Submissions on Preferred Project Report and Response to Submissions

October 2013

6 East St

Russell Vale

NSW 2517

Dear Mr Preshaw,

I write to object to the Preferred Project Report (PPR) of the Underground Expansion Project MP 09_0013 recently submitted by Gujarat NRE (GNRE).

When I asked you directly whether the PPR would be subject to a consultation process when you attended our Community Consultative Committee meeting, you initially evaded the question but eventually conceded that the outlined PPR was so different as to constitute an unrecognisably changed proposal. I indicated that I did not believe the sketched PPR could validly be assessed in terms of addressing submissions for the original proposal. I again sought your undertaking that the PPR would be exhibited to the community who should then have an appropriate amount of time to digest and make submissions to this effectively new proposal. I believe that you gave me such an undertaking and that the community is owed such consultation prior to the PPR being assessed any further.

I take particular exception to the PPR now seeking to evade liability on the issue of mitigating potential flooding through the site. We have all heard the absolute verbal assurances that GUJARAT NRE have given that they accept liability for any flooding which occurs in the absence of the required mitigation measures – these assurances are more hollow than those given to their workers who have gone unpaid for so many weeks. We do not believe that GNRE would ever meet such liabilities and demand that before any more approvals are considered this mandatory condition of earlier approvals (the benefits of which have already been stripped out and shipped offshore) must be met. Until such time as the mitigations required are in place, I believe that the government should insure against this occurrence or accept full liability in the event that your and GNREs failure to ensure compliant activity results in community losses.

Amongst the many further reasons for my objection are:

- The proposed mining takes place under the Metropolitan Special Area (MSA) and in close proximity to Cataract Reservoir. The Special Areas are the final barrier of the SCA managed catchment system that's intended to protect the water supply of the more than 4.5 million people of Greater Sydney and the Illawarra. This area is already significantly damaged by mining. Moreover, the proposed mining in the Wonga East seam undermines two

previously mined coal seams and thereby compounds the potential for damage.

- Remodelling of the ground and surface water commissioned by GNRE will not be completed for at least 3 more months. It would be grossly negligent to consider a recommendation to the PAC on this proposal without this vital remodelling being completed and made publicly available. The critically important nature of this information is emphasized by the concerns expressed by the Dam Safety Committee and the Sydney Water Catchment Authority regarding the proposed expansion of NRE 1.

- The PPR affirms potential risks to the MSA, including: massive cumulative subsidence of up to 5.8m; potential re-activation of subsidence through pillar failure in the old Bulli seam mine; and, the potential for longwalls 6 and 7 to cause water to leak from the dam into the mines and out to the escarpment. The PPR makes it clear that should this happen, essentially there is nothing that can be done. These risks are totally unacceptable, given the importance of the MSA in supplying drinking water to the population of Greater Sydney. Extractive industries cannot co-exist with the water supply.

- The GNRE No. 1 Colliery is in a residential area, close to homes and schools. The colliery is a near constant source of noise and particulate pollution that erodes community health. Not only is this an inappropriate place for a massive, expanding colliery, GNRE has proved itself incapable of implementing basic measures (even measures that were conditions of its previous approvals) such as real time air quality monitors to mitigate its pollution.

- GNRE appears unwilling or unable to invest the capital required to bring the mine to modern standards. It has been obvious for some time that the corporation does not take the responsibilities of their development approvals seriously. The recent financial fiascos only confirm GNRE's unsuitability as a proponent.

- The PPR is so vastly different from the original proposal, that it should be advertised and exhibited again. Slipping through the PPR without notifying the original submitters and allowing them opportunity to comment erodes the integrity and transparency of the planning process.

- The quality of the PPR is poor. There is little detail in the account of the subsidence modelling and, accordingly, no basis for confidence in its predictions. Evidently the proponent lacks the resources to undertake an environmental assessment meeting current standards.

I expect to hear from you directly that the PPR will be subject to the exhibition process as you indicated would be the case at the CCC meeting you attended at the Russell Vale Golf Club.

Yours sincerely

Dr Alison Edwards

Department of Planning and Infrastructure
Clay Preshaw, Planner
clay.preshaw@planning.nsw.gov.au

Objections to Proposal MP 09_0013 PPR

Dear Clay,

The Georges River Environmental Alliance is aware of the damage done by longwall mining in the drinking water catchments that supply the greater Sydney area. Our membership and constituency within the Georges River catchment are thus affected, as we are part of greater Sydney. Furthermore one of those drinking water catchments, the Woronora, is actually contained within the Georges River catchment; after its impoundment at the Woronora Dam, the Woronora River goes on to be a tributary joining the Georges River at the southern Sydney suburb of Como. We are well aware and regret the 'on-the-ground' damage done to the catchment of the Woronora, and do not wish to see this repeated anywhere else in a way that threatens drinking water supplies. **We therefore write to object to this proposal of Gujarat NRE (GNRE) for their Preferred Project Report (PPR) to the Underground Expansion Project MP 09_0013.**

Some of the reasons for our objection are set out below and they echo closely those of the Illawarra Residents for Responsible Mining, (IRRM) and other stakeholder groups who have similar concerns:

- This PPR has dramatically changed the scope of GNRE's Expansion Project application, and yet the new proposal has not been advertised for public consultation. This is primarily a new application and the public should be made aware of these changes through a public exhibition, consultation and submission process.

- There are numerous mentions in the PPR about remodelling of the ground and surface water but this will not be completed for 3 months. This mine has previously flooded causing extensive damage to the residential areas. **It also mines directly under the Metropolitan Special Area, causing cumulative subsidence of 5.8m. It is not appropriate to even consider approval or recommendations without this a comprehensive and expert assessment of impacts.** The PPR lacks the required assessment. We request that DoPI make no recommendations until the remodelling of the ground and surface water has been completed and the information has been assimilated into the PPR.

- The quality of the **PPR does not meet the standard** required to properly assess the possible consequences of the proposed mining. The subsidence of up to 2.6m (as stated in the PPR) is unacceptable, particularly in the vitally important and sensitive Metropolitan Special Area. The PPR also goes on to say that the estimated previous subsidence from Bulli and Wongawilli seam extraction would be up to 1.9m, therefore the cumulative subsidence is 4.5m. GNRE qualifies this by stating that where there are pillars remaining in the Bulli seam the cumulative subsidence could be 5.8m. This is unacceptable.

- The longwalls have been redesigned in the Wonga East area and the longwalls moved away from the Cataract Reservoir but the proposed longwalls still have the potential to damage the Reservoir. The longwalls do not breach the 0.7 x depth barrier but because the Bulli seam workings above have already encroached on this zone there is potential for significantly greater subsidence than predicted. Given this potential failure and no viable means to remediate it once it has happened, we suggest that the LWs 6 and 7 are commenced further away from the reservoir to safeguard our water. There are also two areas that are noted in the PPR as having potential for pillar run, pillar creep or pillar

instability in the Bulli seam. One of these areas will be impacted by LW1 and we suggest that this longwall is stopped short to maintain the integrity of this area**.**

- We believe that GNRE is an unsuitable proponent for this contentious mine. **It has demonstrated that it is unable to self-regulate, has had numerous non-compliances (mainly due to lack of resources) and does not have the investment capital to modernise the mine and colliery infrastructure to acceptable standards.** GNRE has been under mounting financial pressure in recent weeks and their own auditor stated, "We have been unable to obtain alternative evidence which would provide sufficient appropriate audit evidence as to whether the consolidated entity may be able to obtain such financing, and hence remove significant doubt of its ability to continue as a going concern for a period of 12 months from the date of this auditor's report".

We ***have*** not made a reportable political donation.

Yours sincerely,

Name: Sharyn Culllis, Secretary, Georges River Environmental Alliance
Address: 14 Marine Drive, Oatley. 2223
Date: 31/10/13.

IRRM
ILLAWARRA RESIDENTS FOR RESPONSIBLE MINING

Department of Planning and Infrastructure
Clay Preshaw, Planner
clay.preshaw@planning.nsw.gov.au

31 October, 2013

Dear Clay,

Project Application No. MP 09_0013 PPR

We would like to take this opportunity to formally comment on Gujarat NRE's Preferred Project Report to their Expansion Project application MP 09_0013 to allow continuation to mine at No 1 Colliery in Russell Vale. IRRM ask that this PPR be refused until further and proper process has been implemented.

Illawarra Residents for Responsible Mining Inc is a community group that formed in response to the current operations and proposed expansion of the Gujarat NRE (GNRE) No. 1 Colliery in Russell Vale. Our aims include advocating for responsible mining, which is mining that puts the health and wellbeing of ordinary people, protection of the Sydney Water Catchment Area (SWCA) and of the environment, ahead of corporate mining interests.

Preferred Project Report

Gujarat NRE has recently submitted their final version of their PPR for their proposed Expansion Project at No1 Colliery at Russell Vale. This PPR has dramatically changed the scope of their proposal but has not been re-advertised for public consultation. There were hundreds of submissions from the public and not one of the submitters has been personally notified of the PPR or the dramatic changes included in this document. This is essentially a new application and the public should be made aware of these changes through a full public exhibition, consultation and submission process.

The limited time made available to comment on the PPR further emphasizes the dismissive view the Department of the public 'consultation'.
The requirements and guidelines for Preferred Project Reports appear to be very sketchy. We were told by a member of your staff that PPR parameters are specific to a project, from our perspective that amounts to tailoring the process to the proponents' advantage. When asked if we could obtain a copy or sight the documentation exchanged between DoPI and Gujarat NRE, we were told that this material would not be made public. We have grave concerns about the transparency of this process.

Hundreds of people have participated in DoPI's public consultation process for the Expansion Project and IRRM demand that the DoPI and NSW government notify all of them personally about the current situation and give them an opportunity to comment both on the PPR and on the very opaque process being undertaken by DoPI in regard to this matter.

We have been informed that DoPI's recommendations to the PAC will be completed by late November. This would leave little time for the PAC's public and necessary group meetings to be held before the Christmas holidays. We seek assurance that if public and group PAC meetings cannot be organized before the holiday period, then they will be postponed until February 2014. In late 2012 the public was denied an open PAC meeting, apparently because of limited organising time before Christmas and concern Gujarat would be disadvantaged by a delay until the end of the holiday period. That is, the company's interests were put before the concerns of the community despite the delays in reaching that position being tardy responses from the proponent.

GNRE have been requested at numerous times to keep the community informed on approvals and to include the CCC members as part of the application process as concerned stakeholders. GNRE have always agreed to these request in principle but there is always some reason why this cannot be done at the time of any individual application. GNRE even have a list of concerned local residents that they have repeatedly undertaken to keep up to dated. In this PPR process none of the community has been notified by GNRE or the DoPI. IRRM believe that the current process must be stopped and that community must be informed of the PPR and given the necessary opportunity to comment.

Annual Production Rate

GNRE have stated in the PPR that the yearly coal production will remain as per the Expansion EA, which is 3 million tonnes per year. This appears to be an unreasonable statement and inclusion by GNRE as the PPR only seeks approval for extract of 4.7million tonnes over 5 years. Even their extraction schedule shows that they will not extract 3 million tonnes per year. Given that they do not intend to install the infrastructure to handle this volume of coal nor have the hauling capacity (both stated in the PPR page 20 and RTS page 278) we would strongly ask that any approved annual production remain at 1 million tonnes. This will not hinder GNRE financially, as they can still extract the 4.7 million tonnes over 5 years and it will also allow them time to prepare the infrastructure required to process such a large amount of coal. The colliery

infrastructure and transport of coal are some of the most contentious issues with local residents and to date GNRE are still struggling with antiquated systems that impact on the community.

Noise (sound walls)

The ERM final Noise Assessment February 2013 supporting GNRE's EA made mention numerous times about the necessity of sound walls to the north of the site to protect the residents in Russell Vale. This was a confusing inclusion as these sound walls had been removed from the project in the Mod 1 approval in Dec 2012. The ERM's Noise Assessment is used as supporting documentation to justify the proposal to the Government agencies despite this inconsistency. This document was not updated in the PPR and still contains sound walls although the DoPI has already colluded with GNRE to delete these sound walls in an earlier proposal. It seems strange that the DoPI should make such biased statements rather than make their decision on the information and options presented by the proponent. IRRM request that the ERM Noise Assessment be updated to demonstrate how the necessary noise reductions are to be achieved and that this report is finished prior to any recommendations or approvals.

Ground and Surface Water

There are numerous mentions in the PPR about remodeling of the ground and surface water flows but this will not be completed for 3 months. This mine has previously flooded, causing extensive damage to the adjacent residential areas. Furthermore, it mines directly beneath the Sydney Water Catchment Area, with cumulative subsidence of up to 5.8m. Is it appropriate to even consider approval or recommendations without the documents needed to confidently assess the extent of the risk?

The colliery site has previously flooded due to a failure of the proponents stormwater infrastructure at the site. This system was redesigned and conditioned in the Preliminary Works approval but was not commenced within that project. The stormwater remediation was the required in Mod 1 and the time to completion extended to the end of this year. It now appears as if GNRE intend to propose, have made no attempt to meet this condition in two approvals, another solution to the flooding problem. Their statement that the pipe under the stockpile must be ok as it did not block in the 1998 flood is an irresponsible assumption and evidently invalid, given the flood water was diverted by a blockage higher up the system, (otherwise why was the coal washed off the stockpile?).

All pipes and culverts are prone to failure in unpredictable flood events whereas an overland flow path or open creek system is foolproof as required in the two approvals to date has nonetheless never been commenced. Even if there is a viable mitigation of the flooding threat the present colliery poses, it should be provided to meet the previous conditions – twice breached – before any further approvals are given. We believe that the condition for realigning Bellambi Creek was a general condition to remediate their stormwater system that exacerbated the 1998 flood. IRRM insist that this protracted situation be fully rectified before the end of the year in compliance with their condition. GNRE's assurance of cleaning up ONLY their coal in next flood event is not acceptable (they have repeatedly stated publicly that they would accept liability for any such adverse

outcomes but now in this opaque process seek to resile from that public commitment); it is our understanding that they are liable for all water that falls on their colliery site and its consequences, especially when they fail to meet remediation conditions in their mining consent.

The surface and ground water scenario in the SWCA is of grave concern. This is a water catchment for more than 4.5 million residents of Greater Sydney and the Illawarra. Any damage to this pristine resource is unacceptable, even the amounts that GNRE are trying to justify. The only water reduction GNRE have offered in this PPR is "*Given the significant reduced extent of the PPR with the removal of the Wong West extraction area, the impacts from the PPR will be less that the EA*". The reduction in magnitude of an entirely unacceptable proposition does not render the reduced proposal acceptable. We are also appalled by statements in the PPR such as: "*no rehabilitation options are considered viable*" for groundwater and "*However, it should be recognised that there are limited options to control any significant inflow through sealing up the longwall panels or the mine portals*". The proponent concedes that once any water system is compromised there are no or very limited options of remediation. This could have disastrous implications on our water catchment area and is inconsistent with the concept of responsible mining activities.

IRRM request that DoPI make no assessment in this regard until the revised modeling of the ground and surface water impacts has been completed and the information has been validated.

Subsidence

The PPR states that there could be subsidence of up to 2.6m. This is unacceptable, particularly in the SWCA. The PPR also goes on to say that the estimated previous subsidence from Bulli and Wongawilli seam extraction would be up to 1.9m, therefore accumulative subsidence of up to 4.5m is proposed. GNRE qualifies this by stating, that where there are pillars remaining in the Bulli seam the cumulative subsidence would be 5.8m. This is utterly unacceptable. We believe that all subsidence in the SWCA should be reported on a cumulative basis, so everyone is aware of the overall impact and not just the impact of each individual longwall. How can the catchment area possibly function with a topographical subsidence equivalent in height to a two storey building?

There is also subsidence of 2m predicted under the 330Kv electricity pylons. Given we are just emerging from a catastrophic start to the bushfire season due in part power line failures, we are expected to trust that these transmission lines will be appropriately supervised? This aspect of the proposal must be reconsidered - maybe a more sensible approach would be to stay clear of from this built infrastructure by redesigning LWs 1 and 2 to a narrower format that would reduce the subsidence.

The longwalls have been redesigned in the Wonga East area and the longwalls moved away from the Cataract Reservoir but it does not mitigate the risks to an acceptable level. The longwalls do not breach the 0.7 x depth barrier but because Bulli seam above has already encroached on this zone it has the potential for failure. GNRE have stated in the

PPR "*The Wongawilli Seam, the Balgownie Seam, and the Bulli Seam are all hydraulically connected through the intersecting goafs that are interconnected between all three seams and there is not considered to be any credible way to control inflow to the mine from Cataract Reservoir by preventing water egress from the mine"*. Given this potential failure and no viable means to remediate it once it has happened, we suggest that the LWs 6 and 7 start further away from the reservoir to safeguard our water.

This also goes for dykes and previous workings that could be a hydraulic conduit. They should be treated with caution and on the conservative side when mining within their proximity.

There are two areas that are noted in the PPR as having potential for pillar run, pillar creep or pillar instability in the Bulli seam. One of these areas will be impacted on by LW1 and it would be prudent that this longwall is stopped short of the identified risk to ensure the integrity of this area. It is also interesting to note that the EA Potential of Pillar Run Assessment by Strata Engineering Oct 2012 defines pillar run as "a large-scale catastrophic pillar failure" and the conclusion was "is unlikely to induce a pillar run in the overlying Balgownie and Bulli seams which would otherwise adversely affect surface subsidence around Mt Ousley Rd". There are numerous scenarios that constitute real risks lying just outside these two statements, so a conservative approach to layout of longwalls must be adopted if approval is to be considered.

The Sydney Catchment Authority have stated in their submission that the Dam Safety Notification Area around the Cararact dam wall and Cataract Reservoir will be adopted as an exclusion zone where no mining is permitted. GNRE's new longwall layout completely ignores this requirement with LW6 to 11 dramatically encroaching into this zone. IRRM request that LW7 to 11 should be completely removed and LW6 should be drastically shortened to comply with SCA requirements.

However having said this IRRM's stance is still the same, that there should be no mining in the Sydney Water Catchment Area at all. This water resource is more valuable than the extracted coal.

Air Quality

All insoluble particulates are a danger to our health but it is extensively documented that diesel fumes, coal and silica dust are of special concern and 10 micron particulate matter causes less severe health effects than finer particles below 2.5 microns. Yet the mines in NSW are only required to record particulate matter to 10 microns. This falls well short of international best practice.

How are the Government and health authorities supposed to obtain background data if the coal mines are not compelled to monitor the particulate matter that they create? Dust has always been problematic at this mine (probably due to the close proximity to long established residential areas that GNRE recently bought into and due to the fact that they

knowingly bought a mine equipped with antiquated infrastructure).GNRE need to demonstrate that they have the ability to operate this mine under modern regulations and afford an acceptable amenity to the surrounding community.

DoPI and Gujarat NRE must stop dismissing the risk to community health as a collateral risk accepted for the 'greater good' - the returns to Government form the mining nowhere justifies this callous disregard for the health and wellbeing of the impacted community. GNRE were required to have real time monitors INSTALLED by a specific time. The DoPI have now told us that GNRE had complied with the condition because the monitors were installed on site even though they were not operating due to lack of electrical connections. This type of incompetence on the part of proponent and the regulating authority leaves us in no doubt as to where DoPI stand in relationship to mining and its approval process.

Green House Gas Emissions

The submissions to the Expansion Project pointed out that the GHG emission calculations are only based on extracted coal. This does not allow for all the remaining coal above in the Wongawilli seam and above that has been disturbed. The response to submissions stated that there was only rock in the portion above the extracted area but this is not how it is described in the EA geology information. There are also other coal seams between the Wongawilli and the Balgownie seams that haven't been taken into consideration.
GNRE still blatantly refuse to capture GHG for reuse in this stage and have even stated that they will only investigate it in the next stage.

GNRE has GHG monitoring data about emissions but will not release this information to the public. It appears as if GNRE are hiding something and it is certainly not building the communities confidence in this company.

Some of the wording in the PPR would suggest that GNRE are considering CSG extraction on the site. If this is the case we strongly object to this scenario but would strongly suggest that GNRE direct their time and effort towards GHG capture.

Piecemeal Approvals

The numerous Project applications at No 1 Colliery Russell Vale were deemed contentious by several State Government agencies who stated they "*do not consider it good practice to separate elements of the proposed new mining area into separate projects resulting in the assessment being undertaken in a piecemeal fashion*". Then GNRE fractionated the development even further in applying for a Modification to longwall under their Preliminary Works Development Approval, as well as obtaining an approval for a SMP for LW4 with the DRE through a very suspect transitional clause 8K of the Environmental Planning and Assessment Act. During these approval processes GNRE insisted that they only want one approval. Now their Expansion Project application has itself been broken up and will doubtlessly have numerous modifications. GNRE have also always stated that the ongoing viability of the mine is the reason for the

multiplicity of applications but the truth is they do not have the resources to produce a proper and complete application that will take them beyond just marking time. In the past GNRE have argued that the mines viability and job losses are imminent and this seems to persuade DoPI to grant mining approval or write favourable recommendations to the PAC. Brinksmanship of this kind is being allowed to subvert proper exercise of planning controls and must be allowed to continue.

Documentation

GNRE and DoPI do not want a Statement of Commitments to be included in the conditions of this mine. DoPI believes the requirements are all covered in the conditions (which we note are repeatedly unmet by this proponent in any case). It is asserted they merely repeat the same information. GNRE believes it is too restrictive and doesn't allow for changing conditions like economic factors. The requisite expenditures to meet the approval requirements are independent of the changing economics. Any shifting in the economy does not negate the need to meet the requirements of any consent. IRRM and members of the community have expressed numerous times that the documentation and approval information need to be as simple and understandable as possible. We believe that a Statement of Commitments is a readable and easily understood tablature of otherwise lengthy and ambiguous conditions. We also believe that GNRE do not want the Statement of Commitments for this very reason and that they have been tripped up by their own inability to document clearly in the past. IRRM demand that this Statement remain in the approval conditions, to show and enable the general community to properly comprehend them.

The documentation presented by GNRE to support their PPR is poor in quality and short on substance (as has repeatly been the case). The subsidence information is very thin and the ground and surface water report is at least three months away. Our group has trawled through 1000's of pages of previous applications of GNRE's and we are staggered at the lack of information in the PPR. It is almost as if they know the approval outcome and do not want to waste the effort. Alternatively, perhaps this reflects Gujarat's dire financial circumstances and an inability to engage qualified experts. Regardless, this report is entirely inadequate and unsuitable for assessment. The PPR must be rejected, revised and resubmitted at a later date.

Gujarat NRE's Finances

GNRE is an unsuitable proponent for this contentious mining activity. It has demonstrated that it is unable to self-regulate, has had numerous non-compliances (allegedly due to lack of resources) and does not have the investment capital to modernise the mine and colliery infrastructure to the necessary standards. GNRE have been under mounting financial pressure in recent months and their own auditor stated, *"We have been unable to obtain alternative evidence which would provide sufficient appropriate audit evidence as to whether the consolidated entity may be able to obtain*

such financing, and hence remove significant doubt of its ability to continue as a going concern for a period of 12 months from the date of this auditor's report". IRRM request that the planning process be suspended until the proponent has secured its finances and sorted out its inherently poor management, given its recent take-over by Jindal Steel and Power and dire financial situation of GNRE. If the process does continue, IRRM demand the following:

- GNRE be required to fulfill all outstanding commitments prior to any further coal extraction;
- the approval conditions be very specific, have realistic enforceable time limits, supervised appropriately by DoPI and other Government agencies;
- GNRE are penalized severely when they are non-compliant. GNRE have proven in the 9 years of operating that they are incapable of self-regulation.

