safety impact to adjoining land uses, stock and roadside vegetation. In particular it can pose a safety concern to motorists travelling along unsealed roads by obstructing sight distance. The movement of vehicles to and from the railway corridor increases the risk of spreading noxious weeds, plant debris and exotic pests
- **Roadworks in a Road Reserves** – the construction of the railway will require works to be conducted within existing road and rail reserves. This may include temporary closures to allow construction of bridges, level crossings and associated track works. These may result in interruptions to residents using these routes
- **Over Dimensional Vehicles** – the construction of the railway will require over-dimensional vehicles to operate between the site and regional townships. These will predominately supply the railway with large prefabricated items, materials and equipment. Accessibility for over-dimensional vehicles is available at the Bruce Highway intersection with the rail line. Further access will be via the Bowen Developmental Road and Suttor Developmental Road, which are also unrestricted. Currently the only restriction for over-dimension access within the vicinity of the site is through the township of Tambo. There are no excess dimension restrictions for the townships of Alpha, Jericho or Emerald, or for the Capricorn Highway
- **Heavy Mass Vehicles** – the construction of the railway is likely to require the transport of heavy materials and equipment to the site. Transport along approved Higher Mass Limit (HML) roads for vehicles with pavement friendly suspension is administered by DTMR. Currently the Bruce Highway and a small part of the Bowen Development Road are the only HML approved routes within the vicinity of the railway corridor, and
- **Dangerous Good and hazardous Materials** – the development of the railway will require the transport of dangerous goods and hazardous materials to and from the site. This may include fuel and oils, flammable gas, corrosive materials including solvents, explosives and chemical wastes including sewage. The transport of these goods increases the risk of a chemical spill on route.

Mitigation and Minimisation Commitments

To manage potential impacts to traffic and transport associated with the construction and operation of rail, Waratah Coal will implement the following commitments:

- Waratah Coal develop the following documents:
  - Road Impact Assessment Report
  - Road Use Management Plan
  - Traffic Management Plans, and
  - Traffic Control Plans.

These plans will cover key safety and logistical issues such as:

- signage and traffic control requirements, including requirements for bypasses if necessary
- development of temporary access routes and intersections to QDRM standards
- heavy vehicle movements and operating requirements, including appropriate routes, hours of operation, vehicle wash-down and operational restriction
- mitigation works and monetary contributions to be made to road authorities to provide a safe and efficient road network
- relevant contacts within the project
- issue identification and responses
- planning and permit requirements including those needed for over-dimensional vehicles and transport of dangerous goods, and
- processes for community information and responses.

Specific details with reference to management strategies for traffic are given in Element 14 of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.9 Indigenous Cultural Heritage

2.9.1 MINE

Description of Indigenous Cultural Heritage Values

The approach used for indigenous cultural heritage involves the development of Cultural Heritage Management Plans (CHMPs), proceeding into cultural heritage surveys and development of management plans to provide management measures for ongoing works. Desktop assessments have found that no indigenous cultural heritage sites are listed on local, State, Commonwealth or World heritage registers, including the Aboriginal Cultural Heritage Database and Register within the mine area.

However, the lack of sites identified and registered does not mean no sites are present, with the limited number of detailed archaeological investigations highlighting the limited amount of detailed information documented about the area. It is known, however, that several sites exist in the area in the vicinity of the proposed mine.

To date, specific field surveys for the project have only been conducted in specific areas required for geotechnical purposes. Although the survey reports are confidential in nature, the field surveys have identified some cultural heritage material in the vicinity of the mine site. Sites identified have included isolated artefacts, stone artefact scatters and sacred trees.

A series of detailed cultural heritage surveys of the proposed mine area will be undertaken in accordance with the requirements of the agreed CHMPs.

Potential Impacts

No listed indigenous cultural heritage will be impacted by the planned mine development; however, there are expected to be potential impacts on some cultural heritage material within the mine development area. In instances where this cannot be avoided, measures to mitigate impacts will be agreed with the Aboriginal parties, in accordance with approved CHMPs.

Items of unrecorded Indigenous cultural heritage may occur near the proposed mine developments, and without appropriate site management initiatives, may be threatened by construction impacts. Unrecorded Indigenous heritage resources within impact areas will be identified during dedicated field surveys conducted by the relevant Aboriginal party as agreed in the CHMP. The conduct of the cultural heritage study and the implementation of site protection or remediation measures will be specified in approved CHMPs, either already agreed or still to be negotiated with each Aboriginal party.

Impact mitigation measures that may be required include avoiding certain highly sensitive areas, carrying out more field investigations including sub-surface testing, recovering datable occupation material, and collecting and relocating cultural heritage items.

Mitigation and Minimisation Commitments

The following commitments are made in relation to the preservation of Aboriginal cultural heritage and non-Indigenous heritage values associated with the Project area:

- Waratah Coal commits to implementing procedures during site activities that aim to identify, assess and record undetected non-Indigenous heritage sites
- control strategies in the EIS will be implemented to manage known and potential cultural heritage sites and values located within the project site
- conduct regular cultural heritage education sessions/trainings to employees, and
- development and implementation of a CHMP in consultation with the relevant Aboriginal party, and in accordance with the requirements of the ACH Act.

See also the Cultural Heritage section (Section 11) of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.9.2 RAIL

Description of Indigenous Cultural Heritage Values

Waratah Coal is in the process of completing Cultural Heritage Management Plans (CHMP) negotiations with relevant Aboriginal parties. Waratah Coal has undertaken appropriate steps to identify correct Aboriginal parties in accordance with the *Aboriginal Cultural Heritage Act 2003* (ACH Act). The following registered Native title claims have been identified as Aboriginal Parties: The status of CHMP negotiations is shown in Table 14.

Table 14. Status of CHMP negotiations with Aboriginal parties

ABORIGINAL PARTY	CONSULTATIONS COMMENCED	NUMBER OF MEETINGS TO DATE	CHMP STATUS	EXPECTED TIMING FOR CHMP APPROVAL
Wangan and Jagalingou People (QC 04/6)	October 2010	4	CHMP has been agreed	CHMP has been approved
Jangga People (QC98/10)	October 2010	2	CHMP has been agreed	CHMP has been approved
Birri People (QC 98/12)	November 2010	2	CHMP has been agreed	CHMP has been approved
Southern Notification area	June 2011	2	Negotiations are ongoing	Ongoing – Q1 2013
Northern notification area – endorsed Aboriginal parties	Consultations are yet to commence	N/A	N/A	Ongoing – Q2 2013

A portion of the rail corridor is within the APSDA. The NQBP and Coordinator General has completed negotiations with the Juru People (QC10/5) in the APSDA area to finalise an Indigenous Land Use Agreement (ILUA) to address works undertaken within the APSDA. The ILUA will also address protocols for the management of cultural heritage. Waratah Coal will liaise with the relevant Aboriginal party to establish and implement the cultural heritage protocols outlined within this ILUA for its' proposed works within the APSDA.

Field Surveys

To date, specific field surveys for the Waratah Coal Project have not been conducted. Detailed cultural heritage surveys of the proposed rail corridor will be undertaken in accordance with the requirements of the agreed CHMPs.

Potential Impacts

Items of unrecorded Indigenous cultural heritage may occur within of near the proposed rail corridor and without appropriate site management initiatives, may be threatened by construction impacts. Unrecorded Indigenous heritage resources within impact areas will be identified during dedicated field surveys conducted by each relevant Aboriginal party as agreed in the CHMPs

Mitigation and Minimisation Commitments

To manage potential impacts to Indigenous cultural heritage, Waratah Coal will continue engagement and negotiations with endorsed Aboriginal parties and to develop (where not already developed) and implement agreements to manage cultural heritage.

See also Element 15 (Cultural Heritage) of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

2.10 Non-Indigenous Cultural Heritage

2.10.1 MINE

Description of Non-Indigenous Cultural Heritage Values

A staged assessment process for non-indigenous heritage was undertaken in the mine area, involving a comprehensive review of publicly available information together with significant stakeholder consultation and field assessment. No places were identified in the desktop assessment within or in close proximity to the mine area, with the field assessment identifying the Monklands homestead complex, which includes a shearing shed of potential local significance. Development of the mine will require the removal of the Monklands homestead; however, generally the study found that the proposed mine will generally have a minimal impact on places of cultural heritage significance.

Potential Impacts

The open cut mine and associated facilities extends over 120km^2, which includes three pastoral properties: Kiaora, Glenn Innes, and Monklands. A further area of underground mining will be below the Cavendish, Spring Creek and Lambton Meadows properties.

These properties were originally part of the Hobartville run, which was consolidated from a series of smaller runs in the 1880s. With the consolidation, Hobartville became one of the largest runs in the Alpha district comprising 2,200km^2. In the 1890s, however, the Queensland government began resuming parts of Hobartville under provisions of the *Crown Lands Act 1884*. The blocks Hobartville No 3 and No 5 were part of the resumption. By the 1920s, the area had been subdivided into a number of grazing farm and grazing homestead leases including Cavendish, Kiaora, Monklands and Hazelbush. These blocks have remained substantially unchanged, although for periods some blocks have been amalgamated into larger holdings. Cavendish, for example, included Kiaora and Glen Innes, while Monklands and Saltbush have been worked as a single property for an extended period. Until the 1960s these properties, like most other in the Alpha district, principally carried sheep.

Kiaora has been operated as a separate block for more than 20 years. Most of the current infrastructure on Kiaora has been erected in this period and includes a house, sheds, dams, tanks, yards, windmills and fencing.

The infrastructure on Monklands / Saltbush has been developed from the early 20th century, and includes houses, sheds, yards, shearing shed, tanks, dams and fences.

The shearing shed possibly dates from the 1920s or earlier when the property was first established. It is a relatively small shearing shed with two stands and associated yards. The wool press remains although shearing has long ceased.

On Kiaora, none of the infrastructure has heritage significance as it has all been erected in the past 20 years.

The Monklands homestead complex comprising two houses, sheds and shearing shed could potentially have local significance as an example of a small-scale pastoral property in the Alpha district that was developed in the early 20th century. The shearing shed, in particular, is intact with some machinery and a wool press remaining *in-situ*. Monklands is a typical and good example of a smaller holding that was developed following the resumption of the larger runs in the late 19th century.

The survey and assessment of the mine area revealed that generally the project will have only a minimal impact on places of non-indigenous cultural heritage significance, with the only site identified as potentially significant being the Monklands homestead. This site would potentially meet the threshold for local significance, with evidence of use in this former sheep property in the shearing shed and wire-netting fence. The development of the mine and associated infrastructure will require the demolition or removal of the Monklands homestead complex.

Mitigation and Minimisation Commitments

The following commitments are made in relation to the preservation of non-Indigenous heritage values associated with the Project area:

- Waratah Coal commits to implementing procedures during site activities that aim to identify, assess and record undetected non-Indigenous heritage sites
- control strategies in the EIS will be implemented to manage known and potential cultural heritage sites and values located within the project site, and
- conduct regular cultural heritage education sessions/trainings to employees.

See also the Cultural Heritage section (Section 11) of the *Draft Mine EM Plan* contained in the *Appendices – Volume 2* of this SEIS.

2.10.2 RAIL

Description of Non-Indigenous Cultural Heritage Values

Register Review

Waratah Coal undertook a review of the relevant non-Indigenous cultural heritage registers. No places were identified in the Australian Heritage Places Inventory within or in close proximity to the project area.

