NSW GOVERNMENT | Office of Environment & Heritage

Your reference:
Our reference: Doc12/33475
Contact: Susan Harrison, 9995 6864

Mr David Kitto
Major Projects Assessment
Department of Planning and Infrastructure
GPO Box 39
Sydney NSW 2001

Attention: Director, Mining and Industry Projects

Dear Mr Kitto

I refer to your letter dated 7 August 2012 seeking comments from the Office of Environment and Heritage (OEH) on the Environmental Assessment (EA) for NRE No.1 Colliery – Modification MP10_0046 Mod 1.

OEH has reviewed the documents and provides detailed comment in Attachment 1. In summary OEH has identified some significant concerns in regard to adequacy of the EA and the likely high impacts on endangered ecological communities, threatened species and their habitat and groundwater aquifers which could lead to major environmental impacts, including a potential loss of water to nearby Cataract Creek. These concerns are more fully discussed in the attachment. The Pells Consulting Report (Appendix E) also identifies significant shortfalls in the assessment of impacts on groundwater aquifers, streams and swamps. Given the deficiencies in the EA, in terms of both the assessment of potential environmental impacts and proposed ameliorative measures, OEH is of the view that it does not provide a sufficient basis upon which to make a decision regarding this proposal.

OEH considers that this proposal is best assessed as part of the entire mining expansion project, rather than as an incremental modification to the existing proposal, so that the cumulative environmental impacts are adequately assessed and addressed. It is suggested that a meeting be convened between OEH and DoP&I to discuss these matters more fully.

If you have any queries regarding this matter please contact Susan Harrison (02) 9995 6864 (note working days are generally Monday and Wednesday only).

Yours sincerely

MONICA COLLINS
Director Conservation and Regulation
Office of Environment and Heritage

4 SEP 2012

ATTACHMENT 1

Office of Environment and Heritage (OEH) Comment on Environmental Assessment for Gujarat NRE Application for s75W Modification 1 to MP 10_0046 – Preliminary Works Project *Longwalls 4 and 5; Maingates 6, 7 and 8.*

1. Environmental Assessment Process

The NSW Government has invested heavily in time, resources and money to review mining proposals in the Southern Coalfields. This includes a number of major assessments such as:

- Dendrobium Commission of Inquiry
- Southern Coalfield Inquiry
- Metropolitan Coal PAC
- Bulli Seam PAC

In each case significant deficiencies have been identified in the information provided by Industry to Government on which to base decisions that balance the environmental, social and economic benefits and costs of these proposals.

Gujarat NRE does not currently have an approved extraction plan in place for the expansion project with the exception of Longwall 4 which was approved under a Subsidence Management Plan (SMP) approval under Part 5 of the EPA Act. OEH/EPA previously commented on the Draft SMP for Longwalls 4 and 5 Draft Conditions and supporting Review of Environmental Factors, concluding that the proposal could not be supported.

The Gujarat NRE expansion is currently being assessed in 2 stages under Part 3A of the *Environmental Planning and Assessment Act 1979* (EPA Act). The Environmental Assessment (EA) (ERM 2011) for the Stage1 Preliminary Works was deemed to be inadequate in a number of areas by a number of Government agencies. In particular, the subsidence prediction methodology was heavily criticised by a variety of agencies, including OEH (formerly DECCW), as was the lack of baseline data and underestimation of potential environmental impacts associated with various iterations of the mine plan.

The Planning Assessment Commission (PAC) in assessing the Stage 1 Preliminary Works application commented that *"the Commission considers that separation of project applications where the primary purpose of the first is to facilitate the second could lead to lack of public confidence in the NSW assessment and regulatory systems and must be considered undesirable."* (PAC 2011).

