

East End Mine Action Group (Inc)
(EEMAG INC)
East End, Mt Larcom. Q. 4695

14 December 2010

**SUBMISSION TO SENATE INQUIRY INTO
THE MANAGEMENT OF THE MURRAY-DARLING
BASIN**

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14 December 2010

The Committee Secretary
 Senate Standing Committee on Rural Affairs and Transport
 PO Box 6100
 Parliament House
 CANBERRA ACT 2600

Dear Sir / Madam,

Thank you for accepting our submission to the Senate Inquiry into the Management of the Murray-Darling Basin (MDB), and the development and implementation of the Basin Plan.

Our submission is relevant to item (e) "*mining and gas extraction on the aquifer*" in the Terms of Reference.

INTRODUCTION – EVIDENCE THAT SCOPE EXISTS FOR MINING AND GAS EXTRACTION TO AVOID COMPLIANCE WITH WATER ACT 2007 BY WAY OF INACCURATE SCIENCE AND INADEQUATE ENVIRONMENTAL APPROVALS THAT DO NOT RECOGNISE FULL EXTENT OF IMPACTS

Various media reports raising concerns about the accuracy of MDBP science and about the real intent of the process motivated EEMAG to lodge this submission. An article in the North West Magazine (NSW) October 25, 2010, Front Page, headed MDBP: 'The real plan exposed', quotes an interview with Member for Barwon, Kevin Humphries where he stated: "Having attended the Narrabri and Moree forums I found some of the ambit claims, deceptive mapping and false science behind the MDBP absolutely outrageous" Page 2 states "unless there is a very, very large flood the Gwydir is not capable of spilling into the Barwon/Darling system, nor does the Gingham. Yet alarmingly, Mr Humphries said both these water courses were illustrated in the Guide as directly connecting to the Barwon River. Having attended meetings now in the south and the north of the state it is clear these people do not know our catchment systems"

The views in the above statement mirror EEMAG's 15 year experience with Department of Environment and Resource Management / East End mine hydrologists misclassifying the karst limestone aquifer system intercepted by the East End limestone mine as Darcian flow when assessing mine impacts, and the powerlessness of landholders and their representative experts to influence change when the science is demonstrably wrong.

"Significant project" status permits the Queensland Government to override normal administrative processes (i.e. an Environmental Impact Statement (EIS) may NOT be required under 26(1)(b) of the State Development & Public Works Organisation Act 1971 although the Coordinator-General must be satisfied that appropriate environmental assessments will be carried out). Public Objections are not allowed. Given our experiences under regulation of a covert "minimum compliance" strategy for a Special Agreement Act mine we can only conclude that "significant project" status with environmental assessments under that regime are designed to facilitate political decisions where public interest overrides the private right.

There is copious evidence, gleaned from our experiences and from FOI, that scope exists for environmental approvals/regulatory processes for mining/coal seam gas projects in the Murray-Darling Basin (in Queensland) to circumvent compliance with the Water Act 2007. A false and misleading Hydrology Report in the QCL's 1996 Gladstone Expansion IAS facilitated a pre-determined commitment to unchanged environmental approvals for the East End mine's expansion, and exempts key aspects of mine dewatering from Queensland's Environmental Protection Act 1994, the Water Act 2000 (Water Reform objectives) etc. The East End Mine's Environmental Authority amounts to a license to dewater the aquifer system without regard to environmental sustainability since it does not include recognition of the mine's extensive off-lease depletion zone, assessed by DNR&W in 2008 as affecting approx 50 sq km.

The East End mine was a Special Agreement Act mine and has the benefit of a "minimum compliance strategy" as documented in Doctoral Thesis "Industry/Community Relationships in Critical Industrial Developments" (Hoppe 2005). (Relevant Extracts quoted on P.17) This is one of a number of Special Agreement Act mines. Re: one of the other mines see Queensland Hansard 13-15 May 2008, Page 1792, states: "The Mount Isa Mines Limited Agreement Act 1985 facilitated a lower standard for lead emissions than that applicable to other parts of the state."

EEMAG members appeal to the Senate Inquiry to consider our evidence and to recommend;

- (a) the development and implementation of processes to close loopholes that may permit mining and coal seam gas dewatering etc to be exempt from the Water Act 2007 or other applicable legislation, and for current operations to be brought into compliance, the same as the intent for farming enterprises.
- (b) the development and implementation of an independent and affordable appeal on the merits under the Water Act 2007 that incorporates the empirical local knowledge of landholders acquired in their day to day management of the land and its resources, so as to protect the equity/ water supplies of landholders and provide an effective dispute resolution process.

It is inconsistent with the declared objective of conserving water supplies for the Water Act 2007 to permit loophole(s) that may allow mine/CSG exemptions for dewatering while facilitating enforcement standards on farming enterprises. We find it disconcerting that there is no provision for appeals on the merits for any of the Water Reforms agreements, leaving farmers totally vulnerable to having their interests traded-off as an involuntary subsidy to benefit others through political / administrative decisions.

Appeals processes are available for the Australian Tax Office, Department of Immigration and for the Australian Competition and Consumer Commission etc.

We would hope that if Mining and Gas Extraction was brought into proper compliance with the Water Act 2007, and a process to ensure integrity of the science and affordable Administrative Justice for landholders established, that these reforms would flow into administration of Water Reform and the National Water Initiative etc.

Examples of why these reforms are needed are listed below in our summary and thereafter on an issue by issue basis.

SUMMARY – NEED FOR PROCESS TO CLOSE LOOPHOLES THAT MAY PERMIT EXEMPTION FOR MINING / GAS AND FOR AN AFFORDABLE APPEAL ON THE MERITS TO SAFEGUARD LANDHOLDERS' INTERESTS

The East End Mine Action Group Inc (EEMAG), Mt Larcom Queensland, has been in dispute with Queensland Government, its Regulating Agencies and the East End mine for 15 years. The original grant of leases in 1976 and Franchise Act of 1977 for the Special Agreement Act mine set a covert “*minimum compliance strategy” (*Hoppe 2005) for the operation of the mine and minimum compliance arrangements have remained in place ever since. In 1996 the East End Mine conducted an IAS for a \$220 M expansion that included a railway connection to the mine, new kiln at Fisherman’s Landing near Gladstone and trebling of mine production. FOI shows Cabinet reinforced the original benchmark arrangements by entering into an incentive package that included project approvals with environmental conditions unchanged. NO public objections against the mine expansion were permitted. Project approvals proceeded without (a) a proper appraisal of the mine’s existing impacts and (b) public objections against impacts caused by the mine’s trebling of production.

- “*Minimum compliance” amounts to adversely affected landholders and the environment having to subsidise the East End mine under administration of mining regulation and Water Reform/NWI - contrary to the objectives of National Competition Policy.

EEMAG has come to implicitly understand how these arrangements bind the Regulating Agencies to Cabinet’s policy decision while disadvantaging the affected community and abandoning the general environmental duty. Bound by Cabinet’s decisions the Regulating Agencies act to defend their old decisions and adjust both the science and environmental assessments so that the company remains in compliance via an empty and meaningless Environmental Authority. We have explored and challenged these processes through the various administrative channels including the Ombudsman, the Crime & Misconduct Commission, HREOC etc. In every instance, these Government Instrumentalities invoked escape clauses so that we were left without recourse to justice or a remedy.