Economic

Proponents apply pressure to Government by emphasizing royalty revenues, capital investment and jobs. The royalties lost in sterilizing sensitive areas of the catchment are very small relative to annual State revenues and likewise the number of jobs is small relative to the regional workforce. Now there is the other side of the coin to consider. GNRE have not paid their carbon tax ($8.5m); have not paid their coal royalties (amount unknown, not available to the public but approx. $10m for last year); have not paid their staffs superannuation since April; have not paid their staffs wages for over a month; have asked their staff to take unpaid leave for the next 6 weeks; and owe countless and unknown contractors and suppliers. This company has postponed numerous pieces of vital infrastructure and reports due to being under resourced. Any future approval for the mining company should take these financial issues into account. IRRM request that GNRE are required to pay all taxes, royalties, superannuation, wages, contractors and suppliers prior to any approvals. Furthermore, IRRM request that the approvals be conditioned to ensure that all vital and major infrastructures at the mine are in place AND OPERATING prior to any extraction of coal under future approvals.

In conclusion, we would like to emphasize several points:

- The proposed mining takes place under the Metropolitan Special Area (MSA) and in close proximity to Cataract Reservoir. The Special Areas are the final barrier of the SCA managed catchment system that's intended to protect the water supply of more than 4.5 million people of Greater Sydney and the Illawarra. This area is already significantly damaged by mining. Moreover, the proposed mining in the Wonga East seam undermines two previously mined coal seams and thereby compounds the potential for damage.
- Revised modelling of ground and surface water impacts commissioned by GNRE will not be completed for at least 3 more months. This is then no basis for an

assessment. It would be grossly irresponsible to consider a recommendation to the PAC, without the revised modelling being completed and made publically available for comment. The critically important nature if this information is emphasized by the concerns expressed by the Dam Safety Committee and the Sydney Water Catchment Authority regarding the proposed expansion of NRE 1.

- The PPR affirms potential risks to the MSA, including: cumulative subsidence of up to 5.8m; potential re-activation of subsidence through pillar failure in the old Bulli seam mine; and, the potential for longwalls 6 and 7 to cause water to leak from the dam into the mines and out to the escarpment. The PPR makes it clear, that should this happen, essentially nothing can be done. These risks are totally unacceptable, given the importance of the MSA in supplying drinking water to the population of Greater Sydney. Extractive industries cannot co-exist with the water supply.
- The GNRE No. 1 Colliery is in a residential area, close to homes and schools. The colliery is a near constant source of noise and particulate pollution that erodes community health. Not only is this an inappropriate place for a massive, expanding colliery, GNRE has proved itself incapable of implementing basic measures (even measures that were conditions of its previous approvals) such as real time air quality monitors to mitigate its pollution and Ballambi Creek realignment.
- GNRE appears unwilling or unable to invest the capital required to bring the mine to modern standards. It has been obvious for some time that the corporation does not take the responsibilities of their development approvals seriously. The recent financial fiascos only confirm GNRE's unsuitability as a proponent.
- The PPR is so vastly different from the original proposal, that it should be advertised and exhibited again. Slipping through the PPR without notifying the original submitters and allowing them opportunity to comment erodes the integrity and transparency of the planning process.
- The quality of the PPR is poor. There is little detail in the account of the subsidence modelling and, accordingly, no basis for confidence in its predictions. Evidently the proponent lacks the resources to undertake an environmental assessment meeting current standards.

For the reasons stated above and the many more outlined in this submission, we ask for this PPR to be rejected. A subsequently revised PPR must then be made available for public comment.

IRRM has not made donations to any political party.

Yours sincerely,

Gavin Workman
Illawarra Residents for Responsible Mining Inc.

From: <pjmcg1@optusnet.com.au>
To: "clay.preshaw@planning.nsw.gov.au" <clay.preshaw@planning.nsw.gov.au>
Date: 10/31/2013 4:31 pm
Subject: Objections to Proposal MP 09_0013PPR

Dear Clay

I write to object to the proposal of Gujarat NRE for their preferred project report, to the Underground expansion project MP 09_0013PPR.
Reasons being
1) this is virtually a new application which needs the general public to have a comment on.

2) the remodelling of the ground and surface water that has been mentioned, is not to be completed for approx 3 months ? This really needs to be looked at in full.

3) GNRE are unsuitable proponents for this mine. As it's had many non compliance as a result of lack of resources. It has never been able to upgrade the mine to modern standards for today's conditions. ie fluctuating weather, floods,fires etc

4) even though the long walls in the Wonga east area have been moved away from the Cateract Reservoir, they have the potential to damage the Reservoir.

5) Also during the last few weeks that the mine has not been fully operating because of financial difficulties our lives have become somewhat normal, without the coal trucks continually travelling up and down Bellambi Lane. The noise levels have dropped and the traffic flow is not so congested.

I have not made any reportable political donations.

yours sincerely

Rosalynd McGibbon
21 Keerong Ave
Russell Vale NSW 2517

Sent from my iPad

Mr Clay Preshaw
Planning Officer
Major Projects
Department of Planning and Infrastructure, NSW
clay.preshaw@planning.nsw.gov.au

31 October, 2013

Dear Clay,

I write to object to the Preferred Project Report (PPR) of the Underground Expansion Project MP 09_0013 recently submitted by Gujarat NRE (GNRE). Some of the reasons for my objection are as follows:

- The proposed mining takes place under the Metropolitan Special Area (MSA) and in close proximity to Cataract Reservoir. The Special Areas are the final barrier of the SCA managed catchment system that's intended to protect the water supply of the more than 4.5 million people of Greater Sydney and the Illawarra. This area is already significantly damaged by mining. Moreover, the proposed mining in the Wonga East seam undermines two previously mined coal seams and thereby compounds the potential for damage.
- Remodelling of the ground and surface water commissioned by GNRE will not be completed for at least 3 more months. It would be grossly negligent to consider a recommendation to the PAC on this proposal without this vital remodelling being completed and made publically available. This critically important nature if this information is emphasized by the concerns expressed by the Dam Safety Committee and the Sydney Water Catchment Authority regarding the proposed expansion of NRE 1.
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I have not made reportable political donations.

Kaye Osborn
2 Powell Ave
Corrimal, NSW, 2518
kaye_osborn@hotmail.com

COPY OF FORM LETTER – Objection to PPR

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FORM LETTER SIGNEES

Class	Salutation	First	Last	Email	Address 1	City	State	Postcode	Additional Comments
Object	Ms	Barbard	Bicego	bbicego@ozemail.com.au	167 Towradgi Rd	TOWRADGI	NSW	2518	
Object	Mr	Vincent	Bicego	vince_b@ozemail.com.au		TOWRADGI	NSW	2518	
Object	Mr	Lou	Flower	loufa@westnet.com.au	PO Box 613	MOSS VALE	NSW	2577	
Object	Ms	Abbey	Maughan	abbey-maughan@live.com.au	39 The Ridge	HELENSBURGH	NSW	2518	
Object	Mr	Desmond	Jacobs	desjacobs@bigpond.com	111 Bellambi Lane	BELLAMBI	NSW	2518	
Object	Mr	Jan	Chrostowski	jan.chrostowski@waterco.com	103 Midgley St	CORRIMAL	NSW	2518	
Object	Mr	Gary	Caines	thecaines@bigpond.com	28 Gowan Brae Ave	MOUNT OUSLEY	NSW	2519	Refer below
Object	Ms	Vanessa	Barbay	laomedia@gmail.com	3 Ada St	VINCENTIA	NSW	2540	
Object	Ms	Lynnette	Jacona	ljacona47@gmail.com	26 Collaery Rd	RUSSELL VALE	NSW	2517	Refer below

COPY OF VARIED FORM LETTERS – Objection to PPR

Clay Preshaw - Objections to Proposal MP 09_0013 PPR

From: "Gary Caines" <thecaines@bigpond.com>
To: <clay.preshaw@planning.nsw.gov.au>
Date: 10/30/2013 3:35 PM
Subject: Objections to Proposal MP 09_0013 PPR
CC: "Tjapaltjari Al" <al.oshlack@ijan.com.au>

Department of Planning and Infrastructure
Clay Preshaw, Planner
clay.preshaw@planning.nsw.gov.au

Objections to Proposal MP 09_0013 PPR

Dear Clay,

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· There are numerous mentions in the PPR about remodelling of the ground and surface water but this will not be completed for 3 months. This mine has previously flooded causing extensive damage to the residential areas. It also mines directly under the Metropolitan Special Area, causing cumulative subsidence of 5.8m. It is not appropriate to even consider approval or recommendations without this a comprehensive and expert assessment of impacts. The PPR lacks the required assessment. We request that DoPI make no recommendations until the remodelling of the ground and surface water has been completed and the information has been assimilated into the PPR.

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· Furthermore to this petition, I submit via this petition that an unjust breach of human rights is being committed by the alienation of indigenous land rights and a desecration of Aborigines' cultural heritages. A most solemn adverse impact is discharged into the surface waters of the Hawkesbury-Nepean Rivers system by way of a detraction of in-situ waters potability and also in downstream of points of where methane gasification pollutes and resides, also [arguably] adding to airborne toxification and climate changes.The access, entry and passage of minesite exploration and developmental workings are untried and untested encroachments into estates in land entitlements that may be subject to current common-law and State statutory jurisprudential precepts affecting non-exclusive possessory titles in Current & Future Acts regimes. Many landscape surfaces are long since first being 'alienated' from Indigines, however their living inheritances in cultural heritage estates have been lain hostage via these alien edicts of "*Another's form of a Land Law*", and very much so is this the case upon the overlain land surface areas of GNRE's workings plus draw down extensions. The filing of a cause of action ought precede an expedited mediation in lieu of caveats attached to the Crown resources concerned, with contingent Aboriginal Ownership and Native Title holder-ship types of 'protective mechanisms' being invoked as a matter of urgency (with their presence consensually conceded to by the States). In light of the ensuing (NSW) ACH Bill 2014, with its particular address of objects' [site & place] ownership, a moratorium would be a sensible way in which a better position for all may be a win won after following a guiding light into there!

I have/have not made a reportable political donation. (Cross out whichever does not apply.)

Yours sincerely,
Name: Gary R Caines
Address: 28 Gowan Brae Avenue, Mount Ousley NSW 2519
Date: Wednesday, 30 October 2013

Department of Planning and Infrastructure
Clay Preshaw, Planner
clay.preshaw@planning.nsw.gov.au 29th October 2013
Objections to Proposal MP 09_0013 PPR

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I have not made a reportable political donation.

Yours sincerely,

Lynette Jacona
26 Collaery Road
Russell Vale NSW 2517
29th October 2013

From: "Caroline Graham" <rivers@bigpond.net.au>
To: <clay.preshaw@planning.nsw.gov.au>, "Howard Reed" <howard.reed@planning....
Date: 11/13/2013 4:35 pm
Subject: Rivers SOS re Gujarat PPR
Attachments: Fig2_page_11_Gujarat_PPR.pdf

Urgent Plea: Reject Gujarat Plans to Expand Mine in Catchment near Cordeaux Dam

To: Department of Planning and Infrastructure
Planning Assessment Commission
Sydney Catchment Authority
Premier Barry O'Farrell
Relevant public servants and politicians
Selective media outlets

13th November 2013

The Rivers SOS Alliance understands that the Department of Planning and Infrastructure is at present making recommendations to the Planning Assessment Commission concerning Gujarat NRE's modified expansion plans (PPR) for its coal mining operations adjacent to the Cordeaux Dam in the Metropolitan Special Area, a supposedly highly protected area of Sydney's drinking water catchment.

Although no public submissions were called for, we nevertheless feel the urgent need to present serious objections, after careful study of the company's map of the proposed mine layout (attached).

We note that longwall panels 6,7,9,10 and 11 intrude significantly into the so-called Dam Safety Notification Area – the zone indicating danger to the Cordeaux Dam itself, while the proposed seven longwall panels will undermine four upland swamps "of special significance" and numerous streams, all of which are an integral part of this catchment.

In short, it is highly likely that the bed under the dam will be cracked, allowing water loss, and the supply to the dam from streams and swamps will certainly be polluted and minimised, as has been the case elsewhere in the Special Areas, due to operations by BHP Billiton and Peabody Energy. This was well documented and acknowledged some years ago, e.g. in the Southern Coalfield Inquiry Report of 2008.

It is beyond belief, given the research and evidence now available, that such damage in a Special Area could be seriously contemplated, let alone approved, by any public servants, agencies or the government.

The possibility that the dam itself may be impacted, entailing water loss, makes this plan even less amenable to reasonable assessment or considered judgement.

We note that the Duke Lake Dam in the USA is now dry due to longwall mining going 305 m from the lake itself. In the Gujarat plan, longwalls 7 and 9 are similarly close to the stored waters.

So not only the dam itself but a large area of its catchment is threatened. To make matters worse, the proposed multi-seam mining is unusual and has not been adequately researched regarding likely impacts. Any gamble with new methods in the Special Areas must be stopped.

All told, we fail to see how this proposal can accord with the "neutral or beneficial" guideline supposedly applied to all development in the catchment.

The company is bankrupt at present and has not fulfilled conditions re monitoring. The future structure, with other unknown concerns circling like sharks and buying in, is too uncertain. Can an unknown entity be trusted to mine responsibly in our Special Area ? A bond may well be required if conditions are attached, but this is not good enough. No amount of money can restore damaged aquifers or streams (please google "Duke Lake Dam mining" to read several articles which show that the mining company has refused to pay a large portion of the damage, while the county had to spend

millions on court proceedings. Meanwhile streams and rivulets could not be remediated successfully).

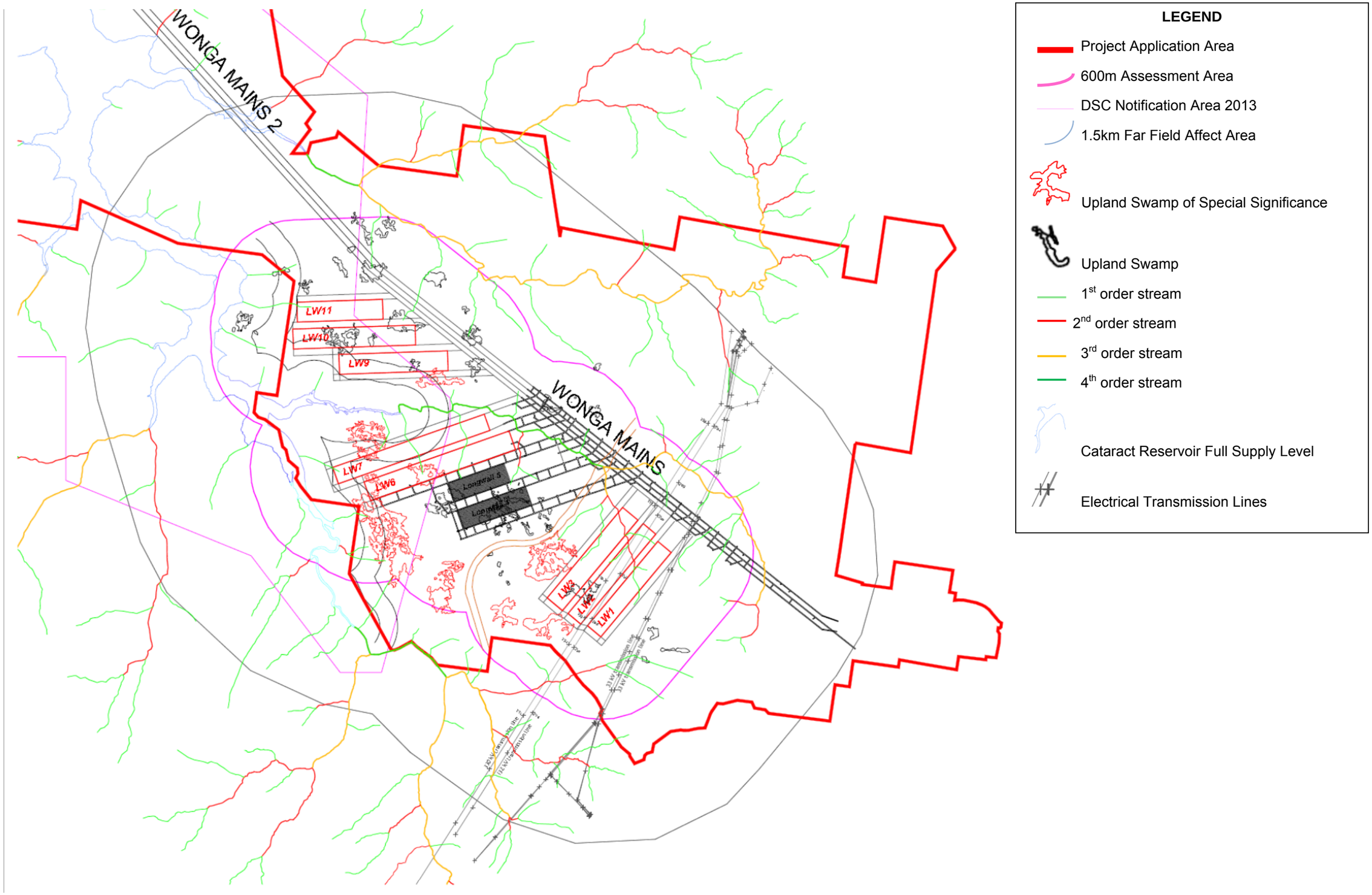
Finally, we trust that politicians, government agencies and public servants will carry out their duties responsibly by rejecting this ludicrous Gujarat NRE proposal outright.

Caroline Graham

Southern Coalfield Representative, Rivers SOS

Ph: 46309421

Figure 2 - PPR Proposed Wonga East Mine Layout



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Somme Comments on the Gujarat NRE 1 PPR

The essential components of a credible proposal for mining in the Special Areas are best practice subsidence predictions undertaken by recognised experts and, related, best practice groundwater and surface water impact modelling and predictions. The PPR lacks the needed groundwater and surface water modelling and the account of the subsidence predictions provides insufficient information to assess its quality or credibility.

The PPR states advised of "*the use of an alternative mine subsidence modelling approach to use as the basis of new impact assessments*", but provides little insight into the new modelling approach or how it improves on that of the original EA.

The PPR refers to the experience gained from the extraction of Longwalls 4 and 5, but provides little insight into that experience. The PPR stares "*The experience available from mining LW4 and LW5 indicates that the subsidence behaviour in a multi-seam environment is different in respect of the overburden stiffness characteristics and therefore the bridging capacity across individual panels, but is otherwise essentially similar to the subsidence behaviour above single seam operations*." In contrast, EA consultants Seedsman suggest[1] that the subsidence over LW4 is "*more related to vertical block collapse than to simple bending of the overburden*". That is, the spanning capacity of the overburden has failed.

Similarly, in commenting on much greater than predicted subsidence above LW4 SCT state[2] "*The implication of this result is that the initial Bulli Seam mining and the subsequent Balgownie Seam mining have reduced the bridging characteristics of the overburden strata so that the overburden strata is more compliant and less able to span across a single panel*." SCT also state:

> "*A characteristic of the reduced bridging capacity of the overburden strata and the increased subsidence that is observed above multi-seam mining operations such as Longwall 4 is increased disturbance of the subsided overburden strata and increased potential for overall increased hydraulic conductivity between the surface and the mining horizons. Such increased hydraulic conductivity is not necessary a significant issue if the main source of recharge is rainfall because, in general, only a very small percentage of total rainfall is lost into mining induced fractures in a typical bushland environment.*
>
> *However, this increased vertical hydraulic conductivity may be an issue if the recharge source is a reservoir, a major creek or river, or a swamp whose flora and fauna are sensitive to the natural balance between inflow from rainfall or surface runoff and losses to the bedrock so that longer term storage of water within the swamp is affected*."

The validity of the assumption that the redirection of rainfall runoff into cracks will be comparatively minor depends on the extent of fracturing from the mine to the surface. That

is, failure of the overburden across the new longwalls could result in significant runoff, stream and swamp losses.

While the PPR advises that "*Significant additional work has been undertaken to address the issues identified in the EA in order to provide the best possible information for groundwater, surface water and subsidence modelling for the Preferred Project*", it also makes it clear that the information gathered to inform the new modelling has yet to be used.

The PPR states; "*It is not anticipated that overall stream discharge into Cataract Reservoir will be reduced by more than the regional groundwater depressurisation effect which is yet be quantified on the basis of the remodelling of catchment groundwater impacts. There is the possibility of connective fracturing from surface to seam but this hasn't yet been observed over LW4 or LW5 to date and is considered extremely unlikely*." This statement alone requires that the PPR must be rejected. But it's not the only such statement: "*There may be reductions in Upland Swamp shallow groundwater levels, surface water discharge and flow longevity as well as water quality following significant rainfall but to date this hasn't been identified as occurring over LW4 or LW5*." Wishful thinking and had waving are not an acceptable approach in a proposal to mine in the Metropolitan Special Area.

The PPR briefly mentions the possibility of using PEST to carry out Monte-Carlo modelling to assess the risk of leakage from the Cataract Reservoir, but then advises this modelling would be too costly to be undertaken at this time.

Conclusion

The PPR is not of a suitable standard for a credible proposal to mine in a Special Area water catchment and must be rejected.

References

[1]*Review of subsidence predictions after the extraction of LW4*, Seedsman Geotechnics, February 2013

[2] *Response to Subsidence Related Comments on Longwalls 4 and 5 and MG 6, 7, 8 PT 3a Modification Application*; SCT Operations, October 24 2012.

The comments submitted for the original EA are attached.

Some Comments on NRE No.1 Colliery Project
Application 09_0013

April 10 2013

From within this submission: Cataract Reservoir supplies water to Sydney - around 4.4 million people. The royalties from the expansion project will provide the equivalent of about $3.15 per person each year for the 18 year life of the project; each will pay far more each year in water rates.

The number of mining jobs is small in the context of the Illawarra regional labour force of 196,200 and employed work force of 131,454 (as of November 2012; http://lmip.gov.au). Mines have closed in the past without devastating the regional economy.

Can the DoPI and the PAC be confident that the residents of Sydney would be willing to accept a risk of a compromise to their water supply, and to the biodiversity and environment of its catchment area, for $3.15 per person a year in royalties and 409 mining jobs? Would the next generation?

The company's perspective is clear, Part D of the EA advises that any costs arising from subsidence are expected to be minimal as "*the mine is mostly located under the Sydney water catchment which has limited economic assets that could be damaged by subsidence*".

The Special Areas provide water to Greater Sydney and the Illawarra - more than 4.7 million people. As mentioned, royalties from the Southern Coalfields amount to around $141 million - in a good year for coal prices. That's equivalent to about $30 per person each year for the next twenty years. Or about 57 cents a week - not even the price of a bottle of water.

How can the DoPI and the PAC determine that the value of the coal beneath the Special Areas is greater than the inter-generational value of the catchment's water quality and quantity, ecosystems, communities, species and outstanding biodiversity? Does it really make sense to put these assets at risk for such small returns?

Note: As advised in the cover letter, this submission is to replace a preliminary version submitted on April 5.
Note: Time constraints have precluded adequate proof reading.

