GeoTerra

AUSTAR COAL MINE PTY LTD

LONGWALL PANELS A1 AND A2 SURFACE WATER AND GROUNDWATER ASSESSMENT

Ellalong, NSW

AUS1-R1F

4 APRIL, 2006

GeoTerra Pty Ltd ABN 82 117 674 941

77 Abergeldie Street Dulwich Hill NSW 2203

Phone: 02 9560 6583 Fax: 02 9560 6584 Mobile: 0417 003 502 Email: geoterra@iinet.net.au

DZW\MPO\DNEW\13958882\2

AUS1-R1F (4 APRIL, 2006)

GeoTerra

Austar Coal Mine Pty Ltd
Locked bag 806
CESSNOCK NSW 2325

Attention: Matthew Fellowes

Matthew,

RE: PANELS A1 and A2 SURFACE WATER AND GROUNDWATER ASSESSMENT

Please find enclosed a copy of the above mentioned report.

Yours Faithfully

GeoTerra Pty Ltd

Andrew Dawkins
Managing Geoscientist (MAusIMM CP-Enviro)

Distribution: Original — Geoterra
1 electronic copy — Austar Coal Mine Pty Ltd

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77 Abergeldie Street Dulwich Hill NSW 2203
Phone: 02 9560 6583 Fax: 02 9560 6584 Mobile: 0417 003 502 Email: geoterra@iinet.net.au

GeoTerra

Authorised on behalf of Geoterra Pty Ltd:	
Name:	Andrew Dawkins
Signature:	
Position:	Managing Geoscientist
Date:	04.04.2006

Date	Rev.	Comments
03.12.2005		Initial Draft
17.01.2006	A	Incorporated Austar comments
23.01.2006	B	Incorporated ERM review
08.02.2006	C	Incorporated amended subsidence predictions
01.03.2006	D	Incorporated SCT subsidence assessment - ref:ACM3011-27.2.06
15.03.2006	E	Incorporated Austar / Sparke Hellmore comments
04.04.2006	F	FINAL

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EXECUTIVE SUMMARY

Field and desk top assessments of surface water and groundwater systems overlying the proposed Longwall Panels A1 and A2 at Austral Coal Mine were conducted between November, 2005 and February 2006.

The objectives of the study are to assess the pre-mining status of surface water catchments and groundwater systems overlying the panels, to ascertain the potential effect of mining as proposed on the surface water and groundwater regime in the mining area and the catchment and to provide an assessment of monitoring and rehabilitation strategies that may be required.

Mining and Subsidence

The proposed mining will be conducted by top coal caving, with the mined seam depth ranging from 5.0m to 6.5m high. The final mined height will depend on coal quality and top coal caving logistical requirements.

This document is based on an assessment of the subsidence expected to result from the proposed mining (SCT Operations, 2006), which assumed a worst case, but unexpected, subsidence of 3.9m to 4.2m. This report assesses the effects of the worst case (but not expected) subsidence on the surface and groundwater regime of the proposed mining area.

On this basis vertical subsidence would become less than 20mm at a 30^{o} angle of draw, or 0.6 of the overburden depth, which equals 231m to 282m for the overburden depth of 385m at the start of Longwall A1 to 470m midway along Longwall A2.

The following surface water, groundwater and general ground surface assessments were made for the categories outlined below.

Streams

- Up to 2^{nd} order, Schedule 1 (DLWC, 2000) ephemeral channels are located over the proposed mine area which were dry for the majority of the assessment period, except for a short period following rains of 43mm in late February and a 46mm, 2 day storm in the first week of March 2006.
- Based on one available sample event, stream surface water in the study area is relatively fresh, ranging from 179 µS/cm to 256µS/cm electrical conductivity and 5.9 to 6.1pH
- When flowing, stream water quality and flow in the unnamed creeks should not be adversely affected due to extraction of the panels.
- No significant erosion or bedload sediment transport has been observed in the gullies over Panels A1 and A2 due to the stabilising effect of woodland and riparian vegetation.
- It is anticipated that no significant additional erosion of the stream bed or banks will occur and that no significant additional quantity of sediment will be mobilised due to mining the proposed panels.
- The creek catchments comprise hilly woodlands within the Aberdare State Forest, Crown land and land owned by the mine which are not used for any agriculture.

