

TECHNICAL REVIEW BOARD ANNUAL REPORT

September 2014 – August 2015

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EXECUTIVE SUMMARY

The Technical Review Board (TRB) was established by the Victorian Government in 2009 as an Advisory Panel under Sections 54A, 54C, 54D and 54E of *The Mineral Resources (Sustainable Development) Act 1990* following the Warden's Inquiry into the collapse of the North East Batter at Yallourn Mine in the Latrobe Valley. A primary function of the TRB is to provide independent advice to the Minister for Energy and Resources (the Minister), the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) and industry (through the Department) on managing risks associated with mine instability and rehabilitation in the Victorian mining and quarrying sectors.

At the commencement of this current reporting period, being September 2014 – August 2015, the Terms of Reference (TOR) for the TRB had a focus on risks to the environment, public safety and infrastructure. Following a change in government, the TOR were expanded in July 2015 to also include rehabilitation.

During the current reporting period, the Board met formally on seven occasions. Additionally, Board members (individually and collectively) had involvement in a range of activities associated with the TOR. The more important of these, with summary comments on their status, were:

- Assessment of findings of the second peer review into the repair of the Morwell River Diversion (MRD). It appears that the final design and construction reports for the remediated section of the river are comprehensive and well documented. The ongoing stability of the MRD outside of the remediated section is an important matter that requires further assessment.
- Review of a comprehensive handbook dealing with managing ground control risk in brown coal mining in the Latrobe Valley, developed with department funding by a specialist. Discussions are ongoing amongst stakeholders as to the most effective way in which to implement this detailed handbook. The TRB has suggested to the Department that the Geotechnical Guideline be distilled from the handbook, with the Department being the repository for both the handbook and the guideline and taking responsibility for having them regularly updated.
- Ongoing support and encouragement of the Latrobe Valley Geotechnical Interest Group (LVGIG), established at the end of 2013. It is pleasing to report on the success of the *First Symposium on Engineering in Brown Coal*, motivated by the TRB and organised by the LVGIG. This symposium was held in October 2014 and had 85 attendees. It is planned to hold it every two years.
- Input into the development of a significant program of work associated with the Batter Stability Project that is intended to be funded by government. The TRB considers this project to be a small but significant element of the substantial research effort required to better understand the material and mechanical properties of brown coal and its local and regional behaviour as a basis for reliable design for mine stability and rehabilitation. Pleasing progress has been made through short-term projects awarded in August 2014 to the Geotechnical and Hydrogeological Engineering Research Group (GHERG) at the Churchill Campus of Federation University (for data collation and evaluation) and to GHD Pty Ltd (for database design). However,

the TRB has serious concerns that due primarily to protracted contractual and approval processes, little progress has been made since December 2014 towards formally commencing this vital project. It is of the view that much more effective use of government funds and timely progress could be achieved if the execution of projects of this nature were outsourced to a project manager.

- Assessment and advice to government regarding a small sinkhole that developed near the upstream edge of the tailings storage facility (TSF) for the Ballarat Gold Project. At no stage did the sinkhole pose a threat to the integrity of the tailings dam or to the public. The TRB was impressed with the mine operator's focus on safety, containment of the tailings, thorough investigation of the incident and risk management.
- Site visits, discussions, assessments and advice on risk to the environment and public infrastructure in relation to active and defunct quarry mining operations on the mid-Goulburn Valley floodplain. The development of an extractive industry in the region is viewed by many as important to support future construction activities in Melbourne. Currently, there is a lack of policy and strategic planning in relation to quarry mining in the mid-Goulburn Valley floodplain. Environmental objectives are not well defined. There is some confusion arising out of a lack of distinction between mining effects, mining impacts and mining consequences and a lack of information and studies to support a reliable assessment of these factors. Notwithstanding this, it is apparent that if the potential impacts were to materialise at one particular site, there could be very serious consequences for critical public infrastructure. Therefore, the TRB has recommended that this site should be the subject of a detailed risk assessment. This advice has been accepted by the Department.