SOWCA is an alliance of the following community groups and organisations:

NATIONAL PARKS ASSOCIATION OF NSW
protecting nature through community action

LOCK THE GATE

Rivers SOS

TOTAL ENVIRONMENT CENTRE

Botany Bay and Catchment Alliance

Georges River Environmental Alliance

Illawarra Escarpment Network

Otford Protection Society

Hawkesbury Environment Network

nisa

Northern Illawarra Sustainability Alliance

IRRM
ILLAWARRA RESIDENTS FOR RESPONSIBLE MINING

Illawarra Residents for Responsible Mining

STOP CSG! Sutherland

STOP CSG SYDNEY

Stop CSG Sydney

Sutherland Shire Environment Centre

Table of Contents

Comments on the NRE No.1 Colliery Project Application 09_0013

General Comments

The OEH points out in their 2012 comments on Gujarat's modification proposal for their Preliminary Works project (MP 10_0046), that 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 Colliery PAC assessment
- Bulli Seam Operations PAC assessment

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. In each case**, the assessments have reflected an increased recognition of community concerns for the impacts of mining on the sensitive and highly valued environment of the Special Areas.**

The 2010 PAC Panel report for the Bulli Seam Operations (BSO) proposal defines the current benchmark for acceptable mining practice in the Special Areas. Community awareness has heightened since 2010.

The 2009 PAC Panel report on the Metropolitan Coal Project proposal makes the following comments on studies of subsidence impacts on swamps:

> "*These programs are funded by the Proponent, designed by the Proponent's consultants, and the information is usually collected, analysed and interpreted by the Proponent's consultants. Whilst there is Government agency oversight of this process and some scrutiny of reports, it does not amount to a rigorously designed and executed set of studies that could be published in the scientific literature or provide the basis for a meta analysis of the relationship between longwall mining and upland swamps*."

That is, studies funded by mining companies cannot be regarded as robust and independent assessments.

Commenting on proponent funded peer reviews, the PAC Panel for the BSO proposal makes the following recommendation:

> *"15.3.4. Recommendation*
> *The Panel recommends that the Department look at this issue with a view to determining whether independent selection and briefing of reviewers should be the norm, even if the cost were borne by the Proponent. As it currently stands the system appears to have little credibility*."

That is, the direct coupling between consultants and project proponents may induces bias in favour of the proponent. There is clearly a conflict of interest and a potential to corrupt the assessment process.

The Department has instead proposed accreditation of consultants. While a small step forward, this fails to address the core problem of the direct relationship between the proponent and the consultant. It's puzzling that the Department has not addressed the problem as recommended by the PAC. **Consultants should be selected at random from a pool with, for example, funding for costs provided along the lines of the Mine Subsidence Board**.

RECOMMENDATION 1: Accredited environmental impact assessment consultants for mining projects should be selected at random from a pool, with funds for assessment costs provided along the lines of the Mine Subsidence Board.

Inadequate Public Exhibition Period

The publication exhibition period allowed six weeks for members of the public to read, digest and comment upon more than 2000 pages of proposal documentation. The Department allowed only three weeks for the 1000 or so pages of the 2012 modification proposal of the Preliminary Works project. In effect, the same amount of time was allowed for comments to be made on each proposal - in spite of comments of concern from the public about the inadequacy of the public exhibition period. This disregard for public consultation by the Department of Planning and Infrastructure (DoPI) is underscored by the four years it's taken for Gujarat NRE to submit its proposal (a brief account is given below). The DoPI's evident disregard for public submissions is further highlighted by the tolerance it has shown towards the many compliance failures and deadlines missed by Gujarat NRE.

Net Benefit - how much for the Special Areas?

The PAC's approvals have been swayed by concerns of job losses should Gujarat operations be interrupted. The same consideration has effect in considering whether or not swamps, creeks or other surface features should be undermined. The EA indicates that 297 staff are employed at No. 4 shaft and 287 are employed at Russel Vale. These figures are dated and incorrect however, with only caretaker staff now employed at No. 4 shaft. The EA indicates 409 jobs, though no details are provided for this estimate and it may also be dated. **The number of mining jobs is small in the context of the Illawarra regional labour force of 196,200 and employed work force of 131,454 (as of November 2012;** http://lmip.gov.au**).** Mines have closed in the past without devastating the regional economy.

Part D provides an assessment of financial benefits that would appear not to have been independently verified. The Commonwealth taxes are substantial and are presumably primarily company tax. Assuming that those who would not be employed, should the mine close, would not be a source of payroll tax assumes they would not subsequently gain alternative employment. This seems an unreasonably pessimistic assumption.

Capital expenditure details are not provided, but it would seem a reasonable assumption that a significant component will be for equipment manufactured overseas.

The NSW levies provide partial compensation for services or impacts, are modest and most will likely be deductible. The project is predicted to deliver $250 million in State royalties over its 18 year life, from a total of 46 million tonnes of coal. This would be equivalent to an average of about $13.9 million each year from about 2.6 million tonnes of saleable coal each year.

Cataract Reservoir supplies water to Sydney - around 4.4 million people. **The royalties from the expansion project will provide the equivalent of about $3.15 per person each year for the 18 year life of the project; each will pay far more each year in water rates**. Can the DoPI and the PAC be confident that the residents of Sydney would be willing to accept a risk of a compromise to their water supply and to the biodiversity and environment of its catchment area for $13.9 million a year in royalties and 409 jobs? Would the next generation?

The Wongawilli seam is classed as a deep seam and would presumably then attract royalties of 6.2%. The price of coal on which the royalty estimate is made is not given. As a relevant aside, BHP-Billiton estimated royalty revenues totalling $521 million from 47Mt of ROM coal over a 9 year project period - an average of about $58 million from 5.2 Mt of ROM coal each year. Either Gujarat have underestimated the royalties or BHP-B have overestimated their royalty payments.

Currently annual State revenue is about $60,000 million, **so the $13.9 million royalties from the project each year would contribute approximately 0.02% of annual State revenues**.

A 2010 Auditor General's review shows that in 2008-9 coal provided $1,200 million in royalties (a peak coal price year) to the NSW Government, with $141 million (11%) of that being from the Southern Coalfields. **State Government revenues in 2008-9 were just under $50,000 million, with the Southern Coalfield then contributing 0.26% of that revenue**. The percentage may have declined with the recent fall of coal prices.

The SCA expects 91% of the Special Areas to be undermined over the next 20 years or so. The swamps will be lost along with other habitats and species, water contamination and sediment arising from the leaching of metal ions will continue to accumulate and the quality of surface water will be further reduced on mixing with ground water brought to the surface as the abandoned mines eventually fill. The legacy of coal mining in the Special Areas will be a broken and degraded landscape, and lost biodiversity of international standing.

The Special Areas provide water to Greater Sydney and the Illawarra - more than 4.7 million people. As mentioned, royalties from the Southern Coalfields amount to around $141 million - in a good year for coal prices. That's equivalent to about $30 per person each year for the next twenty years. Or about 57 cents a week - not even the price of a bottle of water.

How can the DoPI and the PAC determine that the value of the coal beneath the Special Areas is greater than the inter-generational value of the catchments water quality and quantity, ecosystems, communities, species and outstanding biodiversity? **Does it really make sense to put these assets at risk for such small returns?**

The company's perspective is clear, Part D of the EA advises that any costs arising from subsidence are expected to be minimal as "*the mine is mostly located under the Sydney water catchment which has limited economic assets that could be damaged by subsidence*"

Reflecting this, the longwalls plans were revised at some point such that plans to mine beneath Mt Ousley Rd were abandoned to avoid the risk of damage. Likewise, mining under swamps and creeks should not proceed. While a road may be repaired, swamps and creeks cannot.

The Precautionary Principle

The 2010 BSO PAC Panel report provides a detailed account of the Precautionary Principle and its application in a mining context. The importance of the need to consider the Precautionary Principle has recently been reaffirmed in the Land and Environment Court hearing of SHCAG Pty Ltd v Minister for Planning and Infrastructure and Boral Cement Limited. The current proposal from Gujarat fails to adequately apply the Precautionary Principle.

The PAC Panel advises that where there is a "*significant threat and a substantial level of uncertainty the principle requires the application of a significant degree of precaution, with the safety margin falling on the side of the environment*"

Unreliable Subsidence Predictions

To emphasize the uncertainty in predicting subsidence as a consequence of triple seam mining, Pells Consulting list some examples of inaccurate prediction for single seam mining subsidence, in Annex N Pells cites the following examples:

- Appin Colliery LW703 – 33% to 52% over prediction.
- Westcliff Colliery LW34 – 10% under prediction.
- Tahmoor Colliery LW24A – 290% under prediction.
- Tahmoor Colliery LW26 – 100% under prediction

The dramatic damage to the Waratah Rivulet provides another example of significantly underestimated subsidence. The longwalls used at Metropolitan Colliery are very similar to those of Area 2, being 163m wide with 55m pillars. Modelling for the longwalls impacts was undertaken by MSEC using the Incremental Profile Method (IPM) that Pells otherwise describes as "excellent". The Waratah Rivulet suffered dramatic and unpredicted impacts from subsidence of approximately 1.3 metres and upsidence of approximately 150 mm.

The difficulties and risks in predicting single seam mining are compounded in attempting to predict subsidence from multi-seam mining.

Seedsman admit that SDPS is inferior to IPM and its clear **SDPS does not provide a sound basis for the assessment of subsidence risk and impacts from multiple seam mining**. As Seedsman readily admit, the use of four variables and one constant in the commercial software package SDPS is unable to reliably predict subsidence above three mined seams.

Further underscoring the uncertainty of subsidence prediction, the PAC observes in its 2009 report on the Metropolitan Coal Project proposal that "*strains are not necessarily uniformly distributed in accordance with theoretical predictions. For example, a predicted tensile strain of 1mm/m may eventuate in the field as a 5mm wide crack every 5m, or a 10mm wide crack every 10m*."

Prior to the extraction of longwall 4 (LW4), Seedsman predicted maximum vertical subsidence of 0.9 +/- 0.1 metres, this being concentrated in a small region on the centre of the longwall's surface footprint (see Fig. 1). The subsidence measured above LW4 in June 2012, when the longwall was still in progress, was 1.1 metre; in October, a month after completion, it was 1.38 metres. Subsidence over LW4 will continue as subsequent longwalls progress. That is, **the extent of the subsidence over longwall 4 is not yet known**. **Based on the October 2012 figures, the Seedsman's modelling has underestimated the subsidence of this individual longwall by 0.48 metres, or 34.8%.**

Before the LW4 extraction, Seedsman's modelling predicted subsidence of 1.1 metres for LW5 and 1.2 metres overall for Area 2. **The subsidence over LW4 has already exceeded the maximum Seedsman predicted for all of Area 2**.

The longwalls 4 layout was curtailed to prevent impacts to Mt Ousley Rd. **Nonetheless longwall 4 did cause cracking on Mt Ousley Rd, even though it was some 300 metres away and outside the 35 degree angle of draw boundary**. Though the cracking was minor, this further demonstrates the uncertainty of subsidence prediction and the uncertainty of triple seam mining.

In a July 2012 Seedsman reported a revision of the predicted maximum subsidence for LW4 to 1.2 metres, with parameters adjusted in accordance with the observed subsidence to October 2012. This revision was made publically available as part of the EA documentation for the current project proposal and is used to provide new 'visualisations' of the SPDS modelling for remaining longwalls in the Wongawilli East domain.

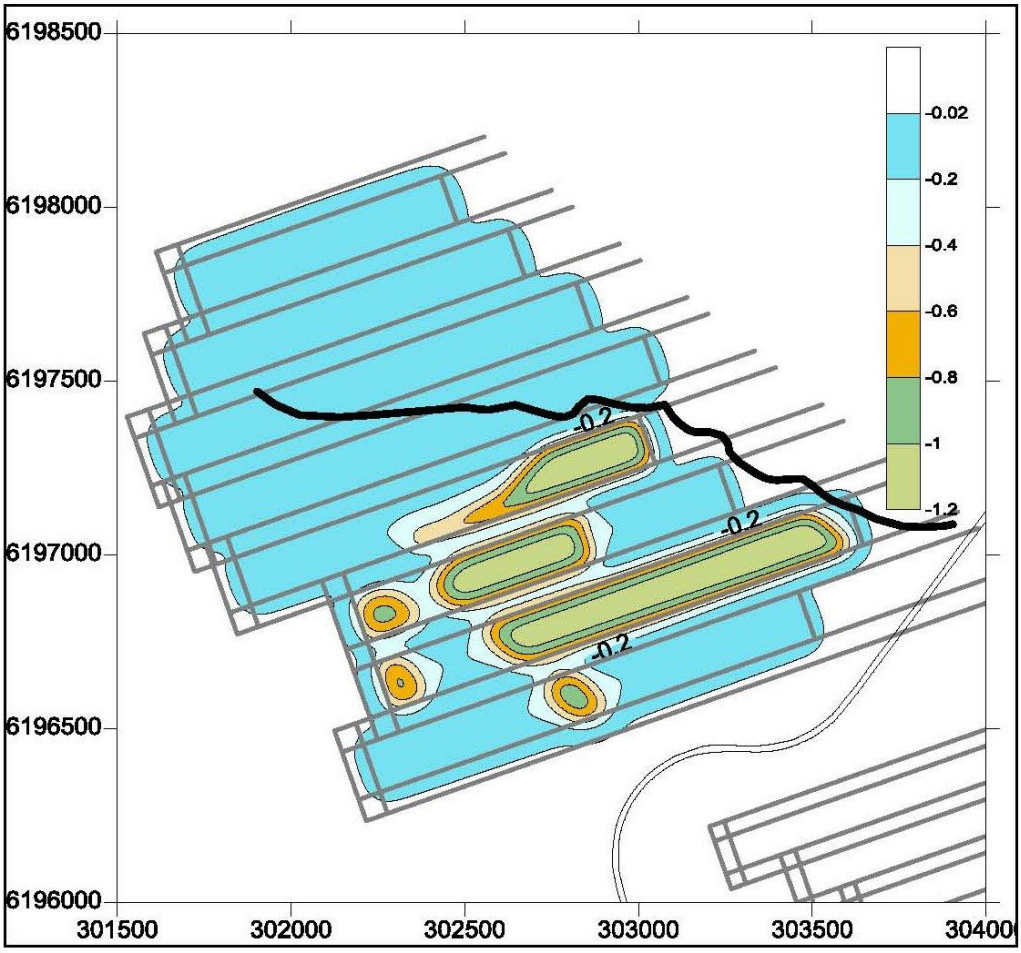

Figure 1. Seedsman pre-longwall 4 predictions for subsidence in Area 2. Taken from Appendix A of the EA for the 2012 modification proposal for the Preliminary Works Project. Subsidence over longwall 4 was predicted to be 0.9 +/-1 0.1 metres. As of October 2012, subsidence was 1.38 metres, in addition to that of the seams above, and will likely increase.

Longwalls that follow the first of a series behave differently to the first and will reactivate the subsidence of preceding longwalls. **There is no reason to assume that the post-LW4 revised SPDS modelling will be any more accurate than the pre-mining modelling for LW4 in predicting the extent of vertical subsidence arising from the new longwalls.**

Likewise there is no reason to conclude that that the extent of subsidence with increasing distance from the longwall can be reliably modelled by SPDS, with or without the data from LW4. That is, **SPDS cannot be assumed to reliably predict the lateral extent of the subsidence footprint defined by a 20mm vertical subsidence contour**. Further, the assumption that the footprint of subsequent longwalls will match that of LW4 is not justified.

RECOMMENDATION 2: Given the uncertainty and the consequences, and consideration of the Precautionary Principle, the 20mm subsidence impact zone must be assumed to be no closer than defined by the 35 degree angle of draw boundary accepted for the Southern Coalfields.

The subsidence impact zone for the proposed longwalls would then be as follows:

- **Area 1** comprises three, 105m wide panels with 40m wide pillars with a depth of cover to the Wongawilli seam of approximately 237m to 255m. The 35 degree angle of draw defined subsidence impact zone on the surface would extend up to **180 metres** from the longwalls.

- **Area 2** comprises eight panels 145 to 150m wide with 60m wide pillars with a depth of cover to the Wongawilli seam of approximately 267m to 320m. The 35 degree angle of draw defined subsidence impact zone on the surface would extend up to **220 metres** from the longwalls.

- **Area 3** comprises five panels with panels 390m wide and separated by 65m and depth of cover to the Wongawilli Seam ranges from approximately 455m to 510m. The 35 degree angle of draw defined subsidence impact zone on the surface would extend up to **360 metres** from the longwalls.

- **Area 4** comprises two panels each 155m wide with 65m pillars with depth of cover to the Wongawilli seam ranges from approximately 460 to 495m. The 35 degree angle of draw defined subsidence impact zone on the surface would extend up to **350 metres** from the longwalls.

Seedsman have revised their modelling for Area 2 to better reflect the observed LW4 subsidence. It is however inappropriate to model the subsidence of a series of longwalls on the basis of the behaviour of the first of that series. That is, **there are no grounds for confidence in revised modelling based on LW4.**

The current cumulative subsidence above LW4 reaches up to 3.7 metres, comprised of about 1m from mining the Bulli Seam, 1.4m from mining in the Balgownie Seam and 1.3m from mining in the Wongawilli Seam. The total subsidence in Area 3 may exceed 4m.

Currently it would appear that only 2D monitoring is being undertaken by Gujarat. A commitment to 3D monitoring to assess far field impacts is needed.

The EA misleadingly suggests the subsidence methodology has been peer reviewed, with statements such as "*the subsidence prediction methodology has been peer reviewed by MSEC and SCT*". This is an indirect reference to meetings of mining company consultants to agree on their judgement of likely subsidence impact risks. Notwithstanding the PAC's caution with respect to peer reviews, this does in constitute a peer review of subsidence prediction methodology as envisaged by the Southern Coalfields Inquiry. The closest the EA gets to assessing the subsidence methodology is the admission that SDPS is inadequate.

The Height of the 'Free Draining' Collapsed Zone

Seedsman's subsidence modelling does not assess the likely height of the 'free-draining' collapsed-zone (caved zone and fractured zone) above the mined seams. There is a brief discussion in GeoTerra's ground water impact modelling report for Gujarat (Annex P), which states "*In the model, it was assumed that the hydraulic conductivity after extraction of the proposed longwalls could enable free drainage within the goaf, with vertical connective fracturing to the mid / Upper Bulgo Sandstone*" **This assumption is made irrespective of the longwall width.**

Appendix C of the 2008 Southern Coalfields Inquiry (SCI) report.[1] discusses the height of the 'free-draining' collapsed-zone (caved zone and fractured zone) above mined coal seams. The discussion refers to detailed investigations by Byrnes into groundwater hydrology undertaken by South Bulli Colliery (now NRE No. 1) for longwall mining under Cataract Reservoir in the mid to late 1990s.[1] Byrnes identified an upper bound in concluding that the collapsed-zone did not extend beyond 1.7 times the panel width.

The SCI report notes that MSEC (2007) undertook a review of literature regarding the likely heights of the caved, fractured and constrained zones and found that:

- generally, the height of the caved zone has been indicated to fall within the range of 1.5 to 14 times the extraction height, with the majority of cases in the range of 5 to 10 times the extraction height;
- the height of the fractured zone has been reported to lie within the range of 10 to 105 times the extracted height; and
- the height to the base of the constrained zone has also been reported in terms of extraction width and found to vary between 0.16 and 1.4 times this width.

As consultants to BHP-Billiton (BHP-B) for the 2010 Bulli Seam Operations (BSO) project proposal, MSEC state "*The height that mining related fractures may form has been established from monitoring and computational studies as being 1 – 1.5 times the panel width. However, the creation of these fractures alone does not necessarily imply that a direct hydraulic connection exists over this zone".* **A direct connection however, isn't the necessary requirement for a significant increase in vertical water flow; vertical flow will increase the further disconnected fracturing extends towards the surface.**

The 2010 BSO project proposed 310 metre wide longwalls for BHP-B's Appin-West Cliff mine. In assessing the MSEC modelling, the PAC Panel concludes:

- *When the MSEC model is applied to conditions similar to the calibration data, it could produce reasonable predictions of the height of fracturing even though it has mechanistic shortcomings for that purpose, with the maximum height being 1.37 times panel width;*
- *Based on other studies including Gale (2008), a potentially worst case outcome appears to be fracturing extending up to a height of 1.5 times panel width but with increasing disconnection of fracturing;*

- *It is unlikely that the highly connected and freely drainable fractured zone will extend upwards into and beyond the Bald Hill Claystone for longwall panel widths up to 310 m. This is suggested by a range of field measurements and observations, the most recent being extensometer measurements conducted over LW32 (310 m width) at West Cliff Area 541 where more than 90% of fracture displacements seem to have occurred at or below the claystone;*

With respect to the last point, the average depth of cover for the domains of the BSO project ranged from 400 m to 600 m, so the Bald Hill Claystone layer would in general have been just beyond the fracture 'horizon' expected at 1 to 1.5 times the panel width. The Panel comments "*In the opinion of the Panel there is substantial uncertainty about the magnitude of the subsidence-related impacts, particularly in areas where the depth of cover is approaching the predicted height of fracturing (i.e. 385 m) for 310 m longwalls*." That is, **the predicted height of fracturing is 1.25 times the panel width**.

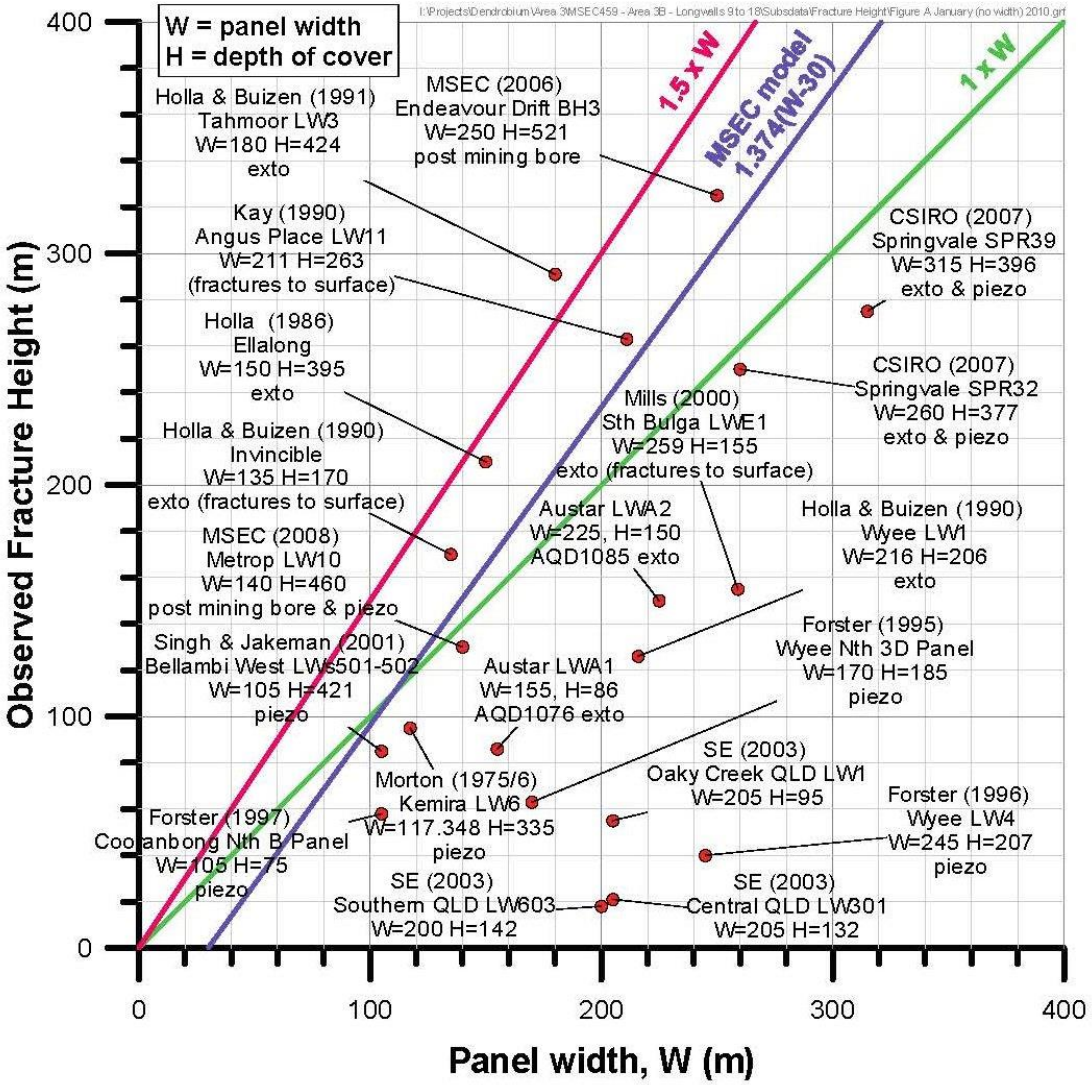

Figure 2. MSEC[2] depiction of fracture zone height with respect to panel width from Attachment A to the BHP-Billiton Dendrobium Area 3B SMP documentation.

