



**HAZELWOOD MINE
FIRE INQUIRY
REPORT 2015/2016
VOLUME IV –
MINE REHABILITATION**



Hazelwood
Mine Fire
Inquiry



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**HAZELWOOD MINE FIRE INQUIRY REPORT
2015/2016 VOLUME IV – MINE REHABILITATION**

THE HON. BERNARD TEAGUE AO – CHAIRPERSON

PROF. JOHN CATFORD – BOARD MEMBER

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Hazelwood Mine Fire Inquiry

LETTER OF TRANSMISSION

The Honourable Linda Dessau AM
Governor of Victoria
Government House
Melbourne VIC 3004

7 April 2016

Your Excellency

In accordance with the Terms of Reference dated 26 May 2015 and subsequently updated on 5 November 2015 and 17 March 2016, we have the honour of presenting to you the fourth and final volume of the report of the 2015–16 Hazelwood Mine Fire Inquiry.

This volume addresses paragraphs 8, 9 and 10 of the Terms of Reference relating to the short, medium and long-term options to rehabilitate the Hazelwood mine, the Yallourn mine and the Loy Yang mine. It considers the adequacy and effectiveness of the current rehabilitation liability assessments and rehabilitation bond systems, having regard to the rehabilitation liability assessments that have been reported in 2015 by the mine operators, as required by the *Mineral Resources (Sustainable Development) Act 1990* (Vic), and to the outcome of the Rehabilitation Bond Review Project.

The report discusses the rehabilitation plans of the Latrobe Valley mines, the role of the government and key agencies in mine regulation and rehabilitation, viable rehabilitation options and assessment of these options, rehabilitation liability assessments, effectiveness of the rehabilitation bond system, alternative financial assurance mechanisms, other outstanding issues requiring consideration, and future coordination and collaboration.

The Board makes several recommendations, affirmations and commendations as a result of this Inquiry.

The Board would like to acknowledge Mrs Anita Roper for her invaluable contribution to the Inquiry from 26 May to 26 November 2015. Over this period, being the majority of the Inquiry, she contributed an enormous amount to all Terms of Reference, but in particular to the direction, scope and engagement of community, industry and government agencies for paragraphs 8, 9 and 10. The Inquiry benefitted from Mrs Roper's great experience of the mining industry. Regrettably, Mrs Roper was unable to continue as a Board member after 26 November 2015 due to a medical condition.

Undertaking this work has been a privilege and we would like to thank the people of the Latrobe Valley for their hospitality and generosity. We also appreciate the contribution of the community, industry and government agencies to the Inquiry's conclusions and recommendations.

Yours sincerely

The Hon. Justice Bernard Teague AO

Prof. John Catford



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Inquiries Act 2014

APPOINTMENT OF A BOARD OF INQUIRY INTO THE HAZELWOOD COAL MINE FIRE

Order in Council

The Governor in Council, on the recommendation of the Premier under section 53(1) of the **Inquiries Act 2014**, appoints:

- the Honourable Bernard George Teague AO;
- Professor John Charles Catford; and
- Mrs Anita Michele Roper

to constitute a Board of Inquiry to inquire into and report on the terms of reference specified in paragraphs 6 to 11 of this Order.

The Honourable Bernard George Teague AO is appointed as Chairperson of the Inquiry.

This Order comes into effect on the date it is published in the Government Gazette.

BACKGROUND

1. In early February 2014 a fire ignited which, on or about 9 February 2014, took hold in the Hazelwood Coal Mine.
2. The Hazelwood Coal Mine Fire impacted the Latrobe Valley communities.
3. In March 2014, a Board of Inquiry was established to inquire into and report on the following specified matters:
 1. *The origin and circumstances of the fire, including how it spread into the Hazelwood Coal Mine.*
 2. *The adequacy and effectiveness of the measures taken by or on behalf of the owner, operator and licensee of the Hazelwood Coal Mine to prevent the outbreak of a fire, and to be prepared to respond to an outbreak of a fire including mitigating its spread and severity, in the Hazelwood Coal Mine, including whether the owner, operator and licensee of the Hazelwood Coal Mine, or any person or entity acting on behalf of any of them:*
 - i. *implemented the recommendations arising from reviews of previous events; and*
 - ii. *in the opinion of the Board, breached or did not comply with the requirements of (or under) any relevant statute or regulation, including any notification or directive given under such statute or regulation and any code of practice, management plan or similar scheme, developed and/or implemented due to such requirements.*
 3. *The adequacy and effectiveness of the application and administration of relevant regulatory regimes in relation to the risk of, and response to, fire at the Hazelwood Coal Mine.*
 4. *The adequacy and effectiveness of the response to the Hazelwood Coal Mine Fire by:*
 - i. *the owner, operator and licensee of the Hazelwood Coal Mine;*
 - ii. *the emergency services; and*
 - iii. *other relevant government agencies, including environmental and public health officials,**and in particular, the measures taken in respect of the health and well-being of the affected communities by:*

SPECIAL

- iv. *informing the affected communities of the Hazelwood Coal Mine Fire and about its known effects and risks; and*
- v. *responding to those effects on, and risks to, the affected communities.*
- 5. *Any other matter reasonably incidental to the matters specified in paragraphs 1 to 4.*
- 4. That Inquiry's report was tabled in the Victorian Parliament on 2 September 2014.
- 5. Since that report was tabled, further concerns have been raised about the potential health impacts of the fire on the Latrobe Valley communities and future options for rehabilitating Victorian mines in the Latrobe Valley.

TERMS OF REFERENCE

You are required to inquire into and report on the following terms of reference:

- 6. Whether the Hazelwood Coal Mine Fire contributed to an increase in deaths, having regard to any relevant evidence for the period 2009 to 2014;
- 7. Short, medium and long term measures to improve the health of the Latrobe Valley communities having regard to any health impacts identified by the Board as being associated with the Hazelwood Coal Mine Fire;
- 8. Short, medium and long term options to rehabilitate:
 - (a) land on which work has been, is being or may lawfully be done in accordance with a Work Plan approved for the Hazelwood Mine, the Yallourn Mine, and the Loy Yang Mine; and
 - (b) land in relation to which an application for variation of the Work Plan is under consideration for the Hazelwood Mine, the Yallourn Mine, or the Loy Yang Mine;
- 9. For each rehabilitation option identified under paragraph 8:
 - (a) whether, and to what extent, the option would decrease the risk of a fire that could impact the mine and if so, the cost of the option relative to the cost of other fire prevention measures;
 - (b) whether, and to what extent, the option would affect the stability of the mine;
 - (c) whether, and to what extent, the option would create a stable landform and minimise long term environmental degradation;
 - (d) whether, and to what extent, the option would ensure that progressive rehabilitation is carried out as required under the **Mineral Resources (Sustainable Development) Act 1990**;
 - (e) the estimated timeframe for implementing the option;
 - (f) the option's viability, any associated limitations and its estimated cost;
 - (g) the impact of the option on any current rehabilitation plans for each mine;
 - (h) whether, and to what extent, the option would impact the future beneficial use of land areas impacted by the mines; and
 - (i) whether the option is otherwise sustainable, practicable and effective;
- 10. Having regard to the rehabilitation liability assessments that have been or will be reported in 2015 by the operators of each of the Hazelwood Mine, the Yallourn Mine, and the Loy Yang Mine, as required by the **Mineral Resources (Sustainable Development) Act 1990**, and to the outcome of the Rehabilitation Bond Review Project:
 - (a) whether the rehabilitation liability assessments referred to above are adequate;
 - (b) whether the current rehabilitation bond system, being one of the measures to provide for progressive rehabilitation by end of mine life as required under the **Mineral Resources (Sustainable Development) Act 1990**, is, or is likely to be, effective for the Hazelwood Mine, the Yallourn Mine, and the Loy Yang Mine; and

- (c) any practical, sustainable, efficient and effective alternative mechanisms to ensure rehabilitation of the mines as required by the **Mineral Resources (Sustainable Development) Act 1990**;
- 11. Sustainable, practical and effective options that could be undertaken by the mine operator to decrease the risk of fire arising from or impacting the Anglesea Mine for the 2015/2016 summer season, noting the impending closure of the mine on 31 August 2015; and
- 12. Any other matter that is reasonably incidental to those set out in paragraphs 6 to 10.

REPORTING DATES

You must report your findings and any recommendations to the Governor as soon as possible, and not later than:

- (a) 31 August 2015, in respect of the Anglesea mine Term of Reference in paragraph 11 of this Order, and any reasonably incidental matters;
- (b) 2 December 2015, in respect of the Health Terms of Reference, and any reasonably incidental matters; and
- (c) 15 March 2016, in respect of the Mine Terms of Reference, and any reasonably incidental matters.

CONDUCTING THE INQUIRY

- 13. You may:
 - (a) conduct your inquiry as you consider appropriate, subject to the requirements of procedural fairness, including by adopting any informal and flexible procedures to: engage with the relevant local communities; ascertain the relevant facts as directly and effectively as possible; and avoid unnecessary cost or delay;
 - (b) have regard to any research, past inquiries, reports and evaluations that may inform your inquiry and avoid unnecessary duplication;
 - (c) have regard to any documents, things or evidence received by, and any matters submitted to, the Board of Inquiry referred to in paragraph 3 as if those documents, things or evidence had been received by you, or those matters had been submitted to you, as the case may be, for the purposes of your inquiry and any report or reports under this Order;
 - (d) consult with the relevant local communities; and
 - (e) consult with and engage experts (including Australian legal practitioners) as necessary to provide relevant advice and assistance.
- 14. You must conduct your inquiry in accordance with this Order, the **Inquiries Act 2014**, and all other relevant laws.
- 15. It is anticipated that in conducting your inquiry you will, to the extent you think it appropriate, work co-operatively with, and seek not to prejudice, any ongoing response or recovery activities or investigations into the Hazelwood Coal Mine Fire.
- 16. The powers of the Board of Inquiry, at the discretion of the Chairperson may, at any time, be exercised by one or more Inquiry members.

BUDGET

- 17. You may incur expenses and financial obligations to be met from the Consolidated Fund up to \$3.378 million in conducting this Inquiry.

DEFINITIONS

- 18. In this Order:

Anglesea Mine means the land the subject of the Mines Aluminium Agreement (Agreement 6829) as in force from time to time, which was ratified by the **Mines (Aluminium Agreement) Act 1961**;

Hazelwood Coal Mine Fire means the fire that took hold in the Hazelwood Mine on or about 9 February 2014;

Hazelwood Mine means the land the subject of Mining Licence Number 5004, as in force from time to time;

Health Terms of Reference means the terms of reference in paragraphs 6 and 7 of this Order;

Loy Yang Mine means the land the subject of Mining Licence Number 5189, as in force from time to time;

Mine Terms of Reference means the terms of reference in paragraphs 8, 9 and 10 of this Order;

Rehabilitation Bond Review Project means the current review into rehabilitation bonds and the methodology by which they are calculated, as referred to at page 1612, lines 7–8 of the transcript of the Hazelwood Mine Fire Inquiry dated 10 June 2014;

Work Plan means a work plan approved under the **Mineral Resources (Sustainable Development) Act 1990** or endorsed pursuant to clause 21A of the Agreement set out in Schedule 1 to the **Mines (Aluminium Agreement) Act 1961**, as amended by the Amendment Agreement set out in Schedule 2 to that Act, as the case may be;

Yallourn Mine means the land the subject of Mining Licence Number 5003, as in force from time to time.

Dated 26 May 2015

Responsible Minister:

THE HON DANIEL ANDREWS MP

Premier

YVETTE CARISBROOKE
Clerk of the Executive Council



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Inquiries Act 2014

AMENDMENT TO THE TERMS OF REFERENCE FOR THE BOARD OF INQUIRY INTO THE HAZELWOOD COAL MINE FIRE

Order in Council

The Governor in Council under section 53 of the **Inquiries Act 2014**, amends the Order in Council dated 26 May 2015 establishing the Board of Inquiry into the Hazelwood Coal Mine Fire by:

1. For paragraphs (b) and (c) under the heading ‘Reporting Dates’ **substitute** –
 - “(b) 2 December 2015, in respect of the Term of Reference in paragraph 6 of this Order, and any reasonably incidental matters; and
 - (c) 29 January 2016, in respect of the Term of Reference in paragraph 7 of this Order, and any reasonably incidental matters; and”
2. After paragraph (c) under the heading ‘Reporting Dates’ **insert** –
 - “(d) 15 March 2016, in respect of the Mine Terms of Reference, and any reasonably incidental matters.”

Dated 4 November 2015

Responsible Minister

THE HON. DANIEL ANDREWS MP

Premier

MATTHEW McBEATH
Clerk of the Executive Council



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Inquiries Act 2014

FURTHER AMENDMENT TO THE TERMS OF REFERENCE FOR THE BOARD OF INQUIRY INTO THE HAZELWOOD COAL MINE FIRE

Order in Council

The Governor in Council under section 53 of the **Inquiries Act 2014**, further amends the Order in Council dated 26 May 2015 establishing the Board of Inquiry into the Hazelwood Coal Mine Fire by:

1. For paragraph (d) under the heading 'Reporting Dates', as per the Terms of Reference amended by Order in Council of 4 November 2015 **substitute** –
'(d) 8 April 2016, in respect of the Mine Terms of Reference, and any reasonably incidental matters.'
2. After paragraph 16 under the heading 'Conducting the Inquiry' **insert** –
'16A. The Chairperson may determine from time to time that any of the functions of the Board of Inquiry may be performed by one or more members separately. This includes, but is not limited to, the function of the Board of Inquiry reporting its findings and any recommendations to the Governor in respect of the Mine Terms of Reference, and any reasonably incidental matters.'

Dated 15 March 2016

Responsible Minister:
THE HON DANIEL ANDREWS MP
Premier

ANDREW ROBINSON
Clerk of the Executive Council

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GUIDE TO READING THIS REPORT

This report constitutes the Board of Inquiry's response to paragraphs 8, 9 and 10 of the 2015–16 Hazelwood Mine Fire Inquiry's Terms of Reference. Terms of Reference 8, 9 and 10 require the Board to inquire into, report on, and make any recommendations that it considers appropriate in relation to short, medium and long-term options to rehabilitate the Hazelwood mine, the Yallourn mine and the Loy Yang mine; the adequacy and effectiveness of the current rehabilitation liability assessments and rehabilitation bond system; and what alternative financial mechanisms are available to ensure that rehabilitation is carried out pursuant to the requirements of the *Mineral Resources (Sustainable Development) Act 1990 (Vic)* (Mineral Resources Act). The Board is also required by Term of Reference 12 to inquire into, and report on, any other matter that is reasonably incidental to Terms of Reference 8, 9 and 10.

KEY TERMS

In this report, the term 'State' is used broadly to encompass the Victorian Government and the Victorian public service.

The term 'Mining Regulator' refers to the Earth Resources Regulation Branch of the Department of Economic Development, Jobs, Transport and Resources and its various predecessors (noting that other government departments and agencies also have responsibility for aspects of mine regulation in Victoria).

The term 'mine operators' refers to the operators of the Yallourn mine (EnergyAustralia Yallourn Pty Ltd), the Hazelwood mine (GDF Suez Australian Energy) and the Loy Yang mine (AGL Loy Yang Pty Ltd). The term 'mine operators' is also used to refer to licence holders of the Yallourn, Hazelwood and Loy Yang mines.

