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## 4. PROJECT DESCRIPTION

This Section provides a description of the proposed South Galilee Coal Project (SGCP).

### 4.1. LOCATION

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#### 4.1.1. Regional Context

The regional location of the SGCP is shown in **Figure 1-1** in **Section 1—Introduction**.

The SGCP is located within the Barcaldine Regional Council Local Government Area, approximately 12 kilometres (km) south-west from the centre of the township of Alpha. Alpha is situated approximately 170 km west of Emerald and 450 km west of Rockhampton in Central Queensland.

There are a number of proposed coal mines in the vicinity of the SGCP, including:

- Galilee Coal (Northern Export Facility), (also known as the China First Coal Project), proposed by Waratah Coal Pty Ltd
- Alpha Coal Mine, proposed by the GVK Group
- Kevin's Corner, proposed by the GVK Group
- Carmichael Coal Mine and Rail Project, proposed by Adani Mining Pty Ltd.

**Figure 4-1** shows the location of mining tenements surrounding the SGCP.

#### 4.1.2. Local Context

**Figure 1-1** illustrates the SGCP's location in relation to the local area's existing infrastructure, such as roads, railways and geomorphic features such as waterways.

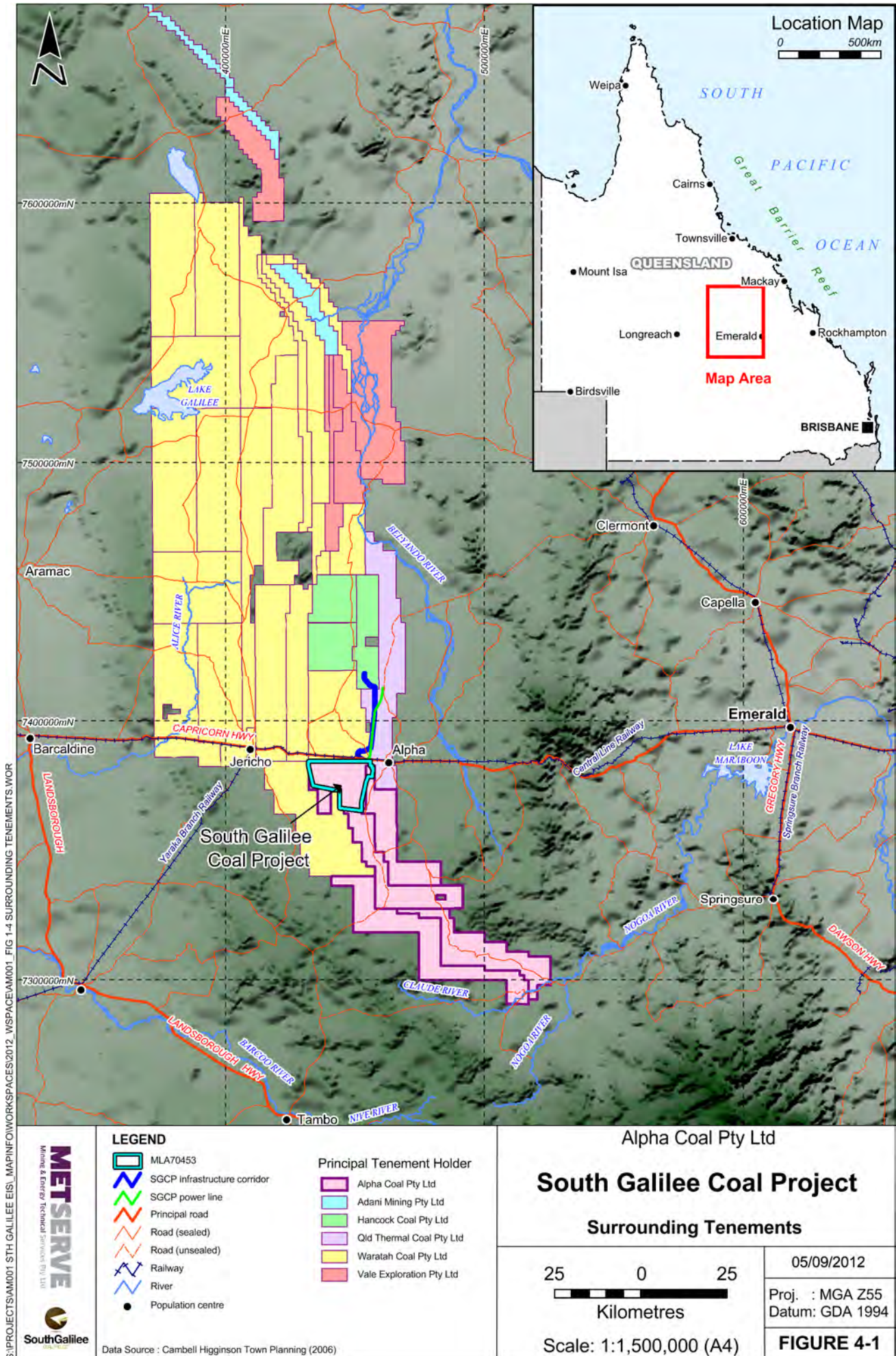
The conceptual layouts of the mine site and infrastructure components over the SGCP's life cycle are presented in **Figure 4-2** to **Figure 4-13**.

#### 4.1.3. Tenements and Tenures

**Table 4-1**, **Figure 4-1** and **Figure 4-14** identify the mining tenements and land tenure in the SGCP area. As identified in **Table 4-1**, several properties within the SGCP area are also subject to other minerals and petroleum tenements.

The coal deposit for the SGCP has been defined by exploration activities undertaken in accordance with two Exploration Permits for Coal (EPCs), (1049 and 1180), held by Alpha Coal Pty Ltd (a subsidiary of Bandanna Energy). The SGCP will be located within MLA 70453 and the infrastructure corridor.



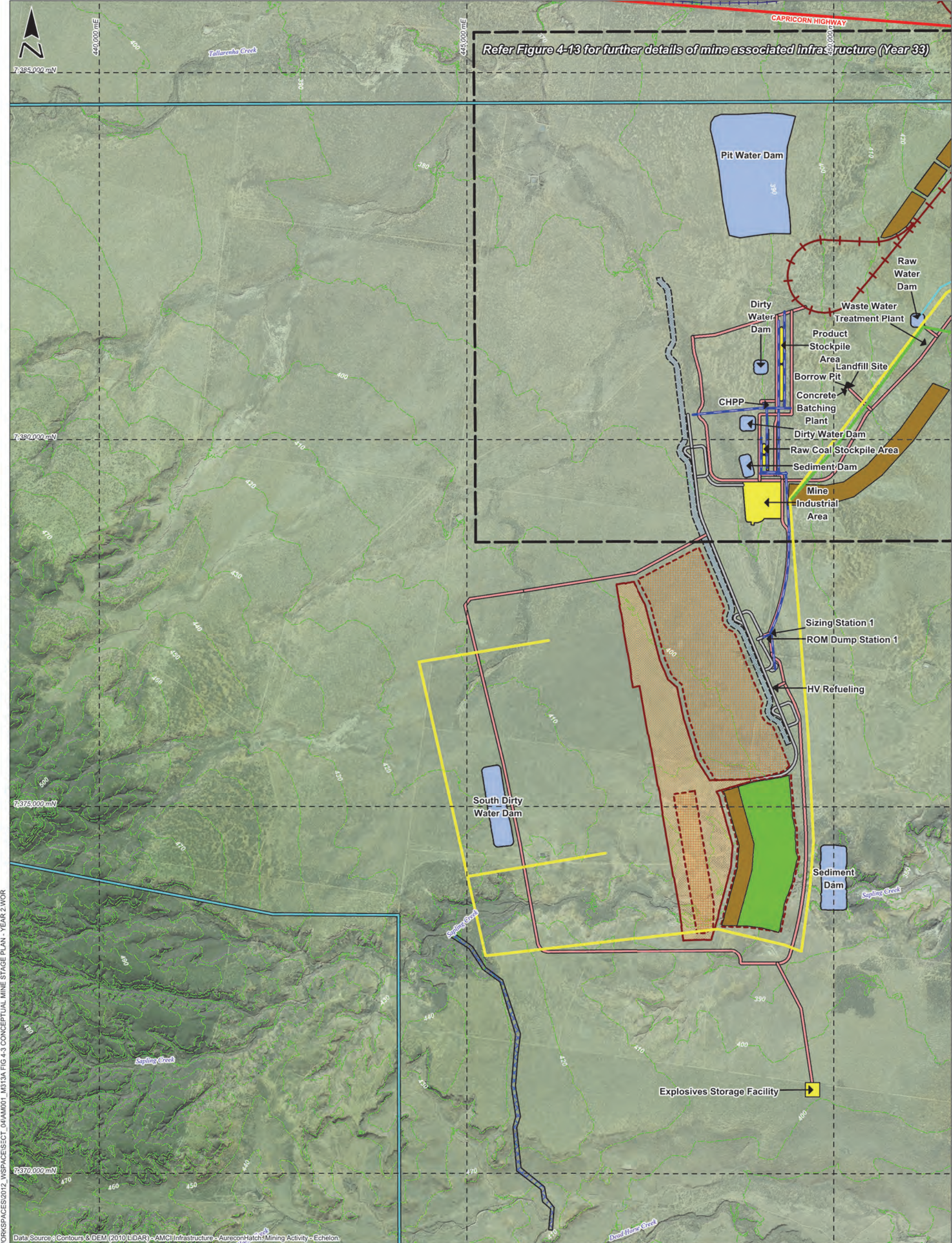


S:\PROJECTS\M001 STH GALILEE EIS, MAPINFO\WORKSPACES\2012\_WSP\SPACE\M001\_FIG 1-4 SURROUNDING TENEMENTS.WOR









MLA70453  
Principal road  
Contour AHD (10m)

**Mining Activity**  
Open pit  
Waste rock emplacement

**Infrastructure**  
Facility area  
Stream diversion  
Drainage channel  
Water storage dam  
Topsoil stockpile  
Topsoil spreading and rehabilitation  
Heavy vehicle road  
Light vehicle road  
On-site rail component  
Coal & rejects conveyor

**Utilities**  
66kV overhead power line  
11kV overhead power line  
Raw water pipeline

Alpha Coal Pty Ltd

## South Galilee Coal Project

Conceptual Mine Stage Plan - Year 2

1 0 1

Kilometres

Scale: 1:50,000 (A3)

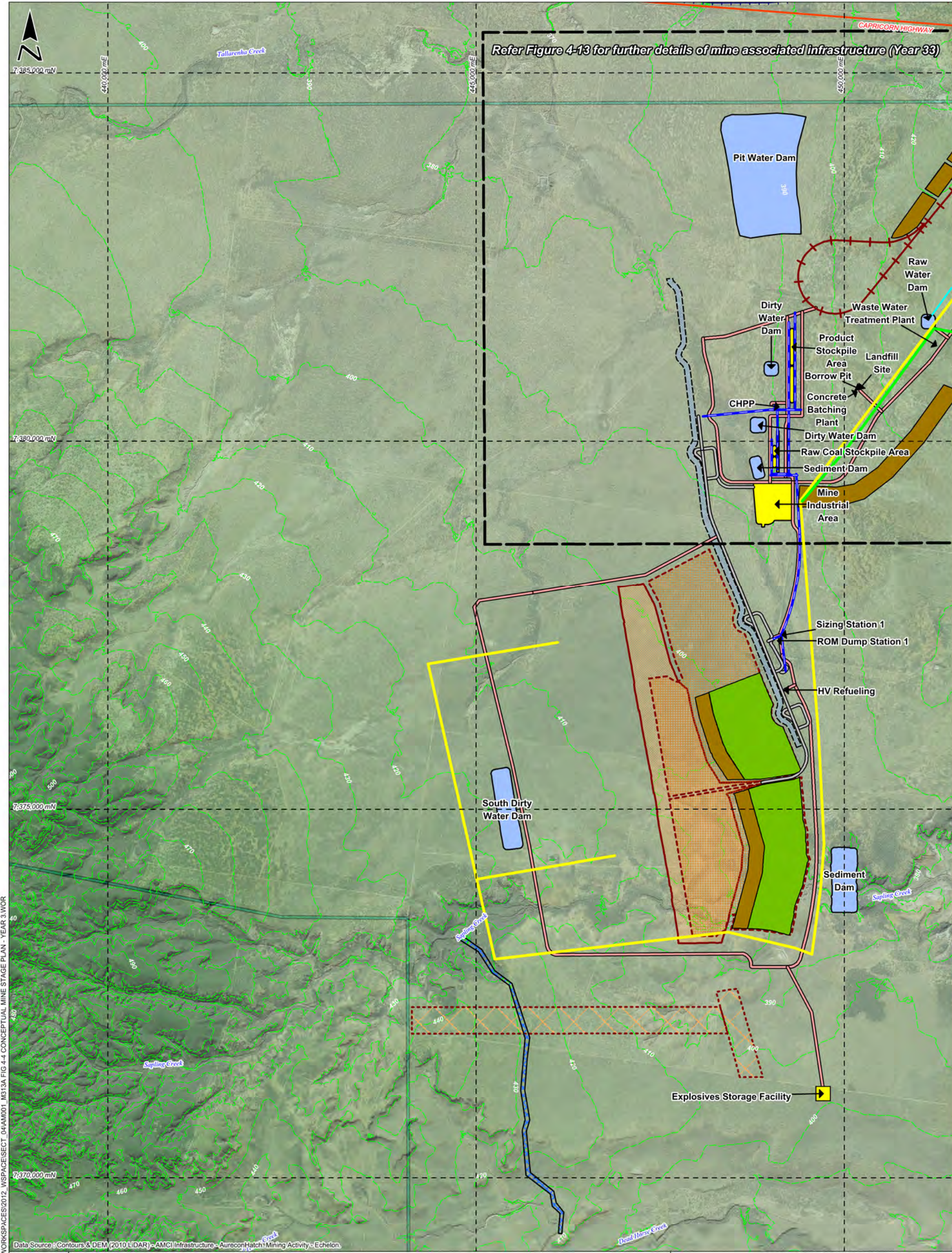
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Proj. : MGA Z55  
Datum: GDA 1994

**FIGURE 4-3**

S:\PROJECTS\AM001 STH GALILEE EIS MAPINFO\WORKSPACES\2012\_VSPACE\SECT\_04\AM001\_M313A FIG 4-3 CONCEPTUAL MINE STAGE PLAN - YEAR 2.WOR





S:\PROJECTS\AM001 STH GALILEE EIS MAP\INFO\WORKSPACES\2012\_VSPACE\SECT 04\AM001 M313A FIG 4-4 CONCEPTUAL MINE STAGE PLAN - YEAR 3.WOR

Data Source: Contours & DEM (2010 LIDAR) - AMCI Infrastructure - Aurecon/Hatch Mining Activity - Echelon.

