Narrabri Coal Pty Ltd

ABN: 76 107 813 963

Narrabri Coal Project

Response to Public and Government Agency Submissions Provided by the Department of Planning

Compiled by:

R.W. CORKERY & CO. PTY. LIMITED

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1 INTRODUCTION

Following the public exhibition of the *Environmental Assessment* for the proposed Narrabri Coal Project, seven public and seven government agency submissions received were forwarded by the Department of Planning (DoP) to R.W. Corkery & Co. Pty. Limited on 25 May 2007 and Narrabri Coal Pty Ltd on 28 May 2007. Each of the submissions was comprehensively reviewed and requests for clarification or further information, along with issues of concern over the breadth of coverage or accuracy given to environmental issues and consultation process identified. The issues raised and comments presented in the submissions have been categorised into eleven separate fields of assessment as follows.

1. Consultation.
2. Groundwater Issues.
3. Surface Water Issues.
4. Socio-economic Impacts.
5. Subsidence.
6. Traffic (including rail traffic).
7. Air Quality.
8. Aboriginal heritage.
9. Noise and Vibration.
10. Visual Amenity.
11. Miscellaneous.

With the exception of the two submissions by the Department of Water and Energy (DWE) and the Department of Environment and Climate Change (DECC), all relevant issues raised within the submissions have been individually addressed within the relevant sub-section of this document. Individual response to the issues raised by the DWE and DECC have been compiled and are included in this document as **Appendices 1** and **2** respectively. These responses have been prepared with input from Narrabri Coal Pty Ltd and seven of the specialist environmental consultants involved in the *Environmental Assessment*, namely:

- groundwater resources (GHD Pty Ltd);
- surface water resources (WRM Water & Environment Pty Ltd);
- salt management (Parsons Brinckerhoff Pty Ltd);
- noise (Spectrum Acoustics);
- Aboriginal and cultural heritage (Australian Archaeological Survey Consultants Pty Ltd)
- air quality (Heggies Pty Ltd); and
- socio-economic impacts (Key Insights Pty Ltd).

Figure R1 displays the locations of the properties / residences of each of the authors of the public submissions. Five of the seven public submissions were provided by local residents, four of which are located south of the Pit Top Area with access to their residences via Kurrajong Creek Road. The fifth submission was submitted by the owners of "Newhaven" located approx 4km north-northwest of the Pit Top Area. **Table R1** reproduces *Environmental Assessment* **Table 4A.2** highlighting the residences of the authors of the submissions (with the addition of "Burragurrum" and "Newhaven") which has also been added to the southern side of **Figure R1**.

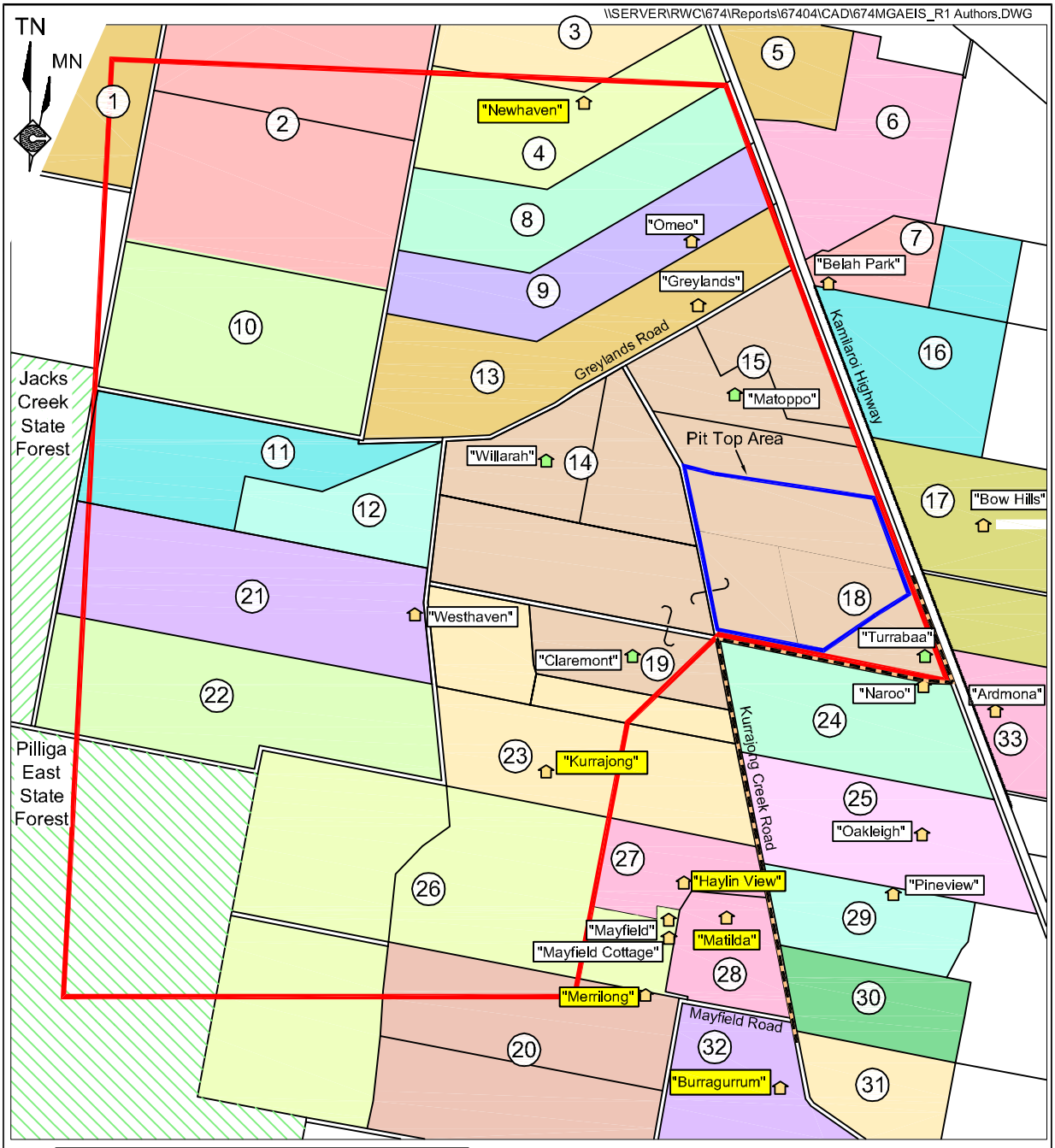
Table R1
Proximity of Residences to Project Activity Areas (m)

Residence	Crusher / Sizing Plant	Rail Loop (Cutting/Embankment)*	Site Access Road
"Ardmona"	2 615	1 490 (+2.0m)	1 330
"Belah Park"	2 650	2 270 (+1.5m)	2 840
"Bow Hills"	2 120	705 (+2.0m)	750
"Burragurrum"	4 890	4 480 (-3.4m)	4 450
"Claremont"**	1 460	1 560 (-6.0m)	1 170
"Greylands"	2 440	2 240 (-0.6m)	2 590
"Haylin View"	3 050	2 800 (-3.4m)	2 700
"Kurrajong"	2 760	2 800 (-6.0m)	2 550
"Matilda"	3 310	2 980 (-3.4m)	2 920
"Matoppo"**	1 560	1 340 (-0.6m)	1 730
"Mayfield Cottage"	3 580	3 330 (-3.4m)	3 240
"Mayfield"	3 400	3 170 (-3.4m)	3 080
"Merrilong"	4 150	3 890 (-3.4m)	3 820
"Naroo"	1 920	1 080 (+2.0m)	980
"Newhaven"	4 550	4 400 (-0.6m)	4 720
"Oakleigh"	2 960	2 380 (+2.0m)	2 230
"Omeo"	3 020	2 810 (-0.6m)	3 180
"Pine View"	3 340	2 750 (-3.2m)	2 680
"Turrabaa"**	1 800	730 (+2.0m)	640
"Westhaven"	3 220	3 390 (-7.6m)	3 070
"Willarah" **	2 170	2 250 (-5.6m)	2 150

* Depth of Cutting expressed as –m / Embankment height above natural ground level expressed as +m

** Project-related residence Property/residence of submission author

Table R2 presents the identified issues and comments in the submissions provided and identifies where in this document each is addressed.



LAND OWNERSHIP			
1	N. & F. King	18	Narrabri Coal Pty Ltd
2	C. & M. Clarke	19	Narrabri Coal Pty Ltd
3	A. & L. Grumley	20	R. & S. Chappel
4	K. & J. Scott	21	A. Castro
5	W. & A. Tick	22	D.,P.,B. & N. Grnearski
6	P. Smart	23	J. & G. Lennox
7	G. & C. Sevil	24	M. W. Foster
8	J. & M. Bish	25	C. Towns
9	A. Day	26	A. & L. Grumley
10	F. & A. Desanti	27	W. Chapman
11	P. & A. Mato	28	W. Chapman
12	R. & M. Cook	29	C. & D. Kirkby
13	M. & D. White	30	M. Thomas
14	Narrabri Coal Pty Ltd	31	B. Scott
15	Narrabri Coal Pty Ltd	32	G. & L. Stuart
16	C. Healion	33	P.C. Webb
17	J. & R. Stieger		

REFERENCE
- Project Site Boundary
- Pit Top Area Boundary
- Residence (Project Related)
- Residence (Non-project Related)
- Submission Author
- Proposed Public Road Sealing

SCALE 1:60 000

1 0 1 2 3km

Land Ownership Source: Dept. of Lands

Figure R1
LAND OWNERSHIP, AND AUTHORS OF SUBMISSIONS AND PROPOSED PUBLIC ROAD SEALING

Table R2
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
1. Mark Lennox "Kurrajong"	(a) "We are concerned that we will end up with coal mining activity all-round us, our concerns arise from previous discussions with Whitehaven administration personnel have had with us."	Section 5.2
	(b) "We have concerns about noise, especially at night. …… we don't have any constant noise at night now and enjoy the freedom of leaving our house open."	Section 12
	(c) "I have concerns about the viability of our farm-stay plans with the area being turned into an industrial coal mining zone."	Section 5.3
	(d) "The farm-stay accommodation and our house are situated on top of a plateau and will overlook the pit top area resulting in concerns of noise, lights, aesthetics and general appeal for wanting to spend time on a farm with a mining outlook."	Section 5.2
	(e) "This property has three titles, all with available building approval. The pit top area will make it unattractive and unobtainable to gain building consent should the mine go ahead."	Section 5.3
	(f) "I have social concerns as historically speaking mining and agricultural factions create friction, especially in respect to our proposed function centre."	Section 5.2
1. Supplementary Submission	"The following four considerations are therefore proposed. 1. Sealed road and associated fire break (250m wide) between Narrabri to the west of Willila onto the Ghooli Rd. 2. Stage one of a wildlife corricor and sealed road linking Pilliga to Kaputar incorporatig housing blocks as part of the corridor and the relocation of Baan Baa (see location map 2 and insert). 3. Access roads and fire trails griding the Pilliga. 4. Lake located on a flood area.	
2. Fiona Scott, B.O. Scott and K.L. Scott "Newhaven"	(a) "Area to be mined …… is there any guarantee that the mine will not revert to the map shown in the July 2006 newsletter in Stage 2? ……."	Section 2
	(b) "Subsidence As outlined in the Narrabri Coal Project – Subsidence Assessment, pages 8-16 to 8-17 seems to indicate that calculated subsidence of between 2.24m and 2.7m could occur. ……This is of great concern, since the portion of "Newhaven" included on the "Project Site" includes two natural waterways and three dams."	Section 6

* Reference to Section of this Response where issue identified is addressed

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Page 2 of 13

Submission received from:	Issue Identified	Section* or Comment
2. Fiona Scott, B.O. Scott and K.L. Scott "Newhaven" (Cont'd)	(c) "Air Quality Figure 4 (page 6-14) of the Air Quality Assessment also ignored the existence of the homestead located on "Newhaven" which is within the project lease area. …… There is no indication in the report on potential air quality impacts at this location."	Section 8
	(d) "Pollution impact on drinking water …… There is no indication in the report on potential impact of coal mine dust on drinking water quality collected from the roof."	Section 4.3
	(e) "Water supplies …… There is no mention of where water would be sourced from if the water from the underground working proves to be insufficient to meet requirements. This region falls within Zone 5 of the Upper Namoi Groundwater Zone and groundwater licences have been permanently cut back to 36% of previous allocations. Where will the water come from to supply the mine if it cannot source enough from its workings?"	Section 4.2
3. G.R. & L.E. Stuart "Burragurrum"	(a) "The first objection is that we are to make our submission to a Department of a very same Government that owns the coal! As stated in 67404 Section 6 p 17, DPI (MR) and the Proponent's objective is to "maximise resource utilisation". At what cost? Where is the fair and impartial review? All the reports that I have read have been prepared by entities paid by the Proponent and usually biased towards the Proponent. Where are the independent reviews? Is there anyone besides stakeholders involved in the process? We affected landholders are not professionals in these fields, where is our support and professional information to either dispute, or refute, these documents?"	Section 12
	(b) "We are most dissatisfied with the lack of communication from the Proponent. Not once has anyone from Narrabri Coal spoken to us or made attempts to contact us in any form, except for the two community newsletters that contain very limited information."	Section 2
	(c) "…….. it is stated that "they" understand there is not school bus on Kurrajong Creek Road. I can assure you there is, and has been for quite a number of years. ……."	Section 7.2
	(d) "…. the Public Exhibition was a joke" (documents available at quoted locations).	Section 12

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
3. G.R. & L.E. Stuart "Burragurrum" (Cont'd)	(e) "Surface Water: 1. If the Narrabri Coal Project has been designed as a no release system …….. why have the culverts on the Kamilaroi Highway been enlarged?" 2. The evaporation ponds have been designed as storage and evaporation ponds for mine inflows and surface runoff. …….. there isn't much allowance for significant rainfall event, which would lead to sediments and contaminants escaping the ponds."	Section 4.2
	(f) "Groundwater …….. In these current climatic conditions, any change in groundwater is unacceptable. …… What will happen if properties are affected? How quickly will remediation proceed? Before or after the stock are sold? What of any future water users? …….. 67404 Section 6 p 8 states that the risk is high for the reduction in groundwater production exceeding 15%. By how much will it reduce?"	Section 3.3
	(g) "Soils and Land Capability A predicted subsidence of <20mm doesn't sound much, but what will happen to the roots of vegetation, both surface rooted and deeper rooted. …. Should Stage Two proceed, imagine the trauma imposed to the vegetation by drops in the order of 2.424 to 2.79 METRES! …… Such a drop in the surface profile cannot be considered insignificant. It will impact on surface water drainage, groundwater flows and salinity. ……"	Section 3.4
	(h) "Visibility Whatever mitigation measures are provided will not change the fact that our landscape will be changed. "Soft lighting" will not make the mine invisible. The landscape WILL be changed."	Section 11
	(i) "Noise Nothing will change the fact that before mining we had a quiet rural area. …….. Any change is going to impact on us. 67404 Section 6 states there is a moderate risk of major and marginal exceedances of noise criteria leading to increased noise and/or vibration from rail and traffic and from mine activities."	Section 10

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
3. G.R. & L.E. Stuart "Burragurrum" (Cont'd)	(j) "Air Quality 1. The specialist conclusion was there would be minimal impacts to what they consider normal for this area. When was the testing done for the expected dust hazard?" 2. There is much discussion in the specialist study on particle matter size, gas compositions, and on models based on areas remote to ours. …. Just what is going to be in the dust produced by site establishment or mine production? … I did not see any assurances that the particle matter composition or concentrations will not impact on the quality of these."	Section 8
	(k) "Traffic Considerations 1. We don't think it fair that we will have to obey new Stop sign at the junction of Kurrajong Creek Road and the mine access road……. 2. Installation of warning lights and bells at the rail crossing is a good idea, but the idea could, and should, be further expanded by installing lights and bells on ALL rail crossings between the site and the port of Newcastle. ….." 3. A six (6) minute delay at the rail crossing is "acceptable" (Page 119) because it doesn't impact on, numerically, many of us. We find it totally unacceptable. …. How are we to know how much time to allow going somewhere when we won't know what traffic (road or rail) we will have to wait for until we get to that section of road? It would become quite unacceptable if Emergency Vehicles were needed either by the locals or the mine staff. ll… I could not find a contingency plan anywhere in the documentation."	Section 7.3
	(l) "Socio-economic 1. …….. The study does not consider what will happen to those that are not involved in "the resource boom". Those involved with mining have a far greater income than the rest of use and everything will be priced accordingly, leaving the rest of the population our in the cold. 2. Given that "two thirds of the initial workforce will be sourced from outside the local area", it will leave quite a lot of local residents missing out on the perceived benefits.	Section 5.5

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
3. G.R. & L.E. Stuart "Burragurrum" (Cont'd)	3. The incidence of "social stress" could well increase, as the gap between the economic groups further widens. The proposal of a coal mine in my neighbourhood has definitely increased my stress levels. 4. In 67404 Section 6 p 12 it stages that all members of the Baan Baa and Narrabri communities will benefit from the project and the Proponent intends to continue to consult with the local community. As far as we are concerned, they never started.	Section 5.5
4. Warren James Chapman "Matilda / Haylin Views"	(a) Groundwater – Both properties have spring fed dams with Haylin Views having a registered bore. I believe underground mining will impact on this viable natural resource.	Section 3.2
	(b) Soils and Land Capability – If groundwater is reduced then so is the productivity and profitability of my properties.	Section 3.4
	(c) Social Impact – I am concerned about resale value of my properties. I am also concerned about perception of the area given the close proximity of the mine.	Section 5.3
	(d) Air Quality – A huge amount of traffic dust hits me from 3 sides……. My home is situated approximately 500 metres from the depot set up by the drillers on Mayfield. Volume of traffic is increasing daily.	Section 8
	(e) Traffic & Transport – Proposed 6 minute wait to cross highway could be a matter of life and death or loss of property for anyone needing an ambulance, fire brigade or police to arrive. Currently the drilling contractor has their depot located approximately 500 metres from my home. Traffic has been gradually building up and we can only anticipate becoming inundated with mine related vehicles as the proposed mine develops. The public road, which is gravel, is incapable of carrying the increased heavy volume.	Section 7.3
	(f) Permissibility – Basically, the drillers are operating a commercial business on rural land which contravenes the Narrabri Shire Council zoning.	Section 12
	(g) Surface Water – Saline water will make its way to local stock and domestic dams downstream and eventually to the Upper Namoi Catchment Area.	Section 4.3
	(h) Noise & Vibration – Traffic noise is already impacting on my life with the drillers depot next door. I believe trains will be operational 7 days per week, 24 hours a day with no set timetable.	Section 10
5. AJ Pickard, Narrabri	(a) The effect that this mine will have on the water table especially if and when they take underground water from the pilliga sandstone and the artesian water basin.	Section 3.2

* Reference to Section of this Response where issue identified is addressed

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
5. AJ Pickard, Narrabri (Cont'd)	(b) Narrabri Coal said that the artesian basin was not under their granted leases and now the bulk of their wash water (850 million litres approximately) is to come from water sourced from that basin.	Section 3.2
6. Robert Roy & Sandra Ann Chappel "Merrliong"	(a) Groundwater – We have had a natural spring on our property which effectively drought proofs our property for our stock, we believe long wall mining will impact on this natural resource which we are fortunate enough to have on our property. No-one has determined the direction and rate of flow this spring and no assessment has been made by any representative of Narrabri Coal Pty Ltd.	Section 3.2
	(b) Soils & Land Capability – If groundwater is affected then the land capability is diminished, our stock carrying capacity would be decreased substantially and we believe this could make our property unviable for us.	Section 3.4
	(c) Social Impact – We are concerned about the resale value of our property with the Stage 1 mining activity proposed for a section of our property and the balance being the proposed commencement of Stage 2 on the southern side.	Section 5.3
	(d) Air Quality – Already our air quality is deteriorating due to heavy traffic volume and this is only the early preparation stages of the proposed mining lease.	Section 8
	(e) Traffic & Transport - 1. The proposed 6 minute wait to cross the railway line to the highway seems excessive, this amount of time could be a matter of life and death or loss of property for anyone waiting for an ambulance, fire brigade or the police to arrive. There is potential for a fatal accident at both Kurrajong Creek crossing and the crossing in the centre of Baan Baa. 2. There is no mention in the assessment of the Narrabri School Bus which travels to and from Baan along Mayfield Road and Kurrajong Creek Road. 3. Currently the drilling contractor has its depot located approximately 500 metres from our home. Traffic has gradually been building up and we can only anticipate becoming inundated with mine related vehicles as the proposed mine develops. The public road, which is gravel, is incapable of carrying the increased heavy volume. The employees of the drilling company speed on the public and private access road into their depot, the constant dust drift over and into our house is both unpleasant and a hazard to endure. As well the road on Merrilong Lane, which gives public road access to the drilling company HQ, is in very poor condition due to the heavy traffic flow and heavy transport vehicles.	Section 7.3

* Reference to Section of this Response where issue identified is addressed

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
6. Robert Roy & Sandra Ann Chappel "Merrliong" (Cont'd)	(f) Surface Water – Saline water will make its way to local stock and domestic dams downstream and eventually to the Upper Namoi catchment area.	Section 4.3
	(g) Noise & Vibration – Traffic noise is already impacting on our lives……. We believe trains will be operational 7 days per week, 24 hours a day with no set timetable.	Section 10
	(h) Subsidence – We believe the impact will be substantial and will have major impact on all residences within the proposed mining lease area both in Stage 1 and Stage 2 as well as impact on those outside the lease area.	Section 6
7. The United Mineworkers Federation of Australia	(i) In part there appears: • A failure to specify with clarity the economic returns to the community. • A failure to specify employment benefits, income employees will receive, how the terms and conditions of employment will be regulated and whether or not wages will be consistent with those that are generally paid in the coal mining industry. • A failure to consider that there are no limitations on the rail infrastructure from Narrabri to the Ports of Newcastle. • A failure to deal with the coal capacity problems at the Ports of Newcastle. Coal producers have had to take action including the retrenchment of employees and the reduction of coal production in the region. • A failure to take into account there is currently more coal produced in the region that can be freighted and shipped out of the Ports of Newcastle.	Section 5.4
8. Narrabri Shire Council	(a) That the Minister for Planning (Minister) take into consideration a bond, or a requirement for the proponent to provide suitable off-sets, to ensure the functionality, capability and suitability of the development site being restored to its current state and require that the appropriate analyses be carried out to determine the current level of landscape functioning on-site.	Section 12
	(b) That the Minister ensure that the cultural heritage awareness induction course is implemented as appropriate and that Aboriginal monitors be invited to the site on all appropriate occasions.	Section 9
	(c) That the Minister consider the potential for an indigenous position(s) in on-site staffing be established for the purpose of cultural heritage management.	Section 9

* Reference to Section of this Response where issue identified is addressed

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
8. Narrabri Shire Council (Cont'd)	(d) That the Minister consider not only the impact of the development on artefacts but on the wider landscape context of any sites of cultural heritage significance and encourage the use of the Burra Charter in the management of heritage sites associated with the development.	Section 9
	(e) That the Minister ensure that the interests (in terms of both business and quality of life) of neighbouring land owners / occupiers are taken into consideration and given close and serious attention.	Section 5.5
	(f) That the Minister condition any development consent given to include the long term retention of the new road arrangement and adjacent to the Kurrajong Creek and "Bow Hills" turn-offs.	Section 7.4
	(g) That the Minister ensure that any development consent given includes a condition that Shire Road 188 be constructed and sealed for a minimum distance of 200 metres south of the intersection with the mine access road.	Section 7.4
	(h) That the Minister ensure all upgrades to, and maintenance of Shire Roads be carried out in accordance with Narrabri Shire Council's standards and that signage at the Kamilaroi highway intersection adjacent to Kurrajong Creek include road names and be implemented to RTA standards.	Section 7.4
	(i) That the Minister ensure that all contributions of $62.50 and $25 per employee be required from the proponent for bush fire fighting services and community facilities, respectively consistent with Narrabri Shire Council Section 94 contributions plan.	Section 5.5
	(j) That the Minister require the proponent to enter into a memorandum of understanding with Council for a community infrastructure trust or similar arrangement.	Section 5.5
	(k) That the Minister consider the need for the streets in Baan Baa to be sealed in preparation of the increased use of those streets resulting from the development.	Section 7.4
	(l) That the Department ensure that Narrabri Shire Council's policies and development control plans are adhered to ……..	Section 12
9. Gunnedah Shire Council	(a) Socio-Economic Issues Council is concerned that the socio-economic assessment takes little account of the potential impacts on Gunnedah. 1. Despite Gunnedah being mentioned in the identified towns in which mine workers would be inclined to live, of the eight persons that were personally interviewed as part of the community consultation process, none were from Gunnedah or living within the Gunnedah LGA.	Section 5.4

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
9. Gunnedah Shire Council (Cont'd)	Interestingly, all persons interviewed noted that Gunnedah would be a potential base for mining and mining related workers. Notwithstanding this, there is little detail as to the impacts or implications of workers residing in Gunnedah Community. Nor is there any reference to the demands generated by service industries that will need to support this mine operation. 2. There is an acknowledgement that the development will place some stress on communities concerned ……. the *Environmental Assessment* again makes no reference to how this stress will be mitigated or how the resultant demands for community infrastructure and services will be supported, managed or financed. 3. The suggestion that 80% of the mine workforce would choose to live in Narrabri is also of interest to Council. It is conceivable that given the migration of the coal industry from the Hunter Valley to the Gunnedah Coal Basin, being south of the Narrabri Coal Mine, may well be the centre of choice for those miners currently residing in the Hunter. Certainly Gunnedah has become a focus for service and support industries to the expanding coal operations in the Gunnedah Basin to date. Accordingly, it is not inconceivable that it would become the hub of the service provision to mines such as the Narrabri Coal Project given that these support operators would also be providing service to other mines near Gunnedah. The possible multiplier effect from the Narrabri Coal Project to the region is significant but not defined within the *Environmental Assessment*. Council wishes to ensure that services in Gunnedah are not unreasonably stressed by this development to the disadvantage of the existing and future community. Recommendation – That the proponent establish a Community Enhancement Program in association with Council and the community in order to address community infrastructure and service demands, with the program funded by a contribution from annual saleable coal production.	Section 5.4 (Cont'd)