- Panels A1 and A2 will undermine the subject streams between 350m and 470m below surface, which is anticipated to be sufficient to avoid surface water entering the mine through connection of surface cracks and the goaf. As a result, no loss of stream flow is anticipated
- Significant redistribution of surface flow to shallow groundwater or generation of new stream paths is not anticipated
- No areas of ponding are anticipated
- No loss of water flow to the catchments of Black Creek and Quorrobolong Creek is anticipated.

Dams

- No dams are present in the 20mm subsidence zone of Panels A1 and A2

Groundwater

- The area contains 4 low yielding (<1L/sec) bores within alluvial sediments and basement of up to 55m deep, although none are located within the 20mm subsidence zone and therefore any temporary depletion of groundwater levels that may occur through subsidence will not be significant.
- No bore yield or water quality data is available for the alluvial aquifer, whilst the coal measures strata are low yielding (<1L/sec) and contain saline water to 14,000µS/cm, that is not of beneficial use for domestic, or agricultural purposes.
- No known significant groundwater dependent ecosystems are present in the study area.
- Groundwater is not extracted from alluvial or coal measures aquifers in the proposed subsidence area.
- Groundwater levels at present are anticipated to be reduced due to the recent drought.
- It is not anticipated that the ecological, environmental or agricultural / domestic receptors in the area will be adversely affected

1. INTRODUCTION

This study provides a baseline, pre-mining assessment of potentially affected stream reaches, dams and groundwater systems within the proposed mining area which will be incorporated into a Statement of Environmental Effects for Section 96(2) modification and a Section 138 variation.

Austar Coal Mine Pty Ltd propose to extract coal by longwall mining Panels A1 and A2 at the Austar Colliery in hilly wooded terrain near the watershed of the Broken Back Range which divides the catchment of Black Creek flowing to the north and Quorrobolong Creek to the south.

The panels are located between the settlements of Ellalong and Kitchener, to the south of Cessnock in the lower Hunter Valley.

1.1 Previous and Proposed Longwall Mining

The ground over Panels A1 and A2 has not previously been affected by longwall mining, however the panels are bound to the north and west by the Kalingo, Bellbird and Aberdare Central bord and pillar workings. Longwalls 1 to 9A were extracted by Ellalong Colliery, whilst Longwalls SL1 to SL3 and part of SL4 were extracted by the previous owners, Southland Colliery.

The proposed mining will be conducted by top coal caving the SE dipping Greta Seam, with the mined seam depth ranging from 5.0m to 6.5m high. The final mined height will depend on coal quality and top coal caving logistical requirements. Mining will occur between approximately 385m and 470m below surface. Longwall A1 is 1481m long and 157.5m wide whilst Longwall A2 is1235m long and 226.5m wide, with a 40m wide pillar.

This assessment is based on an assumed (but not expected) vertical subsidence of 3.9m to 4.2m (SCT Operations, 2006).

Vertical subsidence is expected to become less than 20mm at a 30^{o} angle of draw, or 0.6 of the overburden depth, which equals 231m to 282m for the overburden depth of 385m at the start of Longwall A1 to 470m midway along Longwall A2.

Extraction of the panels is anticipated to start in August 2006 for A1, with A2 starting in August 2007 and finishing in October 2008.

2. GENERAL DESCRIPTION

The study area shown in **Figure 1** is contained within the Aberdare State Forest as well as Crown and mine owned land.

2.1 Streams

Mount Howard at 228mAHD overlies the chain pillar between the previous panels SL3 and SL4, with the ephemeral drainage from the flanks of Mt Howard in the Broken Back Range over LWA1 and LWA2 being primarily to the west in the southern half and to the northeast in the northern portion of the panels, with the watershed trending in a NNW direction as shown in **Figure 1**.

The hilly topography over Panels A1 and A2 lie between 180mAHD and 130mAHD.

The 20mm subsidence zone (SCT Operations, 2006), which is the limit of subsidence of

practical significance, underlies hilly wooded terrain that straddles the NW / SE trending Broken Back Range. Broken Back Range is a watershed between the Black Creek and Quorrobolong Creek catchments. Quorrobolong Creek drains south/south west into Ellalong Lagoon then into Wollombi Brook, whilst Black Creek flows NNW through Cessnock, with both systems subsequently draining to the Hunter River.