The TRB is of the view that there is currently insufficient local information, experience and modelling to make a proper assessment of the risks presented by quarry mining in the mid-Goulburn Valley. If the extractive industry is to develop in a sustainable manner in the mid-Goulburn Valley floodplain, the TRB recommends that the Department seeks the views of a broader scientific and engineering community in order to establish the extent and magnitude of quarry mining-induced impacts and consequences likely to be experienced in this local setting. This needs to be supported by a resource study to inform high level policy making and strategic planning. The TRB considers that the onus for implementing the resource study and the potential impacts study should be led by Mineral Development Victoria or an equivalent planning agency and not by Earth Resources Regulation.

- An ongoing focus on rehabilitation, with the TRB reporting since 2012 that it considers the original measures proposed for the rehabilitation of the Latrobe Valley brown coal mines fall well short of what could reasonably be considered as adequate. Rehabilitation assumed a higher profile in the current reporting period due to the focus of the Hazelwood Mine Fire Inquiry on fire fighting activities on the Hazelwood Mine batters and on covering batters to reduce fuel load, the development of another sinkhole in Latrobe Road, and the C87 Traralgon Panel Growth Report.

The elevated importance of rehabilitation is reflected in the expanded TOR for the TRB. This will be a consideration when reconstituting the membership of the TRB in its next term, which commences in September 2015.

- Fostering of greater engagement and collaboration amongst all stakeholders as one initiative in achieving cultural change in how mine stability and rehabilitation are managed in the Latrobe Valley. An initiative introduced during the current reporting period was to meet informally with industry senior management for half a day each quarter to explore issues and views. After a good start, the initiative was stalled to some extent by a range of factors including the Hazelwood Mine Fire Inquiry. It will be resumed at the first opportunity.
- Ongoing focus and assessment of Department capabilities. Although the TOR for the TRB remain highly relevant, the scope, scale and seriousness of issues which the TRB now deals with under these TOR are significantly different to those envisaged when it was formed. The TRB is becoming increasingly concerned that the Department does not appear to have a clear program for resolving issues when they emerge and the capability to embed and sustain a number of initiatives important to improving the management of mine stability and rehabilitation.
- Independent review of mine stability assessments at Anglesea Coal Mine.

- Ongoing interaction with GHERG and its research activities. Given the need for a substantial research effort to underpin effective mine stability and rehabilitation in the Latrobe Valley brown coal sector, the TRB is encouraged by the extension of government funding for GHERG through to June 2019.
- Maintaining a watching brief on mine stability across all brown coal mines. In the current reporting period, there was a particular focus on mining-induced crack and sinkhole development in and about Latrobe Road and how this type of legacy issue can be best managed.

In going forward, the TRB has committed (with the Minister's approval) to assisting the Hazelwood Mine Fire Inquiry in relation to progressive and permanent rehabilitation. As rehabilitation has been a matter of concern to the TRB for some time, it welcomes the change in its TOR to include rehabilitation.

The importance of research into batter stability for reasons of both mine stability and rehabilitation cannot be overstated. The TRB urges commencement of the Batter Stability Project. This project will only address a small portion of the issues and new research initiatives will also be required.

A number of matters remain "works in progress". These include quarry mining in floodplains, the closure plan for Anglesea Coal Mine and cultural change initiatives in the Latrobe Valley brown coal sector.

1.0 INTRODUCTION

The Technical Review Board (TRB) was established by the Victorian Government in 2009 as an Advisory Panel under Sections 54A, 54C, 54D and 54E of *The Mineral Resources (Sustainable Development) Act 1990* following the Warden's Inquiry into the collapse of the North East Batter at Yallourn Mine in the Latrobe Valley. The Inquiry identified several areas where improvements in the Victorian mining industry could be made. A primary function of the TRB is to provide independent advice to the Minister for Energy and Resources (the Minister), the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) and industry (through the Department) on managing risks associated with mine instability and rehabilitation in the Victorian mining and quarrying sectors.

At the commencement of this current reporting period, the Terms of Reference (TOR) for the TRB had a focus on risks to the environment, public safety and infrastructure. Following a change in government, the TOR were expanded in July 2015 to also include rehabilitation.