* Reference to Section of this Response where issue identified is addressed

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
9. Gunnedah Shire Council (Cont'd)	(b) Transportation Issues 1. Of particular interest to Council are the implications of the increased rail traffic. The use of the 84 wagon trains will have a significant impact on the railway crossings at Gunnedah. Whilst the operation of three additional wagon trains per day may seem acceptable, no consideration has been given to the likely cumulative and daily impacts of rail traffic through Gunnedah having particular regard to the existing three level crossings and the implications for local and highway traffic. Nor has there been any evaluation of the impact of use of the 84 wagon trains either in the initial stage or should the mine become a long wall operation. 2. Council is extremely concerned at the cumulative impact of coal train movement on Gunnedah not only in respect of this proposal but as a consequence of existing mining operations at Tarrawonga and Whitehaven and other potential future mining developments to the north of Gunnedah together with other freight on the line. 3. .. an 84 wagon coal train has an overall length of approximately 1250 metres. The distance between the New Street rail crossing and the crossing at Marquis Street is 870 metres. Effectively, when these long trains are in operation both the New Street and Marquis Street crossings will be blocked for some period of time. Clearly the frequency of this will be dependant on the overall cumulative impact of coal and other freight movement. If the railway line is blocked for an extended period it is most probable that traffic build up and congestion will occur at these roundabout intersections thus impacting on the operation of the state highway. As a consequence of their restriction on access, to and from the Gunnedah CBD, it is likely that more local traffic will use the overhead rail bridge at Abbott Street. This bridge is part of the Oxley Highway but its width does not meet current state highway design standards. Recommendation – That the existing Abbott Street rail overpass bridge be widened to the accepted Roads & Traffic Authority highway standard prior to the introduction of 84 wagon coal trains with provision made in terms of this development proposal and future proposals for contributions from coal mine developers. That the NSW Government initiate a study to consider the cumulative impacts on the Gunnedah urban area of increase coal transportation on the North West Railway Line and mechanisms by which these impacts may be mitigated.	Section 7.5

* Reference to Section of this Response where issue identified is addressed

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
10. NSW Dept of Primary Industries	(a) Mine Safety – DPI requires: • A commitment to compliance with the Coal Mine Health and Safety Act 2002 and the Coal Mines Regulation Act 1982. • Nomination of a person (or persons) as Operator and Manager as required by the *Coal Mine Health and Safety Act 2002* and *Coal Mines Regulation Act 1982*. • Details of the procedures the Proponent intends to adopt in addressing any safety issues identified by an inspector or Mine Safety Office or an authorised Government Official as specified in the *Coal Mine Health and Safety Act 2002*. (b) Mining Operations Plan (MOP) and Rehabilitation • A Mining Operations Plan (MOP) should be submitted to DPI for acceptance prior to the commencement of any construction. The MOP should be prepared in accordance with Department Guideline EDG03. Detailed final landform design and rehabilitation completion criteria should be included in the MOP. • Further design detail for the amenity bunds should be submitted as part of the MOP. • If infrastructure is planned to remain at the end of the project, a reference to a consultation/agreement process with DPI will ensure that DPI has a role in regulating the environmental impact of remaining infrastructure.	
	(c) Dust – It should be stipulated that the proponent maintain this access road (the Ventilation Shaft access road) in a condition that minimises dust generation. Sheeting the road with gravel aggregate may be required.	No longer applicable
	(d) Subsidence – The proponent may be required to prepare a Subsidence Management Plan as a specific requirement for any mining lease before operations can commence.	Section 6
	(e) Fisheries – The EA addresses the impacts on surface water and some aquatic organisms (eg frogs) but does not specifically address the impacts on fish and fish habitat. Culvert construction and any works on watercourses or drainage lines, eg culvert 7 on Kurrajong Creek Tributary 1, should be in accordance with DPI's Policy and Guideline document: *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.*	Section 4.4

* Reference to Section of this Response where issue identified is addressed

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

Submission received from:	Issue Identified	Section* or Comment
11. Namoi Catchment Management Authority	(a) Site Establishment – In regard to S2.4.11 mined rock management and Perimeter Amenity Bund, it is recommended that the Bund batters be reduced to 4H:1V (both internal and external) and they be subsoiled (0.35m) and topsoiled (0.15m) to a minimum of 0.5m.	Section 12
	(b) Some of the specifications for safeguards (Diversion Banks S4B.1.4.2.2 are concerning. The channel grades may result in erosion and turbidity within the bank channel unless the channels are well grasses.	
	(c) It is recommended that the contingency plan for loss of groundwater for local users be a condition of development approval. The contingency plan should specify the remedial actions as well as any compensation measures.	Section 3.3
12 RTA	(a) Gravel Pit Access • The proposed new access should continue to be the main access to the quarry following completion of Narrabri Coal's use of the quarry, rather than close the new access and revert to the old (existing) access to the north. • Installation of appropriate traffic management control of quarry traffic crossing the Kamilaroi Highway, to be determined in conjunction with approval of design of the access by the RTA. • Constructed to conform to a type 'BAL' intersection, see the RTA Road Design Guide, Part 4.	Section 7.4
	(b) Level Crossing • It would be appropriate to provide lighting of the level crossing at the construction phase to ensure visibility of trains passing through the passive controlled crossing. • The level crossing will require the installation of a queuing treatment as detailed in Australian Standard AS1742.7 (2007) in conjunction with the Kurrajong Creek Road upgrade. • The level crossing must be under active control before commencement of the operational phase and trains use the proposed balloon loop. • The proposed notification sign board is to be located west of the level crossing in Kurrajong Creek Road, in a location that will not distract from driver recognition of the level crossing operation. • The level crossing is the subject of a risk assessment undertaken by the Australian Rail Track Corporation, the recommendations of the risk assessment should be undertaken by the developer.	Section 7.4

* Reference to Section of this Response where issue identified is addressed

Table R2 (Cont'd)
Issues and Comments of the Public and Government Agency Submissions Considered

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Submission received from:	Issue Identified	Section* or Comment
12 RTA (cont'd)	(c) Kamilaroi Hwy Intersection • The proposed intersection layout appears acceptable ……. assuming the delay due to trains accessing the mine balloon loop does not exceed that proposed in the *Environmental Assessment*. • It will be necessary to install appropriate advance warning signs in consultation with the RTA. • Maintenance of the Kamilaroi Highway intersection and Kurrajong Creek Road should be the responsibility of the developer for the life on the mine, or until other major development occurs on Kurrajong Creek Road.	Section 7.4
13 Department of Water and Energy	Due to the level of detail included in DWE's submission, and the breadth of information required in the response, this is the subject of a separate report. The detailed response to the DWE submission is provided as **Appendix 1**.	Appendix 1
14 Dept of Environment & Climate Change	Due to the level of detail included in DECC's submission, and the breadth of information required in the response, the Proponent's response is the subject of a separate report (see **Appendix 2**). Based on a review of the issues raised by DECC (and other government and public submissions), the Proponent has received and prepared and updated Statement of Commitments for the Narrabri Coal Project (see **Appendix 3**).	Appendix 2
* Reference to Section of this Response where issue identified is addressed		

2 CONSULTATION

Several of the public submissions complained of a lack of public consultation and/or a mis-information campaign by the Proponent prior to the submission of the *Environmental Assessment*.

Submission 2(a) *- "Area to be mined …… is there any guarantee that the mine will not revert to the map shown in the July 2006 newsletter in Stage 2? ……."*

- Fiona Scott, B.O. Scott and K.L. Scott
"Newhaven"

Submission 3(b) *- "We are most dissatisfied with the lack of communication from the Proponent. Not once has anyone from Narrabri Coal spoken to us or made attempts to contact us in any form, except for the two community newsletters that contain very limited information."*

- G.R. & L.E. Stuart
"Burragurrum"

Submission 4(a) *- "No–one from the mine has been in contact with me regardless of extensive requests that a representative speak with me."*

- Warren Chapman
"Matilda"

The claim by Mr. G. Stuart that the "Turrabaa" Homestead was unmanned on Friday 20 April (4:00pm) and Thursday 26 April (3:00pm) is correct. On those two days, the Company representative had to leave early, however, a note was left at the entry door explaining his early departure but leaving a follow-up contact number. During the entire exhibition period, only two persons visited the "Turrabaa" Homestead to discuss the project.

The Proponent is not aware of difficulties experienced by other district residents in gaining a copy of the CD or EA summary. In fact, a number of district residents who received the correspondence from the Proponent regarding the exhibition period (also sent to Mr Stuart), approached the Company to obtain project documentation but Mr Stuart did not approach the Company's representative during the exhibition.

The claim by Mr Chapman is refuted as Company representatives recall at least two discussions with Mr Chapman. Furthermore, Mr Chapman was one of the two local residents who visited "Turrabaa" homestead during the exhibition period.

3 GROUNDWATER RESOURCES (INCLUDING MONITORING AND CONTINGENCY PLANS)

3.1 Introduction

The Department of Water and Energy prepared a detailed submission with reference to groundwater resources. A detailed response to this submission is provided as **Appendix 1**. In addition, a number of the public submissions raised concerns over the predicted impacts on groundwater and the subsequent impact on their ongoing agricultural activities. The following sub-sections consider the various issues raised with reference to the following groundwater topics made in public submissions.

(i) Impacts on local groundwater bores, springs and / or aquifers (especially that of the Great Artesian Basin) (see Section 3.2).

(ii) Contingency plans in case of impacts on groundwater availability (see Section 3.3).

(iii) Impacts on soils, land capability and agricultural viability (see Section 3.4).

3.2 Impacts on Local Bores, Springs and / or Aquifers

Several of the public submissions expressed concerns and sought additional information on the predicted impact of the project on local groundwater levels, impacts on groundwater bores and/or springs and impacts on general recharge to the Great Artesian Basin aquifer. Suffice it to say as an introductory comment that some of the comments and concerns expressed related principally to Stage 2 of the project, namely the longwall mining operation.

Submission 4(a) *- Groundwater – Both properties have spring fed dams with Haylin Views having a registered bore. I believe underground mining will impact on this viable natural resource.*

- Warren James Chapman
"Matilda" / "Haylin Views"

Submission 5(a) *- The effect that this mine will have on the water table especially if and when they take underground water from the pilliga sandstone and the artesian water basin.*

Submission 5(b) *- Narrabri Coal said that the artesian basin was not under their granted leases and now the bulk of their wash water (850 million litres approximately) is to come from water sourced from that basin.*

- AJ Pickard, Narrabri

Submission 6(a) *- Groundwater – We have had a natural spring on our property which effectively drought proofs our property for our stock, we believe long wall mining will impact on this natural resource which we are fortunate enough to have on our property. No-one has determined the direction and rate of flow this spring and no assessment has been made by any representative of Narrabri Coal Pty Ltd.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

GHD Pty Ltd have reviewed their original groundwater assessment (GHD, 2007) considering these submissions.

Impacts on Local Springs
It is likely that the water source for the noted springs on the "Matilda", "Haylin Views" and "Merrilong" properties would be either isolated alluvial deposits or perched water aquifers from surface water recharge. As such, the drawdown impacts predicted by GHD (2007) would be unlikely to impact on these sources of water located near surface. Notwithstanding the predicted lack of impact, the Proponent would inspect the noted spring fed dams as part of a baseline groundwater monitoring program (see Annexure 1 of **Appendix 1**). This will allow assumptions over spring water source to be confirmed and contingency plans developed in consultation with the land owner in the unlikely event of mining-related impact.

Impacts of the Pilliga Sandstone Aquifer and Great Artesian Basin
GHD Pty Ltd note that groundwater flows within the Purlawaugh Formation and Garawilla Volcanics on the Project Site are to the northeast and therefore do not provide in-flows to the Great Artesian Basin as suggested by the description of Groundwater Management Area (GWMA) 601 (Intake Beds of the Great Artesian Basin). Therefore, the Pilliga Sandstone is the only layer on the Project Site contributing to the intake beds of the Great Artesian Basin.

It is noted that the Pilliga Sandstone layer is unsaturated over the Project Site (GHD, 2007). Therefore, impacts within this layer on the Project Site itself will be minimal although it is acknowledged that the effect of drawdown in other layers on the Project Site will have the effect of lowering water levels within the Pilliga Sandstone beyond the Project Site boundary.

GHD Pty Ltd have therefore re-modelled the underground mining for the project to identify the relative contribution of water from each model layer to mine in-flows and specifically those of the Pilliga Sandstone of the Great Artesian Basin. The groundwater modelling shows the mine inflows are predicted to be primarily sourced from the adjacent Gunnedah Basin Formations. The predicted flow through the base of the Pilliga Sandstone changes from a net inflow of 278m^3/d prior to mining, changing to a net loss of 13m^3/d at Year 50. This decrease of 291m^3/d, assumed to be due mine drainage, is equivalent to an in-flow volume of approximately 100ML in Year 50.

While this level of impact is unlikely to have any noticeable impact on water users within GWMA 601, it will necessitate the Proponent acquiring one or more water access licence(s) for the reduction in in-flows. Given impacts within the Pilliga Sandstone will take several years to occur, the Proponent has committed to obtaining the necessary licence(s) within 5 years of the commencement of coal extraction.

3.3 Contingency Plans

Two submissions requested further detail on actions to be taken in the event of detrimental impacts on the availability and/or quality of groundwater to local land owners.

Submission 3(f) *- "Groundwater*
……. In these current climatic conditions, any change in groundwater is unacceptable. ……. What will happen if properties are affected? How quickly will remediation proceed? Before or after the stock are sold? What of any future water users? ……. 67404 Section 6 p 8 states that the risk is high for the reduction in groundwater production exceeding 15%. By how much will it reduce?"

- G.R. & L.E. Stuart
"Burragurrum"

Submission 11(c) *- It is recommended that the contingency plan for loss of groundwater for local users be a condition of development approval. The contingency plans should specify the remedial actions as well as any compensation measures.*

- Namoi Catchment Management Authority

As noted in Section 4B.2.6.2 of the *Environmental Assessment* (p. 4B-56), *"... the heterogeneity of the fractured rock aquifers below the Project Site and the local area means that while the modelling provides a very good indication of the likely impacts on groundwater levels, bore yields and water availability, impacts may be greater (or less) than predicted in the various layers and subsequently different bores. To accommodate for this possibility, the Proponent would prepare a contingency strategy to ensure that any reduction in groundwater availability to local users would be remediated or replaced."*

The Proponent's commitment is re-stated to preparing and implementing a comprehensive and detailed Groundwater Monitoring and Contingency Plan (GMCP), to the satisfaction of the Director-General of the Department of Planning, the Department of Water and Energy and potentially-affected water users.

Further to the information provided in EA Section 4B.2.6, GHD Pty Ltd prepared a draft GMCP (see **Annexure 1** of **Appendix 1**). The draft GMCP proposes to include the following.

- A comprehensive monitoring network which includes both established groundwater extraction bores and additional monitoring bores to be constructed within the three Groundwater Monitoring Areas identified as occurring on or adjacent to the Project Site.
- A baseline survey of both of the existing and proposed monitoring bores to establish current or initial status including standing water levels, water quality, flow rates and total extraction volumes. Monitoring will be undertaken monthly with at least 12 months of data collected and reviewed prior to the commencement of coal extraction.

- A mining monitoring program to allow potential impacts of the mining operations within the three Groundwater Monitoring Areas to be continually assessed. The program will be reviewed annually by an independent hydrogeologist, with any recommended changes to be incorporated into the following year's monitoring.
- A post-mining monitoring program to be undertaken in all monitoring bores during site decommissioning and rehabilitation and selected bores for a period of time to be negotiated with DWE following mine closure.
- A protocol for the establishment of impact trigger levels and implementation of contingency measures should trigger levels be reached.

Figure R2 presents the locations of the proposed monitoring bores of the GMCP.

Further detail on the draft GMCP is provided by **Appendix 1** and it is acknowledged that the GMCP may require further revision to satisfy the DWE and the Director-General of the DoP.

3.4 Soil and Land Capability

Two submissions also expressed concerns and further information on the impact any decrease in groundwater availability would have on the soil and land capability of their properties as this would ultimately influence the viability of current agricultural activities.

Submission 4(b) *- Soils and Land Capability – If groundwater is reduced then so is the productivity and profitability of my properties.*

- Warren James Chapman
"Matilda" / "Haylin Views"

Submission 6(b) *- Soils & Land Capability – If groundwater is affected then the land capability is diminished, our stock carrying capacity would be decreased substantially and we believe this could make our property unviable for us.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

As noted in response to Submissions 3(f) and 11(c), the Proponent has committed to the preparation and implementation of a GMCP (to the reasonable satisfaction of potentially affected water users). The GMCP would provide contingent measures to be implemented by the Proponent in the event of mine-related impacts on groundwater quality or availability. The contingent measures may include:

- lowering of the pump sets, installation of pumps with higher lift capacity or replacement of bores to accommodate deeper, high lift pumps for the deeper bores;
- deepening of the bores to provide a greater saturated thickness for the shallower bores with alluvial material; and/or
- provision of supplementary high quality water from a reverse osmosis water conditioning plant as a short term mitigation measure whilst long term supply is secured through previously noted (or alternate) measures.

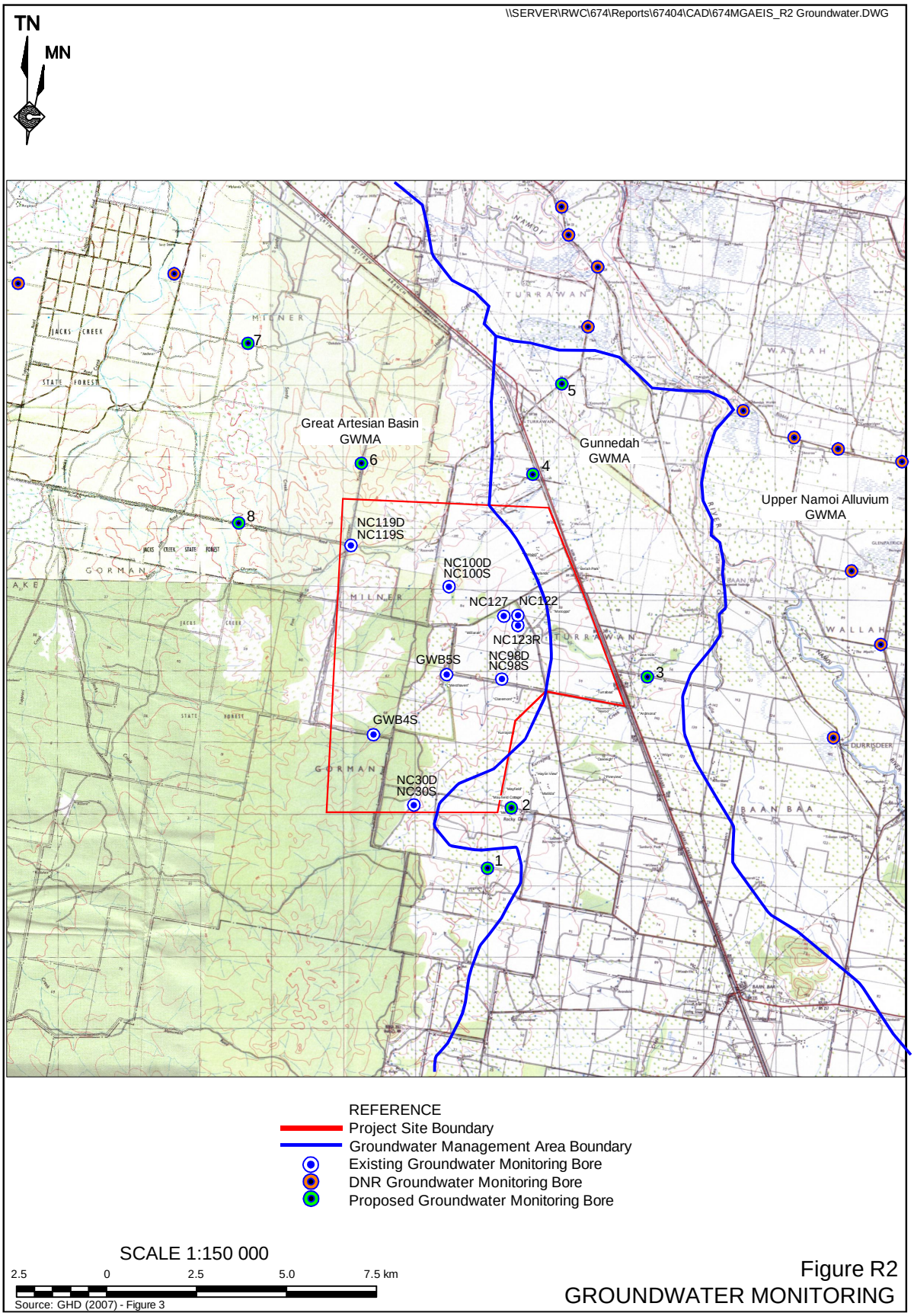

Figure R2
GROUNDWATER MONITORING

Given the proposed preparation and implementation of the GMCP, which would minimize the possibility of reduced groundwater availability to local land owners, there would be minimal impact on property stock carrying capacities and productivity.

4 SURFACE WATER ISSUES

4.1 Introduction

The following sub-sections provide additional information on other surface water issues, as raised by the public and government agency submissions. The following sub-sections consider:

(i) surface water flow patterns and internal water management (see Section 4.2);

(ii) pollution of local water bodies and drinking water supplies (see Section 4.3); and

(iii) specifications of proposed drainage control structures (see Section 4.4).

Issues related to mine dewatering and saline water management are considered in **Appendix 1**, a detailed response to the submission of the DWE.

4.2 Surface Water Flow Patterns and Internal Water Management

Several submissions received relating to the *Environmental Assessment* expressed concerns and sought further information on the management of surface water on and external to the Pit Top Area of the Project Site. The following excerpts from two of the submissions summarise the concerns held by local stakeholders.

Submission 3(e) *- "Surface Water:*

i. If the Narrabri Coal Project has been designed as a no release system ……. why have the culverts on the Kamilaroi Highway been enlarged?"

ii. The evaporation ponds have been designed as storage and evaporation ponds for mine inflows and surface runoff. ……. there isn't much allowance for significant rainfall event, which would lead to sediments and contaminants escaping the ponds.".

- G.R. & L.E. Stuart
"Burragurrum"

With reference to the culverts on the Kamilaroi Highway (point (i)), these were upgraded and enlarged under a capital works program of the NSW RTA. The timing of the works is purely coincidental with that of the planning for the project.

With reference to the storage capacity of the evaporation ponds (point (ii)), reference is made to Sections 2.5.4 and 4B.1.4.3.3 of the *Environmental Assessment* (EA pp. 2-46 to 2-49, and pp. 4B-25 to 4B-26 respectively).

In Section 2.5.4 (EA pp. 2-46 to 2-49), the Proponent's commitment to a saline water management strategy based on observed mine in-flows and dewatering requirements is described. However, depending on the actual volume of mine in-flows, the Proponent will

operate the mine commencing with management using evaporation ponds and then constructing a reverse osmosis (RO) water conditioning plant should the quantities of groundwater inflow be sufficient to sustain such a plant. The submission claims that "*there isn't much allowance for significant rainfall event, which would lead to sediments and contaminants escaping the ponds."* To the contrary, when a water balance model was prepared and run by WRM Water and Environment Pty Ltd (WRM, 2007) considering the wettest 10 year period in the 104 year record for the region against worst-case mine in-flow values, the constructed ponds were predicted to overtop only during Year 10 of operation (see EA Section 4B.1.3.3.3 – pp. 4B-25 to 4B-26).

Parsons Brinkerhoff have advised that lead time for the construction and installation of a RO water conditioning plant of the size likely to be required by the project would be between 3 months and 6 months. Therefore, even during a rainfall period equivalent to the wettest in the 104 year record of the region, with maximum dewatering required, the Proponent would have at leat 9 years to undertake the construction of the RO water conditioning plant.

It is noted that following the submission of the *Environmental Assessment*, the Proponent has reviewed its commitment to the construction of a RO water conditioning plant within the rail loop of the Pit Top Area. The commitment is that as soon as mine in-flows and dewatering requirements exceed operational requirements, the Proponent would commence activities to have the RO water conditioning plant constructed. The area allocated to evaporation ponds would revert to treated water and "brine"[1]. The conditioned water would be used for project potable and ablutions purposes, provided as contingent water supply to surrounding land owners potentially impacted by the mine's activities and/or on-sold under a commercial arrangement negotiated with other potential users. At least two brine ponds would be used such that the brine be allowed evaporate in one while actively discharged into the other. Following evaporation, the remaining salt would be either sold through commercial arrangement or placed within the mined out underground workings.

Submission 2(f) *- "Water supplies*
……. there is no mention of where water would be sourced from if the water from the underground working proves to be insufficient to meet requirements. This region falls within Zone 5 of the Upper Namoi Groundwater Zone and groundwater licences have been permanently cut back to 36% of previous allocations. Where will the water come from to supply the mine if it cannot source enough from its workings?"

- Fiona Scott, B.O. Scott and K.L. Scott
"Newhaven"

The Proponent maintains significant landholdings on the Project Site and would source water from dams on these properties in the event of a shortfall from the underground workings. A second alternative that would be considered would be extracting water from bores sunk into the Gunnedah Basin GWMA.

[1] Brine refers to the salty waste produced by the reverse osmosis (desalination) process. Parsons Brinkerhoff (2007) (**Appendix 4** of the *Environmental Assessment*) estimate the proportion of treated water to brine to be in the order of 70% : 30%.

4.3 Pollution of Local Water Bodies and Drinking Water Supplies

The following concerns were raised in relation to impacts on water quality as a consequence of the project.

Submission 2(d) *- "Pollution impact on drinking water*
……there is no indication in the report on potential impact of coal mine dust on drinking water quality collected from the roof."