The East End Mine is not in breach of its EA but *is* in breach of the EPAct itself, through causing off-lease, Serious Environmental Harm that is actively condoned by DERM’s abandonment of their environmental charter obligations. The definition of Serious Environmental Harm is damage in excess of \$50,000. Note: The Land Court in February 2002 reduced unimproved primary industry classification land values within the 33 sq km mine pit zone of influence (as determined by the mine’s modelling consultant in 2000) by 25%.due to water loss.

At Easter 2010, EEMAG resorted to website www.eemag.net to expose how we have been / are being treated. We hoped public exposure coupled with attaching ourselves to the coal seam gas debate would shame the Government into restoring equitable and accountable administrative processes with unfettered public objections before the Land Court for the East End Mine’s current EIS and mining lease application 80156, lodged in 2008.

The EIS is being conducted under EP Act 1994 legislation and EEMAG have received written advice of DERM’s intention to issue a draft amendment to the mine’s environmental authority. Under State 2004 legislation, section 251 (4) of the EP Act 1994 restricts public

objections to just the amendment (for the new lease), thus leaving intact the original component of a highly defective environmental authority (framed on the basis that dewatering impacts have not migrated off-lease) that is unrepresentative of the mine's impacts - i.e. there will NOT be unfettered public objections before the Land Court under the EIS since objections against the inadequacies of the original EA are forbidden by Section 251(4) of the EP Act.

Rather than having shamed the Government into a more accountable approach we interpret that the way the East End mine is regulated appears to have become the blueprint for how Queensland intends to treat the vast area of water resources and the numerous farmers likely to be affected by the emerging coal seam gas industry – i.e. exempt from Water Reform and NWI Objectives!

EPA advised EEMAG on numerous occasions that East End mine dewatering impacts are managed under the Special Conditions under the Mineral Resources Act. The MR Act of course has no jurisdiction over the neglected environmental issues and treats water as waste. The zone of depletion on which entitlement to alternative water supplies is regulated (33 sq km in 2000 to 2008) has been disputed by EEMAG and its experts since 1995 on the basis of being understated.

Comments that Queensland intends to promote provision of “make good” water supplies to manage mine / CSG dewatering impacts is consistent with our experience, and that prospect is alarming. Widespread concern has been expressed that there appears to be little political will to protect water quality.

EEMAG's experience is that the East End Mine's Special “make good” Conditions are not worded nor effectively enforced so as to properly protect landholders' supplies. Shortcomings are detailed on Page 16. We interpret from a news item on the Country Life website dated 12 Dec 2010 “Water users must be protected” that the “make good” provisions under CSG are weaker than the Special Conditions for the East End mine.

- Alleged inaccuracy of the science: Departmental / East End mine hydrologists misclassify the karst limestone aquifer as Darcian flow – karst systems behave differently to Darcian flow and Darcian flow methodology is inappropriate for karst aquifers. Evidence shows that outdated, inaccurate hydrology and environmental assessments are being used to regulate the East End mine so as to comply with political decisions based on minimum compliance. Off-lease serious environmental harm caused by mine pit dewatering is made exempt from compliance with Queensland's EPAct 1994 and Water Act 2000 (Water Reform and the NWI) by the false circumstances on which the mine's Environmental Authority is framed. Calliope River Water Resources Plan (WRP) is coordinated with the mine's Environmental Authority. The area is unlicensed and the way the WRP is framed sanctions the re-allocation of the bulk of water resources accessible to affected landholders to the mine for dewatering and discharge as waste.
- We have no access to any process for appeal on the merits, no process to ensure administrative justice, nor for effective dispute resolution. The bias of the CEO of the Water Act 2000 is condoned under the Special “make good” Conditions attached to the mining leases. There is no avenue for an independent and affordable appeal on the merits under regulation of mine dewatering, NOR under administration of Water

Reform and NWI. Consultation processes we have participated in disempower landholders and disregard the views of EEMAG's internationally reputed limestone hydrologists. We have copious evidence in support of our grievances but no avenue where we can present them to pursue an effective remedy. Small landholders cannot compete with the legal power of mining companies.

It has taken EEMAG much of the duration of the dispute to interpret that the ongoing political / administrative intent for genuine reform of mining is only “*token and ineffective” (*Mt Larcom Community Restoration Project Report (2003) Prof Brian Roberts and others)

On being queried about the East End mine dispute Queensland Ministers, regulating personnel and East End mine representatives state that the mine is in compliance (with its Environmental Authority). They neglect to mention that the mine's Environmental Authority (by remaining fixed on the outdated and inaccurate 1996 IAS Report that dewatering impacts have migrated approx 500 metres from the mine pit – i.e. not off-lease) exempts the mine from proper compliance with World's Best Practice, the Environmental Protection Act 1994, the Public Interest (adverse effects on landholders), the Water Act 2000 etc. The East End mine is only in compliance through flawed environmental assessments that could not pass a valid objective test on the merit. Section 251 (4) of the Queensland's EP Act 1994 ensures these circumstances continue.

Our submission includes evidence that the Department of Environment and Resource Management (DERM) in 2010 ignored the content of THEIR OWN 1998 findings that discredited the 1996 IAS Hydrology Report – and thereafter, while in possession of these facts, DERM knowingly supported the retention of a grossly inadequate Environmental Authority for the East End mine, issued on the basis of the false and misleading 1996 IAS Hydrology Report.

DETAILS ON ISSUES

EVIDENCE OF USE OF INACCURATE SCIENCE BY GOVERNMENT REGULATORS.

EEMAG's dispute with DNR hydrologists and East End Mine Consultants regarding their evaluation of the limestone mine's cumulative depletion of the water table has been ongoing since 1995. Departmental and East End mine consultants misclassify the complex karst limestone aquifer system intercepted by the limestone mine as a Darcian flow system. It is recognised in Australia and Internationally that Darcian flow methodology is not valid for karst aquifers. Standard modelling assumptions and techniques are inappropriate for a karst limestone aquifer with conduit flows. Karst aquifer systems have interconnections between surface streams and groundwater, this interconnection is an important issue under NWI. The dispute about karst limestone is a key issue, with Departmental/East End mine reports alleged to overstate drought effects as well as other issues of dispute.

The technical findings of Department of Environment and Resource Management hydrologists etc are not able to be challenged, irrespective of their lack of merit. The absence of genuine checks and balances such as a merits appeal process leaves technical reports open to be shaped to fit political decisions with consequent glossing over of serious mining impacts.

We quote EEMAG Consultants' letters below as examples of their efforts to adopt the best available science, to illustrate the level of dissent with DNR&W's (now DERM's) findings, to highlight the inequities and lack of intent of the "consultation" process and regulatory system overall, and gain recognition on the need for reform so that technical processes are required to be full, frank and fearless as the first step in requiring an overused aquifer system to be returned to environmentally sustainable levels of extraction.

The qualifications of EEMAG's internationally recognised consultants are:

- David Ingle (Dingle) Smith, Emeritus Faculty, Australian National University, formerly Senior Fellow, Centre of Resource and Environmental Studies ANU, an eminent limestone hydrologist and geomorphologist, who has extensive karst aquifer experience that includes dye tracing.
- Associate Professor Brian Finlayson, Principal Fellow, Department of Resource Management and Geography, Graduate School of Land and Environment, The University of Melbourne, an eminent limestone hydrologist and geomorphologist; Even DNR&W has recognised that, within the consultative phase Brian Finlayson demonstrated knowledge, expertise and balance superior to that of any DNR&W participant.
- Consulting Engineering Geologist /Geotechnical Engineer Dr Peter James who has had a long-term involvement and is intimately familiar with the Mt Larcom hydrogeology.