The TRB has now reported to three governments, five ministers and three government departments since its inception, prompting the TRB to include an overview of its activities from September 2009 to August 2014 in its last annual report. This September 2014 – August 2015 Annual Report builds on that foundation.

2.0 TERMS OF REFERENCE

The TOR for the TRB have a wide scope and call for advice to be provided to the Minister and the Department in four general areas. These are:

1. Strategy
2. Mine and quarry stability assessments
3. Rehabilitation (as from July 2015)
4. Other activities, including education, research and interaction with industry.

The overall aim of the TOR is to improve geotechnical and hydrogeological performance and knowledge within the Victorian mining industry.

"The Board will report to the Minister on an annual basis. The Minister may subsequently release the Board's report to the Department and relevant industry stakeholders.

The Board will periodically provide advice on mine and quarry stability, to the Minister and Department, in the following areas:

a. Strategy

- *Written and/or verbal advice on the Department's strategies and regulatory approach to mine and quarry stability and geotechnical issues.*
- *Written and/or verbal advice on new developments in technology and science relating to the understanding, monitoring or management of mine and quarry stability and related geotechnical and hydrogeological issues.*

b. Stability Reports

- *Review mine and quarry stability reports including monitoring data that has been submitted to the Department and provide written advice to the Minister.*

c. Other Activities

- *Advise the Minister in formulating appropriate response to significant events related to mine and quarry stability and related geotechnical and hydrogeological issues.*
- *Advise the Minister on appropriate guidelines and educational initiatives related to mine and quarry stability.*
- *With the knowledge and agreement of the Minister, interact directly with industry on mine and quarry stability and related geotechnical and hydrogeological issues, including participation in site visits, presentations and dialogue, particularly with respect to communicating findings of reviews with relevant stakeholders.*
- *In conjunction with the Department, interact directly with Federation University (formerly Monash University, Gippsland campus) in relation to the Research and Development program on brown coal geotechnical and hydrogeological issues.*

d. Rehabilitation

- *Provide written advice and guidance to the Department on any issues related to rehabilitation, including progressive rehabilitation within the mines and quarries."*

3.0 BOARD MEMBERS

The Board comprised the following four members during the current reporting period:

Emeritus Professor Jim Galvin – Board Chairman

Professor Galvin has extensive international experience in mining and geotechnical engineering, risk management and Occupational Health and Safety (OH&S). His career encompasses working in and managing underground mines, leading and directing research bodies, headship of the School of Mining Engineering at the University of New South Wales, and consulting. Current and recent appointments include member of the New South Wales Planning Assessment Commission (part-time); independent member of the Health, Safety, Environment and Community (HSEC) Advisory Committees to the Boards of BHP Billiton and Solid Energy New Zealand; chair of the Federal Government Australia-China Joint Safety Taskforce to Improve Safety in Coal Mining, and of the Continuing Professional Development Committee of the Mine Managers Association of Australia. Professor Galvin has been a member of the TRB since its inception in 2009 and Chairman of the Board since 2011.

Professor Ian Johnston – Board Member

Professor Johnston graduated from the University of Southampton, UK with a bachelor's degree in civil engineering and a PhD in geotechnical engineering. After practicing in the UK, the USA and Europe, he joined Melbourne's Monash University in 1975. He became Dean of Engineering at Melbourne's Victoria University in 1993 and five years later moved to Coffey Geotechnics where he was a Senior Principal. In 2009, he was appointed to the Golder Chair of Geotechnical Engineering at the University of Melbourne. He has more than 40 years' experience in geotechnical engineering, both as an academic and as a consultant for major projects in Australia and overseas. His interests cover a wide range of topics and he is particularly well known for his work on soft and weak rock and the engineering problems associated with the stability of this material in civil and mining engineering.

