2.0 Overview of Existing Operations

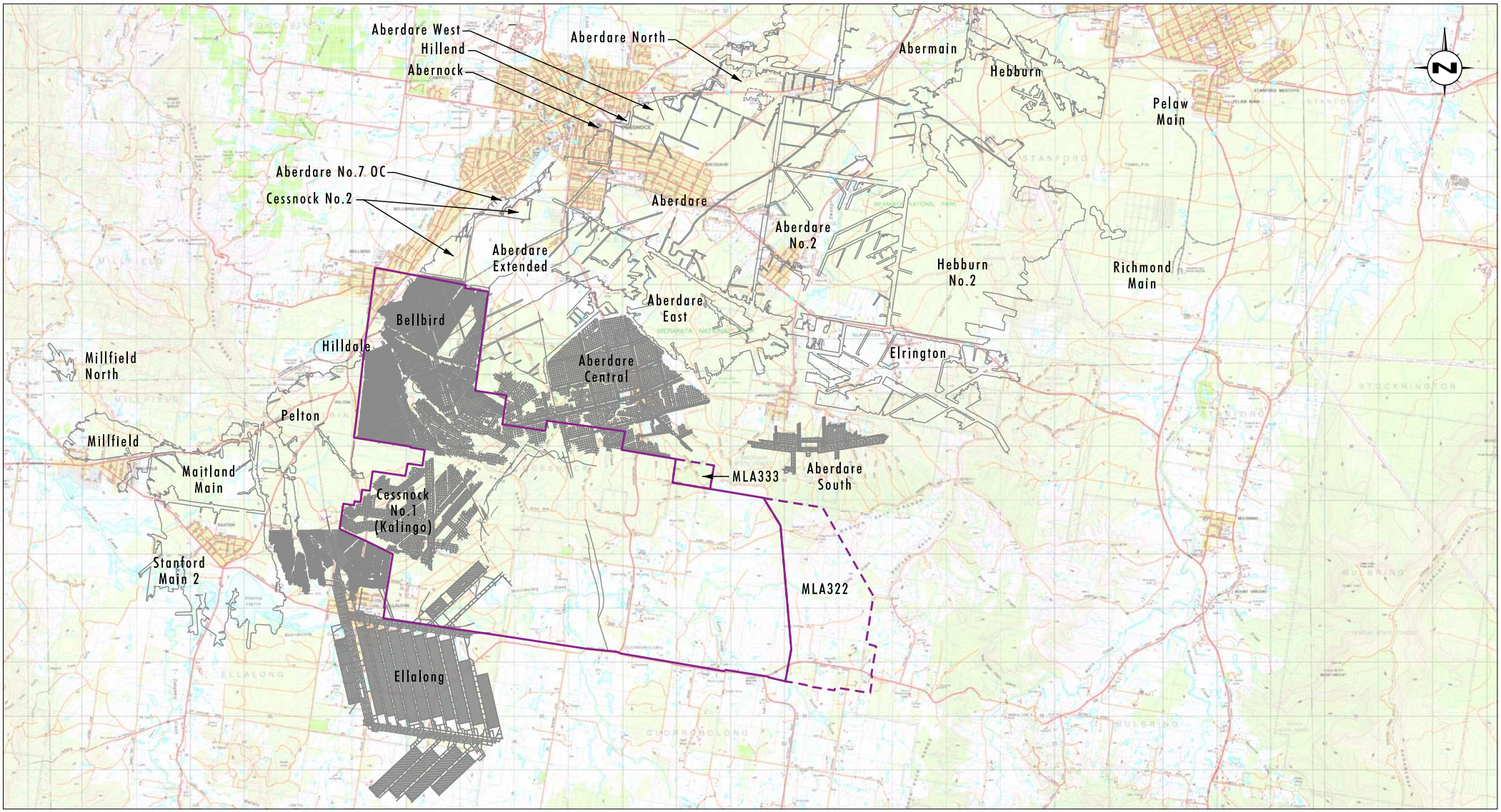
2.1 Mine History

Austar Coal Mine is an amalgamation of several older mines and operates within a number of mining leases under 12 separate development consents issued by Cessnock City Council between 1974 and 2002. Additionally, Austar operates under development consent DA 29/95 granted by the NSW Minister for Urban Affairs and Planning in 1996 and DA 08_0111 granted by the Minister for Planning in 2009. DA 29/95 was modified in 2006, 2008, 2009 and 2010 to provide for LTCC mining in Stage 1 and 2 areas. A full listing and description of current operations and the various consent and approvals under which the mine operates is provided in **Appendix 4**.

Austar mine and its associated infrastructure has a long and productive history. A chronology of mining within the Greta Coal Seam at the site and related activities is presented in **Table 2.1**. The locations of previous underground workings in the area are shown on **Figure 2.1**. The location of infrastructure currently used in the handling and processing of coal from the Austar Mine Complex is shown on **Figure 1.2**. Mining leases currently held by Austar are shown in **Figure 2.2** and listed in **Appendix 4**.

Table 2.1 – History of Mining Activities at Austar Coal Mine

Year	Historical Details
1916	Underground mining commenced at Pelton Colliery.
1918	The Pelton Railway was constructed in 1918.
1921	Underground mining commenced at Cessnock No. 1 (Kalingo) Colliery.
1960/1961	Pelton CHPP constructed.
1961	Underground mining ceased at Cessnock No. 1 Colliery.
Late 1960s	Cessnock No. 1 Colliery amalgamated into Pelton Colliery.
1975	1975 development consent for Ellalong Colliery granted under Part X11 of the *Local Government Act 1919.*
1978	Underground mining commenced at Ellalong Colliery with coal being delivered by overland conveyor to the coal preparation plant, raw and washed coal handling systems and train loading facilities at Pelton Colliery.
1983	Longwall production commenced at Ellalong Colliery.
1992	Underground mining ceased at Pelton Colliery.
1994	High levels of gas (primarily carbon dioxide) encountered in the underground workings at Ellalong Colliery, preventing further mining of additional seams to the south-east.
1995	Pelton Open Cut Coal Mine established.
1996	DA 29/95 approved by the Minister for Urban Affairs and Planning and underground operations from the Ellalong Colliery extended into the Bellbird South Colliery area.
1998	Ellalong and Pelton Collieries amalgamated with Bellbird South Colliery and re-named Southland Colliery.
2003	Spontaneous combustion event resulting in a fire in the underground workings in Bellbird South. Mine placed in 'care-and-maintenance' for approximately 18 months.



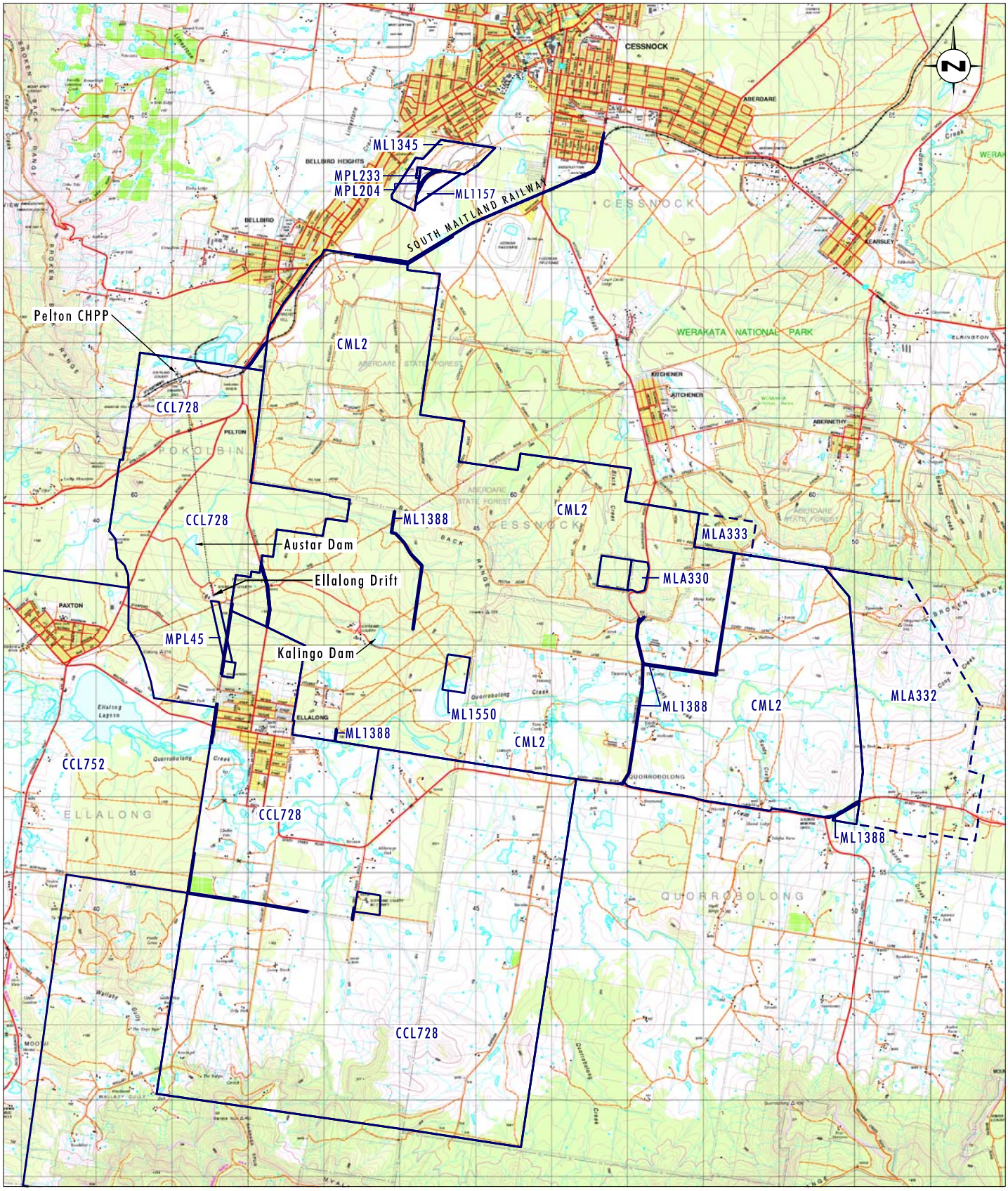
Source: Topo Maps: LPI NSW, Mine Workings: Austar Coal Mine

Legend

- Consolidated Mining Lease (CML) 2
- Pending Mining Lease Application Areas
- Previous Underground Workings

FIGURE 2.1

Previous Underground Workings



Source: Topo Maps: LPI NSW, Mine Leases: Austar Coal Mine

0 1 2 3km
1:70 000

Legend

- Mining Leases
- Pending Mining Lease Application Areas

FIGURE 2.2

Existing Austar Mining Leases

Table 2.1 – History of Mining Activities at Austar Coal Mine (cont)

Year	Historical Details
2004	Yancoal purchased Southland Colliery and changed the name to Austar Coal Mine.
2005	Austar recommenced underground mining in the former Bellbird South Colliery area.
2006	DA 29/95 modified to allow Austar to commence underground mining using LTCC technology in the Stage 1 area.
2008	DA 29/95 modified to allow Austar to commence underground mining using LTCC technology in the Stage 2 area.
2009	DA 29/95 modified to increase the size and dimensions of Longwalls A4 and A5 in the Stage 2 area.
2009	DA 08_0111 for underground mining using LTCC in the Stage 3 area approved by the Minister for Planning.
2010	DA 29/95 modified to allow Austar to extract one additional longwall panel (Longwall A5a) using LTCC technology in the Stage 2 area.
2010	DA 08_0111 wording of Condition 1 of Schedule 3 modified.

As set out in **Table 2.1**, underground mining commenced at Pelton Colliery in 1916. Pelton Coal Handling Preparation Plan (CHPP) was constructed in about 1960/1961 for the washing of Pelton Colliery coal. Pelton Colliery was amalgamated with the neighbouring Cessnock No. 1 Colliery in the late 1960s.

In 1975 development consent for Ellalong Colliery was granted under Part X11 of the *Local Government Act 1919* and the mine was officially opened in July 1979. The 1975 development consent envisaged that coal from Ellalong Colliery would be transported by conveyor from the Ellalong Drift and Pit Top to Pelton CHPP. Longwall production commenced at Ellalong Colliery in 1983.

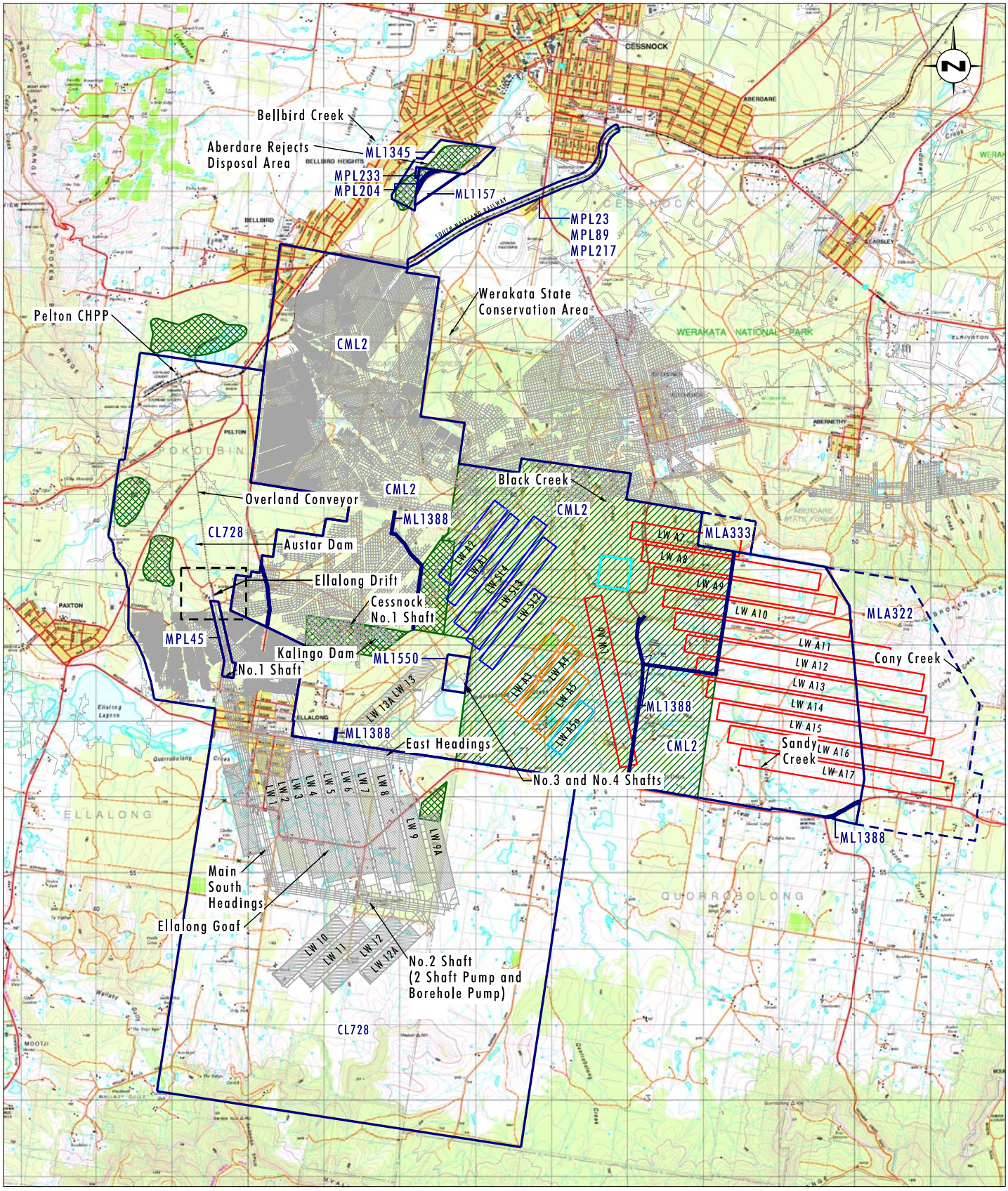
In early 1994 high gas levels were encountered in the southern part of Ellalong Colliery. In 1996 development consent (DA 29/95) was granted by the Minister for Urban Affairs and Planning to extend Ellalong Colliery to the north-east into the Bellbird South area to allow development in an area not affected by high levels of coal seam gas.

The Minister for Urban Affairs and Planning granted development consent (DA 29/95) for mining within CML2 by conventional retreat longwall mining to produce up to 3 million tonnes per annum (Mtpa) of product coal with an approved extraction height of up to 4.5 metres. Approximately 98 Mt of coal was identified in the approved Bellbird South Colliery Extension. The approved mining area that formed part of DA 29/95 is shown in **Figure 2.3**.

In 1998 Southland Coal Pty Limited acquired Ellalong and Pelton Collieries and amalgamated them with Bellbird South Colliery. Ellalong, Pelton and Bellbird South Collieries became known as the Southland Colliery. Southland Colliery was operated until 2003 when fire broke out in the underground workings. Subsequently, the mine was placed into receivership and operations were placed on care and maintenance.

Southland Colliery and its associated infrastructure was acquired by Yancoal in December 2004 and was renamed Austar Coal Mine.

Mining proceeded in the reconfigured Stage 1 area (consisting of LW A1 and A2 as shown on **Figure 1.2**) following a modification in 2006 of the 1996 Minister's Consent to allow for the extraction of coal to a height of 6.5 metres using LTCC technology. A further section 96



Source: Topo Maps: LPI NSW, Longwall Layouts: Austar Coal Mine

0 1 2 3km
1:70 000

Legend

- Layout for Stage 1 Longwall Panels
- Layout for Stage 2 Longwall Panels
- Layout for Stage 2 Extension Longwall Panel
- Conceptual Layout for Stage 3 Longwall Panels as Approved
- Surface Infrastructure Site
- Old Workings
- Mining Leases
- Pending Mining Lease Application Areas
- Surface Application Area (DA 29/95)
- Subsurface Application Area (DA 29/95)

FIGURE 2.3

Mining Area Approved under DA 29/95

Modification (Stage 2) was approved by the Minister of Planning in 2008 to allow LTCC extraction of Longwalls A3 to A5 in Stage 2 (see **Figure 1.2**). An additional minor section 96 (1a) modification to vary the length and widths of Longwalls A4 and A5 was approved in 2009, and a further modification under Section 75W of the EP&A Act adding Longwall A5a to the Stage 2 area was approved in November 2010. Extraction of coal using LTCC technology is currently occurring in Longwall A4 within the Stage 2 area.