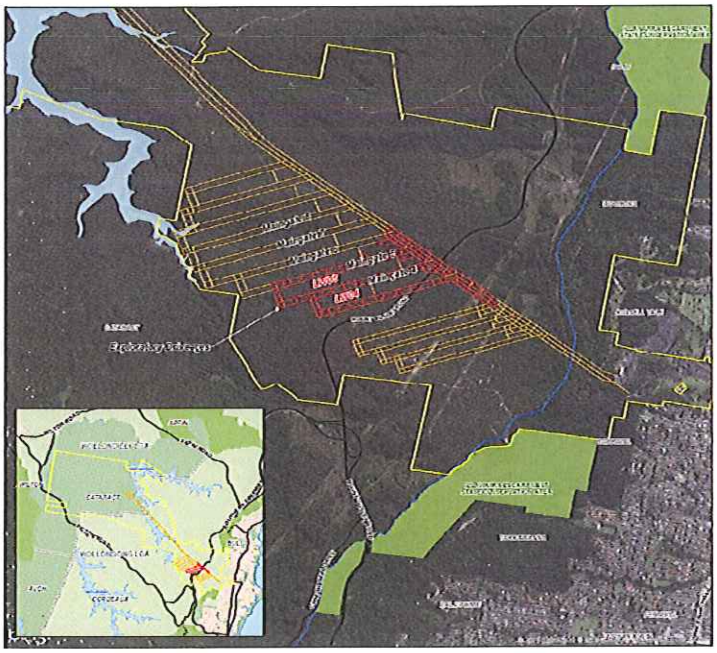

Figure 1 from Cardno (2012)

Figure 1 of the EA (above) illustrates this is the first of many planned longwalls in this area. Also the modification includes the development of Maingates 6, 7 and 8 which will be preparatory to longwall mining. OEH is concerned that this project could facilitate the future expansion project ahead of the full assessment of the larger mine domain that Gujarat will eventually seek. The current process of seeking incremental approvals is a piecemeal approach that does not consider the full cumulative impacts of the mining operation.

OEH's main concern with this EA is the potential impact the proposed mining will have on streams, aquifers and swamps and consequent impacts for threatened species and communities not only above Longwalls 4 and 5 but within the whole mining domain.

2. Deficiencies in the EA

The Environmental Assessment (Cardno 2012) is not restricted to the modification works but includes sections detailing the original expanded mine (including discussions on Wonga West which is approximately 9 km to the west - north-west) as well as new material specific to the reconfigured Longwalls 4 and 5 layouts. The resulting EA is an inconsistent integration of parts of the planned expanded mine plan, parts specific to Longwalls 4 and 5, some new opinions and minor surveys conducted by consultants, with virtually no presentation of baseline monitoring data for the area (e.g. groundwater levels in rock aquifers or upland swamp EECs; flow data for Cataract Creek etc).

One of the more recent pieces of work to be included in this EA is a review of the original expanded mine proposal (and Government agency comments) by Pells Consulting (2011 Appendix E of the Longwall 4 & 5 EA). While the Pells' report expresses differences of opinion in regards to subsidence predictions and probabilities of pillar runs, the consultant also identifies significant shortfalls in the assessment of impacts to groundwater aquifers, streams and swamps (see below). This is an independent peer-review of the original EA for the NRE Stage 2 expanded mine plan that was deemed to be inadequate by a number of Government agencies. The report also identifies significant deficiencies. However, these inadequacies have not been addressed in the current EA.

3. Subsidence

At a meeting with Gujarat and Biosis (26 April 2012) it was identified that the subsidence methodology for the current EA had not changed since the submission of the EA. Therefore Gujarat NRE is continuing to promote mining projects based on subsidence predictions that have been heavily criticised by Government agencies, including Infrastructure and Investment's Chief Subsidence Engineer. This appears to be a highly "experimental" approach to mining in this domain given the extreme lack of information on:

- Cumulative effects of multiple extracted seams;
- Potential for old pillar collapse;
- Lack of confining aquicludes / aquitards in important areas (ie eroded Bald Hill claystone layer within nearby Cataract Creek);
- Presence of faults;
- Inadequate description of prediction methodology and absence of calibration/validation; and
- Relevant supporting documentation and baseline data (and provided within a suitable timeframe to enable review).