Professor Rae Mackay – Board Member

Professor Mackay holds a degree in civil engineering from Imperial College, London University and a PhD in Hydrogeology from the University of Newcastle upon Tyne. In 2011, he was appointed as Director of the Geotechnical and Hydrogeological Engineering Research Group at Monash University – Gippsland Campus. Prior to moving to Australia to take up this appointment, Professor Mackay was an advisor to the UK nuclear waste management program. He was also Professor of Hydrogeology and Head of the Hydrogeology Research Group at Birmingham University, UK, where he worked on a diverse range of subjects including arid zone hydrogeology, sustainable urban water resources, geothermal energy exploitation and nuclear waste disposal. His current research role is directed at understanding risks and impacts associated with the ongoing development and eventual long-term rehabilitation of the brown coal mines in the Latrobe Valley, with his primary interests being in understanding subsurface flow and transport processes and developing predictive models for engineering and environmental applications. Professor Mackay is also a member of the Coal Resources Victoria Advisory Group.

Mr Alan Moon – Board Member

Mr Moon is an engineering geologist with more than 40 years' experience in ground investigations for civil and mining projects in a wide variety of geological environments in Australia and overseas. He has a bachelor's degree in geology from Imperial College, London, a master's degree for research in slope stability and soil mechanics from the University of Tasmania and has held part-time teaching positions at several universities. From 1997 to 2013, he was a Senior Principal with Coffey Geotechnics, providing specialist and review inputs to projects in Australia and overseas. He is now self-employed. Mr Moon has specialist expertise in soil and rock slope stability and risk assessment and management, with most of his recent work being as a geotechnical specialist on technical review panels associated with dams and slopes.

4.0 2014–15 ACTIVITIES AND STATUS

SUMMARY OF TRB ACTIVITIES

A summary list of key TRB activities during the September 2014 – August 2015 reporting year is presented in Table 1. The Board met formally on seven occasions. One Board member also undertook a site inspection and provided advice to the Department in relation to the development of a sinkhole in the tailings dam of a gold mining operation. A range of other tasks was also completed out of session.

Table 1: Summary list of key TRB activities – September 2014 to August 2015

Date	Who	Activity
2014	15 – 17 September	Full Board <ul style="list-style-type: none"> Review Hazelwood Mine Fire Inquiry Report and associated recommendations. Undertake an assessment of PSM report on Latrobe Road Stability. Planning for upcoming conference on Geotechnical Engineering in Brown Coal. Discussion on workshop to be presented by the TRB on Ground Control Management Plans. Drafting of letters to CEOs of Latrobe Valley brown coal mines regarding enhanced engagement with the TRB.
	20 – 22 October	Full Board <ul style="list-style-type: none"> Discussions on status and work program of proposed Batter Stability Project. Participation in First Annual Conference on Engineering in Brown Coal. Presentation of half-day workshop on Ground Control Management Plans.
	15 – 16 December	Three Board Members <ul style="list-style-type: none"> Review of status and work program of proposed Batter Stability Project. Finalisation of TRB September 2013 – August 2014 Annual Report, including a review of TRB activities, key findings and advances since its inception in 2009. Planning for TRB activities during 2015. Letter to the Minister advising submission of September 2013 – August 2014 TRB Annual Report and providing an update on developments subsequent to August 2014.
2015	5 – 6 February	Full Board <ul style="list-style-type: none"> Meeting with the new Executive Director of the Earth Resources and Regulation (ERR) division of the Department of Economic Development, Jobs, Transport and Resources (DEDJTR). Review and preliminary assessment of options for rehabilitation of Latrobe Valley brown coal mines. Meeting with senior management of Latrobe Valley brown coal mines regarding rehabilitation options and the need for mine stability research.
	27 – 28 April	Full Board <ul style="list-style-type: none"> Coffey Presentation to DEDJTR and TRB – Final Report on Independent Third Party Peer Review of Morwell River Diversion Remediation. Discussion on DEDJTR upcoming audits of tailings and slimes dams. Meeting with senior management of Latrobe Valley brown coal mines regarding status of Latrobe Valley Geotechnical Guideline and research into rehabilitation.
	25 – 27 May	Full Board <ul style="list-style-type: none"> Presentation by the Goulburn Broken Catchment Management Authority (GBCMA) on environmental issues associated with quarry mining in a river floodplain. Site visits to six gravel quarries located within the mid-Goulburn Valley floodplain. Discussion on quarry mining within the mid-Goulburn Valley floodplain. Discussion on batter stability and rehabilitation associated with the closure of Alcoa's Anglesea Coal Mine. Formulation of advice to the Department regarding quarry mining impacts in the mid-Goulburn Valley floodplain.
	12 June	Mr Alan Moon <ul style="list-style-type: none"> Site visit to Ballarat Gold Project to advise the Department following the development of a sinkhole in the upper reaches of a tailings dam.
	4 – 6 August	Full Board <ul style="list-style-type: none"> Discussion of issues arising out of new information relevant to quarry mining in the mid-Goulburn Valley floodplain and formulation of advice to the Department. Discussion on Hazelwood Mine Fire Inquiry. Discussion of the C87 Traralgon Panel Growth Report and associated PSM Report and formulation of advice to the Department. TRB Chair meeting with Minister D'Ambrosio. TRB meeting with Hazelwood Mine Fire Inquiry Board members.