No places were identified in the Queensland Heritage Register within the Project area or immediately adjacent. Five places were identified within 20km of the rail corridor; however, it is highly unlikely these places will be affected.

The sites identified are:

- **Strathmore Homestead (QHR 602683)** – Strathmore homestead is located 11km west of the rail on Strathmore Road. It is significant as one of the earliest pastoral runs established in north Queensland and comprises a 1860s slab hut and c. 1900 house
- **Bowen River Hotel (QHR 600042)** – The Bowen River Hotel is located 18km west of the rail on Strathmore Road. It is significant as an 1860s structure built as a hotel on the Bowen Down road, which was the main route from Bowen to the central west and north Queensland pastoral districts
- **Bowen Consolidated Colliery (QHR 601850)** – The Bowen Consolidated Colliery is located 10km east of the rail at Scottville. The colliery is significant as an intact coal mine of the early 20th century and as evidence of the development of the coal mining industry in the region
- **Bowen Cemetery (QHR 602730)** – The Bowen Cemetery is located 12km east of the rail on the Collinsville-Scottsville Road. The cemetery is significant for its association as the burial place of 23 miners killed in mining accidents including seven killed in a major accident at the Collinsville State mine in October 1954, and
- **Barclay's Battery (QHR 602242)** – Barclay's Battery is located 10km north-west of the rail at Mount Coolon. Barclay's Battery is significant as evidence of gold-mining operations in the earlier part of the 20th century in north Queensland.

The Whitsunday, Isaac and Barcaldine Regional Council Planning Schemes

None of these local authorities currently have heritage registers or provision for the protection of heritage places in their planning schemes.

Field Assessment

Field surveys identified 38 cultural features or sites within 1km of the rail corridor. Of the 38 sites seven types of cultural heritage were observed. These being:

homesteads	4
cattle yards	4
stock-watering facilities	21
windmill	1
cattle feed lot	1
roads	5
historic roads	2

Homesteads – with the exception of Hobartville, the other four homesteads are typical post-World War II complexes comprised of low-set timber houses with metal roofs and an assortment of metal clad sheds used for machinery and equipment. Of these four homesteads, none are unusual or exceptional or have any significant cultural heritage values. Hobartville may have local values but is well outside the corridor and will not be impacted.

Dams / earth tanks – dams or earth tanks were the most common feature within the corridor – a total of 21 tanks of varying capacity were identified. More than half were in the southern section of the corridor, indicating more intensive grazing on the Belyando Downs and Suttor River plains compared with the northern section through the Clarke and Leichhardt ranges.

Earth tanks are ubiquitous on pastoral properties and none identified within the corridor have significant cultural heritage values.

Windmills – windmills have been and are widely used on pastoral properties to pump sub-artesian groundwater to water stock. Mass-produced windmills were available from the late 19th century, and in Queensland the two most common locally produced brands were Comet and Southern Cross. The one windmill close to the corridor is certainly a typical example of a windmill found throughout rural Australia and not significant.

Roads – Roads and paths are not normally considered as having heritage values place but they can be important in demonstrating early tracks and transportation routes.

The rail corridor crosses three major roads: the Gregory Developmental Road, the Suttor Developmental Road and the Bowen Developmental Road. The Gregory Development Road had its origins in a major inland route planned prior to World War II linking Brisbane to Cairns. However, events during World War II overtook the proposal and only part of the road was built. The other developmental roads were planned in the 1950s to improve road transport for the pastoral industry and have been gradually upgraded in subsequent decades. The proposed design of the rail will not impact on the roads.

Cattle yards – three cattle yards were identified within and immediately adjacent to rail corridor. Like tanks, yards for mustering and branding are an integral part of a cattle property and none of these yards are neither unusual or exceptional.

Early roads and associated facilities – when Bowen became the point of entry to the northern and north-west hinterland in 1861, the need for a trafficable road from newly established pastoral runs was a high priority. Bowen Downs station, near Muttaburra, was one of the first properties to be established in the north-west. The owners of Bowen Downs were proactive in developing a road from their property to Bowen. The route they developed soon became the major inland road from Bowen to the inland. The main route followed a south-west direction from Bowen, following a section of Eurie Creek and then crossing the Bogie River near Eton Vale station. The main road continued in a south-west direction while an alternate route went in a more southerly direction.

Significant sections of the Bowen Downs road survive in river crossings, location of hotels, coaching stops, cuttings, stone pitching and roadside quarries. The road later became a designated stock route and is therefore a gazetted road. A substantial stone causeway survives where the road crossed the Suttor River.

Eton Vale remnants – on Eton Vale station, evidence of the road is still clearly visible in the crossing of the Bogie River and Spring Creek. Other remnants include quarries, and stone flagging that was possibly the base of a water tank. Remnants of a hotel that was to became the site of a township known at Kinnahaird also remain. Approximately 20km south where the proposed railway intersects the Bowen Downs road, are remnants of a small changing station; located near a tributary of Machinery Creek. These remnants comprise stone flagging, the ant-bed base of a building, well, and fragments of pottery and bottles. The pottery and bottle fragments date from the 19th century and it is likely that this was the site of a modest inn or changing station.

The remnants of both the main Bowen Downs road and changing station are highly significant as evidence of one of the most important early roads in north Queensland. This section of the road was developed at some cost and effort and was probably funded by the consortium who owned Bowen Downs station. The owners of Bowen Downs station considered it was vital for the success of their station for a suitable road to the most accessible port.

This site, in conjunction with other sites on the early coach roads from Bowen, would meet the criteria for entry on the Queensland Heritage Register and evidence of a highly significant early road in north Queensland.

Potential Impacts

The proposed rail project will have a minimal impact on places of non-indigenous cultural heritage significance. Two places that would meet the threshold for entry on the Queensland Heritage Register were identified; however these places are not likely to be directly impacted by the Project works.

Mitigation and Minimisation Commitments

To manage potential impacts to non-Indigenous cultural heritage, Waratah Coal will implement the following commitments:

- facilitate the further examination and formal reporting of the Mountain Creek changing station and the Bowen Downs road to DEHP in accordance with the *Queensland Heritage Act 1992* (QH Act) requirements; and,
- implement procedures during site activities that aim to identify, assess and record undetected non-Indigenous heritage sites, including appropriate induction of relevant project personnel.

See also Element 15 (Cultural Heritage) of the *Draft Rail EMP* contained in the *Appendices – Volume 2* of this SEIS.

3 SOCIAL VALUES AND MANAGEMENT OF IMPACTS

3.1 Social

3.1.1 SOCIAL AND CULTURAL AREA

The social and cultural area of influence is determined by a wide range of interrelated factors, including but not limited to:

- The physical location of project facilities
- The proximity to settlements and other infrastructure
- The tenure of the land and existing land use
- The number of employees, their location and the value of wages
- The number of suppliers, their location and the value of contracts
- The roads used by employees, contractors and suppliers to access the project, and
- The location of service providers who will be impacted by employees and contractors.

While the project will have impacts at state and national level, the project's main social and cultural area of influence is assessed as:

- Alpha and the surrounding area, which will host mine workers and which is expected to undergo substantial and rapid social and economic change
- Bowen and the surrounding area, which will host port and rail workers and which is expected to undergo significant social and economic change, and
- The area along the proposed railway, where up to 46 separate lots will be directly impacted.

3.1.2 COMMUNITY ENGAGEMENT

A consultation plan was prepared during the initial phase of the EIS process, and included the following key steps:

1. Identify stakeholders
2. Develop project materials such as brochures, maps and powerpoint presentations
3. Develop a consultation program, which included:
    - A series of meetings with a range of Federal and State Government agencies
    - Formal meetings with the Barcaldine, Central Highlands, Isaac, Whitsunday and Mackay Regional Councils (and subsequently the Blackall-Tambo Regional Council)
    - Public meetings in Barcaldine, Jericho, Alpha, Emerald, Clermont, Mt Coolon, Collinsville and Bowen;
    - Follow-up meetings with organisations and individuals as part of the various technical studies included in the EIS (including directly impacted property owners)
    - Meetings with Indigenous groups as part of the cultural heritage studies, and
    - Develop communication channels, namely a project website, email address, 1800 free call number and A free post comment form.
4. Ensure input from the public consultation process to each of the relevant technical studies
5. Report back to key stakeholders on the results of the public consultation process, the EIS and SIMP (November 2011), and
6. Assign responsibilities within Waratah Coal for all stages of the pubic consultation process.

The main stakeholders during the EIS process included:

- Elected representatives
- National, State and Local Government agencies (including the owners of public infrastructure)
- Landholders in the vicinity of project facilities
- Indigenous groups, including traditional owners of land on which project facilities will be located
- Other local residents and interest groups
- The proponents of other resource projects (both planned and operational)
- Business groups, and
- The media.

Discussions have occurred with some of the property owners impacted by the mine and rail. Although unable to meet with all property owners due to land access constraints, the public meetings included a large proportion of property owners.

Stakeholder engagement during the SEIS focused on State and Local Government agencies, along with participation in a Community Reference Group meeting in Alpha on 7 November 2012.

3.1.2.1 Key Social and Cultural Issues

The key social and cultural issues are defined as those with which the public were primarily concerned with, and have been identified during 23 public meetings, as summarised in Table 15.

Table 15. Public Meetings Held by Waratah Coal

LOCATION	BARCALDINE	JERICHO	ALPHA	BLACKALL	EMERALD	CLERMONT	MT COOLON	COLLINSVILLE	BOWEN
June 2010	✓	✓	✓		✓	✓		✓	✓
Sept 2010	✓	✓	✓		✓	✓	✓	✓	✓
Nov 2011	✓	✓	✓	✓	✓	✓		✓	✓

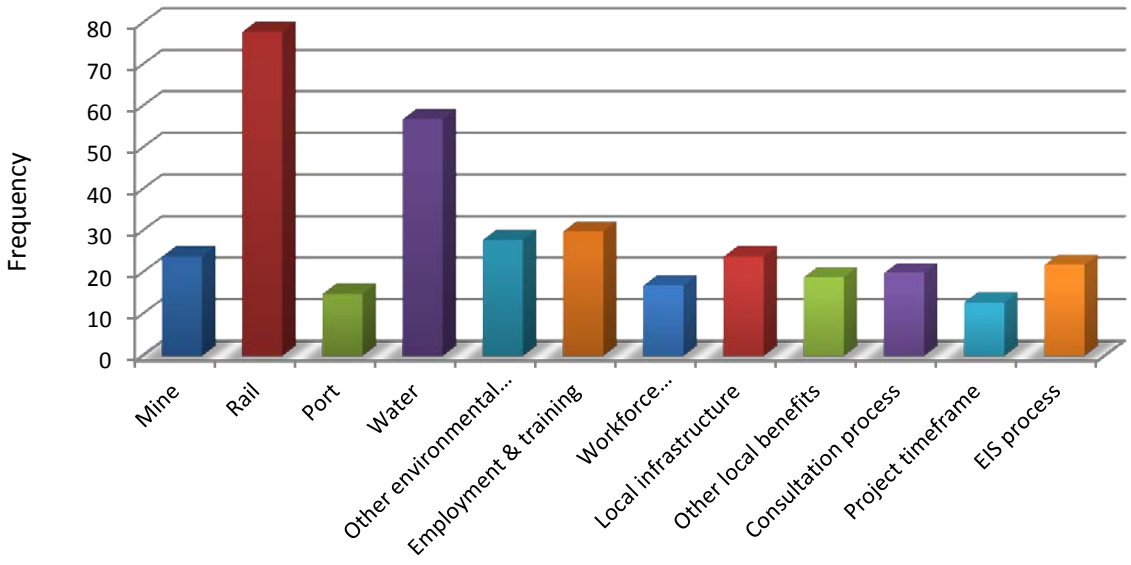
A large proportion of the participants in the meetings in Jericho, Alpha, Clermont, Mt Coolon and Collinsville were potentially impacted property owners. The property owners voiced many of the concerns raised and the meeting summaries therefore provide a good account of their concerns.