Term of Reference 8 does not define 'short', 'medium' or 'long-term'. The Board has therefore adopted the following time periods:

Short-term: from now until the end of mining operations.

Medium-term: from the end of mining operations to 15 years after the end of mining operations.

Long-term: the period commencing 15 years after the end of mining operations.

Other key mining terms are defined in Part 2 and the glossary of this report.

Part 1 of this report, INTRODUCTION TO THE INQUIRY, provides an overview of the Inquiry. This Part discusses how the implementation of the Board's recommendations should be monitored. It also provides a summary of the Board's observations and learnings throughout the 2015–16 Hazelwood Mine Fire Inquiry that it believes should be shared to help inform any future inquiries opened by the State.

Part 2 of this report, BACKGROUND INFORMATION, contains important background information relevant to the Board's inquiry, and a context for informing consideration of Terms of Reference 8, 9 and 10. This Part includes information about the community, landscape, geology and hydrogeology of the Latrobe Valley (the region where the Yallourn, Hazelwood and Loy Yang mines are situated); information on the Latrobe Valley's coal resource; key mining terms that are used throughout this report; a history of mining in the Latrobe Valley up until the mines were privatised in the mid-1990s; and current State, Commonwealth and international policy relevant to the long-term future of coal-fired power generation.

Part 3 of this report, **THE ROLE OF GOVERNMENT AND KEY AGENCIES**, provides an overview of the regulatory framework relevant to the rehabilitation of mines and the financial mechanisms that ensure that rehabilitation occurs. This Part outlines the complex and multilayered legislative framework that governs the establishment, operation and rehabilitation of mine sites in Victoria. It also contains information on agencies that have key roles in regulating mine rehabilitation.

Part 4 of this report, **THE LATROBE VALLEY MINES**, details the current features of each mine—such as their location, size and scale of operation—to provide further context for considering rehabilitation options. This Part summarises the mining licence, current and future work plans and rehabilitation plans of each mine. Part 4 also includes an overview of current water licensing arrangements in the Latrobe Valley.

Part 5 of this report, **VIABLE REHABILITATION OPTIONS**, addresses Term of Reference 8, which asks the Board to consider short, medium and long-term rehabilitation options. It considers the aims and objectives of mine rehabilitation, and identifies potential final rehabilitated landforms for open cut mines. It then assesses these options to identify which are potentially viable for the rehabilitation of the Latrobe Valley mines. The Board commissioned a report from Jacobs Group (Australia) Pty Ltd to inform this assessment, and convened a meeting of technical experts, which resulted in the development of a joint expert report. Part 5 is further informed by the submissions and evidence of the mine operators, the State, key stakeholders, the community, and the advice of geotechnical, hydrogeological and mine rehabilitation experts.

Part 6 of this report, **ASSESSMENT OF REHABILITATION OPTIONS**, responds to Term of Reference 9, which asks the Board to assess the potential options against a range of criteria. This Part assesses the most viable option identified in Part 5 in relation to fire risk, stability, water quality and availability, progressive rehabilitation, timelines for implementation, costs, future land use, impacts on current rehabilitation plans, and the option's viability and associated limitations.

Part 7 of this report, **REHABILITATION LIABILITY ASSESSMENTS**, considers Term of Reference 10(a), which requires the Board to assess whether the mine operators' 2014–15 rehabilitation liability assessments are adequate, having regard to the outcome of the Rehabilitation Bond Review Project. The Board heard evidence from each of the mine operators and the State about the rehabilitation liability assessments submitted in 2015. The Board also heard from representatives of the State about the Rehabilitation Bond Review Project, which is incomplete.

Part 8 of this report, **EFFECTIVENESS OF THE REHABILITATION BOND SYSTEM**, responds to Term of Reference 10(b), which asks the Board to consider whether the current rehabilitation bond system is effective. The system's effectiveness is assessed against whether it provides security to the State should a mine operator default on its rehabilitation liability, and whether it acts as an incentive for mine operators to progressively rehabilitate mine sites. This Part outlines issues with the bond system and its implementation, and provides the Board's views on interim bond increases.

Part 9 of this report, ALTERNATIVE FINANCIAL ASSURANCE MECHANISMS, responds to Term of Reference 10(c), which requires the Board to consider any practical, sustainable, efficient and effective alternative financial assurance mechanisms that might be employed to ensure that rehabilitation is carried out pursuant to the Mineral Resources Act. The Board commissioned a report from Accent Environmental Pty Ltd about alternative mechanisms, and heard evidence from mine rehabilitation and economics experts, the State and key stakeholders.

Part 10 of this report, OUTSTANDING ISSUES REQUIRING RESOLUTION, responds to Term of Reference 12, which asks the Board to consider matters that are reasonably incidental to Terms of Reference 8, 9 and 10. In the context of the regulatory framework and its implementation, this Part discusses the adequacy of the work plans and rehabilitation plans as approved by the Mining Regulator; the consideration and action taken to verify water availability for the purpose of rehabilitation; and the adequacy of engagement with the Latrobe Valley community about rehabilitation.

Part 11 of this report, COORDINATION AND COLLABORATION, focuses on the benefits of increased collaboration and coordination of mine rehabilitation in the Latrobe Valley. This matter falls within Term of Reference 12. The Board commissioned Jacobs Group (Australia) Pty Ltd to conduct an independent review of potential coordinating mechanisms. This Part outlines the Board's views on the need for an independent coordinating body for mine rehabilitation in the Latrobe Valley, with two structures examined in greater detail—a Commissioner model and a statutory authority.

Part 12 of this report, RECOMMENDATIONS, AFFIRMATIONS AND COMMENDATIONS, summarises the Board's conclusions and presents the Board's recommendations, affirmations and commendations.



PART ONE
INTRODUCTION
TO THE INQUIRY

PART 1 INTRODUCTION TO THE INQUIRY

The 2014 Hazelwood Mine Fire Inquiry was held from February to September 2014. On 26 May 2015, The Honourable Lily D'Ambrosio MP, Minister for Energy and Resources, and The Honourable Jill Hennessy MP, Minister for Health, announced the re-opening of the Inquiry. The purpose of the re-opened Inquiry is to investigate and report on whether the 2014 Hazelwood mine fire contributed to an increase in deaths; measures to improve the health of the Latrobe Valley; rehabilitation options and rehabilitation bonds for Latrobe Valley coal mines; and minimising fire risks at Anglesea coal mine for the 2015–16 fire season.

TERMS OF REFERENCE

This report addresses paragraphs 8, 9 and 10 of the Hazelwood Mine Fire Board of Inquiry's Terms of Reference. The Board is to inquire into, report on, and make any recommendations that it considers appropriate in relation to the following:

8. Short, medium and long-term options to rehabilitate:
 - a. land on which work has been, is being or may lawfully be done in accordance with a work plan approved for the Hazelwood mine, the Yallourn mine, and the Loy Yang mine
 - b. land in relation to which an application for variation of the Work Plan is under consideration for the Hazelwood mine, the Yallourn mine, or the Loy Yang mine.
9. For each rehabilitation option identified under paragraph 8:
 - a. whether, and to what extent, the option would decrease the risk of a fire that could impact the mine and if so, the cost of the option relative to the cost of other fire prevention measures
 - b. whether, and to what extent, the option would affect the stability of the mine
 - c. whether, and to what extent, the option would create a stable landform and minimise long-term environmental degradation
 - d. whether, and to what extent, the option would ensure that progressive rehabilitation is carried out as required under the *Mineral Resources (Sustainable Development) Act 1990 (Vic)*
 - e. the estimated timeframe for implementing the option
 - f. the option's viability, any associated limitations and its estimated cost
 - g. the impact of the option on any current rehabilitation plans for each mine
 - h. whether, and to what extent, the option would impact the future beneficial use of land areas impacted by the mines
 - i. whether the option is otherwise sustainable, practicable and effective.
10. Having regard to the rehabilitation liability assessments that have been or will be reported in 2015 by the operators of each of the Hazelwood mine, the Yallourn mine, and the Loy Yang mine, as required by the *Mineral Resources (Sustainable Development) Act 1990 (Vic)*, and to the outcome of the Rehabilitation Bond Review Project:
 - a. whether the rehabilitation liability assessments referred to above are adequate
 - b. whether the current rehabilitation bond system, being one of the measures to provide for progressive rehabilitation by end of mine life as required under the *Mineral Resources (Sustainable Development) Act 1990 (Vic)*, is, or is likely to be, effective for the Hazelwood mine, the Yallourn mine, and the Loy Yang mine
 - c. any practical, sustainable, efficient and effective alternative mechanisms to ensure rehabilitation of the mines as required by the *Mineral Resources (Sustainable Development) Act 1990 (Vic)*.

Under paragraph 18 of the Terms of Reference:

Hazelwood mine means the land the subject of Mining Licence Number 5004, as in force from time to time.

Loy Yang mine means the land the subject of Mining Licence Number 5189, as in force from time to time.

Yallourn mine means the land the subject of Mining Licence Number 5003, as in force from time to time.

Rehabilitation Bond Review Project means the current review into rehabilitation bonds and the methodology by which they are calculated, as referred to at page 1612, lines 7–8 of the transcript of the Hazelwood Mine Fire Inquiry dated 10 June 2014.

Work Plan means a work plan approved under the *Mineral Resources (Sustainable Development) Act 1990* (Vic) or endorsed pursuant to clause 21A of the Agreement set out in Schedule 1 to the *Mines (Aluminium Agreement) Act 1961* (Vic), as amended by the Amendment Agreement set out in Schedule 2 to that Act, as the case may be.

ESTABLISHMENT OF THE INQUIRY

THE BOARD

On 26 May 2015, the Governor in Council established the Hazelwood Mine Fire Board of Inquiry and appointed the following Board members:

BERNARD TEAGUE, CHAIRPERSON

Justice Bernard Teague AO was a Supreme Court Judge from 1987 to 2008. During this period he also chaired the Adult Parole Board and the Victorian Forensic Leave Panel, and was a Council member at the Institute of Forensic Mental Health. Prior to his appointment to the Supreme Court, Justice Teague was a solicitor specialising in defamation and other civil law.

Justice Teague was Chair of the 2009 Victorian Bushfires Royal Commission and Chair of the 2014 Hazelwood Mine Fire Inquiry.

JOHN CATFORD, BOARD MEMBER

Professor Emeritus John Catford is a registered medical practitioner and the Executive Director, Academic and Medical, of the Epworth HealthCare Group.

Professor Catford has been a Professor of public health for 30 years and has held senior academic and health service management positions in Australia and the United Kingdom, and with the World Health Organization. In 2008, Professor Catford led the establishment of the School of Medicine at Deakin University in Geelong. He was appointed Vice President and Deputy Vice Chancellor of Deakin University in 2011.

Professor Catford was a Board member of the 2014 Hazelwood Mine Fire Inquiry.

ANITA ROPER, BOARD MEMBER

Mrs Anita Roper is an experienced Director with a strong background in sustainability. Her career spans the public and private sectors. She has over 30 years of experience in senior management roles working with business, government, communities and multilateral agencies in Australia and internationally. She is currently a Director of Yarra Valley Water, a Board member of the Fitzroy Football Club, and a member of the Victorian Public Sector Commission Advisory Board.

Mrs Roper's previous roles include Chief Executive Officer at Sustainability Victoria and Global Director of Sustainability with Alcoa (New York). She has also previously served as a non-executive Director of Pacific-Hydro and as Chair of the Board's Health, Safety, Sustainability and People Committee; as a member of AngloGold Ashanti's Global Panel on Sustainability; and as a Board member of the Women's Network for a Sustainable Future (New York).

Mrs Roper's mining industry background saw her play a lead role in the engagement of stakeholders and the development of the approach adopted by the Board in inquiring into Terms of Reference 8, 9 and 10. Her knowledge and insight around key rehabilitation issues, combined with her engaging and open manner, proved invaluable in discussions held with the mine operators, agencies and the community.

Regrettably from late November 2015, Mrs Roper was no longer able to participate as a Board member due to a medical condition.

On 17 March 2016, the Terms of Reference were amended to empower the Chairperson to determine that the Board, for this report, is constituted by Justice Teague and Professor Catford. The Chairperson so determined on 22 March 2016.

HAZELWOOD MINE FIRE INQUIRY SECRETARIAT

The Hazelwood Mine Fire Inquiry Secretariat was established to support the Board of Inquiry. Ms Genelle Ryan headed the Secretariat. Members of the Secretariat are listed in Appendix A. The Board thanks them for their professionalism, dedication and commitment to this Inquiry. Throughout the period of the Inquiry, Secretariat staff were required to travel extensively, work extended hours and undertake demanding tasks within short deadlines relating to the diverse Terms of Reference which were operating concurrently. The Secretariat was greatly benefitted by its staff with expert knowledge relating to the Terms of Reference, in particular Mr Andrew Radojkovic and Ms Cassie Nicholls for their contribution to this report. The Board also acknowledges K&L Gates, in particular Ms Justine Stansen, for contributing legal expertise.

COUNSEL ASSISTING

Counsel Assisting, Mr Peter Rozen and Ms Ruth Shann, provided the Board with legal advice and guidance throughout the Inquiry. They also managed the Inquiry's series of four public hearings and forums which were held in various locations including Anglesea, Melbourne, Morwell and Traralgon.

The Board recognises the significant contribution that Counsel Assisting, assisted by the Secretariat, made to the concurrent management of these hearings (totalling 15 days) as well as the Health Improvement Forums (totalling five days). These public events also required extensive travel, extended hours, as well as excellent advocacy and facilitation skills. The Board thanks Mr Rozen and Ms Shann for their assistance.

ACKNOWLEDGEMENTS

For their assistance throughout the Inquiry, the Board thanks the government departments and agencies contributing to the Inquiry, the Victorian Government Solicitor and his office, EnergyAustralia Yallourn Pty Ltd and its solicitor Clayton Utz, GDF Suez Australian Energy and its solicitor King & Wood Mallesons, AGL Loy Yang Pty Ltd and its solicitor Ashurst Australia, and Environment Victoria and its solicitor Environmental Justice Australia.

THE BOARD'S APPROACH

The Board recognised that effectively conducting this Inquiry required genuine engagement with the Latrobe Valley community. The Board emphasised transparency and accessibility throughout this Inquiry and endeavoured to hear and understand the concerns of the Latrobe Valley community relevant to paragraphs 8, 9 and 10 of the Inquiry's Terms of Reference. Members of the Board, Counsel Assisting, Secretariat staff, an international mine rehabilitation expert, and consultants from Jacobs Group (Australia) Pty Ltd visited the Latrobe Valley as part of this Inquiry.

COMMUNITY CONSULTATIONS

On 4 and 5 August 2015, the Board held five facilitated community consultation sessions in Traralgon and Morwell. Seventy-two people attended the consultations, including representatives from the Latrobe Valley's three mine operators and various community groups. At the consultations, the Board provided an overview of the Inquiry and invited participants to discuss the following questions:

- Question 1: What are the long-term infrastructure needs of the Latrobe Valley that the mine sites could deliver?
- Question 2: What should be done towards these desired ends while these mine sites are still operating?