Board members (individually and collectively) had involvement in a range of activities associated with the TOR for the TRB. The more important of these, with comments on their status, were:

SECOND MORWELL RIVER DIVERSION REPAIR PEER REVIEW PRESENTATION

The first peer review of the Morwell River Diversion (MRD) repair was presented to the TRB by Coffey Geotechnics Pty Ltd (Coffey) in December 2013. It was based on an interim report completed by the designers (SMEC) in October 2013. SMEC issued the final recovery design report and the draft construction reports in October 2014, with Coffey making a second peer review presentation to the TRB in April 2015.

Based on the second peer review presentation, it appears that the final design and construction reports are comprehensive and well documented. Coffey reported that most of the issues it had raised in its earlier peer review have now been addressed. The ongoing stability of the MRD outside of the remediated section is an important matter that requires further assessment.

Careful and comprehensive risk assessments are essential to understanding and managing the risks still associated with the MRD. At the time of the second peer review presentation, risk assessments of the remediated section and other areas of the MRD were not available for review by the TRB. The TRB places high importance on undertaking these reviews in fulfilling its TOR.

GEOTECHNICAL GUIDELINE

The inaugural TRB identified the need for the development of a geotechnical guideline for managing ground control risk in the brown coal mines of Victoria. In 2014, the Department funded and oversaw the commissioning of a specialist to

assist an industry committee in developing this guideline. Its overall aim was to collate the current body of knowledge, experience and practice for managing ground control risks associated with the design and operation of the Victorian brown coal mines.

A comprehensive handbook dealing with managing ground control risk in brown coal mining in the Latrobe Valley was prepared by the specialist and copies were submitted to the TRB in June 2015. Discussions are ongoing amongst stakeholders as to the most effective way in which to implement this detailed handbook. The TRB has suggested to the Department that the geotechnical guideline be distilled from the handbook, with the Department being the repository for both the handbook and the guideline and taking responsibility for having them regularly updated. Ideally, the guideline should be structured in a manner that makes it a key reference document to complement Ground Control Management Plans.

LATROBE VALLEY GEOTECHNICAL INTEREST GROUP

The Latrobe Valley Geotechnical Interest Group (LVGIG) was established at the end of 2013 with the encouragement and support of the TRB. The LVGIG has obtained recognition from the Australian Geomechanics Society (AGS) and financial support from the AGS towards its seminar program. A steering committee chaired by Professor Mackay (TRB member) and comprising members of the Latrobe Valley geotechnical community was established at the first meeting to develop an annual program of seminars and symposiums. The September 2014 – August 2015 program is presented in Table 2.