The issues do not necessarily match the main social impacts, as the issues have been defined as an expressed concern, or benefit, or a topic in which more information has been requested, and is based on the frequency in which issues were raised during public meetings held by Waratah Coal.

Initial concerns

The frequency in which the main issues were raised during the initial public meetings (June and September 2010) is illustrated in Figure 17. The main issues related to the railway (approximately 20% of all queries) and the impact of the mine on ground and surface water (approximately 15% of all queries). For the railway, the queries focused on the proposed alignment, rail and train details, and whether one or two railway lines would be constructed.

Figure 17. Main Issues Raised During 15 Public Meetings Held in June and September 2010



Source: Waratah Coal (reported in the Public Consultation Report, November 2010)

The main concerns were predominantly raised by property owners, particularly those potentially impacted by the project. Numerous Indigenous people attended the public meetings. Various issues were raised during these meetings, other than seeking clarification over project details, including:

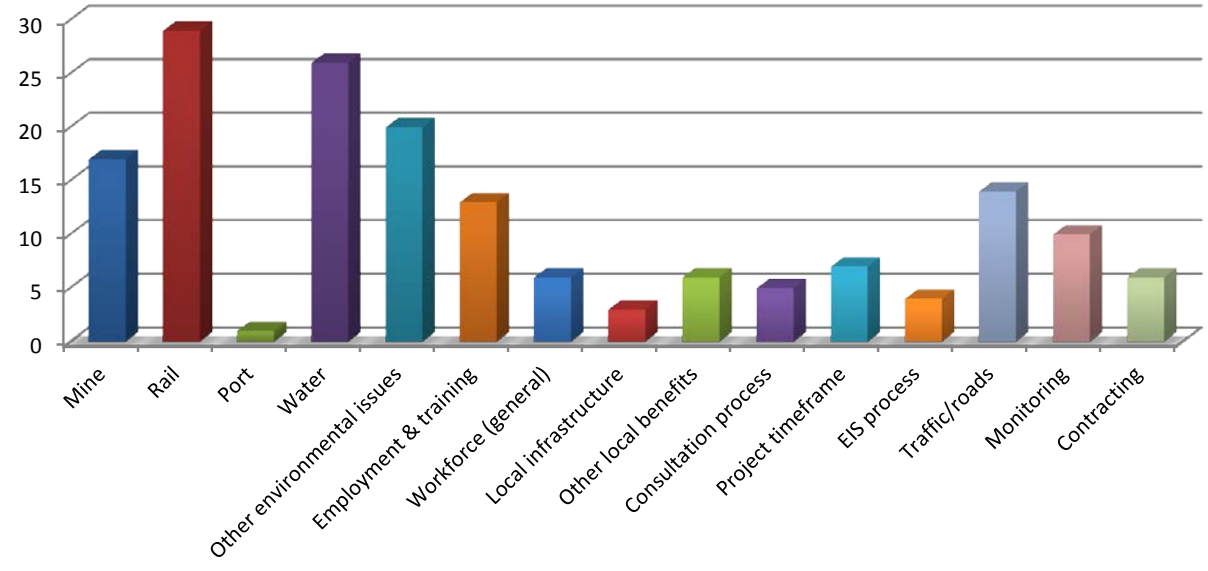
- Opportunities for employment and training, and
- Potential commercial opportunities.

These issues were also highlighted during meetings with the various traditional owner groups, whose lands may be impacted by the project, during the preparation of the Cultural Heritage Management Plan.

Subsequent concerns

The frequency in which the main issues were raised during the public meetings in November 2011, more than one year after the initial public meetings, is summarised in Figure 18.

Figure 18. Main Issues Raised During 8 Public Meetings Held in November 2011



As shown in Figure 18, the main issues raised again related to the railway and the impact of the mine on ground and surface water. However, other environmental issues were more frequently raised, including the potential impacts of the project on the Bimblebox Nature Reserve, the Belyando catchment, the wetlands at Abbot Point and the Great Barrier Reef. In addition, a number of new issues were raised, relating to the impact of the project on roads and traffic, the monitoring of project impacts, and contracting opportunities.

3.1.3 SOCIAL BASELINE STUDY

3.1.3.1 Alpha

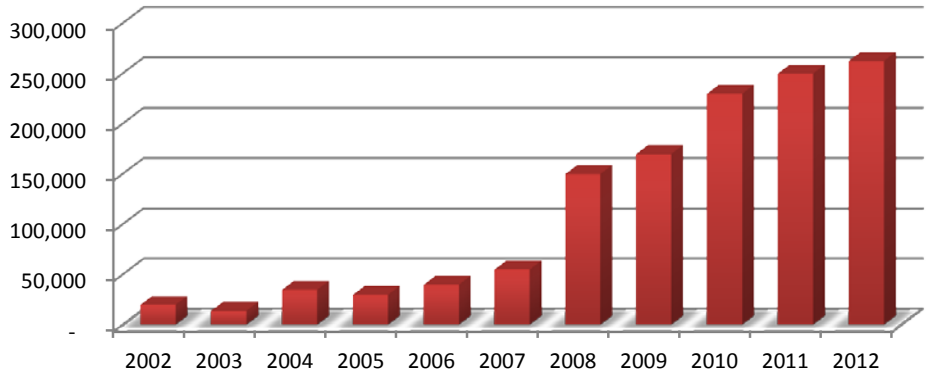
Alpha contains around 350 residents and another 220 people living in the surrounding area. The population is aging and continues to decline, despite recent exploration activity; many of the younger people leave the area in search of higher education or employment; and access to services is limited:

- The public school provides education to Grade 10
- Alpha does not have a resident doctor or a full-time ambulance service, and
- Other than for basic needs, the nearest commercial services, senior high school and health services are located in Barcaldine (143km) or Emerald (169km).

Alpha has high workforce participation rates and low unemployment levels in comparison to Queensland but is experiencing change, in part due to mine exploration: median individual income levels exceeded those for Queensland in 2011, although household income levels are lower, due to smaller household size. The population exhibits more stability than Queensland as a whole, with 62% of residents residing in the same location five year's previously. However, non-resident workers represented over 7% of the workforce within the former Jericho Shire in 2011.

House ownership is high (43% of dwellings are fully owned) but few people are buying a house (19% of dwellings) in comparison to Queensland (30% and 35%, respectively). However, house prices have risen considerably over the past five years, as shown in Figure 19.

Figure 19. Median House Price, Alpha



Source: www.myrp.com.au

Rents in Alpha in mid 2012 typically ranged from $150 to $190 per week. While increasing substantially over the past decade, further rises are likely given the limited market (approximately 100 rental properties) and exceptionally low vacancy rates.

Local objectives

The majority of Alpha's residents, including graziers and their families from the local area, would like improved services in Alpha, particularly health and education, but they wish to retain the friendly and relatively quiet lifestyle. While acknowledging the need for population growth to realise improved health and education services, new residents will preferably come as families, be community orientated and have a desire to share the rural lifestyle. Mining is also seen as potentially making a positive contribution to the community by providing training and employment opportunities, for young people in particular, so they can stay in the area rather than seek employment elsewhere.

The BRC prepared a Community Plan in October 2009. The Plan devotes a section to Alpha, which includes the following extract:

> *"While people saw the need to increase population and have greater community vitality, they also wanted to retain the values and lifestyle of a sustainable small community. They wanted to maintain caring community values and retain a quiet, safe lifestyle that make the community ideal for families.*
>
> *While local mining development offers opportunities for employment and infrastructure investment, people want to see Alpha in the future as a sustainable community with a diverse economy where mining staff are integrated into the community and environmental impacts are minimal.*
>
> *Other aspects of the preferred future were:*
>
> - *Developing the coal and coal seam gas industries but without being "over-run" by mining; and*
> - *Having greater permanent employment through mining and/or other growing industries."*[9]

The above perspectives were reiterated in Council's submission to the Alpha Coal EIS, specifically:

> *"…. the desired regional outcome for strong communities is to retain the sense of identity in the region's rural and remote communities, and support and encourage healthy and viable rural enterprise that enhances the interdependence and liveability of these communities."*[10]

3.1.3.2 Bowen

Bowen contains around 8,600 residents with another 1,600 in the vicinity of the town. The number of residents has stagnated over the past 30 years. Household income levels are 11% lower than for Queensland as a whole, due to the high number of relatively low paid jobs in agriculture and tourism, and their seasonality; a relatively old population (median age of 39); low workforce participation (60%); and a high proportion of single-person households (26%).

Bowen's economy has suffered major setbacks when the abattoirs closed in 1997, and again when Chalco withdrew from the proposed bauxite processing project in July 2010. Further doubts as to the economic future for Bowen followed the decision by SunWater not to proceed with the Water for Bowen project in October 2011, and the decision to review the expansion of facilities at Abbot Point following the election of the LNP in May 2012.

3.1.3.3 Property Owners

The Galilee Coal Project is expected to directly impact 8 properties at the mine site and up to 44 properties along the length of the railway (subject to final alignment of the corridor).

9 Refer Cavaye, October 2009, pp. 12-21.

10 Refer Queensland Government, May 2012, pp. 185-6.

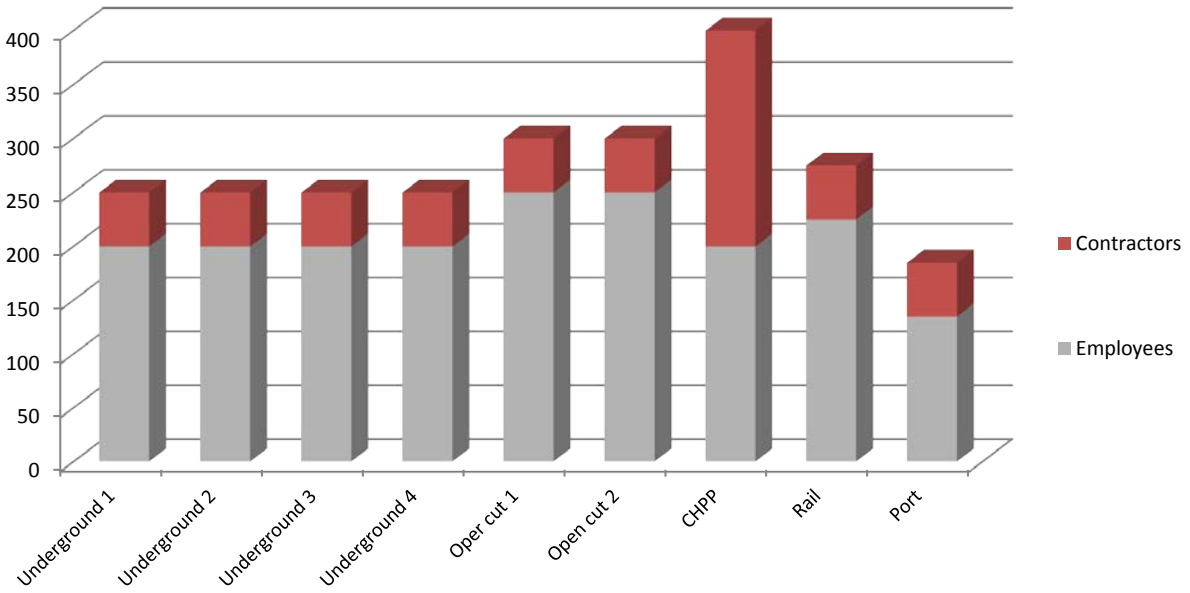
3.1.4 WORKFORCE PROFILE

The Galilee Coal Project will require 3,500 full-time equivalent (FTE) workers during the construction period:

- 2,500 workers for the mine (over a 3 year period), and
- 1,000 workers for the rail infrastructure (over a 3 year period).[11]

The operational workforce is estimated at 2,460 including 1,860 employees and 600 contractors. The operational area of employment is shown in Figure 20.