In 2007 and 2008 DNR&W provided EEMAG with modest funding to facilitate the attendance and participation of David (Dingle) Smith, Brian Finlayson (travelling and attendance) and Peter James (travelling expenses only) at Technical Meetings at Bracewell with DNR&W hydrologists, EEMAG delegates, East End mine representative and community observers. Interestingly, the East End mine was not represented by a hydrologist. Unfortunately the benefits and opportunity for consensus and trust building were negated by DNR&W's ongoing refusal to empower EEMAG experts and delegates in decision-making.

The collective opinion of EEMAG experts is that the DNR&W approach to the science is conceptually flawed. A letter dated 21 September 2007, conjointly worded and signed by the three (3) above experts to the Minister for Natural Resources & Water raising concerns on the consultation process with DNR&W is quoted in full below. To my knowledge there has been no formal response other than acknowledgement of receipt of the letter. (An electronic copy of this letter is attached)

"Dear Sir,

East End Mine, Groundwater Issues

Having just completed a two day meeting with representatives of the DNR&W, discussing the above, we write to you to express a deep concern for the outcome.

The meeting of 13/14 September was held allegedly to achieve a consensus on the groundwater issues. However, assurances that the DNR&W was to act as an unbiased arbiter in this matter were negated by a lack of consideration given to dissenting evidence. Serious

scientific discussion was frequently brushed aside when well-reasoned arguments ran counter to the department's established view.

Based on more than a century of cumulative experience with geohydrology and karst aquifers, the undersigned have severe reservations about the department's conceptual plan and also its reliance on a groundwater contouring methodology that contains some basic interpretative flaws. Moreover, the department's adherence to analysis at a regional scale, based on Darcian principles, simply ignores conflicting evidence at a local scale.

Major environmental impacts on groundwater and surface streams have been apparent for a long time in the East End and Bracewell areas. The DNR&W unduly emphasizes the current drought as the only explanation for the impacts, at least for the latter area. This simplistic view again runs contrary to the weight of evidence.

Other investigative work done by the DNR&W up to this point has also been very limited in scope, considering the excellence of the monitoring program that has been established here. The bulk of the data obtained since 1977 have never been subject to rigorous analysis by the Department. Neither has the department attempted to incorporate into the conceptualization of aquifer behaviour much of the detailed knowledge and climatological data held by local landholders regarding, for instance, comparisons between the effects of the 1960s drought and that of the 1990s.

We understand that the content of the forthcoming departmental report lies entirely within the control of the DNR&W. We therefore express our concern that this report will not provide adequate balanced judgements nor logical conclusions and we wish to make it clear that our presence at the meeting in Mt Larcom on 13/14 September should not be taken as an endorsement of that report.

In summary, we would like to bring to your attention that, after more than a decade, the major environmental impacts still need to be resolved rationally and quantitatively and we would welcome your personal opinion in this respect.

Please find attached, for your information, brief notes on the qualifications and experience of the undersigned." End of quote.

- Despite the above letter, and despite further "consultations" at Mt Larcom on 5-7 March 2008 DNR&W's Nov 2008 Final Draft continues to treat the aquifer system as a simple Darcian flow aquifer and ignore that the complex bedrock geology and areas that exhibit significant karst development. Detailed explanations of this and other shortcomings in DNR&W's work have been repeatedly supplied to DNR&W (including to the Minister) in writing, and verbally during technical "consultation" discussions, to no avail. In recent months DNR&W have admitted that other than for the East End aquifer their experts have had no experience of karst aquifers. Comments by Brian Finlayson, extracts from Dingle Smith and Peter James on DNR&W's (now DERM's) November 2008 Draft are quoted below

COMMENTS BY BRIAN FINLAYSON DATED 28 DECEMBER 2008 ON DNR&W (2008) FINAL DRAFT (Supplied to DNR&W, copy to EEMAG) Quote;

“I have received a copy of the *Review of Groundwater in the Mt Larcom-Bracewell Area. Final Draft* by Bruce Pearce with an invitation to submit comments by January 16th, 2009. I will not be submitting detailed comments on this report and I elaborate more on this below. However, the timelines involved, confined to the Christmas-New Year period, are unrealistic. I will be away, first on holidays in January, and then working overseas until the end of March so even if I chose to comment in detail I would not be able to do this until April 2009.

I have perused this report and I see little point in now attempting yet another commentary on it. Any changes since the last version are only cosmetic and the basis and fundamental problems of this whole approach remain unchanged. Any information that has been provided in other reports or in comments and discussion on previous versions of this report that seriously challenge the methodological approach have simply been ignored.

The geological sequences surrounding the East End Mine are complex both lithologically and structurally yet the approach taken in this report is to ignore all those complexities and treat this material as a single unconfined Darcian aquifer. A major component of the lithology here is limestone (it is, after all, a limestone mine!) and we are being asked to accept that this limestone, which has been here for upwards of 300 million years, has not in all that time developed any of the usual features of limestone aquifers.

Included in this report is a chapter by Drew and Goldscheider from their book *Methods in Karst Hydrogeology* in which they summarise the methods that should be used in the investigation of the hydrogeology of karst aquifers. These two scientists are international leaders in this field yet no notice has been taken of their work in the investigation of this aquifer. Why has this chapter been included here? It should also be noted in this context that Dave Drew's PhD thesis on limestone hydrogeology was supervised by Dingle Smith whose opinions on this matter have also been sought, and ignored.

I could go on to elaborate many quirky inconsistencies in the present report but I will limit myself to just one. For some unknown reason, the limit of drawdown by the mine pumping has been taken to be the 40 metre contour and a series of maps based on this unsubstantiated assumption are given in Map 19. Note the map for June 2007. Elsewhere in this report it is stated that the drawdown by the mine is controlled by structural alignments that trend SE-NW yet here, in the June 2007 map only, there is a narrow band of drawdown heading directly east. I could go on in this vein.

The danger with this report, and others like it that have been produced in the past, is that because the groundwater contours have been drawn and the discussion centred around that view of this aquifer, other commentators get drawn into also discussing these contours and the patterns they show as if they are real. Another far more realistic view of this aquifer system could be constructed by carrying out the kinds of investigations advocated by Drew and Goldscheider (and thousands of other karst hydrogeologists.)

This report does not tell you how this aquifer behaves.” End of quote.

EXTRACTS FROM DAVID (DINGLE) SMITH'S COMMENTS DATED 11 JANUARY 2009 ON DNR&W (2008) FINAL DRAFT (Supplied by email to EEMAG, hard copied to DNR&W) Quote P.1 Para 4

“Groundwater in the Mt Larcom Bracewell Area

Throughout my association with EEMAG all of the many documents I have written, many of which have been sent to your Department, have stressed that the groundwater hydrology of the region concerned should be placed within the context of a karst aquifer. For many years the government and Cement Australia dismissed the possibility that karst effects were even a possibility, more recently they have acknowledged that there may be karst influences...”