Table 2: September 2014 – August 2015 seminar and symposium schedule of the LVGIG

Date	Seminar and Symposium Topics
21 October 2014	First Symposium on <i>Engineering in Brown Coal</i>
22 October 2014	Workshop on <i>Ground Control Management Plans</i>
13 February 2015	Seminar on <i>Introducing Geotechnical Design to Shallow Geothermal Systems</i>
16 June 2015	Seminar on <i>The Performance Characteristics of a Granular Base Using a Laboratory Wheel Tracking Device</i>
4 August 2015	Seminar on <i>Geotechnical Instrumentation and Monitoring</i>

It is pleasing to report on the success of the First Symposium on *Engineering in Brown Coal*. This had 85 attendees with the Opening Address being given by Ms Kylie White, Executive Director of Earth Resources and Regulation, DEDJTR. The symposium was followed by a half day workshop on Ground Control Management Plans co-presented by Professor Galvin (TRB member) and Mr Tim Sullivan (PSM).

The concept of a symposium was instigated by the TRB as one of a number of initiatives for achieving cultural change in how mine stability is managed in the Latrobe Valley. It was intended to provide a technology transfer vehicle for promoting the sharing of local information and technical understanding. In light of the success of the first symposium, it is proposed to hold a symposium every two years.

BATTER STABILITY PROJECT

The TRB considers that a substantial research effort is required to better understand the material and mechanical properties of brown coal and its local and regional behaviour as a basis for reliable design for mine stability and rehabilitation. Hence, it was involved in a significant program of work in September 2013 – August 2014 reporting period to develop a research project proposal and brief within the Department for a batter stability study at Yallourn Mine.

The TRB can report that very good progress was being made on the technical development of the project through short-term projects awarded in August 2014 to the Geotechnical and Hydrogeological Engineering Research Group (GHERG) at the Churchill Campus of Federation University (for data collation and evaluation) and to GHD Pty Ltd (for database design). These projects were focussed on assembling from the Latrobe Valley Regional Borehole Database a database centred specifically on the location of the 2007 batter failure at Yallourn Mine and on undertaking a preliminary review of this data. Professor Ian Johnston (TRB member) is Chair of the Technical Advisory Group for this work.

Preliminary designs and costings for site investigations, experimental work and the programming of activities required to execute the full project at the site of the 2007 Yallourn batter failure have also been completed by GHERG using funding from its continuation contract. However, the TRB has serious concerns that due primarily to protracted contractual and approval processes, little progress has been made since December 2014 towards formally commencing this vital project.

The TRB welcomed the approval of the project brief by government and the awarding of \$2.2M funding for this project in August 2014. It viewed this as a demonstration project and seed funding to encourage more research within the brown coal mining sector. However, the TRB did not anticipate the delays in the government initiating the research.

The nature and extent of the delays reflect that government is not well placed to be managing and undertaking such vital research. The TRB is of the view that much more effective use of government funds and timely progress could be achieved if the execution of projects of this nature were outsourced to a project manager.

BALLARAT GOLD PROJECT TAILINGS STORAGE FACILITY

In June 2015, a sinkhole developed near the upstream edge of the tailings storage facility (TSF) for the Ballarat Gold Project. The sinkhole was about 4 m across and 1.5 to 2 m deep. Two days after the sinkhole was reported, Mr Alan Moon (TRB member) inspected the site with Department staff, mine personnel and the mine's consultants.

Old mine adits had been observed in the area during construction of the tailings storage facility (TSF). At the time of the site visit, it was assumed that the most likely cause of the sinkhole was a localised collapse of the clay liner over an old unmapped adit and loss of tailings into it. Subsequent investigation confirmed this to be the case.

At no stage did the sinkhole pose a threat to the integrity of the tailings dam or to the public. The TRB was impressed with the mine operator's focus on safety, containment of the tailings, thorough investigation of the incident and risk management.

QUARRY MINING IN THE GOULBURN VALLEY FLOODPLAIN

The TRB was requested by the Department to meet with the Goulburn Broken Catchment Management Authority (GBCMA) and to visit a number of active and defunct quarry mining operations on the mid-Goulburn Valley floodplain in the vicinity of the township of Seymour. This was for the purpose of providing advice on risk to the environment and public infrastructure presented by these operations. The GBCMA, in particular, had expressed concerns that quarry mining operations could result in environment and infrastructure being adversely affected by scouring of watercourses and changes in the pathways of watercourses resulting from quarries becoming inundated (captured) during flood events.