A new Project Approval was granted by the Minister for Planning in September 2009, enabling longwall mining using LTCC technology in the Stage 3 area and construction and operation of a new Surface Infrastructure Site and access road south-west of Kitchener (refer to **Figure 1.2**). Shaft construction at the Surface Infrastructure Site commenced in December 2009 and will take approximately 36 months to complete. Longwall mining in the Stage 3 area is scheduled to commence in 2013. A further description of the activities approved under the Stage 3 Project Approval is set out in **Section 2.2.1**.

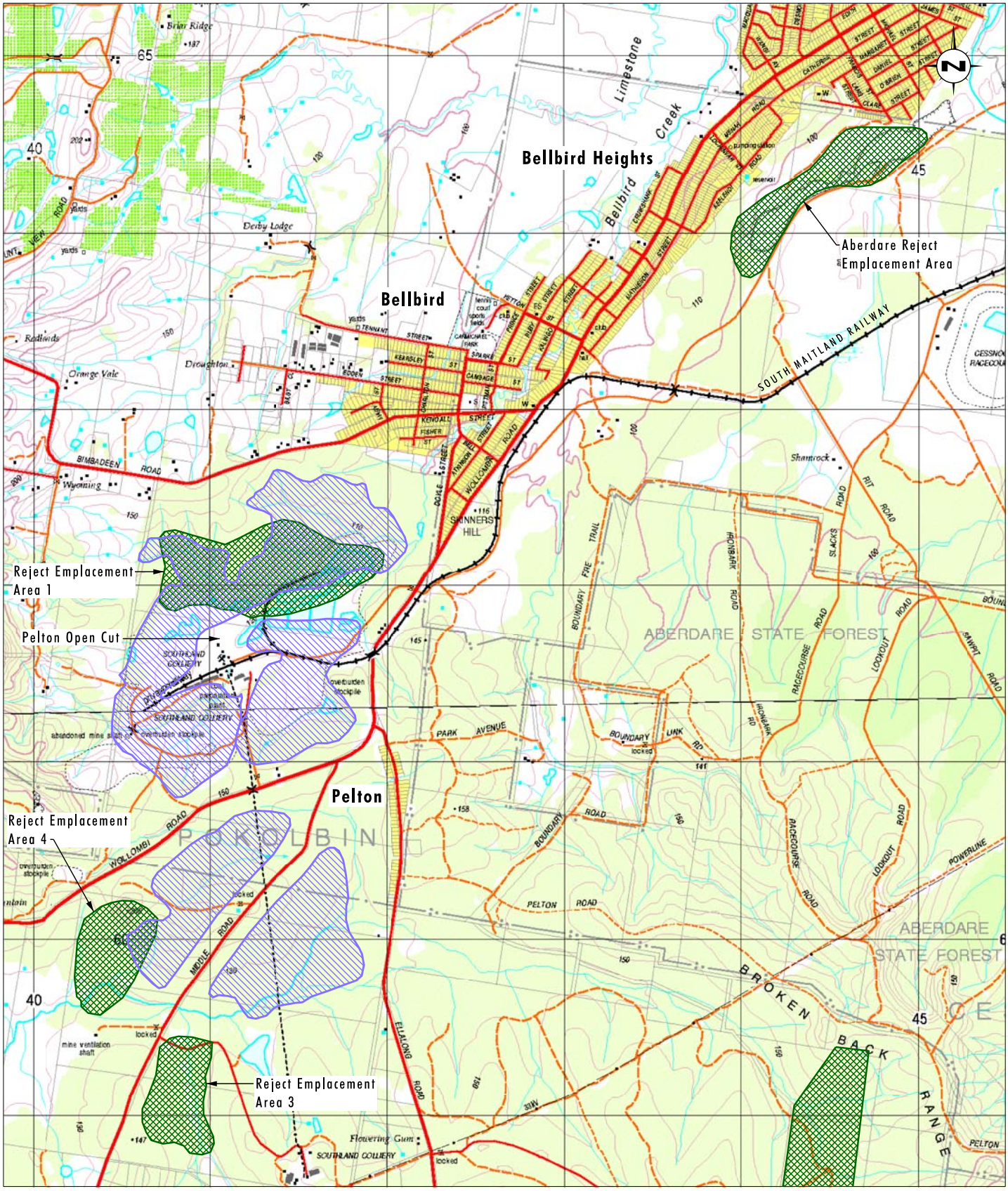
The Austar Mine Complex is located south of the old Aberdare Extended, Cessnock No. 2 and Bellbird mine workings (refer to **Figure 2.1**) and works within the parameters of the Austar Mining Operations Plan using established infrastructure (refer to **Figure 1.2**). The Abermain No. 2, Hebburn No. 2 and Elrington mine workings are all located north-east of Austar, whilst the Maitland Main and Stanford Main workings are located to the west (refer to **Figure 2.1**).

2.2 Current Infrastructure, Operations, Consents and Approvals

Coal from Austar Coal Mine is bought to the surface at the Ellalong Drift and Pit Top via an underground conveyor through the Ellalong East and South Headings. Coal is then conveyed to the Pelton CHPP via an overland conveyor system, processed and handled at Pelton CHPP and railed to the Port of Newcastle via Austar Rail Line, the South Maitland Railway and the Main Northern Rail Line. Up to 60,000 tonnes of specialty coal product is also transported by road from Pelton CHPP. Further detail regarding the transport of specialty coal product is given in **Section 2.4.2**.

Reject from Pelton CHPP is emplaced at approved emplacement areas at Pelton CHPP and Aberdare Extended. The location of current project emplacement areas is shown on **Figure 1.2**. Additional approved reject emplacement areas are shown on **Figure 2.4**.

Full details of Austar's current infrastructure and operations are provided in **Appendix 4**. A summary of current operations is provided in **Table 2.2**.



Source: Topo Maps: LPI NSW

0 0.5 1.0 1.5km

1:30 000

Legend

- Reject Emplacement Area (DA 29/95)
- Reject Emplacement Area (DA 74/75/79)

FIGURE 2.4

Reject Emplacement Areas

Table 2.2 – Summary of Approved Operations

	Approved Operations
Approved Production	• Production of 3.6 Mtpa of ROM coal per year
Operating Hours	• 24 hours, 7 days per week
Number of Employees	• 200 to 275
Mining Methods	• Conventional retreat longwall mining and LTCC
Infrastructure	• Drift sites at Ellalong and Pelton Collieries; • CHPP at Pelton; • Overland conveyor from Ellalong to Pelton CHPP; • Rail loading facility and rail spur adjacent to Pelton Colliery; • Various ventilation and access shafts – (including Ellalong No.1 Shaft, Ellalong No.2 Shaft, an upcast ventilation fan at Shaft No. 3 and Downcast at Shaft No. 4 both located at the Kalingo infrastructure site, and new upcast and downcast shafts under construction at the Stage 3 Surface Infrastructure Site) (refer to **Figure 1.2**); • Offices and amenity buildings at Ellalong and Pelton Collieries, No. 1 and No. 2 shafts, and new offices and amenities to be constructed at the Stage 3 Surface Infrastructure Site; • Water management systems including: drains, diversion banks, sedimentation, treatment and clean water dams, lime treatment plant and water treatment plant; • Electrical sub-stations and compressors; • Nitrogen inertisation plant; and • Diesel and emulsion fluid storage area and dispatch system.
Coal Processing	• All coal is processed at the Pelton CHPP which has a nameplate capacity of 600 tonnes per hour. The plant currently processes up to approximately 520 tonnes per hour giving it a functional production capacity of approximately 4.2 million tonnes per year.
Tailings and Reject Management	• Tailings are pumped underground at Pelton and reject is emplaced at the disused Aberdare Extended Open Cut voids, and at Pelton Colliery in approved areas shown in **Figure 1.2**. As shown on **Figure 2.4**, additional reject emplacement areas have development consent and may be utilised if required.
External Coal Transport	• Product coal can be transported by rail to the Port of Newcastle at a rate of up to 3.0 Mtpa (using up to 6 trains per day). Up to 60,000 tonnes per annum can be transported by road.
Underground Access	• Main mine entrance is at the Ellalong Drift and Pit Top, Middle Road, which runs off Wollombi Road.

Since purchasing the mine in 2004, Austar has been implementing a program of continuous improvement for its operations. This program is being undertaken principally through the ongoing development and review of the Austar:

- Mining Operations Plan (MOP);
- Site Water Management Plan (SWMP);
- Voluntary Pollution Reduction Program (PRP) that is being implemented as part of Environment Protection Licence (EPL) 416; and
- Environmental Monitoring Program (EMP).

Details of these Plans and Programs are provided in **Section 2.3**.

2.2.1 Stage 3 Project – Project Approval 08_0111

Austar received approval from the Minister for Planning in September 2009 to undertake the Stage 3 Extension to Underground Mining and Associated Infrastructure under Project Approval 08_0111. The description of the project approved under Project Approval 08_0111 is set out in **Table 2.3** below.

Table 2.3 – Austar Coal Mine – Stage 3 Project Description As Approved

Project	Stage 3 of the Austar Coal Mine, which involves: • extraction of up to 3.6 million tonnes of run of mine (ROM) coal a year for 21 years using Longwall Top Coal Caving technology from Longwall Panels A6 to A17; and • construction and operation of new pit top facilities off Quorrobolong Road south of Kitchener including an access road, upcast and downcast ventilation shafts, main ventilation fans, winder house, bathhouse, workshop, electricity substation and distribution line, service boreholes, potable and reticulated sewerage services, telecommunication services, offices and store.
Operation of the Austar Mining Complex	The Project will use the existing and approved infrastructure and facilities at the existing Austar Mining Complex as described below to handle, process and transport ROM coal from longwalls A6 to A17. These activities involve the continued operation of: • the Ellalong Drift and associated infrastructure; • the Pelton Coal Handling Preparation Plant for the washing and handling of coal; • the Austar Railway Line which links to South Maitland Railway to transport up to 3 million tonnes of product coal per annum; • road transport of up to 60,000 tonnes of specialty coal product per annum; and • emplacement of reject material from Austar's mining operations at Pelton Open Cut and other sites as approved in the Mining Operation Plan.
Stage 3 Project and Austar Mine Complex Areas	• Stage 3 area including the proposed Stage 3 mining area and the new Surface Infrastructure Site which is located 6 to 8 kilometres south of Cessnock. The location of Stage 3 area is shown on **Figure 1.3**. Cadastral details for the Surface Infrastructure Site and properties above the Stage 3 mining area are listed in **Appendix 5**; and • the Austar Mine Complex as shown on **Figure 1.2** which includes the existing infrastructure and facilities that will be used by the project.

2.3 Environmental Management of Existing Operations

The environmental management of existing operations at Austar mine is undertaken within the framework of the Austar MOP, a suite of environmental management and monitoring plans including the Site Water Management Plan, and the Environment Protection Licence for the mine (EPL 416). This section provides an overview of the environmental management framework at Austar mine and its current environmental performance.

2.3.1 Austar Mining Operations Plan

All aspects of current Austar operations, including environmental management and rehabilitation, are managed in accordance with the current Austar MOP, which was approved by the Department of Primary Industries (DPI, now a part of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS)) in May 2008. The current MOP covers all mining operations at Austar over a seven year period from 2008 to 2015. The MOP encompasses all mining activities within Austar's mining leases including:

- underground mining;
- activities at Ellalong Drift and Pit Top;
- overland transport of ROM coal from Ellalong Drift to Pelton CHPP;
- processing and handling of coal at Pelton CHPP;
- reject management and emplacement activities;
- water management;
- use and management of Austar's remote infrastructure sites (No. 1, 2, 3 and 4 shafts and the Kalingo site); and
- rehabilitation activities.

Review and reporting of Austar's performance against the MOP is provided through Annual Environmental Management Reports (AEMR) and DTIRIS inspections.

2.3.1.1 Coal Reject Management

The Austar MOP provides the framework for the management of coal reject from Pelton CHPP for the life of Austar mine. In accordance with the MOP, fine coal tailings from Pelton CHPP are discharged into underground workings while coarse rejects are emplaced at three approved reject emplacement areas (refer to **Figure 1.2**). There is sufficient capacity within the existing reject emplacement areas shown on **Figure 1.2** to accommodate all coarse reject from the Stage 2 and Stage 3 Projects.

In addition to the existing reject emplacement areas, Austar has planning consent to construct and use additional reject emplacement areas to the south of Wollombi Road and to the east of Middle Road (refer to **Figure 2.4**) under DA 74/75/79 and DA 29/95. The approved reject emplacement areas at Austar have a total capacity of approximately 17.5 Mt. While it is not proposed to utilise approved reject emplacement areas to the south of Wollombi Road or to the east of Middle Road, significant additional reject emplacement capacity is available should the need for additional reject emplacement areas arise. Analysis indicates that a life of mine coarse reject capacity of approximately 3.6 Mt will be required. Approximately 5.5 Mt of reject emplacement capacity is available within the existing three reject emplacement areas (see **Figure 1.2**).

2.3.1.2 Rehabilitation

Rehabilitation Activities

Rehabilitation activities at Austar mine are undertaken in accordance with the Austar MOP. The Austar MOP sets out rehabilitation activities to be undertaken during the seven year period from 2008 to 2015 and provides final rehabilitated landforms for Pelton CHPP, reject

emplacement areas, Ellalong Drift and Pit Top and the remote infrastructure sites. Rehabilitation at the end of mine life will be undertaken in accordance with the provisions of the Austar MOP.

Final Land Use Strategy

The final land use plans for life of mine operations have been developed for the three reject emplacement areas and surface infrastructure areas shown on **Figure 1.2** as part of the MOP (Austar 2008). These plans have been developed to be consistent with land use strategies for the surrounding areas.

2.3.2 Environmental Management and Monitoring

Current environmental management and monitoring plans for Austar mine provide a methodical and integrated approach to fulfilling Austar's environmental objectives and ensure the ongoing management of the site in accordance with the principles of ecologically sustainable development. The existing plans include:

- Environmental Management Strategy;
- Environmental Monitoring Program;
- Subsidence Management Plans for the Stage 1 and Stage 2 areas including:
  - Property Subsidence Management Plans;
  - Public Safety Subsidence Management Plan;
  - Infrastructure Subsidence Management Plans;
  - Subsidence Monitoring Strategy.
- Vibration Monitoring Plan;
- Bushfire Management Plan;
- Air Quality Monitoring Plan;
- Noise Monitoring Program;
- Site Water Management Plan;
- Stage 2 Ecology Monitoring Program;
- Stage 3 Surface Infrastructure Site – Traffic Management Plan; and
- Stage 3 Surface Infrastructure Site – Shaft Construction Environmental Management Plan.

Austar's environmental management plans have been prepared in accordance with the conditions of DA 29/95 or Project Approval 08_0111 where appropriate to the satisfaction of the Director-General of Planning.

A summary of environmental management and monitoring activities relating to air quality, noise and water undertaken at Austar mine is provided in **Sections 2.3.2.1** to **2.3.2.3** below.

2.3.2.1 Air Quality Management and Monitoring

In accordance with the Air Quality Management and Monitoring Plan, Austar operates five dust depositional dust gauges and two high volume air samplers (HVAS), which measure PM_{10}. Results from the dust gauges and HVAS during 2007 to 2010 demonstrate compliance with the ambient air quality goals set out in DA 29/95.

2.3.2.2 Noise Monitoring

Quarterly noise monitoring is undertaken at three locations surrounding Pelton CHPP in accordance with EPL 416 (refer to **Section 2.3.3**) and at two locations in proximity to No. 3 and 4 Shafts in accordance with DA 29/95. Noise monitoring is undertaken within the framework set out in Austar's approved Noise Monitoring Program.

Noise monitoring undertaken in 2007 to 2010 has indicated compliance with Austar's project specific criteria at monitoring locations near Pelton CHPP and No. 3 and 4 Shafts. A program of directed noise studies in relation to Pelton CHPP has been undertaken by Austar in response to community complaints, and more recently Austar has entered into a Noise Pollution Reduction Program for Pelton CHPP. These initiatives are a part of Austar's program of continuous environmental improvement.

Construction noise at the Surface Infrastructure Site (SIS) is managed using the Interim Construction Noise Guideline (DECC 2009), as required by Project Approval 08_0111. Noise monitoring for the SIS is undertaken monthly at three locations surrounding the SIS in accordance with the Shaft Construction Environmental Management Plan.

Noise monitoring undertaken around the SIS from 2009 to 2010 indicated some exceedances of construction noise management levels during drilling of the pilot hole for the shaft, and during the early stages of shaft drilling. Noise controls were immediately implemented to reduce noise impact, with follow up noise monitoring showing compliance with construction noise management levels since May 2010.

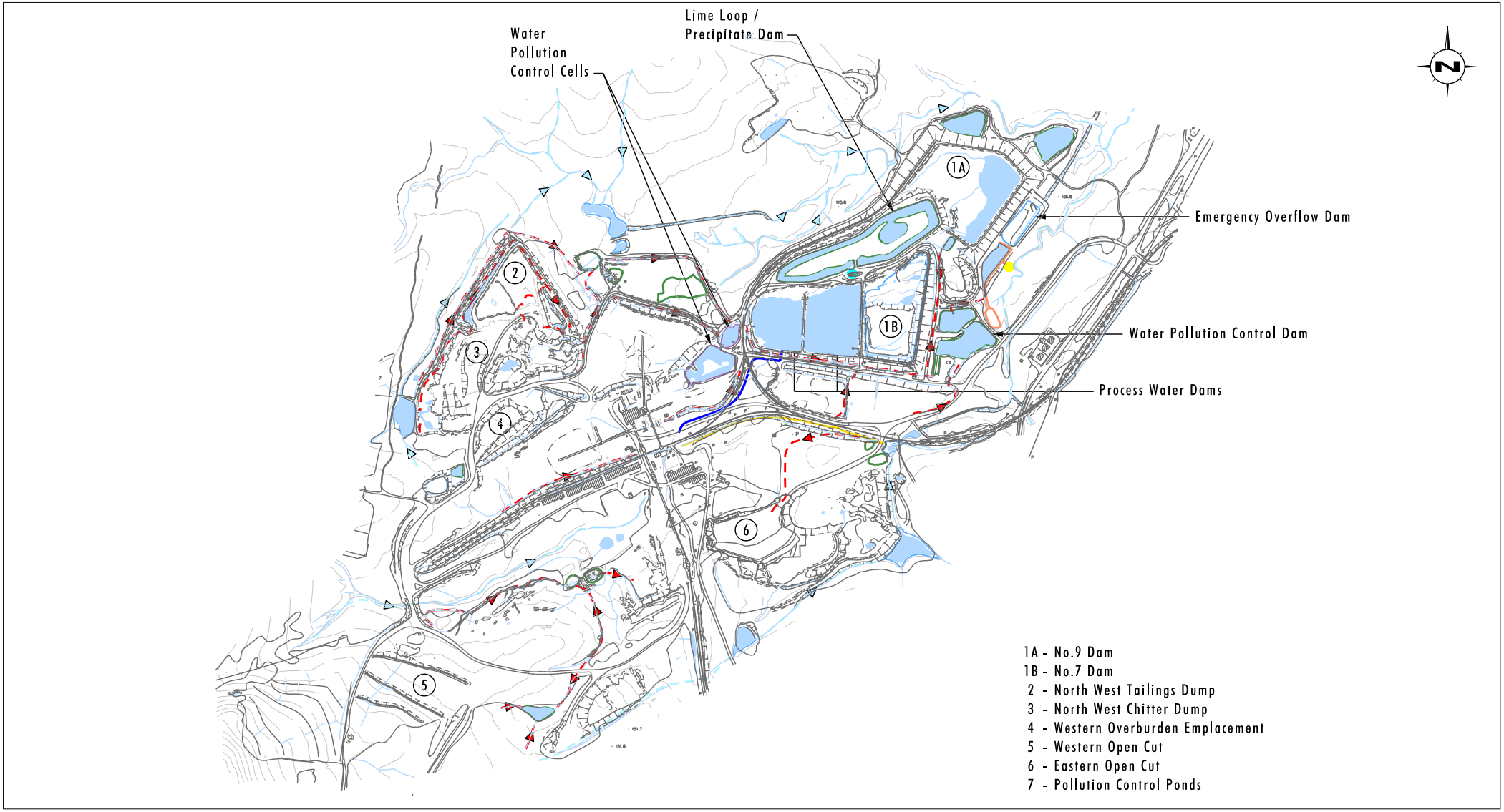
2.3.2.3 Site Water Management

Austar has prepared a Site Water Management Plan (SWMP) for its current operations in accordance with the requirements of Conditions 11 to 16 of DA 29/95. The SWMP details the water management system in place at Austar mine with the aim of ensuring that the mining operation does not result in unacceptable impacts on water quality in the area. The water management system at Austar Coal Mine is detailed in the SWMP (Austar 2009b) and comprises three main components being the underground, Pelton CHPP site and the surface water storage systems. The SWMP has been instrumental in facilitating continuous environmental improvement in terms of water management at Austar mine.