**LEGEND**

- MLA70453
- Principal road
- Contour AHD (10m)

- Mining Activity**
- Open pit
- Waste rock emplacement

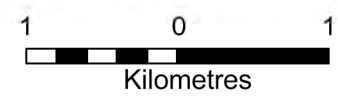
- Infrastructure**
- Facility area
- Stream diversion
- Drainage channel
- Water storage dam
- Topsoil stockpile
- Topsoil spreading and rehabilitation
- Heavy vehicle road
- Light vehicle road
- On-site rail component
- Coal & rejects conveyor

- Utilities**
- 66kV overhead power line
- 11kV overhead power line
- Raw water pipeline

Alpha Coal Pty Ltd

**South Galilee Coal Project**

**Conceptual Mine Stage Plan - Year 3**



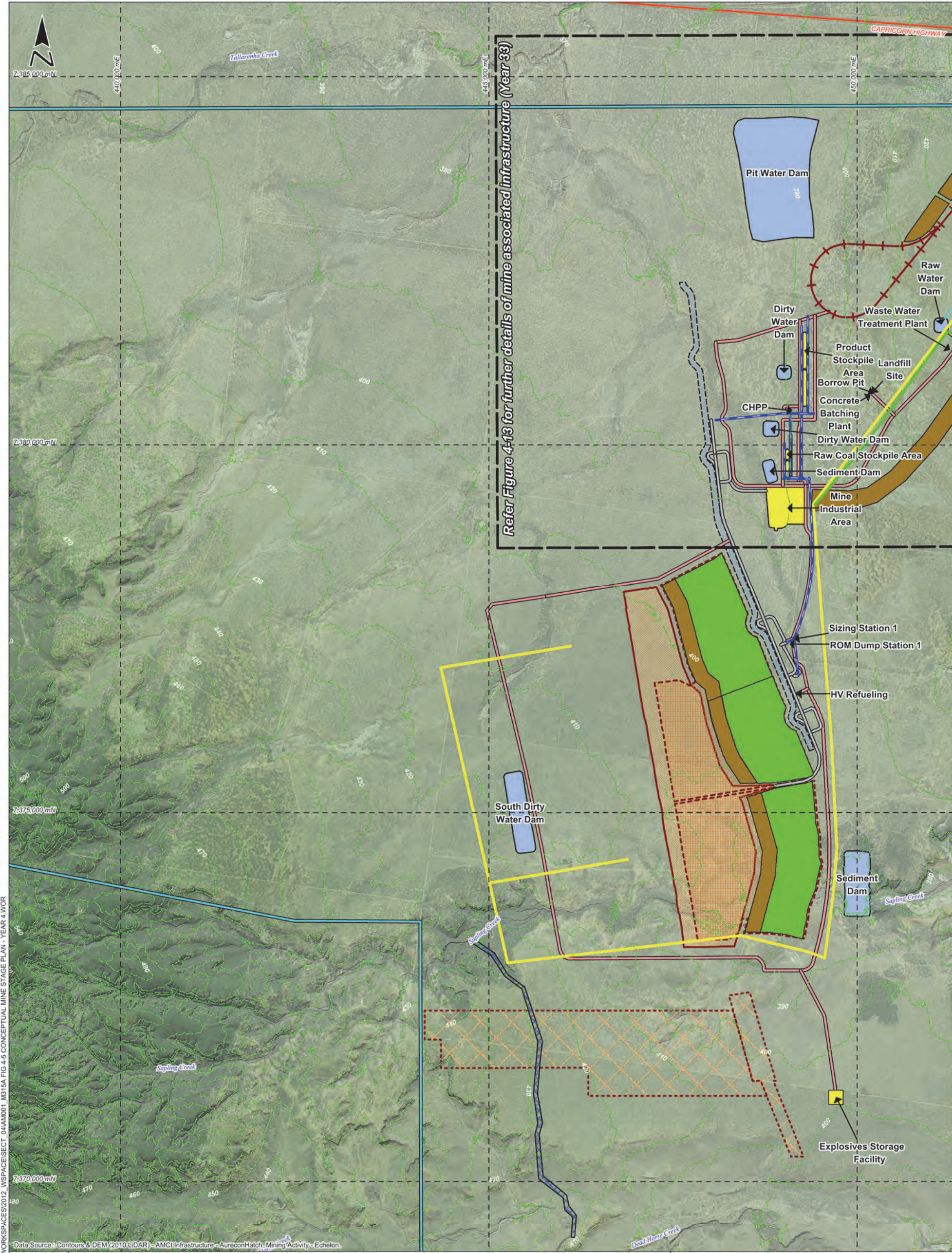
Scale: 1:50,000 (A3)

13/08/2012

Proj. : MGA Z55  
Datum: GDA 1994

**FIGURE 4-4**





S:\PROJECTS\AM001 STH GALILEE EIS MAPINFO\WORKSPACES\2012\_VSPACE\SECT 04\AM001 M315A FIG 4-5 CONCEPTUAL MINE STAGE PLAN - YEAR 4.WOR

Mining & Energy Technical Services Pty Ltd

SouthGalilee

**LEGEND**

MLA70453	Mining Activity	Infrastructure	Utilities
Principal road	Open pit	Facility area	66kV overhead power line
Contour AHD (10m)	Waste rock emplacement	Stream diversion	11kV overhead power line
		Drainage channel	Raw water pipeline
		Water storage dam	
		Topsoil stockpile	
		Topsoil spreading and rehabilitation	
		Heavy vehicle road	
		Light vehicle road	
		On-site rail component	
		Coal & rejects conveyor	

Alpha Coal Pty Ltd

## South Galilee Coal Project

### Conceptual Mine Stage Plan - Year 4

101

Kilometres

Scale: 1:50,000 (A3)

13/08/2012

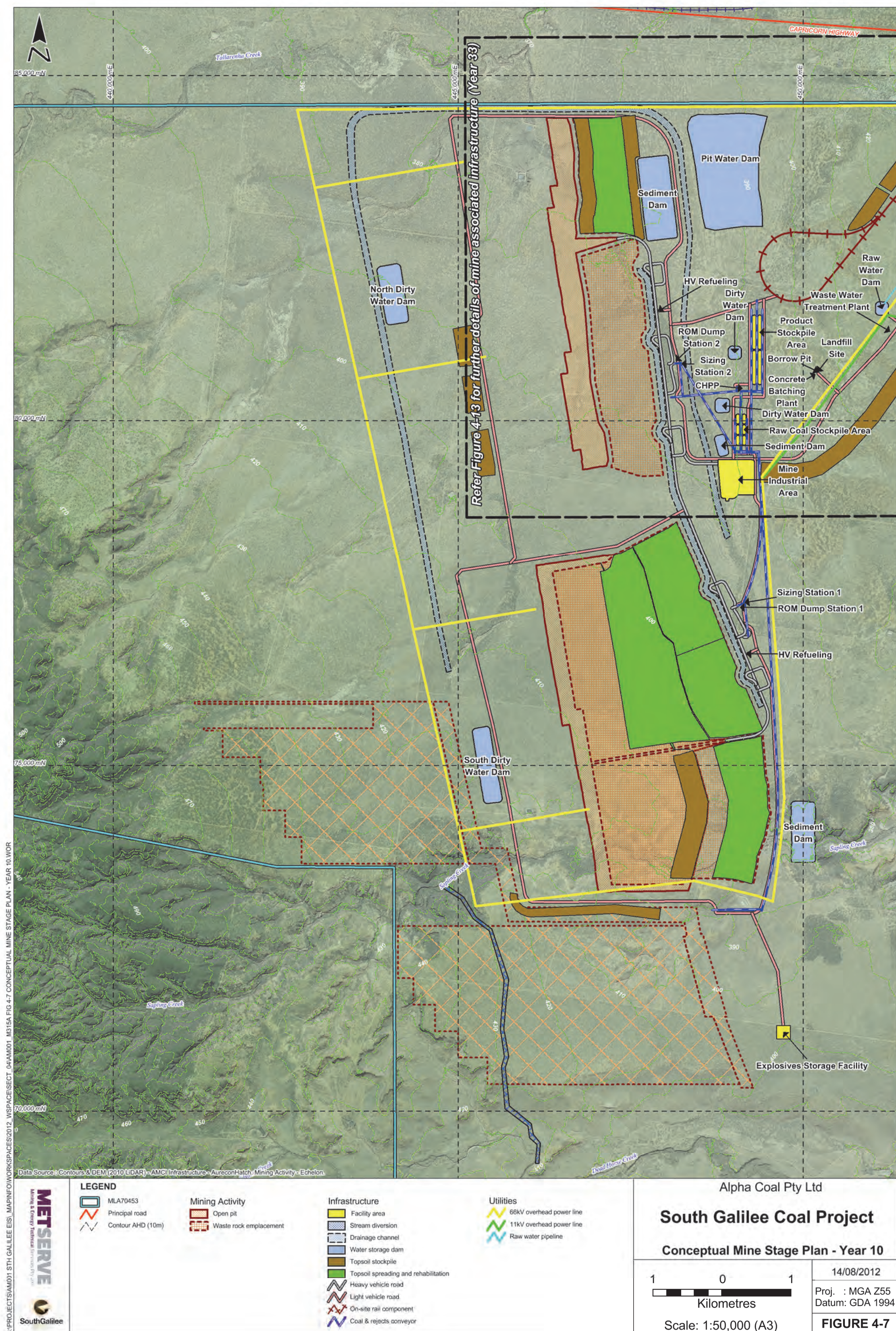
Proj. : MGA Z55  
Datum: GDA 1994

**FIGURE 4-5**

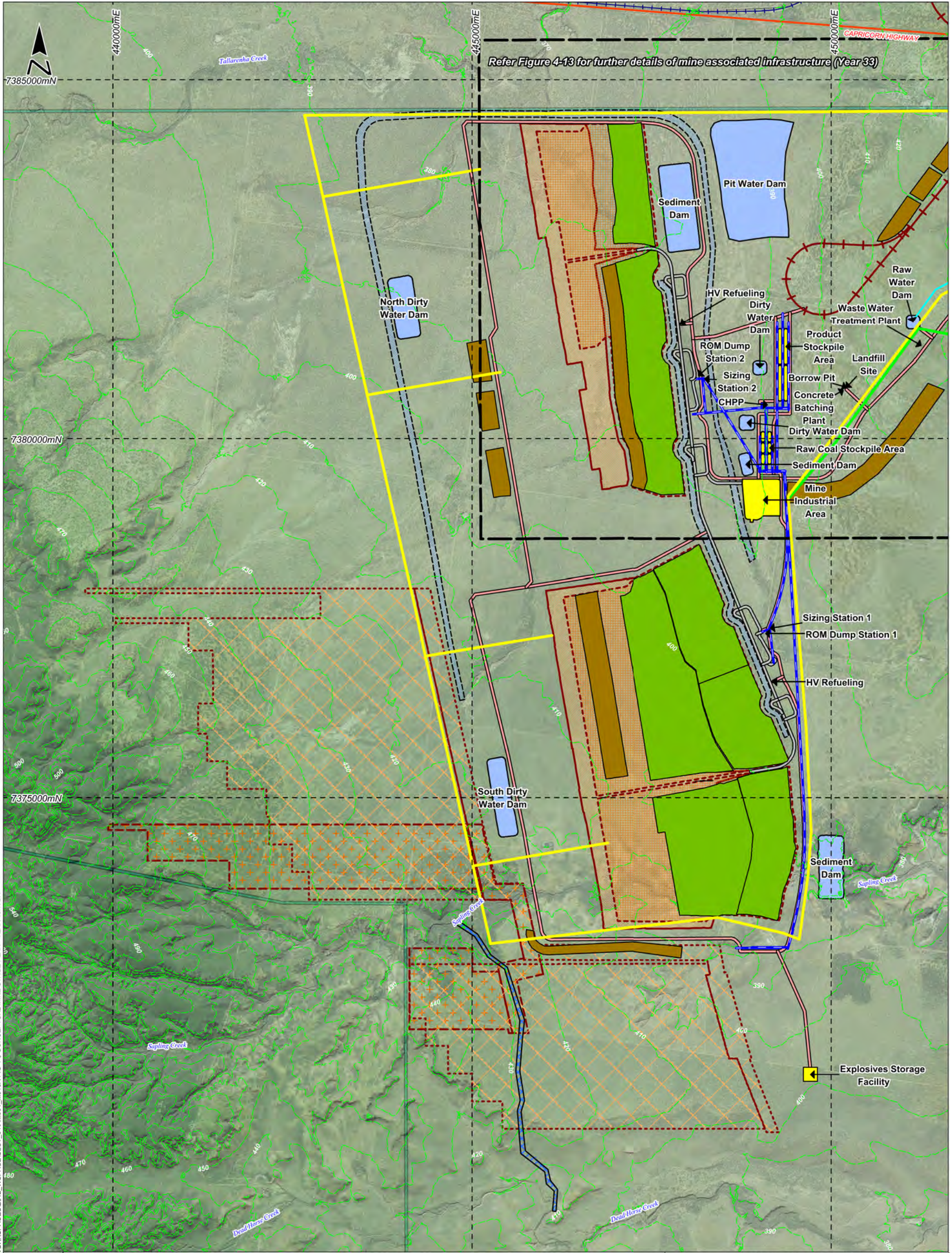












Refer Figure 4-13 for further details of mine associated infrastructure (Year 33)

Mining & Energy Technical Services Pty Ltd

**LEGEND**

MLA70453  
Principal road  
Contour AHD (10m)

**Mining Activity**  
Open pit  
Waste rock emplacement  
D1 underground mining area  
D2 underground mining area

**Infrastructure**  
Facility area  
Stream diversion  
Drainage channel  
Water storage dam  
Topsoil stockpile  
Topsoil spreading and rehabilitation  
Heavy vehicle road  
Light vehicle road  
On-site rail component  
Coal & rejects conveyor

**Utilities**  
66kV overhead power line  
11kV overhead power line  
Raw water pipeline

Alpha Coal Pty Ltd

**South Galilee Coal Project**

**Conceptual Mine Stage Plan**

**Year 15**

1 0 1

Kilometres

Scale: 1:50,000 (A3)

04/09/2012

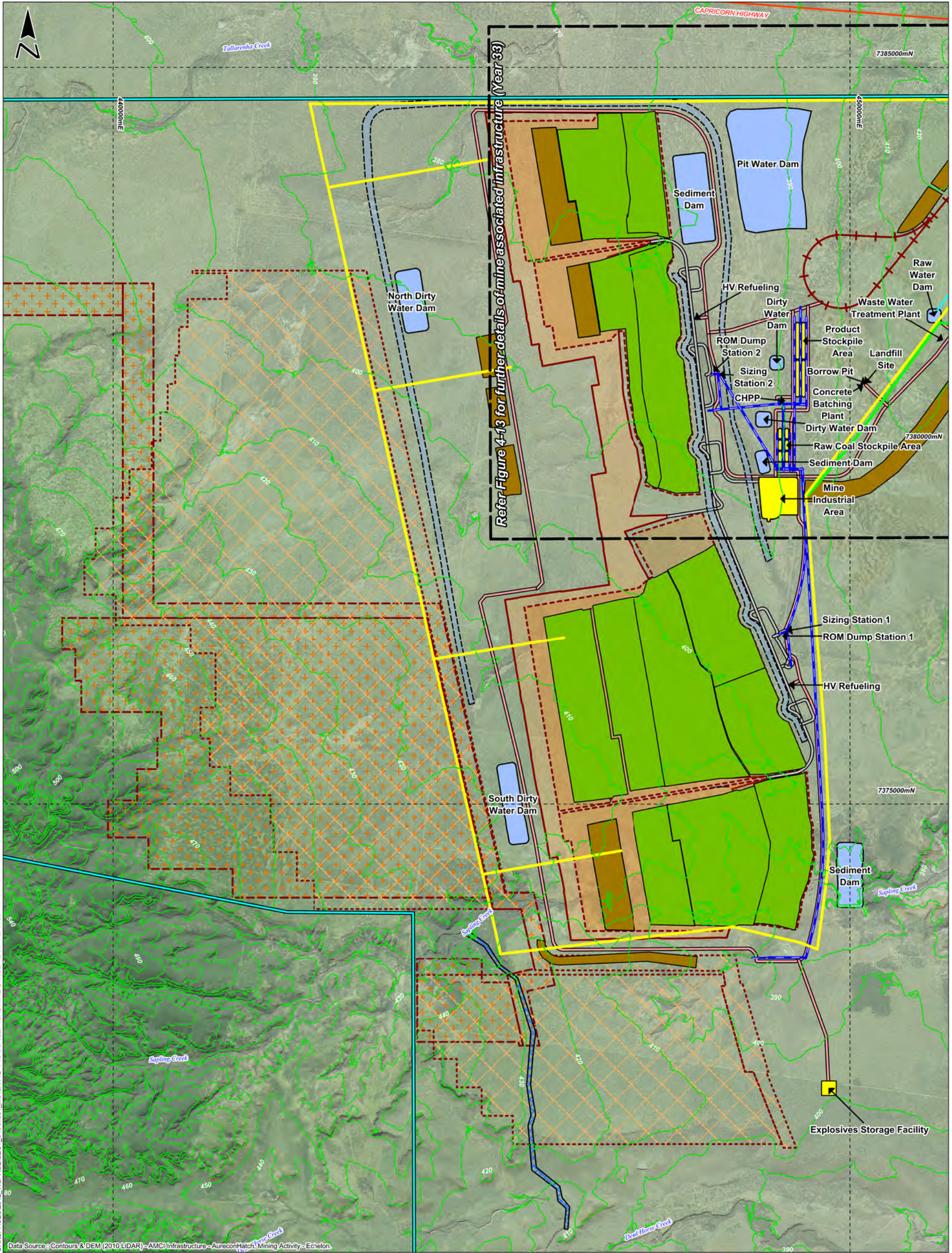
Proj. : MGA Z55  
Datum: GDA 1994

**FIGURE 4-8**









Alpha Coal Pty Ltd

## South Galilee Coal Project

Conceptual Mine Stage Plan - Year 25

1 0 1  
Kilometres

Scale: 1:50,000 (A3)

08/14/2012  
Proj. : MGA Z55  
Datum: GDA 1994

**FIGURE 4-10**

**LEGEND**

MI A70453  
Principal road  
Contour AHD (10m)