Figure 20. Operational Workforce Numbers by Location



The workforce for the rail and port components is estimated at 460 and will be located in the Bowen area. The remaining 2,000 employees and contractors will work at the mine site.

3.1.5 POTENTIAL IMPACTS, MITIGATION MEASURES AND MANAGEMENT STRATEGIES

The Galilee Coal Project will have social and economic impacts through much of Queensland. When considering the cumulative impacts from the development of multiple large-scale coal projects in the Galilee Basin, the most impacted community will clearly be Alpha. However, the expected expansion at Abbot Point will impact significantly on the Bowen community. The most impacted individuals will be property owners with land in the Mining Lease Application (MLA), followed by property owners with land in the rail corridor, then employees and contractors. From a regional perspective:

- Employees are likely to be recruited from Emerald, and towns to the west/southwest of the mine site (e.g. Barcaldine, Tambo, Blackall, Longreach, Winton and Charleville) as employment at the mine will reduce driving time to Bowen Basin mines by around two hours, and
- Businesses in Emerald are likely to benefit most from the supply of goods and services, although some goods and services required for the port and rail are likely to be sourced from Mackay and Townsville.

The *SIMP* outlines a process for identifying, managing and reporting on social impacts and will be updated on an annual basis throughout the life of the project. The *SIMP* is contained in the *Appendices – Volume 2* of this SEIS.

11 This does not include the workforce for constructing port facilities at Abbot Point.

3.1.5.1 Approach to Social Impact Management

The approach for managing social impacts is guided by the need to:

- Understand the communities in which the project is located, and the visions that these communities have for their future
- Prepare strategies to maximise the contribution that the project can make towards realising these visions
- Build productive relationships with these communities and other stakeholders, and
- Support efforts to enhance coordination between proponents.

Waratah Coal aims to:

- Contribute to Alpha's growth and prosperity through a well planned and effectively managed expansion in population, physical infrastructure and economic opportunities, while trying to preserve and contribute positively to the existing lifestyle and friendly, rural atmosphere
- Maximise its contribution to population growth and economic development in the Bowen area
- Minimise impacts on property owners as much as possible, ensure fair compensation when impacts can not be avoided, provide opportunities for property owners to benefit from the project when available, and provide every opportunity to engage with property owners in a meaningful and effective manner, and
- Maximise the economic benefits arising from the project in Central Queensland and the Mackay, Isaac and Whitsunday Regions through a number of targeted employment, contracting and training strategies.

3.1.5.2 Impact management

The strategies for managing and mitigating social impacts have been prepared in response to:

- The social impacts identified in the Social Impact Assessment (SIA)
- The Coordinator General's evaluation of the Alpha Coal EIS, particularly the requirements relating to coordinated approaches for managing social impacts in the Galilee Basin, and subsequent meetings between the Office of the Coordinator General and Galilee Basin proponents;
- Submissions on the draft EIS, and
- Subsequent discussion with key stakeholders, including discussion relating to a Health and Emergency Services Strategy, which was prepared to help facilitate stakeholder input to the management of social impacts.

Social impact management strategies have been prepared and have been grouped into the following six Action Plans.

1. Assistance in Alpha

Waratah Coal supports a coordinated approach to the management of social impacts in Alpha, as proposed by the Coordinator General in the evaluation of the EIS for the Alpha Coal Project. It is envisaged that Galilee Basin proponents will provide annual grants to improve public infrastructure and services in Alpha, including power, water, sewerage, communications, health and emergency services, affordable housing and public education. Based on preliminary population projections for a town of approximately 1,500 residents, Waratah plans to base at least 50 mine employees (and their families) in Alpha; provide suitable housing for these employees; and provide a range of incentives for other employees, their families and contractors to live in or near Alpha. A draft community cohesion policy has been prepared which aims to build strong and productive relationships between the project, its workforce and local communities; and help workers and their families integrate within the Alpha community.

2. Assistance in Bowen

Waratah Coal recommends a similar approach to that proposed by the Coordinator General for the Galilee Basin be applied to Bowen, with Abbot Point proponents providing annual grants to improve public infrastructure and services. The initial priorities in Bowen are to improve water supply and sewerage. All of Waratah's rail and port employees will reside in or near Bowen, and Waratah Coal will provide incentives for the families of employees, and contractors to live in Bowen. The community cohesion policy will be equally applicable in Bowen.

3. Minimising Adverse Impacts on Property Owners

The most impacted properties are the 8 within or overlapping with the MLA and the 44 properties in which the railway corridor passes. Within the MLA grazing will not be possible on 3 properties with a combined area of 355km^2. It is envisaged that Waratah Coal will buy these, and the property owners could buy a property of at least the equivalent size and/or quality, or chose to retire or enter another business venture should they wish to do so. The remaining 5 properties, which have an area of 512km^2, should be able to continue grazing operations (subject to dust impact assessment) although potentially at a lower level of productivity.

The 44 properties impacted by the rail are expected to lose an average of 46 hectares to the rail corridor, which represents 0.28% of their average property area. Waratah Coal will provide financial compensation to directly impacted property owners and will work with each property owner to minimise disruptions and reduce impacts on cattle productivity as a result of the mine and railway. This may entail the realignment of fences, provision of additional watering points, the construction of new access roads and relocation or provision of new cattle yards.

4. Accommodation and Housing

The Galilee Coal Project will lead to a substantial increase in the population of Alpha and contribute to modest population growth in the Bowen area. While an increase in population is regarded as favourable, it will increase the demand for housing and other accommodation in both Alpha and Bowen. This can have negative impacts on housing affordability and the availability of temporary accommodation.

Waratah Coal aims to minimise negative impacts on housing affordability and the availability of temporary accommodation in Alpha and Bowen. To do this, it will be necessary to:

- Monitor housing affordability and the availability and cost of temporary accommodation in Alpha and Bowen
- Provide houses for permanent employees based in Alpha, and
- Include housing affordability and temporary accommodation needs in the development plans for Alpha and Bowen and provide financial support to these through the Galilee Basin CSIA Roundtable (and equivalent structure for Bowen).

5. Workforce Management

Waratah Coal aims to have a well-trained, healthy and relatively stable workforce. Waratah Coal also aims to:

- Maximise employment, in order of priority, in (i) the project area, (ii) the region, (iii) the rest of Queensland, and (iv) elsewhere in Australia, and
- Ensure employees and contractors act in a manner that is conducive to a safe, peaceful and enjoyable lifestyle within the project area.

Waratah Coal will:

- Boost workforce participation by promoting female and Indigenous employment
- Recruit workers from areas in Queensland that have relatively high levels of unemployment
- Promote healthy lifestyle choices among workers
- Implement a Code of Conduct to help promote positive relationships between employees, contractors and local residents (and limit adverse impacts)
- Boost training through engagement of apprentices, providing support to local schools, and establishing long-term links with local training organisations, and
- Ensure all contractors and sub-contractors incorporate strategies to help achieve Waratah's workforce objectives, and report on them as appropriate.

6. Local Industry Participation

Waratah Coal aims to maximise procurement and contracting opportunities, in order of priority, in (i) the project area, (ii) the region, (iii) the rest of Queensland, and (iv) elsewhere in Australia. This will be achieved by:

1. Advertising procurement and contracting opportunities locally
2. Packaging contracts appropriately
3. Holding briefing sessions in the project area for local businesses and contractors
4. Giving preference to locally-based businesses and contractors
5. In some cases, providing assistance to local organisations, and
6. Monitoring and reporting on the number and value of procurement/contracts awarded.

To ensure full, fair and reasonable opportunity for Queensland and Australian companies, Waratah Coal will prepare either an Australian Industry Participation Plan (AIPP) or Local Industry Participation Plan (LIPP). The Industry Capability Network (ICN) has placed a description of the Galilee Coal Project on its website. Further collaboration with the ICN is expected.

Contractors and sub-contractors will be required to incorporate strategies to help achieve Waratah's local industry participation objectives, and report on them as appropriate.

3.1.5.3 Stakeholder engagement

The stakeholder engagement strategy identifies key stakeholders and articulates a process to:

- Ensure stakeholders have a reasonable understanding of the project and its impacts
- Ensure stakeholders have the opportunity to voice concerns or issues relating to the project, and
- Provide stakeholders with opportunities to discuss their aspirations and how the project can contribute to these.

Stakeholder engagement will include:

- Provision of project details and other information through a range of methods (meetings, quarterly newsletters, website, office and other displays)
- A range of options for people to communicate with Waratah Coal (email, phone and post)
- Participating in consultative groups in Alpha and Bowen, including the Galilee Basin Cumulative Social Impact Assessment (CSIA) Roundtable
- Preparing a landholder engagement strategy and database for each impacted landholder

- Preparing an Indigenous engagement strategy and appointing an Indigenous Engagement Officer
- Establishing a grievance and dispute resolution mechanism for employees, contractors and external stakeholders, and
- Establishing a Project Office and appointing a Project Liaison Officer in Alpha.

3.1.5.4 Social Monitoring & Reporting

The social impact management process will be assessed and documented on an annual basis, and will include the preparation of three reports each year.

1. An Annual Social Impact Report
2. An annual report on Local Industry Participation, and
3. An Updated SIMP.

There is an opportunity to involve impacted stakeholders in the process of identifying and managing social impacts through the Galilee Basin CSIA Roundtable (and potentially an equivalent structure in Bowen). In addition, Waratah Coal intends to involve stakeholders by publicising and inviting input to:

- A list of social impacts and assessment of their significance
- The strategies for addressing social impacts, and
- Results from monitoring the implementation of social impact management strategies and evaluating the outcomes.

An external (independent) review will be conducted every two years to:

- Assess the social impacts of the project
- Assess the effectiveness and adequacy of social impact management strategies
- Review the degree of compliance with conditions stipulated by the Coordinator General
- Review the effectiveness and adequacy of stakeholder engagement processes, and
- Provide recommendations to Waratah Coal and the Coordinator General for continuous improvement.

The social reports and external reviews will be publicly available.