An assessment of predicted future groundwater inflow into the mine has been undertaken by Connell Wagner (2007) and forms part of the SWMP (Austar 2009b).

The locations of the main components of Austar's water management infrastructure are shown on **Figure 1.2**. The water management system at Pelton CHPP is shown in **Figure 2.5.**

Monthly monitoring of surface water quality is undertaken at five surface water monitoring locations at Pelton CHPP in accordance with EPL 416.



Source: Southland Colliery / Geospectrum 1998, Adapted from Figure 4, 2005 Austar MOP
Note: Contour Interval 5m

0 200 400 600m
1:12 000

Legend

- Licensed Discharge Point
- Lime Dosing Plant
- Clean Water Dam
- Clean Water Flow
- Dirty Water Dam
- Contaminated Water Flow
- Discharge Channel
- Emergency Dam
- Pipeline
- Pollution Control Dam

FIGURE 2.5

Current Water Management System Pelton CHPP

File Name (A4): R64_V1/2274_949.dgn

The SWMP will be updated to include the Stage 3 Project prior to commencement of secondary extraction within the Stage 3 area. No changes to the SWMP will be required as a result of the proposed Stage 3 Modification.

2.3.3 Environment Protection Licence

Austar holds an Environmental Protection Licence (EPL 416) for its operations. EPL 416 was granted on 7 May 2002 and is reviewed annually. The EPL includes provisions for the discharge of water from Pelton CHPP (refer to **Section 2.3.2.3**), surface water monitoring at Pelton CHPP (refer to **Section 2.3.2.3**) and noise limits surrounding Pelton CHPP (refer to **Section 2.3.2.2**). In accordance with the requirements of EPL 416, Austar maintains a 24-hour telephone complaints line (number is 1800 701 986). An annual return for EPL 416, including a statement of compliance and a summary of environmental monitoring and complaints is submitted to the Office of Environment and Heritage (OEH) at the end of each reporting period.

2.3.3.1 Voluntary Noise Pollution Reduction Program

As a part of Austar's continuous environmental improvement program, Austar has voluntarily entered into a Noise Pollution Reduction Program (Noise PRP). The Noise PRP is a staged program aimed at progressively improving the noise performance of the CHPP. EPL 416 has been amended to include the first stages of the Noise PRP.

Austar commissioned a noise impact assessment titled *Austar Coal CHPP Assessment of Noise Impacts* (Global Acoustics, September 2008; the Noise Report), as the first stage in a voluntary noise pollution reduction program (PRP).

The Noise Report was prepared in accordance with Section 10 of the DECC *Industrial Noise Policy* (INP), which provides guidance on the application of the INP to existing premises, such as the Austar Coal CHPP. The method is essentially the same as for a new development, where project specific criteria are determined, and proposed (or current) operations are assessed against these criteria, with the exception that, should the predicted levels exceed any criterion, an assessment should be made of feasible and reasonable noise mitigation strategies, and negotiated achievable noise levels may be agreed upon between the noise source manager and the regulator.

Austar has implemented noise control in several areas since the Noise Report in 2008, which included erecting noise barrier walls or enclosures around pumps and conveyor feeders; closing openings in the CHPP building; undertaking a trial upgrade of the walls and roof of the main overland conveyor drivehouse; and commencing an upgrade of the acoustic performance of the CHPP walls and roof. The program is ongoing, with progress and monitoring results communicated in six monthly status reports to the OEH, at the Community Consultative Committee, and also summarised in the AEMR.

3.0 Description of Proposed Modification

3.1 Proposed Mine Plan Changes

The proposed Stage 3 Modification will involve:

- the modification of the mine plan as per **Figure 1.4**, including:
  - removal of longwall A6;
  - extraction of coal in longwalls A7 to A19, which are a reorientation of longwalls A7 to A17 shown on **Figure 1.3**;
  - movement of the Stage 3 main headings and limit of longwalls to the west;
  - increase in longwall void widths from 227 metres to 237 metres; and
  - increase in chain pillar width from 45 metres to 55 metres.
- no change to the life of the operation described in **Table 2.3**;
- no change to the rate of coal extraction described in **Table 2.3**;
- no change in the method of coal extraction described in **Table 2.3**;
- mining remains within CML 2 and existing lease extension application areas (MLA322 and MLA333);
- no change to the new pit top facilities off Quorrobolong Road south of Kitchener described in **Table 2.3**;
- no change to the number of properties above the Stage 3 mining area as listed in **Appendix 5**;
- no change to the operation of the Austar Mining Complex as described in **Table 2.3**;
- no change to the processing and handling of coal from that approved;
- no change to the method of transport of coal from that approved;
- no change to the manning levels of the operation from that approved; and
- no change to the hours of operation from that approved.

As shown in **Figure 1.5**, the area of surface impact will be generally within the envelope of that previously approved for the majority of the underground mining area. Surface impacts are proposed to be decreased in the west of the approved Stage 3 area via the removal of Longwall A6, decreased in the south-east and north-west by reorientation of longwall panels, and increased for a section of land between the approved Longwall A6 and the western extent of approved Longwalls A7 to A17.

Ongoing exploration works and resultant refinement of the Stage 3 mine plan will be required over the life of the Stage 3 Project. Exploration works will be undertaken so as to avoid significant surface impacts, in accordance with the provisions of the relevant environmental management plans (e.g. cultural heritage and ecology). Further detail regarding planning and managing exploration works is provided in **Section 7**.

3.2 Interactions with Existing and Approved Mining Operations

As described in **Section 2.2.1**, the Stage 3 Project, as approved, will utilise Austar's existing coal handling and processing infrastructure and facilities, known collectively as the Austar Mine Complex. The proposed Stage 3 Modification involves a change to the Stage 3 mine plan only, with no change to the operation of the Austar Mining Complex proposed. The interaction of mining in the Stage 2 and Stage 3 areas in terms of subsidence and other environmental impacts has been previously assessed as a part of the Stage 3 EA (Umwelt 2008a) and the Stage 2 Extension EA (Umwelt 2010a). An assessment of changes to the cumulative impact of Stages 2 and 3 as a result of the proposed Stage 3 modification is set out in **Section 6**.

3.3 Mining Methodology

No change to mining methodology or the rate of extraction is proposed as a part of the Stage 3 Modification. Austar will extract up to 3.6 Mtpa of ROM coal using LTCC technology. Detail regarding the LTCC Mining Methodology is included within **Appendix 4**.

3.3.1 Conceptual Mine Plan

The conceptual mine plan for Stage 3 Modification is shown on **Figure 1.4**, and includes 13 longwalls with a maximum width of 237 metres and a maximum extraction height of 7.3 metres. The Longwalls of the conceptual mine plan (refer to **Figure 1.4**) vary in length between 805 metres (LWA7) and 2955 metres (LWA16). The solid chain pillar between each longwall has been designed to be 55 metres wide. The conceptual geometry of proposed longwalls is provided in **Figure 1.4**.

3.4 Hours of Operation

Underground mining in the Stage 3 area will be a 24 hour, seven day per week operation.

3.5 Modification Timing and Life of Operation

Approval for the modification is sought by November 2011, allowing for mining within the modified Stage 3 area to commence during November 2011 and terminate by 31 December 2030 as per Project Approval 08_0111.

The indicative longwall mining schedule for underground mining in Stage 3 is outlined in **Table 3.1.** It is proposed that longwall mining will commence in 2013 and continue until approximately 2029.

Table 3.1 – Indicative Longwall Mining Schedule

Longwall	Start	Finish
LWA7	January 2013	November 2013
LWA8	November 2013	September 2014
LWA9	September 2014	November 2015
LWA10	November 2015	May 2017
LWA11	May 2017	October 2018
LWA12	October 2018	March 2020
LWA13	March 2020	September 2021
LWA14	September 2021	February 2023
LWA15	February 2023	August 2024
LWA16	August 2024	March 2026
LWA17	March 2026	May 2027
LWA18	May 2027	July 2028
LWA19	July 2028	March 2029

3.6 Employment

Currently approximately 265 people are employed at Austar with the size of the workforce being limited by the fact that the mine cannot operate at full production due to export restrictions at the Port of Newcastle. At full production of 3.6 Mt per year, there will be employment for approximately 275 people in addition to a range of contractors. It is envisaged that the existing equipment and workforce extracting coal from Stage 1 and 2 will be utilised in Stage 3.

4.0 Planning Context

4.1 Commonwealth Legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) has established a national assessment framework based on the principles of ecologically sustainable development. Proposed action, including projects, developments, activities and alterations that are considered likely to have a significant impact on matters protected by and listed under the EPBC Act need approval from the Minister administering the EPBC Act.

Only those actions that are deemed to have significant environmental impact needed to be referred to Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) for assessment. The Project EA process has included assessment of significant impact under the EPBC Act of the following aspects:

- World Heritage properties (not applicable);
- National Heritage properties (not applicable);
- wetlands of international importance (not applicable);
- threatened species and ecological communities (see **Section 6.4**);
- migratory species (see **Section 6.4**);
- Commonwealth marine areas (not applicable); and
- nuclear actions (including uranium mines) (not applicable).

On the basis of the Ecological Assessment undertaken for the Stage 3 Modification, it is considered that the proposed Stage 3 Modification will not have a significant impact on any of the matters of National Environmental Significance listed above. Details of the Ecological Assessment undertaken for the Stage 3 Modification are provided in **Section 6.4**.

4.1.2 Commonwealth Native Title Act 1993

The Commonwealth *Native Title Act 1993* (NT Act) is a set of rights and interests in relation to land or waters that have qualities identified and administered by the National Native Title Tribunal. The Tribunal is responsible for maintaining a National Native Title Register (NNTR) of native title claimants and bodies to whom native title rights have been granted. These native title holders and claimants must be consulted prior to the granting of a mining lease over land to which the native title claim or right applies.

The NT Act prescribes that native title can be extinguished under certain circumstances, including the granting of freehold land. A search of the NNTR was conducted as part of the Stage 3 Modification EA to determine whether land and waterways within the Stage 3 Modification project area may be affected by a native title determination, application or indigenous land use agreement (ILUA).

No native title claims are known to exist over the land or water system within the proposed Stage 3 Modification mining area.

4.2 NSW State Legislation

4.2.1 Environmental Planning and Assessment Act 1979

Planning and development is carried out under the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Environmental Planning and Assessment Regulation 2000. The development assessment system in NSW is set out in Parts 3A, 4 and 5 of the EP&A Act.

The preparation of this EA will address in-force legislation and planning as administered by the NSW Department of Planning and Infrastructure (DP&I).

Implementation of the EP&A Act also ensures an integrated approach to project assessment and approval and ensures stakeholders contribution and ecologically sustainable development with the following objectives:

(a) to encourage:

(i) the proper management, development and conservation of natural and artificial resources,
(ii) the promotion and co-ordination of the orderly and economic use and development of land,
(iii) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and
(iv) ecologically sustainable development, and

(b) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

As outlined in **Table 4.1**, the Project fulfils the EP&A Act objectives.

Table 4.1 – Austar Stage 3 Modification Assessment of EP&A Act Objectives

EP&A Act Objective	Austar Stage 3 Modification Assessment
• encourage the proper management, development and conservation of natural and artificial resources • encourage the promotion and co-ordination of the orderly and economic use and development of land • encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats • encourage ecologically sustainable development	• proposed planning and development for the safe and economic recovery of NSW coal resource; • effective management of the environmental impacts; • ongoing robust implementation of the principles of ecologically sustainable development; and • a series of management plans prior to and resultant from the Stage 3 Modification EA process.

Table 4.1 – Austar Stage 3 Modification Assessment of EP&A Act Objectives (cont)

EP&A Act Objective	Austar Stage 3 Modification Assessment
• to provide increased opportunity for public involvement and participation in environmental planning and assessment	• continuation of a community consultation program; • continuation of a community consultation committee allowing for community involvement opportunities; and • further opportunities established with the public exhibition of the EA, facilitated by DoP.

Austar has been consulting with the community about the Stage 3 Modification Project since 2010. Feedback from this consultation process has provided input into the Environmental Assessment process.

The community consultation program that has been undertaken during the Project has included the following:

- meetings and discussions with individual residents and landholders;
- presentations to the Community Consultative Committee;
- presentations to and consultation with local community groups at a community meeting; and
- distribution of community information.

4.2.1.1 Part 3A Major Projects Assessment

Approval is sought for the proposed Stage 3 Modification as a modification to Project Approval 08_0111, which was granted under Part 3A of the EP&A Act. At present, the operations approved within Project Approval 08_0111 are classified as 'mining' in Schedule 1 of the State Environmental Planning Policy (Major Development) (SEPP) and hence fall under Part 3A of the EP&A Act. The Stage 3 mining area modification is proposed under Section 75W of the EP&A Act. At the time of writing, the NSW State Government had announced the proposed repeal of Part 3A of the EP&A Act, and transitional arrangements have been put into place to deal with existing applications made under Part 3A. It is understood that mining projects which are already in the Part 3A system will continue to be assessed and determined under Part 3A pending its legislative repeal (DP&I, May 2011).

Approvals and Legislation Not Applicable under Part 3A

Should the proposed modification be approved under Part 3A of the EP&A Act, Clause 75U of the EP&A Act applies. **Table 4.2** outlines the authorisations that are not required under Clause 75U.

Table 4.2 – Approvals and Legislation Not Applicable under Part 3A

Act	Approval
Fisheries Management Act 1994	Permit for works or structures within a waterway a permit under section 201, 205 or 219
Heritage Act 1977	Disturbance to an item listed on State Heritage Register or Interim Heritage Order; Excavation permit an approval under Part 4, or an excavation permit under section 139 Division 8 of Part 6 of the *Heritage Act 1977* does not apply to prevent or interfere with the carrying out of an approved project.
National Parks & Wildlife Act 1974	A permit under Section 87 preliminary research permit; Section 90 consent to destroy relics; or Consent under section 90 of the *National Parks and Wildlife Act 1974*.
Water Management Act 2000	Water use approval, water management work approval or activity approval under section 89; Water management work approval under section 90; or Activity approval under section 91 of the *Water Management Act 2000*.
Threatened Species Conservation Act 1995	Licence to harm or pick threatened species, populations or ecological communities or habitat; Actions that are essential for carrying out an approved project provide the same defence to actions relating to harm to native fauna (and threatened species) as a development consent under Part 4, or environmental assessment under Part 5, of this Act provide.

Approvals and Legislation which must be applied consistently under Part 3A

If the proposed modification is approved under Part 3A of the EP&A Act, the required approvals listed in **Table 4.3** must not be refused by the relevant approval authority and must be substantially consistent with the terms of the Project approval.

Table 4.3 – Consistently Applicable (Approvals and Legislation)

Act	Approval	Authority
Mine Subsidence Compensation Act 1961 (Section 15)	Development within Mine Subsidence District	Mine Subsidence Board (MSB)
Mining Act 1992	Mining Lease	Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS)
Protection of the Environment Operations Act 1999	Environmental Protection Licence under Chapter 3 for any of the purposes referred to in section 43 of that Act	Office of Environment and Heritage (OEH)
Roads Act 1993 section 138	Permit to Impact on a Public Road	Cessnock City Council (Local Roads)

4.2.2 Mining Act 1992

The *Mining Act 1992* is administered by DTIRIS on behalf of the Minister for Resources and Energy as a part of a suite of legislative instruments that place controls on methods of exploration and mining, the disposal of mining waste, land rehabilitation and environmental management activities. The principal means of regulation is the requirement for nearly all exploration and mining to be conducted under a title, such as an exploration licence or a mining lease. It also addresses the environmental responsibilities of explorers and miners, royalties and compensation.

A Mining Lease granted under the *Mining Act 1992* entitles the leaseholder to mine coal from a deposit. Austar currently holds a number of mining leases as indicated in **Figure 2.2** and listed in **Appendix 4**. A further two mining lease application areas, MLA 322 and MLA 333 are pending approval by the Minister for Resources and Energy.

4.2.3 Coal Mine Health and Safety Act 2002

The commencement of *the Coal Mine Health and Safety Act 2002* (CMHS Act) and Coal Mine Health and Safety Regulation 2006 (CMHS Regulation) repeals the *Coal Mines Regulation Act 1982*. The development of the CMHS Act and CMHS Regulation provides closer alignment with the *Occupational Health and Safety Act 2000* (OHS Act) and Occupational Health and Safety Regulation 2001.

The principal aim of the CMHS Act is to secure the objectives of the OHS Act in relation to coal operations. It does this by imposing certain specific safety requirements on coal mines. The CMHS Act was amended by the *Coal Mine Health and Safety Amendment Act 2010* following its review in 2009 to more accurately reflect the provisions of the OHS Act within the coal mining industry, and to clarify the boundaries of coal mining operations.