**Mining Activity**  
Open pit  
Waste rock emplacement

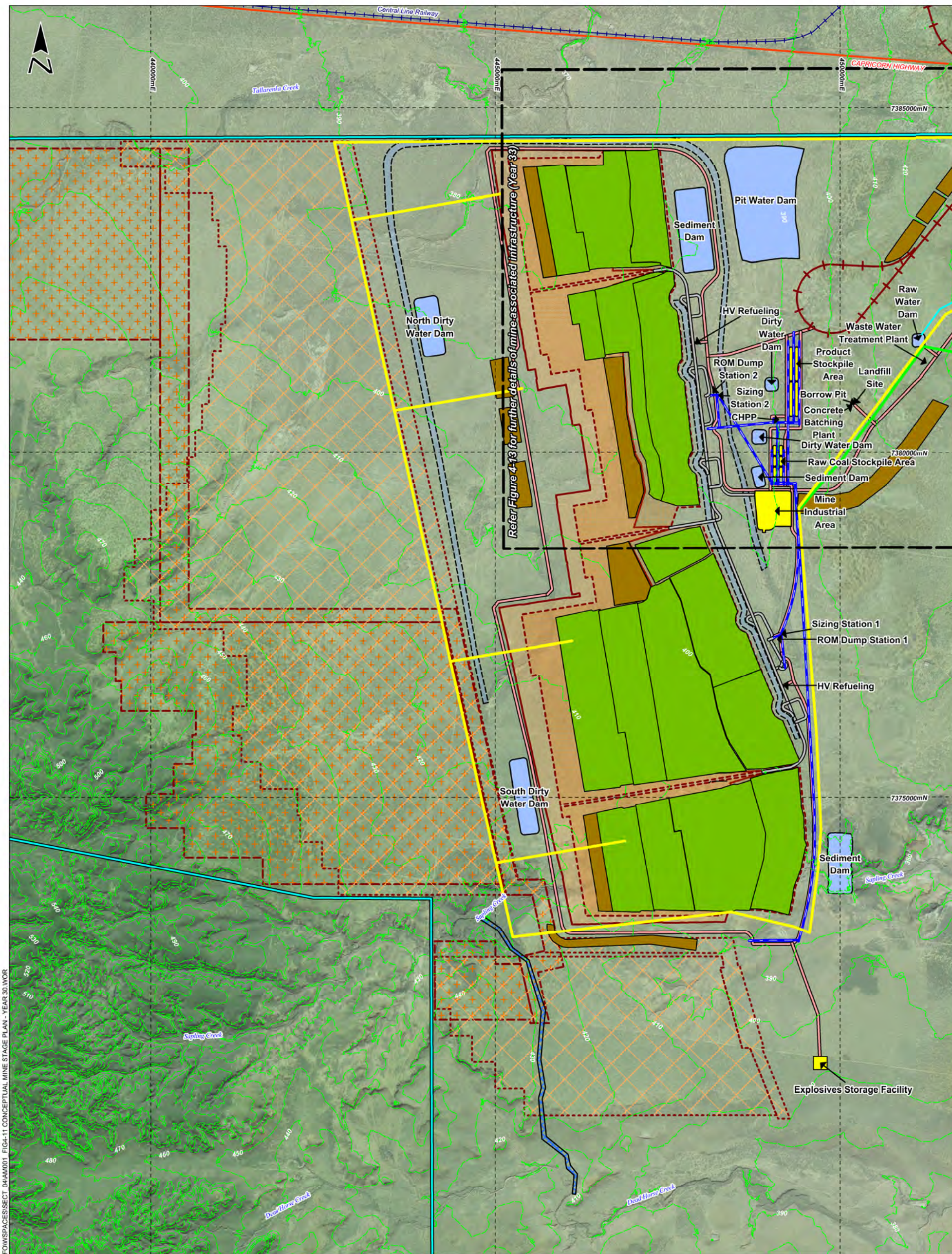
**Infrastructure**  
Facility area  
Stream diversion  
Drainage channel  
Water storage dam  
Topsoil stockpile  
Topsoil spreading and rehabilitation  
Heavy vehicle road  
Light vehicle road  
On-site rail component  
Coal & rejects conveyor

**Utilities**  
66kV overhead power line  
11kV overhead power line  
Raw water pipeline

S:\PROJECTS\AM01\_STH GALILEE EIS\MAPINFO\WORKSPACES\2012\_WSP\SPACE\SECT\_04\AM001\_M315A FIG 4-10 CONCEPTUAL MINE STAGE PLAN - YEAR 25







Refer Figure 4-13 for further details of mine-associated infrastructure (Year 33)

S:\PROJECTS\AM001 - STH GALILEE EIS\GIS\ MAP\INFOWSPACES\SECT 34\AM001 - FIG-11 CONCEPTUAL MINE STAGE PLAN - YEAR 30.WOR

<b>LEGEND</b> MLA70453 Principal road Contour AHD (10m)		<b>Mining Activity</b> Open pit Waste rock emplacement D1 underground mining area D2 underground mining area		<b>Infrastructure</b> Facility area Stream diversion Drainage channel Water storage dam Topsoil stockpile Topsoil spreading and rehabilitation Heavy vehicle road Light vehicle road On-site rail component Coal & rejects conveyor		<b>Utilities</b> 66kV overhead power line 11kV overhead power line Raw water pipeline	
Data Source : Contours & DEM (2010 LiDAR) - AMCI Infrastructure - AureconHatch Mining Activity - Echelon				Alpha Coal Pty Ltd <b>South Galilee Coal Project</b> Conceptual Mine Stage Plan Year 30		24/08/2012 Proj. : MGA Z55 Datum: GDA 1994 <b>FIGURE 4-11</b>	

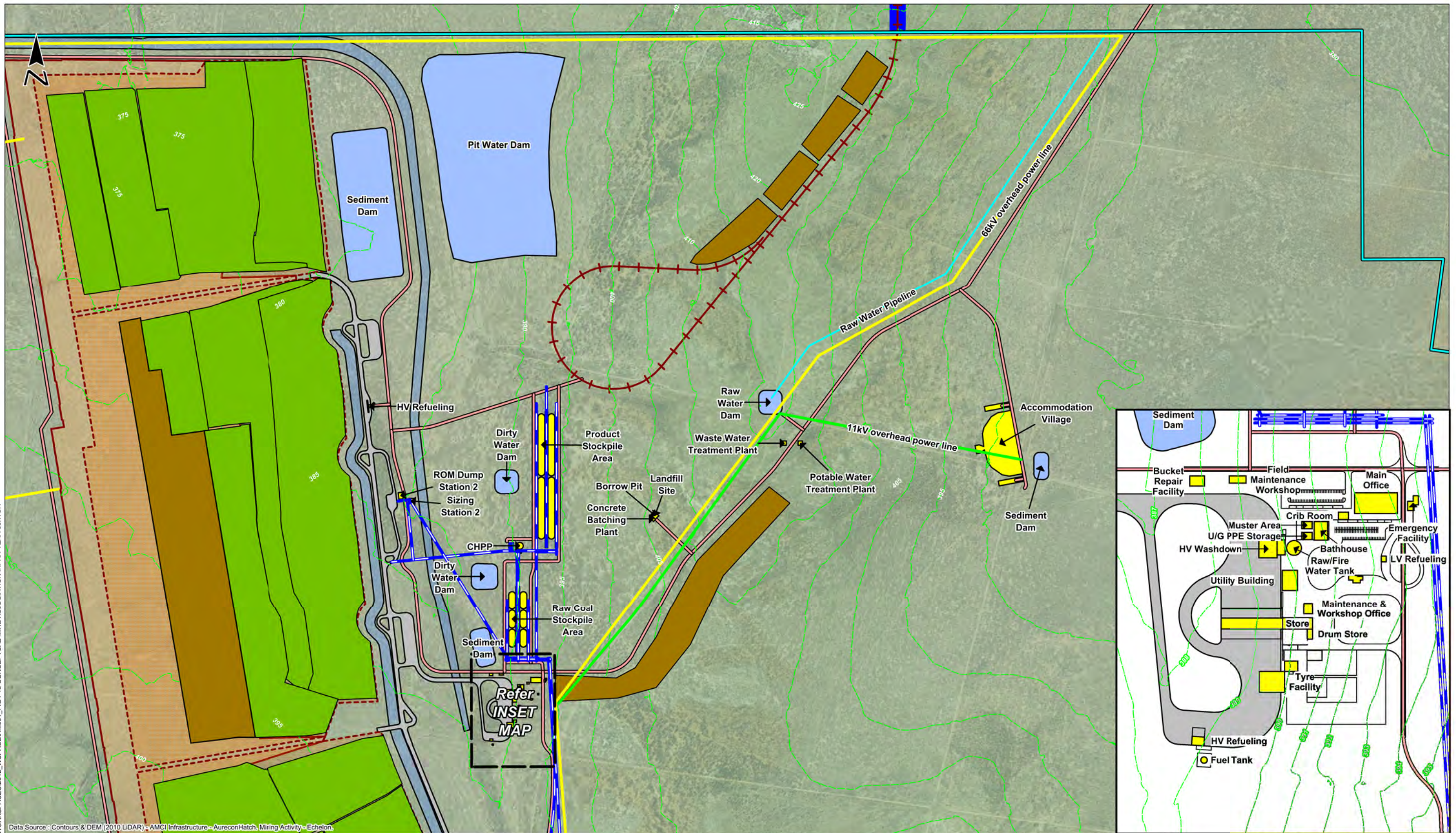
Scale: 1:50,000 (A3)







S:\PROJECTS\AM001 STH GALILEE EIS\MAPINFO\WORKSPACES\2012\_VSP\SPACE\AM001\_FIG4-13 CONCEPTUAL MINE ASSOCIATION INFRA-YEAR 33.WOR



Data Source: Contours & DEM (2010 LiDAR) - AMCI Infrastructure - Aurecon/Hatch Mining Activity - Echelon

#### LEGEND

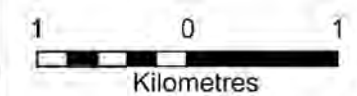
- MLA70453
- Principal road
- Railway
- Contour AHD (10m)

- Mining Activity
- Open pit
- Waste rock emplacement

- Infrastructure
- Facility area
- Stream diversion
- Drainage channel
- Water storage dam
- Topsoil stockpile
- Topsoil spreading and rehabilitation
- Heavy vehicle road
- Light vehicle road
- On-site rail component
- Coal & rejects conveyor

- Utilities
- 66kV overhead power line
- 11kV overhead power line
- Raw water pipeline

Alpha Coal Pty Ltd  
**South Galilee Coal Project**  
Conceptual Mine Associated Infrastructure  
Year 33



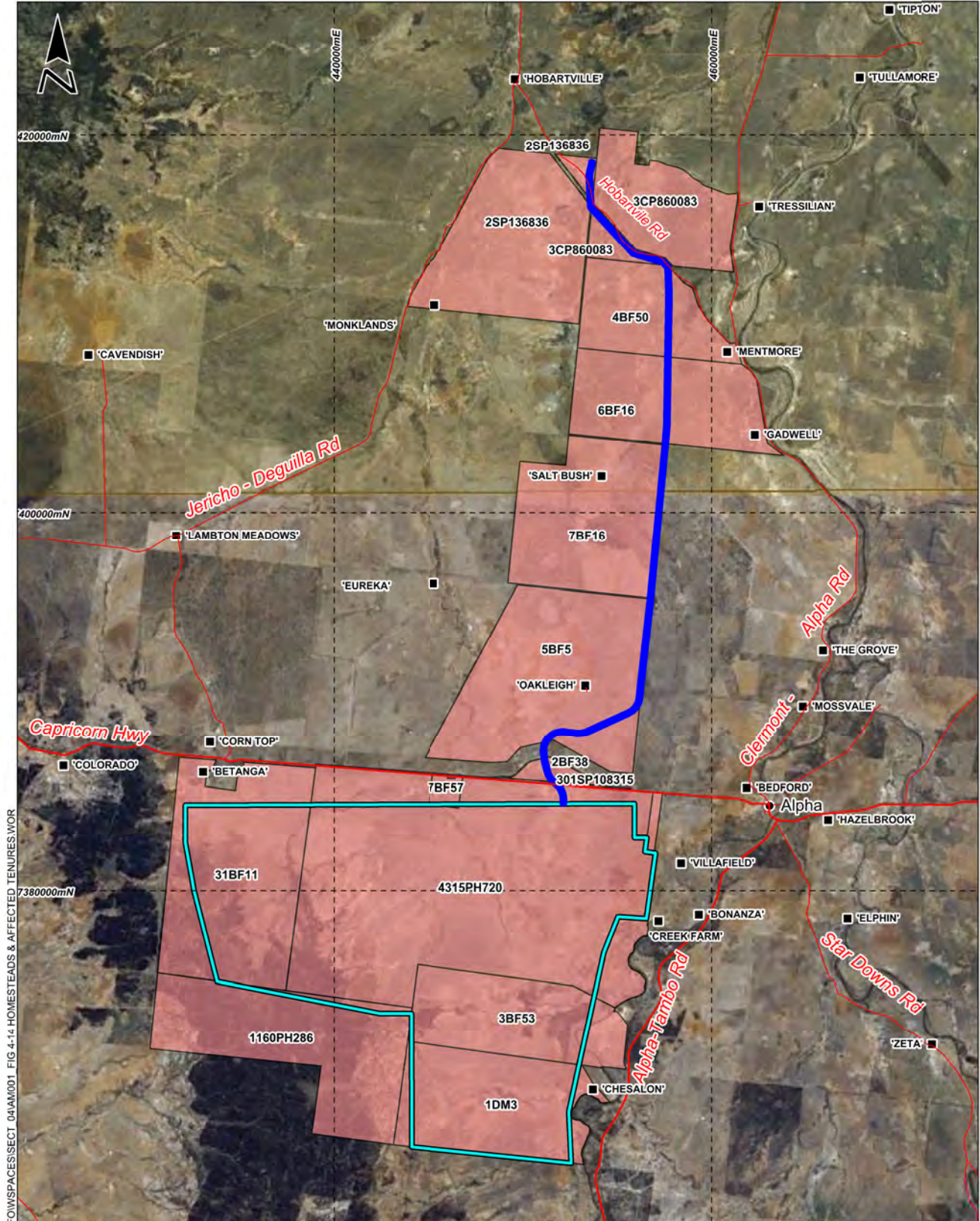
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08/16/2012

Proj.: MGA Z55  
Datum: GDA 1994

**FIGURE 4-13**





S:\PROJECTS\AM001\_STH GALILEE EIS\GIS\MAPINFO\SPACES\SECT\_04\AM001\_FIG 4-14 HOMESTEADS & AFFECTED TENURES.WOR

#### LEGEND

- MLA70453
- Directly affected property
- SGCP infrastructure corridor
- Roads
- Population centre
- Homestead

Data Source:  
Cadastral (Barcaldine May2010)-DERM. Topo (250k raster)-Geoscience Australia.

Alpha Coal Pty Ltd

## South Galilee Coal Project

### Directly Affected Land Tenure

5 0 5  
Kilometres

Scale: 1:300,000 (A4)

24/08/2012

Proj. : MGA Z55  
Datum: GDA 1994

**FIGURE 4-14**

**Table 4-1 Real Property Description for Land Located Within or Partly Within MLA 70453 and Infrastructure Corridor**

Tenure/Tenement <sup>1</sup>	Real Property Description	Property Name	Land Owner ID
<b>MLA 70453</b>			
EPC 1049, EPC 1180, EPC 1040 and EPP 668	4315PH720 <sup>2</sup>	Creek Farm	A
EPC 1049, EPC 1180 and EPP 668	1DM3	Chesalon	B
EPC 1049, EPC 1040 and EPP 668	7BF57	Tallarenha	C
EPC 1049, EPC 1040, EPC 1155 and EPP 668	31BF11	Betanga	D
EPC 1049, EPC 1155 and EPP 668	1160PH286	Armagh	E
EPC 1049, EPC 1180, EPC 1155 and EPP 668	3BF53	Sapling Creek	F
<b>Infrastructure Corridor</b>			
EPC 1040, EPC 1263 and EPP 668	5BF5	Oakleigh	G
EPC 1210, EPC 1263 and EPP 668	3CP860083	Tresillian	H
EPC 1210, EPC 1040 and EPP 668	2SP136836	Monklands	I
EPC 1210, EPC 1263 and EPP 668	4BF50	Mentmore	J
EPC 1263 and EPP 668	6BF16	Gadwell	J
EPC 1263 and EPP 668	7BF16	Saltbush	K
EPC 1040 and EPP 668	301SP108315	N/A	L
EPC 1049, EPC 1180, EPC 1040 and EPP 668	4315PH720	Creek Farm	A
EPC 1040 and EPP 668	2BF38	Leased Reserve	A

<sup>1</sup> EPC 1040 is held by Waratah Coal Pty Ltd  
EPC 1155 is held by Waratah Coal Pty Ltd  
EPC 1210 is held by the GVK Group  
EPC 1263 is held by Queensland Thermal Coal Pty Ltd  
EPP 668 is held by Australia Pacific LNG Pty Limited

<sup>2</sup> 4315PH720 is affected by MLA 70453 as well as the infrastructure corridor

## 4.2. RESOURCE BASE AND MINE LIFE

The indicative stratigraphy of the Project area is shown on **Figure 4-15**.

The SGCP is located in the south-eastern region of the Galilee Basin, an intracratonic basin covering an area of approximately 247,000 square kilometres (km<sup>2</sup>). The Galilee Basin is comprised of Late Carboniferous to Middle Triassic sediments. The thickest Galilee Basin sequence has been recorded at 2,818 metres (m) within the Koburra Trough.