The development of an extractive industry in the region is viewed by many as important to support future construction activities in Melbourne. Currently, there is a lack of policy and strategic planning in relation to quarry mining in the mid-Goulburn Valley floodplain. Environmental objectives are not well defined. There is some confusion arising out of a lack of distinction between mining effects, mining impacts and mining consequences, where these terms are ascribed the following meanings by the TRB:

- Effect – the nature of a mining-induced change to the environment.
- Impact – any physical change to the fabric of the ground, its surface, or a man-made feature resulting directly or indirectly from a mining-induced effect.
- Consequence – any change in the amenity, function or risk profile of a natural or man-made feature due to a mining-induced impact.

A GBCMA consultant has identified a range of quarry mining-induced effects and impacts and has classified the consequences of these impacts as 'intolerable' on the basis of what was little more than a desk top study. The consultant has determined that this consequence rating applies to all current floodplain quarrying operations in the vicinity of Seymour.

The TRB is aware that all of the effects and impacts of quarry mining in a floodplain as identified by the consultant to the GBCMA can occur in practice. However, currently there is insufficient information and studies available to assess if these could all occur in the context of the mid-Goulburn Valley; whether they occur on all occasions; and the consequences of their occurrence.

At one particular site inspected by the TRB, it is apparent that if the potential impacts identified by the consultant were to materialise there could be very serious consequences for critical public infrastructure. Therefore, the TRB has recommended that this site should be the subject of a detailed risk assessment. This advice has been accepted by the Department.

The TRB is of the view that there is currently insufficient local information, experience and modelling to make a proper assessment of the risks presented by quarry mining in the mid-Goulburn Valley. If the extractive industry is to develop in a sustainable manner in the mid-Goulburn Valley floodplain, the TRB recommends that the Department seek the views of a broader scientific and engineering community in order to establish the extent and magnitude of quarry mining-induced impacts and consequences likely to be experienced in this local setting. This needs to be supported by a resource study to inform high level policy making and strategic planning. It is recommended that the required views and study are led by Minerals Development Victoria, or another equivalent planning body, and not by Earth Resources Regulation.

REHABILITATION

The TRB has been reporting since 2012 that it considers the original measures proposed for the rehabilitation of the Latrobe Valley brown coal mines fall well short of what could reasonably be considered as adequate. It was noted then that experience was revealing that rehabilitation is a far more complex matter than envisaged when rehabilitation plans were developed as part of the Work Plans for the mines. This view has been reinforced with the passage of time and subsequent incidents.

Successful rehabilitation is dependent on undertaking considerable further research into material properties and behaviour mechanics of brown coal. Rehabilitation is nowhere near as straightforward as the often envisaged concept of allowing the mines to flood and grading and top dressing those portions of the batters above the final water level. Each batter within each mine needs to be assessed on its own merits. This is one reason why the TRB considers the Batter Stability Project to be a high priority, albeit that it only makes a start at addressing all the issues.

Rehabilitation assumed a higher profile in the current reporting period due to the focus of the Hazelwood Mine Fire Inquiry on fire fighting activities on the Hazelwood Mine batters and on covering batters to reduce fuel load; the development of another sinkhole in Latrobe Road; and the C87 Traralgon Panel Growth Report. The application of high volumes of water during fire fighting activities has the potential to induce batter instability. Conversely, sealing batters to reduce the fuel load has the potential to result in a build up of water pressure with coal joints during heavy rainfall events, with a corresponding reduction in batter stability, unless ongoing monitoring and management plans are developed and sustained in the long term.

Mining-induced ground movements are not necessarily confined to the immediate vicinity of a batter face but can extend well beyond one kilometre of the crest of a batter. The consequence of these movements for infrastructure is a function of the distance of the infrastructure from the crest of the mine and its tolerance to ground subsidence, curvature, strain and tilt. Tolerance can be engineered into a structure to some degree but it comes at a cost. The function of a man-made structure and the consequences associated with it becoming unserviceable or unsafe are important considerations when determining the trade-off between designing infrastructure to tolerate designated levels of ground movement versus locating it a sufficient distance back from the mine crest. This issue appears to have received little attention in the Latrobe Valley to date. It is well established in some black coal sectors.