No additional requirements are applicable to the proposed Stage 3 Modification.

4.2.4 Mine Subsidence Compensation Act 1961

Under the *Mine Subsidence Compensation Act 1961* (MSC Act), the approval of the Mine Subsidence Board (MSB) is required for the erection or alteration of improvements within a mine subsidence district. The proposed Stage 3 Modification mining area is currently not a Declared Mine Subsidence District and approval under Section 15 of the *Mine Subsidence Compensation Act 1961* does not currently apply to the proposed Stage 3 Modification. Clause 47 of the Cessnock Local Environment Plan 1989 (LEP) which specifies conditions of development within mine subsidence districts is also not applicable.

In NSW, if a home or other improvement is damaged as a result of subsidence following the extraction of coal, the owner's rights are protected by the MSC Act. Buildings built outside of and prior to the proclamation of a Mine Subsidence District are automatically covered for compensation. However, homes and other structures built in contravention of, or without, the Board's approval in a Mine Subsidence District, are not eligible for compensation in the event of damage due to mine subsidence.

4.2.5 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (PoEO Act) is administered by OEH. The PoEO Act establishes the procedures for issuing licences for environmental protection including waste, air, water and noise pollution control. The owner or occupier of a premise that is engaged in scheduled activities is required to hold an EPL and comply at all times with the conditions of that licence.

Austar currently holds EPL 416 for its operations. The EPL was granted on 7 May 2002, includes aspects of air, water, applications to land and noise pollution and is reviewed annually. The proposed Stage 3 Modification will not require a variation to the existing EPL above and beyond that previously required as a part of the approved Stage 3 Project.

4.2.6 Water Management Act 2000

The *Water Management Act 2000* (WMA) provides for the sustainable and integrated management of the State's water and is administered by the NSW Office of Water. The WMA governs the issue of new water licences, the trade of water licences and allocations for those water sources (rivers, lakes and groundwater) in NSW where water sharing plans have commenced. The WMA repeals a number of legislative instruments including the licensing provisions of the *Water Act 1912* where water sharing plans have commenced, and the *Rivers and Foreshores Improvement Act 1948*.

Gaining approval under Part 3A removes the need to obtain approvals under the WMA, except water access licences. Under the WMA, water access licences entitle a licence holder to a share of the water in a listed water source that can be sustainably extracted. The WMA requires water access licences to be obtained to enable water to be accessed within regulated areas, including both surface and groundwater.

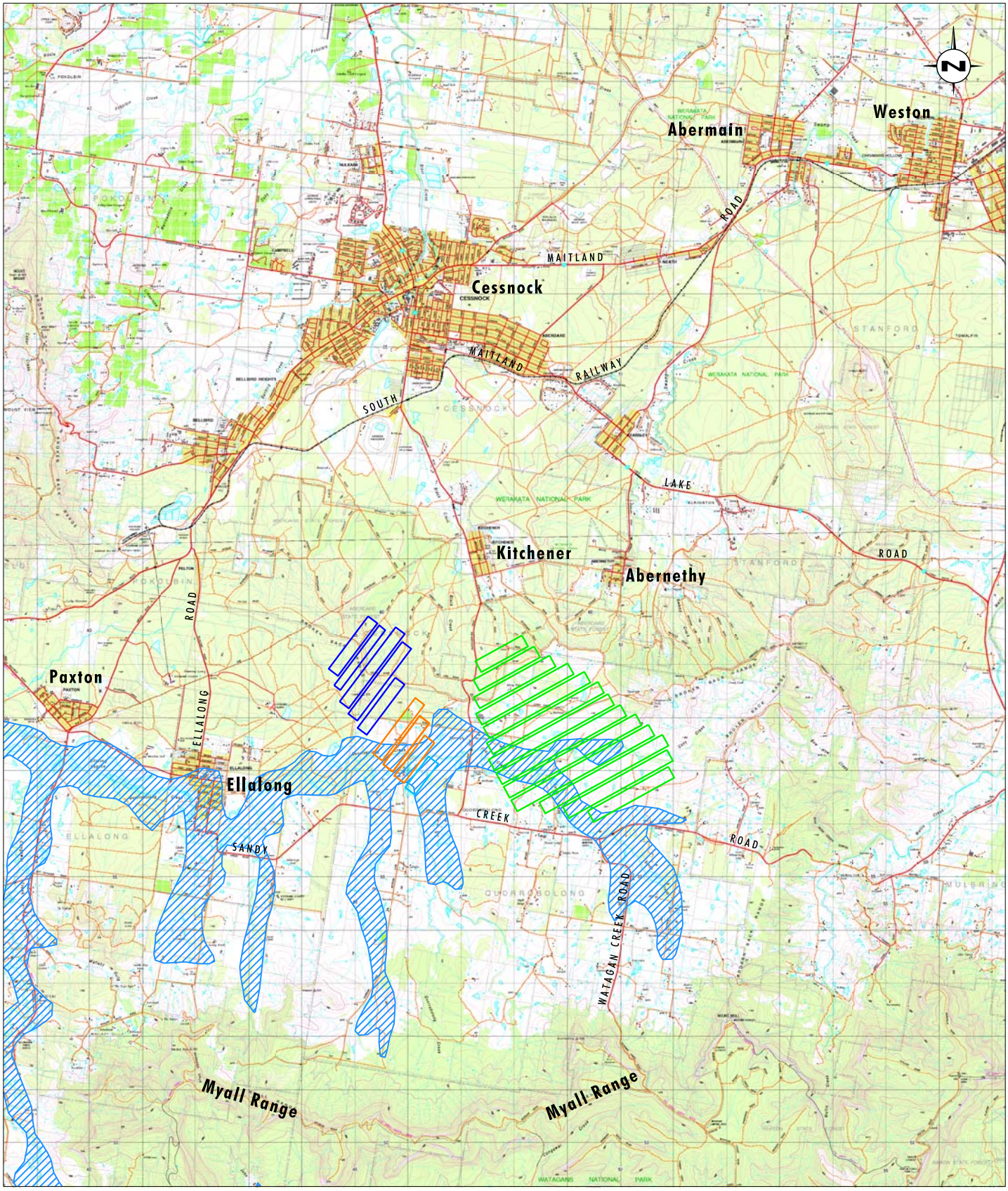
The proposed Stage 3 Modification Area is covered by the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009 (the Water Sharing Plan) which has come into force since the original Stage 3 mine plan was approved. Under the Water Sharing Plan the proposed Stage 3 Modification Area is located in the Congewai Creek management zone of the Upper Wollombi Brook Water Source. The Water Sharing Plan applies to surface water and alluvial groundwater in the proposed Stage 3 Modification Area, but excludes fractured rock aquifers. Licensing for interception of groundwater by mine workings in the proposed Stage 3 Modification Area is regulated under the *Water Act 1912* (refer to **Section 4.2.7**). The zone of alluvium within the proposed Stage 3 Modification Area to which the Water Sharing Plan applies is associated with the Cony and Sandy Creek channels and is shown on **Figure 4.1**. As shown on **Figure 4.1**, there are no registered groundwater extraction bores within the proposed Stage 3 Modification Area.

According to the Report Card for Upper Wollombi Brook Water Source (NSW Department of Water and Energy, August 2009), the hydrological stress rating of the Upper Wollombi Brook Water Source is high, and the risk to instream value from extraction has also been rated as high in recognition of high value features such as Ellalong Lagoon, located approximately 8 kilometres downstream of the proposed Stage 3 Modification Area. As indicated in the City Wide Settlement Strategy, the creekline areas within the proposed Stage 3 Modification Area are vulnerable to groundwater contamination (CCC 2004).

Access to surface water and alluvial groundwater within the proposed Stage 3 Modification Area is not proposed as a part of Stage 3 operations. An assessment of the impact of the proposed Stage 3 Modification on the Upper Wollombi Brook Water Source is provided in **Sections 6.2** and **6.3**. The existing Groundwater Monitoring program for Austar will be modified to include the proposed Stage 3 Modification as discussed in **Section 6.3**.

4.2.7 Water Act 1912

The *Water Act 1912* is administered by the NSW Office of Water, and governs the issue of new water licences and the trade of water licences and allocations in areas where Water Sharing Plans under the WMA have not commenced. The licence is tied to the land as the licence covers both the right to take a specific volume of water as well as the works to be



Source: Topo Maps: LPI NSW, Longwall Layout: Austar Coal Mine

0 1.0 2.0 4km
1:100 000

Legend

- Layout for Stage 1 Longwall Panels
- Layout for Stage 2 Longwall Panels
- Layout for Stage 2 Extension Longwall Panel
- Proposed Stage 3 Modification Longwall Panels
- Upper Wollombi Brook Water Source Alluvium

FIGURE 4.1

Upper Wollombi Brook
Water Source Alluvium

constructed. Most *Water Act 1912* licences for commercial purposes also have to be renewed every five years. A permit under Part 5 of the *Water Act 1912* is required where groundwater is intercepted by mine workings. Austar currently holds a Part 5 permit under the *Water Act 1912*. The permit applies to all of CML2. The Part 5 permit will need to be amended following approval of pending mining lease application areas MLA333 and MLA322 (refer to **Figure 1.1**).

4.2.8 Environmentally Hazardous Chemicals Act 1985

OEH is granted power under the *Environmentally Hazardous Chemicals Act 1985* (EHC Act) to assess and control certain chemicals by making a Chemical Control Order (CCO).

No chemicals or chemical wastes listed under the EHC Act will be required or produced as a result of the Project. Approval will not therefore be required under this Act.

4.2.9 Roads Act 1993

The *Roads Act 1993* in the proposed Stage 3 Modification Area is administered by the RTA, Cessnock City Council or the Department of Lands. The RTA has jurisdiction over major roads, Cessnock City Council over minor roads and the Department of Lands over road reserves or Crown roads. Under Section 138, Part 9, Division 3 of the Act, a person must not (otherwise than with the consent of the appropriate roads authority):

- erect a structure or carry out a work in, or over a public road, or
- dig up or disturb the surface of a public road, or
- remove or interfere with a structure, work or tree on a public road, or
- pump water into a public road from any land adjoining the road, or
- connect a road (whether public or private) to a classified road,

Subsidence remediation works may be necessary along sections of Quorrobolong Road, Sandy Creek Road, Nash Lane and Coney Creek Lane and approval for these works will be required from Cessnock City Council under s138 of the *Roads Act 1993*. The location of subsidence affectation areas is shown in **Figure 1.4**.

Further detail of the subsidence impact on roads within the proposed Stage 3 Modification Area is provided in **Section 6.1.8**.

4.2.10 Crown Lands Act 1999

Crown land is land that is owned and managed by State Government and includes:

- Crown lands held under lease, licence or permit;
- community managed reserves;
- lands retained in public ownership for environmental purposes;
- lands within the Crown public roads network; and
- other unallocated lands.

Crown land may not be occupied, used, sold, leased, dedicated, reserved or otherwise dealt with unless authorised by the *Crown Lands Act 1999* or the *Crown Lands (Continued Tenures) Act 1989*.

The northern portion of the proposed Stage 3 Modification mine plan extends underneath the Werakata State Conservation Area and Crown land. The approval of the Department of Primary Industries – Crown Land may be required for any surface works within these areas.

4.2.11 National Park Estate (Lower Hunter Region Reservations) Act 2006

The northern portion of the proposed Stage 3 Modification mine plan extends underneath the Werakata State Conservation Area listed under the *National Park Estate (Lower Hunter Region Reservations) Act 2006* (NPE Act*).* The NPE Act, which is administered by OEH, facilitates the transfer of certain State forest and Crown lands to the National Park Estate.

Werakata State Conservation Area was previously listed as Aberdare State Forest and is outlined in Schedule 1 of the NPE Act, which lists transfers that have been made from State Forests Reserved as National Park or State Conservation Area. Werakata State Conservation Area is described as:

> 5 Werakata State Conservation Area
>
> An area of about 2,257 hectares, being so much of Aberdare State Forest No 981 as comprises the land designated as 1105-01 on the diagram catalogued Misc R00323 (Edition 1) in the Department of Environment and Conservation, subject to any variations or exceptions noted on that diagram.

As a State Conservation Area (SCA), the land is reserved to protect and conserve significant or representative ecosystems, landforms, natural phenomena or places of cultural significance, while providing opportunities for sustainable visitation, enjoyment, use of buildings and research. The principal difference between the management, objectives and principles of national parks and state conservation areas is that mineral and petroleum exploration and mining may be permitted in SCAs.

The proposed Stage 3 Modification takes into account the objectives of the SCA by reducing potential subsidence impact to the SCA and places of Aboriginal cultural heritage significance from that approved under Project Approval 08_0111. This is further described in **Sections 6.1** and **6.5**.

4.3 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) deal with issues significant to the state of NSW. They are made by the Minister for Planning and Infrastructure and may be exhibited in draft for public comment before gazetted as a legal document.

4.3.1 State Environmental Planning Policy (Major Development) 2005

The Major Development SEPP identifies development to which the development assessment and approval process under Part 3A of the EP&A Act applies. The proposed Stage 3 Modification is classified under clause 5 of Schedule 1 of the Major Development SEPP as development to which Part 3A of the EP&A Act applies as it is 'development for the purpose of mining that is coal or mineral sands mining'. As described in **Section 4.2.1.1**, approval for the proposed Stage 3 Modification is sought as a modification to Project Approval 08_0111 under Part 3A of the EP&A Act.

4.3.2 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP) applies to the proposed Stage 3 Modification development modification. The Mining SEPP consolidates and updates many existing planning provisions related to mining, petroleum and production and extractive industries as well as introducing new provisions to ensure that potential environmental and social impacts are adequately addressed during the assessment and determination of development proposals. The Mining SEPP is aimed at improving the relationship between the *Mining Act 1992* and the EP&A Act in the assessment and approval of mines.

Introduction of the Mining SEPP revoked the provisions that allowed mines to expand without the need for a transparent assessment of their impacts or consent under the EP&A Act once a mining lease had been granted. It is intended that these and other initiatives will lead to improved environmental performance and increased community participation throughout the development assessment and approval process. The Mining SEPP aims to provide for:

- the proper management and development of mining, petroleum production and extractive material resources;
- to facilitate the orderly use and development of areas where the resources are located; and
- to establish appropriate planning controls to encourage sustainable management of these resources.

The Major Development SEPP prevails over the Mining SEPP to the extent of any inconsistency. Any mining that is a major project can only be carried out with Project Approval under Part 3A of the EP&A Act. With regard to coal mining, the Mining SEPP provides that development for the purpose of mining may be carried out only with development consent. The Mining SEPP also defines mining developments that are prohibited, exempt or complying developments. The proposed modifications are not exempt or complying developments and therefore require approval.

4.3.3 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

The State Environmental Planning Policy No. 33 (Hazardous and Offensive Development) provides definitions for 'hazardous industry', 'hazardous storage establishment', 'offensive industry' and 'offensive storage establishment'. The definitions apply to all planning instruments, existing and future. Revised definitions enable decisions to approve or refuse a development to be based on the merit of the proposal.

The Project is not considered hazardous or offensive. A detailed hazard assessment is therefore not required.

4.3.4 State Environmental Planning Policy No. 44 – Koala Habitat Protection

The State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline by:

(a) requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and

(b) encouraging the identification of areas of core koala habitat, and

(c) encouraging the inclusion of areas of core koala habitat in environment protection zones.

While Cessnock Local Government Area (LGA) is listed in Schedule 1 of SEPP 44, no core or peripheral koala habitat has been identified within the Project area (refer to **Section 5.5**). The provisions of SEPP 44 do not apply and a koala plan of management is not required for the Project.

4.3.5 State Environmental Planning Policy No 55-Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) aims to provide a Statewide planning approach to the remediation of contaminated land.

Under SEPP 55, a consent authority must not approve development on land unless the potential contamination issues have been considered. No potential issues of contamination from mining operations have been identified.

The Project will be designed to minimise the risk of contamination. The storage and handling of chemicals will be undertaken in accordance with Australian Standards and OEH guidelines.

A closure and decommissioning strategy, including a contaminated land management strategy will be developed for the decommissioning and closure of the Project in consultation with DTIRIS and in accordance with the Austar MOP. This management strategy will incorporate the investigation, assessment and remediation of any contaminated land and will be included in the MOP if required and submitted to DTIRIS for approval.

4.4 Regional Environmental and Development Plans

4.4.1 Hunter Regional Environmental Plan 1989 (Heritage)

As no items listed within Schedules 1 – 4 of the Hunter Regional Environmental Plan 1989 (Heritage) (HREP) fall within the Stage 3 Modification Project area, the HREP is not applicable.