The expectation is then that, depending on the local geology, **the collapsed zone may extend between 1 to 1.5 times the longwall panel width**. MSEC reaffirm this assessment in their 2012

subsidence prediction report for BHP-B's Subsidence Management Plan for Dendrobium Area 3B (see Fig. 2). This is also reflected in Coffey Geotechnic's groundwater modelling for BHP-B's Subsidence Management Plan for Dendrobium Area 3B (e.g. Figs. 3 and 4). Both MSEC[2] and Coffey[3] indicate that in some locations the collapsed zone above the 310 metre wide longwalls will reach into the Bald Hill Claystone and may extend to the surface. MSEC conservatively comment "*The depth of cover directly above the proposed longwalls varies between 310 metres and 450 metres and, therefore, it is possible that the fractured zone could extend up to the surface, where the depths of cover are the shallowest.*"

GeoTerra indicate the 501 to 509 panels in the Wonga West domain were 110 metres wide and that interconnected fracturing extended to 153 metres, with increased permeability extending into the middle Bulgo of the Bulgo sandstone as a result of delamination. These narrow longwalls also lowered the Hawkesbury Sandstone water level by some 10 to 15 metres. GeoTerra report that a piezometer (P5) installed in the Bulgo Sandstone, 226 metres below the surface, showed a drop of 15 to 20 metres following the passage of the longwall below. The piezometer shows a response to rain that GeoTerra explain as a response to "*recharge and infiltration into the cracked overburden*". That is, **the response is consistent with increased permeability reaching the surface as a result of subsidence**.

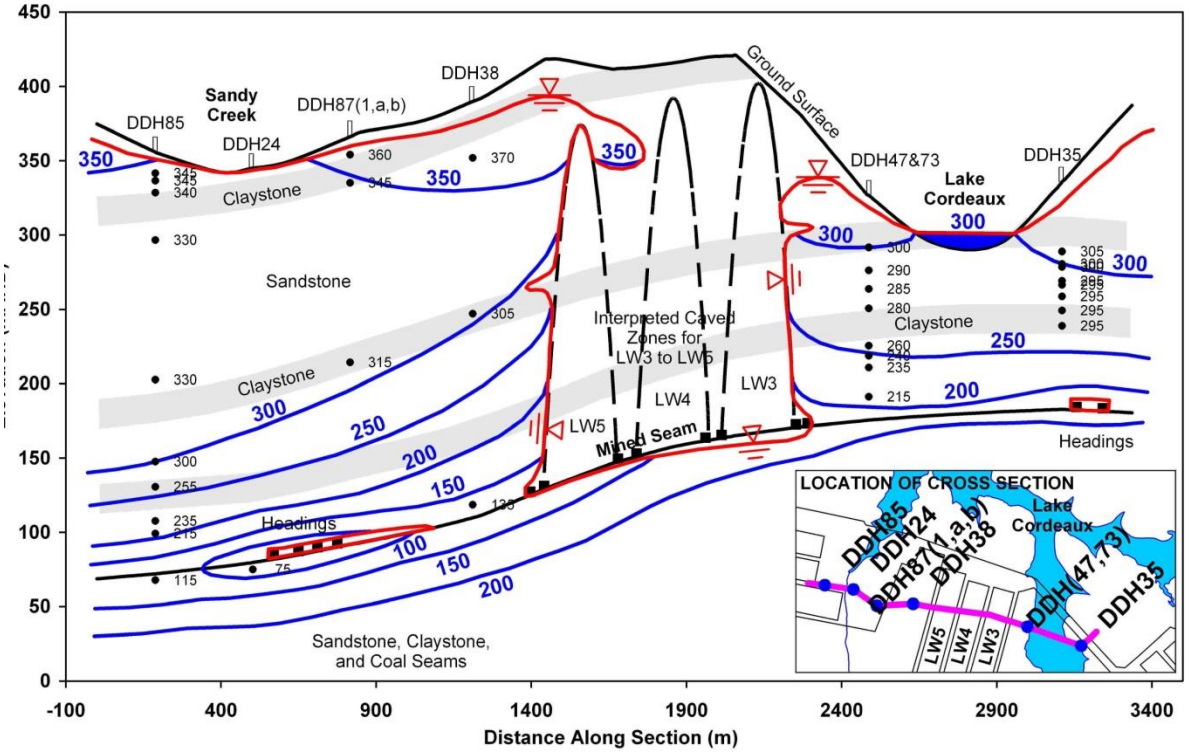

Figure 3. Coffey depiction of collapsed zone above Dendrobium Longwalls 3, 4 and 5; from Attachment C to the BHP-Billiton Dendrobium Area 3B SMP documentation.[3]

GeoTerra also report that 80 to 86 metre longwalls with 67 metre pillars in the Bulli seam in Wonga West caused a pronounced response in the lower Bulgo Sandstone and a slower response in the upper Bulgo Sandstone and Bald Hill Claystone. That is, longwalls less than 100 metres wide may still effect near surface aquifers.

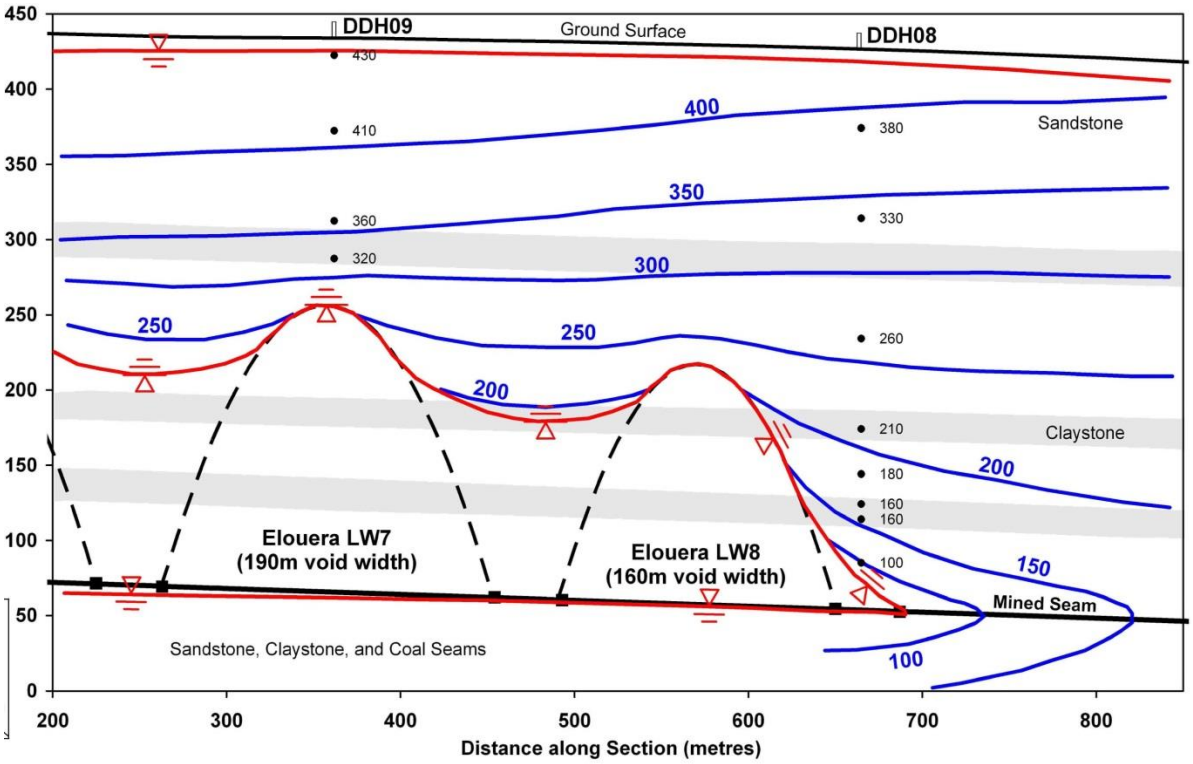

Figure 4. Coffey depiction of collapsed zone above Elouera Longwalls 7 and 8; from Attachment C to the BHP-Billiton Dendrobium Area 3B SMP documentation.[3]

The proposed 390 metre longwalls may reasonably be expected to have a collapsed-zone of 390 to 585 metres above the mined seam, where the depth of cover ranges from 455m to 510m. Even if the collapsed-zone extends no further than the Bald Hill Claystone, this has significant implications for groundwater flows and water loss from the local area catchment.

A continuously connected fracture network is not a necessary condition for a significant increase in vertical water flow. The higher the 'disconnected' fracture zone rises, the greater the overall permeability of the subsurface strata.

The piezometer data for the Wong East domain, given by GeoTerra in Annex P, suggests fracture penetration into the Hawkesbury sandstone from past mining.

The monitoring data reported by GeoTerra point to the prudence of the Reynolds recommendation that panel widths should not exceed one third of the cover depth and pillar widths should not be less than one fifth of the cover depth. The Reynolds recommendations are often described by mining companies as conservative, however it's important to note that they were made in the context of bord and pillar and partial pillar operations.[4]

RECOMMENDATION 3: Given the sensitivity of the Special Areas single seam longwall and pillar widths should be within the limits of the Reynolds recommendations. Multi-seam layouts should be more conservative.

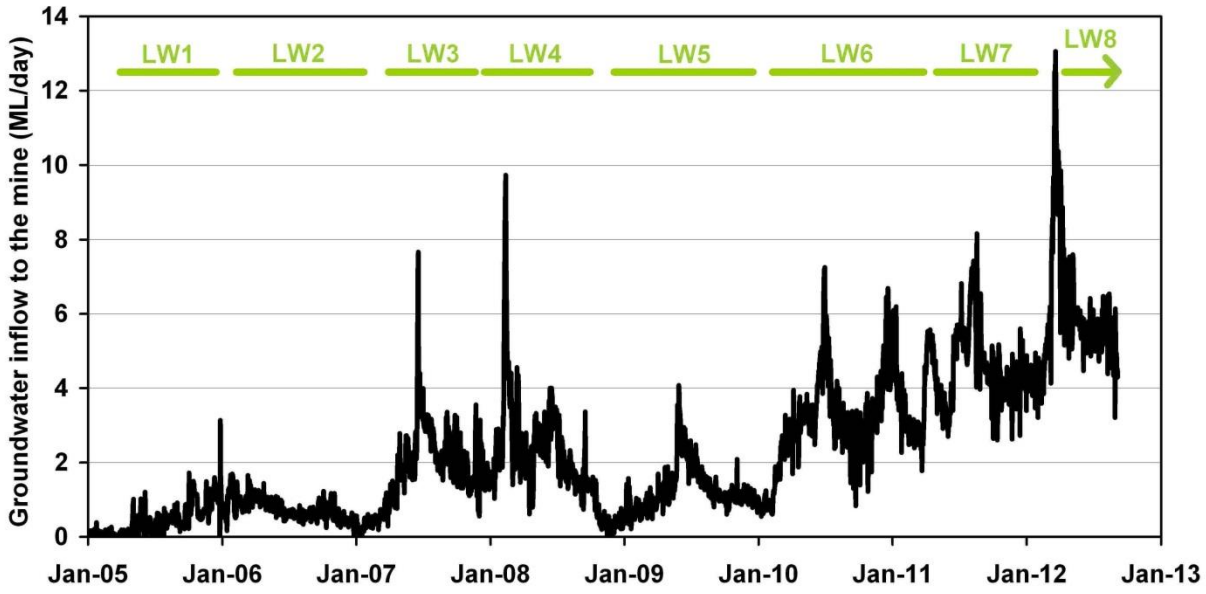

Figure 5. Record of water inflow to the Dendrobium Mine to June 2012 (from Attachment C of the Dendrobium Area 3B SMP documentation).

Of relevance, the Dendrobium mine has a history of high water inflows (Figure 5), with notably large inflows into Area 2 in June 2007 (peaking at 7.5 Ml/day) and February 2008 (peaking at 9.5 ML/day), and into Area 3A in June 2010 (7.2 ML/day) and December 2010 (6.7 ML/day).[5] **A particularly large inflow event occurred in Area 3A in 2012, peaking at 13 ML/day and this would appear to be associated with the 305 metre wide longwall 8**.

Spanning Capacity of the Bulgo Sandstone

Seedsman notes that the Bulgo Sandstone is known to be a spanning unit over Bulli Seam longwall panels with widths of at least 200m to 250m. Seedsman does not however assess the capacity of the overburden to span 390 metre longwalls. **Failure of the overburden would bring the collapsed-zone to the surface.**

Given the uncertainty and the significance of the consequences, the Precautionary Principle advises that the impact assessment must assume that the overburden will not be able to span a 390 metre wide longwall void.

RECOMMENDATION 4: Given the uncertainty and the consequences, 390 metre longwalls must not be permitted in the Special Areas. Prudence dictates that the longwalls should be no wider than recommended by the Reynolds Inquiry.

In their response on behalf of Gujarat to subsidence related comments on Gujarat's 2012 Preliminary Works Modification (MP 10_0046) application, SCT Operations discuss the subsidence over LW4 and conclude that

> "*the initial Bulli Seam mining and the subsequent Balgownie Seam mining have reduced the bridging characteristics of the overburden strata*".[6]

That is, the subsidence data for longwall 4 in Area 2 of the NRE1 mine suggests the bridging capacity of the overburden has been compromised by the mining in the seams above the Wongawilli seam. Perhaps this is not surprising, with approximately 2.5, 1.2 and 3 metres of coal having been removed from the Bulli, Balgownie and Wongawilli seams respectively **- a total extraction height of some 6.7 metres.** If there were sufficient cover, the fractured zone might extend 700 metres above the longwall.

Implications of Reduced Bridging Capacity of the Overburden

In commenting on the subsidence airing from LW4, SCT state[6]:

> "*A characteristic of the reduced bridging capacity of the overburden strata and the increased subsidence that is observed above multi-seam mining operations such as Longwall 4 is increased disturbance of the subsided overburden strata and increased potential for overall increased hydraulic conductivity between the surface and the mining horizons. Such increased hydraulic conductivity is not necessary a significant issue if the main source of recharge is rainfall because, in general, only a very small percentage of total rainfall is lost into mining induced fractures in a typical bushland environment.*
>
> *However, this increased vertical hydraulic conductivity may be an issue if the recharge source is a reservoir, a major creek or river, or a swamp whose flora and fauna are sensitive to the natural balance between inflow from rainfall or surface runoff and losses to the bedrock so that longer term storage of water within the swamp is affected*."

The validity of the assumption that the redirection of rainfall runoff into cracks will be comparatively minor depends on the extent of fracturing from the mine to the surface. Seedsman suggest that the subsidence over LW4 is "*more related to vertical block collapse than to simple bending of the overburden*". **That is, the overburden has effectively failed**; **failure of the overburden across Area 2 could result in significant runoff, stream and swamp losses.**

The Bald Hill Claystone

Consultants to companies mining in the Southern Coalfield invariably invoke the Bald Hill Claystone (BHC) as an aquitard, or even aquiclude, that prevents loss of surface waters - either towards the mine or into the broader regional groundwater system. For instance, SCT state: "*The Bald Hill Claystone is recognised and accepted to have relatively low matrix permeability compared to other stratigraphic units because of its fine grained nature*." GeoTerra state in Annex P that following subsidence the "*Bald Hill Claystone is interpreted to maintain its semi confining status*".

Yet GeoTerra also sate in the same report (Annex P) that:

> "*As shown in Table 6, the average packer test hydraulic conductivity of the Hawkesbury Sandstone varies from 0.0131m/day in the upper section to 0.0003m/day in the mid section and 0.0008m/day in the lower horizon. The Bald Hill Claystone averages 0.0298m/day whilst the upper Bulgo Sandstone averages 0.0066m/day and the mid Bulgo Sandstone averages 0.0004m/day*."

Clearly the BHC does not act as an aquitard, relative to the adjacent strata - its average hydraulic conductivity is in fact higher than that of the Hawkesbury Sandstone above and the Bulgo Sandstone below. According to GeoTerra's Table 6, the BHC conductivity ranges from 0.00005 to 0.12960 m/day, while the Hawkesbury Sandstone ranges from 0.000079 to 0.05875 m/day and the Bulgo Sandstone from 0.00002 to 0.04061 m/day.

These overlapping ranges are consistent with data published by Pells in 2012[7]. Pells provides an insightful account of the origins of the myth of the Bald Hill Claystone aquiclude/aquitard and further observes that, as the tabulated conductivities suggest, the historical notion of confined aquifers is a simplistic convenience not matched by the reality of a continuum of varying conductivities. Pells advises that the Bald Hill Claystone contains as many as eight soil profiles, is fissured and jointed, and is transgressed in places by faults and igneous intrusions. It is not safe to assume the Bald Hill Claystone insulates surface waters from dewatering impacts. Senior technical staff at the Metropolitan Colliery comment that the BHC above the mine is coarse in character and would not act as a significant aquitard.

The evidence advises that the Bald Hill Claystone provides no more resistance to vertical water flow than adjacent strata.

Protecting the Swamps

It is commendable that the proponents state

> "*NRE has provided an undertaking that the mining operations will be modified as required through adaptive management measures informed through monitoring of actual subsidence impacts, to reduce negative outcomes. An adaptive management plan will be developed to use the monitoring program to detect the need for adjustment to the mining operations so that the*

subsidence predictions are not exceeded and subsidence impacts creating a risk of negative environmental consequences do not occur in upland swamps."

However, in contributing to Gujarat's response to submissions on the 2012 proposal to add longwalls 4 and 5 and gate-roads 6,7 and 8 to the NRE1 Preliminary Works Project, consultants SCT state[6]:

"*It should be recognised that any impacts to swamps are unlikely to become apparent until well after mining is complete and well after there is any capacity for the mine to make any significant change to the mining process.* ***The concept of a Trigger Action Response Plan (TARP) as a method of protecting swamps is not credible*** *because many of the impacts are likely to be long term and difficult to detect without extended monitoring*." Bold text emphasis added here.

This statement is consistent with the 2010 PAC Panel report for the BSO proposal and with the long standing position of the OEH (formerly DECC/DECWW). For instance, the BSO PAC Panel observes " *information has been emerging to suggest that a number of upland swamps in the Southern Coalfield are being impacted by subsidence-induced changes to hydrology.*"

While Gujarat make a commitment to an effective adaptive management programme, they provide only general indications of its character - no details are provided. NRE state

"*Recommendations provided by Biosis (2012a) in their assessment of upland swamps will be considered in development of the adaptive management plan and future mining plans*."

The lack of details precludes any judgement of viability. **It would be highly irresponsible to approve the current proposal in the absence of the necessary detail.** There is no reason such detail could not be provided as part of the EA documentation; the provision of such information should be an EA requirement.

Gujarat evidently accept the advice of the OEH in stating "*Drawdown of water levels is one of the first parameters that can be detected following the fracture of rock strata (OEH 2012). Negative environmental outcomes have occurred if there is a statistically significant decrease in water levels within the swamp that is directly attributable to subsidence.*" This observation would not however provide a basis for a TARP that was both effective and affordable in preventing negative environmental outcomes.

It would take several weeks, perhaps months, to establish and reach agreement that a logged decrease in water levels was statistically significant and directly attributable to subsidence. Mining companies are very reluctant to concede that piezometer changes are anything other than weather related and/or temporary**. <u>By the time there is agreement, with the longwall progressing in the interim, the impacted swamp will have suffered further harm.</u>**

SCT correctly advise "*a high level of protection is provided if the swamps are not directly mined under. Higher protection is provided with increased distance between the swamp and the edge of the nearest longwall panel.*"

RECOMMENDATION 6: The subsidence impact zone must not be allowed within reach of a swamp identified as being of special significance and accordingly required to be protected from negative environmental consequences. The subsidence impact zone should not be allowed within reach of any swamp.

In effect, the current proposal offers no realistic protection for the swamps. **The EA states the following with respect to swamps of special significance:**

> "*Commitments to ongoing monitoring and the preparation and implementation of adaptive management measures for these swamps have been made to reduce as far as economically viable the impacts on these swamps*." Emphasis added here.

Clearly this is not in accord with the expectations of the BSO PAC Panel, SCA and the OEH - and is not acceptable to the concerned community. **The swamps are too important to sacrifice to coal**.

The EA provides no insight into the adaptive management strategy that NRE assure will protect the swamps. Some insight is however provided by the Subsidence Management Plan (SMP) for LW5 in Area 2.

Gujarat's Subsidence Management Plan (SMP) level 3, or 'red-alert', TARP swamp hydrology trigger for LW5 is as follows; "*Piezometer becomes, or stays, dry where it has not done so previously*"; and the response is

(i) Immediately inform:
- *DRE Director Environmental Sustainability and Land Use;*
- *Principal Subsidence Engineer – DRE*

(ii) Within 1 week of trigger exceedance being noted instigate investigation including:
- *Engaging a hydrogeologist to investigate and report on the cause of trigger exceedances where the cause may not be directly related to lack of rainfall recharge;*
- *Investigation of possible mitigation measures in consultation with SCA / NOW*
- *Prepare and implement a site mitigation/action plan in consultation with SCA / NOW if necessary*

(iii) Within 1 week of investigation provide investigation results to:
- *SCA*
- *DP & I*
- *OEH; and*
- *DRE*

(iv) Report in End of Panel Report, AEMR & Annual Review as required.

The level 3 trigger does not warn that unacceptable changes in hydrology have begun - it advises that serious damage has already been inflicted. A piezometer falling to 'dryness' signals cracking in the base of the swamp - an impact likely detectable by visual inspection. An example of a piezometer that "*becomes, or stays, dry where it has not done so previously*" is located in

Swamp 1 over longwall 5 of BHP-Billiton's Dendrobium Mine. Figure 6 shows the piezometer trace and Figure 7 and 8 show the associated swamp damage.