Pells's review (2011) of the subsidence modelling recommended that a range of subsidence values be provided given the inherent uncertainties in mining in this area. Notable in this is that subsidence computations undertaken by Pells for the Wonga East domain give stress levels ranging from 3-14 mm/m.

The PAC panel for the Bulli Seam Operations review (NSW PAC 2010 p120) has set out subsidence criteria that should be applied individually to identify swamps that may be at risk of negative environmental consequences. These criteria are as follows:

- all swamps subject to systematic tensile strains >0.5mm/m

- all swamps subject to systematic compressive strains >2 mm/m
- all swamps with depth of cover less than 1.5 times longwall panel width
- all swamps subject to tilt (transient or final) >4 mm/m
- all swamps subject to a predicted valley closure of >200 mm
- all swamps subject to a 'maximum observed closure strain' >7.0 mm/m.

The subsidence predictions for Longwall 5, which undermines upland swamp CCHS3 and is adjacent to CCHS4, clearly exceed these thresholds. Seedsman Geotechnics (2012) predicts maximum tilt at 17 mm/m, with strains anticipated to be between 12 mm/m compression to 10 mm/m tension (Seedsman 2012) in LW5. As such these swamps are clearly at risk of negative environmental consequences from the proposal.

Of additional concern is that the presence of faults in the area have not been addressed appropriately or sufficiently allowed for in predictions of impact. At the meeting with Gujarat and Biosis (26 April 2012) it was also identified that two faults (the Rixons Pass fault and an unnamed fault lying near or under Cataract Creek[1]) constrained mining in the area. The presence of these faults could exacerbate regional groundwater aquifer depressurization both to the north and south of the proposed Longwalls 4 and 5. These faults could also lead to wide variations in subsidence and its related impacts.

It is notable that Pells (2011) and the EA (Cardno 2012 & Seedsman 2012) all identify predicted strains from the current mine plan that exceed threshold levels likely to fracture rock strata and potentially have negative environmental consequences for upland swamp EECs, streams and groundwater aquifers. In addition, these adverse environmental consequences could be exacerbated due to the presence of faults.

4. Impacts to Groundwater Aquifers

Pells (2011; Appendix E) provided an assessment of the groundwater components of the original expanded mine EA (ERM 2011). Major conclusion were that the available data did "*not support a confident assessment on impacts to surface water systems*" and that it "*would be difficult for the monitoring to perceive and quantify impacts to surface water features from mining.*" It noted that there were a number of reasons that the role of the Bald Hill claystone in reducing mining impacts had been overstated. It concluded that "*the examination of sensitivity (the range of possible predictions that can occur under the current level of uncertainty) has not been adequately addressed in the EA*" and did not address the range set out in the PAC report for the Bulli Seam Operations.

OEH also has significant concerns about the influence of mining on groundwater aquifers and their implications for baseflow to streams and the maintenance of threatened aquatic species habitat. In the nearby Dendrobium mine, drawdowns of up to 40m in the Scarborough sandstone, 50m in the Bulgo sandstone and 25m in the Hawkesbury sandstone have been measured (Heritage Computing 2012). It is noted that predicted drawdowns provided in the original expanded mine EA (ERM 2011) and summarised in Table 4 of Pells (2011) are in many cases lower than the maximum drawdowns actually observed over the nearby Dendrobium mine.

Given the peer-review of the Pells' report (2011) that identified significant flaws in the groundwater assessment for the expanded mine plan, it would reasonably be expected that such flaws are addressed in the EA for *Longwalls 4 and 5; Maingates 6, 7 and 8.* There is however no new groundwater assessment for the current EA (or presentation of baseline data that OEH is aware is being collected), with the section of the main report dealing with groundwater still referring to the groundwater section of the expanded mine EA (ERM 2011) as simply being "consistent" with the proposed project modification (p53 of Cardno 2012).