Issues raised by community participants during these consultations, and considered by the Board as part of this Inquiry, related to the themes of job creation; safety and stability of the mines; communication and community engagement; roles and responsibilities in rehabilitation; integration of planning and rehabilitation approaches; revegetation; alternative uses for coal and the mine sites; and ongoing maintenance and monitoring of the mine sites.

The Board also considered issues raised by community participants regarding final land use (how the rehabilitated mine sites could be used after rehabilitation). Themes raised included waste management, alternative energy generation, conservation, flood management, industry development, recreation and tourism.

The Board thanks the community members and the mine operators' representatives who attended the community consultations and provided the Board with invaluable insights and information.

PUBLIC SUBMISSIONS

Individuals and organisations further contributed to this Inquiry by making public submissions. The Board accepted written submissions specific to Terms of Reference 8, 9 and 10, until 24 August 2015. Board members read and considered all written submissions (listed at Appendix B). Common themes in these submissions included rehabilitation options; final landforms and land use; community engagement and regional planning; safety and stability of mines; adequacy of rehabilitation bonds; and potential improvements to the current bond system.

COMMUNICATIONS

A website (<http://hazelwoodinquiry.vic.gov.au/>) was established for the 2014 Hazelwood Mine Fire Inquiry. This website was updated when the Inquiry was re-opened, and has since been continuously updated to provide information to the Latrobe Valley and broader Victorian community about the Board, Terms of Reference, public submissions, community consultations, and public hearings. The Latrobe Valley community was further informed about how they could participate in, or attend the Inquiry, through brochures, posters, mail-outs, media promotion and advertising.

Members of the public were able to contact the Inquiry by phone (1300 556 034) and email (info@hazelwoodinquiry.vic.gov.au) for the duration of the Inquiry.

INDEPENDENT EXPERTS

The Board engaged Jacobs Group (Australia) Pty Ltd as an independent consultant, to provide advice to the Inquiry regarding mine rehabilitation options, and mechanisms to coordinate rehabilitation efforts. The Board engaged Accent Environmental Pty Ltd as an independent consultant, to provide advice to the Inquiry about alternative financial assurance mechanisms.

Dr Friedrich von Bismarck, Head of the German Joint-Governmental-Agency for Coal Mine Rehabilitation, was engaged by the Board to provide independent advice about rehabilitation options and mechanisms to coordinate rehabilitation. The Board arranged for Dr von Bismarck to travel to Australia to consult with local experts. Ms Meredith Fletcher was engaged to provide an historical overview of brown coal mining and electricity generation in the Latrobe Valley prior to the privatisation of the mines.

The Board thanks the independent experts for their contribution.

PUBLIC HEARINGS

Public hearings relevant to Terms of Reference 8, 9 and 10 were held over seven days in Traralgon on 8–11, 14–15 and 18 December 2015. Counsel Assisting, Mr Rozen and Ms Shann, led evidence and made final submissions to the Board. Leave to appear before the Inquiry was granted to the State, EnergyAustralia Yallourn Pty Ltd, GDF Suez Australian Energy, AGL Loy Yang Pty Ltd, and Environment Victoria.

The Board heard evidence from:

- senior officials from the Department of Economic Development, Jobs, Transport and Resources; the Department of Environment, Land, Water and Planning; the Technical Review Board; Emergency Management Victoria; Coal Resources Victoria; and the Environment Protection Authority
- representatives from the Latrobe City Council, Southern Rural Water and Gippsland Water
- a Latrobe Valley community member
- senior mine management personnel from EnergyAustralia Yallourn Pty Ltd, GDF Suez Australian Energy and AGL Loy Yang Pty Ltd
- local and international geotechnical, hydrogeological, environmental, rehabilitation and mine closure experts.

Appendix C lists the names of witnesses who appeared at the public hearings. Appendix D lists exhibits that were tendered at the public hearings.

OUTCOMES OF THE INQUIRY

The Board has made 19 recommendations, taking into account evidence before the Board and the feasibility of implementation. The Board has framed its recommendations with a degree of flexibility so as not to limit their implementation. Where the Board considers that the recommendations should be implemented within particular timeframes, this is made explicit. The Board has also made three affirmations, affirming the State or mine operators where they have already taken action or have committed to take action in response to issues raised during this Inquiry.

The Board has considered how implementation of these recommendations and affirmations will be monitored. For the Board's recommendations from the 2014 Hazelwood Mine Fire Inquiry, the State contracted the Hazelwood Mine Fire Inquiry Implementation Monitor to conduct a monitoring role. More recently, the role of monitoring the 2014 recommendations has been divided between the Hazelwood Mine Fire Implementation Monitor (monitoring the recommendations relating to GDF Suez Australian Energy) and the Inspector-General for Emergency Management (monitoring the recommendations relating to the State).

The Inspector-General is established under s. 61 of the *Emergency Management Act 2013* (Vic) (Emergency Management Act). The objective of the office is to 'provide assurance to government and the community in respect of emergency management arrangements in Victoria and to foster improvement of emergency management in Victoria.'¹ Section 64 of the Emergency Management Act provides that the Inspector-General has powers to monitor and report on the implementation of recommendations arising from the system-wide reviews it conducts.² It also has powers to 'perform any other functions conferred on the [Inspector-General] by or under this or any other Act.'³ The Inspector-General is employed as a member of the Public Service under Part 3 of the *Public Administration Act 2004* (Vic) (Public Administration Act) and reports directly to the Minister for Emergency Services.⁴ The Board considers that in contrast, Governor in Council appointments (for example, that of Emergency Management Commissioner Craig Lapsley) are considered to be more independent than appointments under the Public Administration Act.

The Board considers it essential that the oversight of the recommendations from this report, and other volumes of the Hazelwood Mine Fire Inquiry Report 2015–16, is independent of the State and the mine operators. Further, the Board considers that expertise relating to the issues raised by the Hazelwood Mine Fire Inquiry is necessary.

The Board is of the view that the Inspector-General's current role, as stipulated under the Emergency Management Act, is less appropriate than a monitor who will provide independent oversight of the State's implementation of the Board's recommendations. Further, the Board is concerned that the Inspector-General's office, which deals with Emergency Management issues, may not have the relevant expertise.

The Board considers that the Hazelwood Mine Fire Inquiry Implementation Monitor should be given legislative powers to oversee the implementation of its 2015–16 recommendations and produce publicly-available annual progress reports. The Board notes that the powers provided to the Hazelwood Mine Fire Inquiry Implementation Monitor are confined by the terms of the contract between it and the State, and are of a more limited nature than the powers conferred on the Bushfires Royal Commission Implementation Monitor under the *Bushfires Royal Commission Implementation Monitor Act 2011* (Vic).⁵

The Board is of the view that independent oversight and broad powers are integral to ensuring accountability and transparency in the State's implementation of the Board's recommendations.

The Board recommends that the State empower the Hazelwood Mine Fire Implementation Monitor, in a legislated role independent from the Victorian public service, to:

- oversee the implementation of these recommendations and the commitments made by the State and the mine operators during this Inquiry for the next three years
- report publicly on an annual basis on the progress made in implementing the recommendations and commitments for the next three years.

SOME COMMENTS ON CONDUCTING INQUIRIES

The *Inquiries Act 2014* (Vic) (Inquiries Act) came into effect on 15 October 2014. The re-opened Hazelwood Mine Fire Inquiry is the first to be established under Part 3 of the Act. This Board is in a unique position to make observations about the process and procedures provided under the Act and the Inquiries Regulations 2015 (Vic) (Inquiries Regulations).

HEARINGS

In fulfilling its Terms of Reference concerning the contribution of the 2014 Hazelwood mine fire to any increase in deaths, mine rehabilitation and the Anglesea mine (that is, Terms of Reference 6, 8, 9, 10 and 11), the Board heard evidence at 'traditional' public hearings. Counsel Assisting called witnesses who were sworn in or made affirmations.⁶ Each witness was examined by Counsel Assisting and was then examined by counsel granted leave by the Board to question that witness. The hearing rooms were arranged in a manner loosely modelled on a court room. This process was considered appropriate in relation to Terms of Reference 6, 8, 9, 10 and 11 because the Board was asked to make findings about past conduct in circumstances where there were real disputes about what the findings should be.

By contrast, as explained in Volume 3 of the Hazelwood Mine Fire Inquiry Report 2015–16, the Board took a very different approach to informing itself in relation to Term of Reference 7, which was concerned with the future health needs of the Latrobe Valley. It convened a series of 'Health Improvement Forums' rather than public hearings. This reflected the forward-looking nature of Term of Reference 7, which recommended measures to improve health. There was no evidence that required testing using formal inquisitorial hearing processes in relation to that Term of Reference. The Board made no adverse findings. Those who attended the forums were referred to as participants and not witnesses, and they were not sworn in. Counsel Assisting and the Principal Legal Advisor performed the role of mediators and facilitators, rather than their traditional role.

The different approaches taken by the Board to inform itself worked well. They reflect the high degree of flexibility accorded to a Board under Part 3 of the Inquiries Act.

EXPERT PANELS

The highly specialised and diverse subject matter of the Board's inquiry meant that the Board heard from a number of expert witnesses.

The Board greatly benefitted from hearing evidence in the form of expert panels, in which two or more expert witnesses gave their evidence concurrently. This was particularly helpful to the Board in relation to Term of Reference 6, during which epidemiologists and biostatisticians gave evidence as a panel. Prior to giving evidence at the public hearings, these experts had met privately at the request of the Board. The meetings were facilitated by a member of the Inquiry's Secretariat. The experts considered a series of questions prepared by Counsel Assisting, and prepared a joint report setting out areas of agreement and disagreement. The joint expert report was tendered by Counsel Assisting as an exhibit at the public hearings.

A similar process was followed in relation to the Terms of Reference 8, 9 and 10. A group of geotechnical engineers, hydrogeologists and other mine rehabilitation experts met privately at the request of the Board to consider a series of questions prepared by Counsel Assisting. The meeting was facilitated by a member of the Inquiry's Secretariat. The joint expert report was tendered by Counsel Assisting when the experts gave evidence as part of a panel at the public hearing.

The Board also heard from a large number of expert panels in the Health Improvement Forums as part of its Term of Reference 7 considerations.

The principal benefit to the Board of hearing from expert panels in circumstances where the experts had previously met and produced a joint report was the added confidence the Board could have in an opinion expressed by several experts, some of whom had been engaged by parties with diverse interests. Where there was disagreement between the experts, the area of disagreement was generally narrowed and clarified because the witnesses could respond immediately to each other's views as part of the panel. The feedback from the experts about their experience of the Inquiry was also positive. A number of experts indicated to Counsel Assisting that the approach taken was more in keeping with a genuine and informed examination of important issues than the traditional adversarial process in which each expert is examined separately.

The Board expresses its gratitude to all of the experts who generously gave their time, often at considerable personal inconvenience, to assist the Board. They fulfilled the true role of the expert witness and have made the Board's difficult tasks considerably easier.

ADVERSE FINDINGS

Section 76 of the Inquiries Act requires the Board to follow a procedure before it makes 'a finding that is adverse to a person'. The statutory procedure essentially codifies the common law requirements concerning procedural fairness.⁷

Throughout the course of this Inquiry, the Board has construed the expression 'a finding which is adverse to a person' (which is not defined in the Inquiries Act) broadly. In the Hazelwood Mine Fire Inquiry Report 2015–16, Volume 2, the Board made findings that may affect the professional reputation of the former Chief Health Officer. In this report, the Board has made findings that may be adverse to the financial interests of mine operators. It has also made findings that are critical of the manner in which the Latrobe Valley mines have been regulated, and are therefore adverse to the Mining Regulator.

In each case, the Board has provided the affected party with a copy of a draft part of the report setting out the proposed finding and the 'matters on which the proposed finding is based' as required by s. 76(1)(a) of the Inquiries Act. The affected party was asked to make any submissions about those matters within a specified timeframe.

The Board considered submissions by affected parties as required by s. 76(2) of the Inquiries Act. The Board was assisted by these submissions. In a number of cases, the Board modified its proposed adverse findings in response to the submissions. Where the Board has determined to make the adverse finding despite the submissions, the Board has set out, in summary form, the submissions of the party, as required by s. 76(3) of the Inquiries Act.

As noted above, the Board has maintained a website as part of its commitment to community engagement about the Inquiry. Evidence given and submissions made at the hearings were published on the website. However, the process followed by the Board in compliance with s. 76 of the Inquiries Act has necessarily been treated differently. Because the submissions made by the parties have been in response to a draft report, those submissions have not been published and have been treated confidentially by the Board.

The s. 76 process has been of assistance to the Board in fulfilling its Terms of Reference. Compliance with s. 76 has not been particularly onerous.

COSTS FOR WITNESSES AND EXPERTS

Section 82 of the Inquiries Act provides that a person who attends a Board of Inquiry in accordance with a notice to attend or 'at the request of the Board of Inquiry' is entitled to be paid 'expenses and allowances in accordance with the prescribed scale' in circumstances where the witness 'loses income because of attending an inquiry'.⁸ The relevant scale is prescribed in Part 2 of the Inquiries Regulations.

An issue that has arisen during the course of this Inquiry is the meaning of the phrase 'at the request of the Board of Inquiry' in s. 82(1)(b) of the Inquiries Act. All of the witnesses who gave evidence at the public hearings and Health Improvement Forums did so as either representatives of parties granted leave to appear or at the request of the Board, with very few being served with a notice to attend. This included expert witnesses who had been retained by parties granted leave to appear at the public hearings. The Board assumes that most of the expert witnesses were paid for their time by the parties who had retained them.

However, the Board's Secretariat received a number of claims from witnesses for reimbursement of expenses associated with giving evidence at the public hearings. The Board considers that the Inquiries Act uses specific and different language in describing the circumstances where a witness is entitled to claim reimbursement of lost income and other expenses. The Board considers that a witness who is also a party is not entitled to make a claim under s. 82 as they do not give evidence 'at the request of the Board' but rather they 'appear' at a public hearing pursuant to s. 62 of the Inquiries Act. Further, the Board considers that the Act does not provide scope for the Board to pay witnesses for time spent preparing to give evidence in addition to actually giving evidence in a public hearing.

The Board considers that the State should clarify under what circumstances expenses and allowances should and should not be paid to witnesses.



Dozer at the toe of a mine batter
(source: Department of Economic Development, Jobs, Transport and Resources)



PART TWO
BACKGROUND
INFORMATION

PART 2 BACKGROUND INFORMATION

2.1 OVERVIEW

This Part provides background information relevant to the Board's inquiry, and a context for informing consideration of Terms of Reference 8, 9 and 10. This Part includes information about:

- the community, landscape, geology and hydrogeology of the Latrobe Valley (the region where the Yallourn, Hazelwood and Loy Yang mines are situated)
- the Latrobe Valley's coal resource and key mining terms that are used throughout this report
- a history of mining in the Latrobe Valley up until the mines were privatised in the mid-1990s
- current state, national and international policy relevant to the long-term future of coal-fired power generation.

2.2 ABOUT THE LATROBE VALLEY

2.2.1 COMMUNITY

The Latrobe Valley is situated approximately 135 kilometres east of Melbourne in the Gippsland region. It covers two local government areas over a total area of 5,453 square kilometres¹—Latrobe City, where the Hazelwood, Yallourn and Loy Yang mines are located, and Baw Baw Shire.² Due to the location of the mines, the data in this section focus on Latrobe City.