3.1.5.5 Summary of Commitments

Waratah Coal will:

1. Minimise impacts on property owners as much as possible, ensure fair compensation when impacts can not be avoided, provide opportunities to property owners to benefit from the project when available, and encourage productive engagement with property owners
2. Provide the services of a farm management consultant, if requested, to assist property owners plan for changes as a result of mine and/or rail infrastructure (eg. modifications to fencing, stockyards, watering points and access roads)
3. Base at least 50 mine employees in Alpha and all port and rail employees in the Bowen area
4. Provide housing for mine employees in Alpha that fits within the character of Alpha and provides an appropriate standard befitting of senior managers and other employees who wish to reside in Alpha with their families on a long-term basis
5. Provide all mine employees with the opportunity to reside in the Alpha area

6. Provide incentives for mine employees to relocate to Alpha with their families, for example:
    a. Financial assistance for employees opting to reside in Alpha to purchase a house in Alpha (with similar assistance for employees to buy a house in Bowen)
    b. A one-off bonus for any employee that relocates with their family to Alpha and stays for at least a year
7. Encourage contractors to establish facilities and base staff in Alpha and Bowen by giving preference to businesses and contractors that have locally-based staff
8. Participate in the Galilee Basin CSIA Roundtable and provide financial support, as recommended by the Roundtable, for public infrastructure in Alpha, including affordable housing and health and emergency services
9. Participate in a roundtable (or equivalent) for Abbot Point proponents, and provide financial support to improve public infrastructure in Bowen, including affordable housing and health and emergency services
10. If Bowen is not included in a roundtable (or equivalent), Waratah Coal will hold discussions with the WRC in regard to possible financial contributions towards public infrastructure and/or services in Bowen
11. Establish an arrangement with an established emergency service/retrieval provider for the provision of aero-medical and retrieval services for the project
12. Invite local emergency service providers (police, ambulance, fire & rescue and SES) to participate in the preparation and practicing of emergency procedures
13. Give employment preference, in order, to workers from the local area, the local region, the rest of Queensland and the rest of Australia before overseas
14. Promote healthy lifestyle choices among the workforce
15. Provide induction training to all staff, contractors and sub-contractors to ensure they are familiar with project facilities, local Indigenous cultures and values, occupational health and safety including emergency response strategies, fatigue management policies, employment conditions and entitlements, Waratah Coal's contributions to the local community and the grievance mechanism
16. Implement a Code of Conduct, applicable to all employees, contractors and sub-contractors, which aims to enhance relationships between employees and contractors and the local community and minimise adverse social impacts
17. Participate in government-led initiatives to recruit workers from areas in Queensland that have relatively high levels of unemployment
18. Promote female employment
19. Promote Indigenous employment
20. Provide support for drive in – drive out (DIDO) and fly in – fly out (FIFO) workers, including suitable accommodation and recreation facilities, bus services between the mine site and any nearby regional centre that contains a sufficient number of employees, and promote available support networks
21. Provide support and encouragement for employees living in Alpha to integrate within the local community
22. Engage 20 new apprentices each year (and aim to recruit 50% of these from Central Queensland and the Whitsunday, Isaac and Mackay Regions)
23. Fund an additional 5 apprentices each year (with 4 year funding commitments subject to satisfactory performance), to be engaged and managed by businesses based and operating in the project area
24. Provide support to local schools, including mine tours, workplace training, classroom presentations and other interactions with the aim of strengthening linkages between schools and the mining industry (and increasing female and Indigenous participation)

25. Aim to establish a long-term link with local training organisations (including TAFE centres) to provide guest lectures by skilled trainers (who work for the project) and accommodate workplace training for apprentices and other trainees
26. Implement Indigenous engagement and participation strategies, to help communicate effectively with Indigenous groups, and promote Indigenous employment and contracting opportunities
27. For any overseas workers, provide culturally appropriate facilities at the mine site and provide appropriate food and food-handling procedures, show flexibility, as far as possible, in terms of meeting religious and cultural requirements (eg. for worship), and provide cultural awareness for overseas workers during the induction training, and include awareness on their cultures in induction training provided to other workers
28. Give procurement preference, in order, to suppliers from the local area; the local region; the rest of Queensland; and the rest of Australia before overseas:
    a. Advertise procurement and contracting opportunities locally
    b. Package contracts to help local businesses and contractors submit competitive bids
    c. Hold briefing sessions in the project area for local businesses and contractors, and
    d. Provide support to local organisations to increase their capacity to submit a competitive bid
29. Ensure all contractors and sub-contractors incorporate strategies (at least the equivalent as outlined above) to give preference to local recruitment, local suppliers, promote a healthy lifestyle, promote female employment, promote Indigenous employment and provide training
30. Participate in discussions to help develop strategies to address the loss of agricultural workers to the mining industry
31. Provide information to, and communicate with, stakeholders through a variety of mechanisms, including but not limited to:
    a. Quarterly newsletters
    b. Maintenance of an information hotline and project website
    c. Participation in various consultative committees, including the Galilee Basin CSIA Roundtable
    d. Maintenance of a grievance mechanism, and
    e. Appointment of a Project Liaison Officer and Indigenous Liaison Officer
32. Report on social impacts and social impact management annually, and make the reports publicly available, and
33. Fund an external and independent review of the project's social impacts and social impact management strategies, every two years, and make the reports publicly available.

3.1.5.6 Other recommendations

Waratah Coal supports the Coordinator General's collaborative approach, including the preparation and implementation of a development plan for Alpha, and the contribution by Galilee Basin proponents to one or more combined development funds.[12] However, Waratah Coal would prefer:

- A clear focus on planning and development rather than additional studies
- Separate strategies for the Alpha and Bowen areas (as the Abbot Point proponents include other proponents in addition to the Galilee Basin proponents)
- Clarity around the funding models, and
- Greater emphasis on the Barcaldine and Whitsunday Regional Councils in the development and implementation of plans, and the management of financial contributions from the proponents.

12 Outlined in the Evaluation of the Alpha Coal EIS. Refer Queensland Government, May 2012, pp. 187-191 & 287-290.

3.1.5.7 Next steps

It is envisaged that the next version of the SIMP will be finalised within six months of a Final Investment Decision (FID) to proceed with the project, and will include additional details on the six action plans in response to progress in:

- Defining port and rail infrastructure
- Developing TOR and membership for the Galilee Basin CSIA Roundtable, and
- Implementing the Royalties for the Regions Initiative.

3.2 Health and Safety

Waratah Coal is committed to providing a safe and healthy working environment to its employees, contractors, and visitors and to operating the mine with minimal impacts upon the environment and community. The health, safety, environment, community and heritage matters will be managed through implementation of the Proponent's Integrated Management System through which personnel will be inducted and which will document the ongoing management requirements.

A draft Health and Emergency Services Strategy is contained as Attachment 5 of the *SIMP* in the *Appendices – Volume 2* of this SEIS.

3.2.1 WORKFORCE HEALTH & EMERGENCY INITIATIVES

Each work camp will contain a basic medical facility, medical supplies and trained medical staff. Each site will have a lead Occupational Health & Safety officer. Each site will have established emergency procedures, including muster points, and will have emergency drills on a periodic basis. Waratah will invite local police, ambulance, fire & rescue and SES officers to:

- Visit each work camp to become familiar with site access and layout
- Provide advice and/or participate in the finalisation of fire control strategies, emergency response strategies and training for medical/emergency staff (possibly on a fee basis), and
- Provide advice and/or participate in emergency drills (possibly on a fee basis).

Prior to construction, the Galilee Coal Project will enter an arrangement with an established emergency service/ retrieval provider (eg. Royal Flying Doctor Service or CareFlight), to provide aero-medical and retrieval services, initially for construction workers and subsequently for operational workers. As noted above, this service would preferably be extended to the Alpha community under the auspices of the Galilee Basin roundtable.

Waratah Coal aims to have a healthy workforce. To help achieve this, Waratah Coal will:

- Promote healthy lifestyle choices within the workforce, including but not limited to:
  - Providing a smoke-free work environment
  - Providing healthy food choices in work camps
  - Enforcing zero tolerance for drug and alcohol use during work hours
  - Providing clear guidance on the responsible consumption of alcohol in work camps (after hours)
  - Provide low-alcohol and non-alcoholic beverages in wet mess areas
  - Providing a gymnasium and potentially other exercise options in work camps
  - Considering health promotion strategies such as that trialled in Moranbah[13]

13 '*Be More Active – Moranbah*' is a partnership between BMA and Queensland Health to trial a range of community health promotion strategies.

- Provide induction training to all staff, contractors and sub-contractors to ensure they are familiar with occupational health and safety including emergency response strategies, and fatigue management plans
- Implement a Code of Conduct, which is described during inductions and agreed (in writing) by all employees, contractors and sub-contractors prior to commencement of work, with the aim of defining:
  - Responsibilities towards other employees and contractors and local residents
  - Acceptable behaviour on-site, and
  - Acceptable behaviour while in local communities (particularly Alpha and Bowen)
- Provide a cultural and physical environment where women feel comfortable, included and valued
- Trial flexible working arrangements (for men and women), which take into account such matters as employees' child care commitments and work/life balance, while also meeting operational requirements
- For DIDO and FIFO workers:
  - Ensure accommodation and recreation facilities at the mine site cater for a diverse workforce, including separate accommodation areas for women and culturally appropriate facilities for Indigenous workers or workers from other cultural backgrounds (eg. separate recreational areas, alcohol free areas, etc.)
  - Provide bus services (to reduce traffic and issues relating to fatigue) between the mine site and any nearby regional centre that contains a sufficient number of employees, and
  - Draw attention to support networks (such as *Mining Family Matters*[14]) and the resources they provide (eg. *Working Away: A Survival Guide for Families*)
- Ensure all contractors and sub-contractors incorporate strategies (at least the equivalent as outlined above) to promote a healthy lifestyle.

Traffic Management Plans are not covered in this strategy. However, Waratah Coal will consult with the QPS and Department of Community Safety (DCS) on the development of Traffic Management Plans at the appropriate time.

3.2.2 RELATIONSHIP WITH LOCAL AUTHORITIES

The Project will attempt to establish close relationships with local Police, Ambulance, Fire & Rescue and SES officers. Local authorities will be invited on-site to become familiar with site access and layout, project facilities and risks. As noted above, local authorities will be encouraged to participate in the preparation of emergency strategies, training of staff and/or emergency drills.

To help facilitate a collaborative relationship with local authorities, and to contribute positively to local communities, the Project will provide emergency assistance when practical. This may include utilisation of the Project's personnel and facilities to complement the response by emergency services to car/other accidents, fires or other emergencies in the vicinity of the Project.

14 Refer http://www.miningfm.com.au/

3.2.3 POLICIES AND PROCEDURES

A number of draft policies and procedures have been prepared for the Galilee Coal Project to contribute to a safer and healthier workplace and to enhance the contribution made by the project to the communities in which it is located:

1. Workplace Induction
2. Drug and Alcohol Policy
3. Fatigue Management Plan
4. Community Cohesion Strategy
5. Code of Conduct, and
6. Grievance and Dispute Resolution Mechanism.

The above policies/procedures are attached to this policy, with the exception of the Grievance and Dispute Resolution Mechanism, which is presented as Attachment 8 of the *SIMP* contained in the *Appendices – Volume 2* of this SEIS.