The Galilee Basin is unconformably overlain by the Jurassic Cretaceous Eromanga Basin. The eastern margin of the Galilee Basin is dominated by Permo-Triassic rocks, which outcrop in a long narrow gently curved belt. The Galilee Basin is divided into northern and southern sections by the east-west trending Barcaldine Ridge.

The primary geological units within the SGCP area can be divided into Quaternary, Tertiary, Triassic and Permian age sediments. The Quaternary-Tertiary stratigraphic unit has an average thickness of 21 m with a range of 3 to 52 m. Average depth to the base of weathering is 51 m with a range of 18 to 95 m. The Triassic units occur in the western part of the SGCP area, where the elevation rises into the Great Dividing Range.

The coal seams within MLA 70453 are interpreted to occur in the Late Permian Bandanna Formation. The primary target seams for the SGCP are the D1 and D2 seams. These seams are interpreted to consist of three plies varying in thickness from 0.5 to 4.5 m with raw ash ranging from 7.5 to 41 % on an air dried basis (AMCI and Bandanna Energy, 2011(b)). The coal is high volatile sub-bituminous, dull with abundant bright bands.

A summary of the Australasian Joint Ore Resource Committee (JORC) Code compliant resources is provided in **Table 4-2**.

**Table 4-2 SGCP Resource Base**

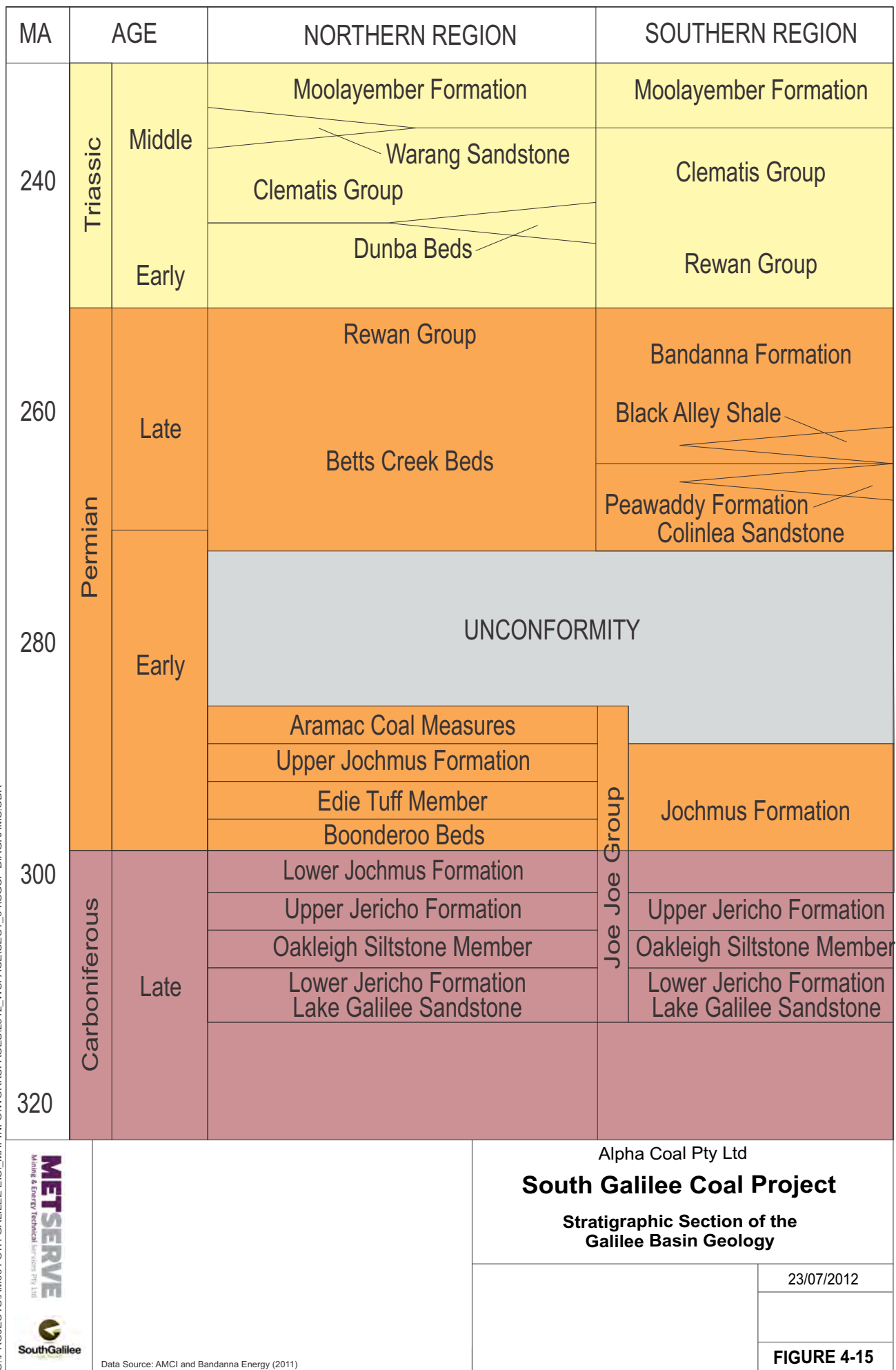
Seam	Resources (Million tonnes [Mt])			
	Measured	Indicated	Inferred	Total
D1	50.4	105.8	555.0	711.2
D2	116.3	100.5	251.0	467.8
<b>Total</b>	<b>166.7</b>	<b>206.3</b>	<b>806.0</b>	<b>1,179.0</b>

Source: AMCI and Bandanna Energy (2011) (b)

It is estimated that approximately 498 Mt of run-of-mine (ROM) coal will be mined, yielding approximately 447 Mt of product coal over the mine's 33 year operational life. Coal contained in underground pillars and development workings will be sterilised along with coal below Endangered Regional Ecosystems (ERE) which will be avoided for conservation purposes. A detailed description of exploration undertaken for the SGCP and a resource definition assessment is provided in **Section 7—Land**.



S:\PROJECTS\AM001 5TH GALILEE EIS\MAPINFO\WORKSPACES\2012\_WS\SPACE\SECT\_04\SGCP DIAGRAMS.CDR



### 4.3. PROJECT TIMING

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Construction activities are expected to commence in 2013, following granting of the required Environmental Authority. Construction will be staged over three phases as dictated by the mining schedule.

The commissioning process of mining and associated infrastructure will be undertaken at various times during the construction period.

Operations are expected to commence in 2015 with a scheduled mine life of 33 years until 2047. Product coal output is anticipated to ramp up to a peak of approximately 17 million tonnes per annum (Mtpa) when both open cut and underground components are operational. However, it is possible that there will be sufficient economic coal reserves to extend the operational life of the Project beyond the currently planned 33 years. The proposed Project sequencing is described further in **Section 4.5.2**.

Rehabilitation activities will be undertaken progressively throughout the mine life.

The Project's development timeframe will be dependent on the completion and access to third party rail and port infrastructure, as well as the availability of electricity and water supplies. As a result, some variation to the proposed development timeframe may occur.

Transport, waste management, accommodation, power and water supply, infrastructure and employment associated with these development phases are discussed in **Section 4.6** to **Section 4.12**.

### 4.4. CONSTRUCTION

---

The Project's construction phase is expected to commence in 2013 and extend over three stages as the ramp-up in coal production reaches its maximum level of approximately 17 Mtpa (refer to **Section 4.5.2** for further detail):

- construction required for Stage 1 (provisionally scheduled for 2013–2015)
- construction required for Stage 2 (provisionally scheduled for 2014–2017)
- construction required for Stage 3 (provisionally scheduled for 2017–2019).

Construction required for Stage 1 includes pre-construction activities such as land acquisition and clearing and all the major civil and capital works (e.g. infrastructure, accommodation village, rail spur and the initial box cut for the open cut mine). Construction required for Stages 2 and 3 involves extending the open cut mining area and constructing the underground mining areas.

Construction works and an indicative construction fleet are detailed in **Table 4-3** and **Table 4-4** respectively.

As construction works will be undertaken progressively, the number and type of equipment is expected to vary depending on the activity being undertaken.

A range of different construction materials and equipment will be required, most of which will be sourced from Brisbane, Gladstone or Mackay, with a small percentage sourced from local and regional areas. The transport of materials and equipment is detailed in **Section 14—Transport**. Construction inputs will be stored at designated laydown areas and temporary storage facilities within the area to be used for Mine Infrastructure Area (MIA) and Coal Handling and Preparation Plant (CHPP) in the operational phase. Ballast material for construction of the on-site rail component and the SGCP rail spur component will be stockpiled near the rail loop area within MLA 70453 and at the northern end of Saltbush Road.

The establishment costs for the SGCP are provided in **Section 18—Economic Environment**.

**Table 4-3 Construction Works Program**

Construction Component	Indicative Timing of Commencement
Mine Access Road, Accommodation Village Access Road, other on-site haul roads and light vehicle roads	2013
Construction access road for SGCP rail component	2013
Water Supply and Reticulation Infrastructure	2013
Water Management Infrastructure	2013
Stream Diversions	2013
Accommodation village	2013
Power Supply, Electrical and Telecommunications Infrastructure	2013
Dragline and Dragline Pad	2014
Initial Box-cut	2015
Continuous Miner, Longwalls 1 and 2	2017
ROM Dumps and Sizing Stations	2014
CHPP and Associated Equipment (e.g. CHPP feed surge bin, thickener, filter building)	2013
On-site Rail Component	2013
SGCP Rail Spur Component (to connect to Common User Rail Component)	2013
Upgrades of the Public Road Network	2013

**Table 4-3 Construction Works Program (cont)**

Construction Component	Indicative Timing of Commencement
Potable Water Treatment Plant	2013
Waste Water Treatment Plant	2013
Main Infrastructure Area (i.e. Administration Buildings, Bath House, Workshops, Hardstand Area, Warehouses etc.)	2014
Material Handling Infrastructure (e.g. conveyors, ROM and Product Stockpiles and Associated Equipment)	2014

Source: Aurecon (2011) and AMCI and Bandanna Energy (2011) (b)

**Table 4-4 Indicative Surface Mobile Fleet for Construction Works**

Fleet Component	Number
Crawler Crane (110 tonne)	1
All Terrain Crane (55 tonne)	1
Concrete Mixing Truck	2
Backhoe Loader	5
Cold Planer	1
Pneumatic Compactor	1
Vibratory Soil Compactor	1
Hydraulic Excavator	10
Motor Grader	2
Asphalt Paver	1
Pipelayer	1
Telehandler	2
Waste Handling Track Loader	1
Dozer (D9T)	5
Medium Wheel Dozer	5
Wheel Loader	1
Franna Crane (20 tonne)	4
B-Double	10
Articulated Truck	4
4x4 Landcruiser	11
4x4 Dual Cab Hilux	54
4x2 Dual Cab Hilux	43
Bus	6
Shovel (RH200)	1
Trucks (Cat 789)	6

**Table 4-5 Indicative Surface Mobile Fleet for Construction Works**

Fleet Component	Number
Dozer (D10)	2
Grader (16M)	1
Water cart	1
Dozer (RT)	1
Drill	1
Other (e.g. service trucks, support trucks, cranes, forklifts, etc.)	10

Construction activities will typically be undertaken during daylight hours, seven days a week. It is expected some construction activities, such as electrical installation, materials deliveries and plant and equipment commissioning may be required to occur over a continuous 24 hour period. Appropriate construction permits will be sought to cover both day and night time construction activities.

#### **4.4.1. Pre-Construction**

##### **4.4.1.1. Land Acquisition**

As described in **Section 4.1.3**, the SGCP will be located within MLA 70453 and the infrastructure corridor.

Where a substantial portion of land will be required for mining operations (e.g. the Creek Farm and Sapling Creek properties), the Proponent proposes to acquire land by negotiation, where practicable. Surface rights will also be required over part of the Chesalon and Betanga properties.

In the event that agreement cannot be reached with landholders, surface rights compensation will be determined by the Land Court of Queensland.

One petroleum tenement (EPP 668) overlies MLA 70453. In accordance with legislative requirements, the Mining Lease Application triggers a need to notify and consult with the EPP holder and enter into negotiations to ensure resource use is maximised.

The Proponent will finalise required land acquisitions and consent from other tenement holders prior to commencement of construction.

##### **4.4.1.2. Land Clearing and Earthworks**

Initial vegetation clearance and earthworks will be required to enable construction of site access and haul roads, water management works and associated mine infrastructure such as the accommodation village, administrative buildings and CHPP.

Land clearing will be undertaken progressively to minimise exposure of disturbed areas, degradation of topsoil and the spread of weeds. Topsoil will be removed and stockpiled in dedicated topsoil areas around the mine for later use in mine rehabilitation (refer to **Section 4.14**).

Stream diversion works will also be undertaken as described in **Section 4.10.1.5** and **Section 9—Water Resources**.

#### **4.4.1.3. Site Access and Health and Safety**

A site access road will be constructed from the Capricorn Highway to the construction office site. It is envisaged that this site access road will also serve as the Main Access Road during the SGCP operations.

A haul road will be constructed from the quarry on the Alpha-Tambo Road through MLA 70453, to connect with the proposed road alongside the SGCP rail line within the infrastructure corridor (refer to **Section 4.6.1**). These roads would be used to transport ballast material and provide access for rail line construction.

For road user safety, upgrades to State and local controlled roads will be required and are described further in **Section 4.6.1**.

Appropriate access restriction measures (e.g. construction of a security post at the site access road) will provide access control during the initial construction stage. Temporary fencing and signage will be installed to restrict access during construction activities and temporary works.

Temporary first aid, fire and emergency response facilities will be constructed where the MIA is proposed during the operations phase.

### **4.5. OPERATIONS**

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#### **4.5.1. Geotechnical Assessment**

A geotechnical assessment has been undertaken to identify any significant constraints to operations.

No impediments to open cut mining of the D1 and D2 seams have been identified, although economic constraints and highwall heights will limit the western down dip extent of mining. For low and highwall design parameters and profiles refer to **Table 7-11** and **Figure 7-12** (refer to **Section 7—Land**). A summary of the key geotechnical conditions and design parameters based on the geotechnical assessment is provided in **Section 7—Land**.

#### **4.5.2. Mine Sequencing**

The SGCP proposes to employ both open cut and underground mining methods. The SGCP execution will involve a staged ramp-up to the maximum production level of 17 Mtpa, as described in **Table 4-5**, **Table 4-6** and **Figure 4-2 to Figure 4-13**.

**Table 4-6 SGCP Mine Sequencing**

Element	Stage 1	Stage 2	Stage 3
Approximate Provisional Commencement Date of Mine Stage	2015	2017	2019
Product Coal	Up to 5 Mtpa	Up to 10 Mtpa	Up to 17 Mtpa
Mining Method	Open cut mining	Open cut and underground mining	Open cut and underground mining

The mine schedule presented in **Table 4-7** is based on the anticipated maximum level of production. The actual schedule will be influenced by final detailed mine planning and design, variations in the construction schedule, geological conditions, economic considerations and the availability of and access to third party infrastructure (e.g. rail and port infrastructure).

The mining methods are described in detail in **Section 4.5.3** and **Section 4.5.4**.

**Table 4-7 Provisional Production Schedule**

Year	Total ROM Coal (Mtpa)			Total Product Coal (Mtpa)	Total Waste Rock (million bank cubic metres [Mbcm])	Total Coal Reject (Mtpa)
	Open Cut	Underground	Total Combined			
1	5.61	-	5.61	5.40	19.40	0.21
2	5.74	-	5.74	5.42	26.52	0.32
3	7.35	3.04	10.39	9.66	55.29	0.72
4	4.79	7.09	11.88	10.71	18.34	1.17
5	7.19	6.99	14.18	12.99	51.78	1.20
6	6.58	7.43	14.01	12.70	46.57	1.31
7	6.08	9.34	15.42	13.86	31.22	1.56
8	5.78	12.20	17.98	16.07	31.47	1.91
9	5.05	12.14	17.19	15.32	25.29	1.87
10	5.04	13.59	18.63	16.58	24.88	2.04
11	4.37	13.22	17.59	15.63	23.90	1.97
12	4.43	13.21	17.64	15.66	24.67	1.97
13	4.76	13.17	17.93	15.94	20.56	1.99
	4.33	13.15	17.48	15.53	18.85	1.96
15	4.36	13.14	17.50	15.54	20.86	1.96
16	4.76	13.07	17.83	15.86	23.00	1.96
17	4.70	13.92	18.62	15.70	24.07	1.92
18	4.54	13.12	17.66	15.73	29.19	1.93
19	4.73	13.09	17.82	15.88	26.17	1.94
20	5.17	11.99	17.16	15.41	29.15	1.75
21	4.63	11.98	16.61	14.88	28.90	1.73
22	4.98	12.01	16.99	15.24	29.58	1.75
23	5.09	12.30	17.39	15.60	32.36	1.79
24	5.12	11.52	16.64	14.95	32.29	1.69
25	5.70	12.32	18.02	16.21	37.40	1.82
26	5.30	11.52	16.82	15.11	37.73	1.70
27	5.26	11.65	16.91	15.24	31.94	1.68
28	6.10	11.29	17.39	15.76	27.14	1.64
29	5.68	5.55	11.23	10.30	26.99	0.93
30	5.93	4.52	10.45	9.65	31.02	0.80
31	5.90	4.53	10.43	9.64	27.83	0.79
32	5.90	4.53	10.43	9.64	27.83	0.79
33	5.90	4.53	10.43	9.64	27.83	0.79
<b>Total</b>	<b>176.85</b>	<b>321.15</b>	<b>498</b>	<b>447.45</b>	<b>970.02</b>	<b>49.56</b>

Source: AMCI and Bandanna Energy (2011) (b)



### 4.5.3. Open Cut Operations

#### 4.5.3.1. Mining Methods

Open cut mining at the SGCP will involve conventional strip mining using draglines with pre-stripping undertaken by conventional truck and shovel.