4.4.2 Hunter-Central Rivers Catchment Action Plan

The Catchment Action Plan (CAP), prepared by the Hunter-Central Rivers Catchment Management Authority, lays out a range of guiding principles for the rehabilitation and sustainable use of the Hunter and Central Rivers catchment areas of which the Stage 3 Modification is a part. These principles have been taken into consideration where appropriate. The guiding principles for mining and extractive industries and how they relate to the proposed Stage 3 Modification Project are listed in **Table 4.4**

Table 4.4 – Guiding Principles of the CAP

Guiding Principles	Comment	Stage 3 Modification EA Section
1. Every precaution should be taken to ensure that surface water flows are not lost or diverted due to subsidence or geological cracking caused by extraction. Where surface water is lost or diverted, offsets or mitigating actions should be provided.	The Flood and Drainage Assessment indicates that the proposed modification will not have a significant impact on the flow regime of the Sandy Creek, Cony Creek and Quorrobolong Creek systems.	7.3, Appendix 7
2. An aquifer's highest beneficial use or an inter-connected groundwater dependent ecosystem's requirements should not be significantly reduced.	Due to the depth of mining and the massive nature of the Branxton Formation there will be negligible impact on all present surface alluvial aquifers and fractured rock aquifers	7.4
3. A water management plan (WMP) should be completed and approved before the commencement of mining operations. This WMP should apply to the full lifespan of the mine including after closure. The WMP would show how mining will be conducted so that water resources are managed sustainably. Development and approval of the WMP should be open and transparent.	The existing Austar Site Water Management Plan will be updated to include the management of water from Stage 3 Modification. Extensive monitoring of groundwater will be implemented as outlined in **Section 6.3**	7.3, 7.4
4. Mining should not occur where the alteration of hydrological regimes adversely impacts significant threatened species habitat and where the impact cannot be managed or offset.	Mining will not result in the alteration of hydrological regimes that adversely impact significant threatened species habitat.	7.3,7.4,7.7 Appendix 8
5. Monitoring should occur throughout the life of a project (planning, operation, and post closure)—i.e. whilst the activity maintains the potential to impact on groundwater, river flows, water quality, river stability or ecosystem health. Environmental monitoring procedures should be open and transparent and reporting to the relevant stakeholders should be part of any extraction activity. Water management audits should be regularly undertaken and results made available to the community.	Subsidence, ecological, surface water and groundwater monitoring will occur and be reported on regularly throughout the life of the project. An Independent Environmental Audit will be conducted every three years. A copy of the Audit report will be given to all relevant stakeholders.	7.1, 7.3, 7.4, 7.7, 7.8, 8.3, 8.4, 8.6, 8.7, 8.9, 8.16, Appendices 7,8,9
6. The CAP should be considered in any decisions about post-mine rehabilitation.	The CAP will be considered in any decisions about post-mine rehabilitation as appropriate.	4.4,
7. Environmental, social and economic factors should be considered in any decisions about post mining land use.	Environmental, social and economic factors will be considered in any decisions about post mining land use.	5.3,
10. Landscape plans (e.g. Mine Synoptic Plans) should be used to guide rehabilitation of the biodiversity values and ecosystem services that can be provided by former mine sites.	Landscape plans will be used, where applicable, to guide rehabilitation and ecosystem services.	5.3,

Table 4.4 – Guiding Principles of the CAP (cont)

Guiding Principles	Comment	Stage 3 Modification EA Section
12. Adequate buffers should be maintained between mining activities and adjacent surface water/alluvial aquifers and to protect significant Aboriginal culture and heritage values where negative impact is likely.	It is anticipated that there will minimal impact on Aboriginal culture and heritage values. All significant sites will be managed according to the Aboriginal Cultural Heritage Management Plan, to be developed in consultation with Aboriginal Stakeholders.	7.5, 7.6, 8.5, Appendix 10
14. Mining should be undertaken so as to minimise the destruction of culture and heritage sites and impacts on culturally significant landscapes.	Mining will be undertaken so as to minimise the destruction of culture and heritage sites and impacts on culturally significant landscapes.	7.5, 7.6, 8.5, Appendix 10
16. Where mining activities significantly impact natural resources, offsets should be considered with the intention of improving or maintaining environmental outcomes.	A biodiversity offset area was included within the approved Stage 3 Project as part of Austar's commitment to ecologically sustainable development. As no natural resources on the surface of impacted lands will be significantly impacted, there is no need for a biodiversity offset as part of the proposed Modification to the Stage 3 longwall alignment.	7.7
17. Off-site impacts of the mining proposal should be considered in the environmental assessment and approval process.	A range of off-site impacts, including socio-economic impacts and water flows have been considered within the EA	Whole document
18. The principles of ecologically sustainable development should be considered in every stage of a mine's operation.	The principles of ecologically sustainable development have been and will continue to be considered in every stage of the mine's operation.	Whole document
19. Cumulative impact of mining should be considered during the approval processes.	The cumulative impact of the Stage 3 Modification is being considered during the approval processes.	7.9

4.4.3 Lower Hunter Regional Strategy 2006

The Lower Hunter Regional Strategy 2006 (LHRS) (DoP 2006a) is a land use planning document that outlines the provision of sufficient, appropriately placed housing and employment land to cater for the Region's predicted growth over the next 25 years. The strategy is based on population growth projections which forecast that there will be an additional 160,000 people in the Region by 2031. These strategic planning documents state that mining will remain a significant element of the economies of both the Lower Hunter and the State. THE LHRS also states that:

> 'where possible, loss of biodiversity will be offset by improvements elsewhere during the life of the Strategy, with existing biodiversity values maintained or improved.'

The proposal is consistent with the LHRS objectives in relation to mining and no loss of biodiversity is anticipated as a result of the Stage 3 modification.

4.4.4 Lower Hunter Regional Conservation Plan 2006

The Lower Hunter Regional Conservation Plan 2006 (LHRCP) (DEC 2006) sets out a 25-year program to direct and drive conservation efforts in the Lower Hunter Valley. It is a partner document to the DoP LHRS that sets out the full range of Government planning priorities, and identifies the proposed areas for growth. The primary objectives of the Regional Conservation Plan (RCP) are to complement the Government's Planning Strategy by:

- describing the conservation values of the Lower Hunter region analysing the current status of biodiversity within the region, and assessing the likely impacts of development identified in the Lower Hunter Regional Strategy (LHRS);
- assessing the biodiversity values of the region, at a landscape scale, and identifying strategic areas for biodiversity protection, enhancement or restoration;
- contributing to a practical framework that can secure, maintain and improve biodiversity values as the Hunter grows over the next 25 years; and
- guiding local level planning with respect to biodiversity, including the development of local biodiversity conservation strategies and the development of new Local Environmental Plans (LEP) that can merit biodiversity certification.

Mining is not listed as one of the Future Threats to Biodiversity in the Lower Hunter however two elements and reserve establishment of the LHRCP apply to the management and operational considerations of the Project. They include (refer to **Figure 4.2**):

1. a large addition of reserved land adjacent to Werakata National Park near Cessnock (2200 hectares) – the gazetted Werakata State Conservation Area (SCA), formerly part of the Aberdare State Forest – which has significantly expanded the existing area of reserve and conserves significant areas of endangered ecological communities (EECs) including Lower Hunter Spotted Gum, Ironbark and Forest Red Gum; and

2. establishment of the Ellalong Lagoon Conservation Area (430 hectares) to the east of Paxton, which contains important freshwater wetland communities to protect further EECs including habitat for the green and golden bell frog.

The formal conservation management status of Ellalong Lagoon has also been considered in discussions of potential mine impacts on downstream water quality (refer to **Section 5.4**).

4.5 Local Environmental and Development Plans

4.5.1 Draft Cessnock Local Environment Plan 2010

The Draft Cessnock Local Environment Plan 2010 (LEP) aims to supersede the current and operational Cessnock Local Environment Plan 1989 (LEP).

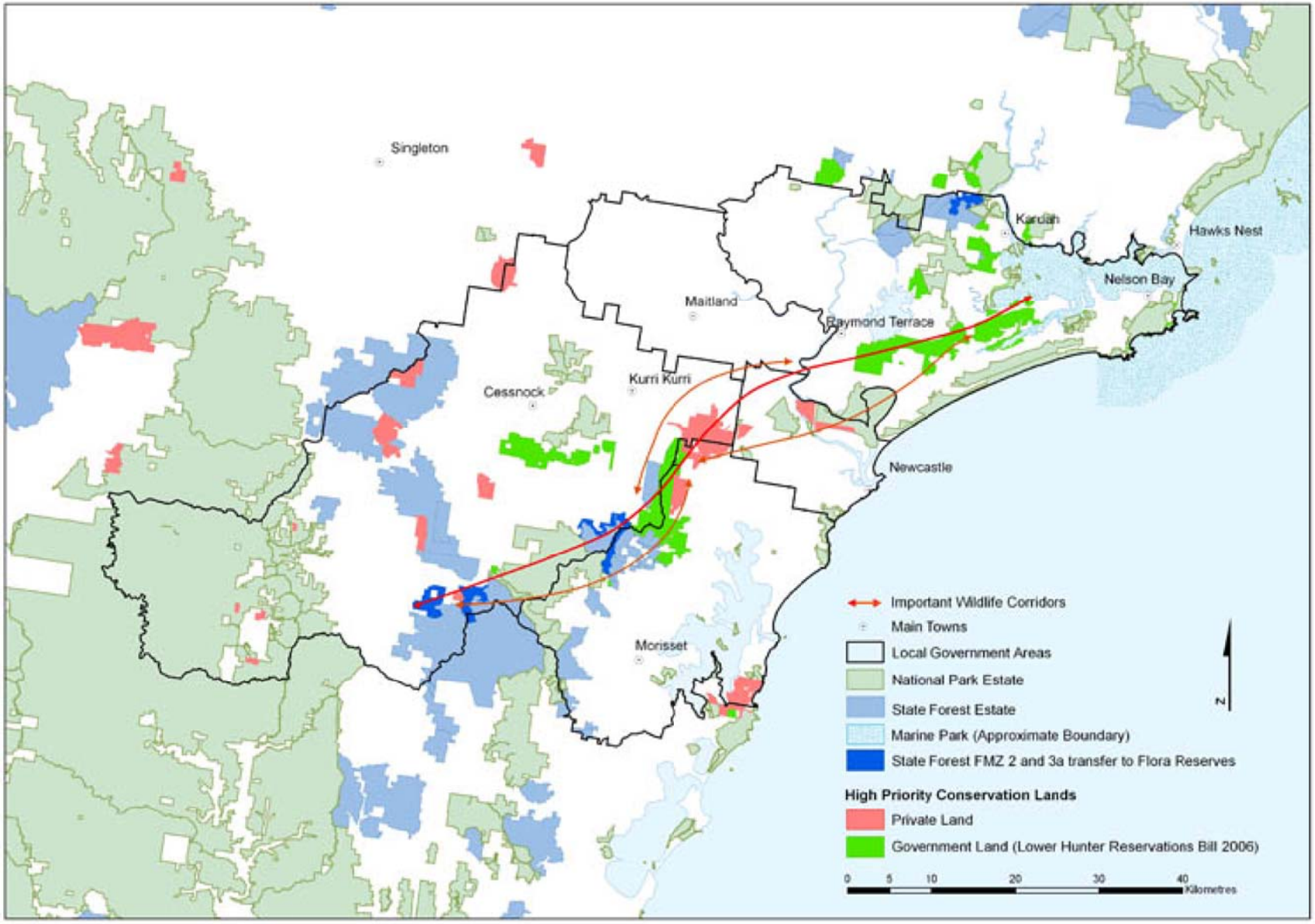


FIGURE 4.2

Reserves for Lower Hunter Region

Source: Department of Environment and Conservation NSW (2006)

File Name (A4): R64_V1/2274_951.dgn

As previously outlined, this EA addresses in-force legislation and planning as part of the assessment process. The proposed Stage 3 Modification is consistent with the aims of the Draft LEP 2010, which are:

(a) to strengthen and protect a high quality, sustainable lifestyle for the Cessnock local government area's residents and visitors;

(b) to conserve and enhance, for current and future generations, the ecological integrity, environmental heritage and environmental significance of the Cessnock local government area;

(c) to encourage development for employment and housing purposes in appropriate locations having regard to proximity to appropriate infrastructure, to ensure efficient use of land and services, to provide walk-able urban environments and to reduce dependency on the use of private vehicles;

(d) to provide opportunities for a range of new housing and housing choice in locations that have good access to public transport, community facilities and services, retail and commercial services and employment opportunities, including opportunities for the provision of adaptable and affordable housing; and

(e) to recognise and protect the historical, cultural and economic values of the vineyards district in terms of agricultural production and associated flow on effects, including tourism.

It is noted that the Werakata State Conservation Area is proposed to be zoned E1 – National Parks and Nature Reserves under the Draft Cessnock LEP. The objectives of this zone are to enable the management of land reserved under the *National Parks and Wildlife Act 1974* (NPW Act) in a manner consistent with that Act. The existing Project Approval 08_0111 is consistent with the objectives of Zone E1, as the provisions of the *Mining Act 1992* apply under Section 47J of the NPW Act.

4.5.2 Cessnock Local Environment Plan 1989

The Cessnock Local Environment Plan 1989 is one of the current planning instruments applicable to proposed Stage 3 Modification in the Cessnock LGA. As specified on the LEP Zoning Map for an earlier draft of the Draft Cessnock Local Environment Plan 2010 that indicates the current zonings from which those displayed have been derived (refer to **Figure 4.3**), Stage 3 Modification and integrated Austar land is currently zoned:

1. Zone No 1(a) Rural 'A' Zone; and

2. Zone No 1 (f) Rural (Forestry) Zone.

The proposed Stage 3 Modification operations are consistent with the zoning references and requirements in each of the stated zones. Mining and operations are permissible with development consent in each of these zones. The operations of the proposed Stage 3 Modification development are consistent with the objectives of each of these zones as outlined below:

Zone No 1 (a) Rural "A" Zone

The stated objectives of this zone are:

(a) to enable the continuation of existing forms of agricultural land use and occupation;

(b) to ensure that potentially productive land is not withdrawn from production;

(c) to encourage new forms of agricultural land use;

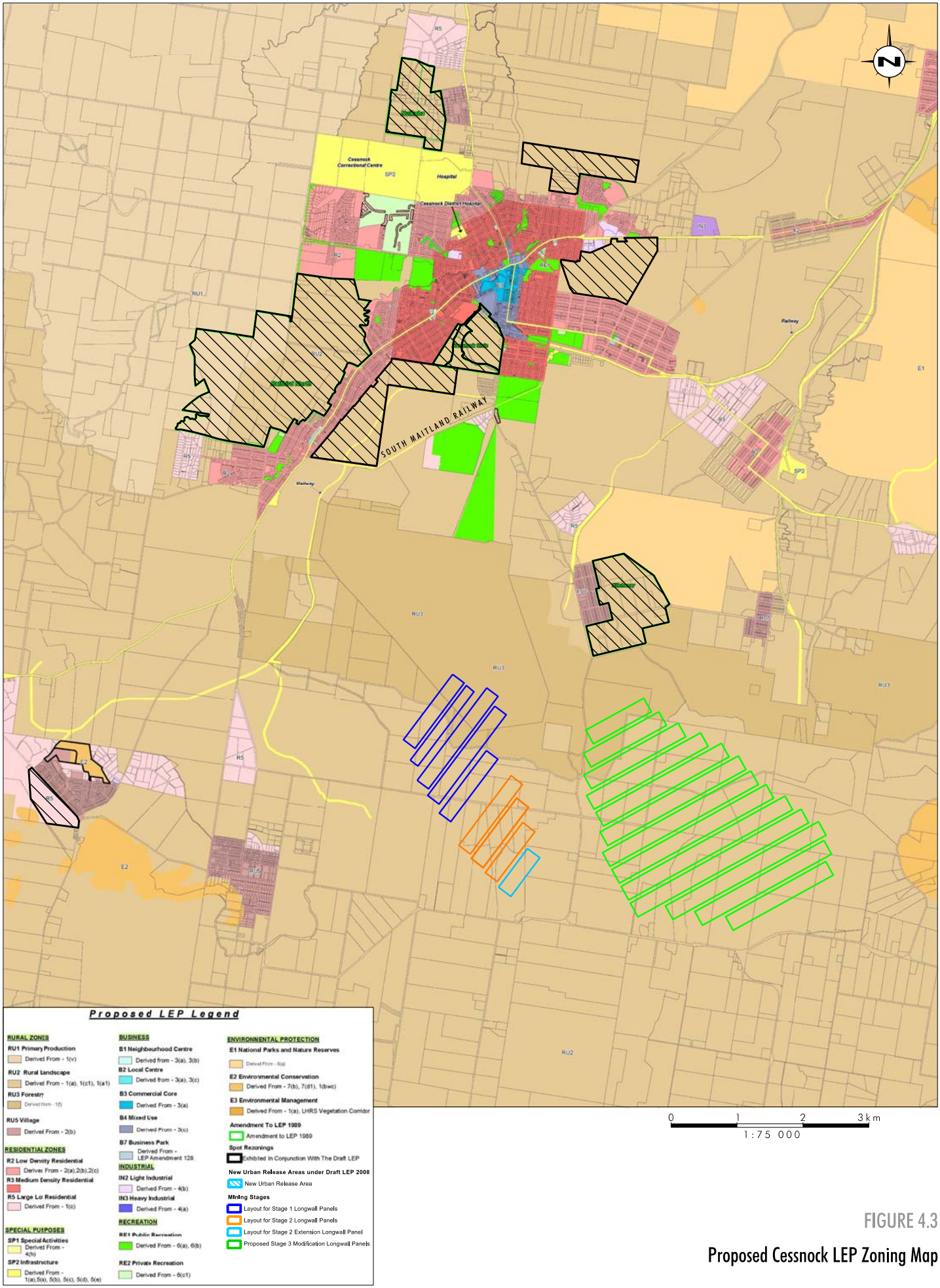


FIGURE 4.3

Proposed Cessnock LEP Zoning Map

Source: Cessnock City Council, 2007

File Name (A4): R64_V1/2274_952.dgn

(d) to enable other forms of development which are associated with rural activity and which require an isolated location, or which support tourism and recreation, and

(e) to ensure that the type and intensity of development is appropriate in relation to:

(i) the rural capability and suitability of the land;
(ii) the preservation of the agricultural, mineral and extractive production potential of the land;

(iii) the rural environment (including scenic resources); and

(iv) the costs of providing public services and amenities.

Zone No 1 (f) Rural (Forestry) Zone

The stated objective of this zone is to recognise and protect the renewable resources of State and private forests and their ancillary recreational functions.