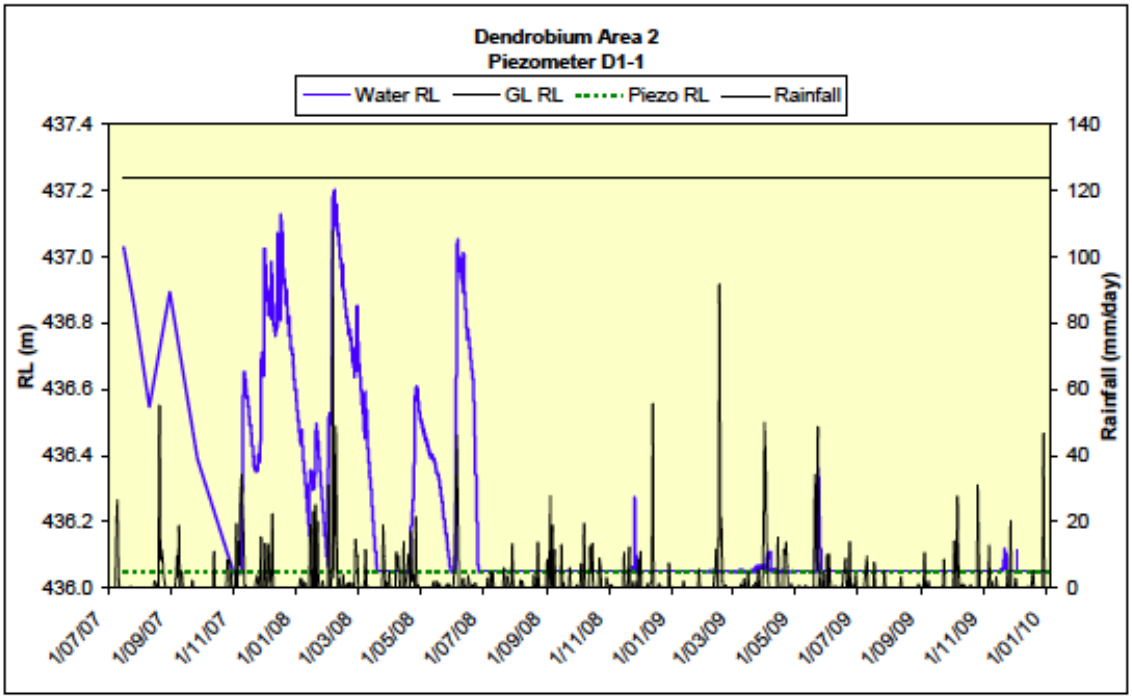

Figure 6. Shallow groundwater piezometer (blue line) readings before during and after mining of longwall 5 in Dendrobium Area 2. The piezometer stops responding to rain as a result of mining, with the water level dropping**.**

There is a **very significant difference** between the level 3 hydrology trigger for LW5 and the determination that a negative environmental outcome has occurred when *there is a significant decrease in water levels within the swamp that is directly attributable to subsidence*." The LW5 level 3 trigger does not, in any sense, provide a warning that would allow a timely response that would prevent negative outcomes. **That is, the LW5 trigger is inadequate.**

As noted above, a more sensitive trigger based on detecting a "*statistically significant decrease in water levels within the swamp that is directly attributable to subsidence*" would also fail to protect the swamp from negative outcomes. Determining that the cause is "*directly attributable to subsidence*" or "*directly related to lack of rainfall recharge*" would take time and may take much more time to be agreed by all of the stakeholders. **Mining companies are very reluctant to accept that subsidence damage is the cause of falling piezometer levels**.

Preparing and implementing mitigation measures in accord with the TARP response will take more time. It's not then hard to envisage that it would take at least two weeks before a response plan is agreed and put into action - and all the while the longwall will be steadily progressing and compounding the harm that has already been detected. Of significance, there is no commitment to halt the longwall machine. **The LW5 response is ineffective.**

Figure 7. Cracked swamp sediment (left) and bedrock (right) in Dendrobium Area 2

Figure 8. Desiccated swamp vegetation in Dendrobium Area 2

While the LW5 TARP is inconsistent with the need to ensure no more than negligible harm, it is consistent with Gujarat's otherwise vague commitment to develop and implement adaptive management measures for swamps of special significance:

> "*Commitments to ongoing monitoring and the preparation and implementation of adaptive management measures for these swamps have been made to reduce as far as economically viable the impacts on these swamps*."

That is, the LW5 SMP will not hinder operations or otherwise impact on the projects economic viability.

While the attempt to identify of swamps of special significance at risk of negative environmental consequences is commendable, the assignment of risk level by Biosis is inadequately justified,

puzzling and, given the accumulating evidence, optimistic. For instance the risk level is ascribed as low for CCUS4, CCUS10 and LCUS8, yet **the criteria set by the BSO PAC Panel are significantly exceeded for these swamps.** The exceedance is greater for CCUS4 than CCUS1, yet CCUS4 is assessed as being at moderate risk while CCUS1 is determined to be at significant risk. The puzzling assessment may reflect an over-emphasis on the modelled flow accumulation changes relative to the consequences of subsurface hydrology changes (fracturing, strata permeability changes).

Further, **it's not clear if the subsidence tilts being used by Biosis to assess modelled flow accumulation changes are accumulated tilts (proposed and past mining) or the tilts predicted by Seedsman for the current proposal.**

In commenting on the risk to all of the swamp in the project area, GeoTerra state**:**

> *Subsidence could affect shallow swamp aquifer water levels due to increased secondary porosity and / or underlying strata fracture permeability through the development of subsidence cracks over the proposed workings. If cracking occurs, the change to swamp water level variability through subsidence depressurisation is not anticipated to be greater than the current variability resulting from climatic influences.*
>
> *Hydraulically connected vertical cracking to the deeper strata is not predicted due to maintenance of the Bald Hill Claystone semi confining layer and the presence of a "constrained" vertical flow zone in the upper Bulgo Sandstone, therefore the swamps and creeks are not predicted to lose water by free drainage into the proposed workings.*

The blanket assumption that cracking will not result in water level variability above climatic influences is at best optimistic. The experience at Dendrobium and Metropolitan mines suggests the assumption is unrealistic.

As discussed above, GeoTerra's data and that of Pells and others show that the Bald Hill Claystone is no more confining than the adjacent strata. **Diverted water will be able to join deeper regional flows via fractures, joints and increased bed-separation**. Water may then be lost from the local catchment, whether or not some reaches the mine.

.

Approving mining beneath swamps amounts to a determination that they are not worth protecting, relative to the perceived value of the coal beneath. It trivialises the recognition of the swamps as Endangered Ecological Communities and their pending recognition under the EPBC Act.

Approving longwall mining under swamps, with or without assurances of adaptive management, places a higher value on the coal beneath than on the environmental and water catchment significance of the swamps - without attempting to objectively quantify the value of the swamps, now and into the future, to the communities of Greater Sydney, the Illawarra and Southern Higjlands.

Harming the Swamps

The EA relays mixed messages about the impact of coal mining on swamps, on the one had evidently accepting the perspective of the OEH, while on the other equivocating about the impact of mining.

Biosis comment (Annex Q):

> "*Although hypothesised to be a contributing factor, subsidence has not been determined to be a sole reason for any observed impacts to upland swamps; however subsidence effects are believed to be a contributing factor*."

Though implicit in their carefully worded summary, what Biosis don't explicitly state is that the **cracking and draining of a swamp alone, in the absence of other factors, may reasonably be expected to be capable of resulting in change of species composition and distribution, desiccation, erosion and, through any of these impacts, the loss of the swamp**. Fire or the onset of drought would accelerate that demise - or might ensure that mining damage that might otherwise have been tolerated, becomes terminal. The converse is of course also true. **We have no control (other than reducing greenhouse gas emissions) over fire and drought, but we can protect the swamps from mining impacts**.

Biosis strain credibility in their equivocating account (Annex Q) of Swamp 1 above the Dendrobium workings:

> "*At Swamp 1 in Dendrobium Area 2 a reduction if groundwater levels in piezometers located in proximity to Swamp 1 coincides with observations of surface fracturing within this upland swamp (Biosis 2011). Despite these observable subsidence effects, no erosion of Swamp 1 has been observed. Changes in flora species composition within Swamp 1 appears to be changing at a faster rate than control swamps, with species richness and diversity declining since this area was undermined (Biosis 2012). However, this decline in species richness and diversity is to be expected following fire, with obligate seeding shrubs out-competing other species and curtailing their growth (Keith et al. 2006*)."

Sidestepping the significant observation that compositional change in Swamp 1 is occurring at an unusually rapid rate, Biosis imply that the large bushfires that occurred across the area at the end of 2001 are primarily responsible for the compositional and biodiversity changes. Both fire and mining will likely have contributed to the demise of Swamp 1. Given the sharp collapse of the water level and the nature of the cracking, mining impacts would seem most likely to have been the key driver of change. This judgement would be consistent with the observation that "*species composition within Swamp 1 appears to be changing at a faster rate than control swamps*". **The swamps of the Woronora Plateau have suffered and recovered from repeated fire events for thousands of years; mining is a recent imposition that can deprive them of water for decades** - until the abandoned mine below fills.

Biosis state that they have "*identified through literature review of locations beyond the Study Area boundaries, that impacts to a very small number of upland swamps, located above mining areas, have been observed*." Biosis conclude "*To date there is little evidence as to whether this drying of upland swamps results in changes to the size of, or species composition within,*

upland swamps. Additional data is required to determine the impacts of reductions in groundwater on upland swamps."

Biosis implicitly suggest that mining under swamps be allowed to proceed until there is a sufficient accumulation of visible evidence of unacceptable harm to swamps. The OEH however recommends that negative environmental outcomes for all swamps need to be defined in terms of a statistically significant decrease in water levels within the swamp that is directly attributable to subsidence. This recommendation sensibly recognises that highly water dependent communities will be stressed by a decline in available water. The recommendation is a prudent response to limited evidence reflecting the absence of a long term, independent and comprehensive study of swamps.

The BSO PAC Panel notes two problems with concluding that a lack of evidence of visible impacts reflects minimal or no risk of harm; (i) *no long term robust scientific information showing before and after mining outcomes for swamps*; (ii) "*most of the swamps that have been undermined previously were undermined by either bord and pillar techniques or much narrower longwall panels*"

The Panel also comments "*This Panel and previous Panels[143] have sought examples of dessicated swamps that have not been undermined but none have been forthcoming to date. The limited monitoring data that is available is not adequate to preclude mining induced subsidence as the root cause of changes in the hydrology of at least some, if not all, of the swamps noted above. At this point in time, neither conventional nor unconventional subsidence effects, singly or in unison, can be eliminated as the source of changes in swamp hydrology.*"

That there have been no long term, robust, independent, peer reviewed studies to examine the relationship between longwall mining and swamp health and character does not justify an assumption that undermining may cause no more than incidental harm, if at all. On the contrary, **the scientific uncertainty, the importance of the swamps and the Precautionary Principle require the assumption that mining under swamps will cause more than negligible impacts** - as suggested by SCT Operations.

Prof. Pells points out in Annex N of the current EA, Sections 5 and 6 of the BSO PAC Panel's report provide a detailed and, currently, definitive account of the mechanisms and nature of subsidence impacts on swamps - which the PAC panel describes as fragile. Oddly, Biosis make no reference to the BSO account of swamp impact mechanisms. Under the heading 'Other Reports' Biosis provide a brief mention of some of the observed impacts discussed in the 2010 BSO report.

The visible evidence of harm may not be as sparse as Biosis and other consultants suggest. Seedsman state in Annex M that:

> *"Contiguous networks of intact upland swamps, including the Wollandoola Creek swamp cluster are present in both the Wongawilli East and Wongawilli West areas. The swamps were noted to be in good condition in the upper regions of Wollandoola Creek and Lizard Creek, and were observed to provide habitat for a number of threatened species listed under the TSC Act.* ***In some parts of the study area sections of swamps were observed to be very***

***dry, with evidence of scouring and erosion in some areas as a result of decreased water availability for reasons that were not determined*.”** Emphasis added here.

Unfortunately Seedsman don’t identify the swamps and their observations don’t seem to be reflected in the Biosis report provided as Annex Q. In considering mine impacts, it may be significant that Biosis report that the swamps in the Wonga West area are generally larger and more spatially continuous, whilst those in the Wonga East area are generally drier, shallower and less spatially continuous.

No explanation is offered, but GeoTerra observe in Annex P that “*The average hydraulic conductivity for the upper Hawkesbury Sandstone pump out tests (excluding NRE-E) is 0.023m/day. The elevated conductivity in NRE E of 2.07m/day could result from subsidence cracking of the surficial sandstone*”. **That is, the hydraulic conductivity of the Hawkesbury Sandstone in Wonga East is nearly two orders of magnitude greater than in Wonga West - apparently because of subsidence effects.**

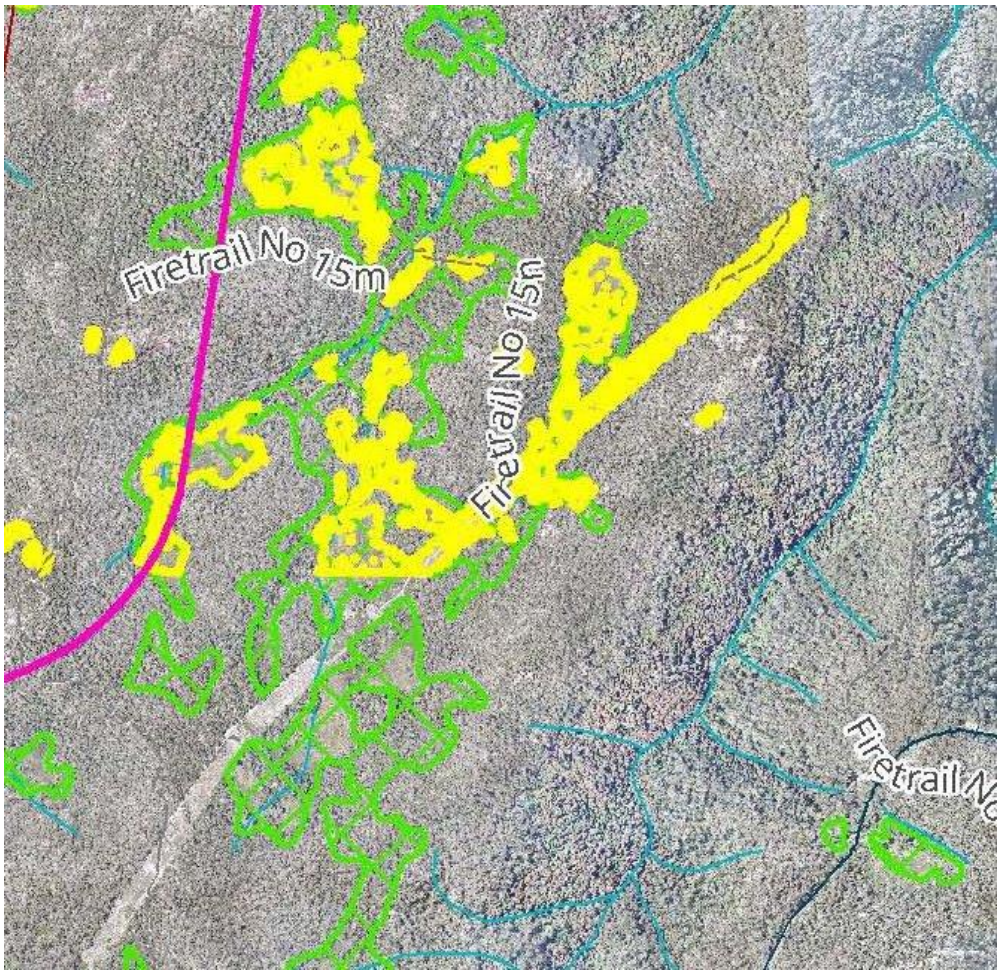

Figure 9. Swamp boundary differences as mapped by NPWS in 2003 (green) and Biosis (yellow) for Gujarat NRE in 2012. Elouera mine workings are below the swamps. The differences may reflect the different mapping techniques and climate effects, but may also reflect real boundary changes in response to the mine below.

A comparison of Table 4 and Table 5 in Annex Q shows that the area of the swamps in Wonga East as mapped by NPWS in 2003 is 68.04 ha, in contrast to 49.06 ha mapped by Biosis in 2012. This may reflect the different mapping techniques and climate effects, but may also **reflect real boundary changes in response to the mine below**. As Fig. 9 shows, there are significant boundary differences for the swamps over the Elouera workings.

The 2010 BSO PAC Panel report includes Swamp 1 in Dendrobium Area 2 as an example of an impacted swamp. More recently monitoring of twenty seven shallow piezometers located within Swamps 12, 15a, 15b and 16 has shown impacts to swamps 12, 15b and 16 in Dendrobium Area 3A as a result of the passage of Longwall 7 earlier this year. The end-of-longwall report conservatively concludes "*Based on the available data obtained from the piezometers and nearby rainfall stations, it appears that shallow groundwaters in Dendrobium Area 3A, particularly those associated with Swamp 15b in sub-catchment (of Sandy Creek) SC10C have been impacted by subsidence resulting from the mining of Longwall 7*." In its submissions on the BSO proposal the then DECCW identified Dendrobium Area 3A as a reference area to monitor before approving further undermining of swamps. **The hydrology of the reference swamps identified by OEH has been impacted by subsidence. It's time to stop undermining swamps**

More recently the progress of longwall 8 has triggered a level 2 TARP alert for swamp 15b[8], which has been cracked. Longwall 8 has a width of 305 metres.

The 2012 Metropolitan annual environmental review (AEMR) indicates subsidence induced hydrology changes to swamps 16, 17 and 20 in the Woronora Special Area arising from the recently completed longwalls 20 and 21. The longwalls used at Metropolitan Colliery were 163m wide with 55m pillars - only slightly wider than the 145 -150 metre longwalls and 60 metre pillars of NRE 1 Area 2. Importantly, the depth of cover for the Metropolitan Colliery longwalls is 400 to 560m - much greater than the 267m to 320m for Area 2.

That is, **the recent impacts to swamps at the Metropolitan Colliery have occurred with similar longwall parameters to those of Area 2 - but with a much greater depth of cover than that over the swamps of Area 2**. The 455m to 510m depth of cover in Area 3 is similar to that over the Metropolitan Colliery longwalls - but the longwalls of Area 3 are some 2.5 times wider. If approved, the proposed mining will have adverse impacts on the swamps above.

RECOMMENDATION 7: An estimate be made of the number of the swamps in the Special Areas that have been undermined, by longwall and bord and pillar methods, and are to be undermined by current approvals. This should then be expressed as a percentage of the total number of swamps and as a percentage of swamp areas.

Undermining the swamps over the proposed longwalls will add to the long list of swamps set to be undermined by the other mines in the Special Areas. Gujarat are required to provide an assessment of cumulative impacts - this should include a tally of the swamps in the Special Areas that have

been undermined, and are to be undermined by current approvals. This should then be expressed as a percentage of the total number of swamps and as a percentage of swamp areas.

The Not So Special Swamps

The classification of swamps as being of special significance undervalues the 'other' swamps, the 'ordinary' swamps, that by number make up 84% of the swamps. This second class status essentially guarantees they will not be protected from harm should a mine propose a longwall beneath them.

The PAC states for the other swamps that "*a presumption of protection from significant negative environmental consequences will exist for all other swamps unless the Proponent can demonstrate for an individual swamp that costs of avoidance would be prohibitive and mitigation or remediation options are not reasonable or feasible. Under circumstances where the decision is to allow significant negative environmental consequences to occur and remediation is not feasible offsets may be considered appropriate*." **Mining companies will inevitably argue the costs of avoidance risk mine closure. 'Like for like' swamp offsets in the Special Areas are not realistic and financial compensation does not replace the lost swamp.**

While the other swamps make up 84% of the total number of swamps, they make up only 34% of the area covered by swamps - but can we really afford to sacrifice 34% of these valuable natural assets? Do we know how many have already been undermined?

Protecting the Streams - Water Quantity

The BSO PAC Panel advises;

> "*All those streams located within Special Areas declared under the Sydney Water Catchment Management Act are significant for their water supply function*."

They PAC also makes it clear that they are vitally important for their dependent biota. Reflecting long standing concerns, the BSO PAC Panel states;

> "*The Panel is of the view that it is no longer a viable proposition for mining to cause more than negligible damage to pristine or near-pristine waterways in drinking water catchments or where these waterways are elements of significant conservation areas or significant river systems*".

As Pells points out in Annex N, the current proposal will result in more than negligible harm to the watercourses within the project area.

No confidence can be held for statements such as "*Only stream reaches within the predicted Wongawilli seam workings 20mm subsidence zone were considered in this assessment*." The subsidence modelling is unable to reliably predict the 20 mm subsidence impact boundary, consequently the modelling cannot be used to judge the limit of subsidence impacts on

watercourses. In the absence of other information, the boundary should be no closer than that of the 35 degree angle of draw. The boundary should be extended for multi-seam mining.

The impact boundary provides no more than a guide. Significant damage was caused to Wongawilli Creek when BHP-Billiton owned the Elouera colliery, with cracks occurring up to 500m from the mining activity.[9] Impacts included loss of flow and altered water chemistry, including high levels of dissolved zinc.

Figure 10. Loss of flow in Lizard Creek and Waratah Rivulet following longwall mining. Other examples include Cataract River, Georges River, Native Dog Creek and Wongawilli Creek

Similar impacts arising from the Elouera colliery occurred at Native Dog Creek, with subsidence in the order of a metre and fracturing occurring up to 500m from the mining activity, loss of flow from the creek and altered water chemistry with toxic levels of aluminium, zinc and nickel detected along with lowered pH at one site.[9]

The 2010 PAC Panel report for the BSO proposal relates mining induced diversions with complete loss of flow over stream lengths over many hundreds of metres have occurred in Lizard Creek and over shorter distances along a 2 km stretch in the upper reaches of the Waratah Rivulet, and in numerous other channels (e.g. Figs 10 and 11). The Waratah Rivulet suffered dramatic impacts that have been well documented and reported in the media.

Mining companies and their consultants contend that any diverted surface water will re-emerge downstream. As OEH point out, this assumption has not been scientifically established or supported by any scientific evidence in any mining company report or peer reviewed study. **Given the uncertainty and the consequences, the Precautionary Principle requires the converse assumption - that diverted water will not return to the surface**.

The SCA believes water is being lost from the Woronora Reservoir catchment as a result of subsidence impacts to the Waratah Rivulet, with water is being diverted to groundwater flows that take it away from the local catchment and into regional flows.

Figure 11. Subsidence related loss of flow in Wongawilli Creek.

RECOMMENDATION 8: Given scientific uncertainty and significant consequence, the Precautionary Principle requires the assumption that diverted stream water will not re-emerge downstream.

This applies to streams of all orders**.** The Planning Assessment Commission expects that for any third order or larger stream of special significance status, or otherwise qualifying for special protection, an assessment is undertaken of all of its tributaries to determine whether subsidence-induced impacts could compromise the protection status of the stream itself. The EA does not provide any evidence or basis for its assumption that undermining the 1st and 2nd order tributaries will not significantly reduce the volume or quality of the water they supply. **Any water lost from 1st and 2nd order streams is water lost from the dependent higher order streams and inconsistent with the requirement of no more than negligible harm. Ferruginous seeps in 1st and 2nd order tributaries will lower the quality of the streams they supply.**

The use of 390 metre longwalls would be reckless, with the free-draining zone reaching up towards the surface and possibly reaching the surface, risking water loss from the Cataract catchment. The further the free-draining and fracture zone extends above the mine, the more quickly will water be drawn away from the surface. Water may then be lost from the local catchment to the mine or to the broader regional groundwater flows. This drainage mechanism has greatest impact below bodies of water - swamps, streams and reservoirs.

The Planning Assessment Commission has made it clear that Lizard Creek and Cataract Creek merit the same level as protection as water courses identified as being of special significance:

> "*Furthermore, despite not achieving special significance status because of previous impacts, Cataract Creek and Lizard Creek exhibit highly significant values and the consequences of further impact makes them worthy of protection*."

That is, Lizard Creek and Cataract Creek must not be subject to more than negligible impacts, where negligible means "*no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, minimal gas releases and continued maintenance of water quality at its pre-mining standard*". The same requirement applies to Wallandoola Creek. The current proposal will expose these creeks to more than negligible damage.