Vegetation is generally woodland on hilly slopes, with riparian vegetation along / within the gullies.

All of the country overlying the panels contains lesser order Schedule1 (DLWC, 2000) gullies and small creeks within the 20mm subsidence zone that are above the 1:100 year ARI flood extent and are not prone to flooding**.**

The creek bed and banks are well defined and relatively stable, with some sedimentation in runoff from 4wd access tracks. Most gullies are not significantly eroded and mainly contain clay to gravelly sediments with minor exposed weathered to fresh bedrock.

No alluvial land or wetlands are located within the proposed mining area.

2.2 Surface Water Quality

Assessment of stream water quality during the study period has been limited to one sampling event due to the lack of runoff in the steep catchments over the study area.

Field monitoring of samples collected from sites C1 and C2 shown in **Figure 1**, indicate the surface water is fresh (179 µS/cm to 256µS/cm) with relatively neutral pH (5.9 to 6.1).

2.3 Dams

No dams are located within the 20mm subsidence area.

2.4 Geology

The study area contains Quaternary hillslope colluvial and gully based alluvial sediments overlying the Branxton Formation conglomerate, sandstone and siltstones. These are in turn sequentially underlain by sandstone, conglomerate, siltstone and coal of the Greta Coal Measures.

The main Quaternary to Recent alluvium is located to the south of the study area along Quorrobolong Creek valley.

The main structural feature in the area are the NW trending “Swamp Fault”, “Bellbird Branch Fault” and “Bellbird Fault” that define the western and northern limit of the panels as well as the “Central Dyke” and “Quorrobolong Fault Zone” to the east of the panels.

There are no geological structures of significance delineated within the study area.

The Greta Seam lies between approximately 350m and 460m below surface and is generally 6.5 thick in the vicinity of LWA1 and LWA2, with a northwesterly dip.

2.5 Hydrogeology

The main aquifer system present is the basement coal measures comprising a variable sequence of aquicludes (siltstones and shales), aquitards (sandstones) and aquifers (coal seams).

The coal measure aquifers are not listed as vulnerable under the current Aquifer Risk Assessment Report (DLWC, 1998), however they are covered, as appropriate, by the generic State Groundwater Policy (DLWC, 1997), Groundwater Quality Protection Policy

(DLWC1998) and Groundwater Dependent Ecosystem Policy (DLWC, 2002).

The current information relating to the groundwater system in the mining area is limited to four registered bores within the local area. Even though no registered bores lie within the 20mm subsidence zone, it can be reasonably assumed from existing information that the groundwater level is sufficiently deep, and the water quality sufficiently saline that it is not a significant groundwater resource and is not expected to have surface based ecosystems being dependent on it.

The nearest registered bore with an abstraction licence is located along Cony (Quorrobolong) Creek (GW038372) with a depth of 9.1m. It is located approximately 2.5km from Panel A1 in alluvium as shown in **Appendix A**.

Rainfall infiltration and recharge to the coal measures is inferred to be very low to negligible based on studies in similar strata, whilst the gully filled alluvium is very thin and of no consequence for groundwater supply.

The coal measures represent an assemblage of aquifers, aquitards and aquicludes, with very low intrinsic or intergranular hydraulic conductivities, with groundwater flow confined mostly to the coal seams (aquifers) where cleats provide enhanced secondary permeability. Sandstones can provide minor porous storage with very low transmissivity, whilst the mudstones, siltstones and shales effectively impede vertical or horizontal flows.

Hydraulic connectivity between strata is provided only through fracturing and jointing, and if it is present, more uniform regional pressure distributions could develop.

Regional water levels within the coal measures are the result of interactions between rainfall recharge and topography over a very long period of geological time. Rainfall percolation can recharge the water table whist drainage channels in the major valleys may incise the water table and provide a leakage path that constrains groundwater levels to drainage bed elevations, or deeper. During rainfall recharge periods, water levels in shallow aquifer systems generally rise, whilst during dry periods, the levels are lowered through natural seepage into the local watercourses, at which time the salinity in surface drainages normally rises.