3.2.4 MONITORING

The demand on health and emergency service providers in the region, and in Alpha/Jericho and Bowen in particular, will need to be monitored. It is therefore suggested that the monitoring framework for the Galilee Coal Project includes the following indicators:

- Population of Alpha and Bowen
- Participation of local police, ambulance and fire & rescue officers in project planning and emergency response procedures/drills
- Workload of police, ambulance and fire & rescue officers (*specific indicators will be developed in consultation with respective agencies*)
- Accident, injury and near misses (for the project), and
- Independent external assessment of the effectiveness of workplace inductions, the drug and alcohol policy, the fatigue management plan, the community cohesion strategy, the code of conduct and the grievance and dispute resolution mechanism.

4 IMPACTS ON THE STATE AND LOCAL ECONOMIES AND MANAGEMENT OF IMPACTS

4.1 Economy

4.1.1 DESCRIPTION OF AFFECTED LOCAL AND REGIONAL ECONOMIES

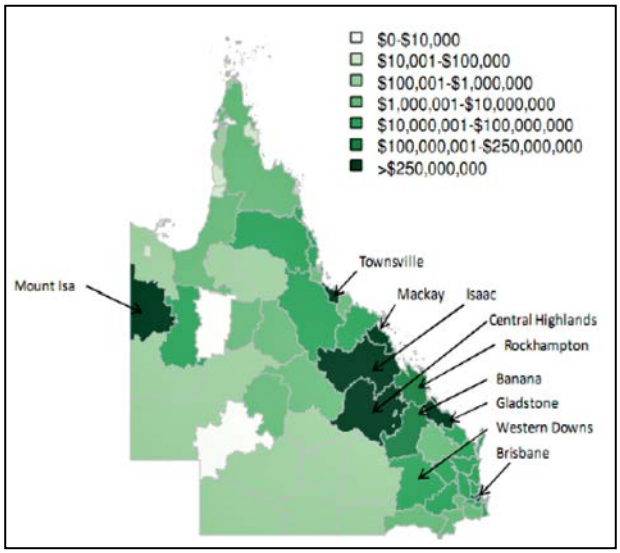
Mining plays a significant role in the regional economy. An analysis of the economic benefits of the resource sector in Queensland was undertaken by Rolfe, Gregg, Ivanova, Lawrence & Rynne using data for 2009/10. Results indicated the following:

- Resource projects employed 38,000 staff and paid $5 billion in salaries and wages;
- $17 billion was paid to Queensland suppliers or as voluntary community contributions;
- The sector generated 254,000 additional jobs and $28 billion in value added effects (boosting Gross Regional Product to $50 billion); and
- $2 billion was paid as royalties[15].

15 Refer Rolfe, Gregg, Ivanova, Lawrence & Rynne, March 2011, pp. 25-29.

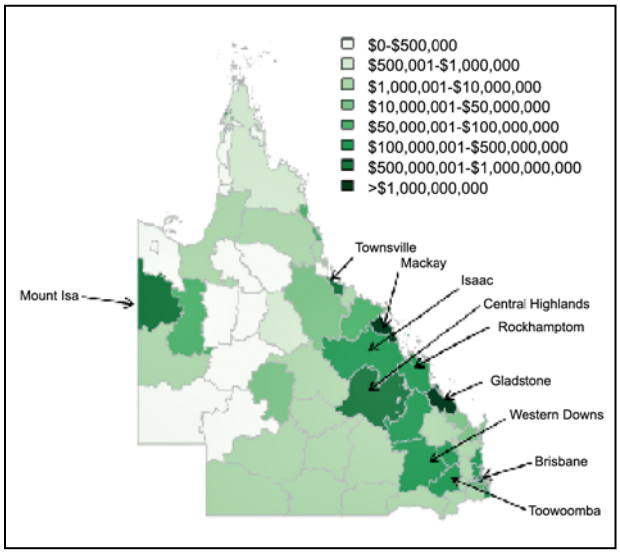
Payments for (i) salaries and wages and (ii) supplies, by local government area (LGA), are shown in Figure 21 and Figure 22, respectively.

Figure 21. Resource Sector Salary Payments, 2009/10



Source: Rolfe, Gregg, Ivanova, Lawrence & Rynne, March 2011, p.31.

Figure 22. Resource Sector Supply Expenditure, 2009/10



Source: Rolfe, Gregg, Ivanova, Lawrence & Rynne, March 2011, p.34.

As shown in Figure 21, the highest salary/wage payments occurred in the Isaac, Central Highlands, Brisbane, Mackay, Mt Isa and Townsville Local Government Areas (LGAs), but were spread through the majority of Queensland. While there is no doubt that resident workers will spend far more money in the local economy than non-resident workers (NRWs), it is important to recognise the important economic contribution made by NRWs from those LGAs that have limited economic opportunities, including many in central-western Queensland. In these locations, mine income can provide a valuable source of off-farm income, which helps maintain the level of economic activity and the population in relatively isolated rural communities.

As shown in Figure 22, supply expenditures were far more concentrated, and primarily benefited Brisbane (47% of the total), Mackay and Gladstone.

Potential Impacts

The project will increase the value of Australia's exports by A$4.6 billion per annum: a 10% increase in the value of coal exports and a 1.5% increase in the value of total exports in comparison to 2010/11. The project is also expected to contribute over A$700 million annually to the Commonwealth Government, on average, predominantly through company and income tax and GST. [16],[17]

Within Queensland, the project is expected to:

- Increase industry output by A$5.7 billion annually once production commences
- Increase employment by approximately 2,975 during the 3-year construction period and 4,000 during mine operations
- Increase household incomes by A$450 million per annum during the construction period and by A$780 million per annum during mine operations, and
- Contribute an average of A$365 million to the Queensland Government, predominantly through payment of royalties.

16 Refer AEC Group, July 2010.

17 The economic analysis was undertaken without estimating the potential contribution that the project might make through a Minerals Resource Rent Tax or the revised royalty rates in Queensland, announced in September 2012.

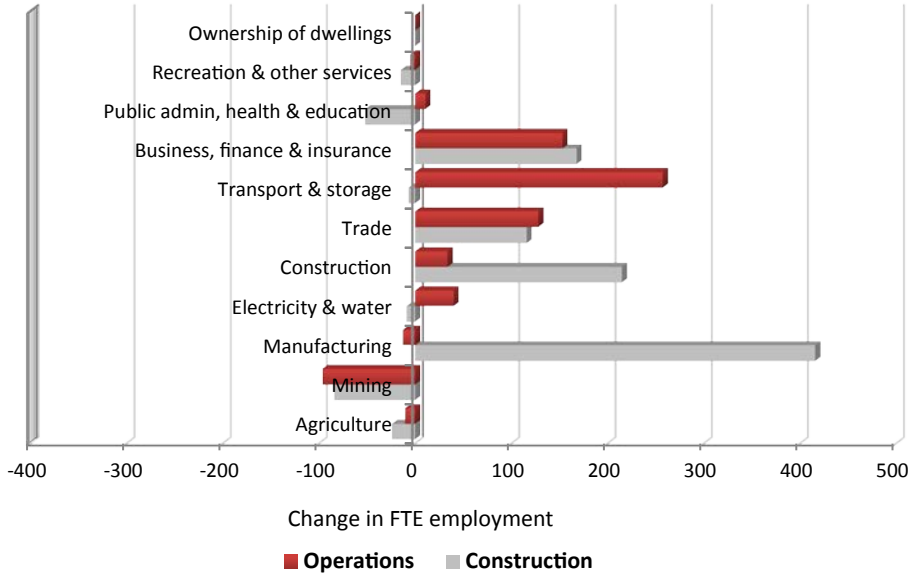
Within the local region, defined for the purpose of the Economic Impact Assessment as the Barcaldine, Central Highlands, Isaac, Whitsunday, Rockhampton and Mackay Regional Councils, the project will:

- Increase industry output by A$6 billion annually once production commences (which exceeds the increase for Queensland as resources are drawn from other parts of the State in support of the project)
- Increase employment by approximately 700 during the 3-year construction period and around 600 during mine operations, and
- Increase household incomes by A$150 million per annum during the construction period and by A$160 million per annum during mine operations.

In addition, the local region is expected to benefit as some of the royalties paid to the Queensland Government are allocated to the region under the Royalty for the Regions initiative.

Changes in employment in the local region – as a result of Project construction and operations – are summarised in Figure 23.

Figure 23. Forecast Change in Employment: Local Region

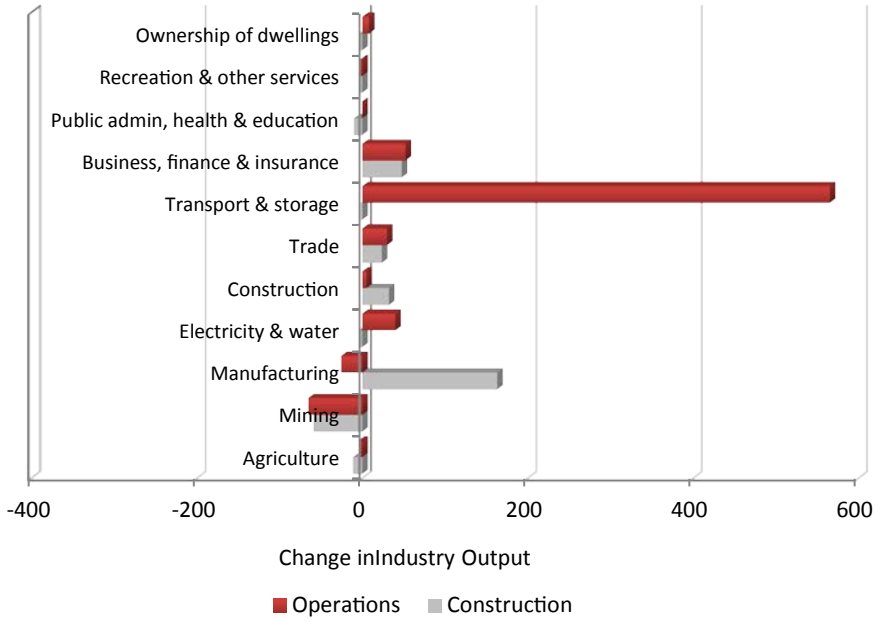


Source: AEC Group, July 2010.

As shown in Figure 23, employment in the manufacturing and construction sectors will increase most significantly during the construction period, although at the expense of employment in mining and public administration. During mine operations employment will increase in the transport, business, finance, insurance and trade sectors, predominantly at the expense of employment in the mining sector.

Changes in industry output in the local region – as a result of Project construction and operations – are summarised in Figure 24.

Figure 24. Forecast Change in Industry Output: Local Region



Source: AEC Group, July 2010.

As shown in Figure 24, manufacturing output will increase substantially during the construction period (as the project increases the demand for locally produced mine products), while mine output will fall (due to the shift in resources between sectors). During mine operations output will increase most in transport and storage, again at the expense of mine output.

Although the project will adversely impact some sectors of the regional economy, the reductions in employment (Figure 23) and industry output (Figure 24) in some sectors are very low in comparison to the net growth in employment and industry output during both the construction and operating phases.

In recognising the valuable contribution that mining makes to the Queensland economy, and scope to build on and increase existing benefits, Waratah aims to maximise the economic benefits arising from the project, foremost from within the project area, then from within the local region (ie. Central Queensland and the Mackay, Isaac and Whitsunday regions) and the rest of Queensland. This will be achieved by:

1. Contributing to population growth by basing 360 staff (and their families) in Bowen and 50 staff (and their families) in Alpha
2. Local recruitment preferences
3. Providing drive in – drive out (DIDO) options for mine workers (and if numbers permit, Bus In – Bus Out options from regional centres)
4. Provision of training, including preference for local apprentices
5. Local procurement strategies, including preference for locally-based companies and interaction with local suppliers to boost their capacity to submit appropriate tenders, and
6. Employment and procurement strategies to encourage Indigenous participation.