The main channel and tributaries of Lizard Creek and Wallandoola Creek are at grave risk of serious impacts from 390 metre longwalls proposed for Area 3.

RECOMMEDATION 9: The layout of the Area 3 longwalls must be revised in accord with the Reynolds Recommendations. The main channels Lizard Creek and Wallandoola Creek must be kept outside of the subsidence impact boundary defined by the 35 degree angle of draw. The tributaries Lizard Creek and Wallandoola Creek should be kept outside of the subsidence impact boundary defined by the 35 degree angle of draw.

Given the acknowledged inadequacy of SDPS, the uncertainty of double seam mining and the unprecedented 390 metre longwall width, there is no reasonable basis for confidence in the statement in Part C that:

> "*The proposed extraction in Wonga West is predicted to result in up to an additional 0.25m subsidence in the main channel of Lizard Creek and up to an additional 0.5m subsidence in the main channel of Wallandoola Creek. This will result in a cumulative subsidence effect with the subsidence caused through the previous Bulli workings, however no site specific, cumulative effect on the creek bed and bank stability or pool levels is anticipated due to the additional subsidence*."

Likewise, the following is at best a statement of optimistic hope lacking a credible scientific basis:

> "*A potential cumulative effect of subsidence on the stream flow from 1st and 2nd order streams, which may or may not also contain upland swamps, is possible if the subsurface*

transfer of the tributary / swamp water outflows does not report back into the lower reach of the tributary before it discharges into the main 3rd order channel of Lizard or Wallandoola Creek. However, it is anticipated that the upper tributaries / swamps will discharge the stream flow back into the 3rd order flow system of the main creeks at or near their confluence with the main stream, so that negligible volumes of tributary / swamp outflow will be 'lost' to the system."

The EA states that "*The Longwall Panels are positioned so that vertical subsidence under 3rd order or higher stream channels will be restricted to less than 250mm, except over Longwall Panel A2 LW8*." **The modelling is unable to reliably predict the vertical subsidence. The EA does not explain the basis for assuming that limiting subsidence to 250mm will ensure negligible impacts to watercourses - strains and cracks accumulate in unpredictable ways**. Peer reviews undertaken by consultants funded by the proponent do not constitute independent reviews. Negligible impact can only be ensured by not allowing mining beneath or near the feature to be protected.

Prof. Pells states in Annex N:

"*We are of the view that groundwater modelling cannot provide definitive answers as to impacts on creeks and swamps. We consider that the modelling completed to date for the NRE No 1 project does not properly consider the likely ranges of permeability and storativity parameters, but notwithstanding this limitation, does indicate that the existing workings, and the proposed mining will have negative impacts on the groundwater regime. We conclude that there will be additional negative impacts on Lizard and Wallandoola Creeks, and the tributaries of Lizard Creek that are located above the proposed Wongawilli longwalls. We also conclude that there will be negative impacts to the length of Cataract Creek that has probably already been impacted by prior mining*."

Negligible impact can only be ensured by not allowing mining beneath the feature that is to be protected.

Protecting the Streams - Water Quality

Commenting on ferruginous seeps GeoTerra state:

"*It should be noted that many Hawkesbury Sandstone aquifers in the Southern Coalfield already have significant iron hydroxide levels, and that ferruginous seeps can also be observed in previously un-subsided catchment areas*."

No references are provided, however the SCA reports that "*Dissolved iron is generally present in Hawkesbury Sandstone groundwater at variable concentrations. Water is normally suitable for raw water supply for medium to large-scale potable use*."[10] Figure 12 shows the impact of subsidence induced ferruginous seeps into the badly damaged Waratah Rivulet. The water is green with dissolved iron and other metals and the stream is lined with iron oxide deposits, and iron and manganese oxidising bacterial mats. The Waratah Rivulet is an important watercourse. In periods of

good rainfall the Rivulet supplies 30% of the inflow to Woronora Reservoir and up to 50% in dry periods.

Commenting in Annex C on ferruginous seeps in the proposed project area, the EA advises that "*due to the lack of pre-mining data, no comment can be made as to whether the seepage is mining induced or not* ". The BSO PAC Panel however attributes ferruginous seeps in O'Hares Creek and the Woronora River, some kilometres from mining activity, to mining induced far-field movements. That is, **ferruginous seeps are initiated by a disturbance and on the Woronora Plateau the trigger is most likely to be mining activity**. These seeps can persist for decades and do not constitute a negligible impact.

SCT Operations comment:

> "*There appears from the iron staining evident in the water flowing in Cataract Creek to be some ongoing impacts from previous mining that was undertaken some 30-40 years ago, so the post mining recovery appears to be relatively slow*."

The BSO PAC Panel comments in its 2010 report that:

> "*the consequences of iron staining, opacity, bacterial mats and deterioration of water quality has potentially significant consequences for hydrologic values (water quality), ecological values, environmental quality and amenity value*".

And

> "*The Panel considers there is strong evidence that growth of bacterial mats, opacity and the deterioration in water quality accompany iron staining and that these impacts may persist for long periods*."

The SCA advises[11] that manganese dissolution and precipitation accompanies iron dissolution and that:

> "*During rainfall events, acidic rain water and surface run-off re-mobilises iron and manganese oxides and hydroxides, eroding them from the streambed and dissolving them from floating mats and returning these metals again to the aquatic system to cause further pollution downstream.*"

And

> "*During high water stages when turbulent flow prevails, iron mats are washed from pools and meanders where they have been immobile during low flow conditions, resulting in further contamination as they are dissolved in acidic conditions.*"

The SCA also advises in the 2010 BSO PAC report that "*Experimental studies in the Waratah Rivulet showed that rainwater is able to completely remove iron/manganese precipitates (Figure 6) increasing their concentration during and after rainfall event. The dissolved phases of iron and manganese are transported into Woronora storage causing significant increasing loading of these metals*" Insoluble oxides and hydroxides transported into water storages add to their sediment load and reducing oxygen. The SCA estimates that between February 2002 and August 2009 some 15 and 4 tonnes of iron and manganese respectively were added into the Woronora Reservoir from the shattered Waratah Rivulet.[11] It's likely that more than 5 tonnes of iron and 1.5 tonnes of

manganese will have since been added to the reservoir, together with other contaminants that include barium and strontium.

Figure 12. October 2012 photograph of the impact of subsidence induced 'springs' in the Waratah Rivulet. The water is green with dissolved iron and other metals and the stream is lined with iron oxide deposits, and iron and manganese oxidising bacterial mats. In periods of good rainfall the Rivulet supplies 30% of the inflow to Woronora Reservoir and up to 50% in dry periods.

The proposed mining will exacerbate existing seeps and create new seeps, adding to the catchment burden.

Remediation - a False Promise

There are currently no independently agreed methods for remediating broken watercourses or swamps. Peabody has spent very substantial sums of money injecting polyurethane resin (PUR) in two locations in the very badly damaged Waratah Rivulet. The work has yet to meet the SCA's performance measures and the BSO PAC Panel expressed concerns the injected curtain would divert water. The method can only be used in ideal locations and its medium to long term durability in a subsidence zone is unknown.

Swamp remediation is likewise problematic. PUR, or some other 'grout', injection can only be undertaken in ideal locations and access would require clearing of swamp vegetation. Propagating the promise of remediation, the Draft Statement of Commitments (Part D of the EA) states "*Should*

the standing water level or groundwater quality be unacceptably affected due to subsidence, methods to ameliorate the situation until the water level or water quality recovers will be investigated." In reality, once a swamp is damaged, there is no prospect of returning it to its pre-mining state, or some reasonable approximation of that state.

Project approvals made with commitments to remediation are nonetheless in fact approving the loss or damage of the threatened asset. It is misleading or delusional hubris to suggest otherwise.

Water Protection Required Under the Law

The Environmental Assessment and Planning (EP&A) Act 1979 requires a consent authority to "*refuse to grant consent to a development application relating to any part of the Sydney drinking water catchment unless the consent authority is satisfied that the carrying out of the proposed development would have a neutral or beneficial effect on the quality of water*." **Damage to swamps and watercourses inescapably fails the Neutral or Beneficial Effect (NorBE) on water test, in contravention of the EP&A Act.** Cumulative impacts cannot be ignored

In the interests of the proponent and consequential State revenue, and ignoring considerations of cumulative impacts, the meaning of neutral could of course be 'redefined' and blurred by the consent authority admitting some 'negligible' deviation from neutral and accepting some level of damage to swamps. The public could then have no respect for the consent authority or the legislative framework within which it operates..

Public Scrutiny of Management Plans

In general, the public are not afforded an opportunity to review and comment on management plans, such as Subsidence Management Plans (SMPs) and Environmental Assessments (EAs) rarely provide any insight into their likely content. In its hasty 2012 approval of Gujarat's 'modification' to add triple seam mining to its Preliminary Works Project (MP 10_0046) the PAC Panel comments on the lack of community consultation with respect to SMPs: "*consultation must be meaningful and the Department must take full account of it in its assessment and approval of the subsequent plans. Concern has been expressed to the Commission on multiple occasions (including this one) that neither proponents nor the Department necessarily meet expectations in this area*". As discussed below the SMP for one of the MP 10_0046 longwalls is inadequate in providing no effective swamp protection.

Access to Environmental Performance Data

Mining companies collect environmental performance data as a condition of approval and will provide tabulated or graphical summaries of that data in end of panel reports or annual reports. The data is collected in the public interest and all of the data should be made available to the public- not just the summaries provided by the company. Doing so would entail little additional effort or cost.

Any consultants reports obtained by company in advance or as part of the development of an EA should also be made available. For instance, a number of documents referred to in this EA do not seem to be publically available' e.g. Biosis 2011.

Mine layout maps for the lease, past and present should be made readily available in electronic and hardcopy form.

Attempting to Form an Alternative Community Consultation Framework

Some three months into their three year Preliminary Works project approval period and three months before the due date, Gujarat sought to form an alternative to the conventional Community Consultative Committee (CCC) utilised by other mining companies. Gujarat relentlessly sought to impose what was clearly an unwieldy community advisory system that was not in accord with the DoPI CCC guidelines.

A group of community members selected by Gujarat as an engagement framework development oversight and design group (Community Review Team) repeatedly advised the company that the CCC alternative being pursued was not in accord with DoPI guidelines, would not be functional and was not acceptable. Gujarat ignored the advice and requests of the oversight group put their proposed alternative to the DoPI and, in doing so, made it clear that the company was not sincerely engaging in a consultation process. Remarkably, the company suggested to the DoPI that it was the community that sought a CCC alternative - this was not the case.

Though having refused to meet with community representatives to discuss their concerns, the DoPI eventually agreed with their position and a conventional CCC has since been formed. A CCC was required to have been formed and operating by April 13 2012; it was instead formed in July and its first meeting was held on the 21st of August - some 10 months into the projects three year approval period.

The DoPI will be well aware that the account of the formation of the CCC given in the EA documentation for the Preliminary Works modification proposal (MP 10_0046 Mod 1) is incorrect and very misleading. The account suggests a company acting in accord with requirements and sympathetic to the interests of the community. The correspondence between the company, DoPI and community representatives makes it clear however that this not the case.

In describing the consultation process led by Twyfords in Part A of the current EA, Gujarat NRE again misrepresent the truth in stating "*The use of a Community Consultative Committee (CCC) that is commonly used in other mine sites was not selected as part of this strategy*." As the email correspondence documents, the community was not at any stage asked to make choice between a conventional CCC and the framework being sought by Gujarat. The pros and cons of the conventional CCC were not canvassed by Twyfords. The impression in the meetings was that the framework being drawn out by Twyfords was to be in addition to a conventional CCC. When concerned community representatives asked if a conventional CCC would be formed, the response was vague.

Part A of the EA also states "*NRE believes that a CCC at the core of the strategy would have a high risk in compromising both effective engagement, and effective business operation (Twyfords, 2012).*" The statement is not explained and neither concern was raised during the Twyfords led consultation process of 2012. At no point did Twyfords raise concerns about the conventional CCC. In hindsight its clear Gujarat had an outcome in mind and the consultation process was a failed attempt to give the impression it was the community that sought that outcome. The process, and its subsequent representation by the company and Twyfords, was dishonest and this reflects poorly on both.

Undermining Confidence in the NSW Assessment and Regulatory System

Many reasons have accumulated for a decline in confidence in the NSW assessment and regulatory System. The saga of Gujarat's expansion of the NRE 1 mine behind Russel Vale exemplifies its flaws and failures. The PAC was introduced as independent body, at least in principle, to address long standing concerns with the objectivity of Government departments with an economic focus (DoPI and DRE) assessing mining proposals that delivered revenue. The series of PAC approvals for the NRE 1 mine have damaged the credibility of the PAC - a risk the PAC recognised in granting the approvals.

Though seemingly well intentioned, Gujarat NRE have nonetheless established a track record of non-compliance. Management plans required for the approved Preliminary Works project were months overdue and the company was months late in establishing a Community Consultative Committee (CCC). End of panel reports are overdue and a due independent review has been delayed.

Gujarat have twice been penalised $1,500 by the EPA and the SCA fined Gujarat $1,500 for damage caused to swamp and *Pultenaea aristata* during the establishment of subsidence monitoring equipment for Longwall 4 in Area 2. The most recently completed longwall in their Wongawilli mine lacked a subsidence monitoring line. Though the DoPI initiated an investigation into a significant number of compliance failures in early 2012, there has been no consequential penalty - in contrast the fines imposed by the SCA and OEH.

The history of the expansion project is noteworthy. A Part 3A application titled ‘‘NRE No. 1 Mine Project’ (MP09_0013) was submitted in early 2009 for “*for the consolidation of its existing operations, continuation of operations and upgrade of associated surface facilities at NRE No. 1 Colliery*”. Director-General’s environmental assessment requirements were issued in March 2009. At some unknown point this project application was withdrawn. An "Underground Expansion Project" application was submitted by Gujarat in August 2009, apparently again under MP 09_0013 and again for the “*consolidation of its existing operations, continuation of operations and upgrade of associated surface facilities at NRE No. 1 Colliery*”. The application included a preliminary Environmental Assessment (EA) and this document is available from the DoPI Web site. Director-General requirements were issued in the same month. The DoPI received a draft EA for the expansion project in February 2011.

A substantial amount of the material in Appendix J of the 2012 Preliminary Works modification application (MP 10_0046 Mod 1) came from the yet to be completed Underground Expansion Project application- underscoring the view that **the modification proposal did not constitute an modification, but was to begin the longwall mining otherwise planned for the Underground Expansion Project**. The Preliminary Works proposal itself was submitted as a Part 3A application (MP10_0046) in March 2010 to extract remnant coal reserves within stipulated mining areas, and augment and upgrade existing infrastructure including surface facilities. The proposal did not include longwall mining or other secondary extraction.

The Preliminary Works application was approved in October 2011, in spite of agency opposition, opposition from Wollongong Council and opposition from the community. There were two noteworthy concerns with the approval;

(i) that it admitted a stepwise approach to the establishment of the delayed expansion project and

(ii) (ii) that approval was given for infrastructure work needed for the next phase of the expansion project - so applying pressure for the subsequent approval of the next phase.

The PAC recognised the risk of to its credibility in approving the project: *‘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. In this context it should be noted that major regulatory authorities and Wollongong City Council were among those submitters who raised the concern*.’

Seeking to side-step the need for approval under the Environmental Planning and Assessment Act 1979 (EP&A Act), sometime around September 2011 Gujarat submitted a subsidence management plan (SMP) for Longwalls 4 and 5 (Area 2) to the Division of Resources and Energy (DRE) in the Department of Trade and Investment. On 24 February 2012 Gujarat advised the Australian Stock Exchange that they intended to commence mining of Longwall 4 from 13 March 2012. The DRE approved a SMP for Longwall (LW) 4 on 26 March 2012, subject to meeting certain conditions and the provision of additional documentation. Longwall 5 was not approved, posing a threat to significant upland swamps.

Gujarat succeeded in being able to abuse a transitional legislative provision (clause 8K) put in place to address the problem posed by a small number of mines operating without EP&A Act approval for historical reasons.

Gujarat succeeded in being able to abuse a transitional legislative provision (clause 8K) put in place to address the problem posed by a small number of mines operating without EP&A Act approval for historical reasons. Apparently unhappy with the use of the transitional legislation, the DoPI initially refused to endorse the DRE approval of the Longwall 4 SMP. Following a subsequent series of meetings with Gujarat, the DoPI changed its mind.

The provisions of the transitional legislation were to end on the 31st of December 2011, however the termination date was changed to March and then the 31st of July and then September 30th 2012. The transitional provisions exploited by Gujarat were not intended to allow the introduction of new longwalls and a challenge to the legality of the approval was initiated by the community group Illawarra Residents for Responsible Mining. The challenge had excellent prospects of success but had to be abandoned when the group was required by the Court to provide $40,000 in security funds. This underscores the great disadvantage the community suffers in seeking justice.

It is surely reasonable to suggest that the legislative provisions of NSW should not be manipulated or distorted to facilitate the commercial imperatives of developers. It is surely reasonable to suggest that the DoPI should act in the public interest and not yield to the commercial imperatives of developers.

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The modification proposal to add Longwalls 4 and 5 and Gateroad 6 to the Preliminary Works project was approved in haste and considerable community dissatisfaction in December 2012 The community argues that a proposal that added longwall mining and introduced the unknown impacts of triple seam mining to the Special Areas could not sensibly be regarded as a modification to the Preliminary Works project. The PAC recognised there was doubt, but nonetheless approved the proposal. Evidently recognising its falling credibility, the approval rejected the inclusion of gateroads 7 and 8.

The modification proposal contained errors, misleading statements and comprised an amalgam of subsidence management plans and expansion project material. Approval was granted by the PAC in the knowledge of the record of non-compliance, misleading representations and fines by the SCA and the Environmental Protection Authority. The approval states a recognition that approving works solely and clearly intended to establish infrastructure to enable mining for which approval has yet to

be sought would undermine confidence in the NSW approval and regulatory system. The PAC would have been aware that the same concerns had been raised in Gujarat's application for longwall mining in the Nebo area of its Wongawilli mine. That application included a driveage for a future expansion project unrelated to the Nebo longwalls. The PAC approved this proposal as well.

The PAC justifies its approvals as a consideration of the need for continuity of mining operations, which is the argument made by all of the companies extracting coal from the Special Areas. Credibility is the price paid in bending the regulatory system and setting aside rational and responsible decision making in order to accommodate the commercial needs of mining companies.

The PAC and the DoPI evidently regard the mining of coal as of greater importance than the credibility of the NSW assessment and regulatory system, and of greater importance than the environment from which it is extracted - and the water that environment provides.

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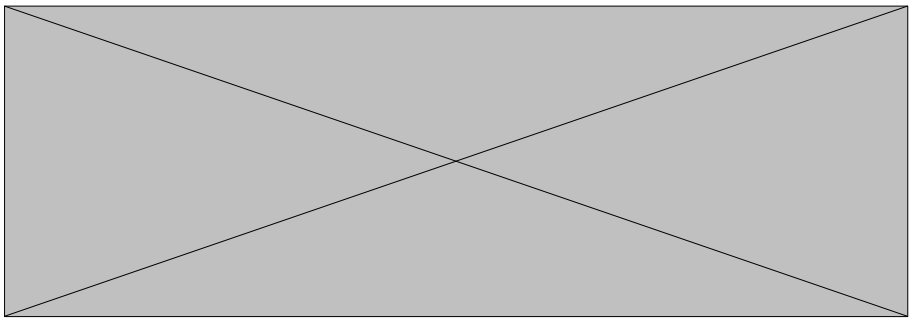

Introduction

Total Environment Centre (TEC) has serious concerns regarding the impacts of the proposed Gujarat NRE No.1 Colliery Underground Expansion Project MP09_0013. The proposed expansion will result in severe environmental damage to habitat for threatened species and Endangered Ecological Communities including, Coastal Upland Swamps and streams forming an important part of Sydney's drinking water catchment. We note that Gujarat NRE has submitted a Preferred Project Report (PPR) which covers a period of 5 years, modifies aspects of the Wonga East longwalls and Wonga Mains driveage and does not include Wonga West longwalls (Gujarat NRE, 2013).

The modified mine layout in the PPR fails to adequately address criticisms of the proposed Underground Expansion Project. It will still result in serious and unacceptable damage to the environmental values of Woronora Plateau. Furthermore, the PPR should not be considered in isolation as it does not delete the remainder of the proposed Underground Expansion Project but simply defers it. We note that the Wonga West longwalls will be submitted as a "separate application at a later date" (Gujarat NRE, 2013). The result will be years of uncertainty and controversy for the Illawarra community and ongoing environmental destruction of the Woronora Plateau.

Impacts of the Preferred Project must thus be considered along with the likely cumulative impacts of any subsequent Wonga West application. In deferring application for approval of Wonga West longwalls Gujarat NRE appears to be limiting the ability of the community and planning authorities to properly assess these cumulative impacts. TEC contends that assessment of cumulative impacts must thus apply the precautionary principle and include those impacts already identified in assessment of the Underground Expansion Project MP09_0013 as the *minimum* likely impacts of extraction in the Wonga West precinct.

There are major concerns regarding the adequacy of the Environmental Assessment (EA) used in both the PPR and Underground Expansion Project MP09_0013. Serious doubts have also arisen regarding the estimation of subsidence effects and their environmental impact. These are heightened by uncertainty regarding subsidence forecasting resulting from multi-seam mining, mining under previous bord and pillar workings and the proposed use of the widest longwall panels in the NSW Southern Coalfield. It is, therefore, likely that the environmental assessment has seriously underestimated the environmental impacts of the project. The impacts forecast by the environmental assessment should thus be viewed as unrealistic, 'best case' scenarios. Nevertheless, these 'best case' impacts predicted by the environmental assessment would result in unacceptable damage to crucial environmental assets.

It is also important the impacts of the Preferred Project and the earlier Underground Expansion Project not be considered in isolation. They should be assessed in the light of the impacts of previous, current and already approved future mining operations on the Woronora Plateau; an area of considerable environmental and scientific value.

Previous experience with longwall mining in the southern coalfield has shown that these impacts cannot be avoided or mitigated by monitoring and remediation programs or by altering the mine layout if damage is detected. In view of this, conditional approval of the project, seeking to minimise or mitigate damage is not a viable option.

Environmental significance of the Woronora Plateau

In a submission to the Inquiry into the NSW Southern Coalfield TEC and the Colong Foundation for Wilderness highlighted the environmental values of the Woronora Plateau (TEC & Colong Foundation, 2007). As the environmental values of this region continue to be threatened by longwall mining it is important that these values be restated here. The impacts of the Preferred Project and the larger proposed NRE No.1 Colliery expansion should be considered not only in the context of area affected by the proposed longwall panels but also their effects on the broader environmental value of the Woronora Plateau.

The Woronora Plateau makes up an area of approximately 100,000 ha located southwest of Sydney, west of Wollongong and north of Robertson. It encompasses the upper catchments of the Woronora River, O'Hares and Stokes Creeks, and the Cataract, Avon, Cordeaux and Nepean Rivers. It extends from Woronora Reservoir in the northeast, to Robertson in the southeast, Mittagong in the southwest and Appin in the northwest.

An almost unbroken cliff line that forms the top of Illawarra Escarpment marks the

eastern boundary of the Woronora Plateau. From the top of the escarpment, the plateau slopes to the northwest, resulting in most of the rainfall falling on the top of the escarpment draining inland into the Avon, Cordeaux, Cataract, and Woronora drinking water catchments, and on into the Hawkesbury-Nepean River system.

The geographical extent of the southern coalfield corresponds almost exactly with that of the Woronora Plateau and Illawarra Escarpment, while also extending into the Bargo River system to the west.