Partial depressurisation of the coal measures at depth will have occurred in the local area since extraction of the older bord and pillar and more recent longwall workings, however no water level measurements are available.

Groundwater flow directions are likely along seepage pathways towards the existing mines or main drainages.

The coal measures are generally low yielding with highest yields from coal seams or igneous intrusions, whilst the sandstones are commonly relatively low yielding. It is anticipated that groundwater levels are currently reduced due to the effect of the drought along with previous mining in the area.

A study has been completed by the CSIRO assessing the adequacy of barriers between longwalls A1 and A2 and the old workings (CSIRO, 2005). Local, mine scale small faults and dykes are present near the workings, however the faults and dykes are not anticipated to be appropriately located or of sufficient size to be influenced by subsidence resulting in significantly increased flows to the workings.

Groundwater quality in the coal measures is potentially poor due to the presence of terrestrial salts, with the quality varying regionally both within and between coal seams

and interburden due to complexities of groundwater flow within the coal measures, as well as the interaction between surface waters and groundwaters. The coal measures groundwater is generally brackish to saline and is important locally only for limited stock and domestic water supply.

Due to the as yet unquantified but anticipated deep water table in the area, based on extrapolation from regional data, it is not anticipated there will be any groundwater dependent vegetation in the 20mm subsidence area.

3. POTENTIAL SUBSIDENCE IMPACTS

3.1 Predicted Subsidence

Vertical subsidence is expected to become less than 20mm at a 30^{o} angle of draw, or 0.6 of the overburden depth, at a horizontal distance of 300m for a 500m deep seam. Actual overburden depth ranges from 385m at the start of Longwall A1 to 470m midway along Longwall A2.

The assumed subsidence, tilts and strains for each potential subsidence scenario are shown in **Table 1**.

TABLE 1 Maximum Potential Subsidence Strain and Tilt

Completion of Longwall Panel	A1	A1+A2
Maximum Subsidence (m)	0.2	3.9 – 4.2
Maximum Tensile Strain (mm/m)	0.1	5
Maximum Compressive Strain (mm/m)	0.2	10
Maximum Tilt (mm/m)	0.8	30

Source: SCT Operations Pty Ltd (2006)

The subsidence assumed for the purpose of this report ranges from 3.9m to 4.2m. This level of subsidence is not expected but is assumed for assessment purposes (SCT Operations, 2006).

The deepest subsidence will occur over the panel centres.

The main effect from subsidence will be the formation of elongate depressions between a maximum of 3.9m to 4.2m deeper than the current ground surface along Panel A2, with the final depth depending on the actual response of the seam and overburden to Panel A1 and A2 extraction.

Based on previous observations in the Southern and Hunter Coalfields, cracking may occur to approximately 20m below surface, with cracks potentially up to 60mm wide (SCT Operations, 2006) that would be focused and oriented along the outer edge of the panels.

It is anticipated the cracks will be essentially indiscernible in the heavily wooded and very hilly country.

Maximum, tilts of 30mm/m and strains of 5mm/m (tensile) and 10mm/m (compressive) may develop after extraction of Panel A2, however strains could be higher if the steep

country affects total horizontal movement over the panels. Surface topography can significantly influence horizontal movements in steep terrain where a large component of downslope movement tends to cause increased tensile strains on topographic highs and compressive strains at topographic lows. These strains would be additional to the systematic strains indicated in **Table 1** (SCT Operations, 2006).

As the stream gradients exceed 30mm/m over Panel A2, which has a gradient of 20m over 450m, no reversal or adverse effects on streams are anticipated.

It is not anticipated that any significant adverse cracking and effect on stream flow, bed or bank stability or stream water quality are anticipated to occur in the low order gullies.

As no registered groundwater bores are located within the 20mm subsidence area, the effect of any temporary groundwater level depletion that may occur through subsidence will not be significant in terms of human or agricultural beneficial use.

No discernible adverse effects are anticipated on groundwater dependent ecosystems in the potential subsidence affected zone due to the assumed deep groundwater table in the 20mm subsidence zone.

There are no residences or access roads of significance that will be adversely affected by changes to surface water flow due to subsidence.

No development of stream bed ponding is anticipated in the hilly post mining terrain.