From a regional perspective, Emerald, located 170km to the east of Alpha, is regarded as likely to benefit most from the Galilee Coal Project. The project is likely to have some employees who reside in Emerald, and is likely to source a considerable proportion of mine goods and services from Emerald. This, along with the expansion of coal and CSG projects in the Central Highlands, will contribute to the high population growth rate (2.5% per annum) projected for

Emerald over the next 20 years, and help sustain high income levels (the median personal income level in 2011 was A$905/week, 54% higher than the median personal income level for Queensland).[18]

Other regional centres expected to benefit from mine employment include Barcaldine, Tambo, Blackall, Longreach, Winton and Charleville: as employment at the Galilee Coal Project will reduce driving time to Bowen Basin mines by around two hours.

The regional centres expected to benefit from the provision of goods and services, other than Emerald, include Mackay and Townsville. While most mine supplies that can be sourced locally are likely to be sourced from Emerald, supplies required for port and rail operations could be sourced from Mackay and Townsville, which are both around 200km from Abbot Point.

Loss of staff to the mining industry

While mining can substantially boost the local economy, it can also draw staff from government agencies and businesses in the local area, including grazing and agricultural businesses, and can leave these agencies and businesses with staff shortages and higher recruitment, salary and training costs. While not always easy to differentiate between long-term structural changes and short-term impacts occurring as a result of the mining boom, the development of multiple large-scale mining projects within a limited timeframe will no doubt challenge the viability of some businesses in Central Queensland.

The response by the Commonwealth and State Governments to date has largely focused on strategies to support population growth (such as Queensland's Regionalisation Strategy); increase workforce participation; increase skill levels within the existing workforce; and making it easier to source overseas workers (eg. using Enterprise Migration Agreements).

While acknowledging the complexity of dealing effectively with the loss of staff to the mining industry, Waratah Coal believes it is possible to help minimise the impacts, particularly on local businesses. For example:

- Outsourcing goods and services and use established, local contractors when possible
- Making financial contributions to affordable housing, particularly in Alpha and Bowen, and
- Providing financial support for apprentices that are engaged by local businesses (and not limiting this support to businesses involved in or related to the mining industry).

Addressing the loss of agricultural workers to the mining industry is difficult, in large part due to the disparity between mining and agricultural wage levels and the seasonality of many agricultural positions. However, Waratah Coal is willing to participate in discussions in an attempt to prepare strategies to limit the loss of agricultural workers to the mining industry.

Strategies to counter the loss of workers to the mining industry are described in more detail in the *SIMP* contained in the *Appendices – Volume 2* of this SEIS.

4.2 Sustainable Development

The principles of sustainable development, including Ecologically Sustainable Development (ESD) has played an integral role in Waratah Coal's decision-making processes with respect to the planning and design of the project. Waratah Coal is committed to continuing to implement the principles of ESD throughout the construction, operation, decommissioning and rehabilitation phases of the project.

Waratah Coal has developed an approach that establishes a strong foundation for the sustainable development of the project. Waratah Coal has developed and applied specific sustainability principles to the planning of the project. These principles, and the commitments and strategies identified when applying them to the impact areas, will be built on progressively as the project develops.

18 Refer ABS, 2012.

Overall, the Environmental Impact Assessment process has demonstrated the sound sustainable basis for the project in that it:

- provides sustainable economic returns for Waratah Coal and its owners
- provides sustainable social and economic benefits to stakeholders including Commonwealth and Queensland Governments, and the local and regional communities
- minimises environmental impacts and has developed offset strategies to address residual impacts, and
- has applied a sustainability approach to guide planning, design, construction, operation and decommissioning of the project.

5 HAZARD AND RISK

5.1 Hazard and Risk Assessment

5.1.1 MINE

A desktop assessment was undertaken to examine the safety, health and risk issues associated with the development and operation of the mine and associated infrastructure. Desktop assessment included:

- Review of legislative requirements for the project
- Identification of dangerous goods and hazardous substances likely to be used for the project
- Preparation of a risk assessment for the construction and operation of the project
- An outline of controls to be implemented for the project to protect the safety and health of employees and the public, and
- Development of detailed emergency plans and emergency response capabilities.

This process identified a number of potential areas of high risk. These included:

- Traffic incidents – offsite
- Traffic incidents – onsite
- Blasting and explosives handling
- Exposure to high voltage
- Working at height
- Fuel storage and handling
- Flooding
- Bushfire, and
- Spontaneous combustion of coal stockpile.

Mine site construction and operational preliminary risk assessment results indicated that the baseline safety and health risk profile varied from low to extreme. Once mitigation measures and design treatments are applied to the assessed hazards the residual risks are either ranked as being low or moderate. The exception to these low to moderate risks being risks associated with the inclusion of highwall operations, which were assessed as being a high risk.

Across the baseline risk assessment, no extreme or high ranking risks were detected outside the mine site boundary; however, offsite hazards associated with vehicle movements were ranked high. Applied control measures and design treatments downgraded the associated risk to moderate.

Overall, the risks assessed are considered to be common to all open cut and underground mining activities and are subject to legislative obligations and controls measures which are provided by way of Commonwealth and State legislation.

Waratah Coal is committed to providing a safe work place for staff and the community. Waratah Coal also commits to minimising the potential risk to the health and safety of onsite and offsite personnel as a result of construction and operational activities associated with the mine site. This will be achieved through the following measures:

- Defaulting under a formal Safety and Health Management System (SHMS) in accordance with all relevant legislative requirements during the construction phase
- Undertaking the operations of the mine site under a formal SHMS in accordance with all relevant legislative requirements
- Monitoring and implementing amendments to the SHMS where necessary and frequently ensuring its applicability and currency to be maintained and throughout the life of the Project, and
- Frequently liaising with internal and external stakeholders with respect to safeguarding and improving the SHMS.

5.1.2 RAIL

Waratah Coal has undertaken a preliminary risk assessment for the rail alignment. The preliminary risk assessment is consistent with Australian Standard/New Zealand Standard ISO 31000:2009: Risk Management – Principles and Guidelines.

Overall, the risks assessed are considered to be common to rail activities and are subject to legislative obligations and controls measures which are provided by way of Commonwealth and State legislation.

No preliminary risk assessment has been undertaken for the decommissioning phase of the project as the rail is expected to remain operational. It is assumed that new technologies and innovations are too be expected throughout the rail's operational life and as such will alter current baseline risk assessment results which have been currently undertaken.

Results of the preliminary risk assessment for the rail identified that the baseline health and safety risk profile varied from low' to extreme. Once mitigation measures and design treatments are applied to the assessed hazards the residual risks are either ranked as being low or moderate.

The exception being the high risk ranking associated with the potential for collisions of trains and collisions at level crossings. Notwithstanding the risk treatments proposed, the historical data suggests that there will always be an inherent level of high risk associated with level crossings.

No extreme or high ranking risks were detected outside the rail's boundary; however, offsite hazards associated with vehicle movements were ranked high. Applied control measures and design treatments downgraded the associated risk to moderate.

Waratah Coal is committed to providing a safe work place for staff and the community. Waratah Coal also commits to minimizing the potential risk to the health and safety of onsite and offsite personnel as a result of construction and operational activities associated with the rail alignment. This will be achieved through the following measures:

- Defaulting under a formal SHMS in accordance with all relevant legislative requirements during the construction phase
- Undertaking the operations of the mine site under a formal SHMS in accordance with all relevant legislative requirements

- Monitoring and implementing amendments to the SHMS where necessary and frequently ensuring its applicability and currency to be maintained and throughout the life of the Project, and
- Frequently liaising with internal and external stakeholders with respect to safeguarding and improving the SHMS.

5.2 Emergency Management Plan

An Initial Emergency Response Plan (ERP) Framework for the Project has established the preliminary framework that the Project will use during consultation with the Emergency Services in the preparation of the final ERP (see *Appendices – Volume 2* of this SEIS).

The ERP will be developed and implemented for the Project as part of the Health and Safety Management System (HSMS) prior to the commencement of construction activities. The system will be modified as the site transitions through to full scale operations.

The ERP will include specific procedures aimed at identifying and minimising risks in an emergency response situation, will provide for regular testing and review of emergency response procedures and prescribe the requirement for routine auditing to ensure the consistency and effectiveness of the system. A key aspect of the development of the ERP will be the initial consultation with the Queensland Ambulance Service, Queensland Fire and Rescue Service and Queensland Police Service and relevant Councils. As the ERP will be a "live" document, consultation with all key stakeholders will continue through the construction and operations of the Project.

Site safety inductions will include specific discussion in relation to emergency response procedures for the Project. Designated first aid facilities and equipment will be established at the rail maintenance yard and at various locations along the rail corridor prior to the commencement of construction. Facilities will remain at the mine and rail maintenance yard throughout the life of the Project. Appropriately trained personnel will be onsite at all times to provide first aid and to implement emergency response procedures when required. First aid response and provision will be included in the site induction training that will be provided to all site personnel.

Several fully trained fire fighting units will be on call during the construction and operation of the mine and rail. These units will consist of appropriately trained personnel from the rail workforce and will have access to fully maintained and functional fire fighting equipment (i.e. water tankers, light units fitted with quick spray units, appropriate communications, appropriate Personal Protective Equipment (PPE)). During operations all staff will undergo regular fire protection and fighting refresher training and all fire fighting facilities and equipment will be installed, serviced, maintained and inspected by a certified agency.

All hazardous materials storages, fuel storages areas, administration buildings, workshops, industrial facilities and accommodation facilities will have a dedicated fire alarm, suppression and fire fighting systems. First aid and fire fighting equipment (hand held extinguishers and fire hoses) will be located at strategic points within each facility and building. Fire fighting equipment and exit locations will be appropriately signed and all work areas will be within the required distance to reach emergency exits. Mine vehicles and train locomotives will also be fitted with fire fighting and first aid facilities in line with current heavyhaul industry practices.

Prior to commencement of construction activities, Waratah Coal will prepare the complete ERP and this will be undertaken in consultation with emergency services representatives, Government agencies, relevant councils and other stakeholders as necessary.

The purpose of the ERP will be to define the processes for emergency response for incidents occurring within the mine footprint, along the rail corridor or rolling stock yard. It will be used as a guide for the Emergency Response Team Leader, Emergency Response Team Members and all site personnel. The ERP will form a critical component of the SHMS. Separate Safety Operating Procedures (SOPs) will be prepared for the safe day to day operation of the mine and rail system.

6 MANAGEMENT PLANS

6.1 Environmental Management Plan

6.1.1 MINE

Waratah Coal have prepared a *Draft Environmental Management Plan* (EM Plan) for the mine component of the Project (see the *Appendices – Volume 2* of this SEIS).

The Draft EM Plan supports the application for draft Environmental Authority for the Project.

An EM Plan is required under *Section 201* of the *Environmental Protection Act 1994* (EP Act) as part of the application for an Environmental Authority (mining activities) process. *Section 202* of the EP Act states that the purpose of an EM Plan is to propose environmental protection commitments to assist the administering authority prepare the draft Environmental Authority.

In accordance with *Section 203* of the EP Act, the draft EM Plan contains the following sections.