4.5.3 Cessnock Development Control Plan 2006

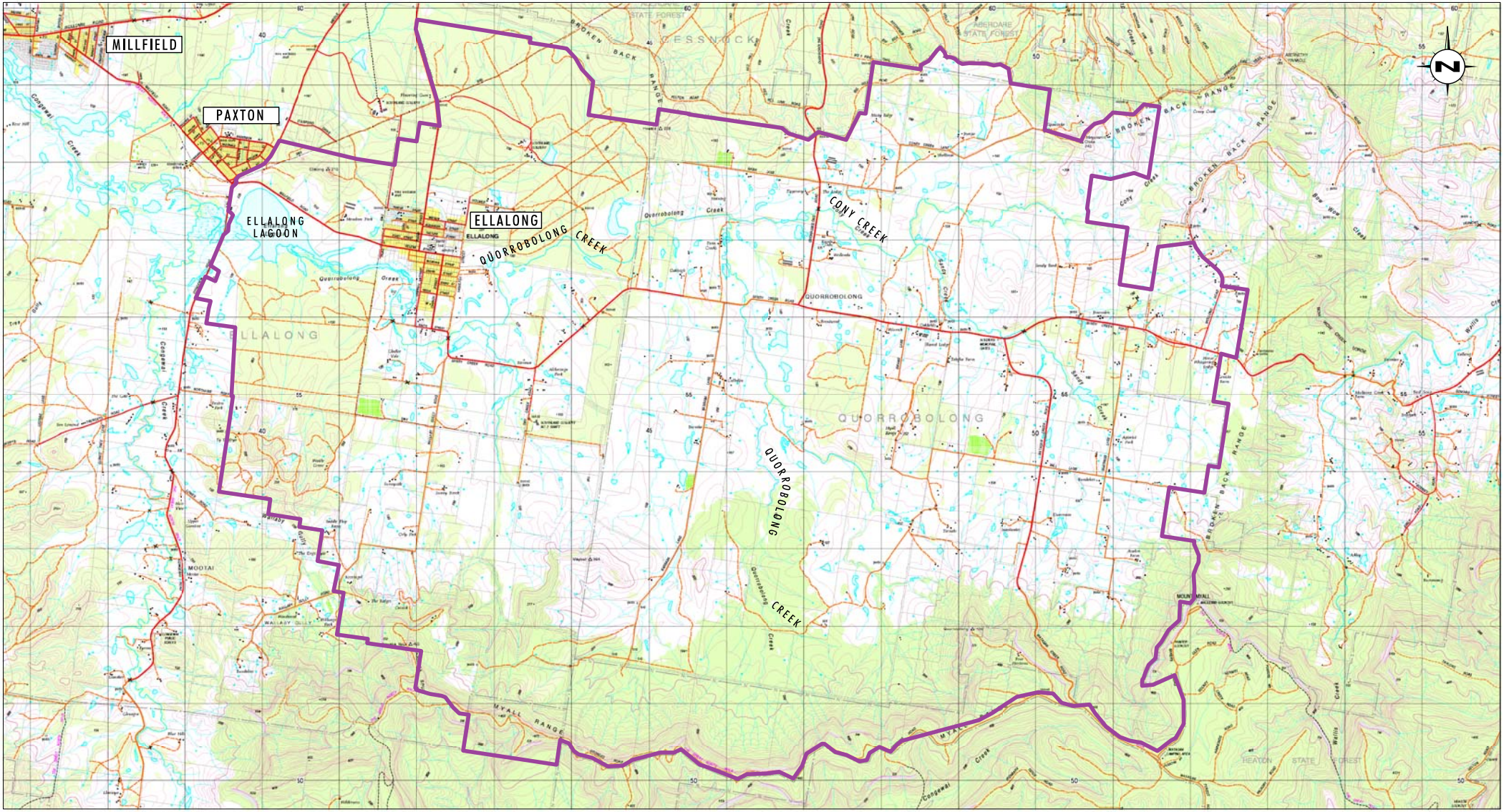
The Cessnock Development Control Plan 2006 (DCP) complements the statutory provisions contained in the Cessnock LEP 1989 (LEP) by providing detailed guidelines for development within the Cessnock LGA. The current DCP replaces a number of existing Development Control Plans as required to comply with Section 74C of the *Environmental Planning and Assessment Act 1979*, as amended. The aims of the DCP are:

- to provide a detailed planning document that outlines requirements for development which meets community expectations and addresses the key environmental planning issues of the Local Government Area;
- to identify exempt and complying development provisions in accordance with sections 76 & 76A of the EP&A Act and Clause 10A in the Cessnock LEP 1989;
- to identify certain development as advertised development and to detail public notification requirements in accordance with Section 74C of the EP&A Act;
- to promote a more simplistic framework for dealing with Development Applications (DAs) consistent with the amended requirements of the EP&A Act;
- to encourage and assist effective community participation in the decision-making process;
- to provide a more accessible and understandable set of guidelines to the general public; and
- to apply common or consistent requirements and procedures in the assessment of all applications.

4.5.3.1 E1- Ellalong Lagoon Catchment Area

The DCP is specifically applicable to the proposed Stage 3 Modification due to the Project's proximity to the Ellalong Lagoon Catchment Area (E1). The Area is identified as E1, as referenced in the DCP 2006, Part E – Specific Areas (refer to **Figure 4.4**). The Part E – Specific Areas was incorporated into the DCP in March 2007. The objectives of E1 include:

(a) to ensure that the water quality of Ellalong Lagoon, which is already under stress, does not deteriorate further;



Source: Topo Maps: LPI NSW

0 1 2 3 km
1:70 000

Legend

Ellalong Lagoon Catchment Management Area

FIGURE 4.4

Ellalong Lagoon
Catchment Management Area

(b) to guide subdivision of land to ensure that allotments created meet the objectives of this plan;

(c) to control the erection of dwellings and dual occupancy developments to ensure that they are appropriately sited to take account of on-site constraints;

(d) to reduce nutrient load entering Ellalong Lagoon by ensuring that effluent from residential and rural areas is adequately contained and treated where necessary;

(e) to reduce sediment transfer through adequate control over clearing of land and development works;

(f) to ensure that new developments are not adversely affected by flooding nor exacerbate existing flood levels; and

(g) to promote the use of land within Rural 1(a) zoning for agricultural purposes, whilst ensuring that a high standard of environmental management is incorporated into existing and future developments.

Of particular reference to Austar are the following components of E1:

Flooding

a) Planning Principles

- To ensure that natural systems which retard and control flooding frequency and severity are not destroyed.

Analysis for the flood study for the Stage 3 Modification project as provided in **Section 6.2** indicates that the proposed Stage 3 Modification will not have a significant impact on the flooding characteristics of the affected area. The proposed Stage 3 Modification addresses the objectives of the relevant components of the DCP.

4.5.4 Cessnock City Wide Settlement Strategy 2004

The Cessnock City Wide Settlement Strategy 2004 (CWSS) (CCC 2004) seeks to address the competing interests that Council must consider when determining the appropriate land use or density for settlement opportunities and follows the principles of ecologically sustainable development. The CWSS indicates that the mining of coal has long been one of the driving forces behind the economies of many of the Lower Hunter LGAs, including Cessnock.

The Wollombi Brook Catchment details in the CWSS and mapping indicates that the Wollombi Brook Catchment is classified as having very high to high groundwater vulnerability along its creek banks and a moderately high rating elsewhere. These Wollombi creekline areas are vulnerable to groundwater contamination.

Commitment was made in the City Management Plan 2010-2013 (CCC 2010) to adopt the Draft Cessnock City Wide Settlement Strategy 2009 by December 2010, although this has yet to occur. Changes to the Cessnock City Wide Settlement Strategy 2004 include:

- updated statistical data,
- ensuring consistency with other legislation, and
- incorporating the Residential & Environmental and Commercial & Industrial into a single document.

4.5.5 Cessnock Social and Community Plan

The Cessnock Social and Community Plan 2009–2014 (CSCP) has been prepared by Cessnock City Council in partnership with a number of stakeholders within the community and community services centre. The CSCP identifies a range of needs within the Cessnock LGA community and proposes actions and strategies which aim to address the needs identified.

As stated in **Section 3.6** the Project will continue to employ ongoing 265 and up to 275 employees for the life of the mine. The proposed Stage 3 Modification will ensure long-term employment opportunities are available to the local community.

5.0 Environmental Context

This section provides the environmental context for the Stage 3 Modification. It describes the key climate, landform and land use characteristics of the land in proximity to the proposed underground mining area in **Sections 5.1** to **5.3**. An environmental risk assessment analysing the risk of significant environmental impact as a result of the Stage 3 Modification taking into account the environmental context is set out in **Section 6**. **Section 6** also sets out the key community issues raised during the consultation process for the Stage 3 Modification. A detailed impact assessment for key environmental aspects identified in the environmental risk assessment is set out in **Section 7**.

5.1 Climate and Meteorology

The climate of the Lower Hunter Valley is described as warm temperate. The region is characterised by seasonal variations from hot wet summers to mild dry winters. The average temperature range is between minus 4.2 to 44.9 degrees Celsius and the highest mean 9 am windspeed is 13.9 kilometres per hour (BoM 2007).

Rainfall in the region is summer dominant, often presenting as high intensity storms. The entire region receives an average of 750 to 950 millimetres of rain per annum. Cessnock receives approximately 750 millimetres of rain per year, which on average falls on 66 days of the year (BoM 2007).

Analysis of historical daily rainfall data (Umwelt 2008b) indicates that major storm events have occurred in the region in 1927, 1930, 1949, 1990 and 2007. Each of these storm events have typically resulted in overland flow flooding and backwater flooding within the Austar Mine Complex. In the 1990 storm event, for example, 311 millimetres fell in 48 hours at Mulbring and 296 millimetres fell at Congewai, the two closest stations near Quorrobolong at the time.

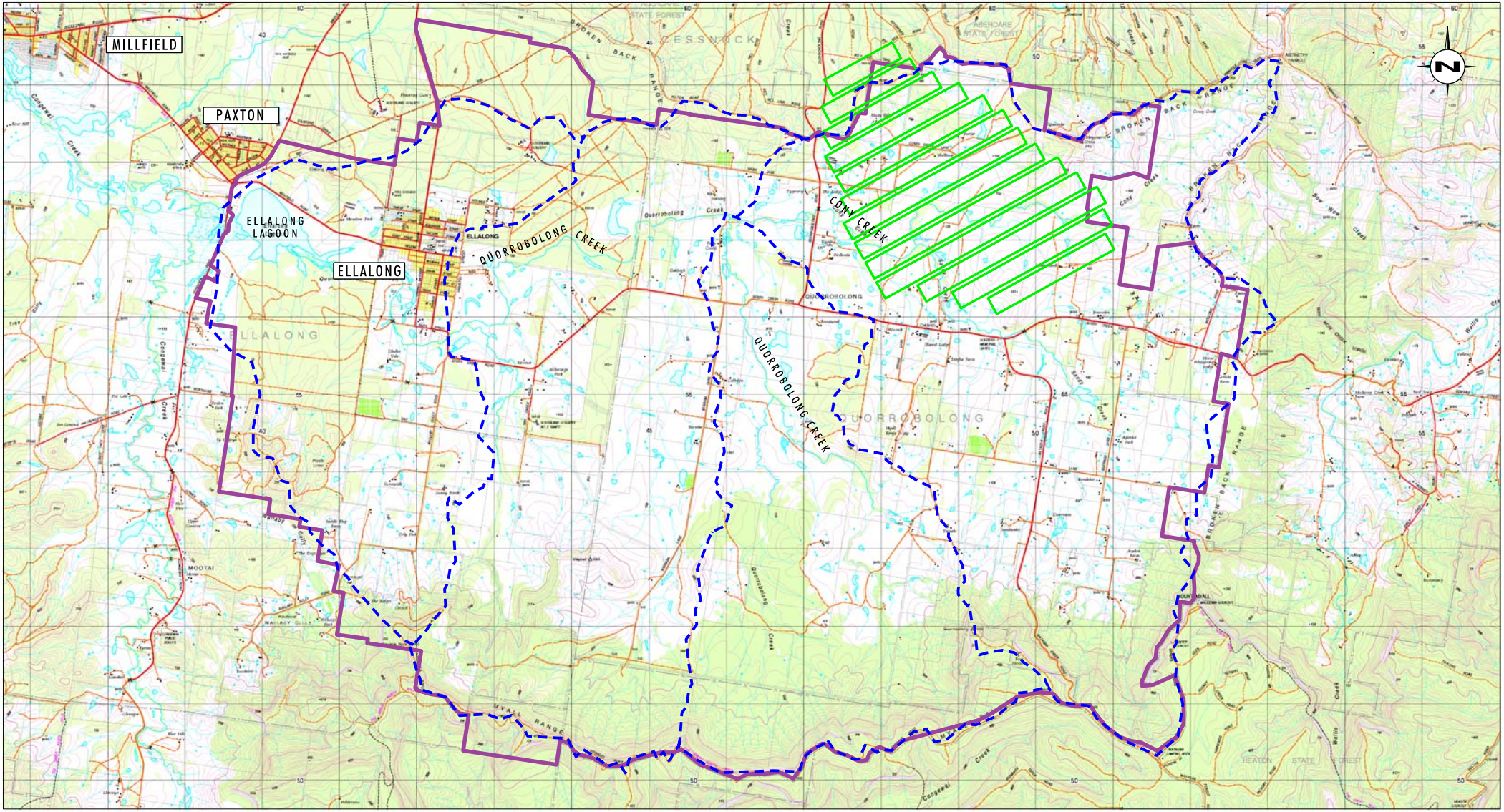
Since April 2007, Austar has operated a meteorological station at the Austar CHPP that records rainfall at 10 to 15 minute intervals as well as wind speed and direction. Over the June 2007 long weekend (8 and 9 June) 255 millimetres of rainfall was recorded and was the equivalent of a 60 year Average Recurrence Interval (ARI) 36 hour event and 115 year Average Recurrence Interval rainfall 24 hour event. To assist in providing certainty in regard to predicted outcomes, this event was used as part of the flooding assessment that was undertaken for the proposed Stage 3 Modification which is discussed further in **Section 7.3**.

5.2 Existing Landform Characteristics

5.2.1 Topography and Drainage

The morphology of the area surrounding Austar Mine Complex includes Broken Back Range (see **Figure 1.1**); the alluvial flats landforms of Black Creek, Bellbird Creek, Cony, Sandy Creek and Quorrobolong Creek systems and the intervening, undulating lands. Catchment boundaries in the vicinity of the proposed Stage 3 Modification Area are shown on **Figure 5.1**.

The majority of the proposed Stage 3 Modification mining area is located immediately to the south of Broken Back Range which is a major landform extending from west of Pokolbin to Mulbring. Broken Back Range has a maximum elevation adjacent to the Stage 3 Modification mining area of RL 236 metres. This unit is characterised by the steep slopes,



Source: Topo Maps: LPI NSW, Longwall Layout: Austar Coal Mine

0 1 2 3 km
1:70 000

Legend

- Proposed Stage 3 Modification Longwall Panels
- Catchment Boundary
- Ellalong Lagoon Catchment Management Area

FIGURE 5.1

Proposed Stage 3 Modification Catchment Boundaries

File Name (A4): R64_V1/2274_983.dgn

narrow ridges and deep gullies. The majority of the Broken Back Range landform in the vicinity of the Austar Mine Complex is within the boundary of the Werakata State Conservation Area.

The majority of the proposed Stage 3 Modification Area drains to Congewai Creek catchment which is bounded by the Watagan Mountains in the south, Broken Back Range in the north and west and Black and Wallis/Swamp Creek catchments to the east. Water flows west out of the catchment via Quorrobolong Creek system which drains to Ellalong Lagoon from where it flows into Congewai Creek, Wollombi Brook and subsequently the Hunter River.

The Lagoon is situated immediately to the south of the townships of Ellalong and Paxton and is conserved as the 530 hectare Ellalong Lagoon Conservation Area. A large area of endangered Hunter Lowland Red Gum Forest and small areas of River-flat Eucalypt Forest on coastal floodplain will be protected. The Lagoon itself supports a population of green and golden bell-frogs (CCC 2004). Potential impacts on Ellalong Lagoon have been previously raised as an issue during consultation relating to underground mining at Austar and were taken into consideration as part of flooding and water management in **Section 7.3**.

5.2.2 Cony Creek and Sandy Creek Catchments

The Stage 3 Modification underground mining area is located on the south facing gentle lower slopes of the Broken Back Range and includes the Sandy Creek and Cony Creek drainage system and associated flats and footslopes. Most of the central and southern portions of the proposed Stage 3 Modification mining area are located under undulating hillslopes, which extend from the Broken Back Range to the alluvial landforms of the Cony and Sandy Creek systems.

The Cony and Sandy Creek system hillslopes have an average gradient of between 1% and 5%. The eastern slopes of the Broken Back Range and the southern crest near Sandy Creek Road have slopes extending up to 18%. The hillslopes are up to 500 metres wide, and elevation in this unit ranges between 130 and 200 mAHD.

Numerous tributaries of the Cony Creek and Sandy Creek systems occur within the proposed Stage 3 Modification Area. The combined length of these streams equal approximately 53 kilometres, and occur as first order (20.5 kilometres), second order (10.5 kilometres), third order (5.2 kilometres), fourth order streams (6.3 kilometres) and fifth order streams (1.8 kilometres). First and second order streams do not have associated alluvial flats, but alluvial flats and floodplains do occur along sections of third, fourth and fifth order streams. Flats of up to 500 metres in width extend from both Cony and Sandy Creeks. The majority of all creeks within the proposed Stage 3 Modification Area have been dammed at least once along their length.

Cony Creek flows from east (headwaters) to west above the modified longwalls where it joins Quorrobolong Creek approximately 2 kilometres west of LWA12. The creek channel is typically approximately four metres wide, with steep banks up to two metres in height.

Sandy Creek originates to the south of the proposed Stage 3 Modification mining area in the slopes of the Myall Range. This creek joins Cony Creek at the south-western edge of the Stage 3 Modification mining area. The channel is approximately two to three metres wide with steep banks that are typically one to two metres high.

Potential impacts of the proposed Stage 3 Modification underground mining on the Cony Creek and Sandy Creek systems are discussed in **Sections 7.1.14** and **7.3**.

5.2.3 Black Creek Catchment

The Black Creek Catchment is bounded to the south by Broken Back Range, Wallis/Swamp Creek Catchment to the east and the LGA boundary to the north. Black Creek flows in a northerly direction through Cessnock to Branxton before joining the Hunter River.

The Black Creek system is classified as being very highly saline and consequently unsuitable for irrigation, stock watering, potable supply and for the maintenance of aquatic ecosystems (ANZECC 1992 in CCC 2004). The presence of faecal contamination also renders Black Creek unsuitable for potable supply (NHMRC 1987 in CCC 2004) but acceptable for recreational and agricultural uses (ANZECC 1992 in CCC 2004). Overall the Black Creek catchment is generally regarded as a degraded catchment suffering from saline water ingress and subsequent adverse effects to the due to extraction for irrigation and stock watering (CCC 2004).