Sydney's five southern Sydney Catchment Authority (SCA) administered Special Areas are located on the Woronora Plateau and include the catchments of the Avon, Cataract, Cordeaux, Nepean and Woronora Dams. The metropolitan water catchments, along with the Woronora Special Area, are recognised by the Royal Botanic Gardens as biologically significant due to their isolation, relative lack of human interference, and their catchment protection measures. These pristine catchments are also home to 30 threatened animals and 26 threatened plants, including the Spotted-tail Quoll and contain the only viable koala populations near Sydney (OEH, 2007).

Since 1887, when the Sydney Water Board took over their administration, the southern catchments have remained largely undisturbed and their environmental values protected by a policy of management for high water quality that includes preventing public access and recreational use. Very little development has occurred within them. Some dissection of the area has occurred due to road and railway construction and the establishment and maintenance of fire roads.

In 1995 the National Parks Association of NSW (NPA) proposed the addition of the southern water catchment areas to the National Parks and Wildlife Service (NPWS) estate in order to ensure (and improve) their ongoing management for nature conservation, noting that "If active coal mines were to preclude or delay gazettal as national parks and nature reserves, the NPA proposes their interim gazettal as state recreation areas" (NPA, 1999).

Coal mining in the southern coalfield has also been taking place for well over a century, as has political debate about mining within supply catchments. However, the 1990s also saw an unprecedented intensification of longwall mining within NSW and a rapid increase of subsidence affected areas and damage to natural features in the southern coalfield. The intensification continues to the present day with new mines or mine expansions proposed and more rivers and streams under threat.

Having been largely undisturbed since 1887, the habitat continuity of the 100,000 ha Woronora Plateau is unique on the NSW coast and one of the best protected, undisturbed and scientifically untapped ecosystems on the east coast of Australia. Along with remnant rainforest and tall old growth forest communities, open treeless heaths, wet heaths and upland swamps occur on plateau areas. Many of the ridge-top, moorland and dell communities are rare. The upland swamps have been recognised as feeder or recharge areas for a number of rivers and streams within the catchments and continue to be poorly studied both botanically and geomorphologically (Tomkins &

Humpheries, 2006; DOP, 2008).

Impacts of the proposed NRE No.1 Colliery expansion on watercourses, streams and groundwater

Coastal upland swamps

The area affected by the proposed NRE No.1 Colliery expansion contains 84 coastal upland swamp EECs (Biosis 2012; OEH, 2013). These swamps are exceptional for the high number of species they contain and are of high conservation significance (Keith & Myerscough, 1993; DOP, 2008; NSW Scientific Committee 2012). They also act as water filters or feeder swamps, releasing water slowly to downstream creek systems and acting to regulate water quality and flows from the upper catchment areas (DOP, 2008; SCA, 2013).

Of the 84 coastal upland swamps present in the proposed mining area a total of 30 have been identified as likely to suffer negative consequences as a result of mining (ERM, 2013; OEH, 2013). Thus the proposed expansion of NRE No.1 Colliery will result in damage to more than a third of the swamps within the mining area. Given the ecological importance of these swamps it would be inappropriate for any swamps to sustain damage. Damage to these swamps thus represents a considerable loss of environmental integrity to the Woronora Plateau. This loss is even more significant considering damage that has already occurred to a large number of swamps in the region as a result of previous mining activity (see cumulative impacts section below).

Of the 30 swamps likely to be damaged, nine (CCUS1, CCUS10, CCUS4, CCUS5, CRUS1, WCUS11, LCUS8, WCUS4 and WCUS7) have been identified as upland swamps of ‘special significance’ (Biosis, 2012; OEH, 2013). The remaining 21 swamps likely to be damaged by longwall extraction (BCUS11, BCUUS4, CCUS11, CCUS12, CCUS2, CCUS21, CCUS23, CCUS3, CCUS6, LCUS18, LCUS19, LCUS20, LCUS21, LCUS25, LCUS28, LCUS29, LCUS9, WCUS12, WCUS8 and WCUS9) (Biosis, 2012; OEC, 2013) should not be viewed as being of lesser conservation importance and thus warranting a lesser level of protection from mining damage.

The PPR notes that longwall panels have been moved away from ‘special significance’ swamps CCUS1, CCUS5 and CCUS 10 (Gujarat NRE, 2013). Despite this the likelihood of serious environmental impact remains. CCUS 5 and CCUS 10 will still be undermined. It is claimed that changes to mining layout will reduce impacts (Gujarat NRE, 2013); however there is little evidence to support this assertion. Given the sensitivity of upland swamps to mining disturbance, the precautionary principle dictates that no undermining of these swamps should be permitted. The PPR provides no protection for ‘special significance’ swamp CCUS4 or for other swamps in the Wonga East precinct. Potential impacts to these swamps alone render the Preferred Project unacceptable. These impacts should also be considered in conjunction with potential

impacts to swamps in the Wonga West which will be subject to a separate application (Gujarat NRE, 2013).

Swamps likely to be adversely affected by the proposed NRE No.1 colliery expansion and the Preferred Project provide habitat for threatened species including Giant Burrowing Frog (*Helioporous* australiacus), Red Crowned Toadlet (*Pseudophryne australis*), Littlejohn's Frog (*Litoria littlejohni*), Stuttering Frog (*Mixophyes balbus*) (NSW Scientific Committee, 2012; Wollongong City Council, 2013).

Subsidence and warping of land surfaces associated with longwall mining has been identified as a threat to the viability of coastal upland swamp EECs (NSW Scientific Committee, 2012). Impacts are caused by "fracturing of bedrock layers between the coal seam and the surface, as well as subsidence, upsidence, tilting and buckling of the ground surface and valley closure" (DOP, 2008; NSW Scientific Committee, 2012).

The most dramatic and instantly visible impact of subsidence on an upland swamp may be a sudden and serious erosion event. Such instances are known to have occurred in the southern coalfield at a time when longwall mining was taking place under or in proximity to the swamp (Tomkins & Humphreys, 2006).

Subsidence damage to an upland swamp can result in the perched water table moving to the subsurface affecting the water balance of the swamp. An altered water balance may, in turn, lead to changes in vegetation in and around the swamp over the longer term (Tomkins & Humphreys, 2006; Benson & Baird, 2012; OEH, 2013). It may, therefore, take months or years before such changes, and their effect on susceptible species and communities, become apparent (NSW Scientific Committee 2012; SCA, 2013). Drainage and dewatering of swamps also increases fire risk and vulnerability to weed invasion (Benson & Baird, 2012). Thus the impacts of subsidence are not limited to effects on swamp hydrology.

The environmental assessment and PPR propose that monitoring will be conducted to determine the accuracy of subsidence predictions and that mine layouts will be altered in response to damage to significant environmental features (ERM, 2013; Gujarat NRE 2013). The potential for impacts to occur months or years after mining has occurred renders any attempts at avoiding or mitigating damage by monitoring swamps and altering mine layouts impractical and ineffective. By the time damage has been detected it is likely that mining will have been completed, with perhaps more swamps being damaged. It should be concluded that the only viable means of preventing damage to upland swamps is to avoid mining beneath them. Furthermore, the proposed trigger for determining that damage is occurring is a piezometer becoming dry that has not previously done so. This would indicate that a swamp has cracked and drained i.e. serious damage has already occurred.

The PPR also proposes that a "Biodiversity Offset Strategy will be developed for impacts that are proven to be greater than allowable by any condition based performance indicators that form part of approved extraction" (Gujarat NRE, 2013). TEC rejects this as a viable option for addressing environmental damage. It is unclear how

‘proven’ impacts greater than those allowed in conditions of consent will be defined. It is also unclear how impacts to swamps could be offset in ways that would satisfy any ‘equivalency’ test under offsetting rules. Furthermore, biodiversity offsets should not be used as a substitute for avoiding impacts. Impacts to swamps can easily be avoided by not mining beneath them.

TEC endorses the view of the Sydney Catchment Authority that mining should not be permitted under or within the 40 degree angle of draw for all upland swamp communities overlying the mining area (SCA, 2013). This approach is consistent with the precautionary principle and the ecological significance of upland swamp communities. It is noteworthy that that Southern Coalfields Inquiry *Impacts or Underground Coal Mining on Natural Features in the Southern Coalfield* (DOP, 2008) found that “no unaffected or ‘healthy’ valley infill swamps were observed where longwall extraction had taken place beneath them”.

Serious doubts exist regarding the adequacy and accuracy predictions relating to subsidence and impacts on swamps. We note that OEH has raised concerns regarding the validity of the ‘flow accumulation model’ used in predicting impacts. These concerns include classifying some swamps as having a ‘low’ potential for impact based on ‘limited available data’ and flow accumulation indicating ‘small’ potential for change without proper definition of what constitutes a ‘small’ potential. (OEH, 2013).

Doubts regarding subsidence predictions are heightened by uncertainty surrounding the effects of multi-seam longwall extraction and mining under previous bord and pillar workings (see below).

The PPR acknowledges that more work is required to determine the relationship between mining subsidence and the long term health of swamps (Gujarat NRE, 2013). In view of this the precautionary principle dictates that mining under swamps should be avoided. TEC is appalled by the suggestion that “the extended baseline of subsidence impacts over the past 100 years offers a rare opportunity to study these effects”. The upland swamps within the application area are too ecologically valuable to be the subject of some sort of manipulative experiment to determine the impact of mining beneath them; particularly when the likely result of such an experiment is serious, irreversible damage to these ecosystems.

Rivers and streams

Stream flows

Subsidence induced cracks occurring beneath a stream or other surface water body may result in the loss of water to near-surface groundwater flows. The ability of the water body to recover is dependent on the width of the crack, the surface gradient, the substrate composition and the presence of organic matter. An already-reduced flow rate due to drought conditions or an upstream dam or weir will increase the impact of water loss through cracking (DOP, 2008).

The potential for the natural closure of surface cracks is improved at sites with a low surface gradient (DOP, 2008). However, many of the impacted rivers and streams within the Southern Coalfield occur in areas with steeper gradients, such as the Upper Cataract River. Cracking and subsequent water loss can result in permanent changes to riparian community structure and composition.

The proposed NRE No.1 expansion will place significant streams that provide habitat for range of threatened species and form part of Sydney's drinking water supply at serious risk of damage. These include Cataract Creek, Wallandoola Creek, Lizard Creek and Lizard Creek Tributaries 1 and 2 (ERM, 2013; OEH, 2013, Wollongong City Council, 2013). Threatened species likely to suffer habitat degradation as a result of subsidence include Macquarie Perch (*Macquaria* australasica) – Cataract Creek; Giant Burrowing Frog (*Helioporous* australiacus) –Lizard Creek and Lizard Creek Tributaries 1 and 2; Red Crowned Toadlet (*Pseudophryne australis*) – Lizard Creek and Lizard Creek Tributaries 1 and 2 (OEH, 2013; Wollongong City Council, 2013). The environmental assessment also notes that Silver Perch (*Bidyanus bidyanus*) and a freshwater cod that may be either Trout Cod (*Maccullochella macquariensisi*) or Murray Cod (*Maccullochella peelii*) or a Trout x Murray Cod hybrid occur within the lower reaches of Cataract Creek in the Wonga East mining domain (ERM, 2013). Further study is urgently required to determine the genetic composition of freshwater cod in Cataract Creek. While the result of translocation, a viable population of Trout Cod would be of conservation significance given the species highly threatened status within the Murray-Darling Basin. Equally, Silver Perch have suffered precipitous population declines within the Murray-Darling Basin. Cataract Creek thus represents an important refuge for this species despite being outside its natural range.

It is disturbing to note that both the catchment modeling scenarios used in the environmental assessment (0.5 ML/day and 1.0 ML/day) indicate that mining will produce serious flow reductions in these streams. We note that a loss of 0.5 ML/day would reduce the frequency of flows greater than 1.0ML/day from in Lizard and Wallandoola creeks 38% to 32% while a loss of 1.0 ML/day would reduce the frequency of 1.0 ML/day flows to 28% (ERM, 2013; SCA, 2013). In addition to reducing the frequency of higher flows, subsidence will also have serious impacts in periods of low flows. A loss of 0.5 ML/day will reduce the frequency of 0.1 ML flows from 70% to 46 % while a loss of 1.0 ML/day would reduce the frequency of 0.1 ML flows to 37% (ERM, 2013; SCA, 2013). Furthermore OEH (2013) notes that under the 0.5 ML/day scenario

Lizard Creek would experience flows less than 0.01 ML/day approximately 52% of the time and Wallandoola Creek approximately 54% of the time. Under the 1 ML/day loss scenario Lizard Creek would experience flows less than 0.01 ML/day approximately 62% of the time and Wallandoola Creek approximately 64% of the time.

TEC notes that under both these scenarios both Lizard and Wallandoola Creeks would cease to flow more often than they flow (OEH, 2013). We share the view of OEH (2013) that this represents an unacceptable impact on habitat for threatened species, stream connectivity and Sydney's drinking water supply. We further note the SCA's comment that these losses would have significant impacts (up to 50% reduction) on stored water levels in Cataract Reservoir during extended dry periods (SCA, 2013).

As discussed below in relation to mining subsidence uncertainties, these predictions should be viewed as optimistic 'best case' scenarios. Actual subsidence impacts on flows are likely to exceed these impacts. TEC supports the view of the Office of Environment and Heritage that the only viable means of protecting these streams from mining damage is to avoid mining beneath them (OEH, 2013). Consequently mining should not be permitted under streams or where streams are within the 40 degree angle of draw.

In addition to questions regarding the adequacy of subsidence predictions there are also serious doubts regarding the catchment yield modeling used to develop flow predictions. We note the following concerns raised by the Sydney Catchment Authority:

- Absence of stream flow data for Cataract River Wallandoola and Cataract creeks and minimal data for Lizard Creek.
- Development of a catchment yield model based on the Loddon River and Bellambi Creek catchments which have higher rainfall, do not overlie the mining area and are not impacted by proposed expansion of NRE No.1 colliery.
- Uncertainties involved in extrapolating a model based on a catchment with 1800 mm annual rainfall to the Lizard and Wallandoola creek catchment which have annual rainfall of 1000 mm.
- Validation of model predictions against stream flow records at Broughtons Pass Weir that is at a different scale to impacted streams and may be influenced by reservoir operation.
- Failure to fully validate modeled low flows against measured flows due to lack of sufficient stream flow monitoring sites.
- Failure to consider the impact of geological structures such as faults and dykes

before and after mining impacts of changes to creeks and swamps.

(SCA, 2013)

A further serious deficiency of the EA is that it has only considered avoiding damage to 'named' 3rd order streams only and has excluded 1st and 2nd order streams from any consideration of value and impacts (OEH, 2013). These streams provide important contributions to the quantity and quality of water flows to upland swamps and larger streams (Bulli Seam PAC, 2010; OEH, 2013) as well as providing important habitat for the threatened species described above (OEH, 2013). TEC shares the concern expressed by OEH (2013) that these streams have been described as "ephemeral" without appropriate flow assessment. These streams should not be dismissed as expendable and not warranting protection. Given their importance to maintaining the viability of aquatic habitat for threatened species mining should not be permitted under or within the 40 degree angle of draw of these streams.

The PPR proposes to eliminate secondary extraction below 3rd order and above streams and to eliminate mining below 3rd and 4th ordered sections of Cataract Creek (Gujarat NRE, 2013). Nevertheless, the likelihood of serious impacts to remaining streams in the Wonga East precinct remains. Furthermore, as noted in the PPR, fracturing of Cataract Creek tributaries may result in reduced inflows to Cataract Creek and increased iron seepage. As a result there is likely to be a reduction in habitat quality for Macquarie Perch and smothering of Macquarie Perch eggs (Gujarat NRE, 2013). The Preferred Project will thus have unacceptable impacts on aquatic habitat and threatened species and should be rejected.

Impacts of the preferred project should also be assessed in conjunction with those likely to occur as a result of development of the remainder of the proposed Underground Expansion Project. As noted this will be the subject of a subsequent application (Gujarat NRE, 2013). The impacts of the Preferred Project, (in themselves severe and unacceptable) cannot be considered in isolation. Proper assessment of the impacts of the Preferred Project and remaining aspects of the Underground Expansion Project is made difficult by deficiencies in the environmental assessment.

It is disturbing to note that the environmental assessment has considered impacts only to segments of streams lying above the mining domain (OEH, 2013). TEC endorses the view that streams should be considered as connected habitats which may be affected by mining impacts throughout their length (OEH, 2013). Assessment of impacts should thus consider impacts throughout the system rather than simply those sections lying within the mining area.

In view of these deficiencies of the environmental assessment there should be little confidence that modeled scenarios accurately represent the likely impact on stream flows. They should not be relied upon in assessing the impact of mining on stream flows. Application of the precautionary principle requires that mining beneath streams be avoided to prevent adverse impacts.

TEC rejects the argument that the importance of Lizard and Wallandoola creeks is diminished by the impacts of previous mining activities (ERM, 2013). As noted by OEH (2013) these streams and their tributaries provide significant aquatic habitat that supports threatened species. Rather than diminishing the conservation importance of these streams and justifying further impact, the impacts of previous mining activities should be considered in assessing the cumulative impacts of the present proposal (see cumulative impacts below). Previous damage renders these sensitive habitats even more vulnerable to further impact and heightens the need to protect them from further damage.

While monitoring, adaptive management and remediation have been suggested as means of avoiding and ameliorating damage to streams (DOP, 2008; ERM, 2013) these are not effective strategies. As noted in relation to upland swamps, the potential for impacts to occur months or years after mining has occurred renders any attempts at avoiding or mitigating damage by monitoring and altering mine layouts impractical and ineffective. By the time damage has been detected it is likely that mining will have been completed. Experience elsewhere in the Southern Coalfields demonstrates that remediation of streams is not effective. There is no long-term evidence that grouting, mortaring or other remediation measures are capable of returning river systems back to health following longwall mining. As noted by the Southern Coalfields Inquiry streambed cracking is difficult to remediate, and made more difficult where access is restricted and cracking extends deeper into the valley floor (DOP, 2008). There is also the issue that damage is often undetectable and that accessing affected areas may result in further surface damage.

The practice of securing environmental flows from the mine, purchasing from town supplies or water catchments is also unsustainable both in terms of availability and financial capacity. Changes in the chemical composition of rivers and creeks from these practices may not support the return of aquatic species to an area.

In 2004 the Senior Environmental Scientist at the SCA made the following comment (Obtained by TEC under FOI) about remediation programs throughout the catchments, while specifically addressing problems within the Waratah Rivulet, “Unfortunately, just like BHPB in Metropolitan catchments, there are no plans for remediation of Waratah Rivulet identified. These systems simply do not ‘self-heal’ in the timeframes that are required if sustainable water supply is to be maintained and ecological health protected in these areas ... I believe that extraction of Longwall Panel 12 should be avoided

altogether ... Given that no subsidence cracking has been remediated in any SCA areas to date, despite decades of coal mining operations, the prospects for maintenance of existing water flows is likely to be significantly affected. The cumulative impact as mining continues in this area will simply exacerbate this and eventually threaten the Woronora River as well."(TEC, 2007)

In June 2006 the SCA proposed a water quality and quantity monitoring program for the Waratah Rivulet. In the proposal, the SCA note that they had "consistently expressed its concern" to the DPI and Helensburgh Coal "regarding the impacts and the lack of solid evidence that remediation is being effective"(SCA, 2006). We understand this is still the situation today.

There is also the issue that damage is often undetectable and that areas where it occurs are difficult to access without further surface damage resulting. Some cracking occurs beneath alluvial, sandy deposits and simply cannot be seen. As the EIS for Douglas Area 7 records, "It is … not possible to visually identify the location and extent of additional fractures that may have occurred as a result of mining previous longwalls" (BHP Billiton, 2006).

It could be argued that the very necessity of remediation, along with the knowledge that damage is not always possible to detect, access to remote areas with the required materials is often not possible, and that not all damaged areas undergo remedial workings, proves that mining developments do not have a neutral or beneficial effect if such a test were to be applied under the EP&A Act.

The PPR also proposes that a "Biodiversity Offset Strategy will be developed for impacts that are proven to be greater than allowable by any condition based performance indicators that form part of approved extraction" (Gujarat NRE, 2013). TEC rejects this as a viable option for addressing environmental damage. It is unclear how 'proven' impacts greater than those allowed in conditions of consent will be defined. It is also unclear how impacts to streams could be offset in ways that would satisfy any 'equivalency' test under offsetting rules. Furthermore, biodiversity offsets should not be used as a substitute for avoiding impacts. Impacts to swamps can easily be avoided by not mining beneath them.

Water quality

Subsidence impacts from longwall mining invariably lead to a decline in surface water quality in cases where riverbed cracking occurs. According to the NSW Scientific Committee (2005) these impacts may include the contamination of groundwater by acid drainage, increased sedimentation, increased rates of erosion with associated turbidity impacts, and a deterioration of quality due to a reduction in dissolved oxygen, increased salinity, iron oxides, manganese, and electrical conductivity.

Subsidence cracking of a swamp, creek or riverbed leads to the mixing of surface water with subsurface water. This may alter the chemical properties of both the surface water and precipitate changes to an ecosystem (DOP, 2008). Iron precipitate and iron oxidising bacteria are a commonplace event and a good initial indicator of damage in rivers where surface cracking has occurred (DOP, 2008). These bacteria are extremely common in Hawkesbury Sandstone areas, where seepage through the rock is often rich in iron compounds and are able to grow in water lacking dissolved oxygen.

Where the bacteria grow as thick mats, as is currently the case in the Upper Cataract River and the Waratah Rivulet, they reduce interstitial habitat, clog streams and reduce available food. Loss of native plants and animals may occur directly via iron toxicity, or indirectly via smothering. Long-term studies in the United States indicate that reductions in diversity and abundance of aquatic invertebrates occur in streams in the vicinity of longwall mining and these effects may still be evident years after mining.

Inspections of the early impacts of mining on the Upper Cataract River and the Waratah Rivulet have shown that a sizeable area of river within the subsidence zone is subject to gas emissions. Gasses released to the surface are most likely to come from an area of strata not connected with mine workings, but it is not unknown for gasses to emanate from the workings themselves. These may include methane, carbon dioxide and other gases. These emissions have been known to result in localised plant death as anaerobic conditions are created within the soil. They may also be flammable and may present a fire hazard.

In the case of the Lower Cataract River, water that did reappear downstream was deoxygenated, heavily contaminated with iron deposits and no aquatic life was found in these areas. In this case too, mining resulted in gas releases, fish kills, iron bacteria mats, the deterioration of water quality and instream habitat. Dead vegetation on the banks of the river is likely to be connected to the generation of anoxic conditions in the soil as the migrating gas is oxidised. Over ten years after mining impacts occurred, water in the Cataract River remains tainted by an orange stain and flammable gas continues to be released.

Previous mine workings have resulted in cracking, iron precipitation and cloudy water in Lizard and Wallandoola creeks with impacts evident several years post mining (SCA, 2013). Predicted bed cracking in Lizard, Cataract and Wallandoola creeks creates the potential for further acidification and iron precipitation (SCA, 2013).

Groundwater impacts

The scientific knowledge of the hydrology of the Woronora Plateau is limited. Subsidence cracking on the surface and fracturing below the surface is likely to have a major impact on the porosity of the strata and direct water flows further into the ground.

This has an immediate impact upon the ability of rivers, streams and upland swamps to hold water.