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[1] This fault does not appear to be identified in Pells (2011) assessment of faults in this vicinity. Pells (2011) however, states (p18) that "*The EA and its various appendices give due consideration to the stratigraphy of the near horizontal Triassic strata above Permian coal seams. However, documentation of important geological structures such as faults, joint swarms and igneous intrusions is very limited, and consideration of such structures on surface deformations, groundwater flow, and impacts on creeks and swamps, is not adequate.*"

Reference to Geoterra (2012; Appendix I of the current EA) identifies that it is specific to swamp CRHS1 which does not lie above either Longwall 4 or 5. As such, Geoterra's conclusions for CRHS1 are not transferrable to any swamps that lie directly above longwall panels (i.e. CCHS3).

Aquifer drawdowns need much greater assessment with regards to their environmental consequence. Apart from their intrinsic value, the ecosystem services that upland swamps and groundwater aquifers provide in keeping rivers and streams flowing during periods of low rainfall are vitally important in protecting downstream ecosystems. Decreases to the groundwater levels in swamp and groundwater aquifers are likely to reduce and/or change the location of baseflow discharges, thereby affecting groundwater dependent and stream ecosystems.

5. Performance Measures for Upland Swamps and Special Significance Assessment

In assessing the proposal for mining of Longwalls 4 and 5 it is instructive to review the SMP approval conditions granted in March 2012 for Longwall 4 as a guide to the likely performance measures relevant to swamps and biodiversity (threatened species) in this area. These are reproduced below:

Feature	*Performance measure*
Swamps	
Coastal upland swamps including swamps labelled CRHS1, CCHS3 and CCHS4	Negligible* environmental consequences including: • Negligible change in size of swamp • Negligible change in the functioning of the swamp • Negligible change to the composition or distribution of species in the swamp • Negligible drainage of water from the swamp, or redistribution of water within the swamp
Biodiversity	
Threatened species, populations and ecological communities	Negligible environmental consequences

In this context "Negligible" is defined as *small, unimportant, such as to be not worth considering.* The assessment of whether the proposal can meet such performance measures is driven by the prediction of subsidence and estimation of the risk of that subsidence resulting in damage to features of special significance.

The EA clearly identifies the natural features of special significance in the proposal area. OEH strongly supports the application of criteria developed by the Metropolitan and Bulli Seam PACs to identify upland swamps of special significance and concurs with the conclusions in the EA that swamps CRHS1, CCHS3 and CCHS4 each meet multiple criteria of special significance. OEH's own assessment of these swamps against the criteria is included below.

Swamp Name	Ref.	Criteria for "special significance" as per PAC (2009, 2010)					
		Size	Complexity	Threatened Species/EEC	Contiguous	Scientific importance	ACH
CRHS1	NPWS 2003, ERM 2012	Yes (11.4ha)	Yes (MU43 present)	Yes (Coastal Upland Swamp EEC, *Pultenaea aristata,* Giant Burrowing Frog, Littlejohns Tree Frog)	Yes (Wallandoola cluster)	No (no major studies known at this time)	?
CCHS3	NPWS 2003, ERM 2012	No (2.6ha)	Yes (MU43 present)	Yes (Coastal Upland Swamp EEC, Giant Burrowing Frog, Littlejohns Tree Frog)	Yes (Wallandoola cluster)	No (no major studies known at this time)	?
CCHS4	NPWS 2003, ERM 2012	No (1.7ha)	Yes (MU43 present)	Yes (Coastal Upland Swamp EEC, Giant Burrowing Frog, Littlejohns Tree Frog)	Yes (Wallandoola cluster)	No (no major studies known at this time)	?

OEH notes there are discrepancies in the areas of upland swamp referred to in the Main Report for CCHS3 (1.7 ha in size) versus the ERM (Appendix H) reference (2.6 ha in size) that should be addressed.

6. Impacts to Upland Swamps

Upland swamps CCHS3 and CCHS4 are natural features of 'Special Significance' and they are clearly at risk of negative environmental consequences from Longwall 5. Given that this application also includes works for Maingates 6, 7 and 8 it is anticipated that further impacts are proposed as a result of additional longwalls to the north. The proposal cannot demonstrate that it can meet performance measures of 'negligible environmental consequences' for these features, which is the best-practice standard currently recognised following many years of detailed iterative investigations and reviews into the impacts of longwall coal mining in the Southern Coalfields.