- Fiona Scott, B.O. Scott and K.L. Scott
"Newhaven"

It is not anticipated that dust deposition on rooves will significantly impact the water supply obtained from rainwater tanks. The predicted increment of dust (see Table 9 of Heggies, 2007, p. 6-33) is significantly smaller than the assumed background levels surrounding the Project Site. Regardless of the incremental increase in dust deposition attributable to the project, the first flush of water during a rain event is likely to contain higher then average amounts of accumulated dust, bird and animal droppings, vegetation and other debris (*Guidance on Use of Rainwater Tanks* (Environmental Health, Commonwealth of Australia, 2004)). Investigations have shown that water quality improves after the initial 5L of water has passed through the down-pipe and it is suggested that the first 20L to 25L can be diverted or discarded to maintain a high quality of water. Based on the Environmental Health guidance, first flush diverters should be common practice to maintain a high quality of water.

Submission 4(g) *- Surface Water – Saline water will make its way to local stock and domestic dams downstream and eventually to the Upper Namoi Catchment Area.*

- Warren James Chapman
"Matilda" / "Haylin Views"

Submission 6(f) *- Surface Water – Saline water will make its way to local stock and domestic dams downstream and eventually to the Upper Namoi catchment area.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

Reference is again drawn to the conservative water balance undertaken by WRM Water and Environment Pty Ltd (WRM, 2007) (see Part 1 of the *Specialist Consultant Studies Compendium*, pp. 1-43 to 1-46, and Section 4B.1.3.3.3 of the *Environmental Assessment*, pp. 4B-25 to 4B-26). Assuming worst-case dewatering requirements during a rainfall period corresponding to the wettest 10 year period in the 104 year record for the region, overtopping of the evaporation ponds would not occur until the tenth year of project operation. This would allow ample time for mine inflows to be monitored and compared against predictions made by GHD (2007) (see Part 2 of the *Specialist Consultant Studies Compendium*, p. 2-41 and Figure 24). In the event the observed mine in-flows indicate the eventual exceedance of evaporation pond storage capacity, a RO water conditioning plant would be constructed and the waste brine ultimately disposed of either within the completed underground workings or sold off site.

The potential therefore for discharge of saline water from the Pit Top Area to surrounding properties is negligible.

4.4 Specifications of Proposed Drainage Control Structures

The *Environmental Assessment* provided detailed design features of surface water management structures to be constructed on the Project Site. The suitability of these was questioned in two of the submissions received.

Submission 11(b) *- Some of the specifications for safeguards (Diversion Banks S4B.1.4.2.2 are concerning. The channel grades may result in erosion and turbidity within the bank channel unless the channels are well grasses.*

- Namoi Catchment Management Authority

The Proponent intends to establish and maintain grass cover within flow channels of the proposed diversion banks and other drainage structures to reduce the potential for erosion within the channels. This not withstanding, the Proponent would conduct regular inspections of all drainage structures and undertake remedial works in the event eroding surfaces are identified.

Submission 10(e) *- Fisheries – The EA addresses the impacts on surface water and some aquatic organisms (eg frogs) but does not specifically address the impacts on fish and fish habitat. Culvert construction and any works on watercourses or drainage lines, eg culvert 7 on Kurrajong Creek Tributary 1, should be in accordance with DPI's Policy and Guideline document: Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.*

- Department of Primary Industries

The Proponent would ensure the proposed culverts on the Project Site are designed and constructed in accordance with the referenced guideline document.

5 SOCIO-ECONOMIC IMPACTS

5.1 Introduction

While the *Environmental Assessment* included an assessment of impacts on the socio-economic setting of the project (Key Insights, 2007), several submissions have expressed concern over social and economic impacts, both personally and to the wider community, should the project proceed. The following sub-sections review the issues raised by the submissions under the following sub-headings.

(i) Impacts on Amenity and Lifestyle (see Section 5.2).

(ii) Impacts on property values (see Section 5.3).

(iii) Impacts on the wider community (see Section 5.4)

(iv) Lack of 'social equity' (see Section 5.5).

5.2 Impacts on Amenity and Lifestyle

The submission of Mark Lennox ("Kurrajong") notes a number of potential impacts on general amenity and lifestyle currently afforded by the setting of "Kurrajong" property.

Submission 1(a), (d) & (f) –

(a) "We are concerned that we will end up with coal mining activity all-round us, our concerns arise from previous discussions with Whitehaven administration personnel have had with us."

(d) "The farm-stay accommodation and our house are situated on top of a plateau and will overlook the pit top area resulting in concerns of noise, lights, aesthetics and general appeal for wanting to spend time on a farm with a mining outlook."

(f) "I have social concerns as historically speaking mining and agricultural factions create friction, especially in respect to our proposed function centre."

- Mark Lennox
"Kurrajong"

The introduction of mining to Baan Baa area will result in a comparatively small footprint of disturbance – principally because the mine would be an underground mine. Hence, it is considered to be an overstatement regarding "*coal mining activity all-round us*". The Pit Top Area will be the only area where surface activities will be carried out.

With respect to the farm stay / function centre proposed on the 'Kurrajong' property, the owner of the 'Kurrajong' property has been well aware of the potential coal mine since exploration commenced.

5.3 Impacts on Property Values and Proposed Developments

Several public submissions referenced possible detrimental impacts on their property value or viability of proposed operations.

Submission 1(d) & (e) –

(d) "I have concerns about the viability of our farm-stay plans with the area being turned into an industrial coal mining zone."

(e) "This property has three titles, all with available building approval. The pit top area will make it unattractive and unobtainable to gain building consent should the mine go ahead."

- Mark Lennox
"Kurrajong"

Submission 4(c) - *Social Impact – I am concerned about resale value of my properties. I am also concerned about perception of the area given the close proximity of the mine.*

- Warren James Chapman
"Matilda" / "Haylin Views"

Submission 6(c) *- Social Impact – We are concerned about the resale value of our property with the Stage 1 mining activity proposed for a section of our property and the balance being the proposed commencement of Stage2 on the southern side.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

The following response was prepared by Key Insights Pty Ltd.

Anxiety regarding a potential drop in property prices is frequently a concern of residents confronted with a major development in their area, be it a mining operation, further residential development or some form of infrastructure.

A direct correlation between such developments and localised property values is hard to determine. One reason for this can include the fact that there are often too few sales to determine a clear change between "before" and "after" sales. Additionally, any change caused by a particular development can be obscured by a multitude of other variables affecting the housing market, including the property cycle, macroeconomic considerations, regional economic considerations and regional climatic considerations.

Generally, developments which contribute to the economic health of an area will have a positive effect on the housing market in that area. The presence of employment opportunities arising from a new mining operation will give increased confidence to the local economy, encouraging investment and spending. A stronger, more diversified economy emerging as a result of new mining activity will fuel demand for housing in the area. This demand for housing will contribute to a steadily growing housing market, making it considerably less likely that prices would fall.

Anecdotal evidence suggests that house prices tend to rise with mooted mine activity in an area. Previous Key Insights research revealed that the Township of Boggabri experienced rising house prices as a result of real estate speculation due to news of a mine project in the area.

Additionally, the diversification of the local economy that the mining development represents would provide a buffer to shocks which might otherwise have a considerable effect on the housing market. For example, the Narrabri area has traditionally been heavily reliant on agriculture. This high exposure to agriculture means that any shocks (for example, a drought) can have a wide ranging negative effect across the economy. The addition to the economy of new, diversified sectors such as mining mean that any future shocks are likely to have a less wide ranging effect on the local economy.

Some of the submissions from local landowners expressed concern over the "perception" of the area, and amenity once it had been "turned into an industrial coal mining zone". It must be noted that the underground nature of the mine will mean that there is minimal surface disturbance to the bulk of the area. The Proponent has undertaken to progressively remediate the Pit Top Area during the site establishment phase. While this is chiefly to stabilise areas disturbed, it will also minimise the impact on the amenity of the area. The Proponent has also undertaken to engage in the extensive planting of native trees and shrubs.

The Proponent's commitment to relocate the mine's ventilation infrastructure will remove any potential impediment, if there was one, for the three property titles within the 'Kurrajong' property. Furthermore, the sealing of the Kurrajong Creek Road will also contribute to the improved value of the properties accessed from this road.

5.4 Impacts on the Wider Community

While acknowledging the preparation of the socio-economic assessment of the project, two submissions presented concerns over the possible impacts on communities outside the Narrabri Shire.

***Submission 7** - In part there appears:*

- *A failure to specify with clarity the economic returns to the community.*
- *A failure to specify employment benefits, income employees will receive, how the terms and conditions of employment will be regulated and whether or not wages will be consistent with those that are generally paid in the coal mining industry.*
- *A failure to consider that there are no limitations on the rail infrastructure from Narrabri to the Ports of Newcastle.*
- *A failure to deal with the coal capacity problems at the Ports of Newcastle. Coal producers have had to take action including the retrenchment of employees and the reduction of coal production in the region.*
- *A failure to take into account there is currently more coal produced in the region that can be freighted and shipped out of the Ports of Newcastle.*

- The United Mineworkers Federation of Australia

With reference to the concerns raised over the port and rail capacity, the Proponent provides the following response.

Capacity of Port Newcastle

The current nominal capacity of Port Waratah Coal Services' Loading Facilities is 105Mt with approvals in place to expand to 120Mt. Newcastle Coal Infrastructure Group has approval to build a new port with capacity up to 66Mt. It is planned to commission Stage 1 (capacity 30Mt) by the end of 2009. The combined capacity will effectively manage coal exports through Port Newcastle for some years.

Rail Capacity

The coal transportation requirements of both Whitehaven Coal Mining Pty Ltd and Idemitsu Boggabri Coal Pty Ltd have been provided to both ARTC and RIC and accordingly, the capacity of the rail system has been planned to accommodate these requirements over the ensuing years.

Currently there are four rail paths per day for 44 wagon coal trains servicing the coal industry north of Werris Creek. Both RIC and ARTC have agreed to upgrade the line north of Muswellbrook to cater for 72 wagon coal trains instead of 44 wagon coal trains. This requires the construction (or lengthening of existing loops) of 5 loops north of Werris Creek and 3 loops south of Werris Creek, and motorising the points and introduction Centralised Train Control (RTC) north of Werris Creek. The improvements will enable 6 x 72 wagon trains per day on the system, ie. an increase in coal transportation of 245%.

Submission 9(a) *- Socio-Economic Issues*
Council is concerned that the socio-economic assessment takes little account of the potential impacts on Gunnedah.

"The Environmental Assessment makes no reference to how this stress will be mitigated or how the resultant demands for community infrastructure and services will be supported, managed or financed".

No account is taken of "who will pay for the additional demands on infrastructure and services generated as a consequence of growth".

"The assessment indicates two thirds of the initial mine workforce would be sourced from outside the local area".

Recommendation – That the proponent establish a Community Enhancement Program in association with Council and the community in order to address community infrastructure and service demands, with the program funded by a contribution from annual saleable coal production.

- Gunnedah Shire Council

The following response was prepared in conjunction with Key Insights Pty Ltd and the Proponent.

The original Social Impact Assessment estimated that 80% of incoming residents would choose to live in Narrabri. The Gunnedah Shire Council submission claims that it is "conceivable" that Gunnedah would be the centre of choice for those miners migrating from the Hunter Valley. While it is conceivable that some workers may choose to do this, Key Insights contends that the majority of workers will opt for the convenience and relatively closer location to the mine provided by the Narrabri Township. This is supported by the experience to date at the Proponent's Tarrawonga Coal Mine where approximately 50% of the mine workforce is drawn from areas outside Gunnedah including Boggabri, Narrabri, Manilla, Wee Waa, Curlewis and other country areas.

The Gunnedah Shire Council submission states that Council wishes to ensure that "services in Gunnedah are not reasonably stressed". Previous research undertaken by Key Insights for another mining project revealed Gunnedah as a well serviced area with significant social infrastructure in the areas of education, health and community facilities. Examples of such social infrastructure have been previously listed in R.W. Corkery & Co. Pty. Limited (2005) (an EIS for the East Boggabri Coal Mine) and are not reproduced in this document.

It is noteworthy, that pre 1998, Namoi Coal Pty Ltd, a company within the Whitehaven Group of Companies, employed at least 200 persons at the Gunnedah Colliery. Employment at other coal mines e.g. Vickery and Preston at the same time resulted in over 450 persons directly employed in coal mining many of which departed Gunnedah in the later 1990's. At that time, the infrastructure within Gunnedah was considered sufficient for those persons. At present, Whitehaven Coal Mining Pty Ltd employs in the order of 100 persons in the Gunnedah area, most of which are domiciled in Gunnedah. The Proponent remains confident that through its programs to encourage cadetships, traineeships and apprenticeships that it will gradually train much of its workforce originating from the Narrabri - Gunnedah area. The fact that Gunnedah is 70km from the Narrabri Project Site and only 30km from Narrabri provides the basis for the Company's expectation that most employees would be drawn from/domiciled in the Narrabri area. Clearly, based on the origin of the employees at the recently opened Tarrawonga Mine, a proportion of the employees are likely to travel from various centres including Gunnedah.

Key Insights projects that any effects upon Gunnedah would be similar to those experienced in Narrabri, but on a smaller scale. Thus, Gunnedah would share in those same positive benefits originally identified in the Social Impact Assessment.

- Reduction of social stress through provision of local jobs and enhanced economic well being.
- Training opportunities for local people, including young people and indigenous people, in a growth industry (mining).
- Contribution to the diversity of the economic base in Narrabri and Gunnedah Shires therefore enhancing the sustainability of rural communities within the Shire.
- Stimulus to local businesses, particularly in Narrabri, including motel and hotel trade, cafes and restaurants, mining related engineering and surplus spending activity such as gyms, cinema, recreational goods and services, beauty salons, and hair dressers.
- Increased population to participate in locals clubs, sporting groups, cultural activities, and organisations, therefore contributing to stronger social networks and social capital.
- More volunteers for community service organisations.

Periods of short term stress for Gunnedah may be experienced in the structural adjustment of housing markets and educational provision although new residents would benefit from the infrastructure in place in the 1990's. Again, any short term stress would be of a lesser magnitude than in Narrabri, and certainly outweighed by positive effects.

The submission mentions the pre-established service and support industries to the mining industry in Gunnedah. Any increase in nearby Narrabri would add to the viability of these firms and the economic vitality of Gunnedah.

Discussion with Mr Tony Jones (Community Liaison Officer for the Proponent and Gunnedah Shire Councillor) revealed that positive economic effects from mining operations were being felt in Gunnedah. He identified industries serving the mine industry, the personal services sector and supermarkets as growing and benefiting from mine activity. Mr Jones also noted that Gunnedah was enjoying considerable development planning which could be linked to the opening of new mining operations in the area. These included two large motel developments and a new industrial subdivision.

Mr. Jones noted that social infrastructure in Gunnedah was quite well developed, and included a number of state-of-the-art programs including the crime prevention committee and an excellent hospital. He mentioned specifically that Gunnedah's disability care was of a high standard. Mr Jones felt that, given the adequate levels of servicing, the onus should be on Council to quantify where services would be stretched as a result of any expected increase in residents and mine-related activity.

The Proponent places considerable emphasis upon its contributions to the local community and is committed to continue contributing to the communities throughout the Gunnedah and Narrabri Local Government Areas. The Company is also committed to its ongoing training and retraining program to maximise the opportunities for local persons to be employed at its various

operations. Positive relationships have been established with local TAFE colleges to assist in the training of new apprentices and trainees. Furthermore, the Proponent has a program to issue Scholarships for various university studies eg. Environmental Science.

The Proponent places considerable emphasis upon its involvement in a range of projects under Community Enhancement or similar programs that involve both long term and short term projects. Emphasis for the Narrabri Coal Project would be upon such programs within the Narrabri Local Government Area. The opportunity exists for other projects undertaken by the Proponent to be involved in programs in the Gunnedah Local Government Area for other programs related to other projects planned in that area.. It remains the Proponent's preference that it retains control over its contributions to local projects and programs, in consultation with the local Council and local community groups – that ie. in contrast to a set proportion of the production / capital costs etc. Each Council will receive increased rates from the Proponent for the land subject coal mining during the life of the various projects in both Local Government Areas. The continued involvement in the direct distribution of financial / resources for local projects and programs is sought by the Proponent.

5.5 Perceived Lack of Social Equity

The submission of G.R. & L.E. Stuart ("Burragurrum"), while acknowledging the potential socio-economic benefits of the project, raises a concern over the equitable distribution of benefits to the entire community.

Submission 3(l) *- "Socio-economic*

1. *…… The study does not consider what will happen to those that are not involved in "the resource boom". Those involved with mining have a far greater income than the rest of us and everything will be priced accordingly, leaving the rest of the population our in the cold.*
2. *Given that "two thirds of the initial workforce will be sourced from outside the local area", it will leave quite a lot of local residents missing out on the perceived benefits.*
3. *The incidence of "social stress" could well increase, as the gap between the economic groups further widens. The proposal of a coal mine in my neighbourhood has definitely increased my stress levels.*
4. *In 67404 Section 6 p 12 it stages that al members of the Baan Baa and Narrabri communities will benefit from the project and the Proponent intends to continue to consult with the local community. As far as we are concerned, they never started.*

- G.R. & L.E. Stuart
"Burragurrum"

The following response was prepared by Key Insights Pty Ltd.

The submission points out that those involved in the mining industry have a "far greater" income than other workers, and that this will lead to prices across the board being set according to these higher incomes. While those working in the mining industry do enjoy substantially above average incomes, Key Insights does not believe the number of workers potentially being employed by this project would represent a significant enough proportion of the total workforce to alter the fundamental supply and demand patterns for the region.

The table below shows a snapshot of the Narrabri LGA workforce from the 2001 Census. Narrabri's employed persons at the Census numbered 6 135. During the operational Stage 1 phase, the Narrabri Coal Project is projected to employ 94 fulltime workers, plus a number of technical, professional and mine support service personnel on an "as-needed" basis. (This may increase to 113 personnel if a third continuous miner is introduced.) 94 Fulltime personnel represent just 1.5% of the total number of employed people across Narrabri.

Narrabri LGA: Employment Characteristics	*Males*	*Females*	*Persons*
Employed:			
Full-time	2,810	1,229	4,039
Part-time	600	1,304	1,904
Not stated	119	73	192
Total	*3,529*	*2,606*	*6,135*
Unemployed	354	184	538
Total labour force	*3,883*	*2,790*	*6,673*
Not in the labour force	1,302	2,244	3,546
Unemployment rate	9.1%	6.6%	8.1%

The table below shows the number of workers (both men and women) across the 10 most prolific employing industries in Narrabri. Mining workers are also included on the table (as at 2001 there were just 14 workers from Narrabri employed in the mining industry). If the Narrabri Coal Project were to proceed, it would provide a significant boost to the number of mining workers in Narrabri. This, however, would still not represent a large proportion of total employment across the LGA.

Narrabri LGA: Employment by Selected Industry	
Agriculture, Forestry and Fishing	1,558
Retail Trade	861
Property and Business Services	466
Health and Community Services	431
Manufacturing	423
Education	352
Transport and Storage	351
Wholesale Trade	348
Construction	339
Accommodation, Cafes and Restaurants	305
Mining	14

A component of the submission notes that two thirds of new employment will be sourced externally, which leaves "local residents missing out on the perceived benefits". This would not be the case in a regional economy, sectors do not exist in isolation. While the proportion of mining workers earning above average incomes will not be large enough to affect the pricing structure of fundamental goods and services, the composition of the economy may be positively affected. The presence of above average incomes may lead to an increase in money available for "discretionary spending" in the area. This can lead to the establishment of businesses to capture this discretionary income. Such businesses may include cafes, restaurants and personal services such as hairdressers and gyms. The establishment of such businesses provide employment and further depth to the economy.

Such businesses would most likely source their staff locally, leading to an increase in employment. They would also provide training for a range of skills that may not previously have been available or in demand in Narrabri.

While mining activity in an area would have far reaching positive economic outcomes to the broader community through structural change of the economy, an important area for consideration is the specific donations and financial contributions that mining companies make directly to the community. In numerous cases, these contributions have a wide-ranging benefit, helping many people across the community, often those who are otherwise disadvantaged.

During discussions with Mr Tony Jones, he mentioned some initiatives that came to mind from recent times where Whitehaven had contributed to local communities. These included:

- $20,000 for an ablutions block for a Narrabri playing field;
- $25,000 to help Gunnedah with its bicentennial celebrations;
- $3,000 for the local Gunnedah Eisteddfod;
- $12,000 to Rotary to go toward a picnic shelter in Gunnedah;
- numerous donations to Boggabri Hospital contributing toward a heli-pad and defibulator;
- $5,000 to assist a Gunnedah cricket team in touring to New Zealand; and
- A donation to send a local student on a trip to walk the Kokoda Track.

Mr. Jones again stressed that the mining companies were good corporate citizens, and that on occasion, these donations were given at the instigation of the mining companies themselves. It has also been noted that to date, Whitehaven Coal Mining Pty Ltd, of which Narrabri Coal Pty Ltd is a subsidiary, has provided donations and financial contributions on an as needs basis. It is the intention of the company to establish a community contribution fund such that donations and contributions to the local community may be more easily managed allowing the company to increase further its level of pro-activity in assisting local community projects.

Submission 8(e) *– That the Minister ensure that the interests (in terms of both business and quality of life) of neighbouring land owners / occupiers are taken into consideration and given close and serious attention.*

- Narrabri Shire Council

It is the Proponent's understanding that the focus of this issue is comprehensively covered through the process in seeking project approval for the Narrabri Coal Project.

Submission 8(i) *– That the Minister ensure that all contributions of $62.50 and $25 per employee be required from the proponent for bush fire fighting services and community facilities, respectively consistent with Narrabri Shire Council Section 94 contributions plan.*

Submission 8(j) *– That the Minister require the proponent to enter into a memorandum of understanding with Council for a community infrastructure trust or similar arrangement.*

- Narrabri Shire Council

The Proponent supports the requirement to provide funding for the bushfire fighting services and community facilities.

Similarly, the Proponent is supportive of a conditional requirement to negotiate a mutually beneficial memorandum of understanding to contribute to community projects.

6 SUBSIDENCE

While the *Environmental Assessment* clearly identified the distinction between the assessed Stage 1 development, where subsidence was predicted to not exceed 20mm, and the possible future Stage 2 development, where subsidence was predicted to exceed 2m, a number of submissions raised concerns over the impact of subsidence on their land and local waterways.

Submission 2(b) *- "Subsidence*
As outlined in the Narrabri Coal Project – Subsidence Assessment, pages 8-16 to 8-17 seems to indicate that calculated subsidence of between 2.24m and 2.7m could occur. ……..This is of great concern, since the portion of "Newhaven" included on the "Project Site" includes two natural waterways and three dams."

- Fiona Scott, B.O. Scott and K.L. Scott
"Newhaven"

Submission 3(g) *- "Soils and Land Capability*
A predicted subsidence of <20mm doesn't sound much, but what will happen to the roots of vegetation, both surface rooted and deeper rooted. …. Should Stage Two proceed, imagine the trauma imposed to the vegetation by drops in the order of 2.424 to 2.79 METRES! ……. Such a drop in the surface profile cannot be considered insignificant. It will impact on surface water drainage, groundwater flows and salinity. ……".

- G.R. & L.E. Stuart
"Burragurrum"

Submission 6(h) *- Subsidence – We believe the impact will be substantial and will have major impact on all residences within the proposed mining lease area both in Stage 1 and Stage 2 as well as impact on those outside the lease area.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

Submission 10(d) *- Subsidence – The proponent may be required to prepare a Subsidence Management Plan as a specific requirement for any mining lease before operations can commence.*

- Department of Primary Industries

The subsidence associated with Stage 1 mining operation was predicted to be 12mm (Mining Geotechnical Services, 2007 – see Part 8 of the *Specialist Consultant Studies Compendium*, p. 8-16). The impact associated with this depth of surface depression (approximately 1cm) would not impact on surface drainage features or vegetation.

Subsidence associated with Stage 2 mining operations was considered conceptually by Mining Geotechnical Services (2007) and will be subject to more detailed consideration and assessment should the Proponent proceed with an application to undertake longwall mining.

As the predicted depth of subsidence is less than 20mm, a Subsidence Management Plan is not required.

7 TRAFFIC (INCLUDING RAIL TRAFFIC)

7.1 Introduction

A number of submissions on the *Environmental Assessment* included concerns and/or requests for further information on issues related to road and rail traffic. The following sub-sections review the issues raised by the submissions under the following sub-headings.

(i) School bus services (see Section 7.2).

(ii) Local traffic considerations (see Section 7.3).

(iii) Proposed road upgrade considerations (see Section 7.4)

(iv) Rail traffic considerations (see Section 7.5).

7.2 School Bus Service

The statement made in the *Environmental Assessment* that no school bus service used the roads on or surrounding the Project Site was based on correspondence received from the NSW Ministry of Transport on 21 July 2006 and discussions held with Mr Jeffrey Holmes (the operator of two local bus services) on 31 July 2006. R.W. Corkery & Co. Pty Limited accepts that there may have been some misunderstanding over the roads discussed with Mr Holmes. Several submissions have identified that this is incorrect.

Submission 3(c) *- "…….. it is stated that "they" understand there is not school bus on Kurrajong Creek Road. I can assure you there is, and has been for quite a number of years. ……"*

- G.R. & L.E. Stuart
"Burragurrum"

Submission 6(e) *- Traffic & Transport -*

2. *There is no mention in the assessment of the Narrabri School Bus which travels to and from Baan along Mayfield Road and Kurrajong Creek Road.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

The Proponent has more recently contacted the operator of the school bus that travels along East Kurrajong Creek Road and established the following.

- Eight children are currently picked up and dropped off at two locations along Kurrajong Creek Road, namely at the entrance to the "Kurrajong" and "Haylin View" properties. It is noted that the four school children currently picked up at "Haylin View" are unlikely to continue to use the bus service as the property has recently been sold to the owner of "Matilda".

- The morning pickup normally occurs between 7:45am and 7:50am and afternoon drop-off between 4:15pm and 4:20pm.
- The normal bus routine involves entering Kurrajong Creek Road at Baan Baa (from the Kamilaroi Highway), travelling northwards along Kurrajong Creek Road and picking up all children, continuing northwards and re-entering the Kamilaroi Highway at the Kurrajong Creek Road rail crossing. The bus then continues northward to Narrabri.

  The afternoon drop-off route is the reverse to the above.