DI Smith, Quote P.2, para 4

“The other aspect on which I would like to comment relates to the groundwater monitoring program set up prior to the commencement of mining. There are two aspects of this that are particularly disturbing.

1. The fact, now acknowledged, that after more than twenty years it is considered that the methods used for water quality sampling were such that the data are valueless. This is discussed on p.76, where it is reported that the procedures used did not meet Australian Standards and the data are unsuitable for any form of detailed analysis. That this state of affairs was allowed to continue without comment from your Department for so long does not reflect well on any of those concerned; ie. the Dept of Natural Resources & Water, Cement Australia and its consultants..
2. It is acknowledged in this and earlier reports that water budgeting is critical to the assessment of possible impacts of the mine on the local groundwater. The key measurement in such a budget is the assessment of quality and quantity of the water that seeps into, and is pumped out of the mine. This should be apparent even to those with no detailed acquaintance with limestone groundwater. There are no long-term reliable records for this, and as far as I can see the recommendations still do not require such observations to be made. On several occasions I have tried to obtain these data from the mine or its consultants and there are no long-term records available. I have mentioned this major shortcoming in reports stretching back to the mid-1990s. The current report acknowledges this deficiency, see for example p.105 ‘Water Balance Studies’, This reports that a reduction of assumptions by a factor of five enabled a ‘reasonable balance to be achieved’. This is certainly not acceptable science!

There are many other aspects of the report that I could comment upon but I will limit this submission to those concerning the need to consider karst influences on groundwater in the area and the quite appalling history of water quality observations and the recognition of the need to adequately monitor drainage into the mine. “ End of quote.

Please Note: Re DNR&W Report (2008), Page 76, Water Quality sampling: Under the original Special Conditions 1976-1997 the water monitoring program was “to be conducted in a professional manner”. DERM rejected 30 years of water quality testing i.e. approx 12,000 bore samples “because the samples were not properly purged and did not meet Australian standards.”. Despite this fiasco the sampling program under DERM’s supervision, continues unchanged!

DR PETER JAMES TO DNR&W DATED 5 JANUARY 2009; Quote from Page 5

“5 Response Summary

The few items discussed above are not in any way meant to be exhaustive, but are provided to demonstrate the manner in which the present draft report retains its technical errors, its misleading and/or biased statements, and its continued attempts to weave a veritable Gordian Knot of technical mistakes. This draft report is obviously intended to stand as the Department’s final word on the whole issue of groundwater depletion associated with the East End Mine operations.....

The response of this writer is that the draft report should be scrapped in its entirety, with the possible exceptions of some of the recommendations (p 107, 108). A completely new, comprehensive and objective report should then be initiated, utilising known geology, geohydrological characteristics and established geohydrological principles (including karst behaviour), together with historical aspects in their rightful context.” End of quote.

QUOTES FROM FOI RE: GOVERNMENT COMMITMENT TO APPROVE QCL’S 1996 EXPANSION OF THE EAST END MINE ON UNCHANGED ENVIRONMENTAL APPROVALS.

FOI of Queensland Cement Limited facsimile transmission to Co-ordinator General’s Office dated 14 June, 1995, Quote: “Subject QCL Gladstone Expansion : Critical Issues. Item 5. Obtaining some form of guarantee on mining lease renewals so as to assure QCL’s shareholder that there are adequate, secure, approved raw material reserves. Item 7. Guaranteeing the status quo remains with regard to environmental licenses on current operations.”

FOI of DME letter to the Managing Director of Queensland Cement Limited dated 8 August 1995, on Page 2 states: “As any expansion of operations would almost certainly require submission of a new Plan of Operations and possibly an EMOS variation, it would probably be advantageous to the company to amend the EMOS currently being considered by the Department and then to prepare a Plan of Operations (for the five years beginning 1 December 1995), such that both would address the proposed expanded mining activities.Renewal of the package of leases at the appropriate time will then take into account the documents already lodged and accepted. Provided the revised EMOS and Plan of Operations are submitted by mid October 1995, the Department undertakes to ensure the documents are processed and, if appropriate, accepted by the 1st December 1995.

FOI of Department of Minerals and Energy facsimile dated 29/09/95 on Page 3 states: “....As discussed with Mr McDonald and Mr Upton this week the EMOS will use the IAS segment on groundwater impacts rather than a separate study. This availability of the ground water study data will be a factor in finalising the EMOS for the expanded activity by 1 December 1995.”

INACCURATE HYDROLOGY REPORT IN 1996 IAS FIXES A FALSE BENCHMARK USED FOR THE EAST END MINE'S ENVIRONMENTAL APPROVALS TO REMAIN BASICALLY UNCHANGED

From EEMAG's experience Impact Assessment Study (IAS) and Environmental Impact Statement (EIS) processes are often fast tracked, deficient, untrustworthy and characterised by false and misleading content. Consultants who do the reports are selected and paid for by the proponent. This does not provide an independent assessment of the issues. We consider that the consultant's role is to produce a report that will present the best possible view of the company's prospects and facilitate approvals of the proposed project.

The absence of any well funded independent peer review analysis (ground/truthed by empirical local knowledge of affected stakeholders) of the IAS / EIS permits assessments of negative impacts that are certainly not full, frank and fearless.

- The QCL 1996 IAS was conducted under the auspices of Office of Major Projects (formerly Co-ordinator General). Cabinet entered into a commitment for environmental approvals to remain unchanged for a trebling of mine production without public objections.
- EEMAG alleges that the false and misleading hydrology segment for QCL's 1996 IAS was shaped to fit a political commitment that environmental approvals for the expanded East End mine would remain unchanged.
- The two above dot points provide cast iron evidence that neither Cabinet nor the Coordinator General were transparent about their decision making processes for the East End mine expansion and that the Hydrology Segment for the 1996 IAS was shaped to fit the political decision. To date they have not relented but carried on with total disregard of environmental sustainability.

FOI shows that the East End mine's Environmental Authority remains fixed on the Draft Interim 1995 Hydrology report included in QCL's 1996 Gladstone Expansion IAS that evaluated dewatering impacts had migrated approx 500 metres from the pit. The 1996 IAS Hydrology Report was discredited by DNR's (1998) Figure 9 that illustrates that in 1991 - 5 years earlier than the 1996 IAS - the off-lease mine impacted area was approx 20 sq km. (Electronic copy of Figure 9 attached) FOI shows that an Irrigation & Water Supply Commission (now DERM) officer advised the Minister in 1988 (8 years earlier than the IAS) that mine depletion extended 2 km from the mine.

In 2001 EEMAG requested that the mine's 1996 IAS (Hydrology Report) be reviewed, but was informed by the Minister's Office that there is no process to review an IAS.

REQUEST TO DERM IN 2010 TO CANCEL CEMENT AUSTRALIA'S ENVIRONMENTAL AUTHORITY ON THE BASIS THAT THE HYDROLOGY REPORT FOR THE 1996 IAS IS FALSE AND MISLEADING – REFUSAL OF REQUEST BY DERM

- Written advices dated 17 September 2008 and 10 March 2009 declared EPA's intention to issue Cement Australia with a draft amendment to their Environmental Authority for new mining lease application 80156.

EEMAG wrote to DERM on 11 March 2010 advising that under the EP Act 1994 section 293 1(b) and 2 (a) that robust grounds exist for cancellation of the East End Mine's current Environmental Authority.