The elevated importance of rehabilitation is reflected in the expanded TOR for the TRB. This will be a consideration when reconstituting the membership of the TRB in its next term, which commences in September 2015.

INDUSTRY ENGAGEMENT AND COLLABORATION

In its 2012–13 Annual Report, the TRB discussed the need to foster greater engagement and collaboration amongst all stakeholders. An initiative introduced during the current reporting period was to meet informally with industry senior management for half a day each quarter to explore issues and views. After a good start, the initiative was stalled to some extent by a range of factors including the Hazelwood Mine Fire Inquiry. It will be resumed at the first opportunity.

DEPARTMENT CAPABILITIES

Although the TOR for the TRB remain highly relevant, the scope, scale and seriousness of issues which the TRB now deals with under these TOR are significantly different to those envisaged when it was formed. The Department has responded to this situation in a number of ways that include employing additional technical staff, engaging consultants, and referring detailed reports to the TRB for analysis and advice.

With few exceptions, issues referred to the TRB by the Department have been in reaction to an incident or crisis. Often, the accompanying material has not been analysed and distilled within the Department prior to referral to the TRB. This is not conducive to the TRB operating proactively and at a strategic level. The TRB is becoming increasingly concerned that the Department does not appear to have a clear program for resolving issues when they emerge and

the capability to embed and sustain a number of initiatives important to improving the management of mine stability and rehabilitation.

In going forward, the TRB considers that there is a need for government to review:

- the legislative structures under which Earth Resources and Regulation (ERR) operates;
- the technical and managerial competencies required within ERR;
- the competencies of those currently filling technical and regulatory roles within ERR;
- the composition of the TRB, both in terms of competencies and stakeholder representation, and whether it may be timely to revise the TRB model; and
- the purpose, content, level of detail and regulatory oversight of Work Plans.

5.0 GHERG

Reviews of GHERG are undertaken twice annually by the Department to evaluate progress. In September 2014, DEDJTR extended funding of the Geotechnical and Hydrogeological Engineering Research Group (GHERG) at Federation University through to June 2019. The four areas of research outlined at the commencement of the new funding period were:

- extension of the geotechnical model;
- monitoring;
- geo-environmental change; and
- mine rehabilitation.

These areas of research have been progressed through nine research projects, including the detailed planning of field and laboratory investigations for the earlier noted Batter Stability Project that is presently awaiting final approval from the Department.

As part of the new funding agreement, GHERG has expanded its laboratory facilities to include a broader range of geotechnical testing equipment required both for the Batter Stability Project and for the wider research activities of GHERG's staff and students. This equipment base is complemented by state-of-the-art finite element geotechnical and multi-physics modelling software and high performance computing facilities. The software allows a full range of analysis to be carried out to resolve the processes and properties being tested in the laboratory with the new equipment, as well as to perform field-scale and mine-scale analyses of groundwater flow and ground movements.

In addition to its research program, GHERG has continued development of the new Masters in Geomechanics and Geohydrology, which is delivered as a distance learning program. The course is attracting good interest both regionally and nationally. GHERG has also provided significant support to the seminar program of the Latrobe Valley Geotechnical Interest Group throughout the year.

6.0 GOING FORWARD

During the first half of the September 2015 – August 2016 reporting period, the TRB has committed (with the Minister's approval) to assisting the Hazelwood Mine Fire Inquiry in relation to progressive and permanent rehabilitation. TRB membership will be reconstituted to reflect the recent change in the TOR of the TRB to now include rehabilitation. Rehabilitation has been a matter of concern to the TRB for some time as reflected in its past annual reports and the TRB welcomes this change.

The importance of research into batter stability for reasons of both mine stability and rehabilitation cannot be overstated. The TRB urges commencement of the Batter Stability Project. This project will only address a small portion of the issues and new research initiatives will also be required.

A number of matters remain "works in progress". These include quarry mining in floodplains, the closure plan for Anglesea Coal Mine, and cultural change initiatives such as regular engagement with senior mine management and the fostering of workshops and seminars.