The bus operator is keen to work with the Proponent to minimise / avoid any delays arising from the periods when coal trains are travelling through the Kurrajong Creek Road Crossing. The bus driver will be provided with a 2-way radio to enable regular contact with the mine control room.

7.3 Local Traffic Considerations

The following concerns have been raised in the public submissions over loca traffic in the vicinity of the Project Site.

Submission 3(k) *- "Traffic Considerations*

1. *We don't think it fair that we will have to obey new Stop sign at the junction of Kurrajong Creek Road and the mine access road…….*
2. *Installation of warning lights and bells at the rail crossing is a good idea, but the idea could, and should, be further expanded by installing lights and bells on ALL rail crossings between the site and the port of Newcastle. …..*
3. *A six (6) minute delay at the rail crossing… . We find it totally unacceptable. …. How are we to know how much time to allow going somewhere when we won't know what traffic (road or rail) we will have to wait for until we get to that section of road? It would become quite unacceptable if Emergency Vehicles were needed either by the locals or the mine staff. ……. I could not find a contingency plan anywhere in the documentation."*

- G.R. & L.E. Stuart
"Burragurrum"

Submission 4(e) *- Traffic & Transport – Proposed 6 minute wait to cross highway could be a matter of life and death or loss of property for anyone needing an ambulance, fire brigade or police to arrive.*

Currently the drilling contractor has their depot located approximately 500 metres from my home. Traffic has been gradually building up and we can only anticipate becoming inundated with mine related vehicles as the proposed mine develops. The public road, which is gravel, is incapable of carrying the increased heavy volume.

- Warren James Chapman
"Matilda" / "Haylin Views"

Submission 6(e) *- Traffic & Transport -*

1. *The proposed 6 minute wait to cross the railway line to the highway seems excessive, this amount of time could be a matter of life and death or loss of property for anyone*

waiting for an ambulance, fire brigade or the police to arrive. There is potential for a fatal accident at both Kurrajong Creek crossing and the crossing in the centre of Baan Baa.

3. *Currently the drilling contractor has its depot located approximately 500 metres from our home. Traffic has gradually been building up and we can only anticipate becoming inundated with mine related vehicles as the proposed mine develops. The public road, which is gravel, is incapable of carrying the increased heavy volume. The employees of the drilling company speed on the public and private access road into their depot, the constant dust drift over and into our house is both unpleasant and a hazard to endure. As well the road on Merrilong Lane, which gives public road access to the drilling company HQ, is in very poor condition due to the heavy traffic flow and heavy transport vehicles.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

In response to concerns raised over the priority of the proposed upgraded intersection of Kurrajong Creek Road and the Site Access Road, it is noted that the majority of traffic at this intersection would be between the Kamilaroi Highway and the Pit Top Area and so if is logical that this road be given priority. It is maintained that the minor inconvenience caused by the changed priority and possible minor delay to local traffic would be outweighed by the safety benefit gained through sealing of Kurrajong Creek Road to 200m south of the entrance to the "Mayfield" property.

In response to concerns raised over the 6 minute delay caused by the level crossing closure, inconvenience to local land owners would be minimised through installation of a noticeboard identifying the approximate closure times of the level crossing to accommodate coal trains, thereby allowing schedules to be planned. These times could also be provided by phone should local land owners so wish to enquire. The issue relating to emergency vehicle access is acknowledged, however, it is noted that the potential for an emergency vehicle to be held-up at the crossing already exists as freight, passenger, livestock and other coal trains use this section of the railway line. It is also noted that the crossing would be closed for no more than 24 minutes each day (<1.7% of the day) as a result of the project (assuming maximum crossing closure periods and two trains entering the rail loop in one day). To further reduce the potential for emergency vehicle hold-up, the Proponent would be happy to advise emergency staff on route of the next crossing closure time, such that alternative access arrangements may be identified in advance.

In response to the concerns held over traffic related to the drilling 'depot' on the "Mayfield" property, the use of this property for this purpose is to be the subject of a development application (DA) by the land owner, with traffic issues to be addressed through this process. Notwithstanding the impending DA process, the Proponent notes that drilling activity on the Project Site will not return to the levels previously experienced and as such, drilling related traffic would be reduced to that associated with a single drill and several service vehicles. Additionally, Kurrajong Creek Road would be sealed to 200m beyond the entrance to the "Mayfield" property (within 12 months of project commencement) eliminating the issues related to dust generated by the movement of the drilling vehicles on the unsealed Kurrajong Creek Road.

7.4 Road Upgrade Considerations

The RTA has provided the following comments in relation to the proposed road upgrades.

Submission 12(a) *- Gravel Pit Access*

- *The proposed new access should continue to be the main access to the quarry following completion of Narrabri Coal's use of the quarry….*
- *Installation of appropriate traffic management control of quarry traffic crossing the Kamilaroi Highway ….*
- *Constructed to conform to a type 'BAL' intersection, see the RTA Road Design Guide, Part 4.*

The Proponent agrees with all of the RTA's recommendation to retain the new entrance to the "Bow Hills" property following the completion of the Proponent's use of the quarry. A traffic management plan would be prepared and implemented (to the satisfaction of the RTA) prior to the commencement of construction of the intersection. With respect to the third point, the intersection has been designed conform to a type 'BAL' intersection, as per the RTA Road Design Guide, Part 4.

Submission 12(b) *- Level Crossing*

- *It would be appropriate to provide lighting of the level crossing at the construction phase ….*
- *The level crossing will require the installation of a queuing treatment as detailed in Australian Standard AS1742.7 (2007) ….*
- *The level crossing must be under active control before commencement of the operational phase and trains use the proposed balloon loop.*
- *The proposed notification sign board is to be located west of the level crossing in Kurrajong Creek Road ….*
- *The level crossing is the subject of a risk assessment undertaken by the Australian Rail Track Corporation ….*

The Proponent would provide lighting at the crossing during the construction phase. The intersection design prepared by Constructive Solutions Pty Ltd, which would be under active control before commencement of the operational phase and trains use the proposed balloon loop, allows for appropriate queuing lengths based on worst-case traffic numbers at the crossing during closure. The Proponent would defer to the RTA should the intersection design (as presented in **Figure 2.8** of the *Environmental Assessment*) require review and updating. As requested by the RTA a notification board with level crossing closure times would be located west of the level crossing in Kurrajong Creek Road.

A risk assessment of the level crossing has been completed by the Australian Rail Track Corporation. The following recommendations would be adhered to, to reduce risk levels to a risk score of <30[2].

1. The queuing treatment on the Kamilaroi Highway would be in accordance with the guidelines of AS1742.7 2007.
2. Boom gates would be installed at the crossing. This would be to address the hazard of road motor vehicle (RMV) driver confusion when there is a train in the loop awaiting departure. The RMV driver may assume the crossing is operating for the train ready to depart and hence drive across the crossing. In fact, the crossing may be operating for the passage of a main line train.
3. Clearing of trees on the western side of the highway, approximately 100m in both directions.
4. The commissioning of the coal loop would trigger installation of active level crossing protection.

Submission 12(c) *- Kamilaroi Hwy Intersection*

- *The proposed intersection layout appears acceptable ……. assuming the delay due to trains accessing the mine balloon loop does not exceed that proposed in the Environmental Assessment.*
- *It will be necessary to install appropriate advance warning signs in consultation with the RTA.*
- *Maintenance of the Kamilaroi Highway intersection and Kurrajong Creek Road should be the responsibility of the developer for the life on the mine ….*

- NSW RTA

Submission 8(f) *- Kamilaroi Hwy / "Bow Hills" Intersection – That the Minister condition any development consent given to include the long term retention of the new road arrangement and adjacent to the Kurrajong Creek and "Bow Hills" turn-offs.*

- Narrabri Shire Council

The Proponent confirms the level crossing closure time quoted in the *Environmental Assessment,* ie. 6 minutes per train, is accurate. The Proponent would install the necessary warning signs on the Kamilaroi Highway and Kurrajong Creek Road in consultation with the RTA and the local community and would be responsible for the maintenance of the Kamilaroi Highway intersection and sealed section of Kurrajong Creek Road for the life of the project.

The Proponent supports the retention of the Kamilaroi Highway / "Bow Hills" intersection following the completion of the site establishment phase.

Submission 8(g) *- That the Minister ensure that any development consent given includes a condition that Shire Road 188 be constructed and sealed for a minimum distance of 200 metres south of the intersection with the mine access road.*

[2] Based on the ARTC safety risk management process, a score of 0 to 20 represents low (acceptable) risk and a score of 20 to 50 represents a possible risk with attention required.

Submission 8(h) *- That the Minister ensure all upgrades to, and maintenance of Shire Roads be carried out in accordance with Narrabri Shire Council's standards and that signage at the Kamilaroi highway intersection adjacent to Kurrajong Creek include road names and be implemented to RTA standards.*

- Narrabri Shire Council

The Proponent has held a number of discussions with local residents to improve local infrastructure around the Project Site. Following encouragement from the Mayor of Narrabri, the Proponent decided to commit to seal a 7.0km section of Kurrajong Creek Road between the Kurrajong Creek Road rail crossing and a point 50m south of the entrance to the "Burragurrum" homestead. This extent of road sealing is substantially greater than that originally sought by Council.

The Proponent acknowledges that the road sealing program discussed above and all road signage would be undertaken in accordance with Narrabri Shire Council standards.

Submission 8(k) – *That the Minister consider the need for the streets in Baan Baa to be sealed in preparation of the increased use of those streets resulting from the development..*

- Narrabri Shire Council

The Proponent respectfully considers it is more appropriate to undertake the sealing of the nominated section of Kurrajong Creek Road rather than the streets of Baan Baa. This diversion is predicated on the recognition that the residents with access onto Kurrajong Creek Road may be noticeably more impacted by the project than the residents of Baan Baa.

7.5 Rail Traffic Considerations

Gunnedah Shire Council has raised concerns over the impact of increased rail traffic on town infrastructure and traffic congestion.

Submission 9(b) *- Transportation Issues*
Of particular interest to Council are the increased rail traffic.. ……

Recommendation – That the existing Abbott Street rail overpass bridge be widened to the accepted Roads & Traffic Authority highway standard prior to the introduction of 84 wagon coal trains with provision made in terms of this development proposal and future proposals for contributions from coal mine developers. That the NSW Government initiate a study to consider the cumulative impacts on the Gunnedah urban area of increase coal transportation on the North West Railway Line and mechanisms by which these impacts may be mitigated.

- Gunnedah Shire Council

The Proponent has held various discussions with Rail Infrastructure Corporation (RIC) and Gunnedah Shire Council to better understand the implications of planning for a range of improvements to the rail network in the Gunnedah Local Government Area. Both the ARTC and RIC have been fully briefed regarding the plans of both Whitehaven Coal Mining Pty Ltd and Idemitsu Boggabri Coal Pty Ltd and have a range of plans in place to increase the number of train paths available for trains passing through Gunnedah.

An important feature of the RIC plans for Gunnedah is the provision of a passing line within Gunnedah itself that will allow coal trains to pass through Gunnedah at 60kph rather than the current <5 to 15kph. Hence, with longer coal trains (72 wagons cf 42 wagons) and the fast speed through Gunnedah, the overall impacts on the use of the level crossing are expected to decrease..

8 AIR QUALITY

Several issues of concern and/or requests for further information in relation to the air quality assessment for the project were identified in the submissions to the *Environmental Assessment*.

Submission 2(c) - *"Air Quality*
Figure 4 (page 6-14) of the Air Quality Assessment also ignored the existence of the homestead located on "Newhaven" which is within the project lease area. ……. There is no indication in the report on potential air quality impacts at this location."

- Fiona Scott, B.O. Scott and K.L. Scott
"Newhaven"

It is acknowledged that the "Newhaven" property is within the Project Site (Property 4 on **Figure 4A.5**), however, potential air quality impacts upon this property caused by the Project were not specifically assessed, for the following reasons.

For the purposes of an Air Quality Impact Study (Heggies, 2007 – Part 6 of the Specialist Consultant Studies Compendium) completed for the Project, the five closest non-project related receptors to the proposed surface operations were chosen as assessment points (see Table 1 of the Heggies (2007), p. 6-12, for further detail on the selected non-project related receptors). "Newhaven" is located to north of the Project Site, approximately 3.7km from the Pit Top Area Boundary and 4.5km from the nearest Project Site component (Rail Loop). These distances, when compared to those of the selected non-project related receptors included in Table 1 of the Heggies (2007), illustrate that the property "Newhaven" is further from the Project Site than the selected non-project related residences.

Furthermore, as the predicted maximum ground-level concentrations for each of the selected receptors are predicted to satisfy all relevant air quality goals, as reported in Section 6, and illustrated in Appendices 6 to 8, of Heggies (2007), it can be assumed that the impact likely to be experienced at the "Newhaven" property would be minimal.

Submission 3(j) - *"Air Quality*

1. *The specialist conclusion was there would be minimal impacts to what they consider normal for this area. When was the testing done for the expected dust hazard?"*
2. *There as much discussion in the specialist study on particle matter size, gas compositions, and on models based on areas remote to ours. …. Just what is going to be in the dust produced by site establishment or mine production? … I did not see any assurances that the particle matter composition or concentrations will not impact on the quality of these."*

- G.R. & L.E. Stuart
"Burragurrum"

In response to Question 1 of Submission 3(j), the existing background dust deposition environment that was assumed to be representative for the area surrounding the Project Site was derived from a range of dust deposition gauges located about the Project Site itself (see Figure 4 of the Heggies, 2007 – p. 6-14). Monitoring was conducted between December 2005 and December 2006, which was the most up to date dataset available at the time of the Heggies (2007) assessment. Results of the monitoring were presented in Table 2 of Heggies (2007) (p. 6-15). This monitoring was deemed appropriate for the derivation of a site-specific background dust deposition environment for the Project Site.

In response to Question 2 of Submission 3(j), dust generated during the site establishment phase of the Project would consist primarily of crustal material, due to the dominance of earth-moving activities. Dust from the operational phase of the Project would primarily be coal dust, a consequence of fugitive dust emissions resulting from the various coal handling operations within the Pit Top Area of the Project Site. It is noted that the predicted ground-level concentrations of all pollutants from Project activities would be well within the relevant air quality criteria, at all nearest non-project related receptors, for both construction and operational phases of the Project (see Section 6 of Heggies (2007) (pp. 6-32 to 6-40).

Submission 4(d) *- Air Quality – A huge amount of traffic dust hits me from 3 sides……. My home is situated approximately 500 metres from the depot set up by the drillers on Mayfield. Volume of traffic is increasing daily.*

- Warren James Chapman
"Matilda" / "Haylin Views"

The use of the "Mayfield" property for the purpose of a drilling equipment depot is to be the subject of a development application (DA) by the land owner, with traffic issues to be addressed through this process. Notwithstanding the impending DA process, the Proponent notes that drilling activity on the Project Site will not return to the levels previously experienced and as such, drilling related traffic would be reduced to that associated with a single drill and several service vehicles. Additionally, Kurrajong Creek Road would be sealed to 200m beyond the entrance to the "Mayfield" property (within 12 months of project commencement) eliminating the issues related to dust generated by the movement of the drilling vehicles on the unsealed Kurrajong Creek Road.

Submission 6(d) *- Air Quality – Already our air quality is deteriorating due to heavy traffic volume and this is only the early preparation stages of the proposed mining lease.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

Air quality modelling prediction of Heggies (2007) (see Part 6 of the Specialist Consultant Studies Compendium) indicate that the incremental increase in dust levels will be less than 10% of background levels (see Table 9 of Heggies, 2007, p. 6-33). It is therefore considered that once the activities of the drilling contractor on and surrounding the "Mayfield" property reduce (to a single drill rig and associated service vehicles), dust deposition levels will reduce to the predicted levels.

Dust monitoring will be undertaken for the life of the project regardless of the predicted minor impact. Should dust deposition levels approach or exceed the nominated criterion, contingent measures will be implemented (as will be documented in an Air Quality Monitoring Protocol for the project).

Submission 10(c) - *Dust – It should be stipulated that the proponent maintain this access road (the Ventilation Shaft access road) in a condition that minimises dust generation. Sheeting the road with gravel aggregate may be required.*

- Department of Primary Industries

The ventilation shaft road will no longer be trafficked significantly by project vehicles as ventilation is now to be undertaken via a third drift rather than the previously proposed shaft. As such, the proposed sheeting will be unnecessary. The Site Access Road will, however, be sealed and therefore maintained to minimise dust generation.

9 ABORIGINAL HERITAGE

Additional information with reference to Aboriginal heritage and cultural management is provided in response to the submission of the DECC (see **Appendix 2**).

Submission 8(b) *– That the Minister ensure that the cultural heritage awareness induction course is implemented as appropriate and that Aboriginal monitors be invited to the site on all appropriate occasions.*

Submission 8(c) *– That the Minister consider the potential for an indigenous position(s) in on-site staffing be established for the purpose of cultural heritage management.*

Submission 8(d) *– That the Minister consider not only the impact of the development on artefacts but on the wider landscape context of any sites of cultural heritage significance and encourage the use of the Burra Charter in the management of heritage sites associated with the development.*

- Narrabri Shire Council

The Proponent is committed to undertake the following in response to the assessment of Aboriginal heritage and discussions with the Narrabri Local Aboriginal Land Council (LALC).

(i) A Cultural Heritage Management Plan will be prepared addressing all surface disturbance to be undertaken during the site establishment phase. This document will be prepared in consultation with the Narrabri LALC.

(ii) Aboriginal monitors will be invited to inspect all topsoil stripping activities.

(iii) The induction program for all Company personnel and contractors will include a component addressing all relevant Aboriginal heritage matters relevant to the mine site.

In light of the above approach, the Proponent respectfully acknowledges that it is unnecessary for one or more indigenous positions to be established for the purpose of cultural heritage management.

10 NOISE AND VIBRATION

The following concerns and/or requests for further information in relation to project noise were raised in the submissions to the *Environmental Assessment*.

Submission 3(i) - *"Noise*
Nothing will change the fact that before mining we had a quiet rural area. …….. Any change is going to impact on us. 67404 Section 6 states there is a moderate risk of major and marginal exceedances of noise criteria leading to increased noise and/or vibration from rail and traffic and from mine activities."

- G.R. & L.E. Stuart
"Burragurrum"

Noise levels were predicted to comply with criteria established in accordance with Department of Environment and Climate Change guideline documents. The moderate risk level noted in Table 6.1 of the *Environmental Assessment* (p. 6-6) is designated simply due to the potential consequence and it should be noted that the likelihood of occurrence is classified as "rare".

Noise monitoring would be undertaken in accordance with a Noise Monitoring Program and Protocol to be developed prior to commencement of the project to ensure all activities are undertaken in compliance with the established noise criteria.

Submission 4(h) - *Noise & Vibration – Traffic noise is already impacting on my life with the drillers depot next door. I believe trains will be operational 7 days per week, 24 hours a day with no set timetable.*

- Warren James Chapman
"Matilda" / "Haylin Views"

Submission 6(g) - *Noise & Vibration – Traffic noise is already impacting on our lives……. We believe trains will be operational 7 days per week, 24 hours a day with no set timetable.*

- Robert Roy & Sandra Ann Chappel
"Merrilong"

Please refer to the response to Submission 4(d) in Section 8 in relation to the traffic to and from the "Mayfield" property drilling 'depot'.

As noted in Section 4B.8.4.2.1 of the *Environmental Assessment* (p. 4B-117), the Proponent would rely on RailCorp scheduling of coal train movements and therefore would have little control over the operation of rail traffic on the North Western Branch Railway. As far as practicable, however, the Proponent would attempt to have coal train path times occur outside the nominated shift change over (see Section 2.11.1). Assuming the path schedule follows from that at Whitehaven rail siding (see Section 4B.8.2.2), this would be achieved.

11 VISUAL AMENITY

The following issue in relation to impacts on visibility was raised in the submissions to the *Environmental Assessment*.

Submission 3(h) *- "Visibility*
Whatever mitigation measures are provided will not change the fact that our landscape will be changed. "Soft lighting" will not make the mine invisible. The landscape WILL be changed."

- G.R. & L.E. Stuart
"Burragurrum"

The change to the landscape has been acknowledged within the *Environmental Assessment* (see **Table 6.1**, p. 6-5 and 6-8). However, the changes would be relatively minor in the long term and assessed as acceptable. With respect to night time lighting, comparison is drawn to the operating Whitehaven and Tarrawonga Coal Mines on which the proposed approach to night time lighting was drawn. The operator has not received any complaint from local land owners or residents, located at similar or closer distance to these operations, over the use of lights.

12 MISCELLANEOUS

The following issues or requests for further information raised in the submissions to the *Environmental Assessment* were unable to be categorised. Each is considered and a response provided as follows.

Submission 1(b) *- "We are concerned that we will end up with coal mining activity all-round us, our concerns arise from previous discussions with Whitehaven administration personnel have had with us."*

- Mark Lennox
"Kurrajong"

The "coal mining activity" to which Mr Lennox refers would be restricted to those activities on the Pit Top Area and the Narrabri Coal Project is an underground mine. The Proponent knows of no other mining project in the immediate vicinity of the "Kurrajong: property.

Submission 3(a) *- The first objection is that we are to make our submission to a Department of a very same Government that owns the coal! As stated in 67404 Section 6 p 17, DPI (MR) and the Proponent's objective is to "maximise resource utilisation". At what cost? Where is the fair and impartial review? All the reports that I have read have been prepared by entities paid by the Proponent and usually biased towards the Proponent. Where are the independent reviews? Is there anyone besides stakeholders involved in the process? We affected landholders are not professionals in these fields, where is our support and professional information to either dispute, or refute, these documents?"*

- G.R. & L.E. Stuart
"Burragurrum"

It is noted that the *Environmental Assessment* has been prepared by an independent consulting company in conjunction with a number of other specialist environmental consultancies. The *Environmental Assessment* was prepared in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979* and has been reviewed by all relevant NSW government agencies, whose role it has been to ensure all environmental issues have been properly addressed, twice.

Submission 3(d) *- .... the Public Exhibition was a joke (documents available at quoted locations).*

- G.R. & L.E. Stuart
"Burragurrum"

The Proponent has undertaken all activities related to the preparation and exhibition of the *Environmental Assessment* in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979* and the specific requirements of the Department of Planning.

Submission 4(f) *- Permissibility – Basically, the drillers are operating a commercial business on rural land which contravenes the Narrabri Shire Council zoning.*

- Warren James Chapman
"Matilda" / "Haylin Views"

A development application to Narrabri Shire Council is being prepared for the activities on the "Mayfield" property. The permissibility of the activities will be assessed through this process.

Submission 11(a) *- Site Establishment – In regard to S2.4.11 mined rock management and Perimeter Amenity Bund, it is recommended that the Bund batters be reduced to 4H:1V (both internal and external) and they be subsoiled (0.35m) and topsoiled (0.15m) to a minimum of 0.5m.*

- Namoi Catchment Management Authority

The slopes of the Perimeter Amenity Bund batters were designed to reduce the area of disturbance associated with the bund, while maximizing the potential for the establishment of trees and shrubs on the external (visible) side (slope 3H:1V). A cover of grass would be established on the steeper internal side (slope 1H:1V). The recommended soil depths would be adhered to by the Proponent.

Submission 8(a) *– That the Minister for Planning (Minister) take into consideration a bond, or a requirement for the proponent to provide suitable off-sets, to ensure the functionality, capability and suitability of the development site being restored to its current state and require that the appropriate analyses be carried out to determine the current level of landscape functioning on-site.*

- Narrabri Shire Council

It is not normal practice for a monetary bond to be placed on a coal mining proposal as a condition of either a development consent or project approval. Rather, a security deposit is invariably imposed by the DPI (MR) as a requirement of the mining lease for the venture.

Submission 8(l) *– That the Department ensure that Narrabri Shire Council's policies and development control plans are adhered to ……..*

- Narrabri Shire Council

The Proponent acknowledges its preparedness to adhere to any requirements of Narrabri Shire Council's policies and development control plans relevant to the Narrabri Coal Project.

13 REFERENCES

GHD Pty Ltd, 2007. *Groundwater Assessment of the Narrabri Coal Project,* prepared on behalf of Narrabri Coal Pty Ltd (Part 2 of the *Specialist Consultant Studies Compendium*).

Heggies Pty Ltd, 2007. *Air Quality Assessment of the Narrabri Coal Project,* prepared on behalf of Narrabri Coal Pty Ltd (Part 6 of the *Specialist Consultant Studies Compendium*).

Key Insights Pty Ltd, 2007. *Socio-Economic Assessment of the Narrabri Coal Project,* prepared on behalf of Narrabri Coal Pty Ltd (Part 9 of the *Specialist Consultant Studies Compendium*).

Mining Geotechnical Services Pty Ltd, 2007. Subsidence Assessment of the Narrabri Coal Project, prepared on behalf of Narrabri Coal Pty Ltd *(*Part 8 of the *Specialist Consultant Studies Compendium).*

R.W. Corkery & Co Pty Limited, 2007. *Environmental Assessment* of the Narrabri Coal Project, prepared on behalf of Narrabri Coal Pty Ltd.

WRM Water & Environment Pty Ltd, 2007. *Surface Water Assessment of the Narrabri Coal Project,* prepared on behalf of Narrabri Coal Pty Ltd (Part 1 of the *Specialist Consultant Studies Compendium*).

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APPENDIX 1

Response to Department of Water and Energy's "*Review of Narrabri Coal Mine Environmental Assessment, Narrabri Coal Pty Ltd*"

Compiled by:

R.W. Corkery & Co. Pty Limited

In Conjunction with:

GHD Pty Ltd;
WRM Water and Environment Pty Ltd;
Parsons Brinckerhoff; and
Coffey Geotechnics.

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A1.1 INTRODUCTION

The following document addresses the key water and groundwater management issues, as identified by the Department of Water and Energy (DWE) in a submission to the Department of Planning (DoP) on the *Environmental Assessment* and *Specialist Consultant Studies Compendium* prepared and made publicly available for the Narrabri Coal Project. This response draws together the input from GHD Pty Ltd, WRM Water and Environment Pty Ltd, Parsons Brinckerhoff Pty Ltd and reflects the discussion and peer review of the groundwater matters by Ross Best of Coffey Geotechnics.