5.2.4 Regional Groundwater Resources

The regional groundwater resources in the area surrounding the Austar Mine Complex comprise:

1. Alluvial aquifers

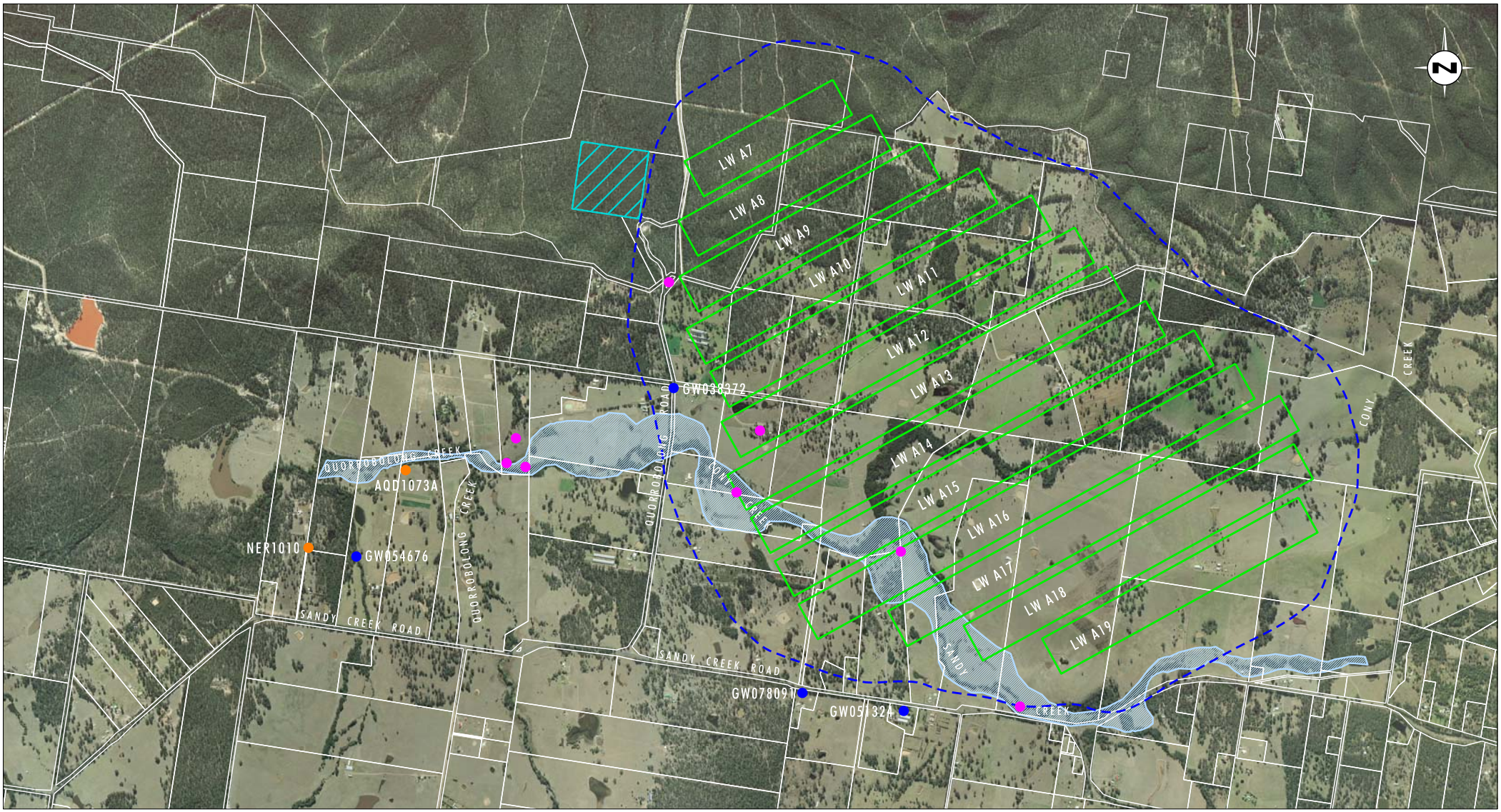
   Quorrobolong Creek, Sandy Creek and Cony Creek each have alluvial sediment deposits. The groundwater in the alluvium is derived largely from infiltration of rainfall and runoff, although some is derived from lateral infiltration during high flows in the adjacent creeks. There is negligible utilisation of the alluvial groundwater in the area principally due to low yields and high salinity. There are no registered groundwater bores within the proposed Stage 3 Modification mining area, however there are several bores in the surrounding area as shown on **Figure 5.2**.

2. Fractured rock aquifers (including coal seam aquifers)

   The Permian strata overlying the coal measures in the Newcastle Coalfield generally have very low permeabilities ($<10^{-8}$ m/s). There are occasional layers that have a slightly higher permeability and represent relative aquifers. Discontinuities in this water bearing strata are termed fractured rock aquifers. Flows are often small in these zones, and water quality is generally poor and suitable only for stock use. Fractured rock strata in the vicinity of Austar Mine Complex include the Branxton Formation and the Greta Coal Measures.

3. Abandoned coal mines

   The local groundwater regime in the vicinity of the Austar Mine Complex is heavily influenced by historic mine workings. Abandoned collieries adjacent to the Austar mine such as Pelton, Bellbird, Kalingo, Aberdare Central and Aberdare East (see **Figure 2.1**) are partially filled with groundwater that typically has very low pH, high conductivity and high iron and sulphate levels. These abandoned workings are filled by normal groundwater percolation through fractured rock and through infiltration via interconnected cracking in areas where shallow workings exist. Fine tailings from Pelton CHPP and mine water from the Austar Coal Mine are also discharged into Pelton and Bellbird collieries in accordance with the Austar Site Water Management Plan (Austar 2009).



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW, Aerial Photography: AAM Hatch 2006, Alluvial: Connell Wagner

0 0.5 1 1.5km
1:32 000

Legend

- Proposed Stage 3 Modification Longwall Panels
- 20mm Subsidence Contour for Proposed Stage 3 Modification
- Approved Surface Infrastructure Site
- Alluvial Area
- Groundwater Bore Locations
- Proposed Groundwater Monitoring Sites (Stage 2 and Stage 3)
- Existing Austar Monitoring Locations

FIGURE 5.2

Extent of Alluvium

As stated, the quality of water contained in the abandoned mine workings is extremely poor. This is evidenced by the groundwater quality data obtained for water entering the mine through the coal barriers between the abandoned mines and the Austar workings.

A detailed assessment of the characteristics and potential impacts of the proposed Stage 3 Modification underground mining on the groundwater resources is provided in **Section 7.4**.

5.2.5 Geology and Soils

Geology

Austar is located in the South Maitland Coalfield of the Maitland Group which forms part of the Newcastle Coalfields. The mid Permian Age Greta Coal Measures outcrop around the Lochinvar Anticline, which is the dominant structural feature in the Cessnock area. Austar Mine Complex is located on the nose of the Anticline. Coal in the Stage 3 Modification Area will be sourced from the Greta Seam at depths of approximately 440 to 750 metres below the surface (see **Figure 5.3**). The Seam is the main economic coal seam in the Greta Coal Measures (Connell Wagner 2007).

The Greta Seam is overlain by the Branxton Formation, which comprises a series of interbedded sandstone and siltstone layers up to 20 metres thick. The Pelton Seam, which is less than 0.5 metres thick, lies at the top of the Branxton Formation and forms the upper limit of the Greta Coal Measures (Connell Wagner 2007).

Four geological units are present in the area surrounding the proposed Stage 3 Modification Area (see **Figure 5.4**). The geological units include:

1. Branxton Formation

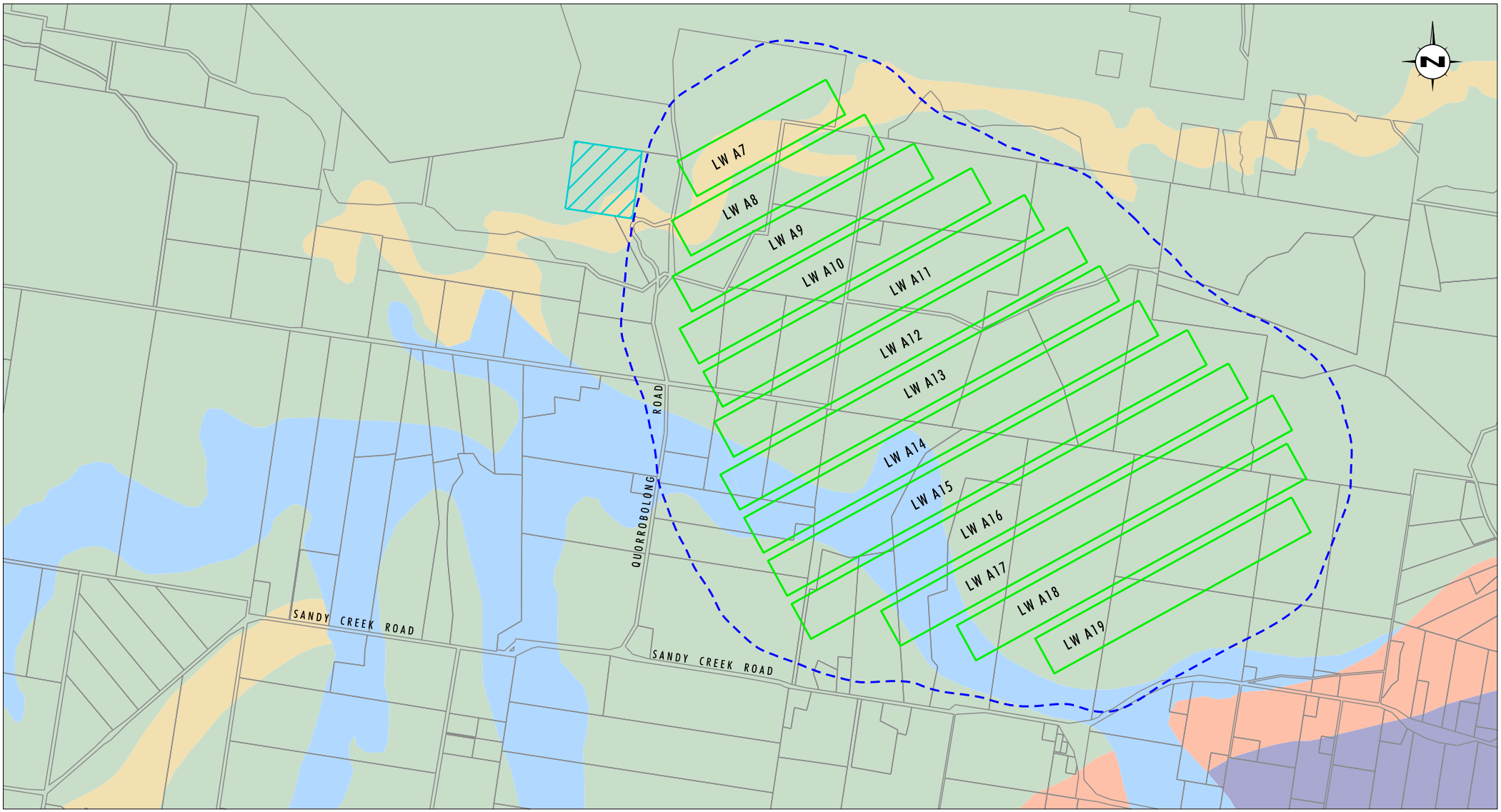
   The Formation overlies the Greta Coal Measures and extends to the ground surface. The Formation is prevalent across most of the proposed Stage 3 Modification underground mining area with small exclusions including linear belts of Fenestella Shale in the north, undifferentiated alluvium along Cony Creek and Sandy Creeks and Muree Sandstone in the south. Maximum thickness in this region is of the order of 1300 metres, and comprises sandstone and conglomerate towards the base, with silty sandstone becoming more common towards the top. The rock is generally strong and massive, with few bedding plane partings. The thickness and strength of this formation is such that it can span significant distances when undermined and as a result it effectively acts as a beam above the mining goaf supporting the overlying strata. Characteristics of the Branxton Formation and its response to predicted subsidence impacts are discussed further in **Section 7.1**.

2. Fenestella Shale

   Fenestella Shale consists of fine to coarse grained sandstone, conglomerate and clay and occurs in a narrow band, no greater than 380 metres wide in the northern part of the proposed Stage 3 Modification underground mining area. The landscape above this band of Fenestella Shale is contained within the Werakata State Conservation Area, and consists of steep slopes with intermittent gullies.

3. Undifferentiated alluvium

   The undifferentiated alluvium is confined to the alignment of Sandy Creek and the alignment of the Cony Creek system to the west of its junction with Sandy Creek. The alluvium contains sand, silt, clay, gravel, residual and colluvial deposits, channel, levee, lacustrine, floodplain and swamp deposits. Tertiary terraces may also be present.



Source: Cadastre: LPI NSW, Geology: Mineral Resources 2003, Longwall Layout: Austar Coal Mine

0 0.5 1 1.5km
1:32 000

Legend

- Proposed Stage 3 Modification Longwall Panels
- 20mm Subsidence Contour for Proposed Stage 3 Modification
- Approved Surface Infrastructure Site
- Branxton Formation (Conglomerate, sandstone, siltstone)
- Fenestella Shale (Conglomerate, sandstone, siltstone)
- Undifferentiated alluvial deposits; sand, silt, clay and gravel; some residual and colluvial deposits. Includes some channel, levee, lacustrine, floodplain and swamp deposits. May include some higher level Tertiary terraces
- Mulbring Siltstone (Siltstone, claystone, minor fine-grained sandstone)
- Muree Sandstone (Fine to coarse-grained sandstone, conglomerate, minor clay)

FIGURE 5.3

Geological Map

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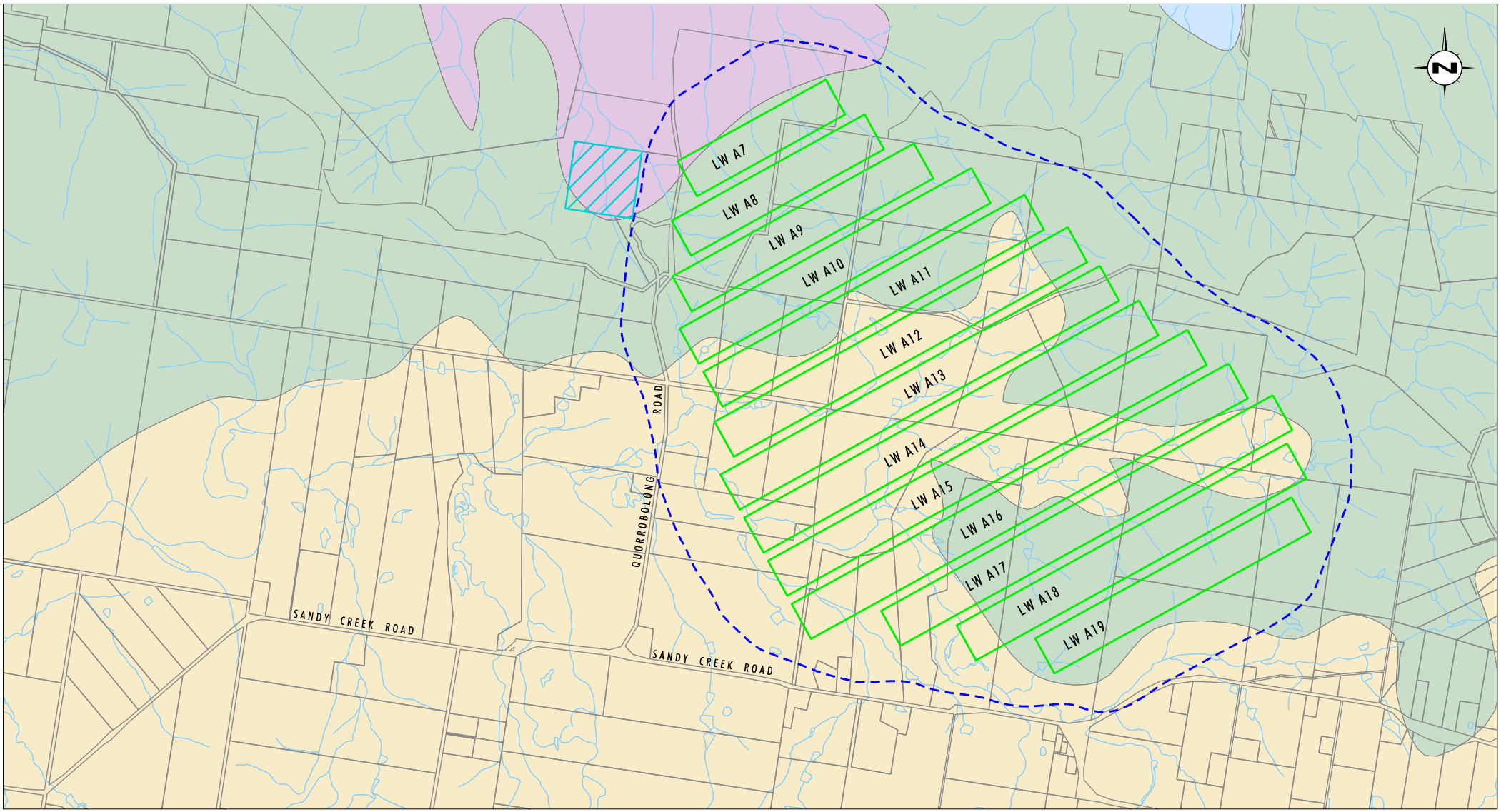


Source: Cadastre: LPI NSW, Soils: Department of Natural Resources 2005, Longwall Layouts: Austar Coal Mine

0 0.5 1 1.5km
1:32 000

Legend

- Proposed Stage 3 Modification Longwall Panels
- 20mm Subsidence Contour for Proposed Stage 3 Modification
- Approved Surface Infrastructure Site
- Quorrobolong Soil Landscape
- Aberdare Soil Landscape
- Neath Soil Landscape
- Branxton Soil Landscape
- Drainage Line

FIGURE 5.4

Soil Landscape Map

Soils

Three soil landscapes described below occur within the Project area as shown on **Figure 5.4**. The soil pH throughout the Project area varies from slightly acidic to alkaline.

1. Quarrabolong Soil Landscape

   The Quarrabolong Soil Landscape comprises a significant proportion of landscape above the proposed Stage 3 Modification mining area. The Landscape defines the creek lines and associated landforms (flats, lower hillslopes) of the Quorrobolong Creek, Cony Creek and Sandy Creek systems. These soils have very low permeability and very high strength when dry (Charman and Murphy, 1991). The sandy nature of the upper horizons potentially leads to accelerated erosion if disturbed (HLA 1995).

2. Aberdare Soil Landscape

   Aberdare Soil Landscape extends along the crests and hillslopes of the Project area to the south of the Werakata State Conservation Area. Alluvial soils (sand) are also found along drainage lines. Topsoil pH ranges between 5 and 6.5 (Kovac and Lawrie 1991). The topsoil and subsoil can be moderately erodible.

3. Branxton Soil Landscape

   The Branxton Soil Landscape occurs only in the northern section of the Project area and within the Werakata State Conservation Area. The soils of this landscape include yellow podzolic, red podzolic, yellow soloth soils, alluvial sands and siliceous sands. Excluding alluvial soils, the topsoil of all units is moderately erodible. Topsoil pH ranges between 5.5 and 6.5. Acid topsoil problems are encountered throughout the area (Kovac and Lawrie 1991:109).

5.3 Land Use and Tenure

The Cessnock City Wide Settlement Strategy (CWSS) identifies an interaction of urban, rural-residential, and rural-settlement with agriculture, mining, forestry, and extractive industries as the existing land uses of the LGA (CCC 2004).

Areas to the north and west of the Project are being considered as part of new urban development strategies in the Lower Hunter Regional Strategy (LHRS) (DoP 2006a). Cessnock LGA is identified as a major growth centre in the LHRS and has a projected capacity of an additional 21,700 dwellings over the next 25 years. New projected urban areas include Bellbird North, Bellbird Heights, Millfield-Paxton (Sanctuary Village) and Kitchener (CCC 2004).