It is known that subsurface water on the Woronora Plateau can move laterally for long distances (SCA, 2008). On TEC's visit to Waratah Rivulet in 2007 it was noted that some areas where water naturally seeped from the valley sides had ceased to flow, indicating that perched groundwater lenses have probably been fractured. These and groundwater storages under hills and ridges are known to help sustain flows during dry periods (SCA, 2008).

The lack of scientific knowledge regarding groundwater in the Woronora Plateau and uncertainties reading subsidence effects of multi-seam mining have resulted in simplifications and assumptions being made in modeling used to predict groundwater impacts (Golder Associates, 2010). These include basing the model on only 10 years of climate data and inadequate groundwater monitoring and failure to consider the cumulative impacts of previous mining or the presence of faults and dykes (SCA, 2013).

There can thus be little confidence in the accuracy of these predictions which should be regarded as optimistic 'best case' scenarios. TEC endorses the view of the Office of Environment and Heritage that *it is the responsibility of the Proponent to provide necessary data upon which major decisions about impacts to groundwater resources, and their interaction with environmental values, are to be made* (OEH, 2013). In view of the deficiencies of the groundwater modeling TEC believes that the proposed NRE No.1 expansion should be refused as it is not possible to accurately assess its environmental impact.

The PPR discusses revised modeling to address deficiencies with the modeling data presented in the environmental assessment. It is noted that this revised modeling is incomplete and that there are no outcomes to report on (Gujarat NRE, 2013). In view of this TEC does not see how the impacts of the preferred project can be properly assessed. Nor is it possible to assess the adequacy of this revised modeling to determine if the flaws in the environmental assessment have been addressed.

Even on the basis of this inadequate modeling it is clear that the proposed expansion of NRE No.1 colliery would result in serious adverse impacts. This applies both to the Wonga East domain (covered by the PPR) and the Wonga West domain (to be covered by a subsequent application). Groundwater drawdowns in the Wonga East and Wonga West domains are potentially greater than those measured over Dendrobium for the lower sandstone seams and coal measures (OEH, 2013). Drawdowns for the Hawkesbury Sandstone strata are potentially underestimated with a 7.6 m decline measured in the upper Hawkesbury Sandstone and up to 25 m decline for the lower Hawkesbury Sandstone over Dendrobium (OEH, 2013).

Uncertainties surrounding subsidence predictions

It is likely that the subsidence predictions included in the environmental assessment and PPR have severely underestimated the impacts of the proposed NRE No.1 Colliery expansion. Subsidence impacts of previous longwall mining on the Woronora Plateau have significantly exceeded predictions. Examples include Westcliff Colliery Longwall 34 (exceeded predictions by 10%), Tahmoor Colliery Longwall 24A (exceeded predictions by 290%) and Tahmoor Colliery Longwall 26 (exceeded predictions by 100%) (Pells Consulting, 2011).

Concerns regarding the accuracy of subsidence predictions for the proposed NRE No.1 colliery expansion are underlined by the fact that impacts of Longwalls 4 and 5 were severely underestimated (DPI, 2013). Measured subsidence and tilt over Longwall 4 substantially exceeded predictions (OEH, 2013). In October 2012 measured subsidence over longwall 4 had exceeded predictions by 0.48 metres or 34.8% (SOWCA, 2013). Serious concerns have been raised by several NSW Government agencies reading the accuracy of methodology used to predict subsidence in the environmental assessment. We note that the Seedsman visualization method used in the environmental assessment is untested and has not been validated, particularly for multi-seam mining (OEH, 2013). We note also that subsidence from longwalls in Wonga East (the area covered by the PPR) is considered to have been underestimated (DRE, 2013).

The PPR makes much of the fact that subsidence data from Longwalls 4 and 5 provide valuable data for informing subsidence impacts throughout the Preferred Project area (Gujarat NRE, 2013). It should be clear from Longwalls 4 and 5 that accurate assessment of subsidence impacts is extremely difficult. The predictions contained in the PPR and environmental assessment should thus be viewed as optimistic ‘best case’ scenarios.

TEC supports the recommendation made to the major project assessment, that given this level of uncertainty, the 20mm subsidence impact zone should be assumed to be no closer than defined by the 35 degree angle of draw boundary accepted for the Southern Coalfields (SOWCA, 2013). These parameters generate the following subsidence impact zone predictions:

- **Area 1** comprises three, 105m wide panels with 40m wide pillars with a depth of cover to the Wongawilli seam of approximately 237m to 255m. The 35 degree angle of draw defined subsidence impact zone on the surface would extend up to **180 metres** from the longwalls.

- **Area 2** comprises eight panels 145 to 150m wide with 60m wide pillars with a

depth of cover to the Wongawilli seam of approximately 267m to 320m. The 35 degree angle of draw defined subsidence impact zone on the surface would extend up to **220 metres** from the longwalls.

- **Area 3** comprises five panels with panels 390m wide and separated by 65m and depth of cover to the Wongawilli Seam ranges from approximately 455m to 510m. The 35 degree angle of draw defined subsidence impact zone on the surface would extend up to **360 metres** from the longwalls.

- **Area 4** comprises two panels each 155m wide with 65m pillars with depth of cover to the Wongawilli seam ranges from approximately 460 to 495m. The 35 degree angle of draw defined subsidence impact zone on the surface would extend up to **350 metres** from the longwalls.

(SOWCA, 2013).

Subsidence predictions are further complicated by the potential for faults in the mining area to exacerbate impacts (OEH, 2013). We note that the environmental assessment does not adequately document the presence of faults, joint swarms and igneous intrusions or their potential to interact with mining activities (Pells Consulting, 2011; OEH, 2013).

A further source of uncertainty in relation to subsidence impacts is the assumption that the Bald Hill Claystone will act as an aquitard to reduce the loss of surface waters (Geoterra, 2012). However, the hydraulic capacity of the Bald Hill Claystone is higher than the either the Hawkesbury Sandstone above or Bulgo Sandstone below (Geoterra, 2012; SOWCA, 2013). The assumption that Bald Hill Claystone will limit loss of surface waters is thus flawed and should not be relied upon.

TEC notes that longwall layouts in the Wonga East domain have been modified in the PPR, however, there still remains the probability of considerable subsidence impacts and uncertainty regarding the accuracy of subsidence predictions. We note that while Longwall 7 has been narrowed from 150 m to 131m and Longwall 8 deleted, Longwalls 1,2, 3 and 6 have been increased in width to 150 m and Longwalls 9,10 and 11 are unchanged at 150 m (Gujarat NRE, 2013).

Impacts of the Preferred Project should also be considered in conjunction with proposed Wonga West longwalls which will be the subject of a separate application.

Multi-seam longwall mining previously mined areas.

Uncertainties regarding subsidence impacts are magnified by proposed multi-seam longwall mining and longwall extraction in areas with previous bord and pillar mining. A key concern is the fact that it is impossible to accurately predict subsidence caused by multi-seam mining , particularly where pillar extraction has been performed by hand-mining techniques as is the case with the Bulli Seam(DRE, 2013). We note that the environmental assessment has been criticised for giving inadequate attention to the increased risk of non-conventional subsidence and irregular subsidence profiles which may concentrate surface deformations and impacts (DRE, 2013). There is also insufficient assessment of the risk of pillar runs and re-working of old Bulli Pillar Workings beyond normal mine subsidence limits (DRE, 2013).

It is also important to note that subsidence from multiple-seam mining will be more severe and complex than is the case with single seam extraction. Subsidence will be an accumulation of each seam subsidence (OEH, 2013).

Widest longwall panels in the southern coalfield

While not part of the PPR the proposed longwalls in the Wonga West domain should not be excluded from consideration as these will be subject of a subsequent application (Gujarat NRE, 2013). The Preferred Project should thus be considered as part of the overall NRE No 1. expansion and assessed in that light. The proposed 390 metre longwall panels proposed for the Wonga West area will be the widest longwall panels used in the southern coalfields and will occur under previously mined seams (OEH, 2013). Subsidence impacts are directly related to longwall panel width. With increasing panel width, the roof has a greater depth to fall before ‘doming out’ (DOP, 2008). The proposed 390 metre wide panels (under previous workings) are thus likely to result in subsidence impacts worse than those previously experienced in the Southern Coalfields.

The Seedsman assessment (Seedsman Geotechnics, 2012) states that the *Bulgo sandstone is known to be a spanning unit over Bulli Seam longwall panels with widths of at least 200m to 250m*. There is no assessment of the capacity of the overburden to support 390 metre wide panels (IRRM, 2013; SOWCA, 2013). It cannot be assumed that the overburden is capable of supporting 390 metre wide longwall panels, particularly where they occur beneath previous workings. The collapsed zone encompassing the caved zone and fractured zone from longwall extraction can be expected to extend between 1 and 1.5 times the width of the panel (DOP, 2008; IRRM,

2013) in the absence of overburden failure. The 390 metre panels can thus be expected to have a collapsed zone of at least 390-585 metres wide where the depth of cover ranges from 455 metres to 510 metres (IRRA, 2013; SOWCA, 2013). In the event of failure of the Bulgo sandstone overburden the height of the collapsed zone will be even greater (IRRM, 2013).

The likely impacts of subsidence from 390 metre wide panels and multi-seam mining have significant implications for groundwater flows, swamps and streams. The closer the collapsed zone is to the surface, even if the facture zone is disconnected, the greater the rate of groundwater drawdown and loss of surface waters (IRRM, 2013; SOWCA, 2013).

In view of the high level of uncertainty surrounding subsidence predictions TEC does not believe that there is sufficient information on which to base an approval of the proposed GRE No.1 Colliery expansion in either its original form or as proposed in the PPR. The predicted impacts of the Preferred Project and the overall Underground Expansion Project (while almost certainly understating the true impacts that would occur if mining proceeds) would represent unacceptable damage and warrant refusal of the application.

Cumulative impacts

The impacts of the proposed NRE No. 1 expansion should not be considered in isolation. They should be assessed in the light of the impacts previous, current and already future mining operations on the Woronora Plateau. Given the extensive damage that has occurred to streams and swamps in the region, further damage should be considered unacceptable. In our submission to the Southern Coalfields Inquiry TEC provided details of damage that had already occurred in the region (TEC, 2007). We again provide this information, along with examples of damage documented since 2007, so that the proposed NRE No.1 Colliery expansion may be placed in the context of its impacts on the wider conservation significance of the Woronora Plateau.

Coastal upland swamps

The first upland swamp observed to have suffered damage potentially related to mine subsidence was Drillhole Swamp on Flying Fox Creek in the Avon catchment. Drillhole Swamp was subjected to mining disturbance in the 1960s when pillar extraction took place below the swamp, and again in the 1970s through longwall mining. Cracking of

the bedrock of Flying Fox Creek was discovered in 1971, presumably as a result of pillar extraction mining (Tomkins & Humpheries, 2006; DOP, 2008). The damage was investigated as part of the Reynolds Inquiry (Reynolds, 1977), however the methods of investigation caused damage to the swamp themselves (Tomkins & Humpheries, 2006). Major erosion of the swamp took place in 1978 as the result of a severe storm (Tomkins & Humpheries, 2006).

Swamp18 is situated on Native Dog Creek, also in the headwaters of the Avon catchment. Mining at Illawarra Coal's Elouera Colliery passed under the swamp between 1995 and 1997. The ensuing subsidence cracked Native Dog Creek and a study commissioned by BHPB in 2001 recorded a fracture down the left margin of the swamp (Tomkins & Humpheries, 2006). It is now known that the swamp been had dewatered by 2001, after longwall mining had taken place and before the fierce wildfires of 2001/02. A major erosion gully appeared in the swamp in 2002 (Tomkins & Humpheries, 2006). Geophysical studies conducted in 2003 found that a complex series of fractures along the swamp's main drainage line had led to the dewatering and that another swamp that was, similarly burnt but not subject to longwall mining and fracturing, remained uneroded (Tomkins & Humpheries, 2006).

Longwall mining under Flat Rock Swamp in the Woronora catchment commenced in 2002 and continued to 2005. Although an erosion event had been occurring at the southernmost end of the swamp since the early 1990s, it was not until September 2004 that the SCA's Senior Environmental Scientist described the whole swamp as "totally compromised" (TEC, 2007). Erosion was first detected at the northern end of the swamp in 2002 and substantially increased during a period that coincided with the extraction of longwall panels and the wildfires of 2001/02. The "collapse" and "failure" of Flat Rock Swamp, the recharge point for the Waratah Rivulet, has potentially serious consequences for water quality, quantity and aquatic ecosystems in the Woronora Special Area.

The drying of swamps also reduces their effectiveness as natural fire breaks (Tomkins & Humpheries, 2006; NSW Scientific Committee, 2012). This potential impact could be most severe in areas such as Wongawilli Creek where Dendrobium Area 3 has recently undermined with a loss of surface water and early impacts to swamps observed and where there is one of the higher concentrations of upland swamps on the Woronora Plateau.

Swamp 1 in Dendrobium Area 2 suffered a reduction in groundwater levels, surface fracturing and changes in species composition following longwall mining (Biosis, 2011; Biosis, 2012; SOWCA, 2013). Following the recent extraction of Longwall 7A in Dendrobium Area 3A, piezometers within swamps 12, 15a, 15b and 16 have indicated impacts to swamps 12, 15b and 16 (SOWCA, 2013). Following the passage of Longwall 8 cracking was detected in swamp 15b and a level 2 Trigger Action Response Plan was triggered (SOWCA, 2013)

Dendrobium Area 3 lies in an area containing more upland swamps than other previously mined locations. This operation carries the serious potential of impacting

upon water yields and quality in the Pheasants Nest, Cordeaux and Upper Nepean catchments given the natural role upland swamps play as filters and regulators of flow.

Subsidence induced changes to hydrology have been detected to swamps 16, 17 and 20 in the Woronora Special Area following extraction of Longwalls 20 and 21of the Metropolitan Colliery (SOWCA, 2013).

Rivers and streams

Cataract River

Nine longwall panels from (the then) Tower Colliery were mined directly under the Lower Cataract from 1988 to 2000 close to Douglas Park and outside of the Special Areas. Local residents began to report damage to the river in 1994. Water had drained away, hundreds of cracks in the riverbed were revealed, as were the skeletons of fish up to 1m in length. From 1996 onwards, large amounts of methane gas began venting in spots in the riverbed and can still be observed. At its height, sections of the river appeared to be boiling and the gas could be set alight.

The dam wall of Broughtons Pass Weir, controlling 20% of Sydney's water supply, was also cracked in four places and leaked across its face. A pump house adjoining the weir was also damaged. The Nepean Tunnel and the Upper Canal were cracked and the extent of water loss was unknown. In its submission to the Dendrobium Commission of Inquiry in 2001, the (then) NSW Department of Land and Water Conservation (DLWC) estimated that the Cataract River had lost 50% of its flow down cracks.

According to a 2004 report by the Department of Infrastructure, Planning & Natural Resources' Hawkesbury-Nepean River Management Forum, (DIPNR, 2004) "Investigations confirmed that the loss of water was primarily attributable to long-wall mining. BHP Billiton (BHPB) undertook rehabilitation by grouting the cracked streambed at key sites to reduce the loss of water". However, the current environmental flow releases of 1.7 ML/day in the Cataract River released from Broughtons Pass Weir are not enough to keep the river flowing or to maintain acceptable water quality.

In September 2006 the NSW Department of Primary Industries (DPI) approved the Appin 3 Subsidence Management Plan (SMP) by BHPB's Illawarra Coal. The approved mine plans saw three longwall panels come within 60m of the Upper Cataract River. Minutes of the SMP Interagency Review Committee (IAC) meeting held on August 2nd 2006 (SMP Interagency Review Committee, 2006) revealed that an independent consultant engaged by the SCA recommended that mining come no closer than 350m to the Cataract River. Reported damage involved two rockfalls, cracking, iron oxide staining and gas emissions on the surface of the river. Cracking was visible below the

surface and gas seen coming to the surface in over twenty places.

Damage has also occurred to Lizard and Wallandoola creeks as a result of previous mining activities (OEH, 2013) As discussed above the proposed NRE No.1 Colliery expansion will result in further damage to the these streams and the Cataract River.

Upper Georges River

Surface cracking of the riverbed in the upper reaches of the Georges River, near Appin, has occurred due to longwall mining subsidence. The cracking resulted in loss of river water and consequently the loss of instream habitats, instream biota and degraded water quality. Changes to local groundwater movement also occurred, as acknowledged by Primary Industries Minister Ian Macdonald in 2003.

The Upper Georges River catchment is affected by mining at both the Appin and West Cliff Collieries operated by Illawarra Coal. In 2000 Jutts Crossing on the Georges River at Appin cracked and rock pools drained entirely. Further cracking to the River was reported in 2001. In 2002 Marhnyes Hole, a popular swimming hole near Appin, cracked and water disappeared. Rock fall collapses forced the temporary closure of the swimming hole to the public on safety grounds.

Stokes Creek, a smaller tributary of the Upper Georges River, was undermined between 1990 and 1999. Surveys in 2004 identified substantial areas where water levels had dropped considerably as well as ongoing problems with the leaching of oxides. No such drops in water level were observed in areas that had not been undermined.

Through licences issued by the Department of Environment and Climate Change (DECC), Illawarra Coal is permitted to discharge polluted water, high in pH and salinity, primarily over the Brennans Creek Dam Spillway. Part of Brennans Creek was redirected to allow for modified drainage resulting from the coal waste emplacement area for Appin, West Cliff and Dendrobium mines.

West Cliff Colliery's current SMP approval covers three longwall panels that will have impacts on the Georges River to the north of the Appin township. One panel extends right up to the river while the other two will come within 30m of the watercourse. The minutes of the IAC meeting from August 2nd 2006 contain a statement that the impacts of mining so close to the river will be the same as mining beneath it.

Illawarra Coal contends that drainage of pools to the south of the current mining area did not occur as a result of previous mining works. However, according to the IAC minutes, the DPI "does not believe the company claims."

In 2001 the Healthy Rivers Commission noted that, "Downstream of Appin, the Georges River flows through spectacular sandstone gorges that have environmental, tourism and

aboriginal heritage values, all of which may be threatened by mining if adequate controls are not enforced" (HRC, 2001)

Bargo River

Longwall damage to the Bargo River in 1994 was among the first to be reported in the Southern Coalfields. In 2002 a 2km section of the Bargo River near Tahmoor was reported as being completely dry and large cracks were found in the riverbed. This occurred in the vicinity of longwall panels 14-19. While monitoring did not commence until after this incident, results indicated flow losses of between 0.5ML/day to 2ML/day at different points.

The Tahmoor Colliery, owned by Centennial Coal, is pumping an average of 5 tonnes of salt per day from its workings into the river.

The current series of longwalls come within 230m of cliff lines along the Bargo River. The section of the River affected by longwall mining is listed as an Indicative Place on the Register of the National Estate.

The Bargo River catchment is one of the Macarthur Region's most significant natural and cultural features, and one of the few substantial bushland areas around Sydney that is not protected in a National Park or Metropolitan Catchment Area (National Parks Association, 1999).

Upper Nepean River

Illawarra Coal's Douglas Area 7 Project was approved without modification in November 2006. The project brings longwall panels within 180m and on both banks of the Nepean River. The Nepean River has a sandy riverbed, which will make the detection of fracturing and the implementation of remediation works difficult. Future mine plans would see this series of longwalls continue to move northwards along the western side of the Nepean River.

Waratah Rivulet

The Waratah Rivulet is located just to the west of Helensburgh and flows into the Woronora Dam from the south. Along with its tributaries, it makes up about 29% of the Dam catchment. The Dam provides drinking water to both the Sutherland Shire and the northern suburbs of Wollongong. The entire rivulet lies within the Woronora Special Area and is managed by the SCA.

Peabody Energy's Metropolitan Colliery mines coal from under the Woronora Special Area. The mine is one of Australia's oldest coal mines but longwall mining has only been taking place since 1995. The area currently being mined is upstream of the Woronora Dam and was described in the 1999 Healthy Rivers Commission's Independent Inquiry into the Woronora River System as being in 'largely pristine' condition (HRC, 1999).

Longwall mining has been listed as a key threatening process in NSW (NSW Scientific Committee, 2005). The Waratah Rivulet was listed in the declaration along with numerous other rivers, creeks, swamps and aquifers as being damaged by this form of underground coal mining. In September 2006 it was alleged serious damage, an addition to the impacts already on the public record, had taken place. Inspections in November 2006 discovered the Waratah Rivulet was dry for much of its length in the area affected by mining subsidence. Similar waterways at a similar elevation in the area, such as Heathcote Creek were flowing healthily at the time.

The sandstone streambed had suffered extensive cracking typical of longwall damage throughout the Southern Coalfield. SCA officers indicated that at one series of pools, water levels had dropped about 3m. There was also anecdotal evidence suggesting the Rivulet has ceased to flow over places never known to have stopped previously.

The watercourse above the longwall panels has tilted to the east as a result of mining subsidence. Rock ledges that were once level are now sloped. Iron oxide stains in the streambed typically associated with longwall damage are present. The SCA also stated that they did not know whether water flows were returning further downstream – as claimed by Peabody Energy, the DPI and the then Minister Macdonald. There was also evidence of failed attempts at remediation with a distinctly different coloured sand having washed out of cracks to sit on the dry riverbed or in pools.

Flat Rock Swamp, an upland swamp at the southernmost extremity of the longwall panels, was also undermined. It is the main source of water recharge, or the feeder swamp, for the Waratah Rivulet. The swamp was visibly unhealthy with a severe erosion event having taken place on the eastern side and large amounts of organic matter having been dislodged.

Further damage has occurred to the Rivulet under the current approval.

Creeks in the Avon and Cordeaux Dam catchments

The NSW Scientific Committee's key threatening process declaration (NSW Scientific Committee, 2005) states that these creeks have all suffered from subsidence-induced cracking within the streambed, followed by significant dewatering of permanent pools and in some cases complete absence of surface flow. In the case of Wongawilli Creek, upland swamps were drained and pollution also occurred downstream. All are located in Special Areas feeding the Avon and Cordeaux Dams.

Cracking and loss of flow in the upper reaches of Wongawilli Creek and Native Dog Creeks, impacted upon by BHPB's Elouera Mine, was confirmed in 2001. Cracks occurred up to 500 metres from mining activity. Water quality impacts included high levels of zinc, nickel, aluminium and lowered pH.

Ongoing mining in Dendrobium Area 3 continues to impact these catchments.

Conclusion

The proposed expansion of Gujarat NRE No.1 Colliery presents a major threat to the environmental values of the Woronora Plateau. There is clear evidence that the impacts predicted in the environmental assessment (ERM, 2013) represent optimistic 'best case' scenarios. Serious flaws have been identified with the methodology used to predict subsidence impacts on upland swamps, rivers and streams, aquifers and threatened species. Uncertainties surrounding the nature and extent of subsidence impacts are heightened by proposed multi-seam mining and longwall mining under previous bord and pillar workings. Due to these inadequacies in the environmental assessment and the difficulty of accurately determining the impacts of multi-seam mining and longwall mining under previous bord and pillar workings, there is no basis on which the application can be approved.

The PPR does not adequately address these concerns. The predicted impacts of mining in the Wonga East domain alone represent unacceptable damage to streams, upland swamps and aquifers and warrant refusal of the application, even if considered in isolation. Furthermore, these impacts should not be assessed in isolation of those likely to result from those that would be caused by mining in the Wonga West domain (to be the subject of a separate application). Dividing the Underground Expansion Project into smaller components should not be allowed to disguise the very serious impacts of the combined proposals.

When considered in the light of previous damage resulting from mining activities on the Woronora Plateau, the impacts of the proposed NRE No.1 Colliery expansion are even more disturbing. Given the extensive damage that has occurred to streams and swamps in the region, any further damage should be considered unacceptable.

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