The following sections present each of the 10 key water and groundwater management issues together with a response to the issue(s) raised.

A1.2 KEY WATER AND GROUNDWATER MANAGEMENT ISSUES

A1.2.1 The Impact of Mining and Dewatering Causing Lowering of Watertables and Standing Water Levels in Bores Used for Stock and Domestic Supply by Local Landholders

The DWE wrote:

> *"The environmental assessment outlines some significant expected impacts on groundwater systems over the project area. The modelling of expected long term drawdown levels in the various strata suggest that many stock and domestic bores will be affected. Above the general mining area, drawdowns of greater than 10m are predicted for bores sourcing from the Napperby Formation above the volcanic sill. The drawdown in bores sourcing Surat Basin strata (part of the Great Artesian Basin recharge zone) is less but still significant. Impacts are also expected within the Garrawilla Volcanics on shallower unconfined water tables, where modelling suggests drawdowns of the order of 1m or so. Bores sourcing deeper strata, particularly the Black Jack Formation, will be significantly affected with dewatering of the Hoskissons seam predicted to reduce piezometric head in the seam by 100m or so. This will have a significant impact on adjacent strata.*
>
> *Consequently local landholders may experience a number of operational problems such as additional pumping costs, reduced bore yields, the need to lower pumps or deepen bores, or the need to source alternative water supplies. The proponent has suggested that a drawdown of 15% is the starting point for defining a significant impact. This is not supported under the current embargo on the Great Artesian Basin (GAB) intake beds. Beyond this level Narrabri Coal has indicated a preparedness to address these problems. It is not clear whether local landholders concur with this as the trigger for significance. Furthermore, there is no clear mechanism proposed for addressing landholder concerns about such impacts if the mine proceeds. Avenues for landholders to have their concerns fairly treated need to be outlined in any consent or approval conditions.*

In response GHD writes:

> The proposed Groundwater Monitoring and Contingency Plan (GMCP) (see **Annexure 1**) outlines the recommended water level and groundwater quality monitoring for the existing extraction bores and monitoring bores in and adjacent to the Project Site. The monitoring

program includes bore owner consultation, assessment of baseline water levels and groundwater quality at each extraction bore and determination of the 10% and 15 % trigger levels for each bore. Regular assessment of the monitoring data for each extraction bore including comparison of observed trends with predicted mine impacts and trigger levels is recommended. The contingency measures are outlined in the program and a contact within Narrabri Coal who will address any extraction bore concerns is to be identified and their details provided to all bore owners in the extraction bore monitoring program.

In regard to the criteria recommended to trigger contingency measures, the 15 % reduction on available drawdown was adopted as a trigger level based on verbal advice from the then DNR Barwon office hydrogeologist (Tikiri Tennakoon) in January 2006 that this figure is typically adopted as the aquifer interference policy has not been finalised. Recent assessments in the Gunnedah Basin where this figure was proposed for contingency planning include the East Boggabri (Tarrawonga) Coal Mine.

The DWE wrote:

The drawdown effects will radiate beyond the mining area boundary. The modelling suggests the impact may not be significant for the shallower strata, but is likely to be significant for deeper strata. Hence it will be important that a monitoring program address areas outside of the mining lease that may be affected by mining, and that landholders right across the affected area have the opportunity to have their concerns addressed, not just those in close proximity to the mining site.

In response GHD writes:

The monitoring bore network has been extended beyond the Project Site covering the extent of the predicted the drawdown over the mine life (see **Annexure 1**). Regular monitoring of the existing extraction bores within this area has been proposed (subject to land owner permissions).

The DWE wrote:

The modelling has assumed certain values in each of the strata for hydraulic conductivity and storage coefficient, factors which affect the vertical and lateral extent of drawdown. Some sensitivity analysis of hydraulic conductivity has been undertaken for the deeper strata, but not for the storage coefficient.

In response GHD writes:

Additional modelling has been completed to assess sensitivity of the model to storage co-efficient. The model was run with the storage co-efficient significantly reduced. For the upper unconfined layer the value was halved and the confined layers, reduced by an order of magnitude. The impact on mine inflows is shown in **Figure A1.1** and indicates predicted mine inflows are reduced (when compared to the base model results of GHD (2007)) and reach a maximum inflow of around 1750m^3/day after 43 years.

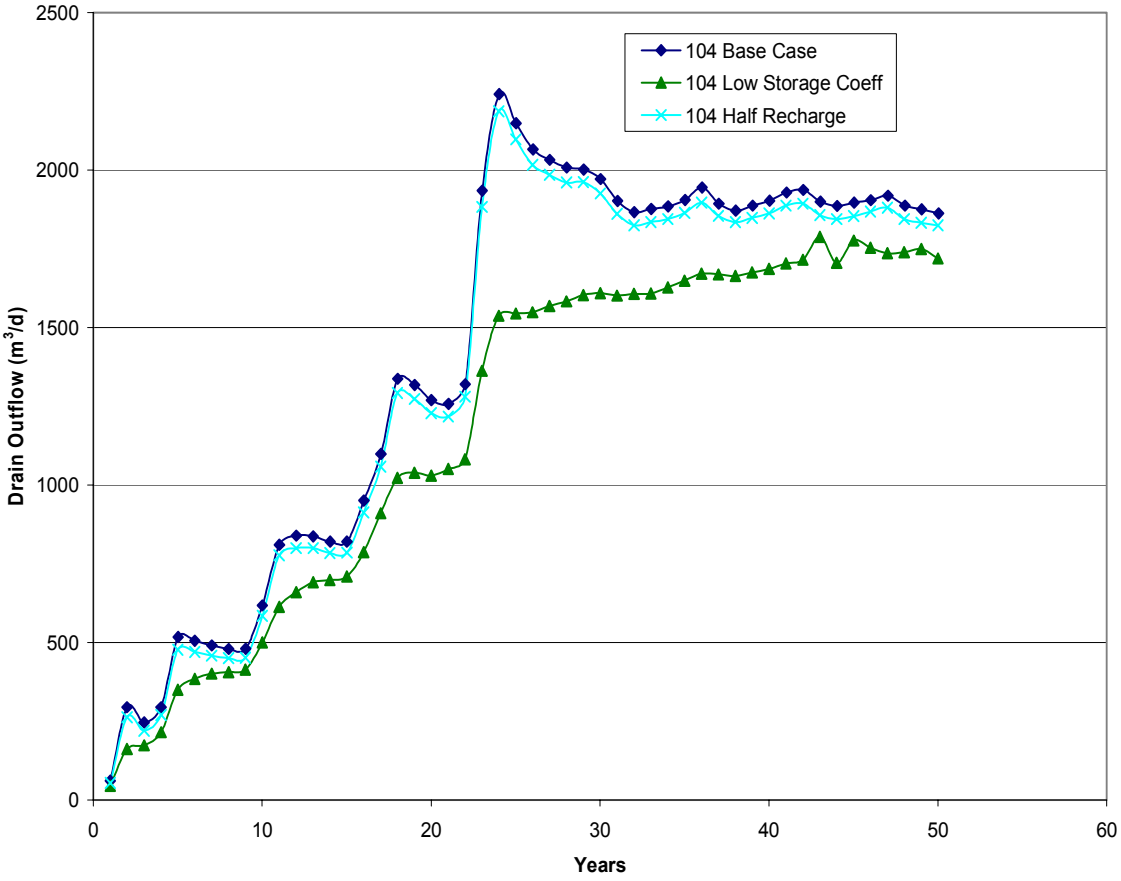

Figure A1 - 1 Mine inflows Sensitivity Analysis with Low Storage and Reduced Recharge

The predicted impact on aquifer pressures assuming low storage values is shown in **Figure A1.2** and **Figure A1.3** and shows an additional 1m of drawdown in the Pilliga Sandstone at the closest point to the west of the mine at year 50. This is rapidly reduced to less than 0.1m further west. The increase in drawdown within the Hoskissons Coal Seam shown in **Figure A1.3** is more significant being approximately 10m deeper in the area to the west of the mine. It should be noted however, that if the storage coefficients are lower, the time taken to recover post-mining is correspondingly shorter.

The DWE wrote:

Furthermore the environmental assessment recognises that there is considerable heterogeneity in the geological strata, and that localised fracturing can greatly influence hydraulic behaviour, aspects which are difficult to model. The Department has also received some information that indicates some major faulting in the geological strata in this locality. In addition the extent of mining induced fracturing on hydraulic behaviour is difficult to model. Hence a thorough monitoring program is essential to detect any major departures from the impacts predicted in the environmental assessment.

The results of such monitoring will be critical for the assessment of impacts if Stage 2 long wall mining is to proceed to project application.

An additional longer term concern of permanent dewatering of the sub strata is the risk of consolidation of aquifers which may have a permanent effect on their hydraulic behaviour and their yield post mining.

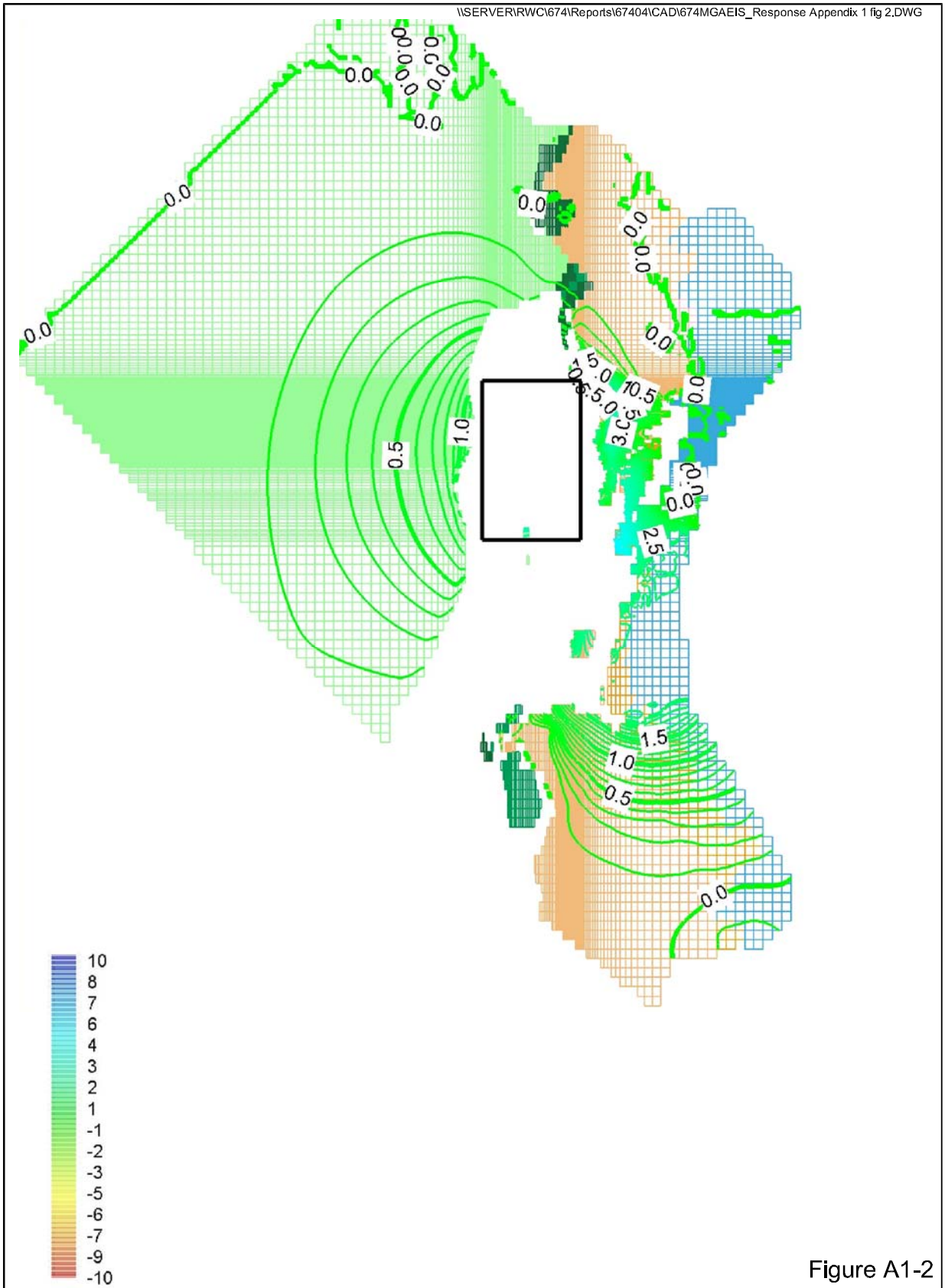

Figure A1-2
DIFFERENCE IN WATER LEVELS AT 50 YEARS IN LAYER 2 (PILLIGA SANDSTONE IN GREEN) WITH LOW STORAGE MODEL COMPARED TO BASE CASE

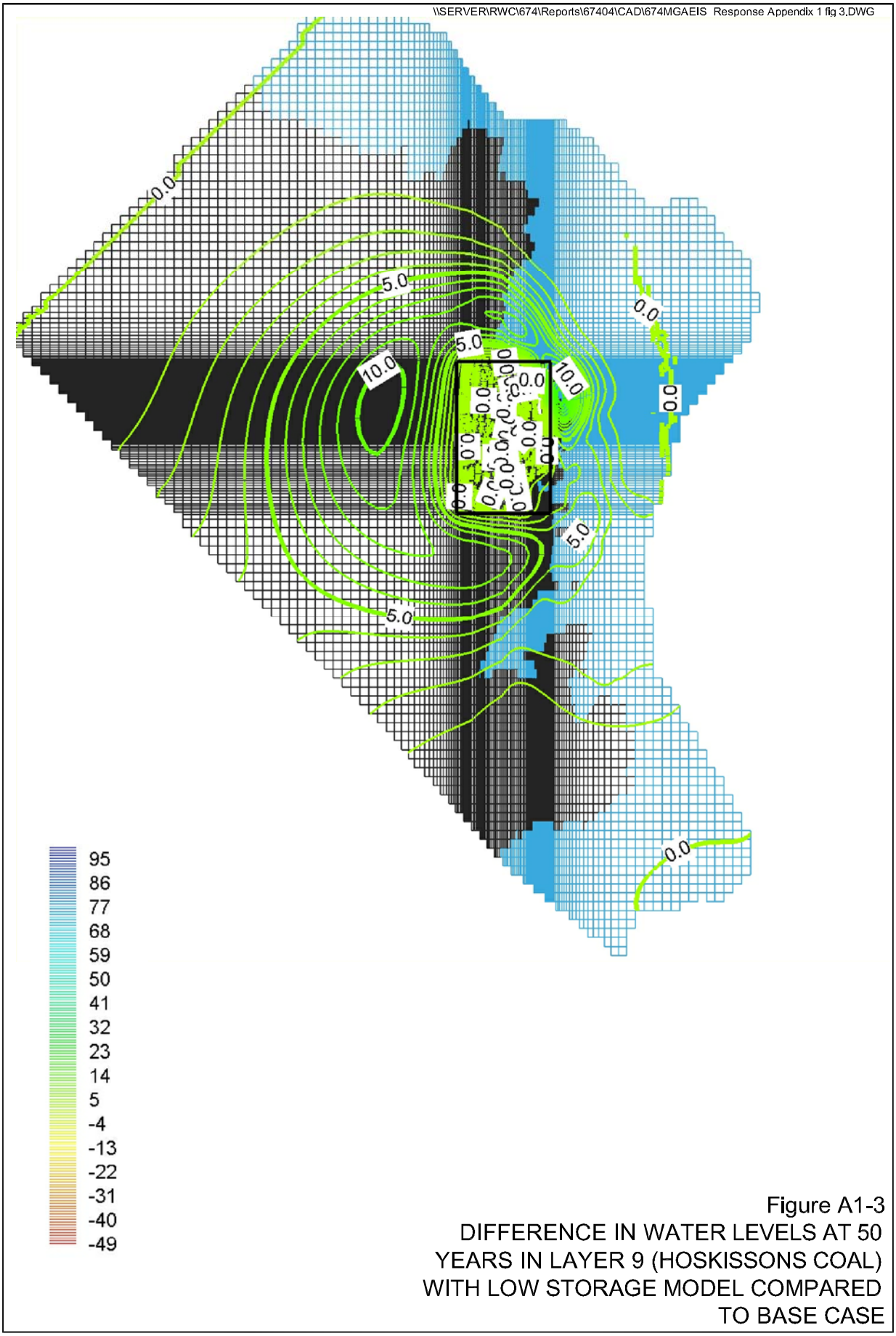

Figure A1-3
DIFFERENCE IN WATER LEVELS AT 50 YEARS IN LAYER 9 (HOSKISSONS COAL) WITH LOW STORAGE MODEL COMPARED TO BASE CASE

Therefore, DWE requires an intensive monitoring and evaluation program for groundwater sources which are located within the cone of depressurisation of the project. The program must be approved by DWE prior to commencement of mining operations. The program must specify the target aquifers, including the embargoed Great Artesian Basin intake beds and Namoi alluvium, and determine and monitor groundwater tables above and below overburden levels to which fracture propagation will extend for pillar extraction.

In response GHD writes:

The monitoring program attached as Annexure 1, identifies eight additional groundwater monitoring sites nominating the target aquifer for each location. The bores form transects which extend out from the mine taking and take into account existing DWE groundwater monitoring bores where available. The transect to the east and north will monitor the extent of potential mine impact on the fringes of the Namoi River alluvium and the transects to north west will monitor the potential impacts on the Pilliga Sandstone which forms the major aquifer for the GAB intake beds. Regular hydrogeological reviews are also recommended and would include assessment of groundwater monitoring data and pump test data and revising the conceptual hydrogeological model for the site and surrounding region as the new data becomes available. Comparison of measured groundwater levels with those predicted from numerical modeling of mining groundwater influences would form part of the review process.

In relation to the risk of mining related dewatering permanently affecting hydraulic behavior and post mining yields of the aquifers, the predicted fracturing associated with the Stage 1 development is described as “minor fracturing in the immediate roof of the worked section” by Mining Geotechnical Services (2005) and is therefore not expected to impact on the hydraulic properties of the overlying and underlying strata. The potential impact of declining aquifer pressures on extraction bore yields has been assessed as part of the Groundwater Assessment and those bores considered to be at risk of reduced yields are specifically addressed in the proposed groundwater monitoring program.

The DWE wrote:

DWE requires the proponent to prevent any inflows from the Great Artesian Basin and replace any loss of access to existing groundwater users (basic landholder rights and licensed users) caused as a result of mining operations. Limits to acceptability of loss of yield or water level in bores must be determined to DWE satisfaction.”

In response GHD writes:

The attached monitoring program (Annexure 1) provides an outline of the proposed contingency measures to address any loss of access to the existing groundwater users should the trigger levels be exceeded.

Refer to Section A1.2.3 for discussion of Great Artesian Basin potential impacts.

A1.2.2 The impact on water quality in local bores due to dewatering.

The DWE wrote:

> *"The lowering of watertables and pressures, and fracturing over the mining area, will affect groundwater flow patterns, which may result in changes in water chemistry and the quality of bore water. The salinity of groundwater in the locality is quite variable, both within and between strata. The change of an aquifer from a confined to an unconfined state may also increase oxidation processes, causing some change in water chemistry. Where sulphur bearing material is present, such oxidation can contribute to acidification. While the coal in the Hoskissons seam is described as low sulphur high quality, there is limited information on the acid forming potential of surrounding strata. In addition to monitoring the piezometric head and yield of bores, the proponent must ensure adequate baseline data is available on water quality, and for periodic measurement of key water quality parameters. Priority must be given to those aquifers or bores which have relatively better quality water.*

In response comments relating to water quality monitoring, GHD writes:

> The proposed groundwater monitoring program (see **Annexure 1**) provides for the establishment of baseline groundwater chemistry at the extraction bores and groundwater monitoring bores across the region. Regular sampling of the monitoring and extraction bores and analysis for a range of water quality parameters is recommended during mining to provide a basis for assessment of mining related impact on water quality. The proposed sampling includes bores to the northwest of the mine where the Pilliga Sandstone is saturated with TDS levels recorded as less than 500mg/L.
>
> In response comments relating to possible acidification of water discharged to the surface evaporation ponds, GHD writes:
>
> Should any deterioration in water quality of the mine in-flows occur due to oxidation of the sulphidic minerals in the adjacent strata, treatment of the water to increase the pH would occur as part of the mine water management system. This would minimize the potential risk caused to the downstream environment in the unlikely event that seepage occurs through the lined evaporation ponds.

The DWE wrote:

> *The proponent must monitor the range of target aquifers identified in the Environmental Assessment contributing groundwater inflow to the mine workings, and identify any locations where geological structures may contribute additional groundwater flow to the mine workings. The proponent must model pre- and post- mining groundwater levels under a range of recharge and fracturing scenarios, and quantify inflows from the Gunnedah Basin GWMA and GAB intake beds.*

In response GHD writes:

> The groundwater model was run varying the modeled recharge rates to assess the impact on mine in-flow and predicted aquifer pressures. Modelled groundwater recharge was halved and impact on mine in-flows is shown in **Figure A1.1**. The results show modeled mine in-flows are approximately 40m^3/d less than the base case. This is to be expected given that the flow balance shows that for all cases, the volume of mine in-flow is almost identical to the volume out of elastic storage, indicating recharge is not a significant component of mine

in-flow and the impact of varying rainfall recharge is expected to be minimal. Varying rainfall recharge would also be expected to have little impact on immediate (50 year) post mine recovery, which would be through in-flow from storage in the surrounding aquifer in to the cone of depression rather than recharge.

The 2005 SRK report "*Narrabri Coal Project Structural Risk Interpretation*" identified northwest and northeast trending structural zones across the Project Site based on the results of the high resolution magnetic and radiometric surveys. A comparison of the identified zones and the location of hydraulic testing across the site indicates that several of the bores where hydraulic testing was completed were located in the zones identified by SRK. These include (NC-30, NC-111 and NC-115). The permeability results from NC-111 were in the higher range for the coal seam and the results at NC-115 were close to the geometric mean for this formation. The wide range of permeability results for the formations tested supports the conclusion that some results were more influenced by fracturing. The number of tests completed including the coal seam (9) and mine floor (12) and the use of the geometric mean in the modelling is considered to taken into account the variable nature of fracturing across the site.

The groundwater modelling shows the mine inflows are predicted to be primarily sourced from the adjacent Gunnedah Basin Formations. The predicted flow through the base of the Pilliga Sandstone changes from a net inflow of 278m^3/d prior to mining, changing to a net loss of 13m^3/d at year 50 a decrease of 291m^3/d, assumed to be due mine drainage.

The DWE wrote:

The proponent must nominate trigger levels for remedial action to impacted aquifers, to DWE approval. The groundwater assessment must set benchmarks for impacted bores, and response triggers to any impacted supply bore in terms of yield or water quality."

In response GHD writes:

The proposed groundwater monitoring program (see **Annexure 1**) will monitor groundwater levels and quality across the range of formations which are predicted to contribute flow to the underground workings. After establishing the baseline levels and water quality, trigger levels will be determined for each bore with respect to bore yield, based on a reduction in available saturated thickness and water quality, based on the ANZECC guidelines.

A1.2.3 The Impact on Inflows in Intake Areas of the GAB

The DWE wrote:

"Inflows to the Great Artesian Basin (GAB) in the Surat Basin are stated to be in a north westerly direction, with the Pilliga Sandstone, Purlewaugh Formation and Garrawilla Volcanics the main strata involved. The modelling suggests that drawdown in the Surat Basin strata will be less than 1m to the west of the site. The estimated impact of this on GAB inflows is not stated. While a 1m lowering of the piezometric head may not sound significant, it should be remembered that there may be a cone of depression to the east, centred over the mine site, which may be a significant influence over local groundwater behaviour. If assumptions in the modelling prove to be faulty, impacts may occur to groundwater integrity in the GAB. The proponent is required to prevent any inflows from

the Great Artesian basin and quantify and replace any loss of groundwater access to existing water users caused as a result of mining.

In response GHD writes:

In relation to inflows from the GAB impacts, a distinction between the groundwater flow patterns in the water table aquifer in the Surat Basin can be made for the local flow system either side of the ridgeline that is found on the western boundary of the Project Site. The north south trending ridgeline forms a surface water divide and would be expected to influence the localised shallow water table flow system which is typically a subdued reflection of topography. The monitoring data shows water table to the east of the ridgeline is found in the Purlawaugh Formation and Garrawilla Volcanic and the Pilliga Sandstone where it occurs on the western portion of the Project Site, is unsaturated. The groundwater flow direction in the water table aquifer over the Project Area is inferred to be to the northeast and north towards the Namoi River. Therefore the predicted reduction in aquifer pressures in the Garrawilla Volcanics over the Project Site estimated to be in the order of 6 m at bore GW22595 would be expected to impact on the localised discharge to Namoi River alluvial aquifer rather than the GAB Intake Bed.

To the west of the ridgeline, the Pilliga Sandstone is saturated and the groundwater flow direction is to the north west along regional flow lines.

The deeper regional groundwater flow pattern are likely to be more influenced by basin stratigraphy and structure however the measured pressures in the Gunnedah Basin sequence shown in Figure 12 of GHD (2007) also suggest a localised easterly and north easterly flow direction. However the groundwater model which represent regional scale process assumed a regional northwesterly flow direction and is difficult to incorporate the smaller scale localised flow systems in the model.

The Groundwater Assessment report states in Section 6.91 that the flow across the constant head boundary on the northwest of the model domain, representing inflows to the Great Artesian Basin, remains unchanged at 3005m^3/d during mining and for a period of 50 years after mining. The model run was extended to 500 years to assess the post closure impact on recharge to the GAB and the results are shown in **Figure A1.4**. The total flow across the boundary with no mining impact is 3005m^3/d of which 2937m^3/d (98%) is comprised of flow in the Pilliga Sandstone as it the most permeable model layer. The flows across the boundary begin to decline marginally around 60 year and stablise after 350 years. The long term reduction in the flow across the boundary in the Pilliga Sandstone is estimated to be 30m^3/d (0.35L/s) which represents 1% of the pre-mining flow within the model domain. Therefore the post mining impact on flows to the GAB is estimated to be minimal. This figure is considered to represent a maximum value as due difficulty in re-wetting mine void cells in MODFLOW, recovery of pressures in the mine area are considered to be underestimated.