##### 4.5.3.1.1. Clearing

Prior to the commencement of mining operations, vegetation will be cleared and topsoil will be removed and stockpiled separately for later use in mine rehabilitation (refer to **Section 4.14** and **Figure 4-2** to **Figure 4-12**). Live placement of topsoil will be employed where areas for rehabilitation become available. Topsoil stockpiles will be nominally no more than 2 m in height. Identification and treatment of topsoil contaminated by weed species is described in **Section 8—Nature Conservation**.

##### 4.5.3.1.2. Drilling and Blasting

As described in **Section 7—Land**, drilling and blasting of overburden material will be required as part of mining operations. Drilling and blasting is expected to be required for the lower 20 % of the Permian overburden material in order to uncover coal economically.

Holes will be drilled into the overburden material at engineered intervals using a drill rig, charged with Ammonium Nitrate Fuel Oil (ANFO) and blasted.

Blasting will be undertaken in accordance with the conditions of the Environmental Authority.

##### 4.5.3.1.3. Overburden Removal

A power shovel will be used to excavate the boxcut to allow dragline access. The overburden material will be dozed to provide a flat surface for the dragline to sit on. The dragline will be positioned adjacent to the overburden material to be moved, from where it will dig and dump overburden onto the spoil pile.

##### 4.5.3.1.4. Overburden/Interburden Placement

A portion of the boxcut waste will be used for construction of flood prevention berms and the remainder will be placed within the waste rock emplacement facilities. Overburden removed by the draglines will be spoiled in previous strips.

All potentially acid forming (PAF) material will be selectively handled where practicable to ensure that the potential for acid rock drainage is limited.

The major potential source of PAF material will be the waste material that is found within 5 m of the coal seams. This can be split into the waste above the top seam (D1) or interburden (between the D1 and D2 seams). The waste above the D1 seam will be removed using draglines and will be mixed with non-acid forming (NAF) waste. This mixed waste would then be placed in the portion of the dump known as dragline spoil.

The interburden waste will be dumped in-pit where practicable. The remaining interburden that cannot be dumped in-pit shall be trucked to the waste dumps and tipped into voids between the dragline spoil piles. Reject material from washing the coal will also be dumped within the dragline spoil piles. Once all PAF material has been placed, a 10 m cover of NAF material will be applied over the entire waste rock emplacement area to ensure that the PAF waste is not exposed.

#### 4.5.3.1.5. Coal Mining

In strip mining operations, the waste rock and coal are extracted in a series of 'strips', running parallel to each other. Each strip is mined then filled and rehabilitated progressively.

The SGCP will comprise four open cut pits, with a total strike length of approximately 14 km.

A truck and shovel fleet will be used for pre-stripping (i.e. removal of any overburden material deeper than the dragline cut-off depth of 65 m). A smaller truck and shovel operation will be utilised to mine coal and remove interburden.

Multiple mining areas for coal will allow for both the D1 and D2 seams to be mined concurrently in separate areas of the mine. This will allow blending of ROM coal from both seams to allow control of feed quality to the CHPP.

#### 4.5.3.2. Major Equipment and Mobile Fleet

The indicative mine fleets required are shown in **Table 4-8** and **Table 4-9**.

**Table 4-8 Indicative SGCP Open Cut Mine Fleet**

Fleet Component	Use	Number		
		Stage 1	Stage 2	Stage 3
Drill Rig	Drilling holes before blasting Exploration drilling	1	2	2
Dragline (Marion 8750)*	Removing overburden	-	1	2
Shovel (RH200)*	Excavating overburden and interburden Excavating coal	1	3	3
Truck (Cat 789)*	Hauling waste rock and coal	6	10	10
Truck (Cat 793)*	Hauling waste rock and coal	-	12	12
Dozer (D11 CD)*	Removing overburden Mine work	-	2	2
Dozer (D10)*	Mine work Rehabilitation work	2	8	9
Grader (16M)*	Mine work	1	2	2
Water Cart	Dust suppression for mine work	1	3	3
Dozer (Rubber Tyred)	Mine work	1	3	3
Other	Mine work Support mine work	10	20	20

Source: AMCI and Bandanna Energy (2011) (b), \* or equivalent

**Table 4-9 Indicative SGCP Major Surface Fleet**

Description	Peak Number
Crawler Crane	1
All Terrain Crane	1
Dozer (D9T)	5
Dozer (D10)	1
Water Cart	1
Dozer (Rubber Tyred)	1
Backhoe Loader (Cat 740)	5
Franna Crane	4
Fuel Truck	2
Articulated Truck (Cat 740)	2
4x4 Landcruiser (or similar)	12
4x4 Dual Cab Hilux (or similar)	57
4x2 Dual Cab Hilux (or similar)	21
Bus	6
Lighting Towers (3 Head)	10
Lighting Towers (6 Head)	15
Dewatering Vehicle	3
Ambulance	1
Fire Truck/Emergency Response Vehicles	4

#### **4.5.3.3. Mine Dewatering**

Open cut mining will result in groundwater inflow from the surrounding aquifers into the open cut pits. Dewatering volumes are anticipated to be less than 10 megalitres per day (ML/d) during the initial and final years of operations and up to 20 ML/d during peak years. Water management is discussed in further detail in **Section 4.10** and **Section 9—Water Resources**.

### **4.5.4. Underground Mining Operations**

#### **4.5.4.1. Mining Methods**

As described in **Section 4.5.2**, the underground mining operations will commence in Stage 2 and will continue for the life of the SGCP. Underground operations will utilise the longwall mining method.

#### 4.5.4.1.1. Development of Mains Headings and Gateroads

The southernmost open pit has been designed to facilitate access to the underground mine area via a boxcut. Seven headings have been designed from the boxcut to the D1 seam. Access to D2 seam will be by short inter-seam drifts from D1 to D2, initially for conveyor, personnel and material transport and return roadway. The inter-seam drifts will provide access to the D2 seam in coal and subsequently seven heading mains will be developed in the D2 seam.

Mains headings and gateroad panels will be developed by a full head single pass Continuous Miner unit. The design basis for underground mining of the D1 and D2 seams is outlined in **Table 4-10**. Roof and rib support will be installed utilising board bolting rigs as required.

**Table 4-10 SGCP Underground Mine Design Parameters**

Coal Seam	Mains Pillars	Gateroad Pillars	Roadways	Longwall Panel Width
D1 Seam	60 m x 30 m	125 m x 25 m	5.2 m x 3.3 m	350 m
D2 Seam	<p>60 m x 30 m (outbye mains pillars are the same as D1 seam in order to achieve panel superimposition)</p> <p>60 m x 35 m (western mains pillars provide allowance for mining under first D1 longwall block)</p> <p>60 m x 30 m (inbye north-south mains pillars)</p>	<p>125 m x 25 m (outbye gateroad pillars are the same size as D1 seam in order to achieve panel superimposition)</p> <p>125 m x 30 m (inbye pillars are wider for greater depth)</p>	5.2 m x 3.0 m	350 m

Source: AMCI and Bandanna Energy (2011) (b)

The roadways will form the ventilation passages and provide access for personnel, machinery and other equipment.

A series of pillars will be left in place to support the overlying strata and protect the roadways as mining proceeds (refer to **Table 4-10**).

#### 4.5.4.1.2. Coal Mining

Longwall coal mining machines use a shearer to cut a slice of coal from the coal face on each pass and the coal is transferred to the main gate conveyor via a face conveyor (Mine Subsidence Engineering Consultants [MSEC], 2007). A series of hydraulic roof supports are used in front of the coal face to provide a stable working area for the shearer, face conveyor and the machine operators. As each slice of coal is removed from the longwall face, the hydraulic roof supports are moved forward (MSEC, 2007). As the face retreats, the roof and a section of the overlying strata are collapsed behind the longwall machine (referred to as the 'goaf'), (MSEC, 2007).

The longwall face equipment is established at the end of the panel that is remote from the main headings and coal is extracted within the panel as the longwall equipment moves towards the main headings (MSEC, 2007). The longwall miner and drift conveyor systems operate at up to 4,500 tonnes per hour (tph) and 6,000 tph, respectively.

In order to start each new longwall panel, the longwall machine will be disassembled into components and re-assembled in the installation roadway of the next panel.

The underground mine will be a multi-seam operation, with the D1 seam mined first, followed by the D2 seam. The separation distance between the seams is approximately 9–17 m. In order to maximise pillar stability during mining of the D2 seam, the underground mine has been designed so that the D2 longwall panels directly underlie the D1 panels (where both exist together).

Coal will be extracted in panels 350 m wide, and up to 5,000 m in length. The minimum depth of cover will be 140 m.

#### 4.5.4.2. Major Equipment and Mobile Fleet

One longwall machine will be required for Stage 2 and two for Stage 3. An indicative list of underground equipment and mobile fleet is provided in **Table 4-11**.

**Table 4-11 Indicative Underground Mining Fleet**

Element	Stage 1	Stage 2	Stage 3
Development			
Continuous Miner	N/A	3	3
Shuttle Cars		6	6
Longwall Mining			
Longwall Machine	N/A	1 x 1,000 tph	2 x 1,000 tph
Shearer		2	2
Bob Cat		1	1
Grader		1	1
Utility Vehicle (MPV)		4	4
LHD (Eimco)		5	5
Underground Transport (PJB)		5	5
Mobile Bolting Rig		1	1
Surface Substation			
Site Bus	N/A	3	2
Site 4x4's		5	5
Staff Vehicles		10	10
Site Forklift (Large)		1	-
Site Forklift (Small)		1	1

Source: AMCI and Bandanna Energy (2011) (b)

#### 4.5.4.3. Ventilation Systems

Mine ventilation modelling has assumed negligible gas content with no significant additional mine ventilation required for gas dilution (refer to **Section 4.5.4.4** for further detail). The following ventilation design parameters have been assumed for the SGCP:

- Roadways to the D1 and D2 seams will provide intake and return ventilation (i.e. four intake roadways and three return roadways). The required intake ventilation for each drift will be of the order of 120 cubic metres per second (m<sup>3</sup>/sec).
- Three drifts into each seam horizon allow for mine intake ventilation.
- Once the inter-seam drifts have been established and seven heading mains developed in the D2 seam, a shaft will be sunk to intersect both seams. This shaft will then act as a return shaft and the return roadways outbye of the shaft will be converted to intakes.
- With 70 % mine ventilation efficiency required, mine ventilation would be 365 m<sup>3</sup>/sec.
- Dual return shafts of 6 m diameter have been provisioned. The first shaft will be in the pit bottom area and sunk to the base of the D2 seam (~150 m). The second shaft will be sunk in by D1 and D2 blocks (to ~140 m depth).
- Both shafts will have substantial mine ventilation fans connected to the shaft collars operating in exhaust mode. It is envisaged that up to three fans of 450 kilowatt (kW) capacity will be connected to each shaft to provide the necessary mine flow and redundancy for maintenance.

Further detailed mine ventilation modelling will be conducted as part of the Definitive Feasibility Study (DFS).

#### 4.5.4.4. Coal Seam Gas Management

No significant indications of gas have been reported during SGCP exploration activities. Work undertaken on the tenements located immediately north of the SGCP has not identified economically recoverable gas reserves, nor was methane considered to be a likely significant operational management issue (AMCI and Bandanna Energy, 2011 (b)).

An in-seam gas assessment will be conducted as part of the DFS.

An automatic gas monitoring system will be designed and installed to comply with the *Coal Mining Safety and Health Act 1999* and *Coal Mining Safety and Health Regulation 2001*.

Any seam gas make, particularly at greater depths, will be managed by the ventilation system described in **Section 4.5.4.3**.

#### 4.5.4.5. Mine Dewatering

Water inflow to underground workings will vary depending on the stage of development, although inflow is expected to be less than 10 ML/d during the initial and final years of operations and up to 20 ML/d during peak years. A dewatering system comprising electric and air operated pumps will be used to pump accumulated water through mains dewatering pipelines to storage facilities or dams on the surface.

Water management is described in further detail in **Section 9—Water Resources**.

#### 4.5.5. Coal Reclaim and Preparation

The materials handling process is shown in **Figure 4-16**. The CHPP will operate 24 hours per day (hr/d), seven days per week with a ROM coal feed capacity of approximately 2,000 tph. Block and process flow diagrams for the CHPP are shown in **Figure 4-17** and **Figure 4-18**, respectively.

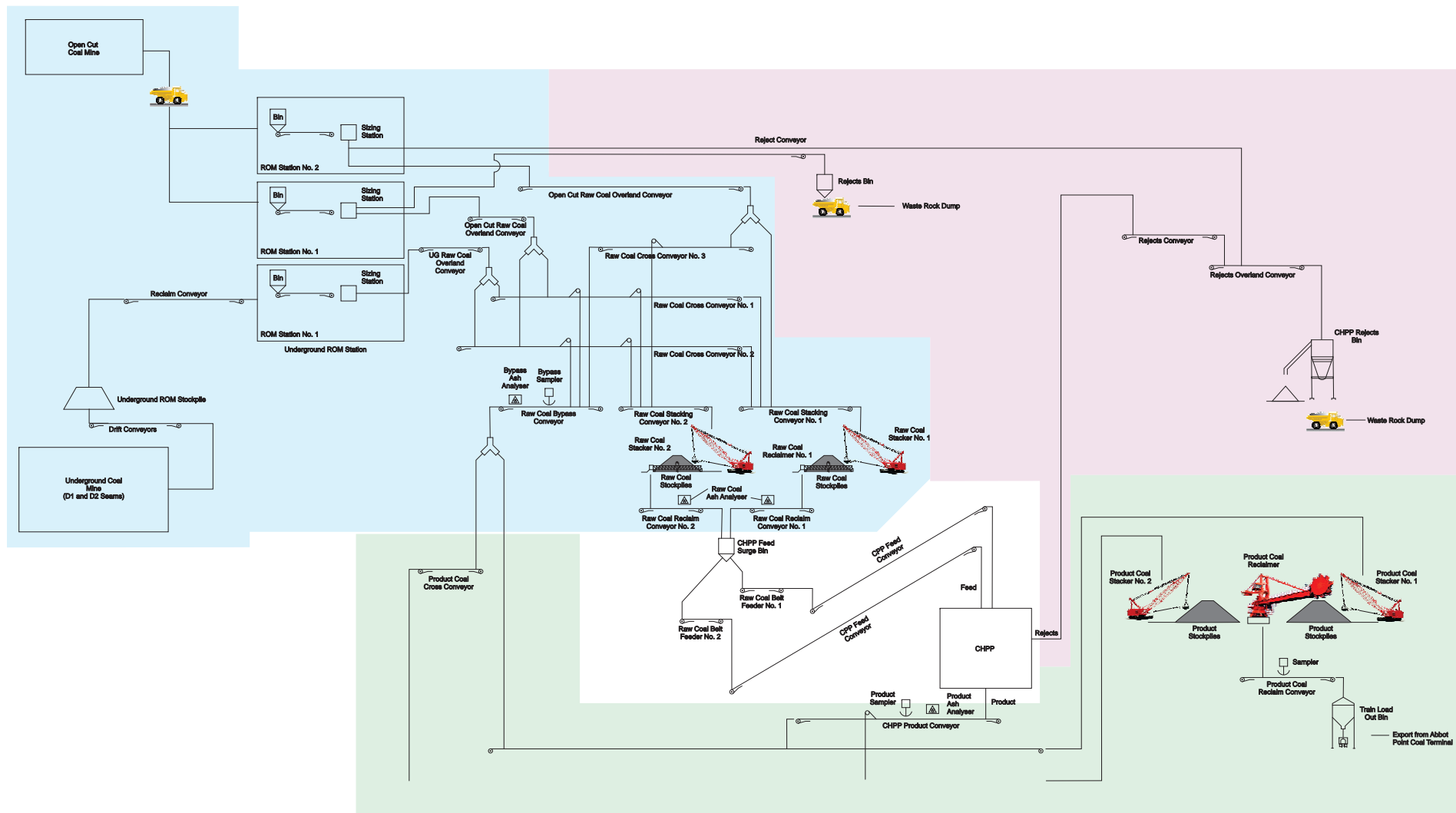
##### 4.5.5.1. Coal Reclaim

ROM coal from open cut mining will be hauled by truck to one of two main ROM dump stations and placed into a 600 m<sup>3</sup> hopper. Transfer conveyors will transport coal to the sizing station, where it will be sized to meet the CHPP nominal topsize. Sizing screens will be used to separate undersize (< 50 millimetre [mm]) and oversize materials (50 to 300 mm). Oversize material will be fed to the rotary breaker to be crushed to < 50 mm before being transported by overland conveyor to the raw coal stockpiles located near the CHPP. Any material that is not sized to < 50 mm in the rotary breaker will be deemed to be reject and will report to the rejects conveyor.