The upland swamp at greatest risk is identified as *CCHS3.* Given these upland swamp EECs are identified as such they should be afforded special protection by way of a negligible impact criteria in any mine approval conditions. In order to be able to meet the performance measures the proposal needs to be modified, either by altering the mining parameters (panel width, pillar width) where mining is carried out beneath the swamps of special significance, or by shortening the longwalls to avoid subsidence impacts to these swamps.

Pells (2011) review concluded that groundwater modelling could not provide definitive answers on the impacts to streams and swamps. It was considered "*probable*" that there will be negative impacts on at least five swamps above the Wonga West workings, namely WCHS1, WCHS2, ICHS3, ICHS4 and WCFS2 but was unable to qualify the impacts.

A major part of the problem in considering such conclusions is that Pells' (2011) focus was for the broader mine plan and is not necessarily specific to the reconfigured Longwalls 4 and 5; Maingates 6, 7 and 8 (the

subject of the current EA; Cardno 2012). Monitoring over the nearby Dendrobium mine has, however, clearly revealed adverse impacts on upland swamp EECs. If the relatively impermeable base of upland swamps is fractured, then any perched aquifer is likely to drain downwards into the fracture network, thereby altering natural groundwater levels within the swamp and leading to increased desiccation. The similarity of impacts in Dendrobium Swamps 12 and 15b to impacts measured in Kangaroo Creek swamp on the Newnes Plateau as a result of longwall mining (DECCW 2010) reveal some consistent patterns of longwall mining impacts on swamps. Not only is the absolute level of the aquifer being affected (ie loss of permanent perched aquifer), but the groundwater level recessions in response to rainfall after undermining are very abrupt when compared to recessions prior to undermining.

Given the existence of vulnerable and endangered species in Cataract Creek a negligible impact criteria should also apply to Cataract Creek in any mine approval conditions. Because of the high level of uncertainty in environmental outcomes if mining proceeds, remediation of any impacts to upland swamps or Cataract Creek should be mandated in any mine approval conditions and a bond instituted that would allow for remediation should the Proponent not undertake such remediation.

As identified earlier, predicted subsidence parameters (especially strains) exceed threshold levels likely to fracture rock strata and could potentially have negative environmental consequences for upland swamp EECs, streams and groundwater aquifers.

If baseflows to Cataract Creek from groundwater aquifers or perched swamp aquifers are impacted by the current mining proposal, then this is likely to lead to adverse impacts on a range of threatened species within Cataract Creek. This includes a number of ground dwelling frogs (eg. Stuttering Barred Frog[2] and Giant Burrowing Frogs[3]) and Macquarie perch[4], the latter confirmed to be present in the lower reaches of Cataract Creek.

7. Impacts on Streams

The EA does not assess whether any of the streams within the proposal area could be considered to have special significance as per the findings of the PAC (2009, 2010). Significant streams on sandstone of the Woronora Plateau are considered to be those that are:

- 3rd order and above that have permanent flow
- 1st or 2nd order streams associated with swamps as part of their headwaters (as an indicator of streams with permanent flow).

Cataract Creek is a 3rd order stream at the western end of the SMP area and two of the 1st order tributaries that flow north from swamps CCHS3 and CCHS4 may also meet the definition of special significance.

8. Mitigation and an Adaptive Management Approach

The Biodiversity Management Plan (BMP) (Appendix J) states that "*if fracturing occurs remediate as soon as possible*", and the Trigger Action Response Plan (TARP) states that if predictions are exceeded impact mitigation measures will be implemented. However, there is no detail on what these remediation or impact mitigation measures will be. Given the lack of certainty about the effectiveness of such practices the BMP should also include a discussion of potential offset mechanisms that may be invoked should impact occur and remediation be impractical or unsuccessful.