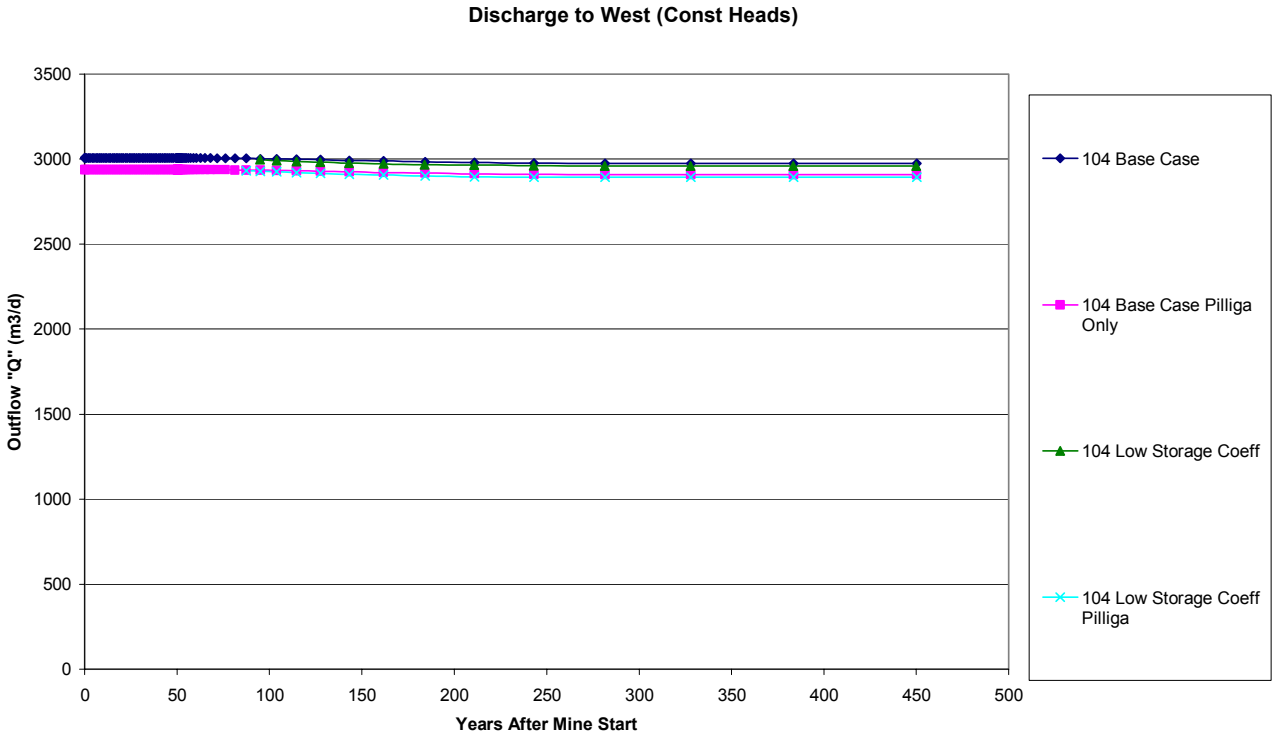

Figure A1.4 Post mining predicted flows at NW model boundary

The DWE wrote:

The groundwater monitoring program must be developed to the satisfaction of DWE and include sites to the west and North West of the mining area, including installing bores in the Pilliga Sandstone. The groundwater monitoring program must establish benchmarks for pre-mining groundwater levels, in order to establish any depressurisation of the GAB. This must be reported against modelling predictions in the Environmental Assessment, and trigger response mechanisms developed to remediate impacts which occur within the embargoed groundwater system."

In response GHD writes:

Three additional bores are included on the attached groundwater monitoring program (see Annexure 1) to the west and northwest of the site to monitor groundwater levels and quality in the area where the Pilliga Sandstone is expected to be saturated. In addition, groundwater extraction bores in this region understood to be sourcing their supply from the Pilliga Sandstone have been included in the monitoring program and groundwater levels and water quality is recommended to be regularly monitored and assessed. The monitoring results will be assessed against the model predicted impacts at these bores and trigger levels calculated from the baseline monitoring data.

A1.2.4 The impact of dewatering on the Namoi River alluvial groundwater system, on both inflows and quality.

The DWE wrote:

"The EA model predictions indicate that the radius of drawdown to the east of the mining

area will be more limited than to the west and impacts on the Namoi quaternary alluvium groundwater system are unlikely. The rising and outcropping of strata in this direction with limited connectivity between strata is provided as a major factor in limiting drainage to the mining sites. However, as indicated above, the modelling outputs rely on several key parameters and do not easily account for strata variability or discontinuities, so monitoring the interface between the Gunnedah groundwater system over the mining area with the alluvial system must occur. The lateral extent of the cone of depression caused by mine dewatering must be monitored carefully to ensure it does not encroach into the alluvial system. Some additional monitoring bores are required across this zone.

In response GHD writes:

It is recommended three additional groundwater bores be drilled in the Gunnedah Basin sediments to the north and east of the mine. These bores are located on the fringes of the predicted drawdown cone and adjacent to the Namoi River alluvium.

The DWE wrote:

One factor which may exacerbate the lateral distribution of the cone of depression caused by mine dewatering is increased mine inflows from hard rock aquifers and permeability due to induced fracturing caused by mining. Groundwater behaviour under dewatering must be monitored very carefully to better understand aquifer behaviour and response. However, predicted mine inflows in the first few years will be relatively low and insufficient to gauge aquifer response when the mine extends to deeper and higher production levels and inflows increase. Therefore, there will be insufficient feedback to gauge the likely impact of long wall mining on the system by year 3. Additional sensitivity analysis on aquifer parameters must be provided, to simulate the effects of fracturing and subsidence may assist in quantifying potential risks. The proponent must establish a monitoring bore network along the fringe of the Namoi alluvium to detect changes in groundwater levels and behaviour. The proponent must conduct short term high level pumping of the coal seam to simulate long term inflows, once sufficient evaporation pond storage capacity is available."

In response GHD writes:

A short term pump test is recommended to be included in the Phase 2 - Mining groundwater evaluation program of the proposed groundwater monitoring program (see Annexure 1). The pump bore would screen the coal seam and a preliminary assessment suggests that a suitable location would be north of the project site in GMWA 604 in the vicinity of the proposed Bore 4. Comments would be sought from DWE on the proposed final location and duration of the test prior to commencement of the testing.

With regard simulating the effects of fracturing and subsidence, the Mining Geotechnical Services Report (October 2005) noted fracturing associated with the Stage 1 development is expected to be minor and occur in the immediate roof of the worked section. The report states that there is little information with regard to pillar compression over pillar mining areas and the resultant surface affects because surface subsidence is generally considered to be negligible. A maximum surface subsidence of 12mm is predicted and considered very much as a worst case given the massive strata units.

As the mining induced fracturing is predicted to be minor associated with the roof area, this is not anticipated to impact significantly on the permeability of this unit or have any significant impact on the predicted in-flows.

A1.2.5 The impact of lowered water tables and sub strata fracturing on local watercourses and groundwater dependent vegetation.

The DWE wrote:

"The groundwater assessment suggests that the standing water levels in the Surat Basin bores are generally at 30-40 m depth so are unlikely to contribute significantly to base flows in any drainage lines or watercourses draining the mining area, except for one bore sourcing the Garawilla Volcanics which had standing water at 6m or so. The streams draining the landscape in the area are ephemeral but respond quickly following substantial rainfall. The depth of standing water levels is consistent with our understanding of stream behaviour. Consequently a drop of approximately one metre is unlikely to significantly affect native vegetation.

However, the current dry or drought conditions have prevailed for a number of years and it would be useful to monitor the shallow unconfined aquifers during a period of above average rainfall. The hydraulic gradient of the watertable is in a northeast direction towards the Namoi River. It is unclear the extent to which such shallow flow contributes to the alluvial system, presumably little given the large difference in water quality between the two systems. However the unconfined aquifer system may discharge to creeks or drainage lines as they emerge onto the Namoi floodplain, and may support native vegetation in the zone just above the floodplain. This aspect should be included in monitoring across this zone.

In response GHD writes:

The groundwater modelling presented in the Groundwater Assessment (Section 6.9.1) noted that the Namoi River cells showed a relatively minor net gain of groundwater (approximately 46L/s) over the model domain and this volume remained unchanged when the model was run with and without mining. The negligible impact of the mine is considered to be due to the poor hydraulic connection between the two systems in part due to the sub-cropping of the coal seam on the Boggabri Ridge.

The location of creeks and drainage lines at the boundary between the Gunnedah Basin and Namoi River floodplain was taken into account when locating Bores 3, 4 and 5 (see Annexure 1) and where located adjacent to drainage lines where possible. This will allow the shallow groundwater levels in the vicinity of the creek to be determined and then be compared to rooting depths for native vegetation requirements.

The DWE wrote:

More critical to riparian vegetation on creeks and drainage lines will be any changes to surface water flows caused by subsidence or fracturing beneath the creek bed. While the depth of the Hoskissons seam may be sufficient to minimise the risk of fracturing reaching the surface, there may be an impact on porosity and hydraulic behaviour below the creek bed. Such impacts may also affect the reliability of farm dams.

In response GHD writes:

> No mining related impact on the porosity below creek beds or farms dams is expected as the fracturing associated with the Stage 1 development is predicted to occur in the roof area only. The only mining related alteration to the hydraulic behavior below the creeks and farm dam is minor drawdown of the water table aquifer which is expected to be generally less than 1m over the model domain. Given the depth to water table is typically well below the base farm dams this additional minor drawdown is not expected to affect the reliability of farm dams.

The DWE wrote:

> *The EA presents no mitigation measures to address flow loss impacts on watercourses or associated vegetation communities. DWE requires appropriate measures be required to provide adequate protection to the impacted riparian communities and the watercourses upon which they depend."*

In response R.W. Corkery & Co. Pty. Limited writes:

> Impacts on catchments to Kurrajong Creek would be minimal and unlikely to have a major affect on local flows. The Proponent would provide for annual monitoring of vegetation along Kurrajong Creek Tributaries 1 and 2 as part of a Flora and Fauna Management Plan and implement remedial measures in the event of any identifiable impacts

A1.2.6 The risk to catchments and surface water systems of inadequate measures to contain mine water discharges and contaminated runoff.

A1.2.6.1 Evaporation Pond Capacity and Water Balance

The DWE wrote:

> *"The environmental assessment outlines the surface water management infrastructure proposed, for handling various categories of water based on expected quality, including several scenarios for mine dewatering. The Department's major concern is the capacity of the evaporation ponds to accommodate the expected mine inflows, as well as their construction. The modelling suggests that mine inflows will peak at around 800 ML per year in the future, with long term steady state flows of around 690 ML per year. The combined capacity of the proposed evaporation basins is 693 ML, with a surface area of 21.36 ha. Annual evaporation rates are unlikely to exceed 1800 mm per year, so the maximum evaporative capacity of the basins ignoring rainfall is of the order of 385 ML per year. Given the small amount of surface infrastructure and haul roads, it is difficult to believe that the difference (up to 400 ML per year) will be a made up by using water for dust suppression. Detail on the mine water balance is limited, and it is not clear whether the studies were based on annual data, monthly data or preferably daily data. The ability to evaporate mine water in winter conditions is critical, particularly if it coincides with a major surface runoff event which needs to be transferred to the evaporation basins……"*

The following response was compiled based on information provided by WRM Water and Environment Pty Ltd, Parsons Brinckerhoff Pty Ltd and Narrabri Coal Pty Ltd.

Water Management Strategy

The proposed water management strategy involves a two phased approach to ensure uncontrolled spills of contaminated water from the Pit Top Area do not occur. The Phase 1 strategy involves the construction of evaporation ponds to collect, store and either re-use the stored water for operational purposes both underground or within contained areas of the Pit Top Area or evaporate the saline groundwater. This strategy would be implemented from the commencement of the project when mine in-flows are predicted by GHD (2007) (see Part 2 of the *Specialist Consultant Studies Compendium*, pp. 2-41 and Figure 24). It is noted that GHD predict that groundwater inflows in the first year under the worst case scenario would not exceed 295ML, significantly less than the predicted long term inflows. Phase 2 water management would be triggered if recorded mine in-flows approximated or exceeded those predicted by GHD (2007), thereby indicating an eventual overtopping of the evaporation ponds. Two possible water management options for Phase 2 were identified in the *Environmental Assessment*, ie. the construction of additional evaporation ponds or the construction of a reverse osmosis water conditioning plant. The Proponent has subsequently committed to the construction of a reverse osmosis water conditioning plant once mine in-flows exceed operational requirements sufficiently to sustain the reverse osmosis process (approximately 880m^3/day).

In order to assess the suitability of the two stage strategy and to determine the likelihood and timing for Phase 2 water management, WRM (2007) prepared a water balance model of the proposed mine site water management system, which assessed the behaviour of the evaporation basin and retention pond on a **DAILY** basis (see Part 2 of the *Specialist Consultant Studies Compendium*, pp. 1-43 to 1-46). Water Balance modelling was undertaken for the following scenarios.

- Start-up Water Balance (10 Years) to assess the behaviour of the Water Management System during the initial 10 years of mining when groundwater inflows are expected be at their lowest.
- Long Term Simulation (1900 – 2004) to assess the behaviour of the Water Management System when the groundwater inflows are expected to be at their greatest. (This is expected to occur after approximately 25 years of mining).

In both cases, the operational water use requirements (both surface and underground) were based on the figures quoted in Section 2.9.2 of the *Environmental Assessment* (p. 2-53).

Start-up Water Balance (10 Years)

The behaviour of the evaporation ponds during the initial 10 years was assessed using the daily water balance model using three 10 year rainfall scenarios obtained from historical records.

- A typical wet rainfall period (1968 – 1977).
- A typical dry rainfall period (1911 – 1920).
- A typical median rainfall period (1994 – 2003).

The mine in-flows expected during the initial 10 years, as predicted by GHD (2007) were used. The modelling predicted that the evaporation ponds would not spill in any of the modelled scenarios except for the typical wet period in combination with the maximum upper limit groundwater inflows. For this scenario, the evaporation ponds did not spill until the tenth year of operation. Based on these results, it was recommended by WRM (2007) to construct all of the evaporation ponds before the tenth year of mine operation especially if the first few years of operation experience wetter than average rainfall conditions. However, given the Proponent's current commitment to construct a reverse osmosis water conditioning plant once mine in-flows sufficiently exceed operational requirements to sustain the operation of the plant, evaporation pond construction would be restricted initially to Ponds A and B only.

Through discussions held with a manufacturer and supplier of reverse osmosis water conditioning plants of a size similar to that which would potentially be required by the project (Veolia Water) by Parsons Brinckerhoff (PB), it has been established that a lead time of between 3 and 6 months would be required to construct and commission an appropriately sized reverse osmosis plant. Ample time would therefore be available to the Proponent to monitor actual mine in-flows and construct the reverse osmosis water conditioning plant should the dewatering volumes sustain it.

Long Term Simulation (1900 – 2004)

For the long term simulation, a long term sequence of **DAILY** rainfalls and evaporation derived from historical records was used (104 years). Rainfall runoff modelling was undertaken to derive a long term sequence of daily runoff from the various Project Site catchments using best practice principles. The modelling predicted that the proposed evaporation pond could accept only 880m^3/d (321.5ML/year) over a long term simulation without being overtopped.

Therefore, should monitoring of mine in-flows during the initial years of mining indicate comparable in-flow volumes to those predicted by GHD (2007), planning for the construction and commissioning of a reverse osmosis water conditioning plant would commence. The water balance model indicates that a reverse osmosis water conditioning plant with a capacity of approximately between 1.12ML/day and 1.62ML/day may be required to ensure the evaporation ponds do not spill under the expected long term groundwater inflows.

Evaporation Pond Construction

As noted in the *Environmental Assessment*, the evaporation ponds would be lined with a layer of clay with a permeability not exceeding 1 x 10^{-9}m/day or FML with a permeability not exceeding 1 x 10^{-14}m/day. Preliminary soil testing has indicated that suitably impermeable material is present in-situ, however, further testing would be undertaken, should the project be approved.

Conclusion

It has been demonstrated through the preparation of a carefully considered water management strategy (by Narrabri Coal Pty Ltd) and a detailed water balance by WRM (2007) that even during a period equivalent to the wettest 10 year period in the rainfall record and with maximum initial mine in-flows, the ponds would not overtop for at least 9 years. The water balance also indicates that the ponds, as designed, would hold sufficient

capacity for mine in-flows of up to 880m^3/d (321.5ML/year)[1]. It remains the Proponent's commitment not to conduct more than the initial two ponds for evaporation (Ponds A and B). It is intended that Ponds C and D would in effect become storages for conditioned water and brine, albeit that they may need to be re-configured / re-designed to reflect the storage quantity required.

Considering the Proponent has committed to the installation of a reverse osmosis water conditioning plant well in advance of the ponds over topping, and the ponds would be constructed using suitably impermeable material, the risk of salt contamination downstream is considered negligible.

A1.2.7 Reverse Osmosis Water Conditioning Plant and Accumulated Salt Management

A1.2.7.1 Reverse Osmosis Water Conditioning Plant

The DWE wrote:

"……The environmental assessment does raise the prospect of annual "spill" volumes from the evaporation basins, and indicates that this will need to be addressed by alternative management, such as irrigation or a reverse osmosis water conditioning plant. The detail on either of these 2 options is lacking, other than some preliminary investigations. Given the salinity of the mine water, DWE believes irrigation is not a realistic option without some dilution, unless mine water quality proves to be much better than the current base line studies suggest."

The following response was compiled based on information provided by Parsons Brinckerhoff Pty Ltd and Narrabri Coal Pty Ltd.

The Proponent agrees that the saline nature of the groundwater to be dewatered is too high to consider irrigation. For this reason, no further detail was provided on irrigation of groundwater that would be dewatered from the underground workings.

Significant detail is provided on the required design, operation and management of a reverse osmosis water conditioning plant within the Pit Top Area within **Appendix 4** of the *Environmental Assessment* (PB, 2007). As the Proponent is now committed to the construction of such a plant, once mine in-flows exceeding operational requirements are sufficient to sustain its operation, a summary of the proposed operation is provided along with additional information on waste management.

A1.2.7.2 Accumulated Salt Management

The DWE also wrote:

"An additional concern is the concentration of salt in the ponds. As the salinity of the ponds increases, solidification of salt in the base of the ponds will occur, which will gradually utilise pond storage capacity. For example, at peak mine discharge of 800 ML per year and an assumed concentration of perhaps 8,000 mg/L, the annual salt load will be 640 tonnes. If

[1] Consideration of accumulated salt and impact on pond capacity is considered in Section A1.2.7.

the solid salt density is around 1 kg/L, this will utilise almost one tenth of the total storage volume. That is the ponds could be filled with salt after 10 years.

While mine discharge in the early stages will be low and easily accommodated, the environmental assessment does not adequately address long term salinity management issues. It seems there will be a long term salt load to be accommodated somewhere in the landscape. Regardless of whether a water desalination plant is constructed, there will still remain a concentrated brine to be stored in the landscape.

Hence there is a long term salinity risk to landscapes and potentially watercourses which requires more detailed investigation. Discharge to the Namoi River is not an acceptable option in the Murray-Darling Basin."

The following response was compiled by Parsons Brinckerhoff Pty Ltd.

In response to the above query, it is worth revisiting the water balance included in PB (2007) (see **Appendix 4** of the *Environmental Assessment*, p. A4-4).

A simplified water balance is shown in **Figure A1.5**, which represents the worst case groundwater inflows occurring after 25 years of operation.

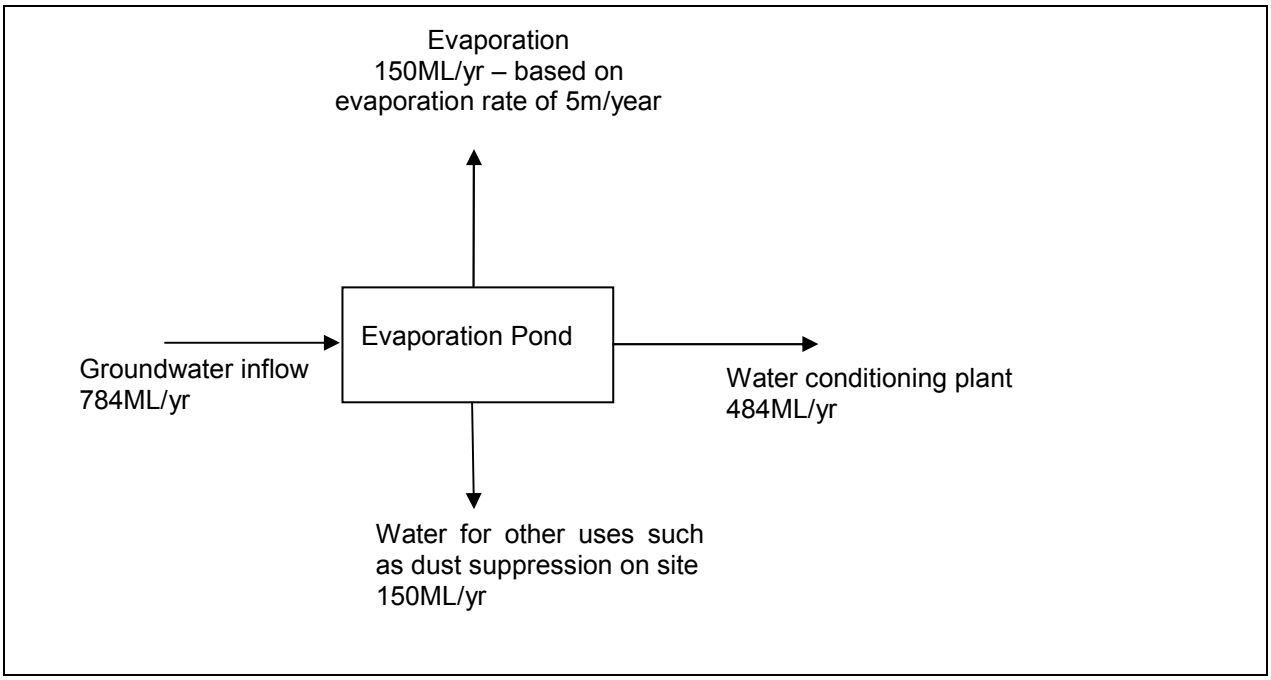

Figure A1.5 Water Balance at Year 25

Calculation of Salt Accumulation within the Evaporation Pond

Mine in-flows are predicted by GHD (2007) to reach approximately 800ML per year after 25 years of production, before reducing gradually over the remaining life of the project. Based on the DWE's comments, it appears the DWE is presuming that this is all being evaporated in the evaporation pond when in fact a reverse osmosis water conditioning plant would have been constructed to manage the in-flows additional to operational requirements and storage capacity. PB note they are unsure of the source of the salt concentration value of

8 000mg/L and how they have justified their chosen pond size. In order to better understand the DWE's enquiry, PB has worked through the DWE's methodology in calculation 1 below.

1. Assuming an in-flow value of 800ML/yr and the DWE's salt concentration of 8 000mg/L, then:

   - 800 x 10^6L/yr x 8000 mg/L = 6.4 x 10^{12} mg/yr = 6 400tpa of salt.

   Assuming salt density of 1000 kg/m^3, then:

   - 6 400t = 6 400m^3;

   Evaporation Pond Capacity: 1.5m depth, 10.1ha area = 151 500m^3, then:

   - 6 400m^3 / 151 500m^3 = 4.2% of total pond capacity;
   - ie. 4% evaporation pond capacity is taken up by salt per year; therefore
   - it would take 25 years for the entire pond to be taken up by salt.

   The quantity of salt accumulation which the DWE calculated (640t and 10 year pond filling period) is incorrect and should in fact be 6 400t and a 25 year filling period as shown in Calculation 1.

Calculation 2 below estimates salt (and solid) accumulation using the data as per PB (2007). Salt concentration is based on the worst case TDS value of 25 000mg/L (which was the concentration of solids within groundwater as determined through laboratory analyses of collected samples) and a more accurate groundwater inflow rate of 634ML/yr (784ML/yr – 150ML/yr), ie. total groundwater flow less the amount being used on site for underground dust suppression, surface dust suppression and water application to coal stockpiles.

2. Assuming a mine in-flow of 634ML/yr and a salt concentration of 25 000mg/L, then:

   - 634 x 10^6L/yr x 25 000mg/L = 1.585 x 10^{13}mg/yr = 15 850tpa;

   Assuming salt density of 1000 kg/m^3, then:

   - 15 850t = 15 850m^3.

   Evaporation Pond Capacity: 1.5m depth, 10.1ha area = 151 500m^3, then:

   - 15 850m^3 / 151 500m^3 = 0.10 x 100 = 10% of total pond capacity;
   - ie. approximately 10% evaporation pond capacity is taken up by salt per year; therefore
   - it takes 10 years for salt/solids to consume the entire pond capacity.

This scenario shows that within 10 years, the entire 10.1ha evaporation pond capacity (Ponds A and B) could potentially be consumed by salts. The Proponent would undertake regular (annual) excavation and removal of accumulated salt from the ponds to maintain storage capacity. The excavated salt or concentrated brine would either be sold as an

industrial salt product or placed within the completed underground mine workings. Given the saline nature of the groundwater intersected by the underground workings, the deposition of salts in this fashion would have limited impact on local groundwater quality.

The preparation of an Accumulated Salt Management Plan would be prepared prior to the construction and operation of the proposed reverse osmosis water conditioning plant.

The leaching of accumulated salts within the ponds to soil and potentially groundwater would be prevented by lining the evaporation / brine ponds with a suitably impermeable layer or liner (permeability = 1 x 10^{-9}m/s). Preliminary investigations have indicated that suitably impermeable clays are present in-situ and could be used to line the ponds. Further testing confirmation of liner to be used would be undertaken following approval of the project.