Latrobe City is situated on the land of the Brayakaulung clan of the Gunaikurnai people.³ There are over 73,000 residents in Latrobe City, with the majority of the population living in the towns of Traralgon, Morwell, Moe, Newborough and Churchill.⁴

Major industries in the region include coal mining and electricity generation, forestry and paper production, food processing and engineering. Federation University Australia is located in Latrobe City. As the regional centre for Gippsland, Latrobe City is also home to a number of service providers and government agencies.⁵

The Latrobe Valley community contributes significantly to Victoria's economic wealth. However, the community is less prosperous and less healthy overall than the rest of Victoria. The median household income in the Latrobe Valley is significantly lower than the Victorian average, and there is a much higher proportion of low income households in the Latrobe Valley.⁶ In September 2015, the unemployment rate in Latrobe City was 7.8 per cent⁷, and unemployment was as high as 14.4 per cent in Morwell⁸ (compared with the Victorian average of 6.3 per cent⁹).

2.2.2 LANDSCAPE

The Latrobe Valley is a broad and relatively flat valley that sits 20 to 100 metres above sea level. It is bordered by the Strzelecki Ranges to the south and the Great Dividing Range to the north. The rolling foothills that surround the valley are up to 250 metres above sea level.¹⁰ The average annual rainfall in the area is 731 millimetres.¹¹

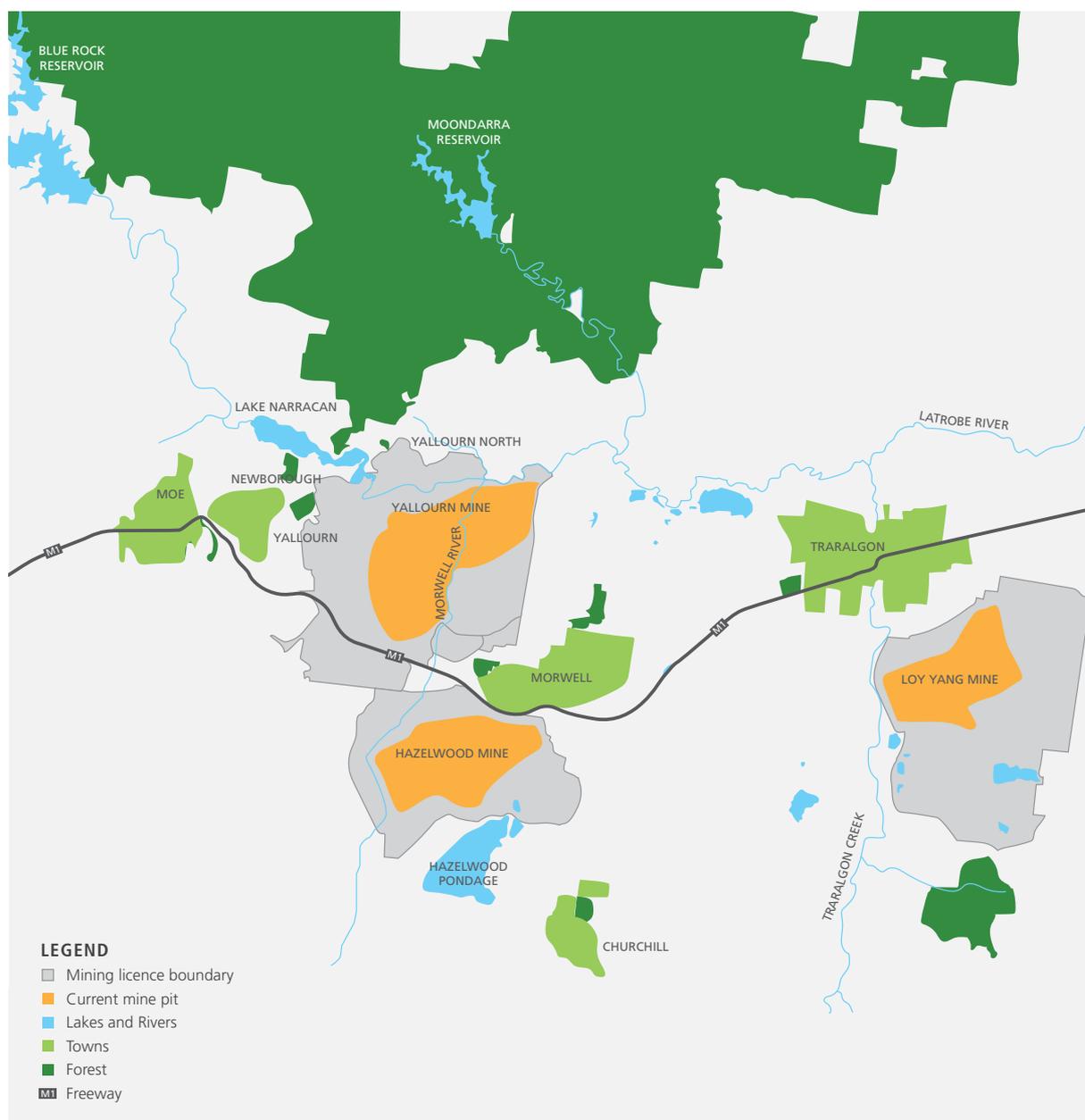
The major waterways in the area are the east-flowing Latrobe River and its tributaries—the Morwell River (including Middle Creek), Traralgon Creek and Bennett's Creek. The multiple streams that dissect the slopes of the Strzelecki Ranges and the Great Dividing Range, including Tanjil River, Tyers River and Rintoul's Creek, feed into the Latrobe River.¹²

The Morwell River has been diverted a number of times to facilitate access to coal. The current Morwell River Diversion changes the course of the river by carrying it on an embankment across the centre of the Yallourn mine until it joins the Latrobe River.¹³

Water for the Latrobe Valley is stored in dams, including Lake Narracan, which was constructed between 1959 and 1961 and provides water for cooling the Latrobe Valley power stations. Lake Narracan is situated on the Latrobe River and has a capacity of 7,230 megalitres.¹⁴ The dam at Blue Rock Reservoir is approximately 15 kilometres upstream from Lake Narracan, on the Tanjil River. It was constructed between 1979 and 1984 and supports the Latrobe Valley power stations. It has a capacity of 208,190 megalitres.¹⁵

The key waterways and geographical features of the Latrobe Valley are shown in Figure 1.

Figure 1. Map of the Latrobe Valley



Source: Adapted from GeoVic, Department of Economic Development, Jobs, Transport and Resources

2.3 COAL AND THE LATROBE VALLEY

2.3.1 THE COAL RESOURCE

Coal is a combustible mineral that is widely used as a fuel to generate electricity.¹⁶ It forms over millions of years when vegetable matter partially decomposes in conditions of restricted air and increased pressure and temperature.¹⁷

Coal progressively transforms through stages—from peat, to brown coal or lignite, to black coal (which includes sub-bituminous coal, bituminous coal and anthracite).¹⁸ It is formed in beds with depths ranging from less than a millimetre to many metres. Coal beds thick enough to be mined are referred to as ‘coal seams’.¹⁹

Deposits of brown coal originated from forests and swampy environments between 7 and 25 million years ago, making them relatively young compared to deposits of black coal, which can be over 250 million years old.²⁰ Victoria is home to one of the largest known deposits of brown coal in the world. There are an estimated 65 billion tonnes of brown coal in the Latrobe Valley, approximately half of which has been identified as ‘potentially economic’.²¹

A key feature of the Latrobe Valley’s coalfield is its relatively shallow overburden and narrow interseams (collectively referred to as waste rock). The overburden (topsoil, sand, clay and other non-coal material that cover the coal) is between 6 and 30 metres deep,²² and covers coal seams up to 100 metres thick with multiple seams giving a virtual continuous thickness of up to 230 metres.²³ Narrow layers of non-coal material known as interseams run between the coal, which are composed of sand, silt and clay.²⁴ The shallower overburden and narrow interseams, and thicker coal seams, mean that when the coal is mined, there is a lower ratio of waste rock to coal, making mining cost effective. This ratio, known as a strip ratio, is much lower in mines in the Latrobe Valley than in many other mines around the world. For example, the strip ratio of the Hazelwood mine is between 4:1 and 5:1 (coal to waste rock),²⁵ whereas the strip ratio in Germany’s brown coal mines is almost the reverse.²⁶

While Victoria’s coal is low in impurities compared to other deposits around the world, it is high in moisture, with a water content of up to 70 per cent.²⁷ The coal cannot be used wet for energy generation, so it undergoes a drying process prior to use in power stations.²⁸ However, as stated by Geoscience Australia, ‘the high water content and reactivity of Gippsland Basin brown coal has precluded it from coal export, and its future development depends on advances in new drying, gasification and liquefaction technologies.’²⁹

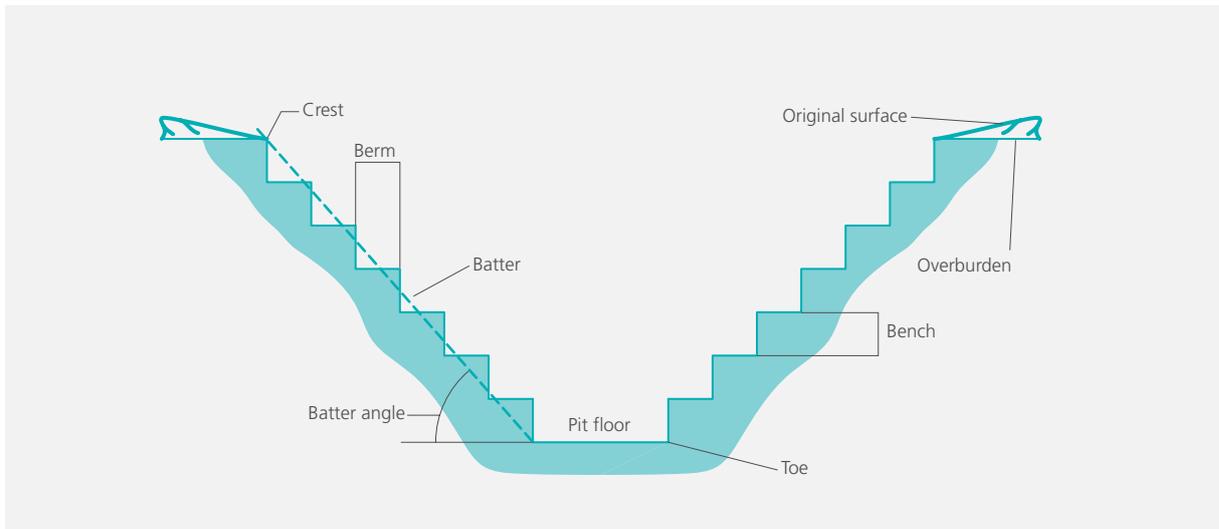
The coal in the Latrobe Valley is very light (only just heavier than water) with its density ranging from between 1.11 and 1.14 tonnes per cubic metre.³⁰ It is also ‘jointed’—meaning that there are multiple continuous cracks through the coal.³¹ This means that the coal is very sensitive to movement as a result of interaction with water. As groundwater and coal are extracted, the unmined coal relaxes and moves, allowing natural joints, or cracks, to open up. If a crack then fills up with water, the water pressure in the crack can cause a whole block of coal to be pushed and slide outwards.³² This is discussed in Part 6.3.1.

2.3.2 KEY MINING TERMINOLOGY

The three mines in the Latrobe Valley are open cut mines. Open cut mining is used when the resource to be mined is relatively close to the surface and is spread over a large area. Open cut mining involves removing overburden from the surface of the mining area and placing it in a stockpile (or ‘overburden dump’). Overburden is often used in rehabilitating a mine. The coal seam is then exposed by digging a pit into the ground.

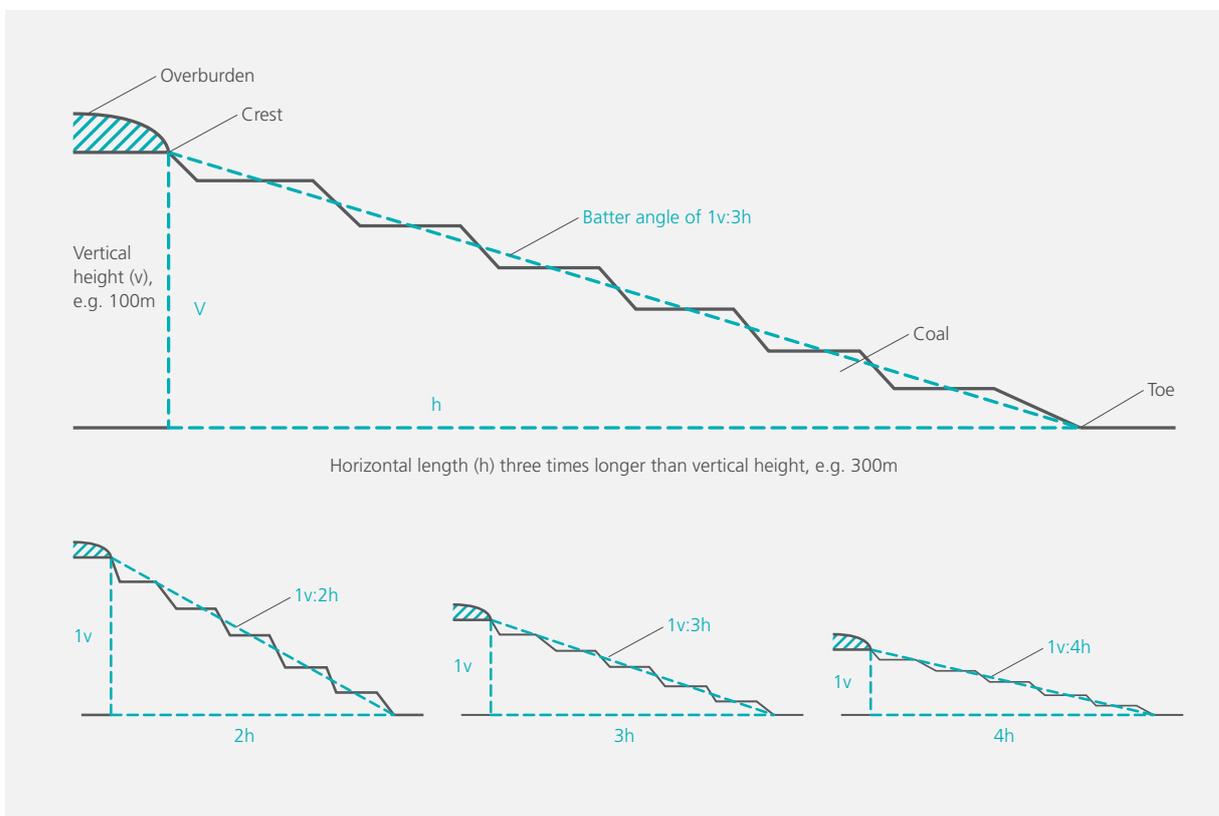
The bottom of the pit is known as the ‘floor’, and the walls are known as ‘faces’ or ‘batters’. The top or edge of the mine is called the ‘crest’, and the point where the face joins the floor is the ‘toe’. As the coal is excavated, the miners cut ‘benches’ into the faces of the mine. These are individual working levels of the mine, with sloping surfaces separated by flat surfaces called ‘berms’. Berms provide access to the batter and are used for mine infrastructure and utilities. Once the limit of extraction has been reached at a bench, it is referred to as a ‘worked out’ or ‘permanent’ bench’. Figure 2 illustrates these terms.