4. SURFACE WATER AND GROUNDWATER MONITORING

The proposed monitoring program is described below.

4.1 Surveying

Ground surface movements over the panels should be surveyed.

4.2 Streams

Observational, non quantitative monitoring and recording of stream flow and duration, as well as field assessment of pH and electrical conductivity is recommended when the streams are flowing.

Inspection and photographic recording of stream bed / bank stability and stream erosion should be taken over Panel A1 and Panel A2 before and after extraction at the estimated maximum subsidence locations of each panel.

4.3 Groundwater

There are no registered bores or piezometers requiring monitoring over the potential subsidence area.

4.4 Rainfall and Evaporation

Daily rainfall and evaporation data should be obtained from the Bureau of Meteorology station at Cessnock.

5. GENERAL

The assumed subsidence of 3.9m to 4.2m is an upper bound, worst case scenario which exceeds the subsidence levels indicated by the application of best practice subsidence predictive assessment (SCT Operations, 2006).

Due to the very hilly terrain and high vegetative cover over the subsidence area, it is anticipated there will be minor significant crack development and a lack of adverse observable effects on stream or groundwater systems.

In order to account for any unexpected adverse subsidence effects that may occur, a pre and post mining monitoring and rehabilitation program is proposed as outlined below.

5.1 Reporting

All pre and post Panel A1 and A2 inspection observations should be compiled and reviewed after Panel A2 has been completed.

The report will summarise all relevant monitoring, outline any changes in the creeks and hillslope land over the mined out areas and assess the need or appropriate response for any unanticipated rehabilitation requirements.

Relevant monitoring and management activities will also be reported in the mine's Annual Environmental Management Report (AEMR) each year.

5.2 Rehabilitation

Even though no observable adverse effects are anticipated on the surface water or groundwater systems in the Longwall A1 and A2 20mm subsidence zone (SCT Operations, 2006), any adverse effects that require rehabilitation of stream bed and bank stability, stream flow, groundwater levels or groundwater quality will be achieved through producing and implementing a specific post mining rehabilitation plan that addresses the affected issue.

6. CONCLUSIONS

Mining and Subsidence

The proposed mining will be conducted by top coal caving, with the mined seam depth ranging from 5.0m to 6.5m high. The final mined height will depend on coal quality and top coal caving logistical requirements.

For the purpose of environmental assessment subsidence is assumed (but not expected) to range from 3.9m to 4.2m (SCT Operations, 2006).

Vertical subsidence is expected to become less than 20mm at a 30^{o} angle of draw, or 0.6 of the overburden depth, which equals 231m to 282m for the overburden depth of 385m at the start of Longwall A1 to 470m midway along Longwall A2.

The following surface water and groundwater related assessments were made for the assumed subsidence as outlined below.

Streams

- Surface runoff is relatively fresh (179 to 256µS/cm) with circum neutral to slightly acidic pH (5.9 to 6.1)

- It is not anticipated that the geomorphology, stream flows or stream water quality of the low order creeks over the panels will be observable adversely affected by subsidence.
- When flowing, stream water quality and flow in the unnamed channels should not be adversely affected due to extraction of the panels.
- No significant erosion or bedload sediment transport has been observed in the gullies over Panels A1 and A2 due to the stabilising effect of woodland and riparian vegetation.
- It is anticipated that no significant additional erosion of the stream bed or banks will occur and that no significant additional quantity of sediment will be mobilised due to mining the proposed panels.
- Panels A1 and A2 will undermine the subject streams between 350m and 470m below surface, which is anticipated to be sufficient to avoid surface water entering the mine through connection of surface cracks and the goaf. As a result, no loss of stream flow is anticipated
- Significant redistribution of surface flow to shallow groundwater or generation of new stream paths is not anticipated
- No areas of ponding are anticipated
- No loss of water flow to the catchments of Black Creek and Quorrobolong Creek is anticipated.