We requested EPA to refrain from their declared intention to amend the Environmental Authority, and instead to cancel the existing EA. Our letter stated that EEMAG is not opposed to issuing of a new EA framed on a proper evaluation of the mine's impacts with proper conditions and timelines.

The submission to EPA included supportive documents demonstrating that the Draft Interim C R Dudgeon Hydrology Report of 14 August 1995 included in QCL's 1996 IAS was materially false and misleading. See extract quoted below:

“Materially false and misleading content within the 1996 Gladstone Expansion IAS includes:

- 1996 IAS findings, Hydrology (*Dudgeon) P.47 states quote that “pumping from the mine has created a steep drawdown cone extending approximately 500 metres from the pit boundaries” i.e. the IAS set a false benchmark in claiming that only negligible mine induced water depletion had migrated off-lease by 1995. However DNR (Feb 1998) see ⁴ Figure 9 ruled that by **1991** (after 3 successive years of above average rainfall and January floods in 1991 with full aquifer recovery at Bracewell) recharge shortfall i.e. (mine dewatering impacts) extended over an approx 20 sq km off-lease area at East End with loss in levels of up to 6.5 metres. Since 1991, those 1991 East End aquifer levels remain the pinnacle, with the aquifer thereafter trending progressively lower. *CR Dudgeon Report 14 August 1995 not provided, refer DNR files.
- See *DNR Final Draft Review of groundwater in the Mt Larcom – Bracewell area Nov 2008. Refer to contour Map 6, March 1991; compare with Map 7 July 1995; presumably the July 1995 water monitoring measurements on which Map 7 is based were likewise utilised in the CR Dudgeon Report of August 1995. Such comparisons confirm the materially false and misleading nature of the CR Dudgeon Report. (*DNR Report not provided)
- Dr Dudgeon's report omitted to adequately consider the karstic nature of the limestone or to adequately categorise crucial differences between karst and Darcian flow characteristics. Karst has conduit flows, underground cavities and interconnectivity of surface and groundwater etc. The numerous Karst features should be listed in the EMOS and EA as environmental values....(The importance of differentiating between Karst and Darcian flow is recognised in Australia and internationally.)
- The pertinent aspect of Dr Dudgeon's omissions or in according insufficient weight to karst can be demonstrated in the following manner. See 1996 IAS under heading 7.1.3.Expansion Proposals Relevant to Water Resources Assessment, quote, “The only aspect of the proposal to expand cement works production capacity which would affect water supplies in the Mt Larcom area are the increased rate of mining and the change of method of transporting limestone between the East End mine and Fisherman's Landing.” **Rebuttal** Under **karst** limestone aquifer conditions, conclusions that only expanded mine production and transport would affect water supplies in the Mt Larcom area...are invalidated as the very next blast could intercept randomly located conduits with potentially massive dewatering of the connecting aquifer to that level. Reliance upon a Darcian flow rationale in the local karst aquifer system is misleading and unrealistic.

- The CR Dudgeon Report offset the company's liability by placing undue emphasis on drought. There were two motives apparent. If the report had found that widespread off-lease mine dewatering impacts were entrenched; under circumstances where the company failed to meet the analysis, reporting and distribution requirements of the Special Conditions from 1980 -1995 coupled with the company's failure to comply with "make good" provisions to affected landholders, then QCL's embarrassing non-compliance may have jeopardised Cabinet's support, environmental approvals and funding for their Gladstone expansion. The second perceived motive was to avoid liability and to allay allegations of professional neglect.

The Dudgeon report was prepared under circumstances where the water monitoring data was tightly controlled and results were not publicly known." End of quote.

DERM responded on 5 May 2010 Quote, "In relation to your concerns on the Draft Interim Hydrology Report of 14 August 2010 by Dr C R Dudgeon, I advise that this has been reviewed by the department and it is not considered that this represents cause to cancel the EA"

- RTI (formerly FOI) reveals that instead of conducting an up to date review of the 1995 Dudgeon Report so as to accountably respond to 2010 allegations that the report was false and misleading, DERM in 2010 relied upon their 21 September 1995 review of the Dudgeon Report within the 1996 IAS that was of course, quite unable to canvas or satisfy the review criteria.

That no new review of the CR Dudgeon Report has occurred since 1995 was confirmed in a telephone conversation between EEMAG's Research & Communications Officer Alec Lucke and a Regional Manager of DERM on 29 June 2010.

- Thus DERM ignored the content of THEIR OWN 1998 findings that discredited the C R Dudgeon Report within the 1996 IAS – and thereafter, while in possession of these facts, DERM knowingly supported the retention of an unrepresentative of impact EA issued on the basis of a false and misleading report.

We recommend that Section 251 (4) be rescinded so that DERM is required to properly review the company's environmental performance and that in instances where an EA is unrepresentative of cumulative impacts that the whole of project EA be subjected to unfettered public objections in the Land Court.

FOI SHOWS IN 2001 EPA USES OUTDATED, DISCREDITED 1996 IAS HYDROLOGY REPORT FOR FRAMING EAST END MINE'S BASICALLY UNCHANGED ENVIRONMENTAL APPROVALS FOR LEASE RENEWAL.

Two key environmental approval documents for mining are the Environmental Management Overview Strategy (EMOS) and Environmental Authority (EA.)

The EMOS is now a planning document used to determine the adequacy and appropriateness of the Environmental Authority's conditions to minimise environmental harm caused or likely to be caused by the authorised mining activities. The EA is the principal environmental approval document.

When an EIS is conducted and environmental approvals issued on *projected* impacts the “original” component of the Environmental Authority remains insulated by Section 251 (4) of the EP Act 1994 with public objections restricted solely to any subsequent amendment. In those instances where time and circumstances prove that projected impacts substantially exceed the EIS assessment the “original” but inadequate EA remains exempted from public objections, and thus remains unchanged.

An EPA Memorandum of 22 October 2001 (FOI) documents EPA’s decision to frame the mine’s March 2002 EMOS and April 2002 Environmental Authority (for lease renewal in March 2003) on the false, misleading and out of date 1996 IAS findings (that pumping from the mine had created a steep drawdown cone extending approx 500 metres from the pit - ie impacts had not migrated off-lease.)

EPA’s 2001 use of the outdated 1996 IAS Report meant disregarding subsequent Reports that identified progressive escalation of mine dewatering impacts. I.e. DNR (1998) 22 sq km in 1997; East End Mine Modelling Consultant (2000) 33 sq km; EPA Consultant (May 2001) endorsed 33 sq km mine impacted zone. (East End Mine Community Liaison Group Consultant Dr Peter James evaluated in July 1997 that mine dewatering had caused a mine depletion zone of approx 60 sq km, with variable loss of levels of up to 20 metres and loss of perennial stream flow.)

By disregarding reports subsequent to 1996, that evaluated the existence of widespread off-lease impacts, EPA’s 22 Oct 2001 decision;

- (a) permitted the EMOS and EA process to avoid having to undertake a new EIS with Public Objections before the Land & Resources Tribunal;
- (b) facilitated mine pit dewatering discharges to be increased from 6 Megalitres per day to 10 Megalitres per day under the EA; and
- (c) facilitated the EMOS and EA and to be exempt from consideration of “standard criteria” under the EP Act 1994. Standard criteria are applicable Commonwealth, State or Local government plans, standards, agreements or requirements.