A1.2.7.3 Additional Sensitivity Analysis of the Groundwater Model

The DWE wrote:

"The mine discharge figures are based on modelling which used some basic values for strata hydraulic conductivity and storage capacity. It is not clear whether these characteristics are representative of likely conditions under continuous or long wall mining techniques. In the long wall mining scenario, there is likely to be greater fracturing and disturbance of overlying strata, which one would assume would tend to increase transmissivity. While some sensitivity analysis of hydraulic conductivity was undertaken for the Hoskissons Seam and the Arkarula Formation, the overlying strata were not included. Therefore considerably uncertainty exists over mine inflow rates and the ability to accommodate them in the longer term. Therefore considerable assessment will be required on mine inflows before assessment of Stage 2 long wall mining can occur."

R.W. Corkery & Co. Pty Limited provides the following response:

The need for the assessment / evaluation of Stage 1 mine in-flows is acknowledged and has been provided for in the *Environmental Assessment* of the Narrabri Coal Project. It is reiterated here that the Proponent will undertake continuous monitoring of mine in-flows, relating the results to the relevant operational stage of the mine and predictions for long-term mine in-flows.

A1.2.7.4 Conclusion

The DWE wrote:

"Mine water balance information is limited, and is sensitive to groundwater inflows and climatic variations. The site water management plan for the proposal must present options for management of water on site, including response mechanisms for extended wet periods and excess groundwater inflows. Options to assess and manage salt content left in the evaporation ponds must be investigated further."

R.W. Corkery & Co. Pty Limited provides the following response:

The identified gaps in information identified by the DWE in relation to the water balance, options for management of water on site, and options to assess and manage salt content left

in the evaporation ponds have been clarified and additional information provided. Of greatest note is the fact that the water balance was calculated using daily rainfall records, and even during a period equivalent to the wettest 10 years on record and assuming maximum mine in-flow rates, the project has almost 10 years of storage capacity. Given the approximate lead time for construction and commissioning of a reverse osmosis water conditioning plant has been quoted by a manufacturer as 3 to 6 months, there will be ample time available for verification of mine in-flows and calibration of a transient mine water balance. Calibration of the water balance will provide the information required to ascertain whether in-flows exceeding 880m^3/day are expected and therefore requiring the construction of the reverses osmosis water conditioning plant.

The Proponent has also committed to constructing the evaporation / brine ponds with a suitably impermeable layer or liner. To further minimise the potential for saline contamination to the soil and water below and surrounding the ponds, the accumulated salt will be periodically excavated and either sold off-site or placed within completed sections of the underground workings.

In addition, the Proponent will install shallow piezometers and/or soil lysimeters around the ponds with immediate remedial activities to be implemented should contamination be identified.

Based on the additional information provided within this document, it has been further demonstrated that the Narrabri Coal Project can be managed to minimise impacts on the surrounding environment and with contingent measures in place to mitigate against possible impacts on water availability to surrounding land owners.

A1.2.8 Watercourses and Subsidence

The DWE wrote:

"The New South Wales Rivers and Estuarine Policy requires riverine integrity to be protected. The environmental assessment does not appear to consider the impacts of the mine on the watercourses in particular stream stability, flow and water quality. DWE recommends that a minimum buffer of 40 metres should be provided between the 20 mm line of subsidence and the bank of schedule 2 streams unless the proponent can demonstrate that the mine will not degrade the watercourses, or that any potential degradation can be mitigated DWE recommends a stream monitoring program should be undertaken prior to mine implementation, during operations and post operations to ensure the watercourses are managed appropriately and to ensure any impacts can be remediated."

The following response was compiled by R.W. Corkery & Co. Pty Limited and WRM Water and Environment Pty Ltd.

The impact of the rail loop construction on the hydrology of Kurrajong Creek Tributary 1 was considered by WRM (2007) (SCSC pp. 1-38 to 1-41) with no significant change to flow / flooding conditions predicted. WRM (2007) also provided design details for Pit Top Area surface water management structures to prevent the discharge of contaminated water to the local tributaries of Kurrajong Creek. No additional assessment of impacts on local watercourses was undertaken due to the fact that disturbance associated with the project would avoid direct impact on the most proximal of these Kurrajong Creek Tributaries 1 and 2. While the level of assessment contained within the *Environmental Assessment* and

Specialist Consultant Studies Compendium is considered sufficient, it is noted that the Proponent would prepare and implement a water monitoring program to assess impacts on local watercourse and water quality over time.

Mine subsidence is not predicted to exceed 12mm (Mining Geotechnical Services, 2007) (see Part 8 of the *Specialist Consultant Studies Compendium*, p. 8-16) with the impact associated with this depth of surface depression (approximately 1cm) not sufficient to impact on any schedule 2 streams over the Project Site. The DWE comment relating to a 40m buffer between the 20 mm line of subsidence and the bank of schedule 2 streams is therefore not relevant for the Stage 1 assessment of the Narrabri Coal Project.

A1.2.9 Water Licensing

The DWE wrote:

"The Department has had discussions with Narrabri Coal Pty Ltd, however at this stage they have not lodged any applications for water licencing. A licence under Part 5 of the Water Act 1912 is required to access mine water and for any additional monitoring bores. All licences must be obtained for incidental water (i.e. seepage into underground or open-cut works) dewatering bores, mining extraction works, and production and monitoring piezometers prior to their installation."

Application was made to the Department of Water and Energy for a licence under Part 5 of the *Water Act 1912* in May 2007.

The additional groundwater modelling completed as part of this response has identified the relative contributions to mine in-flow from each layer of the model. Of particular interest, it has been identified that while the groundwater modelling shows that mine in-flows are predicted to be primarily sourced from the adjacent Gunnedah Basin Formations, the predicted flow through the base of the Pilliga Sandstone changes from a net inflow of 278m^3/d prior to mining, to a net loss of 13m^3/d at Year 50. This decrease of 291m^3/d, assumed to be due mine drainage, is equivalent to approximately 100ML per year. Accordingly, the Proponent will be required to obtain (through purchase from existing licence holders) a water access licence(s) for this volume of water[2].

A1.2.9.1 Conclusions

The DWE wrote:

"In summary, there are a number of issues of uncertainty, most of which involve longer term impacts that need to be addressed to generate greater confidence in the proposal. Some of these can be covered by the installation of a more widespread groundwater monitoring system and analysis of the impacts of early mine development, including some short term "testing" of the system. DWE requirements for a groundwater monitoring and response plan must be adopted prior to mining extraction commencing.

Management of accumulated salt within the evaporative basin system requires additional

[2] It is worthy of note that the volume of reduced in-flow from the Pilliga Sandstone would gradually increase over the life of the mine and that it would be several years before the impact of reduced in-flow would be felt in the Pilliga Sandstone. Therefore, a water access licence(s) would not be required from commencement of the project, rather within the first couple of years.

explanation, and a rigorous assessment and monitoring program to prevent long term contamination of the site."

R.W. Corkery & Co. Pty Limited provides the following response:

The Proponent has reviewed the previously proposed monitoring program for the Narrabri Coal Project and has adopted all of the DWE's recommended inclusions. **Annexure 1** provides the draft Groundwater Monitoring and Contingency Plan incorporating these recommendations.

Additional groundwater modelling has been completed to provide additional sensitivity analyses of the model to storage coefficient and recharge. In both cases, the model was found to be relatively insensitive to these parameters.

Additional groundwater modelling was also undertaken to provide a more accurate description of the relative impacts of the project on the layers of the Great Artesian and Gunnedah Basins. The modelling confirmed the conclusions of GHD (2007) that the bulk of mine in-flows would be provided by the Gunnedah Basin strata. However, by assessing each model layer separately, it was determined that by Year 50, in-flows from the Pilliga Sandstone layer, the only strata contributing in-flows to the Great Artesian Basin, would reach 291m^3/day (equivalent to 100ML/year). While it will be several years before any impact to in-flows of the Pilliga Sandstone occurs, the Proponent has committed to obtaining the necessary water access licence(s) prior to this.

The objectives and implementation of water and salt management within the Pit Top Area has also been clarified within this response. It has been confirmed that sufficient storage is provided by the proposed evaporation ponds, even under a worst case in-flow and rainfall scenario. This will provide sufficient time for water balance calibration to be undertaken and final water management determined. The Proponent notes that should in-flows exceed 880m^3/day, a reverse osmosis water conditioning plant would be constructed and commissioned. The Proponent has also committed to the lining the evaporation / brine ponds with suitably impermeable layer or liner, installing a monitoring system around the evaporation / brine ponds and annual excavation and disposal (either off-site or underground) of the accumulated salt.

The information contained within this response confirms the Narrabri Coal Project may be undertaken with minimal and manageable impact on the local environment.

ANNEXURE 1

Groundwater Monitoring and Contingency Plan
for
Narrabri Coal Project

Prepared by:

GHD Pty Ltd;

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AN1 GROUNDWATER MONITORING NETWORK

It is proposed that eight additional groundwater monitoring bores are drilled at the approximate locations as shown in **Figure An1.1**. The purpose of the additional bores is to allow monitoring of any potential impacts on the aquifers utilised for groundwater extraction in the region and to provide additional information on the groundwater flow directions and water quality of these aquifers in, and adjacent, to the Project Site.

The monitoring bores will be aligned along transects extending away from the mine. Bores 1 and 2 are located along a transect to the south of the mine providing additional monitoring in the vicinity of existing extraction bores and where a spring feed dam is understood to be present. Bores 3, 4 and 5 will be located to monitor the potential impact on groundwater levels within the Namoi River alluvium along transects extending to the east and north of the Project Site. Bores 6, 7 and 8 will be located to the northwest and west of the mine and will provide additional information on the extent of the saturated Pilliga Sandstone and water levels trends in this area where 10 DWE registered extraction bores have been identified. Where possible, the bores will be aligned with existing DWE bores located in the Namoi River alluvium and in the GAB Intake Beds GWMA's as shown in **Figure An1.1** to extend the monitoring transects. **Table An1.1** presents a summary of the proposed additional monitoring bores for the Narrabri Coal Project.

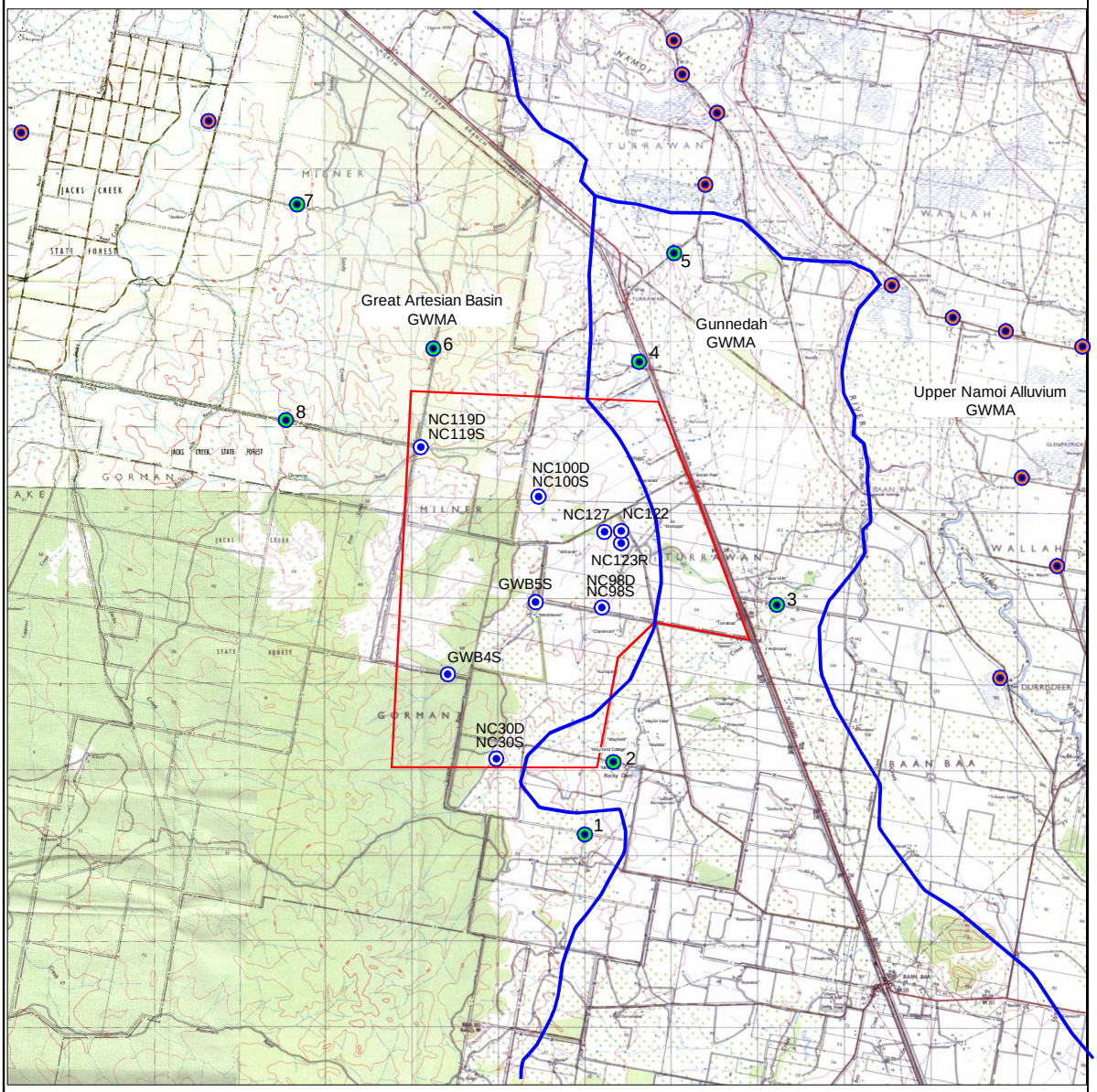
Table 1

Proposed Additional Groundwater Monitoring Bores

Bore	Basin	Interpreted Formation and Aquifer Type	Purpose of Monitoring
1	Surat Basin	Purlawaugh Formation Water Table aquifer	Monitoring impact to south of mine.
2	Gunnedah Basin	Napperby Formation - Water Table aquifer	Additional monitoring in vicinity of registered bores and spring fed dams
3	Gunnedah Basin	Lower Black Jack Formation Water Table aquifer	Monitor potential impact extending eastwards to Namoi River alluvial aquifer
4	Gunnedah Basin	Napperby Formation - Water Table aquifer	Monitor potential impact extending northwards to Namoi River alluvial aquifer
5	Gunnedah Basin	Napperby / Black Jack Formation - Water Table aquifer	Monitor potential impact extending northwards to Namoi River alluvial aquifer
6	Surat Basin	Pilliga Sandstone / Purlawaugh Formation – Water Table aquifer	Define extent of saturated Pilliga Sandstone and monitor potential impacts extending NW from mine on water table.
7	Surat Basin	Pilliga Sandstone – Water Table aquifer	Monitoring potential impacts extending north west from the mine on the Pilliga Sandstone.
8	Surat Basin	Pilliga Sandstone – Water Table aquifer	Monitoring potential impacts extending west from the mine on the Pilliga Sandstone.

These additional monitoring bores will also provide information required to characterise the localised groundwater flow systems, particularly the flow direction, in the water table aquifer in the Surat Basin sequence either side of the north-south oriented ridgeline located to the immediate west of the Project Site. To the west of the ridgeline the Pilliga Sandstone is understood to be saturated and flow to the northwest. To the east of the ridgeline, monitoring data indicates that the water table is found in the Purlawaugh Formation and Garrawilla Volcanics and northerly and northeasterly flow to the Namoi River predominates.

\\SERVER\RWC\674\Reports\67404\CAD\674MGAEIS_Response Annexure 1 Fig 1.DWG



REFERENCE
- Project Site Boundary
- Groundwater Management Area Boundary
- Existing Groundwater Monitoring Bore
- DNR Groundwater Monitoring Bore
- Proposed Groundwater Monitoring Bore

SCALE 1:150 000

2.5 0 2.5 5.0 7.5 km

Source: GHD (2007) - Figure 3

Figure An1.1
GROUNDWATER MONITORING

Table An1.2 presents a summary of the existing groundwater monitoring bores to be included in the groundwater monitoring program.

Table 2
Existing Groundwater Monitoring Bores to be included in Monitoring Network

Bore	Formation	Purpose
NC30S	Napperby Formation (no sill at site)	Monitor impact on water table aquifer in southern mine area
NC30D	Napperby Formation (no sill at site)	Monitor impact on deeper aquifer in southern mine area
NC98S	Garrawilla Volcanics	Monitor impact on water table aquifer eastern mine area
NC98D	Napperby Formation (above sill)	Monitor impact on deeper aquifer in eastern mine area
NC100S	Garrawilla Volcanics	Monitor impact on water table aquifer NE mine area
NC100D	Napperby Formation (above sill)	Monitor impact on deeper aquifer in NEmine area
NC119S	Purlawaugh Formation	Bore Dry - remove form progrma is continues to be dry
NC119D	Garrawilla Volcanics	Monitor impact on water table aquifer in NW mine area
NC122	Hoskissons Coal	Monitor impact below in coal seam in NE mine area
NC123R	Pamboola Formation	Monitor impact below mine floor in NE mine area
NC127	Arkarula Formation	Monitor impact in mine floor in NE mine area
GWB4S	Purlawaugh Formation	Monitor impact on water table aquifer central mine area
GWB5S	Purlawaugh Formation	Monitor impact on water table aquifer SW mine area

AN2 GROUNDWATER MONITORING PROGRAM

AN2.1 Phase 1 Pre Mining Monitoring Program

An extensive pre mining groundwater monitoring program will be undertaken prior to the commencement of coal extraction to establish the baseline groundwater levels and groundwater quality data for the existing groundwater extraction bores within, and surrounding, the Project Site and for the groundwater monitoring bore network.

AN2.2 Groundwater Extractions Bores Baseline Survey and Monitoring Program

A baseline survey of all registered extraction bores within the predicted drawdown cone is recommended to be completed. This includes the following 22 bores:

- Bores to the south of Project Site boundary, namely GW022596, GW005094, GW00592 and GW005023.
- Bores within Project Site boundary, namely GW060976, GW000018, GW000014, GW000013, GW017215 and GW043315. (Note this excludes bores listed as backfilled, groundwater exploration bores and bores owned by Narrabri Coal.)
- Bores to the north and west of Project Site, namely GW003604, GW067626, GW003623, GW003052, GW000016, GW070841, GW003622, GW068591, GW002197, GW062614, GW003598 and GW044892.

The survey will establish the current status of each bore, verify the bore construction and location information provided by the then Department of Natural Resources (shown in Table 4 of the Groundwater Assessment) and collect data of standing water levels in the bores when the pumps are operational and non operational, water quality, flow rates and total extraction volumes. Other groundwater information such as location of springs will also be recorded.

A preliminary survey of Project Site conducted by Narrabri Coal indicates that there is one new bore on the "Willara" property that was not registered at the time of the DNR data search. All landowners within the Project Site will be contacted to confirm total number of registered and unregistered bores.

Flow meters will be installed to record total extraction volume from the following bores GW000013, GW000014, GW000018 and GW017215 as the drawdown impact on these bores is predicted to exceed 15% over the mine life and it is therefore necessary to establish the volume of water extracted from the bores which could potentially require an alternative source. Depending on the existing bore headworks, monitoring tubes/airlines will be installed in bores GW060976, GW043315 and the four bores to be fitted with flow meters, to allow accurate monitoring of static and pumping standing water levels in the bores.

AN2.3 Baseline Monitoring Bore Program.

Once the status of the registered 22 bores listed is established, all functional bores and any additional unlicensed bores within the Project Site will be monitored on a monthly basis for standing water level prior to commencement of coal extraction (for a minimum of 12 months). The time since the pumps were operated will also be recorded to establish variation in pumping and static standing water levels. A groundwater sample will be obtained from each bore and monitored for pH, EC, major ions and selected heavy metals to provide baseline water quality data for each bore.
In order to provide additional information of the baseline hydrogeological conditions in, and adjacent to, the 20 monitoring bores at 17 sites (as shown in Figure 1) will also be monitored for standing water level on a monthly basis prior to the commencement of coal extraction.

Groundwater sampling of the monitoring bores will be completed on a quarterly basis in the first year prior to the commencement of coal extraction. The groundwater samples will be analysed for pH, EC, major ions and selected metals. This will establish the baseline groundwater chemistry across the Project Site and surrounding areas.

AN3 PHASE 2 - MINING MONITORING PROGRAM

During the mining phase, regular monitoring of the existing groundwater extraction bores and proposed monitoring bore network will be undertaken to allow on going assessment of any impacts of the mine on the groundwater levels, water quality and groundwater users in the area. Quarterly monitoring of standing water levels will be undertaken in all monitoring bores. Each monitoring bore will also be sampled on an annual basis and analysed for pH, EC, TDS, major ions and selected metals. To provide a more detailed monitoring dataset on the impact of mining, dataloggers will be installed in selected monitoring bores. Suitable bores may include NC-98D in the drift area, NC-122, NC-123R and NC-127 all monitoring Black Jack Formation units in the northeast of the proposed underground workings.

Quarterly monitoring of standing water levels will be undertaken in the groundwater extraction bores within the Project Site (GW00013, GW000014, GW000018, GW017215, GW043315 and

GW060976). Annual monthly monitoring of the remainder of the 22 extraction bores will be undertaken to monitor potential impacts.

Annual sampling of extraction bores is proposed within the Project Site and adjacent bores (GW005023, GW005892, GW003604, GW067626 and GW003623). The samples will be analysed for pH, TDS and major ions and selected metals to assess long term trends in groundwater chemistry.

Regular assessment of the groundwater monitoring data and other hydrogeological information is proposed. An independent, qualified hydrogeologist will be commissioned to review the monitoring results, assess the adequacy of the monitoring program and provide an assessment of the trends in groundwater levels and water quality in relation to the proposed water level and groundwater quality trigger levels in the area. The ongoing groundwater monitoring program will be reviewed annually to ensure only meaningful data is being collected.

In addition to the ongoing hydrogeological assessment of the monitoring data, completion of a short term pumping will be undertaken to assess the hydraulic connection between the coal seam and overlying strata and simulate mine inflows. The test will also provide further data on the hydraulic parameters of the aquifer including storage co-efficient which could not be determined from the packer testing program. A pump bore will be drilled and screened over the coal seam and additional monitoring bores may also be required. It is proposed to locate the pump bore in Gunnedah Basin GWMA, to the north of the Project Site in the vicinity of the proposed Bore 4. Comments on the proposed duration and location of the test will be sought from DWE prior to commencement of the testing program. The pumping test is to be completed when sufficient evaporative disposal capacity is available on site.

AN4 PHASE 3 POST MINING MONITORING PROGRAM.

Regular monitoring of the groundwater extraction bores and monitoring bores is proposed during the mine site decommissioning and rehabilitation phase as required by the regulatory authorities. Ongoing monitoring of selected monitoring bores may be required post mine closure and sealing and decommissioning of monitoring any bores not required for ongoing monitoring is also proposed.

AN5 CONTINGENCIES AND TRIGGER LEVELS

As part of the baseline survey, it is proposed that all bore owners within the predicted drawdown cone receive a copy of the proposed groundwater monitoring program and have opportunity to comment on the proposed contingency measures and trigger levels. On commencement of mining it is recommended that the monitoring data for the extractions bores be assessed and the trigger levels based on 10% and 15% of available drawdown be determined for each bore within the modelled drawdown cone.

The proposed contingencies protocols are as follows.

- If the monitoring data indicates that the available drawdown in an existing bore has been reduced by greater than 10%, a period of intensive monitoring followed by hydrogeological assessment will be undertaken. The bore will revert to a minimum of monthly monitoring for at least six months and a datalogger to establish the fluctuations in static and operational water levels of the bore will be

installed. The data from the intensive monitoring of the extraction bore and surrounding monitoring bores will be reviewed by an independent hydrogeologist to assess the hydrogeological conditions in the area of the impacted bore. If the decline in water level is considered to be related to mining, intensive monitoring of groundwater levels will continue to establish the rate of decline and discussions initiated with the bore owner on contingency planning.

- If the monitoring data indicates that the available drawdown in an existing bore has been reduced by greater than 15%, contingency actions should be triggered. These may include the following.
  - Establish a new extraction bore to provide required yield.
  - Lower pump(s) in the impacted bore(s) or provide higher lift pumps if bore construction allows.
  - Sourcing an alternative water supply of comparable water quality and yield. Narrabri Coal is committed to the establishment of a RO water conditioning which could be used to supply alternative high quality water, should it be supplied. It is noted that this contingent measure would be a short term measure only, and likely to be implemented while more long term solutions like those noted in the two previous points are finalised.

The bore owners will also be provided with contact details for Narrabri Coal personnel to report any significant changes in the operation of their bore related to either declining water levels or water quality to initiate further monitoring and hydrogeological assessment.

With regard to groundwater quality, should the assessment of the water quality data from the ongoing monitoring of the extractions bores indicate changes in groundwater quality (compared with regard to the ANZECC trigger levels relevant for the bore use), a hydrogeological assessment of the data will be completed. This may include:

- re-sampling of the bore in question and analysis of the data in surrounding bores to assess the cause and extent of impact;
- if the impact is assessed to be mining related, install additional groundwater monitoring bores in the area to assess the extent of impact;
- conduct a risk assessment to assess the risk to groundwater users and the environment from the change in groundwater water quality and identify possible remedial options; and
- conduct remediation if necessary.

APPENDIX 2

Response to Department of Environment and Climate Change's "*Proposed Narrabri Underground Coal Mine (Mp 05-0102) – Review of Publicly Exhibited Environmental Assessment Report*"

Prepared by:

R.W. Corkery & Co. Pty Limited

In Conjunction with:

Australian Archaeological Survey Consultants Pty Ltd; and
Parsons Brinckerhoff Pty Ltd

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A2.1 INTRODUCTION

The following document addresses the requested amendments to the draft Statement of Commitments nominated by the Department of Environment and Climate Change (DECC) in a submission to the Department of Planning (DoP) on the *Environmental Assessment* and *Specialist Consultant Studies Compendium* prepared and made publicly available for the Narrabri Coal Project.

The following sections review each of the requested amendments and where relevant includes the detail of the revised or additional commitment.

The preferred project report and final Statement of Commitments have been provided separately to this document.