Dams

- No dams are located over the potential 20mm subsidence zone

Groundwater

- No registered groundwater extraction bores are located in the subsidence zone, and therefore, any temporary depletion of groundwater levels that may occur through subsidence will not be significant.
- The nearby area contains 3 low yielding (<1L/sec), high salinity coal measures aquifers and 1 shallow alluvial bore of 9.1m deep in Quorrobolong Creek
- No known significant groundwater dependent ecosystems are present in the study area.
- Groundwater is not extracted from alluvial or coal measures aquifers in the proposed subsidence area.
- It is not anticipated that the ecological, environmental or agricultural / domestic receptors in the area will be adversely affected.
- The area contains 4 low yielding (<1L/sec) bores within alluvial sediments and basement of up to 55m deep, although none are located within the 20mm subsidence zone and therefore any temporary depletion of groundwater levels that may occur through subsidence will not be significant.
- No bore yield or water quality data is available for the alluvial aquifer, whilst the coal measures strata are low yielding (<1L/sec) and contain saline water to 14,000µS/cm, that is not of beneficial use for domestic, or agricultural purposes.

7. REFERENCES

CSIRO, 2005 Report on Mine Water Modelling for Panels LWA1 and LWA2 at Austar Mine

DLWC, 1997 NSW State Groundwater Policy Framework Document

DLWC, 1998 NSW State Groundwater Quality Protection Policy

DLWC, 1998 Aquifer Risk Assessment Report

DLWC, 2000 Draft Guidelines For Management of Streams in Coal Mining – Hunter valley

DLWC, 2002 NSW State Groundwater Dependent Ecosystems Policy

HLA Envirosciences Pty Ltd 1995 Environmental Impact Statement Ellalong Colliery. Extension into Bellbird South

SCT Operations Pty Ltd 2006 Subsidence Estimates - Austar Coal Mine, Longwalls A1 and A2 (27 February 2006)

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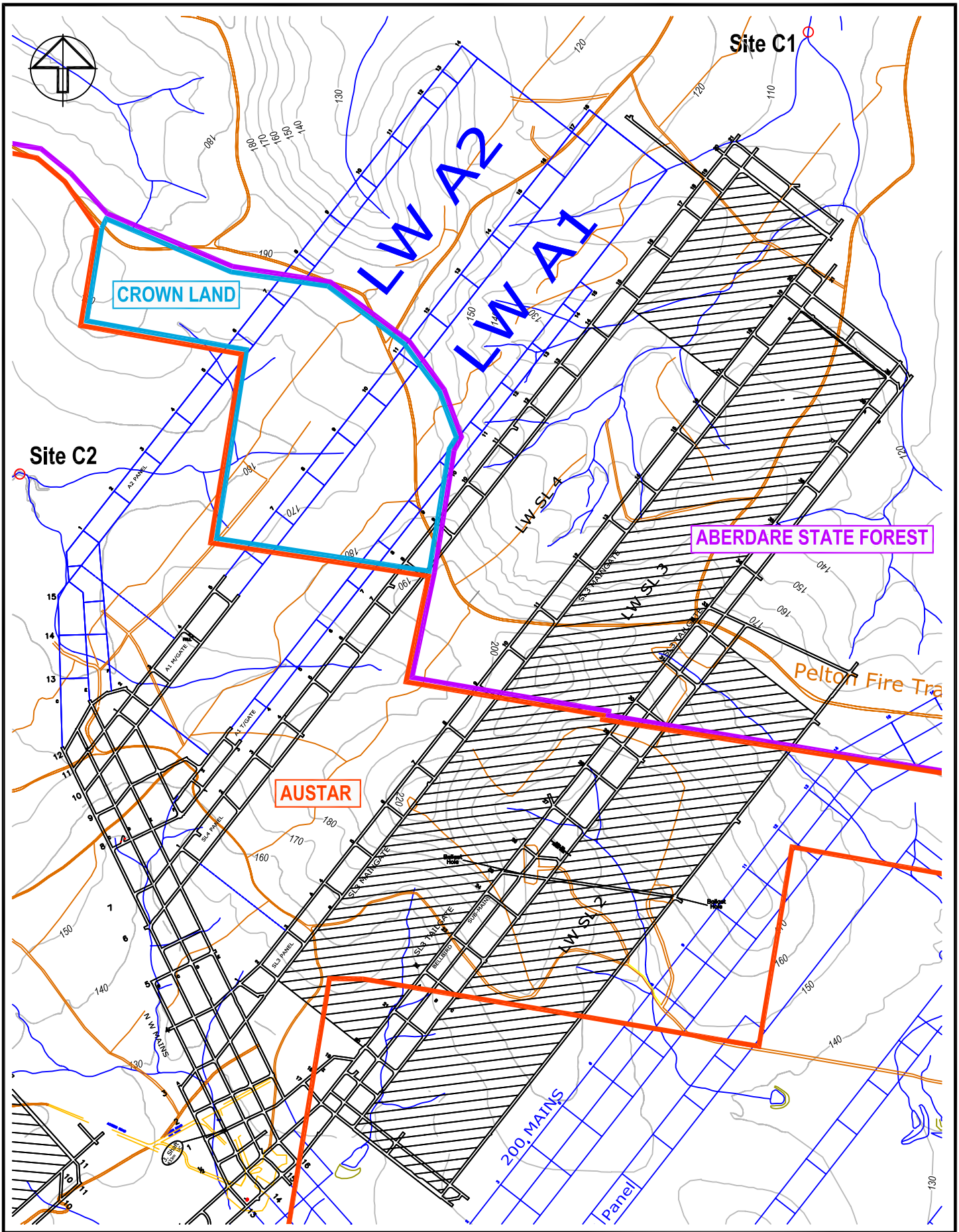