Examples of “standard criteria” are listed below;

- the Queensland *Water Act 2000* (COAG Agreement on Water Reforms)(In 2010 also NWI - and Water Act 2007 if it was applicable);
- the COAG Agreement on Ecologically Sustainable Development
- any applicable Environmental Impact Study, assessment or report – for example the findings of ALL of the (approx 40) technical Reports subsequent to the false and misleading 1995/96 IAS findings were exempted from consideration
- best practice environmental management;
- the public interest
- The mine’s Special “make good” Conditions

The East End mine’s EMOS and EA do not recognise karst features (caves, sinkholes, springs conduit flows, interconnection of surface and groundwater) as environmental values. Affected landholders are an Environmental Value, but are not included since they are not recognised in the zone of depletion on which the EMOS and EA are framed.

The East End mine’s EA has NO conditions to minimize / repair off-lease water depletion caused or likely to be caused by mine dewatering and does NOT define what impacts on the

water table are acceptable. The EA in its present form amounts to a license to dewater the interconnected karst aquifer system without consideration or concern as to the aquifer's sustainability. Calliope River WRP is coordinated with the East End mine's EA and does not use the best available science for Larcom Creek subcatchment.

- In fact DERM does not recognise groundwater levels as an environmental value and thus does not regard loss of groundwater levels (that sustain perennial stream flow and eco-systems) due to mine dewatering as an environmental impact. This is not consistent with NWI objectives!

We interpret that under Water Reforms, mine pit discharges may become an allocation to the mine. The mine does not make productive use of the water but discharges it downstream as waste.

DENIAL OF RIGHTS OF REVIEW AND APPEAL TO THE COURT

A letter from the Office of Minister for Sustainability, Climate Change and Innovation to EEMAG dated 26 June 2008, states, quote: "Interested persons have the opportunity to object to the mine or the conditions of the environmental authority when the application for the environmental authority is first made. This includes rights of review and appeal to the court."

EEMAG has never had an opportunity to participate in public objections against the East End mine's original EA or for "rights of review and appeal to the Court" under a public objections process. These circumstances could be expected to be paralleled elsewhere within the mining industry as EA's were transitioned after legislative changes in 2000 into all mining established operations.

To test Section 251 (4) of the EP Act, EEMAG lodged objections against the glossed over circumstances and stark omissions in the mine's *original* EA when a draft *amendment* was open to public objections in 2006. Our objections were struck out in the Land & Resources Tribunal without being heard.

SPECIAL "MAKE GOOD" CONDITIONS DO NOT WORK TO PROPERLY PROTECT LANDHOLDERS ACCESS TO WATER SUPPLIES

EEMAG members' ongoing experience is that "Special make good Conditions" attached to East End mining leases are not adequately worded nor effectively regulated so as to properly protect water supplies and land use potential for affected landholders.

The existing set of Special Conditions coupled with the "minimum compliance" culture in which they operate has been less than satisfactory for affected landholders. Without the continual prodding and poking from EEMAG little or nothing would have been done for any landholder. The Conditions have simply not worked to promptly and properly protect landholders' water supplies. EEMAG has had to be the squeaky wheel that has occasionally been lubricated while the East End Mine, protected by their unwarranted "in compliance" status, engages in tokenism and defer and delay tactics

- We interpret from a news item on the Country Life website dated 12 Dec 2010 “Water users must be protected” that the “make good” provisions under CSG are weaker than the Special Conditions for the East End mine.

Details of shortcomings in East End mine Special Conditions are listed below: These issues have been raised with the Queensland Government in our Submission on Strategic Cropping Land. Despite EEMAG seeking to have the Special Conditions upgraded for Lease Renewal in 2003, they were in fact substantially downgraded.

- (a) No timelines imposed: From time of determination of a landholder's entitlement to commissioning an equivalent alternative water supply commonly takes about 3 years with worst case being 13 years wait (from loss of the supply) for a “like for like” irrigation supply. Dispute over the accuracy of hydrology assessments and /or landholders’ entitlements has been ongoing since 1995.
- (a) No recognition of or redress for economic loss and difficulties incurred due to delays in assessment of entitlement and unreasonable delays in provision of alternative water supplies, or for providing inadequate alternative supplies.
- (b) Affected landholders outside the zone of depletion recognised by the Regulating Agencies / East End mine are in “no man’s land” with no scope for redress, even though their on the ground evidence may be supported by experts independent of the Regulating Agencies/East End mine.
- (c) The term *injuriously affected* included in 1976 original Condition 11 omitted from Special Condition 4 at Lease Renewal in 2003. The term *injuriously affected* entitled landholders to administratively determined compensation for loss of land values due to water loss. However this entitlement was never honoured. The Regulating Agencies chose instead to provide only lukewarm support for make good provisions of an alternative water supply.
- (d) In 1996/97 replacement bores were around 45 to 50 metres deep. Now replacement bores are commonly drilled 80 –100 metres plus. Water from deeper bores is more expensive to draw to the surface and servicing of the pump more problematic and expensive. Bore interception of silt contaminated conduits at depth (more examples of karst) has also proven very problematic.
- (e) These deeper drilling programs are intersecting multiple aquifers and we are concerned that these aquifers are being depressurised and bled into the mine affected zone.
- (f) The Special Conditions do not recognise that drying of sub soil moisture occurs in concert with loss of ground water levels and loss of perennial stream flow resulting in reduced land viability
- (g) Legal advice 20.9.2004 is that the Special conditions are worded so as to condone the bias of the CEO of the Water Act 2000, and the merit of the decision and the technical assessment used for making the decision are not legally challengeable.
- (h) Legal advice 25.11.2004 is that taking a case against the Company to the Land & Resources Tribunal (LRT) does not amount to “an independent review” of DNR&M findings, since to take an action in the LRT under Sec 363 (2)(h) of the *Mineral Resources Act 1989* we would have to sue the Company and prove the liability and quantum of our claim against the Company and this is entirely different to merely seeking a meritorious review of the decision of the Chief Executive under Special Condition 4. The cost of a case was quoted at \$450,000.00 to \$550,000.00.
- (i) There needs to be a mechanism to equitably resolve disputes that is affordable to small landholders and with funding so that they are assisted by their own experts. It is

recognised that in mediation the weaker party is often bullied and that it is almost impossible for small landholders to compete with the legal power of mining companies.

COMMITMENT TO “MINIMUM COMPLIANCE” FOR THE EAST END MINE

EEMAG learned of the commitment to “minimum compliance” when we received a copy of the Doctoral Thesis “Industry/Community Relationships in Critical Industrial Developments” (Hoppe submitted 2005 / released 2006) undertaken under the strict protocols of Griffith University. (A copy was simultaneously supplied to Cement Australia.) The Doctoral Thesis is a comparative study between a Holcim mine in Switzerland and the Holcim owned mine at East End in Queensland. It identifies and elaborates on the effects of “minimum compliance” for the East End mine and includes comparative tables on the differences between the way the two projects operate. It is accessible on EEMAG’s website as well as Griffith University’s ADT website. Some relevant information is quoted below:

On Page 9.19 an East End mine manager’s statement is documented, quote: “We are legally in compliance with regulation, compliance and with everything, so where is the problem? You see that is not just our problem, but it also applies to government agencies. You’ve got these old guys still there sticking to decisions they made in 1977. That is what I believe is holding us back in East End.” The Thesis reports the manager’s statement as an indication of two major points; a minimum compliance strategy - clearly a legacy of the 1970s and early 1980s - and a defence strategy of earlier East End Mine (EEM) specific decision-making by government agencies spanning over 3 decades.