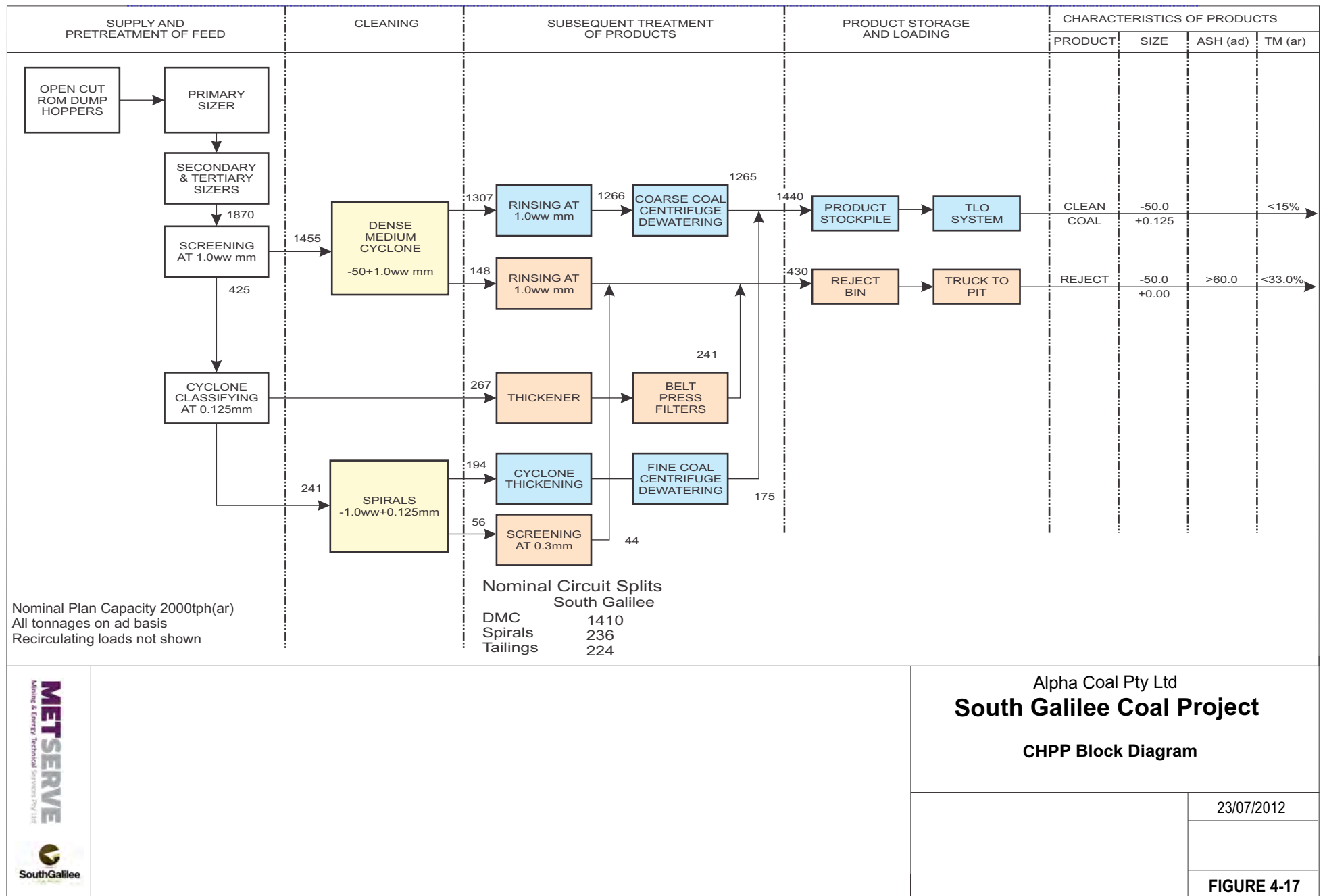
ROM coal from the underground mining operations will be transferred via D1 and D2 drift conveyors to a centralised underground ROM stockpile located in the boxcut area (120,000 t capacity). ROM coal will be transported to the underground sizing station on a reclaim conveyor, where it will be sized to meet the CHPP nominal topsize. Sizing screens and sizers will be used to separate undersize (< 50 mm) and oversize (50 to 250 mm) materials. Oversize material will be crushed to > 50 mm and deposited on the underground overland conveyor. Coal will then be conveyed to the raw coal stockpile area located on the surface, near the CHPP.

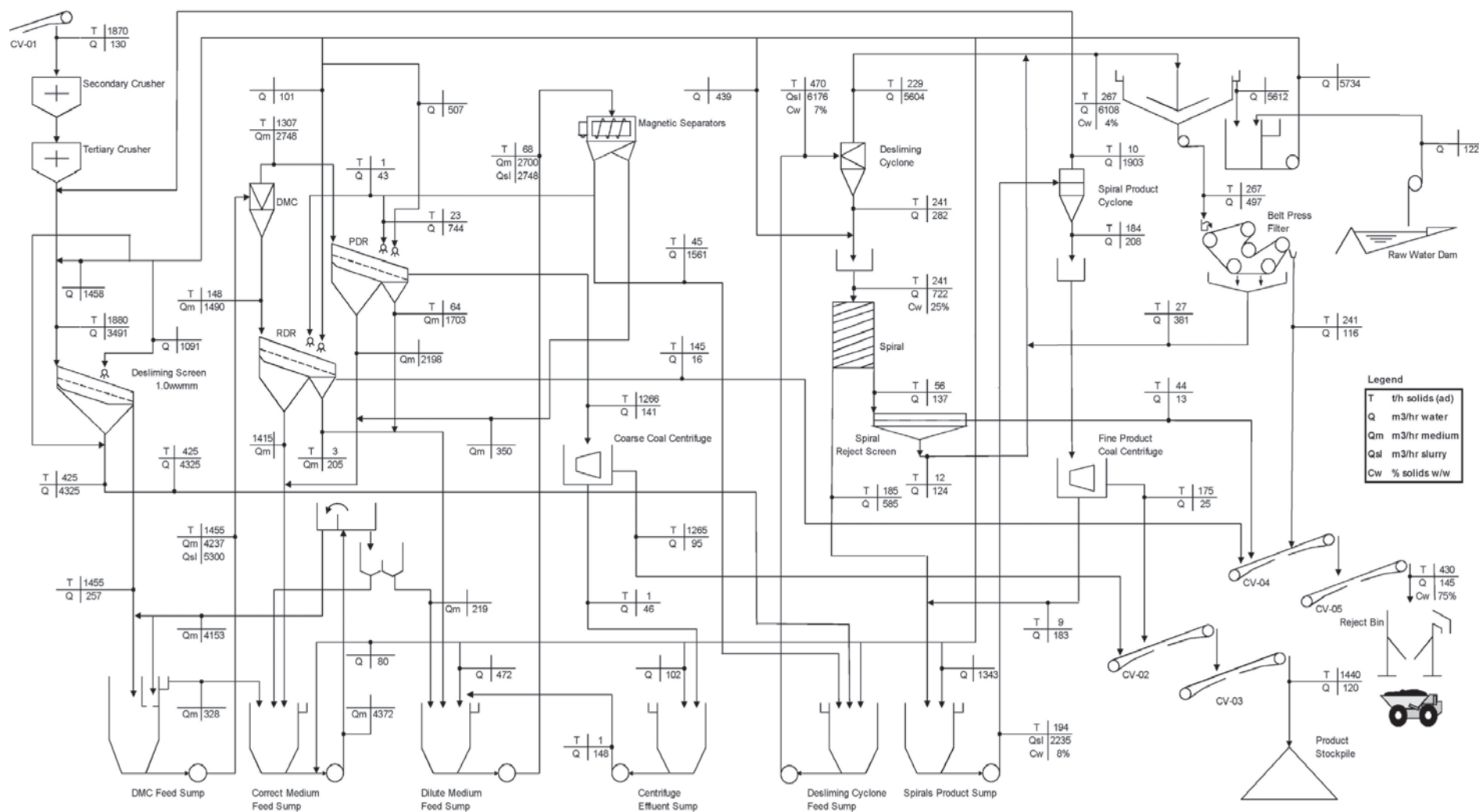
The raw coal stockpile area will receive both open cut and underground ROM coal and will consist of four separate stockpiles (each with a capacity of 60,000 t) fed by two luffing stackers. Raw coal can bypass the raw coal stockpiles and CHPP and be conveyed directly to the product stockpiles, if the *in-situ* qualities are consistent with the product coal specifications.

Stockpiled ROM coal will be reclaimed by bridge bucket wheel reclaimers and conveyed to the CHPP feed surge bin. The design of the ROM coal reclaim and plant feed system will allow a controlled, blended feed to the CHPP.









#### **4.5.5.2. Coal Handling and Preparation Plant**

In Stage 1, coal will be processed in a wash plant or by dry beneficiation.

In Stages 2 and 3, the SGCP CHPP will use conventional wet beneficiation processes that are used extensively throughout the Australian coal industry.

The modular CHPP components will be constructed progressively to align with the mine plan coal production levels and the staged execution strategy (refer to **Section 4.5.2**). The +1.4 mm coarse coal fraction will be beneficiated in dense medium cyclones and the 1.4+0.125 mm fine fraction will be beneficiated using spirals. The 0.125 mm material will be discarded to rejects due to the high cost and low marginal value typically associated with coal in this coal fraction.

Two CHPP modules will be used, each with a nominal 1,000 tph capacity (i.e. nominal CHPP feed rate of 2,000 tph).

Coal will be processed and blended to produce a 13.5 % ash export thermal coal.

The CHPP will be supported by a CHPP workshop and office.

#### **4.5.6. Product Handling**

The product stockpile area will comprise four product coal stockpiles (each with a capacity of 230,000 t), fed by automated stackers. Both product coal from the CHPP and raw bypassed coal will report to the product stockpile area.

Product coal will be reclaimed via a single slewing bucket wheel reclaimer and conveyed to the train load-out system. The nominal load-out rate will be 8,000 tph. As described in **Section 4.6.2**, product coal will be transported by train to Abbot Point Coal Terminal (APCT), where it will be shipped to international customers. Further information regarding coal transport is provided in **Section 4.6**.

The product handling system will allow coal blending to achieve a consistent quality that meets product specification.

### **4.6. TRANSPORT**

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#### **4.6.1. Road**

The Capricorn Highway is the main road in the vicinity of the SGCP.

The Capricorn Highway is a state controlled road, connecting Rockhampton, Emerald and Longreach. Access to the SGCP will be from the Capricorn Highway via a turn-off approximately 12 km west of Alpha to the Mine Access Road. The Mine Access Road and Accommodation Village Access Road will be sealed 10 m wide (including shoulders), single carriageways (i.e. single lane for each direction of travel). The maximum speed limit will be 60 km/hr. On site, light vehicle roads and haul roads will be unsealed.

The following road upgrades will be required:

- removal and replacement of the seal on the Capricorn Highway between the Alpha Aerodrome and the intersection with the Mine Access Road (approximately 10.2 km)
- installation of a new auxiliary left turn lane on the Capricorn Highway for the mine access road turn-off.

As described in **Section 4.11.5**, road construction material will be sourced both on-site and externally. Ballast material sourced from the existing quarry on Alpha-Tambo Road will be transported on a haul road through MLA 70453, to connect with the proposed road alongside the SGCP rail line within the infrastructure corridor.

Road transport would be required for transport of the following during the construction period:

- road base, ballast and fill materials
- trucks and vehicles
- parts for construction of draglines and shovels
- diesel-powered generators and fuel
- CHPP construction equipment and materials
- workshops, warehouses and associated mine infrastructure building materials and equipment
- pre-fabricated accommodation buildings and site offices
- construction personnel
- other construction materials and equipment.

Road transport would also be used to transport personnel to site during operations and for delivery of some materials and equipment (e.g. equipment maintenance parts, food and supplies to the accommodation village, ANFO etc.).

A detailed description of the transport routes and potential impacts of the SGCP on the road network is provided in **Section 14—Transport**.

#### **4.6.2. Rail**

Product coal is proposed to be transported by rail to the APCT, located approximately 500 km north east of the Galilee Basin.

The Galilee Basin is currently not connected to a major coal haulage railway system. However, Waratah Coal Pty Ltd, the GVK Group and Adani Mining Pty Ltd have all proposed to construct railway systems from the Galilee Basin to the APCT. All of these proponents have indicated to the Proponent that their respective rail infrastructure will be open to third party access. On June 6, 2012, the GVK-Hancock Coal rail alignment was approved by state government to allow third party access for the transportation of coal from the Galilee basin to the APCT.

Irrespective of which proponent(s) ultimately establish rail infrastructure to the APCT, the line(s) will be a standard gauge rail system.

A standard gauge railway has considerable advantages over the existing narrow gauge rail network in Queensland in that it has a substantially higher carrying capacity (e.g. 24,000 t loads compared to 10,000 t loads on the Bowen Basin QR National Network).

The railway will have four components as outlined below and shown on **Figure 4-19**:

- **On-site rail component** – on-site rail will comprise track and signalling located within MLA 70453, including the loading loop, breakdown and fuel sidings.
- **SGCP rail spur component** – the SGCP rail spur connection will comprise track and signalling (including a passing loop and connecting turnout) to connect the on-site rail component and the common user rail component.
- **Common user rail component** – the common user rail component will link the Galilee Basin to the expanded APCT.
- **Unloading loop rail component** – the unloading loop rail component at the APCT will facilitate train unloading and subsequent movement of the coal to a stockpile. The layout of the unloading loop rail component is expected to be consistent with North Queensland Bulk Ports (NQBPs) expansion master plan.

Design parameters, including the points of interface between the proposed SGCP rail components and existing road and rail infrastructure are described further in **Section 14—Transport** and **Appendix K—Transport Technical Report**.

The following works will be required:

- construction of an underpass at the Capricorn Highway
- construction of a rail bridge over the Central Line Railway (single span bridge)
- construction of a level crossing at Hobartville Road.

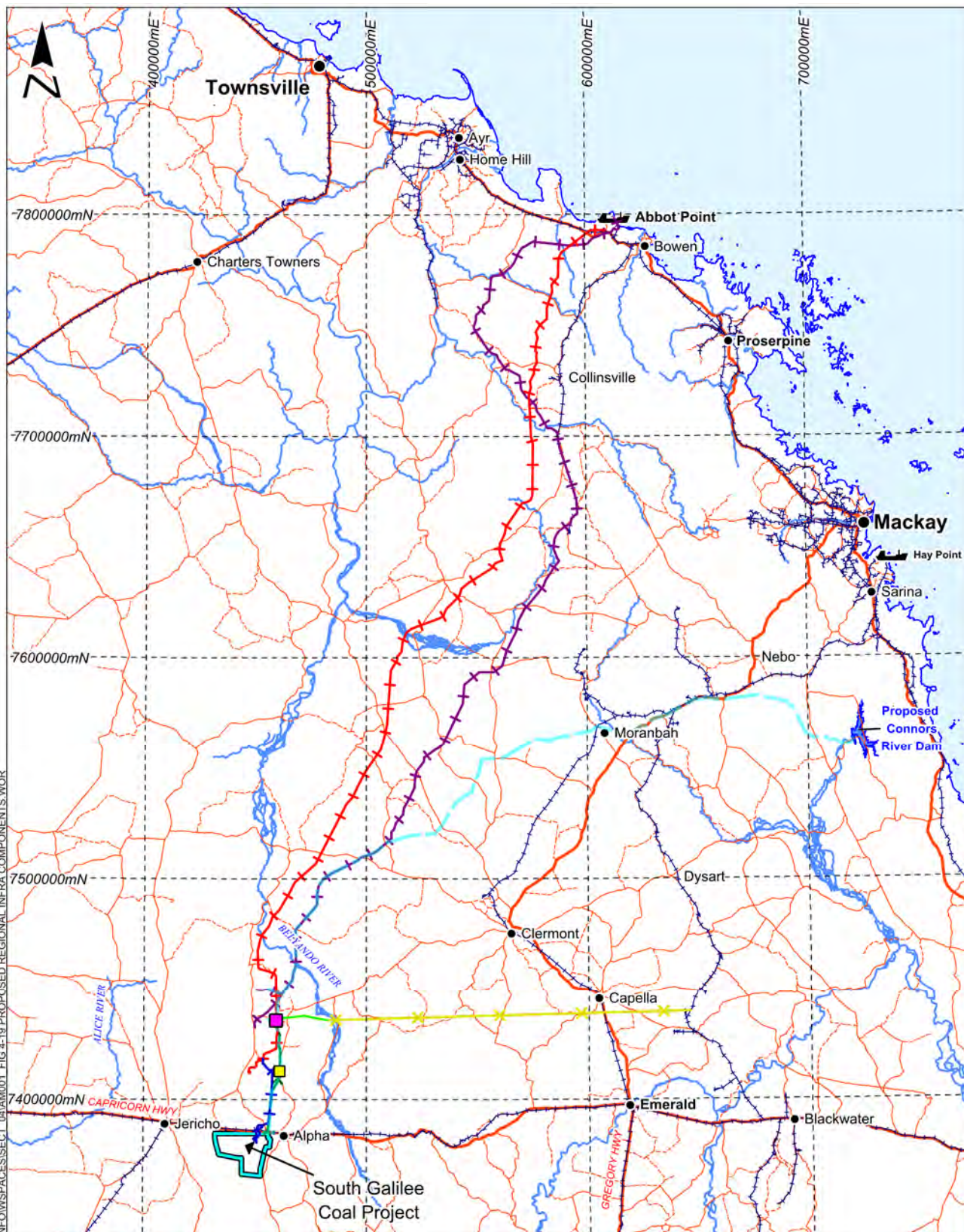
The SGCP will also be required to provide capital to increase the capacity of common user rail infrastructure, where necessary.