There is a high (but unquantified) risk to EECs and groundwater aquifers which could lead to major impacts in this area, including a potential loss of water to nearby Cataract Creek. Based on previous experience (Lower Cataract River, Marhnye's Hole, Waratah Rivulet) any proposed remediation of impacts is likely to

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[2] The Stuttering Frog *Mixophyes balbus* is listed as an endangered species under the NSW TSC Act and vulnerable under the Commonwealth EPBC Act.

[3] The Giant Burrowing Frog (*Heleioporus australiacus*) is listed as vulnerable under both the EPBC Act and NSW TSC Act.

[4] The Macquarie perch is listed as an endangered species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and vulnerable under the *NSW Fisheries Management Act 1994*. Endangered species under the EPBC Act are a matter of national environmental significance.

be small in nature, expensive and difficult to apply in these forested areas. There is also currently no known method of remediating swamps that have been dewatered due to longwall mining fracturing underlying rock strata. Any impacts to EECs are therefore unlikely to be remediated and we are looking at a scenario of loss if significant impacts do eventuate from this mine plan. If mining is approved, negligible impact criteria should be applied to swamp CCHS3, CCHS4, Cataract Creek and any impacts deemed not negligible should have mandatory remediation conditions.

While an adaptive management approach to mining given the wide variety of unknowns in this area could be contemplated, it potentially introduces a high risk to environmental assets (including upland Swamp EECs) that overly the mining domain.

The Bulli Seam PAC report (2010) made reference to a NSW Land and Environment Court finding on the definition of adaptive management, stating it was not a "*suck it and see, trial and error approach to management*" but "*an iterative approach involving explicit testing of the achievement of defined goals. Through feedback to the management process, the management procedures are changed in steps until monitoring shows that the desired outcome is obtained. The monitoring program has to be designed so that there is statistical confidence in the outcome*". (Newcastle and Hunter Valley Speleological Society Inc v. Upper Hunter Shire Council and Stoneco Pty Limited [2010] NSW LEC 48).

9. Monitoring Data

Virtually no baseline monitoring data has been provided in the current EA (Cardno 2012) and for some sites there is not even 12 months worth of data by which to assess impact (let alone recovery if that indeed occurs). Given the lack of baseline monitoring and inadequate details on type and adequacy of this monitoring or clear and effective management feedback loops in the EA, OEH is of the view that the proposed mining in its current format adopts a 'trial and error' approach to mining impact management. As such, it places much if not all of the risk of adverse outcomes on significant environmental assets.

As a minimum, detailed hydrological monitoring must be implemented at all swamps identified in the project approval, and preferably all swamps in the larger project area. The key performance measure that links all other performance measures is

- *Negligible drainage of water from the swamp, or redistribution of water within the swamp.*

If this performance measure is met then the likelihood of all other performance measures being met is high, as any changes in size, function or composition of the swamp will be driven by loss or change in water quantity, quality and distribution. Similarly for threatened species that are considered swamp specialists, if there are negligible changes in water within the swamp then there are unlikely to be consequences for any populations as habitat condition and structure is unlikely to change. Stream dependant frogs, particularly Littlejohn's Tree Frog, may be an exception if stream flows are lost or diverted after they leave a swamp.

The EA does not include 2 years of baseline monitoring as required. OEH considers that the Proponent needs to take a longer term view of its operations and establish required monitoring programs well ahead of time to enable the information needs for environmental assessment to be met. If monitoring has commenced in the area prior to mining, as required by the approvals process, then the results of that monitoring should be presented as the baseline against which the performance of the mining will be measured.

10. Information Required for Further Assessment

In order that OEH can provide adequate comment on relevant management plans and EAs, OEH requests the following information:

- All baseline raw monitoring data (piezometer levels, pool levels, flow gauging, vegetation sampling, aquatic ecology sampling etc) used in or cited for the various Management Plans for this proposal.