Figure 2. Mine terminology



The overall angle or steepness of the face is called the 'batter angle' and is measured in terms of a ratio between the vertical height and horizontal length of that slope. This ratio is shown in mining terms as 'v:h', so a slope might be termed 1v:3h when the horizontal length (h) of the batter is three times longer than the vertical height (v). Figure 3 shows an example of how this batter angle is measured. The term 'battered off' refers to the process of flattening or reducing the angle of the batter.

Figure 3. Batter angle examples



Mining operations are complex and technical, and this report only refers to those operations that are relevant to the Board's deliberations. Some of the terminology used in this report includes:

- Rehabilitation—the process of returning land disturbed to a stable, productive and/or self-sustaining condition, consistent with how the land will be used post-mining.³³
- Progressive rehabilitation—the work undertaken towards that goal during the life of the mine, as areas become free from mining activity or significant infrastructure is removed.³⁴
- Final rehabilitation—occurs after mining has ceased and results in the final landform.³⁵
- Dredgers/bucket wheel excavators—very large and heavy machinery that continuously digs the coal using a large wheel covered with buckets that scoop the coal as the wheel rotates.
- Dozer push—a method of mine rehabilitation where coal from one bench is redistributed to the bench above or below to achieve the planned batter profile. This differs from 'truck and shovel' rehabilitation, where a large quantity of coal is excavated, placed into a truck, transported and dumped elsewhere.³⁶

This report also uses various units of measurement described in Table 1 below.

Table 1. Units of measurement

Unit	Definition
Megalitre (ML)	One million litres
Gigalitre (GL)	One thousand megalitres, or one billion litres
Megawatt (MW)	One million watts of electricity
Megatonne (Mt)	One million tonnes
Relative level (RL)	A measurement of height in metres relative to sea level. Represented as an acronym, where 'RL +10m' means a relative height of 10 metres above sea level, and 'RL -10m' means 10 metres below sea level

2.3.3 REGIONAL HYDROGEOLOGY AND THE MINES

As well as the network of waterways outlined in Part 2.2.2, the Latrobe Valley has a system of groundwater aquifers that are intersected by and underlie the mines.³⁷ Groundwater is the water located beneath the Earth's surface. Aquifers are naturally occurring underground bodies of porous rock (such as sand or gravel) in which groundwater can move from place to place.³⁸

Aquifers range in thickness and extent, and can vary laterally.³⁹ An aquifer system comprises multiple aquifers that are geologically grouped together.

Beneath the Latrobe Valley, three major aquifer systems have the greatest impact on the mines—the near-surface Shallow Aquifer System, the Morwell Formation Aquifer System and the Traralgon Formation Aquifer System. The Morwell and Traralgon Systems are major aquifers separated by layers known as aquitards, which contain less permeable materials such as coal, clay or silt. The Shallow Aquifer System is closer to the surface and water from this system is typically used for stock and domestic purposes.⁴⁰ Figure 4 is a representation of a cross-section of the Latrobe Valley's aquifers. The three mines are indicated, showing the proximity of each mine floor to the aquifers.

2.3.4 HISTORY OF COAL MINING IN THE LATROBE VALLEY

Brown coal was first discovered in the Latrobe Valley in 1873,⁴⁸ and since the mid-1900s, the region has been at the centre of Victoria's coal mining and power generation activities.⁴⁹ Coal has played a key role in the social and economic development of the Latrobe Valley region, although not without some costs to the community and environment.

In 1918, legislation was passed in the Victorian Parliament to establish the Electricity Commissioners—a public corporation initially tasked with promoting the use of electricity, including the development of a scheme for coal mining and 'electrical undertaking' in Morwell.⁵⁰ In 1920, the Electricity Commissioners became the State Electricity Commission of Victoria (SECV), and its powers were expanded to include development of 'open cut workings for the production of raw brown coal.'⁵¹ The SECV took on the task of developing an open cut mine, briquette factory and power station 10 kilometres north of Morwell, with the first sod turned for the power station in 1921 (see Figure 5). This mine subsequently became known as Yallourn, from Aboriginal words meaning 'brown fire'.⁵²

The development of Yallourn was significant for Victoria, not only because of the electricity it generated, but also because of the technological and industrial advances it represented. Yallourn became 'a national icon, a focus for national pride' and a symbol of modernity in Australia.⁵³ However, there were several emergency events in the first decades of the mine's establishment, including a major flood in 1934 and a fire in 1944, both of which caused lengthy interruptions to mining operations.⁵⁴

With the development of the Yallourn site came a proposal to build a model town to house the new workforce for the mine. The SECV 'hoped that providing ideal conditions for its workers would lead to an ideal workforce.'⁵⁵ The town flourished for some time; however in 1969 the SECV announced that a new power station would be built in Yallourn, and in 1970 a Parliamentary Public Works Inquiry endorsed the demolition of the town.⁵⁶

Demand for electricity post-World War II meant that the SECV had to expand its operations beyond the Yallourn mine.⁵⁷ In the late 1940s, the SECV announced that the Hazelwood mine, then known as the Morwell Open Cut, would be developed together with briquette factories. The development encountered challenges, with mining operations commencing in the mid-1950s.⁵⁸ In 1956, the SECV announced that Hazelwood power station would be built, and the development of briquette factories was abandoned.⁵⁹ In 1977, the SECV began construction of Loy Yang mine, and mining commenced in the early 1980s. Over the following years, the populations of Morwell and Traralgon grew as more workers were employed.⁶⁰

The State did not require the SECV to develop a rehabilitation plan for the Loy Yang mine or for the other mines when they were established, although there was a general assumption that the pits would be flooded at the end of the mine life.⁶¹ During SECV operations, only minimal progressive rehabilitation was undertaken at the mines, with future access to coal prioritised over rehabilitation efforts.⁶² In 1983, legislation was introduced to require private mining companies to provide a rehabilitation bond. This legislation was reinforced through rehabilitation requirements introduced under the Mineral Resources Act (then known as the *Mineral Resources Development Act 1990* (Vic)). However, the SECV was exempted from the operation of those provisions through the *State Electricity Commission of Victoria Act 1958* (Vic).⁶³

In the late 1970s and 1980s, the SECV began to show a greater interest in rehabilitation, culminating in the release of a discussion paper on a draft rehabilitation policy in 1985, and the adoption of a rehabilitation policy and formation of a consultative group to develop rehabilitation plans in 1986.⁶⁴ However, in 1993 a special report undertaken by the Victorian Auditor-General's Office into open cut mining production in the Latrobe Valley found that 'the SECV had not demonstrated that there was a structured and co-ordinated approach to achieving its environmental objective in the areas of land rehabilitation of open cuts and water quality management.'⁶⁵

In response, the Chief General Manager of the SECV stated that, since 1986, 'extensive rehabilitation' had been completed, particularly with respect to overburden dumps. Regarding rehabilitation plans for the operational open cut mines, the Chief General Manager of the SECV noted that rehabilitation plans 'are currently being developed and will be progressively implemented during the next 20 to 40 year remaining life of these mines. Funding for these projects has been included in operational budgets.'⁶⁶

By the late 1980s, the SECV was allocating up to 45 per cent of its annual earnings to pay its debts, which totalled more than \$8 billion. Public confidence in the SECV fell, and there was scrutiny from the community and government about a state-owned model of electricity supply.⁶⁷ After the 1992 state election, the Kennett Government began restructuring the industry, with the Latrobe Valley mines and power stations ultimately privatised in the mid-1990s.⁶⁸ Latrobe Valley resident, Mr David Langmore, submitted that at that time, the SECV had only undertaken 'limited amounts' of rehabilitation, and that while substantial work had been done at the Yallourn mine, no significant rehabilitation had commenced at the Loy Yang and Hazelwood mines.⁶⁹

Following privatisation of the mines, the new mine operators each had a rehabilitation plan.⁷⁰ They provided a \$15 million rehabilitation bond to contribute to any rehabilitation liability should they default on their obligations and as an incentive for them to comply with these obligations.⁷¹ In 2004, the Yallourn mine rehabilitation bond was reassessed and lowered to \$11,460,500.⁷²

Currently, the Latrobe Valley mines supply approximately 95 per cent of Victoria's base load electricity.⁷³ Part 4 of this report provides an overview of the mines today, including their licence holders, licence terms and the scale of their operations. The State continues to regulate coal mining and implement coal development programs.⁷⁴ Part 3 of this report outlines the State's current regulatory framework.

Figure 5. Historical photographs of the Yallourn power station



SECV Commissioners turning the first sod for the Yallourn power station, 5 February 1921

(source: Museum Victoria Collection, <http://collections.museumvictoria.com.au/items/764505>)



Yallourn power station circa 1930 (source: Museum Victoria Collection, <http://collections.museumvictoria.com.au/items/773882>)

2.3.5 ENVIRONMENTAL CONSIDERATIONS AND THE CHANGING POLICY CONTEXT

Mining operations can have a range of impacts on land stability, groundwater, fire risk, wildlife habitats, native vegetation, and waterways. In its submission to the Inquiry, Federation University Australia states that contamination from coal and its mining products can be an issue long after mine closure, and can cause harm to the environment and human health if not properly managed.⁷⁵

The use of brown coal (that is, the generation of electricity) also has significant environmental impacts. In its written submission to the Inquiry, the Gunaikurnai Land and Waters Aboriginal Corporation describes to the Board how mining has damaged their Country, including through the diversion and damming of waterways.⁷⁶ The Board notes that the use of brown coal is a major contributor to Victoria's greenhouse gas emissions.⁷⁷ Mr Langmore submitted to the Board that '[t]he rehabilitation of the Latrobe Valley's brown coal open cut mines is arguably the greatest environmental challenge confronting Victoria in the next couple of decades.'⁷⁸

Research undertaken by the CSIRO and the Australian Bureau of Meteorology predicts that, as a result of climate change, eastern Victoria (including the Latrobe Valley) will experience increasing average temperatures in all seasons; generally less rainfall in the cool seasons; increased intensity of extreme rainfall events; rising mean sea levels; and a harsher fire-weather climate.⁷⁹ This will have a broad range of significant impacts on the environment and the community.⁸⁰

The role of water in achieving mine rehabilitation plans is a key environmental consideration. Since privatisation, the mine operators have developed rehabilitation plans in which the mines become pit lakes—and, as will be explained in Part 4, the Mining Regulator has approved these plans. In Part 6, the Board notes the vast quantities of water that will be needed to fill the mines under those plans—more than four times the volume of water in Sydney Harbour.

Community perceptions about the relative scarcity of water have changed during the last two decades in large part because of the long drought in Victoria between 1997 and 2009. In 2005, the *Water Act 1989* (Vic) was amended to include a new role for the responsible Minister—to make sure that a 'program of sustainable water strategies is undertaken for the State'.⁸¹ Under s. 22C of that Act, a 'Sustainable Water Strategy must provide for the strategic planning of the use of water resources in the region to which it applies'. The applicable Strategy for the Latrobe Valley, the *Gippsland Region Sustainable Water Strategy*, was provided to the Board. It is discussed in Part 6.

There have been State and Commonwealth policies that address the impact of coal-fired electricity generation on Australia's environment. In July 2011, the Gillard Government announced the *Contracts for Closure* program as part of the Commonwealth's Clean Energy Future package. It aimed to encourage the closure of some of Australia's 'emissions-intensive' power stations by 2020, by providing financial incentives to power station operators to shut down early.⁸² In September 2012, after beginning negotiations with a number of operators (including the Hazelwood and Yallourn power stations), the Gillard Government announced that the program would be terminated. The then Minister for Resources and Energy, the Hon. Martin Ferguson MP, said that the program's termination was due to uncertainty about whether the Government could obtain 'value for money' through the negotiation process.⁸³

More recently, the Turnbull Government was part of negotiations for the *Paris Agreement* at the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change.⁸⁴ The *Paris Agreement* will commit each party to reducing its emissions, with the aim of keeping 'the increase in global average temperature well below 2°C above pre-industrial levels', and ideally to 1.5°C above pre-industrial levels. Under the Agreement, governments will make commitments to greater transparency and accountability through reporting; five-yearly review of targets; strengthening societies' ability to address the impacts of climate change; and supporting developing countries to do the same. The *Paris Agreement* will be open for signature in April 2016.⁸⁵

Currently, Australia has a target of reducing emissions by five per cent below 2000 levels by 2020, which equates to a 13 per cent reduction on 2005 levels.⁸⁶ The Turnbull Government's recent report into progress towards this target and other climate change commitments, notes that '[e]lectricity generation represents the largest share of emissions in the national greenhouse gas inventory, accounting for 33 per cent of emissions in 2014–15.'⁸⁷ However, during the *Paris Agreement* negotiations, the Foreign Minister, the Hon. Julie Bishop MP, indicated that 'coal-fired power generation is here to stay', as '[t]echnological breakthroughs and innovation will drive much of the change that will underpin the transition to a low-carbon economy.'⁸⁸



PART THREE
**THE ROLE OF GOVERNMENT
AND KEY AGENCIES**

PART 3 THE ROLE OF GOVERNMENT AND KEY AGENCIES

3.1 OVERVIEW

The rehabilitation of mines, and the financial mechanisms that ensure that rehabilitation occurs, are mandated by legislation. This Inquiry must therefore consider the legislative framework relevant to mining in Victoria generally, and the Latrobe Valley coal mines in particular.

This Part outlines the complex and multilayered legislative framework that governs the establishment, operation and rehabilitation of mine sites in Victoria.

The Victorian statutory regime governing coal mining is complex and has evolved considerably over time. Recently, regulatory change has seen a shift from prescriptive requirements to assessing and managing potential risks. Some of these changes are a result of the 2014 Hazelwood Mine Fire Inquiry, which led to increased recognition on the part of the mining industry and the State of the need to identify and mitigate risks, particularly concerning fire.¹

The key legislation governing coal mining in Victoria is the *Mineral Resources (Sustainable Development) Act 1990* (Vic). The Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013 (Vic) provide further detail relevant to the Act and its implementation.

Water is an integral part of coal mining and power generation in the Latrobe Valley. The existing power stations require large volumes of lower quality water for cooling, as well as a small volume of high quality water for boilers and on-site water use. Low quality water is also required at the mines for fighting fires, dust suppression, ash disposal, and washing down conveyors and equipment.² The principal Victorian legislation relating to water use is the *Water Act 1989* (Vic).

Other Victorian legislation relevant to the Latrobe Valley mines includes the *Occupational Health and Safety Act 2004* (Vic) and the *Environment Protection Act 1970* (Vic).

The Commonwealth has a limited role in regulating Victorian coal mines. Commonwealth legislation most relevant to Victorian coal mining is the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

3.2 MINERAL RESOURCES ACT AND MINERAL INDUSTRIES REGULATIONS

The State Minister for Energy and Resources is responsible for administering the *Mineral Resources (Sustainable Development) Act 1990* (Vic) (Mineral Resources Act) and the Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic) (Mineral Industries Regulations).³ The Earth Resources Regulation Branch in the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) is responsible for the regulation of mines in Victoria.⁴ In this report, the Earth Resources Regulation Branch and its various predecessors are referred to as the 'Mining Regulator' (noting that other government departments and agencies also have responsibility for aspects of mine regulation in Victoria). The Secretary of DEDJTR is referred to in this report as the 'Department Head'. The Minister for Energy and Resources is referred to in this Part as 'the Minister'.