Page 9.23 states that **integration of new and progressive socio-environmental government legislations into the EEM case is highly unlikely because of the earlier specific deep structure commitments which exclude many contingency options and include only those that are *mutually agreed upon and are consistent with the earlier deep structure choices.**

It states that government stakeholders have little choice but to live with the legacy of earlier decision-making; and that it is necessary for these stakeholders, therefore, to defend earlier EEM specific deep structure decision-making because it controls socio-environmental community demands and equally important, minimises legal exposure. **It documents an interview with a public servant recognising that decision-makers in the EEM case “try to defend some of their old decisions, realising that earlier decisions were not as good as they should have been.”** (My bold)

Page 8.21 documents that the openness by Kantonal (Swiss) government agencies to local knowledge and experiences is very different to the attitudes of Queensland government authorities involved in the East End mine development. Queensland’s response to local wisdom and experiences is short and clear. Quote: “If information is not collected, analysed and interpreted by the agency or by its approved external experts, such data cannot be recognized by the department as scientifically legitimate and can therefore no be considered in the final decision-making process.”

Page 8.38 states: “The practice of sparse and slow data distribution while pursuing minimalist compliance is not new. Industrial organisations and government institutions frequently use this method as a means of controlling the situation (Roome, 1998; Wilson, 2000)” and “**The**

research data and the responses from various stakeholders suggest that handling of the issues associated with *Clause 11* as well as *Clause 9 (b)* of the lease conditions was and still is questionable.” (My bold)

My note: (Refer to P9.23 quoted above re *mutually agreed decisions): After the EMOS and Environmental Authority had been issued in 2002, Mines Minister Robertson instructed his Department “to renew the leases in consultation with the company.”

Thank you for accepting EEMAG’s submission, all documents are available.

Yours faithfully,

Heather Lucke
Secretary
East End Mine Action Group Inc (EEMAG)
East End, Mt Larcom Qld 4695

**David I Smith, Brian L Finlayson, Peter M James
Consulting to EEMAG**

c/ EEMAG

21 September 2007

The Hon. Craig Wallace MP
Minister for Natural Resources and Water
Level 13, Mineral House
41 George Street, Q 4000

Dear Sir,

East End Mine, Groundwater Issues

Having just completed a two day meeting with representatives of the DNR&W, discussing the above, we write to you to express a deep concern for the outcome.

The meeting of 13/14 September was held allegedly to achieve a consensus on the groundwater issues. However, assurances that the DNR&W was to act as an unbiased arbiter in this matter were negated by a lack of consideration given to dissenting evidence. Serious scientific discussion was frequently brushed aside when well-reasoned arguments ran counter to the department's established view.

Based on more than a century of cumulative experience with geohydrology and karst aquifers, the undersigned have severe reservations about the department's conceptual plan and also its reliance on a groundwater contouring methodology that contains some basic interpretative flaws. Moreover, the department's adherence to analysis at a regional scale, based on Darcian principles, simply ignores conflicting evidence at a local scale.

Major environmental impacts on groundwater and surface streams have been apparent for a long time in the East End and Bracewell areas. The DNR&W unduly emphasizes the current drought as the only explanation for the impacts, at least for the latter area. This simplistic view again runs contrary to the weight of evidence.

Other investigative work done by the DNR&W up to this point has also been very limited in scope, considering the excellence of the monitoring program that has been established here. The bulk of the data obtained since 1977 have never been subject to rigorous analysis by the department. Neither has the department attempted to incorporate into the conceptualization of aquifer behaviour much of the detailed knowledge and the climatological data held by local

landholders regarding, for instance, comparisons between the effects of the 1960s drought and that of the 1990s.

We understand that the content of the forthcoming departmental report lies entirely within the control of the DNR&W. We therefore express our concern that this report will not provide adequate balanced judgments nor logical conclusions and we wish to make it clear that our presence at the meeting in Mt Larcom on 13/14 September should not be taken as an endorsement of that report.

In summary, we would like to bring to your attention that, after more than a decade, the major environmental impacts still need to be resolved rationally and quantitatively and we would welcome your personal opinion in this respect.

Please find attached, for your information, brief notes on the qualifications and experience of the undersigned.

Signed

.....
.....
.....

COPY: Director General, DNR M&W

Minister for the Environment

**David Ingle SMITH, Snr Fellow (Ret), Centre for Resource & Environmental Studies, ANU;
Formerly Reader, Univ. of Bristol**

BSc (Hons, Kings Coll. 1956), Geography

BSc (Hons, Kings Coll. 1957) Geology

MSc (McGill Univ. 1959) Geography/Geomorphology

After taking up an appointment as Lecturer, later Reader, at the University of Bristol, D.I. Smith became involved in research in geomorphology and hydrology, with special reference to limestone regions in both the U.K. and the West Indies. Worked in conjunction with Government and United Nations Agencies; developed various techniques for tracing underground flows in limestone and supervised PhD students in this area. Appointed Senior Fellow in the Centre for Resource and Environmental Studies at the Australian National University, in 1976, and carried out research in water resource problems in Australia, South Africa, Malaysia and China. Worked with a wide range of Commonwealth Departments and water agencies in all States and Territories.

Publications

In excess of 200. Some relevant publications are:

Smith D.I. (1971). The concepts of water flow and water tables in limestone. *Trans Cave Res. Group, Gt Brit.*, 13(2):95-99

Smith D.I. et al (1973). Experiments in tracing underground waters in limestone. *Jnl Hydrology* 19:323-349

Smith D.I. & Atkinson T.C. (1974). Rapid underground flow in fissures in chalk: S. Hampshire. *Qtly Jnl Engin. Geol.*, 7(2):197-205

Smith D.I. et al (1976). The hydrology of limestone terrains. *The Science of Speology*, Chapt.6. Academic Press.

Smith D.I. & Atkinson T.C. (1977). Underground flow in cavernous limestones... Malham area. *Field Studies*, 4:597-616

Smith D.I. (1993). The nature of karst aquifers and their susceptibility to pollution. *Catena*, 25:41-58

Another 4 papers of dye tracing, not here listed.

Published "*Water in Australia; resources and management*" (Oxford Univ. Press, 1998), the first comprehensive account of the nation's water resources and management.

Brian Leslie FINLAYSON, Associate Professor, School of Social & Environmental Enquiry & Co-director, Centre for Envir. Appl. Hydrol., Univ. of Melbourne

B.A. (Hons. Univ of Qld, 1970) Geography
PhD (Univ. of Bristol 1976) Geomorphology
Roy. Soc. Victoria Research Medal, 2003
Edie Smith Award for contributions to Aus. Speleological Research

Over thirty years experience in university teaching at Bristol, Oxford, James Cook and Melbourne, and held visiting academic positions at Univ. of Amsterdam, Aus. Defence Force Academy, Taiwan Forestry Research Bureau, Chinese Academy of Science, Rhodes University and Central Qld University. Supervised more than thirty Doctorate and fifteen Masters research students. Undertaken individual and multi-disciplinary research in the areas of global hydrology, sediment transport, catchment management, environmental flows etc., and provided specialist expertise in geomorphology, environmental hydrology and karst geomorphology. Undertaken consulting with a wide variety of government agencies, commissions and consultants, both throughout Australia and abroad.