The following references cited in the Management Plans:

- Geoterra, in prep Gujarat NRE Coking Coal Ltd NRE No. 1 Colliery Stream Assessment
- Geoterra, in prep Gujarat NRE Coking Coal Ltd NRE No. 1 Colliery Groundwater Assessment
- Golder Associates, 2011 Groundwater Modelling Results at NRE No.1, Technical Memorandum
- WRM Water & Environment, 2011 NRE No.1 Colliery Surface Water Modelling
- Biosis Research (2009). *NRE Gujarat Targeted Herpetological Surveys.* Report for ERM Australia.
- Cardno Ecology Lab (2010). *Aquatic Ecology Monitoring for Gujarat No. 1 Mine.* Report for Gujarat NRE.
- EcoLogical (2009). *Wonga East and Wonga West Threatened Fauna Habitat Assessment.* Report for ERM Australia.

11. Referral under the Environment Protection and Biodiversity Conservation Act 1999

It is the view of OEH that the upland swamps in the project area are part of the Temperate Highland Peat Swamps on Sandstone EEC listed under the Commonwealth EPBC Act. It is highly likely that at least some, if not all, of the swamps meet the criteria for this community. This EA should be referred to the Australian Government for assessment. It should also be noted that the Commonwealth determination is being reviewed for this community and a new draft determination for 'Peaty Swamps on Sandstone' specifically includes upland swamps on the Woronora Plateau.

12. Aboriginal Cultural Heritage

The assessment undertaken for the proposed modification application states that it is highly unlikely that the proposed works will impact on any registered Aboriginal objects within the proposed mining area. It states that as a result of previous monitoring of axe grinding grooves and engravings on sandstone rock platforms/outcrops, changes in site conditions have only been recorded at one site, where cracking occurred to the platform, but not to the axe grinding grooves or engraving.

Further, OEH had a meeting with the Proponent regarding LW4 HMP on 23rd April 2012. As a result of this meeting, it was confirmed that Gujurat NRE will continue to monitor Aboriginal objects to identify if there will be impact to them as a result of mining activities.

Previous comments by OEH/EPA regarding the protection of Aboriginal Cultural Heritage are still relevant, namely, that the performance measures for ACH are aligned with the Bulli Seam Project PAC recommendations, particularly with regard to the quantification of impacts/potential impacts to ACH as a result of mining. Further, the monitoring programme must include any Aboriginal objects that may be impacted by mining activities and that the mining footprint for these purposes includes the maximum extent of predicted subsidence.

References

BHPBIC (2009). *Appendix L. Bulli Seam Operations Socio-Economic Assessment Report prepared for Illawarra Coal Holdings Pty Limited by Gillespie Economics.* August 2009

Cardno 2012. *Longwalls 4 and 5; Maingates 6, 7 and 8 Application for s75W Modification 1 to MP 10_0046 – Preliminary Works Project 112069-01/Report 001* Ver 2. August 2012

DECCW 2010. *Review of Piezometer Monitoring Data in Newnes Plateau Shrub Swamps and their relationship with Underground Mining in the Western Coalfield.* NSW Department of Environment, Climate Change and Water. January 2010.

ERM 2011. *NRE No. 1 Colliery Stage 2 Environmental Assessment. Volume One – Report. Report prepared for Gujarat NRE Coking Coal Limited.* February 2011

Geoterra 2012. *Appendix I Subsidence Effects on Swamp CRHS1*, 2012

Heritage Computing (2012) *End-of-Panel Groundwater Assessment for Dendrobium Longwall 7 (Area 3A) Report HC2012/9 for Illawarra Coal* April 2012

Planning Assessment Commission, 2010. *The PAC Review of the Bulli Seam Operations Project.* NSW Planning Assessment Commission, Sydney ISBN 978-0-9806592-6-9

PAC 2011. *Determination – NRE No 1 Colliery, Preliminary Works Project Wollongong and Wollondilly Local Government Areas.* 13 October 2011

Pells Consulting 2011. *Appendix E. Review of subsidence and related facets of the NRE No. 1 Colliery. Underground Expansion Project Draft Environmental Assessment.* Report to Gujarat NRE Coking Coal Limited

Seedsman 2012. *Appendix B LW 4 and 5 Revised Predictions*