The regulatory oversight of coal mines in Victoria has changed since the privatisation of the Latrobe Valley mines in 1996 and 1997. From the time that the mines' licences were granted until 4 December 2002, the Department of Natural Resources and Environment (DNRE) was responsible for regulation of the Latrobe Valley mines. From 5 December 2002 to 30 June 2013, the responsibility fell to the Department of Primary Industries (DPI). From 1 July 2013 to 31 December 2014, the Department of State Development, Business and Innovation (DSDBI) was responsible for regulating the Latrobe Valley mines. From 1 January 2015, regulatory oversight has been undertaken by DEDJTR.⁵ Figure 6 summarises these changes.

Figure 6. Regulatory oversight of mines⁶

The stated purpose of the Mineral Resources Act is ‘to encourage mineral exploration and economically viable mining and extractive industries which make the best use of, and extract the value from, resources in a way that is compatible with the economic, social and environmental objectives of the State.’⁷

To achieve this purpose, one of the Act’s objectives is to ‘establish a legal framework aimed at ensuring that land which has been mined or from which stone has been extracted or removed is rehabilitated.’⁸

Mining licences and work plans are the primary instruments through which the purpose and related objectives of the Mineral Resources Act relevant to coal mining are fulfilled.⁹ Licences allocate Crown rights to resources, such as coal, to the licence holder, while work plans regulate the operation of a mine under that licence.¹⁰

3.2.1 MINING LICENCES

Subject to certain exemptions that are not relevant to this Inquiry, under s. 8(1)(a) of the Mineral Resources Act, a person cannot carry out mining in Victoria without obtaining a mining licence from the Minister. An applicant for a mining licence must satisfy the Minister that it can meet the requirements set out in s. 15(6) of the Mineral Resources Act, including the requirement that the applicant is likely to be able to finance the rehabilitation of land.¹¹

The Minister can vary licence conditions, either at the request of the licence holder, or if the Minister considers it necessary, including for reasons relating to the mine’s rehabilitation or land stability.¹² The Minister may impose conditions on a mining licence including conditions about:

- rehabilitation of the land
- risks to the environment, public, land, property or infrastructure
- environmental offsets on the land or any other land
- work undertaken under a licence
- protection of community facilities.¹³

Under s. 38 of the Mineral Resources Act, the Minister may cancel a licence on a number of grounds, including if the licence holder fails to substantially comply with its obligations under the Mineral Resources Act or the Mineral Industries Regulations, or any conditions of the licence or work plan. The Minister is required to give 28 days’ notice of his or her intention to cancel the licence.¹⁴ The Minister is otherwise entitled to serve a notice requiring the licence holder to stop work due to a contravention or likely contravention of the Mineral Resources Act or the licence conditions, and require the contravention to be remedied within a specified period. Failure to comply with such a notice may result in a penalty of 2500 units for a corporation (currently approximately \$380,000) and a court order for rectification.¹⁵

Mining licences for the Latrobe Valley’s three coal mines were granted pursuant to s. 47A of the *Electricity Industry Act 1993* (Vic) (Electricity Act) under an Order in Council.¹⁶ The processes for licensing and work plans under the Electricity Act differed from the approval processes now in effect in Victoria. Operators of the Latrobe Valley mines were not originally required to meet certain obligations that exist under the current regulatory framework, such as undertaking an Environment Effects Statement assessment, public consultation regarding community concerns, or applying for planning approval.¹⁷ However, all other requirements of the Mineral Resources Act—such as the application of licence conditions, the need for authority to commence work, the need for a work plan (including a rehabilitation plan), and specifying the amount of the rehabilitation bond—were applicable to the mines at the time they were privatised and were included in the Order in Council.¹⁸

3.2.2 WORK PLANS

On its own, a mining licence does not authorise mining activities. Under s. 40 of the Mineral Resources Act, a licence holder must also have a work plan approved by the Department Head.¹⁹ A licence holder may also apply for a variation to its work plan, which requires approval by the Department Head.²⁰ Under s. 41AAB of the Mineral Resources Act, the Department Head has discretion to approve an application to vary a work plan.²¹

Section 40(3) of the Mineral Resources Act provides that a work plan must:

- a. be appropriate in relation to the nature and scale of the work proposed to be carried out; and
- b. identify the risks that the work may pose to the environment, to any member of the public, or to land, property or infrastructure in the vicinity of the work; and
- c. specify what the licensee will do to eliminate or minimise those risks as far as reasonably practicable; and
- d. if the licence is a mining licence or prospecting licence, in relation to the mining activities proposed to be carried out under the licence, include a plan for consulting with the community that demonstrates that the licence holder will use appropriate and effective measures to consult with the community throughout the period of the licence and is prepared in accordance with the regulations and any guidelines issued by the Minister relating to such plans (*a community engagement plan*); and
- e. if the licence is a mining licence or a prospecting licence, under which mining activities are proposed to be carried out, include a rehabilitation plan for the land proposed to be covered by the licence; and
- f. if the licence is a mining licence relating to a declared mine, contain the prescribed mine stability requirements and processes; and
- g. contain any other matters required by the regulations.²²

Mines are 'declared' if there are geotechnical or hydrogeological factors within the mine that pose a significant risk to public safety, the environment or infrastructure.²³ Operators of declared mines are required to report regularly on the management of those risks.²⁴ The Latrobe Valley coal mines are declared mines.²⁵

Regulation 32 and Schedule 15 of the Mineral Industries Regulations specify that work plans for a coal mine must address matters such as:

- a description of work
- the identification of mining hazards arising from each phase of work, including rehabilitation and closure
- the identification and assessment of risks to the environment, members of the public, land, property or infrastructure
- a risk management plan, specifying control measures to eliminate or minimise identified risks associated with mining hazards
- a rehabilitation plan, including concepts for the end utilisation of the site, and proposals for progressive rehabilitation, final rehabilitation and closure of the site
- a community engagement plan
- for 'declared mines' such as the Latrobe Valley mines, information on mine stability
- a fire risk management plan, prepared with the input of an independent expert with appropriate expertise in mine safety and fire prevention, mitigation and suppression.²⁶

The Department Head may impose conditions on a work plan (or work plan variation).²⁷

Recent amendments to the Mineral Resources Act require that details regarding risk management are included in a work plan.²⁸ These amendments were originally due to come into effect on 31 December 2016.²⁹ However, following the recommendations of the 2014 Hazelwood Mine Fire Inquiry, the commencement date was brought forward to 8 December 2015.³⁰

Further to the amendments to the Mineral Resources Act, Schedule 15 of the Mineral Industries Regulations has also been amended and prescribes that a risk management plan must include control measures to eliminate or minimise identified risks, and specify the criteria against which the control measures for the risk will be assessed. For coal mines, a fire risk management plan is required. This plan specifies procedures for regular testing of control measures and emergency procedures that will be implemented to manage fire risk.³¹

These amendments to the Mineral Resources Act and Mineral Industries Regulations do not apply retrospectively to the current Latrobe Valley work plans. However, as a result of the 2014 Hazelwood Mine Fire Inquiry recommendations, in January 2015, the Minister varied each of the Latrobe Valley mines' licence conditions, requiring the mine operators to prepare and implement a Risk Assessment and Management Plan.³² The purpose of such a plan is to:

comprehensively assess risks to the environment and public safety arising as a result of operation of the mine and [to] describe how the licensee will manage the risk. Risk assessment must have regard to fire risks, particularly to controls for prevention, mitigation and suppression of fire, irrespective of the source and location of a fire.³³

Each of the mine operators in the Latrobe Valley has completed a Risk Assessment and Management Plan. The Mining Regulator, with the assistance of independent fire risk experts, is currently assessing these plans.³⁴ Mr Luke Wilson, Lead Deputy Secretary of Agriculture, Energy and Resources at DEDJTR, advised the Board that the Risk Assessment and Management Plans are 'likely to result in changes to operations at the mines as well as the mine rehabilitation plans.'³⁵

REHABILITATION PLANS

Section 78(1) of the Mineral Resources Act requires a licence holder to 'rehabilitate land in accordance with a rehabilitation plan approved by the Department Head.'³⁶

Section 79 of the Mineral Resources Act states that a rehabilitation plan must:

- a. take into account
 - i. any special characteristics of the land; and
 - ii. the surrounding environment; and
 - iii. the need to stabilise the land; and
 - iv. the desirability or otherwise of returning agricultural land to a state that is as close as is reasonably possible to its state before the mining licence...was granted; and
 - v. any potential long term degradation of the environment.³⁷

Schedule 15 of the Mineral Industries Regulations requires that a rehabilitation plan address concepts for the end use of the site and include proposals for:

- progressive rehabilitation, stabilisation and revegetation of the land affected by mining
- landscaping to minimise the visual impact of the mine site
- final rehabilitation and closure of the site, including security of the site.³⁸

Licence holders must, as far as practicable, complete rehabilitation during the period of the licence.³⁹ If a licence holder breaches its obligation to complete progressive rehabilitation, the Mining Regulator is entitled to issue a notice under s. 110 of the Mineral Resources Act, requiring the licence holder to comply with its obligations, resulting in a fine if it fails to do so (as outlined in Part 3.2.1).⁴⁰

The licence holder has an obligation to rehabilitate land in accordance with its rehabilitation plan under s. 78 of the Mineral Resources Act. If rehabilitation of the land has not been completed before the licence expires, the licence holder must complete it as 'expeditiously as possible', and during the period that rehabilitation is being completed, continue to employ a manager to 'control and manage' the site.⁴¹ There is a fine of 20 penalty units for a failure to comply with this obligation (currently approximately \$3000).⁴² Further, under s. 83 of the Mineral Resources Act, the Minister may take action to rehabilitate land if she or he is satisfied that rehabilitation has not been completed in accordance with the (former) licence holder's obligations under s. 78.⁴³

Licence holders are required to report annually on rehabilitation works.⁴⁴ They do this through an Annual Activity and Expenditure Return (Annual Return), which must include all of the information set out in Schedule 19 of the Mineral Industries Regulations.⁴⁵ Item 11(e) of Schedule 19 requires that the mine operator provide 'an estimate of the current rehabilitation liability for the licence area.'⁴⁶ 'Rehabilitated' is defined in a note to Schedule 19 as 'landforming complete and planting undertaken. Further land management may be required.'⁴⁷

COMMUNITY CONSULTATION

Section 39A of the Mineral Resources Act requires licence holders to consult with the community by sharing information about 'any activities authorised by the licence that may affect the community' and providing members of the community with a 'reasonable opportunity to express their views about those activities.'⁴⁸

Under s. 40(3)(d) of the Mineral Resources Act, a work plan must contain a plan for community consultation. Under Schedule 15 of the Mineral Industries Regulations it is necessary that a plan:

- a. identifies any community likely to be affected by the mine operations; and
- b. in relation to the mine operations, includes proposals for—
 - i. identifying community attitudes and expectations; and
 - ii. providing information to the community; and
 - iii. receiving feedback from the community; and
 - iv. analysing community feedback and considering community concerns or expectations; and
- c. includes a proposal for registering, documenting and responding to complaints and other communications from members of the community in relation to the mine operations.⁴⁹

3.2.3 ROYALTIES, RENTS AND LEVIES

Each of the Latrobe Valley mine operators is required to pay royalties to the State each financial year in accordance with the prescribed rate, being either the base amount per gigajoule unit of lignite produced (that is, the energy content of the coal), or the amount prescribed in the Mineral Industries Regulations.⁵⁰ The licensee must send an annual report to the Department Head that describes the information used to calculate the royalty, including the quantity of coal produced and the energy content of that coal.⁵¹

Each of the mine operators is required to pay rent in relation to the land covered by its licence in accordance with the Mineral Industries Regulations.⁵² For the period 1 July 2015 to 30 June 2016, the rent is calculated at 12.1 fee units per 10 hectares.⁵³ The Mineral Resources Act also requires each of the Latrobe Valley mine operators to pay a mine stability levy to the Minister 'for the purpose of providing measures designed to decrease geotechnical and hydrogeological risks to mine stability' in relation to the Latrobe Valley mines.⁵⁴ In the Mineral Industries Regulations, the mine stability levy is set at 34,868 fee units, which amounts to \$474,204.80 for the period from 1 July 2015 to 30 June 2016.⁵⁵ The mine stability levy is payable each financial year.⁵⁶

The amounts paid by each mine operator for the period from 1 July 2014 to 30 June 2015 are shown in Table 2.

Table 2. Royalties, rents and levies paid by the Latrobe Valley mines, between 1 July 2014 and 30 June 2015⁵⁷

Mine	Rent \$	Royalty \$	Levy \$	Total \$
Yallourn mine	234,705	6,746,531	447,705	7,428,941
Hazelwood mine	144,021	9,835,777	447,705	10,427,503
Loy Yang mine	211,633	16,147,597	447,705	16,806,935
Total	590,359	32,729,905	1,343,115	34,663,379

3.2.4 REHABILITATION BONDS

Section 80(1) of the Mineral Resources Act requires a licence holder to 'enter into a rehabilitation bond for an amount determined by the Minister.' The Mining Regulator describes a rehabilitation bond as 'a financial security which must be provided by [a licence holder] prior to work commencing to ensure that rehabilitation can be undertaken by [DEDJTR] should the [licence holder] be unable to meet their rehabilitation obligations.'⁵⁸ If the licence holder fails to rehabilitate the mine consistent with its obligations under the Mineral Resources Act,⁵⁹ the Minister may take steps to rehabilitate the mine site.⁶⁰ The bond can then be used towards costs incurred in undertaking rehabilitation.⁶¹ If the rehabilitation costs exceed the bond amount, the State can recover that excess from the licensee.⁶² The State's submission to the Board notes that bonds 'provide an incentive for licensees to comply with their rehabilitation obligations.'⁶³

To determine or review the amount of a rehabilitation bond, the Minister may require the licence holder to undertake an assessment of its rehabilitation liability under s. 78 of the Mineral Resources Act.⁶⁴ Such assessments must be undertaken 'in a manner and form determined by the Minister' and take into account the work necessary to rehabilitate the land in accordance with the licence holder's obligations under s. 78.⁶⁵

Pursuant to s. 79A(3) of the Mineral Resources Act, the Minister may also require the licensee to engage an auditor to review a rehabilitation liability assessment. Section 77U defines an 'auditor' by reference to s. 53S of the *Environment Protection Act 1970* (Vic) (Environment Protection Act), which provides authority for the appointment of 'environmental auditors'. Environmental auditors are discussed further in Part 3.4.2.

The Minister may also review the amount of a rehabilitation bond based on the information contained in the mine operator's Annual Return, to determine whether the amount is sufficient.⁶⁶ The Minister may, after consultation with the licence holder, require the licence holder to enter into a further rehabilitation bond.⁶⁷ It is an offence to fail to comply with such a requirement.⁶⁸ The Minister may prohibit a licensee from doing any work until it has entered into the further rehabilitation bond.⁶⁹

Once the Minister is satisfied that the land has been rehabilitated and that the rehabilitation is 'likely to be successful', the Minister must return the bond to the licensee as soon as possible.⁷⁰ For mining licences on private land, this can only occur after consultation with the local council and land owner.⁷¹ As a condition of returning the bond, the licence holder may be required to enter into a further rehabilitation bond 'if any land or part of the land to which the bond relates has not been rehabilitated, or requires further rehabilitation.'⁷²

Rehabilitation bonds are discussed in more detail in Parts 7 to 9 of this report.