The existing Central Line Railway will be used to transport the majority of the SGCP construction materials and equipment, where practicable.

Approximately two diesel trains per day would be required to transport product coal to the APCT. Each train would consist of four locomotives and 182 wagons (the Proponent and Bandanna Energy, 2011). Product coal trains will generally operate continuously, 24 hours per day, seven days per week for approximately 330 days each year. It is anticipated that the majority of bulk consumables and equipment required during operations would also be transported to site on the common user rail line.



S:\PROJECTS\AM001\_STH\GALILEE\_EIS\GIS\MAPINFO\SPACE\SECT\_04\AM001\_FIG 4-19 PROPOSED REGIONAL INFRA COMPONENTS.WOR



#### LEGEND

- MLA70453
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Proposed Powerlink substation
- Proposed Waratah / SGCP substation
- Population centre
- SGCP Rail Spur Component
- Waratah Common User Rail Component
- Hancock Common User Rail Component
- Powerlink Galilee Basin Transmission Project
- SGCP Powerline
- Connors River Pipeline / Moranbah to Alpha Pipeline

Alpha Coal Pty Ltd

### South Galilee Coal Project Proposed Regional Infrastructure Components

100 0 100

Kilometres

Scale: 1:2,500,000 (A4)

28/08/2012

Proj. : MGA Z55  
Datum: GDA 1994

**FIGURE 4-19**

#### **4.6.3. Air**

A contract fly-in-fly-out (FIFO) air service provider will be used to transport the SGCP workforce to and from the site. The Alpha Aerodrome will be upgraded as required, with upgrades expected to be undertaken by the air service provider.

#### **4.6.4. Ship**

As described in **Section 4.6.2**, product coal is proposed to be exported from the APCT, located approximately 500 km north-east of the Galilee Basin.

The APCT is currently undergoing significant expansion as part of the X50 project to increase capacity to 50 Mtpa.

In May 2011, the Queensland Government announced the 99 year lease of the X50 APCT to Mundra Port Pty Ltd. Under the lease, the State will retain ownership of the Port land and fixed infrastructure such as the jetty and the wharf (NQBP, 2011). The State will also continue to facilitate future private-sector funded expansion of export infrastructure within the broader port precinct, such as Terminal 2 and Terminal 3. The NQBP remains the port authority for the APCT.

The major expansion projects which are proposed for the APCT are the T2 and T3 projects. This will involve the development of two additional separate tranches of coal terminal capacity (Preferred Developers are the GVK Group and BHP Billiton Limited).

There is potential for the SGCP to secure interim and long-term port capacity at GVK's Abbot Point Terminal 3 (T3). Any long-term access would be subject to GVK obtaining approvals to T3 expansion.

The proposed APCT expansions will be subject separate environmental impact assessment and approvals processes, and as such, the port expansion component does not form part of this EIS.

### **4.7. WASTE MANAGEMENT**

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The proposed waste management strategies that will be implemented as part of the SGCP are detailed in **Section 13—Waste**.

#### **4.7.1. Air Emissions**

The SGCP is located in a rural setting which is subject to nuisance dust from unsealed roads, rural activities or natural events such as dust storms or bushfire.

The nearest homesteads to the SGCP surface disturbance activities are Chesalon, Creek Farm, 'Villafield' and 'Bonanza'.

Due to the location of the SGCP and the lack of any significant air pollution sources, air pollution from operations is expected to be confined to rising dust. Most rising dust will originate from overburden removal, coal preparation, haulage and rail loading, blasting and operation of large mobile equipment.

The potential for spontaneous combustion of stockpiled coal is considered minimal. In the event of coal fires developing, additional localised impacts on air quality due to the emission of smoke and gases would be expected.

Further details of the air quality impacts and mitigation measures are provided in **Section 10—Air Quality**.

#### **4.7.2. Waste Rock**

The total waste rock volume for the life of the SGCP is estimated to be approximately 970 Mbcm.

Waste rock characterisation, including geochemical analysis, indicates that (refer to **Section 7—Land**):

- the bulk of the overburden and interburden material is likely to be NAF
- the roof within 5 m of the D1 seam appears to be the main PAF horizon, with a number of other lower capacity PAF horizons associated with coal seams and also within interburden between seams D1 and D2
- PAF materials are likely to be fast reacting, with little or no lag time (days to weeks) once exposed to atmospheric conditions.

As described in **Section 4.5.3**, waste rock will be removed by the draglines and spoiled in previous mine strips. The roof horizon within 5 m of the D1 seam will be selectively placed away from the dump outer slopes and will be enclosed within a 10 m NAF cover. Interburden waste will be trucked into voids between dragline spoil peaks or trucked along the cut and dumped in the void after the D2 seam has been mined. PAF material will be selectively handled where practicable to minimise the potential for acid rock drainage.

The proposed handling and management of PAF materials is expected to be sufficient to manage potential environmental impacts as a result of acid mine drainage and salinity at the SGCP.

#### **4.7.3. Coal Rejects**

As described in **Table 4-6**, approximately 50 Mt of coal reject would be produced over the life of the SGCP.

A description of the geochemical and physical characteristics of the coal reject material is provided in **Section 7—Land**. Geochemical characterisation of the coal rejects indicates that this material is likely to be mainly PAF.

Coarse reject material from the CHPP will be transferred on the rejects conveyor to a 300 t reject surge bin located adjacent to the ROM Station 2. The reject bin will also receive rejects from the open cut sizing stations.



The rejects system will treat all < 0.125 mm material that enters the CHPP from the ROM stockpiles. The rejects system will consist of a 'high-rate' thickener coupled with a conventional clarified water return system, followed by belt press filters. Standard flocculant mixing and batching systems will be installed and dosing will be controlled by automated clarometer systems. The cake from the belt filter press will be deposited on the CHPP rejects conveyor as part of the combined CHPP reject.

The mining truck fleet will transport rejects to the waste rock emplacement facility, where they will be covered with a 10 m NAF cover. Coal reject material will not be placed at the base of any waste rock emplacements.

#### 4.7.4. Solid and Liquid Waste Disposal

The objective of waste management will be to minimise waste generation and maximise opportunities for recycling. However, the facilities and equipment associated with mining and coal processing do generate a large amount of commercial and industrial wastes commensurate with the scale of operations. Waste streams generated during operation of the SGCP may include the following:

- general waste suitable for disposal to landfill
- re-usable or recyclable waste (e.g. paper, cardboard, wood, scrap metal, batteries and oils)
- sewage waste and waste water
- regulated waste (e.g. chemicals, engine coolant, gear lubricant, solvents, contaminated soil and tyres).

With the exception of recyclable waste which will be transported off-site by recycling contractors, the above wastes will be either treated on-site (e.g. sewage waste and waste water will be treated as described in **Section 4.11.3**) or disposed of in an on site landfill designed and managed to the appropriate legislative standards.

### 4.8. ACCOMMODATION

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As described in **Section 4.12**, the SGCP will be a FIFO operation, with personnel housed in an accommodation village located within MLA 70453.

The construction workforce will be housed in the accommodation village and following the construction period, the village will be modified to form a permanent accommodation village. The village has therefore been sized for the peak construction and operations overlap of 1,600 personnel.

The accommodation village will be located in the north-eastern corner of MLA 70453 (refer to **Figure 4-13**), approximately 4 km from the mining operation.

The accommodation village will be accessed from the Capricorn Highway. Typical accommodation village facilities include the following:

- ensuite accommodation
- restaurant
- laundry facilities
- multi-purpose sports courts
- gymnasium
- swimming pool
- recreational lounge rooms
- theatre
- pool hall
- parking
- stores
- maintenance and service buildings.

## **4.9. POWER SUPPLY AND DISTRIBUTION**

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### **4.9.1. Construction Power**

Estimated peak energy requirement during construction is approximately 1,950 kW per annum. Construction power will be supplied via stand-alone diesel powered generators.

### **4.9.2. Operations Power**

The peak power supply required during operations is approximately 80 MW per annum.

#### **4.9.2.1. Off-site**

Given the projected growth in demand, Powerlink Queensland proposes to supply power to the Galilee Basin. The Galilee Basin Transmission Project proposes to extend the existing high voltage network into the Galilee Basin via a new 275 kilovolt (kV) transmission line between Powerlink Queensland's existing Lilyvale Substation near Emerald and a proposed 'hub' substation 50 km north of Alpha, to be known as the Surbiton Hill Substation. From the Surbiton Hill Substation, 132 kV electricity transmission lines will extend to Kevin's Corner and Alpha Coal Project. Powerlink Queensland plans to have the Galilee Basin Transmission Project completed by early 2014, subject to mining investment decisions. Powerlink's Galilee Basin Transmission Project is subject to a separate environmental impact assessment and approvals process, and as such, the electricity supply to the SGCP on-site reticulation system does not form part of this EIS.

The Proponent will be responsible for the construction of a 132 kV feed line from the proposed Waratah/SGCP Substation to the northern boundary of MLA 70453.

#### **4.9.2.2. On-site**

A conventional 132 kV switchyard will be constructed to support two 132/66 kV transformers and associated switchgear. The on-lease electricity reticulation system would comprise 66 kV overhead lines between the site switchyard and the high voltage distribution substations (1 and 2) and the open cut mining area. Where possible, the overhead power lines would be aligned parallel to roads and the number of road crossings will be minimised.

Viable options for utilising renewable energy sources will be incorporated into infrastructure planning and construction.

## **4.10. WATER MANAGEMENT**

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### **4.10.1. Water Management System**

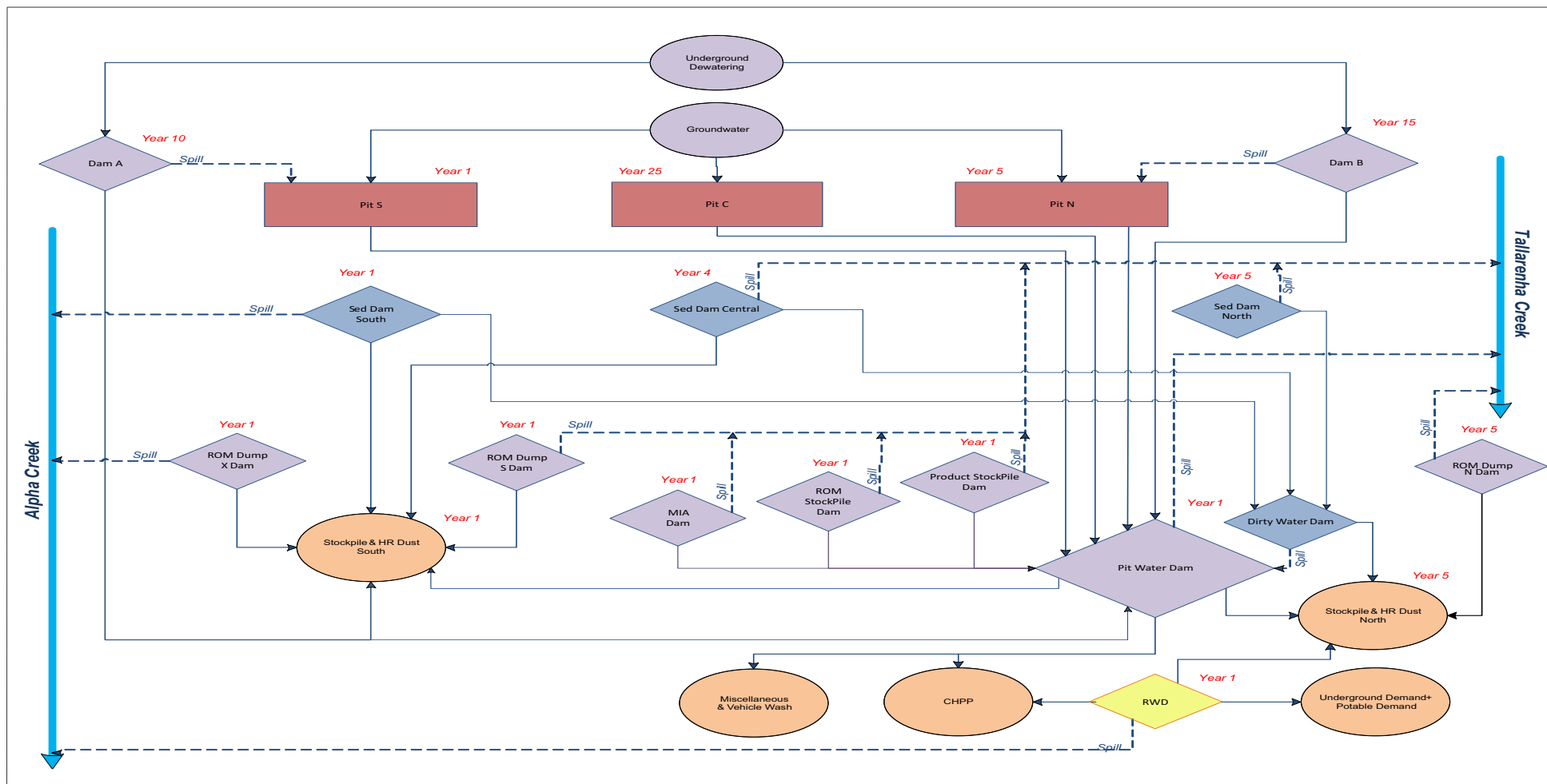
The water management system will be based on the following key principles:

- separation of clean runoff from mine affected water
- maximising the recirculation of process water to be utilised within the CHPP and for dust suppression
- implementing water efficient work practices and recycling in order to keep the consumption of raw water to a minimum.

A water management schematic is provided in **Figure 4-20. Figure 4-2 to Figure 4-12** illustrate the SGCP water management system as it changes over the life of the mine. The conceptual SGCP water storage/management infrastructure components are described in **Section 4.10.1.1. to Section 4.10.1.6.** Additional surface water management infrastructure may be constructed over the life of the SGCP, if required.

The major water management infrastructure components include:

- sediment dams
- dirty water dams
- pit water dam
- raw water dam
- drainage channels
- stream diversion.



#### **4.10.1.1. Sediment Dams**

Sediment dams will intercept runoff water and reduce the volume of suspended solids by reducing the flow energy and allowing water to stand. The proposed design criteria of the sediment dams are to:

- retain the flow from a 10 year ARI event, 24 hour storm to allow sufficient time for 0.05 mm diameter (coarse silt) particles to settle
- maximise the length of the dam relative to the width of the dam to maximise hydraulic retention time and deposition.

#### **4.10.1.2. Saline Water Dams**

Four saline water dams are proposed to store mine affected water.

For the purposes of this EIS assessment, water balance modelling indicates that it may be necessary for SGCP to undertake controlled releases from the water management system to the receiving environment in order to balance the mine water inventory during periods of high rainfall. If this is required, the controlled water releases will be undertaken in accordance with an approved procedure and in compliance with Environmental Authority conditions.

#### **4.10.1.3. Pit Water Dam**

Water from the open cut pits (as a result of rainfall events or groundwater inflow) will be transferred to the Pit Water Dam. The mine pit may be used to store excess runoff entering the pit during, and after, very large rainfall events. Water will be stored for a short period of time, subsequently being used in the CHPP or for dust suppression.