- **Section 1 – Introduction**, provides background on the proponent, describes each of the relevant mining leases and land tenure, and identifies the relevant stakeholders.
- **Section 2 – Project Description**, describes the relevant mining activities and the land on which the mining activities are to be carried out.
- **Section 3 – Environmental Values, Impacts, Commitments, and Draft Conditions** describes:
  - environmental values likely to be affected by the mining activities
  - potential adverse and beneficial impacts of the mining activities on the environmental values,
  - environmental protection objectives,
  - control strategies adopted to achieve the environmental protection objectives,
  - environmental protection commitments, and
  - proposed Environmental Authority (EA) conditions.
- **Section 4 – Environmental Management** describes details of the Project's systems for monitoring, reporting, research, training and auditing.

The structure and content of the draft EM Plan addresses the Department of Environment and Heritage Protection's (DEHP) *Guideline No. 8, 'Preparing an Environmental Management Overview Strategy for non-standard Mining Projects'.* The commitments provided in the EM Plan are measurable and auditable; they set objectives and outline control strategies to achieve the objectives.

6.1.2 RAIL

A Draft Environmental Management Plan (EMP) (see the *Appendices – Volume 2* of this SEIS) has been prepared to outline an environmental management strategy for the rail component of the Project. It outlines the strategic level overview EMP and establishes the environmental management and monitoring obligations associated with the construction and operation of the rail starting at the balloon loops adjacent to the mine site and ending at the boundary of the Abbot Point State Development Area.

The Draft EMP proposes a range of measures to protect the identified environmental values that may be potentially affected by the Project. The measures proposed in this document are to be used by the administering authorities to establish the approval conditions for the project. Waratah Coal is committed to the preparation of specific EMPs for each core project component (i.e. mine, rail and port) to ensure compliance with best practice environmental management throughout the life of the Project.

The Draft EMP is a live, interactive document that will be updated in accordance with best practice environmental management practices, standard operating procedures, any Works Approvals and Licence conditions, and in consultation with key project stakeholders. This draft EMP has been specifically prepared to provide strategic level environmental measures for Waratah Coal and its contractors to follow for the construction and operation of the rail and related infrastructure to ensure that:

- activities associated with the Project's development do not adversely affect adjacent environmental and heritage values or the local community, and
- any potential environmental impacts of the development are managed in accordance with legislative requirements and best environmental management practices.

6.2 Decommissioning and Rehabilitation Plan

The *Draft Mine EM Plan* (see *Appendices – Volume 2* of this SEIS) also includes a section on rehabilitation and decommissioning (refer to section 9.6.3 – 9.9).

The following resources will be used to assist in the development of the final Rehabilitation and Decommissioning Plan, which will be a stand-alone document:

- DERM *Guideline: Rehabilitation Requirements for Mining Projects*[19], and
- *Leading Practice Sustainable Development Program for the Mining Industry: Mine Rehabilitation*[20].

These documents have been prepared based on a number of case studies and experience across Australia and in Queensland specifically and represent best practice mine rehabilitation activities. Specifically, with respect to rehabilitation of Queensland open pit operations, the leading practice document uses Gregory Crinum coal mine as a case study of best practice rehabilitation. Other relevant case studies used in this document include Kidston Gold Mine in Queensland and Mt Owen open pit coal mine in New South Wales.

The use of these documents, as well as others such as the *Leading Practice Sustainable Development Program for the Mining Industry: Mine Closure and Completion*[21] and the experience of site personnel, their colleagues, DERM and specialist consultants commissioned with providing rehabilitation and closure related advice will ensure that the proposed rehabilitation will result in a stable and non-polluting site.

Additional to the Rehabilitation and Decommissioning Plan for the site, which will be based on best practice, experience and case studies, the completion criteria developed for each aspect of the mine closure and rehabilitation will be used to define successful rehabilitation. The rehabilitation indicators and completion criteria will be determined based on critical assessment of the likely final land uses for each closure domain across the site and targeted to achievement of the outcomes identified throughout Section 1.3 (of the existing Galilee Coal Project EIS). These criteria will be measured against and where the monitoring results are not trending towards successful closure, contingency measures will be identified and adaptive management applied.

Waratah Coal commits to returning the land to a post-mine land use that will be stable, self-sustaining and require minimal maintenance. It also identifies the requirement for stakeholder consultation and agreement to appropriately define a biodiversity offset strategy and rehabilitation and closure plan. The site will not be relinquished back to the government until such time as agreed completion criteria are met and prove that the land is available for the agreed final land use.

19 DERM (2011) *Guideline: Rehabilitation requirements for mining projects.* Department of Environment and Resource Management. 2011.

20 DITR (2006) *Leading Practice Sustainable Development Program for the Mining Industry: Mine Rehabilitation.* Department of Industry, Tourism and Resources, October 2006.

21 DITR (2006) *Leading Practice Sustainable Development Program for the Mining Industry: Mine Closure and Completion.* Department of Industry, Tourism and Resources, October 2006.

6.3 Social Impact Management Plan

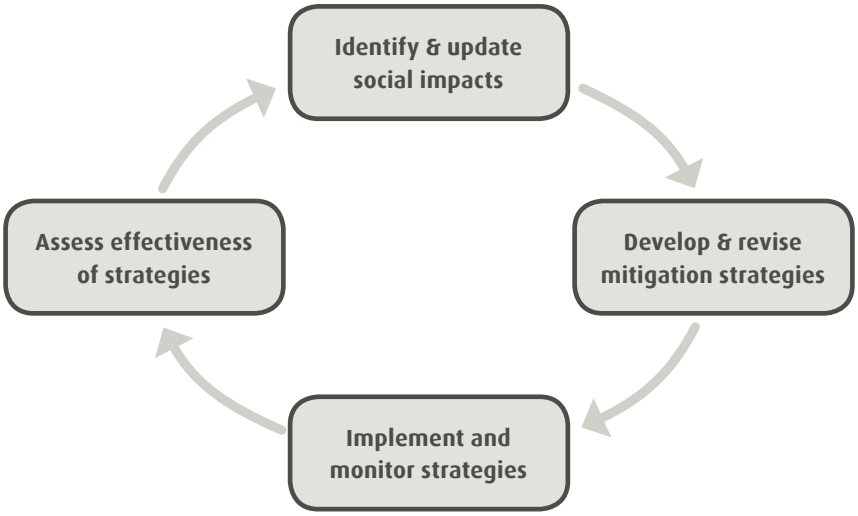
The Social Impact Management Plan (SIMP) has been prepared. The SIMP outlines a process for identifying, managing and reporting on social impacts and will be updated on an annual basis throughout the life of the project.

The SIMP is a document that shall be revised annually throughout the construction, operating and decommissioning phases of the project. The purpose of the SIMP is to outline a process for identifying, managing and reporting on social impacts. More specifically, the SIMP shall:

1. Provide information on the project, the main stakeholders and the project's social impacts
2. Describe management and mitigation strategies which Waratah Coal and other stakeholders will employ to enhance positive social impacts and minimise adverse social impacts
3. Describe how the strategies will be monitored and assessed, and
4. Outline the process for re-assessing social impacts and revising management and mitigation strategies.

The cyclical nature of social impact management is illustrated in Figure 25.

Figure 25. Social Impact Management Cycle



The format of the SIMP generally follows the guideline prepared by the Department of Infrastructure and Planning[22] and reflects the good practice principles for the development and implementation of SIMPs as recommended in the guideline *Leading Practice Strategies for Addressing the Social Impacts of Resource Developments*.[23]

Several other guidelines have been utilised in preparation of the SIMP:

- A leading practice handbook on community engagement and development, prepared as part of the *Leading Practice Sustainable Development Program for the Mining Industry*[24]
- The IAP2 Pubic Participation Spectrum[25]
- Toolkits and guidelines prepared by the International Council on Mining and Metals (ICMM) on community development and grievance mechanisms[26]

22 Refer Department of Infrastructure and Planning, September 2010.

23 Refer Franks, Fidler, Brereton, Vanclay & Clark, November 2009.

24 Refer Department of Industry, Tourism and Resources, October 2006.

25 Refer International Association for Public Participation, 2004.

26 Refer ICMM, October 2005 and ICMM, October 2009.

- Recommendations and strategies prepared by the Centre for Social Responsibility in Mining (CSRM) on grievance mechanisms and social monitoring[27]
- Australian guidelines to reduce health risks from drinking alcohol[28], and
- Workplace fatigue management guides.[29]

7 CONCLUSION

Waratah Coal intends to establish a new coal mine, railway and associated supporting infrastructure to export highly volatile, low sulphur, steaming coal to international markets.

The project will realise significant economic and social benefits on a regional, state and national scale. The rail corridor will open a new multi-billion tonne coal province with opportunities for thermal coal export to world markets for both Waratah Coal, as well as other Galilee Basin proponents through welcomed third party access arrangements. It will also provide much needed new rail infrastructure in Central Queensland to ease existing congestion on the current coal haulage systems.

Further, the project will generate considerable export income for the Australian economy with revenue of A$4.6 billion per annum, or A$85 billion over the life of the project. Commonwealth and State Government revenue will also be increased through taxes and royalties of up A$360 mpa (State) and A$700 mpa (Commonwealth) respectively from the project alone.

The project will also assist in driving the growth of Central and North West Queensland, creating approximately 6,000 direct jobs during construction and 1,500 permanent employees for the long term operation of the mine, 60 rail and 150 port facilities. A flow through benefit of an additional 70,000 indirect jobs is anticipated, with the majority of these expected to occur in Queensland.

Throughout the design, construction and operational phases of the project, Waratah Coal will implement ecologically sustainable principles in line with industry best practice. As a significant project in regional Queensland, Waratah Coal will engage with local communities and conduct its operations in a way that respects and enhances existing community values and lifestyles.

Studies undertaken for the EIS and SEIS conclude that the environmental impacts of the development of the coal mine and rail alignment project can be minimised and/or mitigated to acceptable levels, or in the case that a residual impact remains, successfully offset.

A range of specific management measures and plans are proposed, and a *Biodiversity Offset Proposal* has been formulated.

Given the geographic expanse of the project, stakeholder communication and social impact management will be a key element of Waratah Coal's project development plan. While the project offers significant positive benefit to the region, Waratah Coal is aware that negative impacts such as increased demand on public infrastructure and services, impacts to agricultural land and increases to the cost of living (particularly in relation to housing costs) that may result from the development of the project.

Waratah Coal will implement measures to reduce these issues including preferential employment of local employees and local suppliers, engaging with affected property owners to minimise disruptions and reduce impacts on cattle productivity and establishing a, effective grievance mechanism for the management of issue identified by staff, contractors and other parties.

27 Refer CSRM, November 2009 and CSRM, July 2005.

28 Refer National Health and Medical Research Council, February 2009.

29 Refer NSW Mine Safety Advisory Council, December 2009 and Queensland Government, February 2011.

Waratah Coal is committed to effective ongoing community engagement throughout the Project's development and operational phases. This is an important and necessary process to build and maintain relationships with impacted communities and other stakeholders; to contribute as appropriate to the sustainable development of local communities; and to therefore earn and maintain a social license to operate.

Waratah Coal is committed to delivering a project founded on ecologically sustainable principles and commissioned with a social license to operate. Waratah Coal will deliver an environmentally, socially and economically sustainable project which will support and enhance regional advancement throughout its whole project life.