3.3 WATER ACT

Under the *Water Act 1989* (Vic) (Water Act), the State retains the overall right to the use, flow and control of all surface water and groundwater in Victoria.⁷³ The Minister for Environment, Climate Change and Water administers the Water Act, with the assistance of the Water and Catchments Group within the Department of Environment, Land, Water and Planning (DELWP).⁷⁴ DELWP works in partnership with water corporations and catchment management authorities in managing the allocation of water resources pursuant to the Water Act.⁷⁵ In the Latrobe Valley area these authorities include Southern Rural Water, Gippsland Water and the West Gippsland Catchment Management Authority.⁷⁶

The Minister for Environment, Climate Change and Water issues the following water entitlements:

- bulk entitlements
- environmental entitlements
- water shares
- s. 51 licences to take and use water (referred to as 'groundwater licences' in this report).⁷⁷

Of these entitlements, the Latrobe Valley mine operators and their associated power stations have access to water through bulk entitlements and s. 51 licences to take and use groundwater (referred to as 'groundwater licences' in this report).

The Minister for Environment, Climate Change and Water has appointed Southern Rural Water as a 'Resource Manager', which requires it to act as the Minister's 'representative in the Latrobe basin and to monitor the entitlement holders' compliance with their [water] entitlements.'⁷⁸ Southern Rural Water is also the appointed 'Storage Manager' for the Latrobe Valley pursuant to the Water Act.⁷⁹

3.3.1 BULK ENTITLEMENTS

The Minister for Environment, Climate Change and Water may issue bulk entitlements to water to an 'authority'.⁸⁰ An authority is defined in s. 34 of the Water Act, and can include water corporations (for example, Southern Rural Water) and 'generation companies' within the meaning of the Electricity Act.⁸¹

A bulk entitlement is a right to take, use and supply water in a waterway, water in storage works of a water corporation, and groundwater.⁸² A bulk entitlement holder is required to comply with the conditions and obligations of its bulk entitlement, including the volume of water that can be taken.⁸³

Dr Sharon Davis, Executive Director of the Water Resources Division, Water and Catchments Group at DELWP, advised the Board that bulk entitlements issued to the Latrobe Valley coal mines do not have explicit conditions attached about what the water should be used for, 'other than to "supply electricity generation works"'. The bulk entitlements do not define what constitutes electricity generation works.⁸⁴

The Water Act provides that a bulk entitlement can be assigned or transferred by an Authority to any person, after approval from the Minister for Environment, Climate Change and Water.⁸⁵ Examples of this are the water supply agreements between Gippsland Water and GDF Suez for the transfer of part of Gippsland Water's bulk entitlement (discussed further in Part 4 of this report).⁸⁶

3.3.2 GROUNDWATER LICENCES

The Minister for Environment, Climate Change and Water may issue a licence to take and use water to a person upon an application under s. 51 of the Water Act. Southern Rural Water administers the groundwater licences that have been issued to the Latrobe Valley mine operators.⁸⁷

A groundwater licence is a right to take and use water from sources including groundwater.⁸⁸ These licences are subject to conditions and obligations, including the volume of water that can be taken and how the water can be used.⁸⁹

When a groundwater licence is issued to a 'generation company' within the meaning of the Electricity Act in order to take and use groundwater for 'purposes associated with an open cut coal mine', the licence may be issued for a period of up to 30 years, subject to any special conditions.⁹⁰ In other cases, groundwater licences are limited to a period of up to 15 years.⁹¹

Section 58 of the Water Act provides that a licence can be renewed by an application made to the Minister for Environment, Climate Change and Water before the licence expires.⁹² In determining whether to renew a licence, the Minister must have regard to the matters mentioned in s. 53 of the Water Act. For example, this could include advice received from a relevant catchment management authority and the report of any panel constituted under s. 50; and 'the existing and projected availability of water in the area'.⁹³ Once the Minister has complied with the consultation requirements set out in the Water Act, the Minister must renew the groundwater licence 'unless, in the opinion of the Minister, there are good reasons not to do so.'⁹⁴ The renewal may be subject to amended or further conditions.⁹⁵

A groundwater licence may only be renewed for a period of 15 years, although further renewal applications can be made.⁹⁶ The Minister for Environment, Climate Change and Water may revoke a groundwater licence for a number of reasons, including if the licence holder has failed to comply with licence conditions.⁹⁷

3.4 OTHER STATE LEGISLATION RELEVANT TO MINING

3.4.1 OCCUPATIONAL HEALTH AND SAFETY ACT

The *Occupational Health and Safety Act 2004* (Vic) (OHS Act) and the Occupational Health and Safety Regulations 2007 (Vic) (OHS Regulations) place obligations on all Victorian workplaces to secure, and eliminate risks to, the health, safety and welfare of employees and other persons at work.⁹⁸ The OHS Act also aims to 'ensure that the health and safety of members of the public is not placed at risk by the conduct of undertakings by employers and self-employed persons.'⁹⁹

Part 5.3 of the OHS Regulations creates a range of specific additional obligations with respect to mines. In particular, rr. 5.3.7 to 5.3.9 are intended to reflect the way in which the statutory duties under ss. 21 and 23 of the OHS Act (relating to the duties owed by an employer to employees and members of the public to provide a safe environment) are to be performed by mine operators. Regulation 5.3.7 deals with the identification and assessment of risks to health and safety associated with all 'mining hazards', which includes risks such as ground control, slope stability, flooding and mine fires.¹⁰⁰ Regulation 5.3.8 deals with the adoption of risk control measures to eliminate or reduce those risks. Regulation 5.3.9 requires the mine operators to carry out reviews of their identification and assessment of risks, together with the control measures for countering those risks on a regular basis and after any incident involving a 'mining hazard'.

Importantly for the purposes of this Inquiry, the obligations imposed by the OHS Act and Regulations are not limited to the period during which a mine is operational. They extend to the period during which a mine site is being rehabilitated.¹⁰¹

WorkSafe administers and enforces the OHS Act and Regulations.¹⁰²

3.4.2 ENVIRONMENT PROTECTION ACT

The Environment Protection Authority (EPA) is the statutory authority charged with administering the Environment Protection Act and Regulations.¹⁰³ The purpose of the Environment Protection Act is to 'create a legislative framework for the protection of the environment in Victoria having regard to the principles of environment protection.'¹⁰⁴

The EPA's role includes:

- administering the Act and any Regulations and orders made under it
- regulating waste discharge activities, industrial waste, noise and pollution
- recommending State environment protection policies and waste management policies as Victorian statutory policy
- implementing National Environment Protection Measures
- issuing works approvals, licences, permits and remedial notices
- recommending Regulations be made
- enforcement action for breaches of the Act.¹⁰⁵

ENVIRONMENTAL AUDITORS

Section 53S of the Environment Protection Act empowers the EPA to 'appoint any person to be an environmental auditor for the purposes of this Act.'¹⁰⁶ The Environment Protection Act specifies that the function of an environmental auditor is:

- a. to conduct environmental audits; and
- b. to prepare environmental audit reports; and
- c. if requested, to issue certificates of environmental audit or statements of environmental audit; and
- d. any function conferred on an environmental auditor under this or any other Act.¹⁰⁷

The EPA describes the benefits of using an appointed environmental auditor as ensuring the receipt of reliable information on the condition of the environment and any risks posed, by:

- detecting actual or potential environmental impacts
- assessing compliance with regulations
- assessing the nature of harm, or risk of harm to the environment caused by an industrial process or activity
- understanding significant environmental issues.¹⁰⁸

Part 8.5.3 of this report discusses environmental auditors further.

FINANCIAL ASSURANCES

Following a number of business failures resulting in environmental clean-up incidents, the EPA introduced the financial assurances scheme as a mechanism to ensure that appropriate funds are available in the event that a clean-up is required.¹⁰⁹

Sections 21, 31A and 53F of the Environment Protection Act empower the EPA to require financial assurances. Pursuant to s. 21(1)(ba), in some circumstances the EPA may issue a works approval or licence, or amend a licence, on the condition that a financial assurance is provided.¹¹⁰ Section 31(2A) empowers the EPA to issue a pollution abatement notice requiring the recipient to provide a financial assurance to the EPA.¹¹¹ Additionally, under s. 53F(5), the EPA may refuse to issue or transfer a permit to transport prescribed waste or prescribed industrial waste unless it is first provided with a financial assurance.¹¹²

Historically, financial assurances have been required in the form of a bank guarantee.¹¹³ However, s. 67B prescribes other forms of security and also allows the EPA to accept any form of security that it considers appropriate.¹¹⁴ The EPA is currently considering expanding the range of financial assurances that it will accept to include:

- bank guarantee
- letter of credit
- guarantee (by deed poll)
- certificate of title
- mutual fund
- bond
- accumulating trust fund
- insurance.¹¹⁵
- controlled bank account

A financial assurance is not required for EPA licence holders that operate within the mining industry or power stations.¹¹⁶ However, a financial assurance is required for certain types of landfills.¹¹⁷ The mine operators each hold EPA licences that require them to maintain a financial assurance in relation to certain landfills that they operate. However, despite ongoing negotiations between the mine operators and the EPA, financial assurances have not been provided by any of the mine operators.¹¹⁸

3.5 COMMONWEALTH REGULATORY FRAMEWORK RELEVANT TO MINING

The Commonwealth Government has a minor role in regulating coal mining through the administration of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (Commonwealth Environment Act). Section 24D of the Commonwealth Environment Act requires ministerial approval of certain developments with a significant impact on water resources. Section 24D will only apply if a 'constitutional corporation, the Commonwealth or a Commonwealth agency' takes an 'action' that involves 'coal seam gas development' or 'large coal mining development' and the action has, will have or is likely to have 'a significant impact on a water resource'. The expression 'large coal mining development' is defined as 'any coal mining activity that has, or is likely to have, a significant impact on water resources'.¹¹⁹ Under s. 528 of the Commonwealth Environment Act, each licensee meets the definition of a constitutional corporation.

Section 16 of the Commonwealth Environment Act makes similar provision for an 'action' by a 'person' that has, will have, or is likely to have a 'significant impact on the ecological character of a declared Ramsar wetland'.¹²⁰ The Board notes the submission by Environment Victoria that the 'Gippsland Lakes are an internationally significant wetland' and would meet this description.¹²¹

It is possible that the operation of ss. 16 and 24D of the Commonwealth Environment Act could be triggered by the 'action' of filling a mine pit with water after coal mining ceases, on the basis that this is a coal mining activity that will impact significantly on water resources.¹²² However, the Board notes that the Commonwealth Department of Environment's guidelines concerning the meaning of actions relating to 'large coal mining development' under the Commonwealth Environment Act suggest that these are limited to the extraction of coal.¹²³ This may well exclude activities, such as mine filling, which necessarily occur after extraction has concluded.¹²⁴

3.6 OTHER AGENCIES INVOLVED IN MINE REHABILITATION

In addition to the Minister for Energy and Resources, DEDJTR, DELWP, WorkSafe and the EPA, a range of other agencies and organisations are involved in the regulation and implementation of mine rehabilitation.

3.6.1 COAL RESOURCES VICTORIA

Since privatisation of the Latrobe Valley mines, the State has had a role in the strategic planning of Victoria's coal resources, primarily through Coal Resources Victoria (formerly Clean Coal Victoria). Coal Resources Victoria was established in 2008 to undertake strategic planning on behalf of the State for the future development of Victoria's coal resources.¹²⁵ Its role includes strategic resource planning, regional environmental planning, coal research, and engaging with key stakeholders with an interest in coal development.¹²⁶

Since December 2013, Coal Resources Victoria has been staffed by one Director (currently Ms Jane Burton).¹²⁷ The Director's role is to 'provide advice on resource planning and stakeholder engagement regarding the Victorian Government's coal resource'.¹²⁸

On 18 November 2015, the State announced an independent review of past coal development programs to plan for the future of Victoria's coal resources and develop a new coal policy.¹²⁹ This new coal policy will 'consider the economic, social and environmental factors, to give the community and industry certainty into the future.'¹³⁰ The review coincides with public announcements by AGL and GDF Suez that they will not be investing in new conventional coal-fired power stations.¹³¹

3.6.2 TECHNICAL REVIEW BOARD

The Technical Review Board was established in 2009 under Part 4A of the Mineral Resources Act.¹³² Its establishment was an outcome of the Mining Warden's Inquiry into the 2007 Yallourn northern batter collapse.¹³³ The batter collapse is discussed in Part 4 of this report.

The State advised the Board of Inquiry that the overall aim of the Technical Review Board is 'to improve geotechnical and hydrogeological performance and knowledge within the Victorian mining industry.'¹³⁴ The Technical Review Board is an advisory panel comprised of a team of four experts, chaired by Professor Jim Galvin.¹³⁵

The role of the Technical Review Board is to provide independent advice to the Minister for Energy and Resources and to DEDJTR, on issues related to mine and quarry stability. This includes advice on the State's strategies, guidelines and regulatory approaches, as well as new technology related to mine stability and geotechnical issues.¹³⁶

The Technical Review Board provides annual reports to the Minister, who can then release the reports to DEDJTR and the mining industry.¹³⁷ The Technical Review Board's Annual Reports from 2011–12 to 2014–15 are available on the Mining Regulator's website.¹³⁸

The Technical Review Board's original terms of reference did not have a specific focus on mine rehabilitation; however the Board did provide advice to the State on rehabilitation issues and its concerns about the Latrobe Valley mines' rehabilitation plans in its annual reports, and other direct advice to DEDJTR between 2011 and 2015.¹³⁹

In August 2015, the State included 'rehabilitation' in the Technical Review Board's terms of reference. The Technical Review Board now provides advice and guidance to DEDJTR on issues such as progressive and final mine rehabilitation. The State appointed Ms Corinne Unger, who is a specialist in rehabilitation policy and procedures, to the Technical Review Board in September 2015.¹⁴⁰

The current Technical Review Board members are appointed until the end of June 2016, with Professor Galvin advising the Board that this term was fixed 'to align with the reform work that's going on within [DEDJTR]', and that 'the Minister has set the end of the financial year as the review point for whether the Board goes forward.'¹⁴¹

3.6.3 GEOTECHNICAL AND HYDROGEOLOGICAL ENGINEERING RESEARCH GROUP

The Geotechnical and Hydrogeological Engineering Research Group (GHERG) is a research and development program initially established at Monash University's Gippsland campus in 2009, and now operated through Federation University Australia.¹⁴² It is funded by the State to undertake geotechnical and hydrogeological research¹⁴³ 'to advance understanding of ground movements associated with the Latrobe Valley brown coal mines.'¹⁴⁴ GHERG's objectives include:

- undertaking geotechnical and hydrogeological research and development to address the issue of insufficient expertise and skill shortages
- fostering research and innovation in coal geotechnical and hydrogeological engineering
- providing support to the Technical Review Board
- developing training programs for mine staff.¹⁴⁵