A2.2 REVIEW OF PROPOSED AMENDMENTS TO THE DRAFT STATEMENT OF COMMITMENTS

A2.2.1 Rehabilitation and residual salt management

The DECC wrote:

- *The SoC should include specific reference to rehabilitation of the storage/ evaporation basins with reference to the proposed mitigation measures outlined on page 2-66 of the Environmental Assessment.*

  The Proponent agrees to include additional commitments reflecting the management and rehabilitation of the evaporation, water storage and/or brine ponds.

  Action(s) / Commitment(s):

  Two active ponds (Ponds A and B) would be operated at all times such that evaporation be allowed to dry out the accumulated salt in one pond while water is discharged into the second pond. The accumulated salt would be regularly excavated from the ponds (initial excavation would be annual, with the interval revised over time depending on the deposition rate of the salt) and disposed of either off-site (through commercial arrangement) or placed within the completed underground mine workings.

  Monitoring of shallow piezometers to be constructed surrounding the ponds would identify if any leakage of saline water was occurring with contingency measures such as excavation and relining of the ponds undertaken if this is identified. As noted in the *Environmental Assessment*, sampling and analysis of the soil below and surrounding the ponds would precede rehabilitation, with identification of salt contamination triggering the implementation of a Salinity Contamination Contingency Plan (which would be developed in consultation with Department of Water and Energy (DWE) and DECC within 12 months of project commencement).

Timing:

- Salt excavation to initially be undertaken annually, possibly reducing based on observed salt deposition rates.
- Monitoring of shallow piezometers surrounding the ponds would be undertaken on a quarterly basis for the life of the project.
- Sampling and analysis of soil would be undertaken prior to rehabilitation of the ponds.
- Remedial / contingency measures in response to identified salt contamination would follow immediately on identification of such contamination.

The DECC wrote:

- *DECC recommends that following further validation / calibration of the groundwater models, water balance model and saline mine-water quality monitoring that an additional assessment and reporting be undertaken for estimating residual salt loads in the evaporation basins and proposed ongoing management (to ensure capacity of ponds is maintained) and rehabilitation options for the salt loads in the surface environment. This may include, for example, options for returning salt loads to underground workings and out of the surface environment and/or options for marketing and sale of salt as a resource.*

  It has been calculated (by Parsons Brinckerhoff Pty Ltd) that when mine in-flows are at maximum level (predicted to be after approximately 25 years of mining) and assuming highly saline water (TDS = 25 000mg/L), approximately 15 850t of salt would be deposited. Two active ponds (Ponds A and B) would be operated at all times such that evaporation be allowed to dry out the accumulated salt in one pond while water is discharged into a second.

Action(s) / Commitment(s):

The volume of dewatered mine in-flows will be measured to establish the likely future dewatering requirements (through comparison to the predictions of GHD (2007) (Part 2 of the *Specialist Consultant Studies Compendium*). Based on the predicted dewatering requirements (and measured TDS of the water) the annual deposition of salt in the ponds will be calculated.

The accumulated salt would be regularly excavated from the ponds (initial excavation would be annual, with the interval revised over time depending on the deposition rate of the salt) and disposed of either off-site (through commercial arrangement) or placed within the completed underground mine workings.

Timing:

- Predicted annual salt deposition to be reviewed annually.
- Salt excavation to initially be undertaken annually, possibly reducing based on observed salt deposition rates.

The DECC wrote:

- *DECC recommends proponent be required to provide further details on proposed native revegetation as part of a rehabilitation or landscape management plan for the premises. Refer more details under Natural Heritage and Documentation sections.*

Action(s) / Commitment(s) / Timing:

The Proponent will prepare a Rehabilitation and Landscape Management Plan within 12 months of receiving project approval.

A2.2.2 Water Management

The DECC wrote:

- *Action 6.4: DECC recommends conditions of consent to include discharge limit conditions for dirty water areas which discharge from the premises (that is areas not contaminated by saline waters or chemicals) where the key objective is management of total suspended solids (TSS). The sediment basins will need to be designed to meet a 100%ile discharge limit condition of 50mg/L total suspended solids; 10mg/L grease and oil and pH within range 6.5-8.5. Attachment 3 includes standard limit conditions included in existing mining operations for disturbed area catchments.*

  The Proponent accepts the conditional requirement.

Action(s) / Commitment(s) / Timing:

The Proponent will prepare and implement a Site Water Management Plan, including a site water balance, detailed design of all surface water management structures and monitoring programs for surface and groundwater, within 6 months of receiving approval for the project.

The design of dirty water management structures will ensure any discharge of water to meet the nominated criteria.

The DECC wrote:

- *Action 6.8: DECC recommends that the evaporation basins be designed to a target of $1x10^{-9}$ m/s at 900mm thickness or equivalent design for floors and walls. If it is proposed to use an FML a minimum thickness of 1.5mm is required at effective permeability of $1x10^{-14}$m/s with appropriate sub-grade preparation to minimise puncture of materials and long term protection of the liner from UV degradation and protection through wetting and drying cycles.*
- *In addition, DECC recommends that:*
  - *(i) Prior to commencing construction works, that detailed design of the proposed construction works of the evaporation/ storage dams be submitted. This must include the development and implementation of a Quality Assurance/ Quality Control (QA/QC) process to ensure that construction of the evaporation/ storage ponds meets the design specifications; and*

(ii)Prior to commissioning the evaporation/ storage ponds a post construction verification report be submitted which includes work as executed drawings for the completed works; final surveyed dimensions and capacities; results of QA/Qc testing verifying that design clay liner depth and permeability has been achieved.

The Proponent accepts the recommendations of DECC in relation to evaporation pond preparation. In addition, should an FML be used, this would be covered with up to 500mm of compacted clay to ensure no punctures occur during excavation of the accumulated salt.

Action(s) / Commitment(s) / Timing:

Prior to construction of the evaporation ponds, further testing and analysis of in-situ clay material will be completed to determine if sufficient low permeability material is present to complete construction.

Should a FML be used, the floor of the pond would be lined and compacted with fine clay (ie. no rocks / gravel) and covered with at least 500mm of clay to prevent exposure to UV light and minimize possibility of liner puncture during salt excavation.

Following in-situ soil testing and prior to commencement of construction, detailed designs for the ponds will be submitted to the DECC.

Prior to commissioning the ponds a post-construction verification report be submitted which includes work as executed drawings for the completed works; final surveyed dimensions and capacities; results of QA/QC testing verifying that design clay liner depth and permeability has been achieved.

The DECC wrote:

- *Action 6.9: This objective requires revision and further clarification. The proposed freeboard refers to a 1 in 100 year event but no specified design storm size. The DEC considers that a minimum 1 in 100 year 72 hour storm event be maintained below the spillway of the evaporation pond. The freeboard and embankment design should also adequately protect the embankment from wave action and erosion. DECC supports design of the evaporation dam system to allow emergency spill for dam safety considerations only with no contingent release of saline waters to Kurrajong creek. To ensure that freeboard is maintained, this will require the proponent to cease pumping mine water to the evaporation pond system to ensure compliance with this draft statement of commitment. DECC recommends that this be explicitly included in the statement of commitments or consent conditions as follows:*

  'Mine water will not be pumped into the evaporation pond system when the approved freeboard is exceeded'

  The Proponent accepts the recommendation of DECC in relation to the maintenance of evaporation pond freeboard.

The DECC wrote:

- *Action 6.10: This objective requires revision and further clarification. The objective refers to dewatering contingency plan and requirements should a 1 in 100 year ARI capacity of the evaporation / storage pond be exceeded. Commitment has been made in the EA report of nil discharge from the water management system based on the available 116 year rainfall sequence used in the water balance calculations. DECC recommends that an annual review of the water balance be undertaken and report submitted demonstrating that as constructed design will continue to meet a nil discharge target based on assuming a wet 10 year cycle and longer term water balance based on the 116 year rainfall data. Following completion of the transient calibration of the groundwater model and first annual review of the water balance, the proponent should prepare the proposed formal dewatering contingency plan. The plan should include identification of lead times to implement the contingencies and triggers for commencing contingency plans.*

The Proponent agrees with the recommendations presented by the DECC.

Action(s) / Commitment(s) / Timing:

The volume of water discharged to, and remaining storage capacity of, the evaporation ponds will be undertaken and an annual review of the water balance completed to determine compliance with the nil discharge commitment over the equivalent wettest period of the regional rainfall record.

As a secondary safeguard, the Proponent will construct a containment bund downstream of the evaporation ponds to retain any spill, in the unlikely event of an evaporation pond embankment failure.

Following completion of the initial annual water balance review, the Proponent will prepare a Dewatering Plan providing specific detail as future management of mine in-flows and including identification of lead times for construction of a RO water conditioning plant. The Proponent has committed to the construction of a RO water conditioning plant once dewatering volumes exceed operational requirements sufficiently to sustain the operation of the RO process (approximately 880m^3/day).

The DECC wrote:

The following additional commitments in relation to water management should be included in the final statement of commitments or included in conditions of consent. DECC recommends that:

- *in accordance with recommendations by Coffey (who undertook the peer review of the groundwater modelling) that a review of the transient calibration of the groundwater model after 6-12 months of mining be undertaken to feed into predictions of groundwater inflow rates and drawdown impacts;*
- *quarterly summary reports be provided that includes average and maximum daily mine water inflow on a quarterly basis, stored volume of water within the evaporation/ storage dam system and remaining capacity within the evaporation/ storage dam system;*

- *the proponent is required to advise when the mine water inflow exceeds 880m^3/ day (or an alternative trigger point based on review of the water balance models and approved by DoP and DECC). This is the flow assumed for the modelling up to where it is predicted that nil discharges would occur based on the long term water balance model;*
- *an irrigation management plan be developed and approved by Planning and DECC for any individual irrigation schemes for water sourced from the mine water management system. Any proposal must be undertaken in accordance with the DECC document "Use of Effluent by Irrigation" and in particular constraints identified due to salinity and sodicity of the water;*
- *if an option is triggered for construction of a treatment plant with proposed discharge of treated water to Kurrajong creek that a study be undertaken assessing impacts of modified hydrology on the aquatic environment and riparian zone. In addition, there is only limited monitoring data of water quality within Kurrajong creek. The study should also assess additional ambient water quality data collected as part of the monitoring program to determine an appropriate discharge quality for TDS/ conductivity;*
- *the upper range default value for conductivity for upland rivers of 350us/cm (as a 100%ile limit) be used for discharge to waters criterion until further investigation is completed on ambient water quality in Kurrajong Creek; and*
- *the proponent be required to offset any residual salt loads that are discharged to waters in accordance with the 'green offset' provisions of the Protection of the Environment Operations Amendment Act 2005.*

With the exception of the following, the Proponent agrees with the additional commitments suggested by the DECC.

1. Fresh water generated by the RO water conditioning plant would be utilised in the following order of priority.
    a. For potable and ablutions purposes within the amenities block within the Pit Top Area.
    b. As a replacement source of water for local land owners potentially disadvantaged or impact upon by the operation of the project.
    c. As a supplementary source of water for the local community, available through commercial arrangement with the Proponent.

    In the unlikely event there is any surplus of conditioned water, the Proponent would investigate irrigation of the surplus water onto the paddocks within the Company's landholding.

    As a consequence, water would not be discharged and there would be no necessity to undertake a hydrological study of Kurrajong Creek.

2. As the Proponent does not propose to irrigate saline or treated water, there would be no requirement to prepare an irrigation management plan.

3. As the Proponent does not propose to irrigate saline water, there would be no requirement to provide 'green offsets' in accordance with the provisions of the *Protection of the Environment Operations Amendment Act 2005*.

Action(s) / Commitment(s) / Timing:

The Proponent has included a separate section on Evaporation Pond and Salt Management within the Final Statement of Commitments which reflect the recommendations of DECC.

A2.2.3 Groundwater

The DECC wrote:

- *DECC recommends that groundwater monitoring also be undertaken up-gradient and down-gradient of the evaporation ponds to monitor leakage and potential impacts on groundwater from the pond system. Depending upon depth to groundwater in this location, an alternative monitoring method to assess pond leakage may be installation of soil lysimeters.*

Action(s) / Commitment(s):

Shallow piezometers of soil lysimeters will be installed upgradient and down-gradient of the evaporation or brine ponds to monitor leakage and potential impacts on groundwater from the storage of the saline water.

Timing:

The monitoring locations will be established prior to the commencement of mine dewatering.

A2.2.4 Natural Heritage

The DECC wrote:

- *DECC strongly recommends that the proponent avoid impacts on the remnant surrounding the proposed ventilation shaft by relocating the infrastructure to nearby cleared land and re-assessing any visual impacts and mitigation measures.*

  In accordance with the recommendation of the DECC, the Proponent has revised the proposed ventilation system for the project. Ventilation will now be via a third drift with the ventilation fan located at the entry to this drift in the box cut. The "Preferred Project Description Report" prepared in accordance with Section 75H(6(c)) of Part 3A of the *Environment Planning & Assessment Act 1979* presents the detail of the revised ventilation arrangement.

  Altered impacts on air quality and noise have been reassessed as part of the Preferred Project Description Report.

The DECC wrote:

- *Not all of the recommendations made in the EA Main Report and associated specialist reports are reflected in the Statement of Commitments (SoC). These should be specifically incorporated into the SoC. See Attachment 2 for more details.*

  The Proponent has reviewed the recommendations made in the *Environmental Assessment* (Section 4B.3) and has now included these in the Final Statement of Commitments. Central to the implementation of the DECC's recommendations is to be the preparation of a Flora and Fauna Management Plan. The plan would be a practical document and would specify responsibilities and accountabilities for all actions.

  The plan will include the specific steps that will be taken to ensure that all commitments contained with the Final Statement of Commitments, along with the mitigation measures proposed in the *Environmental Assessment* are explicitly followed. The implementation of these commitments and mitigation measures will be subject to ongoing monitoring and reporting.

  As noted previously, the Proponent has also committed to the preparation of a Rehabilitation and Landscape Management Plan.

  The additional commitments are as presented as follows.

  Action(s) / Commitment(s) / Timing:

  Locate the facilities within the Pit Top Area so as to avoid or minimise removal of hollow-bearing trees that are potential nest and/or roost sites (prior to clearing).

  Break up the trees cleared (excluding those found to be hollow-bearing) into small sections and used as mulch (during clearing activities).

  Conduct a tree hollow survey (by a qualified ecologist) of any individual trees to be cleared as well as fallen timber that would be disturbed by the project (prior to clearing).

  Undertake regular inspections of all Pit top Area water storages for fauna and instigate appropriate measures if fauna identified (Ongoing).

  Prepare a Flora and Fauna Management Plan (with 12 months of commencement of operations).

- *DECC recommends that the proponent specifically include the development of a landscape rehabilitation plan in the SoC which, at a minimum:*

  i. Covers the rehabilitation of all areas impacted by the proposal and identifies those areas to be revegetated with native species;

  ii. Contains specifications for revegetation using endemic native species of trees, shrubs and grasses as far as possible, and include the stratification of the landscape to ensure that suitable endemic species are re-established in suitable positions in the local catchment/landscape context;

  iii. Specifies methods to ensure that the majority of woody plants to be used in revegetation will be grown from seed collected on site. These revegetated areas should be protected from grazing by both native fauna and domestic stock;

  iv. Includes measures to connect existing habitat and future areas of rehabilitation;

v. Includes monitoring procedures for assessment of the effectiveness of revegetation along with measures for on-going weed control; and

vi. *Specifies how long the monitoring or maintenance of rehabilitation work will go on for after the mine has closed and who will be responsible for this.*

The Proponent agrees with the recommendation to prepare a Rehabilitation and Landscape Management Plan, including points (i) to (vi) above.

A2.3 ABORIGINAL HERITAGE

The DECC wrote:

- *Action 9.1: DECC request that the induction of employees and contractors include information of the National Parks & Wildlife Act 1974 part 6, sections 86 & 90 (cultural awareness program 9.1).*

The Proponent agrees with the request of the DECC.

Action(s) / Commitment(s) / Timing:

A nationally recognised cultural awareness induction course will be provided to employees and contractors. This will involve trained assessors and Indigenous representatives.

The DECC wrote:

- *Actions 9.3 to 9.9: DECC is of the view that the Aboriginal assessment has provided limited information in which to develop adequate management strategies for Aboriginal heritage. The proponent should provide details on proposed short term actions and long term management through a detailed plan of management for Aboriginal heritage to be reviewed by DECC prior to construction commencing.*

The Proponent is committed to preparing a Cultural Heritage Management Plan (CHMP) for the project. The CHMP will include detailed management strategies for cultural heritage and ongoing Indigenous consultation and will be completed within 6 months of project approval.

Action(s) / Commitment(s) / Timing:

The Proponent will prepare a Cultural Heritage Management Plan (CHMP), to the satisfaction of the DECC and other stakeholders, within 6 months of project approval.

The DECC wrote:

Correspondence from the Aboriginal community remains outstanding. The assessment report needs to provide demonstration of Aboriginal community interaction. DECC recommends that the proponent follow the procedures outlined in the DEC 2005 Draft Guidelines of Aboriginal consultation, and the DEC 2005 Guidelines for Aboriginal cultural heritage Impact Assessment and Community Consultation for Part 3A.

Several attempts were made by the Proponents Archaeological consultant over a period of six to nine months to obtain written acknowledgement from the Narrabri Local Aboriginal Land Council (LALC), who were actively involved in the field assessment and formulation of recommendation. This effort will continue and it is anticipated that comments will be received from Narrabri LALC in the coming few weeks.

The DECC wrote:

DECC is of the view that the Aboriginal assessment has provided limited information in which to develop adequate management strategies for Aboriginal heritage. In particular the archaeological investigation has not referred to previous work (BBBS cultural heritage assessment 2000 & 2002) which provides a summary of the known distance from water, in metres, Aboriginal sites occur, and the variety of landforms in the region which are culturally sensitive or least sensitive (RACD:2000 & 2002). This information combined with the data collected within the proposed easement would assist in the development of appropriate buffers around sensitive creeklines identified in the assessment report, as well as decision making about test pitting in select areas (9.4).

The Proponents Archaeological consultant (Australian Archaeological Survey Consultants Pty Ltd) was aware of the BBBS investigations and acknowledges this exceptionally fine work. However, it was not considered vital to the study for two main reasons:

1. The present buffer zones around the creeks are greater than those indicated in the BBBS reports. Moreover, good visibility at the time of the survey (combined with detailed viewing of several geological sub-surface test excavations) indicated that no sites were located in the areas of impact. Monitoring will also be included in the CHMP to be prepared on approval of the project.
2. The idea that distance to water and site parameters in this landscape can be calculated adequately seems somewhat naive. A very basic understanding of geomorphic processes in this environment would make it clear that most streams, particularly certain types of ephemeral waterways move their courses quite regularly – thus making very detailed site distance calculations rather odd. We refer to the plethora of papers on this subject which show that ephemeral creeks change course regularly and many may have formed only in the recent past - post-European colonisation (Nanson and Young 1981). Numerous studies have been made of similar landscapes, and it has been found that where land has been clear, rabbits have effected sediment stability and alternating drought and heavy rains are common, massive amounts of sediment shift via fluvial erosion (McIvor et. al. 1995; Lu, et. al. 2001; Latta 1997). Typically, such erosion, in the form of gullies, occurs on mildly sloping hills with climatic patterns, and recent landscape histories, similar to the Study Area. In such environments, it has been estimated that upwards of 10 percent of sediments can be transported in decades, often more rapidly (Australia State of the Environment Report 2001). This means that streams, which can form quickly, would appear to have archaeological potential, but may in fact simply be a remnant of modern erosion processes. It is not known if this is the case for the Study Area. However, combined with the fact that there is a buffer greater than the BBBS data suggest, and given the results of the surface survey and sub-surface inspection, the

conclusions of the report seem valid in this respect. To ensure this is the case, the CHMP, in addition to Indigenous monitoring, will outline a reinspection programme involving an archaeologist and Indigenous representative.

References Cited:

Australia State of the Environment Report 2001 (Theme Report) Prepared by: Ann Hamblin, Bureau of Rural Sciences CSIRO Publishing on behalf of the Department of the Environment and Heritage

Latta J. 1997 *Benchmarking survey 1997: a report on farming practices in the low rainfall regions of NSW, SA and Victorian mallee.* Agriculture Victoria, Mallee Sustainable Farming Project Inc.

Lu H., Gallant J.' Prosser IP, Moran C. and Priestley G. 2001 *Prediction of sheet and rill erosion over the Australian continent, incorporating monthly soil loss distribution.* Technical Report. State of the Environment Unit, Environment Australia.

McIvor J.G, Williams J. and Gardener C.J. 1995 Pasture management influences runoff and soil movement in the semi-arid tropics, *Australian Journal of Experimental Agriculture* 35, pp. 55-65.

Nanson, G. and R. Young 1981 Overbed deposition and floodplain formation of small coastal streams of NSW. *Ziet Geomorph* 25.

A2.4 AIR QUALITY

The DECC wrote:

The draft statement of commitments in relation to air quality generally appears adequate. DECC however, recommends that the following additional commitment or consent condition be included:

- *Prior to commencement of mining operations, the licensee must submit a report to the Department on greenhouse gas monitoring and potential abatement measures. This report must include:*

  (i) a detailed plan for monitoring of greenhouse gas emissions generated by the development;

  (ii) an investigation of methods to reduce greenhouse gas emissions generated by the development (including pre-drained methane gas), including technologies to convert mine gas emissions into energy and potential for off-setting greenhouse gas emissions.

DECC will also require standard licence operational conditions to be included as identified in Attachment 3.

The Proponent has reviewed the recommended conditions / commitments and agrees to include these in the Final Statement of Commitments for the project.

Action(s) / Commitment(s) / Timing:

The Proponent will prepare a Greenhouse Gas Report to the DECC including commitments and procedures to monitor and report annually on greenhouse gas emissions. Calculation of greenhouse gas emissions will be accomplished by recording diesel and energy consumption, and coal seem gas exposure and calculating annual CO_2-Equivalent emissions through the use of established conversion equations (as issued by the Australian Greenhouse Office).

Based on CO_2-Equivalent emissions of the first 12 months of mining, the Proponent will evaluate the need for conversion of mine gas emission to electricity in consultation with the DECC.

A2.5 NOISE AND VIBRATION

The DECC wrote:

- *The draft statement of commitments in relation to noise impacts generally appears adequate. DECC recommends that noise limit conditions proposed in the environmental assessment report be included in the conditions of consent, as further outlined in Attachment 3.*

  The Proponent has planned project operations to meet the criteria specified in the *Environmental Assessment*.

A2.6 SUBSIDENCE

The DECC wrote:

- *DECC notes that a formal Subsidence Management Plan (SMP) is not required due to maximum prediction of 12mm subsidence from use of room and pillar coal extraction. DECC recommends that survey points be incorporated above mined areas to verify subsidence is less than predictions. The information would also be useful into baseline data and input into possible Stage 2 long wall mining impact assessment and subsidence predictions.*

  The Proponent will install relevant survey control points to monitor subsidence of the surface level.

A2.7 ENVIRONMENTAL MONITORING

The DECC wrote:

> *Attachment 3 provides a summary of recommended monitoring to be included for the project. The SoC should also include the following monitoring requirements (in addition to that proposed in the report).*

Noise
Noise monitoring should also be undertaken during the operational stage to validate noise predictions, particularly under noise enhancing meteorological conditions (SE wind and inversions) in relation to noise from the pit top area, train movements on the premises and from the ventilation fan discharge. The key sensitive receptors for operational noise monitoring should include:

- *Bow Hills residence – potential impacts from pit top activities, including train movements on the premises/ inversion conditions.*
- *Westhaven residence – potential noise impacts from ventilation fan operation*
- *Naroo residence - potential impacts from pit top activities, including train movements on the premises.*
- *Greylands residence – potential impacts from pit top activities, particularly under SE wind.*

Additional verification monitoring should also be undertaken by the proponent based on noise complaints from sensitive receptors.

Groundwater
Groundwater monitoring bores and/ or lysimeters (depending upon depth to groundwater) should be installed progressively above and below any constructed evaporation dams to monitor potential leakage of salts from the ponds.

Soils
Soil profile testing should be undertaken down-gradient of the evaporation pond system to assess whether seepage of salts into the soils is occurring and appropriate mitigation measures undertaken.

Irrigation schemes (if approved on a case by case basis)
Monitoring requirements may include soil monitoring through the profile targeting salinity/ sodicity and physical parameter; volume water irrigated; quality of water irrigated; terminal pond (if required) discharge quality. The monitoring will be dependent upon outcomes of additional studies undertaken prior to irrigation being undertaken.

Water management system
Table 4B.14 identifies additional monitoring not included in the SoC. These should be included. In addition the following monitoring should be included:

- *Evaporation Pond/ Storage Pond system - quarterly and discharge event monitoring of EC, TDS, pH, TSS, TOC, heavy metals, Sodium Adsorption Ratio (SAR);*
- *Volume monitoring (continuous flow meter) of dewatered mine inflows to evaporation pond system (daily flow logged/recorded);*
- *Volume monitoring of pumped flows from retention pond to evaporation pond system;*
- *Volume monitoring (estimate) of discharges to waters from retention pond and evaporation pond systems.*

Air
Action 6.10 refers to deposited dust monitoring at 11 sites, however there are only 8 sites identified on the attached figure. The final SoC needs to clarify this discrepancy.
The Proponent has included all the recommendations in the final Statement of Commitments.

A2.8 DOCUMENTATION

The DECC wrote:

- *The proponent refers to developing a systematic set of documents to guide planning and implementation of strategies. The SoC should specifically commit to development of Construction and Operational Environmental Management Plan(s) (EMP) with associated plans for water management, noise, air quality, flora and fauna, blasting, Aboriginal and cultural heritage, rehabilitation and land management and waste management.*

  The Proponent agrees to prepare the following environmental plans for the project.

  - Air Quality Monitoring Program.
  - Noise Monitoring Program.
  - Blast Management Plan.
  - Cultural Heritage Management Plan.
  - Flora and Fauna Management Plan.
  - Greenhouse Gas Plan.
  - Site Water Management Plan.
  - Salinity Contamination Contingency Plan.
  - Groundwater Contingency Plan.
  - Rehabilitation and Landscape Management Plan.