PROJECT:	AUSTAR	**AUSTAR** **PROPOSED PANELS A1 AND A2** **MINE AND CONTOURS**	**GeoTerra** **FIGURE 1**
DRAWN:	A. DAWKINS		
DATE:	13 MAR.2006		
SCALE:	1:1000		

APPENDIX A

DNR REGISTERED BORE DATA

Groundwater Bore Search Quorrobolong

Disclaimer: The State of New South Wales and the Department of Infrastructure, Planning and Natural Resources and its employees, officers, agents or servants do not accept any responsibility or any inaccuracies or ommissions contained in this data, and expressly disclaim all and any liability and responsibility to any person in respect to anything and of the consequences of anything done or ommitted to be done by any such person in reliance, whether wholly or partially upon the contents of this data.

N

0 1 2 3 4 5 Kilometres

Produced by: r,11 Date: 15/11/2005 g:\rk\100417 4\products\boresearch\boresearch2005\2316.apr

Date/Time :15-Nov-2005 11:49 AM
User :PCLARKE
Report :RMGW001D.QRP
Executable :S:\G5\PROD32\Ground.exe
Exe Date :18-Apr-2005
System :Groundwater
Database :Edbp

NSW Government
DEPARTMENT OF NATURAL RESOURCES

DEPARTMENT OF NATURAL RESOURCES
Work Summary

GW038372

Converted From HYDSYS

License :20BL028899

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	NOT KNOWN	NOT KNOWN
Work Status : Supply Obtained		
Construct. Method :(Unknown)		
Owner Type : Private		

Commenced Date : **Final Depth :** 9.10 m
Completion Date : **Drilled Depth :** 0.00

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :NORTHUMBERLAND	QUORROBOLONG	128
	Licensed :NORTHUMBERLAND	QUORROBOLONG	PT11 755254

Region :20 - HUNTER **CMA Map :**9132-2S QUORROBOLONG
River Basin :210 - HUNTER RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6357470 **Latitude (S) :**32° 54' 37"
Elevation Source :(Unknown) **Easting :**347065 **Longitude (E) :**151° 21' 53"

GS Map :0053B4 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

Remarks

***** End of GW038372 *****

DEPARTMENT OF NATURAL RESOURCES
Work Summary

GW051324

Converted From HYDSYS

License : 20BL111325

Work Type : Bore open thru rock
Work Status : (Unknown)
Construct. Method : Rotary Air
Owner Type : Private

	Authorised Purpose(s)	Intended Purpose(s)
	DOMESTIC	DOMESTIC
	STOCK	STOCK

Commenced Date :
Completion Date : 01-Feb-1980
Final Depth : 46.00 m
Drilled Depth : 46.00 m

Contractor Name :
Driller :

Property : - N/A
GWMA : -
GW Zone : -

Standing Water Level :
Salinity : 10001-14000 ppm
Yield :

Site Details

Site Chosen By

	County	Parish	Portion/Lot DP
Form A :	NORTHUMBERLAND	QUORROBOLONG	67
Licensed :	NORTHUMBERLAND	QUORROBOLONG	P+ Port 67