#### **4.10.1.4. Raw Water Dam**

The Raw Water Dam will store raw water for use during construction and operation (including use at accommodation village). The Raw Water Dam will accept and store water from the external water supply. The Raw Water Dam will be located south of the rail loop (refer to **Figure 4-2**). Water will be supplied via gravity-fed pipelines east to the accommodation village and west to the operations area. The water level in the Raw Water Dam will be maintained to ensure that a minimum of seven days storage is available at all times. Potable water will be supplied by the potable water treatment plant, located adjacent to the Raw Water Dam.

#### **4.10.1.5. Drainage Channels**

Drainage channels will be constructed to direct clean runoff around the open cut mining area into the natural streams. The drainage channels serve to minimise the inundation of the open pits with runoff (therefore minimising the amount of saline water) and maximise the volume of clean runoff remaining within the natural environment. The drainage channels will have a gradient and cross-sectional shape and size such that peak velocities do not lead to local erosion. The detailed engineering design of the drainage channels will be determined during the DFS process.

#### **4.10.1.6. Stream Diversion**

To maximise coal recovery within the proposed open cut mining area and to maintain Pit 4 in a safe condition, a diversion of Sapling Creek is proposed (refer to **Figure 4-2**). Sapling Creek is an ephemeral tributary of Alpha Creek.

The drainage line requiring diversion does not experience substantial or consistent flow, however, is classified as a watercourse under the *Water Act 2000*.

The diversion of Sapling Creek will be designed according to relevant legislation, policies and guidelines. Stream diversion stability and sustainability is to be achieved through a number of key processes, including:

- effective management of flood impacts
- short and long-term morphological and geotechnical stability
- hydro-geological sustainability
- ecological sustainability.

#### **4.10.2. Water Consumption and Supply**

Up to approximately 900 megalitres per annum (ML/a) of raw water is expected to be required for the SGCP during construction and a peak of approximately 5,172 ML/a during Year 10 of operations.

##### **4.10.2.1. Construction**

Raw water for construction activities will be sourced from groundwater bores located within MLA 70453. On-site raw water dams will be constructed to store water from these bores in order to maintain 7-day supply.

An on-site water treatment plant will be constructed to treat groundwater to supply up to approximately 225 ML/a of potable water for the construction workforce and accommodation facilities.

##### **4.10.2.2. Operation**

Operational raw water will be sourced from a combination of groundwater, dewatering, surface water harvesting and the external water supply to be determined during various stages of the SGCP.

Up to approximately 84 ML/a of potable water will be required for domestic and underground mining activities. A water treatment plant will be constructed near the Raw Water Dam (refer to **Figure 4-2**) to supply potable water. Potable water will be stored in two water tanks, one to supply the accommodation village and one to supply the mine site.

Should water for underground mining activities not be required to meet the same standards as potable water, a separate water treatment system may be constructed, provided it is economically and practically advantageous.

#### 4.10.2.2.1. *External water supply*

It is estimated that a 3,000 ML/a allocation from the external water supply will be sufficient to meet SGCP water demand until the commencement of Stage 3 operations, after which an additional 470 ML/a will be sourced from rainwater, runoff from disturbed and undisturbed areas, and groundwater.

In the stages that the external water supply is operating, raw water requirements vary from approximately 658 ML/a to 1,138 ML/a.

Water resources are discussed in further detail in **Section 9—Water Resources**.

### 4.11. **ASSOCIATED INFRASTRUCTURE**

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The infrastructure requirements proposed as part of the SGCP are outlined in **Section 4.11.1** to **Section 4.11.9** below. The surface infrastructure has been grouped in four main areas, including:

- the MIA acting as the central support hub
- the CHPP area to service the CHPP and stockpile facilities
- underground services area, located at the surface access for the underground mine
- accommodation village.

#### 4.11.1. **Mine Industrial Area**

The MIA will contain the following:

- main office – air conditioned office to house workstations for staff and contractors and the main control and communications room
- training/inductions/emergency services building – demountable building to house first aid and emergency services personnel
- bath house – bathroom, locker room and change facilities for mine personnel
- cap lamp and self-rescuer storage area – storage area to house personnel equipment required for underground duties (e.g. cap lamps, self-rescues) and general PPE for open cut operations
- mine light vehicle car park
- bus drop-off/pick-up facility
- office and visitor car park
- heavy vehicle workshop
- medium vehicle/light vehicle workshop
- maintenance and workshop office – air conditioned demountable building for personnel closely related to the MIA workshops

- warehouse – secure unloading area and storage for parts and goods
- tyre facility – includes tyre removal, change and storage facilities
- bucket repair facility
- utilities/underground workshop – multi-purpose workshop used for welding and fabrication, sandblasting and painting, materials handling works/repairs, track replacement/repairs etc.
- heavy vehicle washdown – a drive through facility used to wash down heavy vehicles for maintenance, housekeeping and personnel safety
- medium vehicle/light vehicle washdown – a drive through facility used to wash down medium/light vehicles for maintenance, housekeeping and personnel safety
- heavy vehicle refuelling – split into four key areas (i.e. MIA refuelling, haul road refuelling, highwall refuelling and mobile refuelling)
- light vehicle refuelling – facility to service both on-site vehicles and external vehicles (e.g. delivery trucks), if required
- bulk lubricant facility
- controls and communications building
- field maintenance workshop – multi-purpose workshop used for performing maintenance of open cut field equipment.

#### **4.11.2. Underground Services Area**

The underground services area will be located beside the boxcut in the southern area of the mine.

Equipment to be transported underground will be disassembled at the MIA and transported via the main drift. Assembly will be undertaken in the underground workshop.

Underground access for SGCP personnel will be via the drift portal.

#### **4.11.3. Sewage and Waste Water**

A waste water treatment plant (WWTP) will be located on-site, near the Raw Water Dam (refer to **Figure 4-2**). Waste water and sewage (from the MIA, CHPP and accommodation village) will report to the WWTP for treatment. Facilities isolated from the sewage network (e.g. underground mine receiving centre) will operate on septic systems which will be collected periodically and transported by tanker to the STP. Approximately 10,000 kilolitres (kL) of treated waste water will be piped to the Sediment Dam per day.



#### 4.11.4. Explosives Storage Facility

The explosives storage facility will be located south of the underground mining area (refer to **Figure 4-2**).

The explosives storage facility will include magazines for the storage of initiation products. The storage facility will be licensed to hold up to approximately 60 t of initiation products (i.e. detonators and primers).

Ammonium nitrate and emulsion will be stored near the rail loop. This facility will be licensed to hold 1,000 t of ammonium nitrate, 100 t of emulsion.

The explosives storage facility will be designed and constructed in accordance with relevant legislation and Australian Standards.

#### 4.11.5. Quarry

The fill material for the majority of earthworks and road sub-base will be sourced from the rail cutting site and an on-lease borrow pit (refer to **Figure 4-2**), the exact location of which will be determined following geotechnical assessment. Road base and rail line ballast materials are proposed to be predominantly sourced off-lease due to the absence of high quality material on-lease. **Section 4.6.1** describes the transport of quarry materials.

#### 4.11.6. Fuel Storage

A summary of the types and volumes of hazardous materials (including diesel) to be transported, stored and/or used on-site is provided in **Section 19—Hazard and Risk**. Diesel will be supplied to the site for the operation of mine equipment. The on-site fuel storage facilities will include:

- approximately 16,000 L medium/light vehicle refuelling facility
- two 100,000 L portable refuelling stations
- 1 ML tank located in the MIA
- two 1 ML heavy vehicle refuelling tanks
- two 1 ML tanks located at the rail unloading point.

All fuel storage facilities will be designed, constructed and operated in accordance with the requirement of *Australian Standard 1940 Storage and Handling of Flammable and Combustible Liquids*.

Regular inspections will be conducted and spill response and management procedures will be implemented. Repair and maintenance work will be completed on an as-needs basis.

#### **4.11.7. Telecommunications**

Two communication centres (primary centre located within the Administration and Mining Operations Offices and secondary centre adjacent to the CHPP offices) will be constructed to house the networking and electronic equipment required for the site, including the following:

- Wide Area Network (WAN) Routers and Firewalls
- WAN Accelerators
- corporate IT Servers
- corporate Storage Area Network (SAN)
- corporate Data Backup
- corporate IP Telephony
- closed-circuit television equipment (CCTV) and IP CCTV network video storage
- Voice Over Internet Protocol (VOIP) phones to be connected to Power Over Ethernet capable Ethernet switches
- rail network equipment
- radio network equipment:
  - UHF (Analog) construction radio will be provided for the construction phase and repeater base stations will be utilised to provide coverage across the site
  - UHF (Digital) mobile radio system will be used for site communications during operations
- production network servers.

#### **4.11.8. Compressed Air Distribution**

Compressed air will be required to service underground and surface operations. The compressed air system will be located at the underground services area and comprise compressors, oil separators, dryers, valving and receivers.

A second compressed air system will be located at the heavy vehicle workshop.

#### 4.11.9. Other Buildings/Facilities

Other buildings/facilities located outside the MIA include the following:

- control room
- CHPP lab—laboratory for routine plant analysis and general quality control analysis
- concrete batching plant – concrete batching plant will be located between the Raw Water Dam and the CHPP
- water truck refill – two water truck refill points will be located on the main haul road, close to the heavy vehicle refuelling facilities
- dragline assembly facility – pad for use by contractor(s) during construction/assembly of the draglines and other ultra-heavy equipment requiring on-site assembly
- heavy vehicle go-lines – three go-lines to fit the heavy vehicle fleet during major shut downs (i.e. northern, central and southern go-lines)
- security/site access outpost – demountable building housing security personnel and an electronic boom gate to regulate traffic flow to and from the mine site
- brake testing ramp – facility where brakes on underground vehicles can be proven prior to entering the mine
- mobile crib facilities – crib huts containing toilet facilities for use by operators working in the open cut pits
- ballast dump – storage of gravel and stones ballast for use in underground roadways
- stone dust system – shed for the storage of stone dust.

### 4.12. EMPLOYMENT ARRANGEMENTS

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#### 4.12.1. Construction

The construction workforce for the SGCP will be employed on a contract basis. The construction workforce is anticipated to be up to approximately 1,600 personnel, although numbers will fluctuate with the staffing requirements of the various construction components. In addition to the mine personnel, support personnel would be required for operating the accommodation village and there would be periodic increases of maintenance contractors for shutdown work on the major plant and infrastructure. As described in **Section 4.4**, construction will be undertaken during daylight hours, seven days a week.

The accommodation facility for the construction workforce is described in **Section 4.8**.

The construction workforce for the SGCP will operate on a 21 days on, 7 days off roster with 12 hour shifts.

#### 4.12.2. Operations

A breakdown of the approximate anticipated operational workforce is provided in **Table 4-12** and a summary for each stage of the SGCP (including contractors and employees) is outlined below:

- Stage 1 – 507 personnel
- Stage 2 – 886 personnel
- Stage 3 – 1,288 personnel.

**Table 4-12 Operational Workforce Breakdown**

Position/Role	Workforce Numbers		
	Stage 1	Stage 2	Stage 3
Management	11	12	12
Technical Services	25	35	49
Underground Operation	0	310	619
Open Cut Operation	214	214	214
CHPP and Maintenance	174	194	214
Safety Department	20	23	28
Human Resources Department	18	18	18
Commercial	23	26	28
FTE Contractors	0	21	21
Miscellaneous (e.g. cooks, cleaners, gardeners/maintenance)	22	33	85
<b>Total</b>	<b>507</b>	<b>886</b>	<b>1,288</b>

Source: AMCI and Bandanna Energy (2011) (b)

The SGCP will be a FIFO operation. However, employment of people who reside locally will not be discouraged.

The operational workforce for the SGCP will operate on a 7 days on, 7 days off roster with 12 hour shifts.

The accommodation facility for the operational workforce is described in **Section 4.8**.

#### 4.12.3. Decommissioning

The decommissioning workforce will be determined in detail prior to the decommissioning phase when sufficient information regarding the required activities is obtained. However, it is estimated that a peak of approximately 300 personnel will be required in this phase.

The accommodation facility for the decommissioning workforce is described in **Section 4.8**.

#### 4.13. ONGOING EXPLORATION AND EVALUATION ACTIVITIES

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Exploration and evaluation activities will be ongoing and may involve in-seam and surface-to-seam drilling. All exploration and evaluation activities will be undertaken in accordance with industry standards, particularly the Department of Environment and Heritage Protection's (DEHP) *Code of Environmental Compliance for Exploration and Mineral Development Permits*.

Exploration activities will be undertaken with contract drill rigs to supply geological data and coal samples for analysis. Geological information and coal samples will be used to inform detailed mine planning and provide coal quality data.

For all exploration and evaluation activities, established access tracks will be utilised wherever practicable. Where this is not practicable, clearing of access to the selected drill sites will be required. Clearing of an access path generally involves grading a track at surface level. Land and vegetation disturbance will be minimised. A permit to clear/disturb will be submitted and signed off by the Environmental Advisor for each proposed drill site. If drilling is required in a mapped ERE area, control strategies will be implemented in accordance with the EM Plan (refer to **Section 21—Environmental Management Plan**). After the completion of any exploration activities, all drill hole sites and access tracks will be rehabilitated.

#### 4.14. REHABILITATION AND DECOMMISSIONING

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##### 4.14.1. Rehabilitation

The primary rehabilitation objective is to reconstruct disturbed lands to a safe, non polluting, stable and self-sustaining state.

The site will be rehabilitated to enable two post-mining land uses, native bushland and grazing (refer to **Section 5 – Rehabilitation and Decommissioning**).

Rehabilitation works will include:

- reshaping disturbed areas (e.g. construction areas, waste rock emplacement facilities) to allow for drainage while minimising erosion potential

- placement of topsoil at a specified depth over the reshaped disturbance areas
- seeding with an appropriate species mix for the proposed final land use
- on-going monitoring to measure rehabilitation works against agreed success criteria.

Rehabilitation of any significant subsidence effects (e.g. surface cracking, erosion etc.) may include:

- filling and/or repairing of any significant subsidence-induced surface cracking
- installation of sediment controls (e.g. sediment fences) or stabilisation techniques (e.g. rocks, vegetation etc.).

#### **4.14.1.1. Topsoil Management**

Topsoil will be stripped from disturbance areas associated with the SGCP (refer to **Section 4.4.1** and **Section 4.5.3**). The availability and suitability of topsoil reserves is detailed in **Section 7—Land**.

Current reserves show availability of sufficient topsoil to rehabilitate all SGCP disturbance areas as per the proposed rehabilitation strategy (refer to **Section 5—Rehabilitation and Decommissioning**).

Topsoil stockpiles (refer to **Figure 4-2** to **Figure 4-12**) will be clearly signposted to ensure integrity and protection. To prevent topsoil deterioration during storage:

- an up-to-date inventory of topsoil material including the volume and location of stockpiles will be maintained by mine planning and surveying personnel
- live placement of topsoil will be desirable but will depend on rehabilitation backlog – topsoil will be reused as soon as practicable
- soil will be stockpiled nominally no more than 2 m in height
- the establishment of a vegetative cover will be encouraged to minimise erosion, perpetuate nutrient cycling and maintain a viable seed bank where practicable
- stockpiles will be located where they will not be disturbed by future mining
- stockpiles will, as far as practicable, be located for minimal exposure to wind erosion and runoff.

Some soil stockpiles may require relocation during the life of the SGCP.

#### 4.14.2. Decommissioning

A Mine Closure Plan will be developed in advance of closure and decommissioning. This plan will document how disturbed areas will be rehabilitated to meet closure and relinquishment requirements. It will be developed in consultation with appropriate stakeholders and regulatory agencies. The objectives of the post-mine land use are to ensure that:

- post-mine areas are self-sustaining and require no ongoing maintenance, while protecting the physical and biological integrity of the surrounding environment after mining activities have ceased
- existing and potential beneficial uses of the area are preserved where practicable after mining activities have ceased.

##### 4.14.2.1.1. *Waste Rock Emplacements*

The waste rock emplacement facilities will be progressively rehabilitated and decommissioned once the final rehabilitation success criteria have been achieved.

##### 4.14.2.1.2. *Final Voids*

The final void remaining at the end of the SGCP life will cover approximately 329 ha with a depth of approximately 140 m (refer to **Section 5—Rehabilitation and Decommissioning**).

##### 4.14.2.1.3. *Infrastructure*

Contractors will be required to decommission temporary construction equipment and plant in accordance with a Construction Environmental Management Plan.

SGCP infrastructure will be located on land owned by the miner. Final landform designs for the infrastructure areas will be based on decommissioning, dismantling and/or disposing of the plant and equipment and re-profiling the base to match the original pre-mining landform where practicable. Contour ripping, topsoiling and revegetation will be undertaken to encourage a vegetative cover. Detailed rehabilitation plans will be developed and refined over the life of the SGCP.

Unless determined to be suitable and requested by the landowner, water storages will be removed in a similar manner and rehabilitated to a waterbody or grazing post-mine land use.

##### 4.14.2.1.4. *Subsidence Areas*

The post-mine land use of the subsidence areas will be native bushland.