Land use in the area surrounding the proposed Stage 3 Modification Area is primarily rural lands (with dispersed rural settings), residential and the forested areas of Werakata State Conservation Area. The land is this area includes the villages of Ellalong, Millfield, Kitchener, Quorrobolong, Aberdare, Abernethy, Pelton, Paxton and Bellbird. The dominant land uses within and adjacent to the Project area include grazing, poultry production, forestry and mining.

As specified on the Cessnock LEP Zoning Map (refer to **Figure 4.3**), the land surrounding the proposed Stage 3 Modification Area is zoned:

1. Zone No 1(a) Rural 'A' Zone; and
2. Zone No 1 (f) Rural (Forestry) Zone.

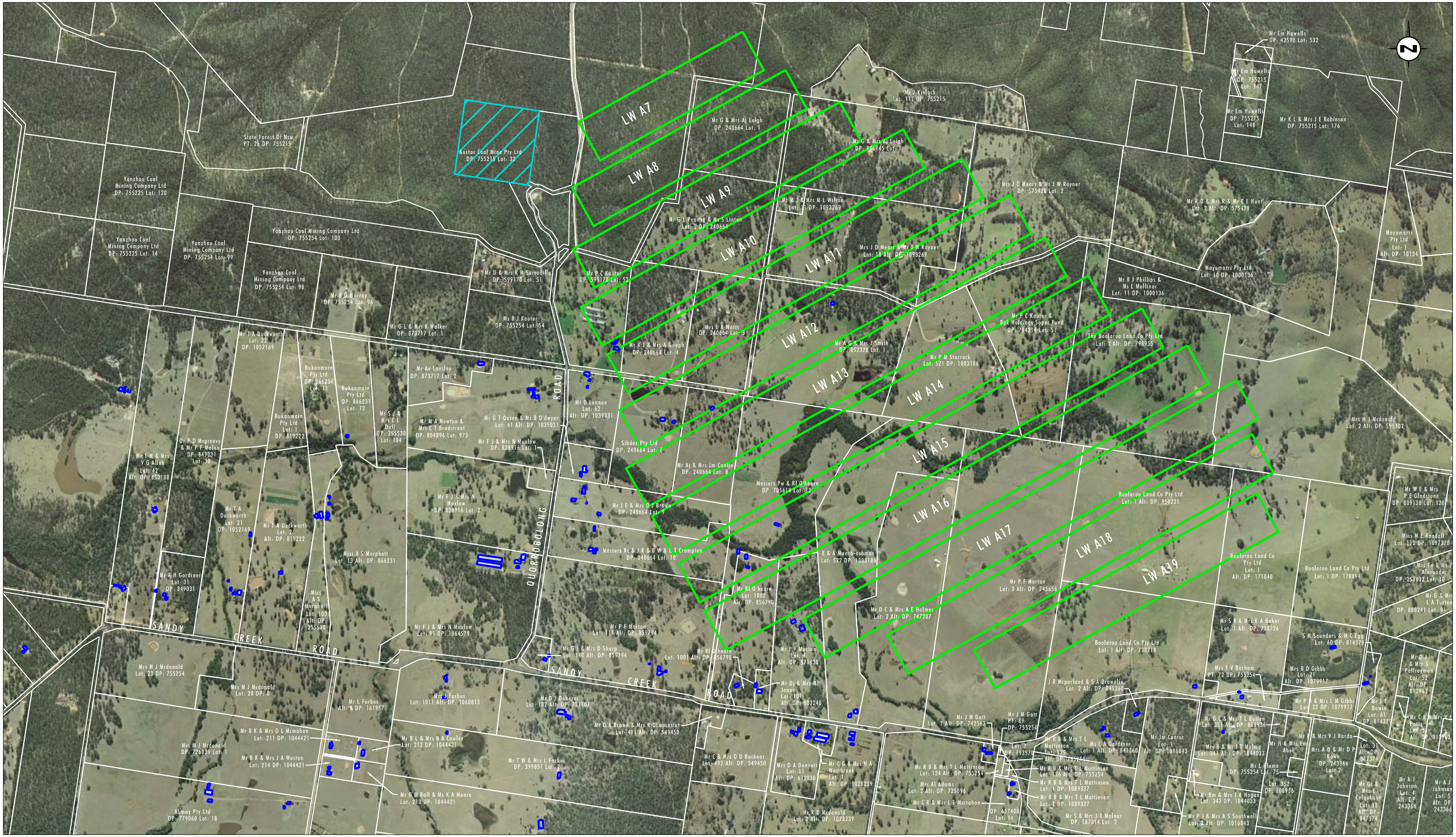
The northern portion of the mine plan extends underneath the Werakata State Conservation Area and sections of Crown land, as well as an area of Austar owned land. The remainder of the proposed Stage 3 Modification mining area is located under private land as shown on **Figure 1.6**. Cadastral boundaries and the locations of dwellings are shown on **Figure 5.5**. Land use and landscape characteristics of the proposed Stage 3 Modification Area are summarised in **Table 5.1**.

Table 5.1 – Landscape and Land Use in the Vicinity of the Proposed Stage 3 Modification Area

Project Land Areas	Project Area Features
North of Nash Lane/West of Quorrobolong Road	A series of blocks on partly forested steeper land, on the margins of the former Aberdare State Forest (now the Werakata State Conservation Area).
Between Nash Lane/Sandy Creek Road/West of Quorrobolong Road	Dominated by elongated allotments aligned north to south, with east west property boundaries aligned with the channel of Quorrobolong Creek. Gently sloping and have access to natural water supplies from pools along Quorrobolong Creek and its tributaries. Multiple large dams for cattle. Only one property projected to be mildly affected by mine subsidence with the proposed mine plan modification
Between Coney Creek Lane/Sandy Creek Road/East of Quorrobolong Road	A series of relatively large/cleared properties (except along the creek lines and extensive creek flats). New spacious homes have been built (as a second residence). Small scale cattle grazing dominates. Some land rehabilitation/revegetation projects. Access to good water supplies in Sandy Creek or to large farm dams.
South of Sandy Creek Road/West of Quorrobolong Road junction	Allotments elongated and aligned east west. Access to tributaries of Quorrobolong Creek. Some properties overlie former underground mine workings, but none are located over the proposed modified Mine Plan.
South of Sandy Creek Road/East of Quorrobolong Road	Series of small allotments, some subdivided. Earlier rural character is being replaced by smaller scale; densely settled, rural residential development. Most blocks retain endemic vegetation. Not located above the conceptual Mine Plan.
North of Coney Creek Lane/East of Quorrobolong Road	Series of moderately large blocks on steeper, well vegetated country. Property owners in this area tend to be owner occupiers who do not depend on primary production from the property for their income.

As detailed in **Appendix 4**, Austar operates within a number of mining leases under continuing use and 12 separate development consents which were issued by Cessnock City Council between 1974 and 2002 and by the NSW Minister for Urban Affairs and Planning in 1996 (DA 29/95). Underground mining is currently being undertaken within CML2. The majority of the proposed Stage 3 Modification mining area is within CML2 and beneath rural land holdings.

A description and assessment of potential impact on the land use from the proposed Stage 3 Modification is provided in **Section 7**.



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW, Aerial Photography: AAM Hatch 2006

Legend

- Proposed Stage 3 Mondification Longwall Panels
- Approved Surface Infrastructure Site
- Residential Dwelling
- Property Boundaries

FIGURE 5.5

Stage 3 Proposal Lot and DP Locations

6.0 Environmental Risk Analysis

6.1 Environmental Risk Analysis

An environmental risk analysis has been completed for the potential change in impact that may be created by the Stage 3 Modification and is included as **Appendix 6**. The risk analysis was undertaken in accordance with *AS/NZS 4360:2004 Risk Management*. The risk matrix, consequence table and likelihood table used for the assessment is included in **Appendix 6**.

Consistent with AS/NZS 4360, environmental risks have been categorised as low, medium, high or extreme. As shown in **Appendix 6**, the majority of activities are rated as low or medium level risks, with few high risks and no extreme risks. With the completion of further studies, assessment and development of mitigation measures as outlined in **Section 7**, most of the high risks will be able to be reduced to medium level risks, due to better definition of potential impacts and effective implementation of management and mitigation measures.

6.1.1 Landform

Mining of the Stage 3 Modification will result in changes to the subsidence of the landform within the 20 mm subsidence contour as shown on **Figure 1.5**. Landform changes due to subsidence were identified as having a low risk of significant environmental impacts as subsidence is predicted to be generally within the envelope of subsidence of the approved Stage 3 Project. Further assessment of potential landform impacts due to subsidence is provided in **Section 7.1**.

6.1.2 Visual Attributes

The visual context of the Stage 3 Modification Area is of predominantly rural land holdings with cleared pasture areas interspersed with native vegetation. Visually prominent features of the area include Ellalong Lagoon, Broken Back Ranges and Watagan Mountains. Subsidence as a result of the Stage 3 Modification is predicted to be generally within the range of subsidence approved under Project Approval 08_0111. In addition, no changes to surface works are proposed. Consequently the risk of significant visual impact as a result of the Stage 3 Modification is considered negligible and no further impact assessment is required.

6.1.3 Flooding and Drainage

Possible environmental impacts relating to flooding and drainage within the Stage 3 Modification Area identified in the environmental risk assessment include changes to water flow (including depth, duration and velocity of flood waters), as well as water quality and channel stability in Sandy Creek and Cony Creek due to mine subsidence. The risk of significant impacts on localised flooding and drainage as a result of mining within the Stage 3 Modification Area was assessed as moderate to high. A further assessment of potential impacts on flooding and drainage is provided in **Section 7.3**.

6.1.4 Groundwater

Possible environmental impacts relating to groundwater resources within the Stage 3 Modification Area identified in the environmental risk assessment include changes to groundwater level and quality due to mine subsidence. The risk of significant impacts was assessed as low due to the limited use of groundwater resource in the area, the lack of significant impacts on groundwater resources as a result of mining in the Stage 1 and

Stage 2 areas and that the subsidence impacts are predicted to be similar to those of the approved Stage 3 Project. A further assessment of potential impacts on groundwater resources is provided in **Section 7.4**.

6.1.5 Heritage Attributes

Cony Creek and Sandy Creek (and surrounding lower hillslopes and flats) were identified to be areas of archaeological potential by Aboriginal stakeholders and archaeologists during studies undertaken as part of this EA. In addition, numerous items of European historic heritage are located within the subsidence envelope of the Stage 3 Modification.

Subsidence has the potential to impact on heritage values. Subsidence predictions show a reduction in impact on the grinding groove identified in earlier Archaeological studies, and that for most other sites of Aboriginal cultural heritage predictions are relatively similar. Further predictions show a slight reduction in impact to sites of historic heritage. The risk to items of historic heritage value was assessed as low. Further assessments of the potential impact to cultural heritage and historic heritage values are provided in **Sections 7.5** and **7.6** respectively.

6.1.6 Ecological Attributes

The vegetation communities present within the Stage 3 Modification Area encompass the structural range from simple sedgeland to subtropical rainforest, and include various forest communities with Spotted Gum (*Corymbia maculata*) being a dominant tree species. The Subregion is of biogeographic and scientific significance as it supports a transition between the sub-tropical northern and less fertile southern ecological communities. The proposed Stage 3 Modification was assessed to have low potential to impact ecology of the landform above the proposed Stage 3 Modification mining area (see **Appendix 8**). Impacts on ecology outside of this area are considered to be highly unlikely. A detailed assessment of the ecology and potential impacts of the proposed Stage 3 Modification underground mining area is provided in **Section 7.7**.

6.1.7 Greenhouse Gas and Energy

The Stage 3 Modification environmental risk assessment did not identify any further potential direct environmental impacts to greenhouse gas and energy beyond the approved Stage 3 Project as there are no proposed changes to energy usage. However due to the increased amount of coal that is able to be accessed under the Stage 3 Modification, the Department of Planning and Infrastructure has requested an update to the greenhouse and energy assessment undertaken for the Stage 3 Project (as approved). A further assessment is provided in **Section 7.8**.

6.1.8 Vibration

Underground mining has the potential to create vibration events as the land subsides. The environmental risk analysis assessed the potential for the proposed modification to the Stage 3 mining area to increase any vibration potential over what is already approved as low. However, as vibration has been raised as an issue of concern among landholders, an assessment of vibration impacts for the Stage 3 Modification has been included as **Section 7.2**.

6.1.9 Built Features

6.1.9.1 Public Utilities

The environmental risk assessment included a review of public utilities occurring within the area (such as roads, railways, bridges, pipelines, etc.). The risk assessment found that the Stage 3 Modification Project could potentially impact on a range of public infrastructure. The risk of damage was assessed as being high and further impact assessment is therefore necessary. A further assessment of subsidence impacts on public utilities is provided in **Section 7.1**.

6.1.9.2 Farm Land, Facilities and Residences

The environmental risk assessment included a review of farm land, facilities and residences occurring within the Stage 3 Modification Area. A full list of the items considered in the risk assessment is included in **Appendix 6**. The risk assessment found that the Stage 3 Modification could potentially impact on lands and facilities within 41 rural land parcels, and may impact upon 26 rural residences. The risk of damage was assessed as being moderate to high and further impact assessment is therefore necessary. A further assessment of subsidence impacts on farm land, facilities and residences is provided in **Section 7.1**.

6.2 Government Agency Consultation

During the preparation of this EA, the following government agencies were consulted to assist in identifying matters to be addressed and potential issues of concern:

- Department of Planning and Infrastructure (DP&I);
- NSW Office of Water (NOW);
- NSW Office of Environment and Heritage (OEH);
- Hunter Central Rivers Catchment Management Authority (HCRCMA);
- Cessnock City Council (CCC);
- Mine Subsidence Board (MSB);
- Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) – Minerals & Energy; and
- Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC).

EARs were provided by the DP&I (formerly the Department of Planning) on 7 April 2011. The matters set out in the EARs and relevant government publications have formed the basis for the preparation of this EA.

Table 6.1 sets out the key matters required to be addressed by the EARs and identifies where in the EA these matters are discussed.

Table 6.1 – Environmental Assessment Requirements

Requirement	Section of EA
General Requirements	
an executive summary;	Executive Summary
a detailed description of:	
• existing and approved operations and infrastructure on site; and	Section 2, Appendix 4
• the existing environmental management and monitoring regime on site	Section 2.3
a detailed description of the modification, including the: • need for the modification; • alternatives considered; • likely interactions between existing and approved mining operations; • likely staging of the proposed modification; and • plans of any proposed building works;	Sections 3 and 9
a risk assessment of the potential environmental impacts of the proposed modification, identifying the key issues for further assessment;	Section 6
a detailed assessment of the key issues specified below, and any other significant issues identified in the risk assessment, which includes: • a description of the existing environment, using sufficient baseline data; • an assessment of the potential impacts of all stages of the proposed modification, including any cumulative impacts associated with the concurrent operation of the proposed modification with any other existing or approved mining or gas production operations in the region; • taking into consideration any relevant policies, guidelines, plans and statutory provisions; and • a description of the measures that would be implemented to avoid, minimise, mitigate and/or offset the potential impacts of the proposed modification, including detailed contingency plans for managing any significant risks to the environment;	Sections 5 and 7
a statement of commitments, outlining all the proposed environmental management and monitoring measures;	Section 8
a conclusion justifying the modification on economic, social and environmental grounds, taking into consideration whether the modification is consistent with the objects of the Environmental Planning & Assessment Act 1979; and	Section 9
a signed statement from the author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading.	Appendix 3
Key Issues	
Subsidence – including: • a detailed assessment of subsidence and accurate predictions of potential subsidence effects (both systematic and non-systematic) including potential cumulative effects and a sensitivity analysis; • identification of sensitive receptors potentially affected by subsidence (including environmental features, heritage sites, public access and roads, utilities, buildings, water storage facilities and any other structures or infrastructure) and an assessment of significance of those receptors; • detailed assessment of the potential impacts of subsidence effects on the natural and built environment, with particular reference to sensitive receptors; and • identification of how subsidence impacts would be rehabilitated, including methodologies and response times.	Section 7.1 and Appendix 9

Table 6.1 – Environmental Assessment Requirements (cont)

Requirement	Section of EA
Surface and Ground Water – including: • detailed assessment of impacts to surface and groundwater resources; • a detailed site water balance; • assessment of flooding behaviour and impacts to flood prone land; • proposed surface and groundwater monitoring; and • proposed surface and groundwater management and contingency actions to protect environmental flows and supply to landowners.	Sections 7.3, 7.4 and Appendix 7
Biodiversity – including: • an assessment of the potential impacts of the project on any terrestrial and aquatic threatened species or populations or their habitats, and endangered ecological communities or groundwater dependent ecosystems; and • a description of the measures that would be implemented to maintain or improve the biodiversity values of the surrounding region in the medium to long term;	Section 7.7 and Appendix 8
Greenhouse Gas – including: • a quantitative assessment of the potential additional scope 1, 2 and 3 greenhouse gas emissions from the modified project, and a qualitative assessment of the potential impacts of these emissions on the environment; and	Section 7.8
Heritage – both Aboriginal and non-Aboriginal.	Section 7.5 and 7.6 and Appendix 10
References	
The environmental assessment of the key issues listed above must take into account any relevant guidelines, policies, and plans.	Whole EA
Consultation	
During the preparation of the EA, you should consult with the relevant local, State or Commonwealth government authorities, service providers, community groups or affected landowners. The consultation process and the issues raised must be described in the EA. In particular, you must consult with: • Office of Environment and Heritage • Department of Trade and Investment (including the Office of Water) • Mine Subsidence Board • Cessnock City Council • relevant Aboriginal Groups	Sections 6.2 and 6.3 and Appendix 11

6.3 Stakeholder and Community Consultation

The community consultation program being undertaken by Austar has included letters, community meetings and presentations to key stakeholders including individual landholders within the Stage 3 Modification Project Area and the Austar Coal Mine Community Consultative Committee. An example of the letters of information and the presentation given to the key stakeholders in regard to the Stage 3 Modification Project is provided in **Appendix 11**. The consultation program forms a part of the ongoing community consultation undertaken by Austar and will continue throughout the Stage 3 Modification application process. Ongoing consultation will be linked to the existing Property Subsidence Management Planning (or Built Feature Management Plans) process and the Community Consultative Committee.

The key issues of community interest raised to date in the consultation process include:

- area of subsidence impact;
- impact on housing, other structures and agricultural areas within the proposed Stage 3 Modification Area;
- impact on creek lines, flooding and drainage; and
- cultural heritage impacts.

A further assessment of subsidence impacts on farm land, facilities and residences is provided in **Section 7.1**. An assessment of impacts on creek lines, flooding and drainage is provided in **Section 7.3**.