Region : 20 - HUNTER
River Basin : 210 - HUNTER RIVER
Area / District :

CMA Map : 9132-2S QUORROBOLONG
Grid Zone : 56/1 **Scale :** 1:25,000

Elevation :
Elevation Source : (Unknown)

Northing : 6355620
Easting : 348430
Latitude (S) : 32° 55' 37"
Longitude (E) : 151° 22' 44"

GS Map : 0053B4 **AMG Zone :** 56 **Coordinate Source :** GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	-0.02	12.00	150			Driven into Hole

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
39.00	40.00	1.00	Fractured	7.00		0.30			10001-14000 ppm

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Soil	Soil	
1.00	9.00	8.00	Clay	Clay	
9.00	46.00	37.00	Shale Water Supply	Shale	

Remarks

Owner's name: C. & N. Westbrook, address- 71 Sandy Creek Rd, Quorrobolong, Ph. 02 4998 6226 Bore has not been used for 2 years. Groundwater is highly saline. Pump seized due to corrosion.

***** End of GW051324 *****

DEPARTMENT OF NATURAL RESOURCES
Work Summary

GW054676 *Converted From HYDSYS*

License : 20BL117254

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	STOCK	STOCK
Work Status : Abandoned Bore		
Construct. Method : Rotary Air		
Owner Type : Private		

Commenced Date : **Final Depth :** 39.60 m
Completion Date : 01-Jun-1982 **Drilled Depth :** 39.60 m

Contractor Name :
Driller :

Property : - NOT KNOWN **Standing Water Level :**
GWMA : - **Salinity :** Salty
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : NORTHUMBERLAND	QUORROBOLONG	L2 DP538102 (128)
	Licensed : NORTHUMBERLAND	QUORROBOLONG	21 1052169

Region : 20 - HUNTER **CMA Map :** 9132-2S QUORROBOLONG
River Basin : 210 - HUNTER RIVER **Grid Zone :** 56/1 **Scale :** 1:25,000
Area / District :

Elevation : **Northing :** 6356515 **Latitude (S) :** 32° 55' 7"
Elevation Source : (Unknown) **Easting :** 345280 **Longitude (E) :** 151° 20' 43"

GS Map : 0053B4 **AMG Zone :** 56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
10.70	11.30	0.60	Fractured			1.00			Salty

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	0.60	0.60	Topsoil	Topsoil	
0.60	6.10	5.50	Clay	Clay	
6.10	10.10	4.00	Clay Sandy	Clay	
10.10	24.40	14.30	Shale Water Supply	Shale	
24.40	39.60	15.20	Sandstone	Sandstone	

Remarks

***** End of GW054676 *****

DEPARTMENT OF NATURAL RESOURCES
Work Summary

GW078091

License : 20BL166581

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	DOMESTIC	DOMESTIC
Work Status : (Unknown)	FARMING	STOCK
Construct. Method : Rotary	STOCK	
Owner Type :		

Commenced Date : **Final Depth :** 55.00 m
Completion Date : 09-Feb-1997 **Drilled Depth :** 55.00 m

Contractor Name : John Hans ISELT
Driller : 1435 ISELT, John Hans

Property : - N/A
GWMA : 017 - HUNTER
GW Zone : -

Standing Water Level :
Salinity : Fresh
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
Diviner	**Form A :** NORTHUMBERLAND	QUORROBOLONG	LOT 491 DP 549450
	Licensed : NORTHUMBERLAND	QUORROBOLONG	491 549450

Region : 20 - HUNTER
River Basin :
Area / District :

CMA Map :
Grid Zone : **Scale :**

Elevation :
Elevation Source :

Northing : 6355656 **Latitude (S) :** 32° 55' 36"
Easting : 347843 **Longitude (E) :** 151° 22' 23"

GS Map : **AMG Zone :** 56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	55.00	150			Down Hole Hammer

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	0.40	0.40	Topsoil	Topsoil	
0.40	4.50	4.10	Clay Brown	Clay Bands	
4.50	17.00	12.50	Siltstone	Siltstone	
17.00	55.00	38.00	Shale	Shale	

Remarks

***** End of GW078091 *****

***** End of Report *****