Publications

Some relevant publications.

- McMahon T.A. & Finlayson B.L. (2003) Droughts and anti-droughts: the low flow hydrology of Australian rivers. *Freshwater Biology*, 48:1147-1160.
- McMahon T.A. et al, & Finlayson B.L. (2002). Estimating discharge at an ungauged site. *Aus. Jnl of Water Resource*,. 5:113-117.
- Ladson T.A. & Finlayson B.L. (2002). Rhetoric and reality in the allocation of water to the Environment: case study, Goulburn River. *River Res. & Applications*, 18:555-568.
- Davis J, Finlayson B.L., & Hart (2001). Barriers to science informing community-based land and water management. *Aus. Jnl Environ. Management*, 8:99-104

Contributed chapters to two books and joint author/editor of three books, including:
Finlayson, Brian & Hamilton-Smith, Elery (Ed) (2003). *Beneath the Surface: A Natural History of Australian Caves*. UNSW Press, Syd.

Peter Michael JAMES, Consulting Engineering Geologist/Geotechnical Engineer

BSc (Qld, 1959), Geology & Maths

MSc (Eng) & DIC (Imperial College, 1965), Geotechnical Engineering

PhD (Imperial College, 1970). "Time Effects and Progressive Failure in Clay Slopes"

After two years seismic exploration for oil, transferred to geotechnical engineering in the UK, in 1961. Postgraduate study/research was followed by a period (1970-74) as senior lecturer in Dept. of Civil Engin., Univ. of Qld. Subsequently worked as an independent consultant in more than fifteen countries, for a range of clients including major consultants, government bodies (including P.R. China, New Zealand, PNG, Malaysia), the ADB and World Bank. Member of a Panel of Experts on dam projects in China, Indonesia and Malaysia. Experience with investigations and projects in limestone/karst includes: Sri Lanka (Kotmale Hydro & Canyon Hydro); P.R.China (Lubuge Hydro); Turkey, (Yedigoze Dam); Queensland, (Bjelke Peterson Dam); air photo interpretation of karst terrain along proposed highway over the Cantabrian Mts, Spain; reservoirs in evaporate terrains in Laos and Greece. Various specific investigations in the area of geohydrology.

Publications

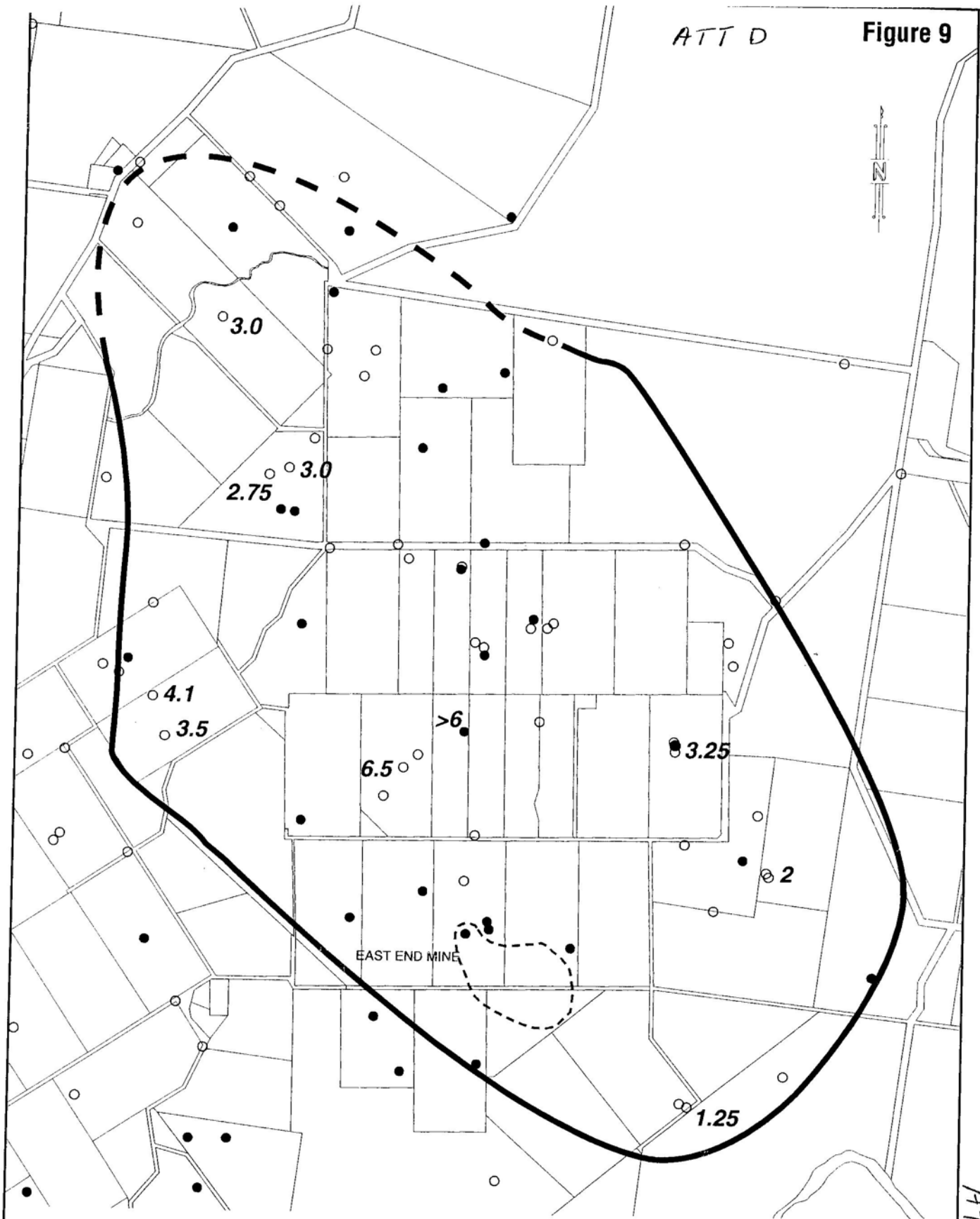
In excess of fifty. Some relevant publications.

Some insitu permeability tests in sands. Qtly Jnl Engin. Geol. #2, 1970

A geohydrological study of sand mining impacts: Manifold Hills. Case Histories in Engin. Geol., Vol.3, GSA 1997

Engineering problems associated with unusual weathering processes in limestone. Engin. Geol. Case Histories, Vol 2, GSA, 1992

Comments on the diagnosis of karst features in dam engineering. Aus. Geomechnics #6, 1983

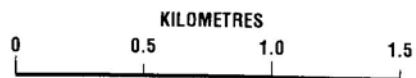



LEGEND:

- Monitored Bores
- Unmonitored Bores
- 2.75** Drawdown (metres)
- Impacted Area Boundary

NOTE:


Bores outside Impacted area have zero water level difference





RESOURCE SCIENCES CENTRE

Bracewell - East End Area
Groundwater Investigations
Mine Impacted Area 1991
(WL Difference 1978/79 - 1991)



ATT D