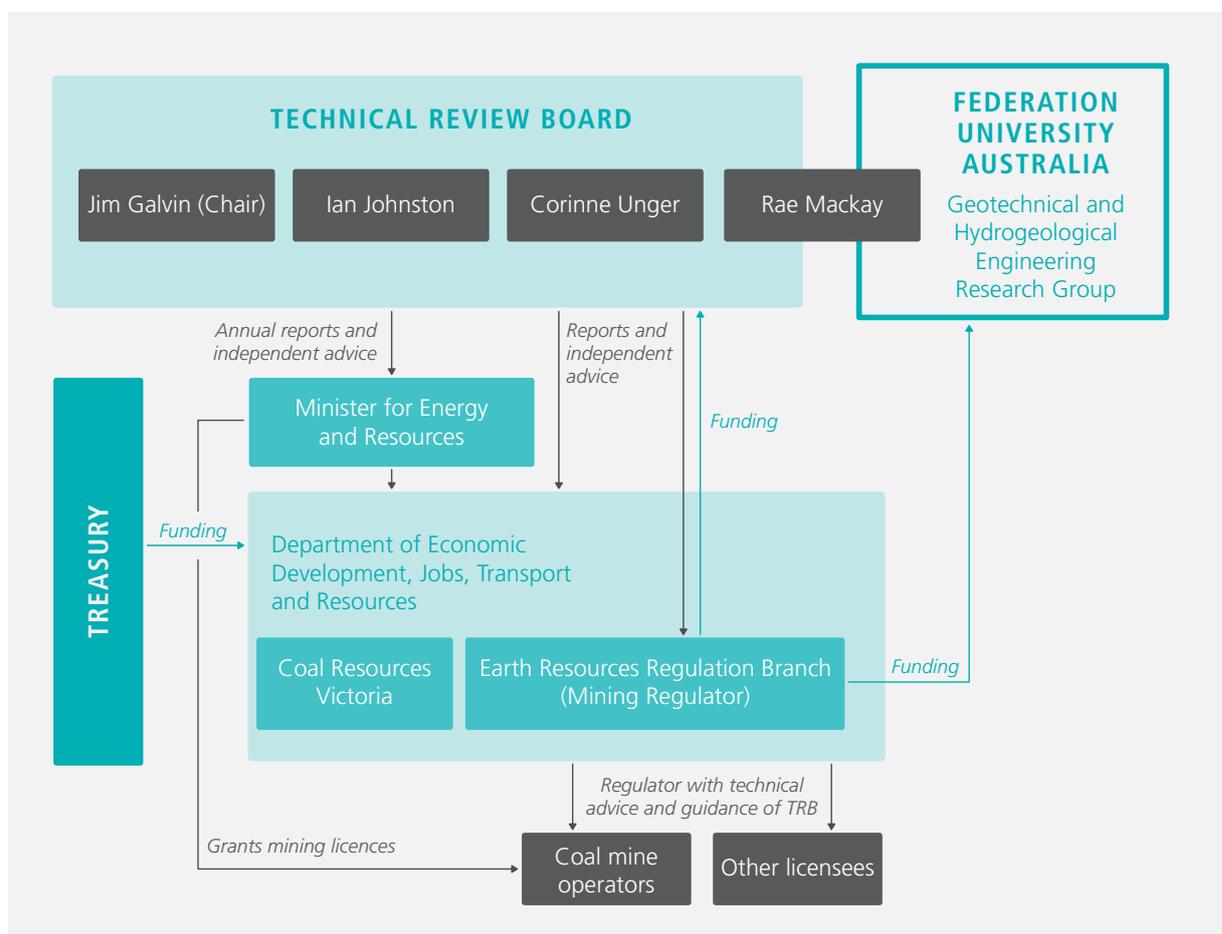
The State renewed funding for GHERG in September 2014, allocating \$2.47 million for GHERG to continue its work up to 30 June 2019.¹⁴⁶

GHERG currently plays a key role as a knowledge repository in relation to geotechnical and hydrogeological engineering for the Latrobe Valley mines. A database containing historical information, photographs and construction drawings, as well as the past research results of the State Electricity Commission of Victoria, is available to approved researchers and the mine operators.¹⁴⁷ Research undertaken by GHERG has extended knowledge about the properties and movement of the coal and groundwater, as well as mine rehabilitation. It has also established an education and training program.¹⁴⁸

GHERG interacts directly with the Technical Review Board. The Director of GHERG, Professor Rae Mackay, is also a board member of the Technical Review Board.¹⁴⁹ Professor Mackay stated that there is a measure of independence between the two organisations. He is required to obtain consent from the mine operators to use any documents obtained through the Technical Review Board for his work with GHERG.¹⁵⁰

Figure 7 shows the relationship of the Technical Review Board to GHERG, the State and the mine operators.¹⁵¹

Figure 7. Relationship of the Technical Review Board and GHERG to key stakeholders





Conveyor system at the Loy Yang mine
(source: Department of Economic Development, Jobs, Transport and Resources)



PART FOUR
THE LATROBE
VALLEY MINES

PART 4 THE LATROBE VALLEY MINES

4.1 OVERVIEW

The Latrobe Valley mines are ‘large and complex structures.’¹ While the mines have common elements, each also has unique features, which inform how they are mined and rehabilitated. This Part details the features of each mine—such as their location, size and scale of operation—to provide the context for considering rehabilitation options.

Previous incidents at the mines, such as mine collapses and fire incidents, are part of this context and have affected mine operations, the community and the environment. These incidents, and the responses to them, have significantly informed how mines and the Mining Regulator operate today. They also highlight the need for an active approach to both preventing and mitigating risk during mining operations, and to progressive and final rehabilitation of the mines.

This Part summarises the licence and work plan parameters relevant to each mine. As outlined in Part 3 of this report, rehabilitation plans are a mandated part of work plans. An overview of the rehabilitation plan for each mine is included in this Part. Part 4 also includes an overview of current water licensing arrangements in the Latrobe Valley. While this Part refers to the power stations located at each of the Latrobe Valley mines, under the Terms of Reference of this Inquiry, the focus of this report is on the operation and rehabilitation of the mines, not the power stations.

Table 3 contains a summary of some of the relevant details about the Latrobe Valley mines.

Table 3. Summary of Latrobe Valley mines

	Yallourn	Hazelwood	Loy Yang
Licensee	EnergyAustralia	GDF Suez	AGL Loy Yang
Location of ultimate holding company	Hong Kong	France Japan	Australia
Mine location	Northwest of Morwell	South of Morwell	Southeast of Traralgon
Mining licence number	5003	5004	5189
Date licence granted	9 April 1996 ²	10 September 1996 ³	6 May 1997 ⁴
Production rate (per annum)	18 Mt	16 Mt	30 Mt
Term of licence	30 years ⁵	30 years ⁶	40 years ⁷
Planned closure	2032 ⁸	2033 ⁹	2048 ¹⁰
Total annual water allocation (2015)	41.985 GL	36.484 GL	62.996 GL
<i>Groundwater licence</i>	3.285 GL ¹¹	22.484 GL ¹²	19.996 GL ¹³
<i>Bulk entitlement</i>	36.5 GL ¹⁴	–	40 GL ¹⁵
<i>Water supply agreement</i>	2.2 GL ¹⁶	14 GL ¹⁷	3 GL ¹⁸

4.2 YALLOURN MINE

4.2.1 OVERVIEW AND OWNERSHIP

Yallourn is the oldest of the three Latrobe Valley mines. The Yallourn mine is situated northwest of Morwell, at the junction of the Latrobe and Morwell Rivers and close to the railway line.

The Yallourn North Open Cut mine was opened in the late 1800s, and the Yallourn Open Cut (now known as the Yallourn mine) commenced operation under the authority of the State Electricity Commission of Victoria (SECV) in 1924.¹⁹

EnergyAustralia Yallourn Pty Ltd currently operates the mine on behalf of the licence holder, Yallourn Energy Pty Ltd.²⁰ EnergyAustralia Holdings Limited is the holding company of EnergyAustralia Yallourn Pty Ltd,²¹ and is wholly owned by the Hong Kong-based company CLP Holdings Ltd.²² In this report, the mining licence holder and its predecessors are referred to collectively as EnergyAustralia.

EnergyAustralia operates the Yallourn mine and adjacent power station (the Yallourn W power station). The power station is comprised of two 360 megawatt and two 380 megawatt units, which supply approximately 22 per cent of Victoria's base load electricity.²³

EnergyAustralia has three mining licences relevant to its Yallourn operation—Mining Licence 5003 (MIN5003), MIN5216 and MIN5304. Coal mining is exclusively carried out under MIN5003, with the smaller licences required for associated infrastructure.²⁴

MIN5003 was granted on 9 April 1996. A standard schedule of conditions is attached to the mining licence—including the requirement for minimising surface disturbance; obtaining a groundwater licence and monitoring groundwater levels; controlling erosion; establishing buffer zones and visual screening; conducting progressive rehabilitation and final rehabilitation; and lodging a rehabilitation bond.²⁵ In January 2015, a new condition was added (1A Risk Management) to MIN5003, requiring the licensee to submit a Risk Assessment and Management Plan by 31 August 2015.²⁶

4.2.2 KEY FEATURES AND SETTINGS

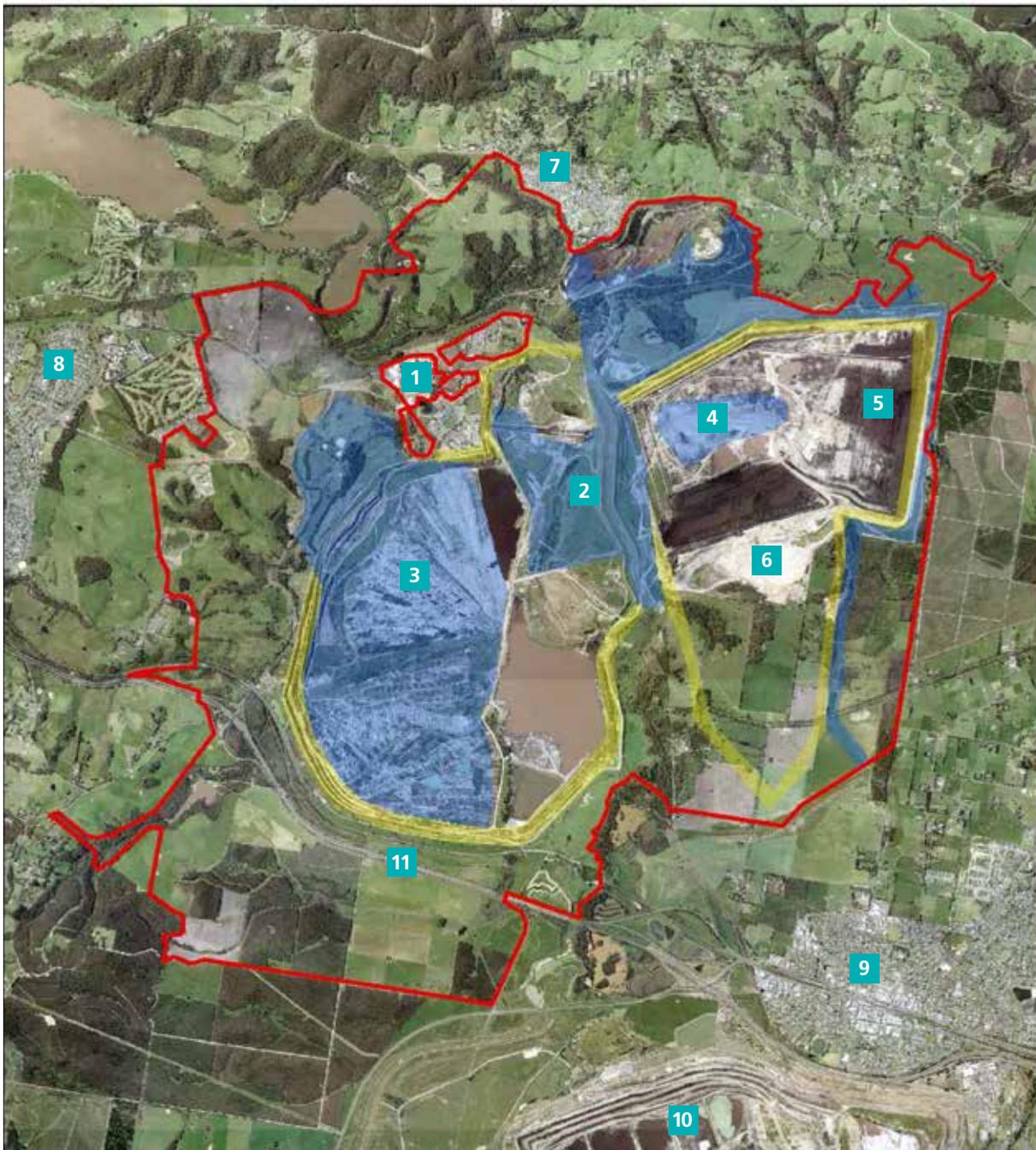
The mine is currently eight kilometres wide at its widest point, with a perimeter of 26 kilometres.²⁷ It is the shallowest of the Latrobe Valley mines, with a depth of approximately 95 metres below ground level at its lowest point.²⁸ As at July 2015, 1,769 hectares of the mine site had been disturbed by mining operations.²⁹

Since mining began in 1924, over one billion tonnes of coal and over 293 million cubic metres of overburden have been mined.³⁰

The mine comprises four coalfields—Township Field, East Field, East Field Extension and Maryvale Field (shown in Figure 8). Coal is mined exclusively from what is known as the Yallourn coal seam.³¹ The Yallourn seam is between 40 to 90 metres thick and is covered by between 8 to 46 metres of overburden.³² The coal seam is 60 metres in Township Field and 85 metres in Maryvale Field.³³ The coal seam at the Yallourn mine has a high moisture-content (generally around 65 per cent).³⁴

The expansion of the coal mining activities into the East Field and the Maryvale Field at the Yallourn mine were the subject of an Environment Effects Statement assessment between 1999 and 2001. In 2005, the expansion led to the construction of the Morwell River Diversion. The Morwell River Diversion is an earthen embankment that carries the river across the Yallourn mine until it joins the Latrobe River.³⁵

Figure 8. Map of the Yallourn mine and power station³⁶



Legend

- Mining Licence Boundary
- Rehabilitation - past
- Rehabilitation - future

Coordinate System: GDA 1994 MGA Zone 55
 Projection: Transverse Mercator
 Datum: GDA 1994



Produced by
 Earth Resources Information Centre
 Date: 30/07/2015



- | | |
|----------------------------|---------------------|
| 1. Power Station | 7. Yallourn North |
| 2. Morwell River Diversion | 8. Newborough |
| 3. Township Field | 9. Morwell |
| 4. East Field | 10. Hazelwood Mine |
| 5. East Field extension | 11. Princes Freeway |
| 6. Maryvale Field | |



The closest aquifer is 40 to 50 metres below the floor of the Yallourn mine.³⁷ EnergyAustralia has only had to undertake limited dewatering of the aquifer since mining operations expanded into East Field in 2008 and Maryvale Field in 2015.³⁸

The design of the Yallourn power station has been guided by the properties of the coal seam. The moisture content of the coal seam requires it to be partially dried prior to being blown into the power station's furnace.³⁹ Coal from other mines can only be burnt in the Yallourn power station provided it is sufficiently blended with the coal from the Yallourn mine.⁴⁰

4.2.3 WORK PLAN AND REHABILITATION PLAN

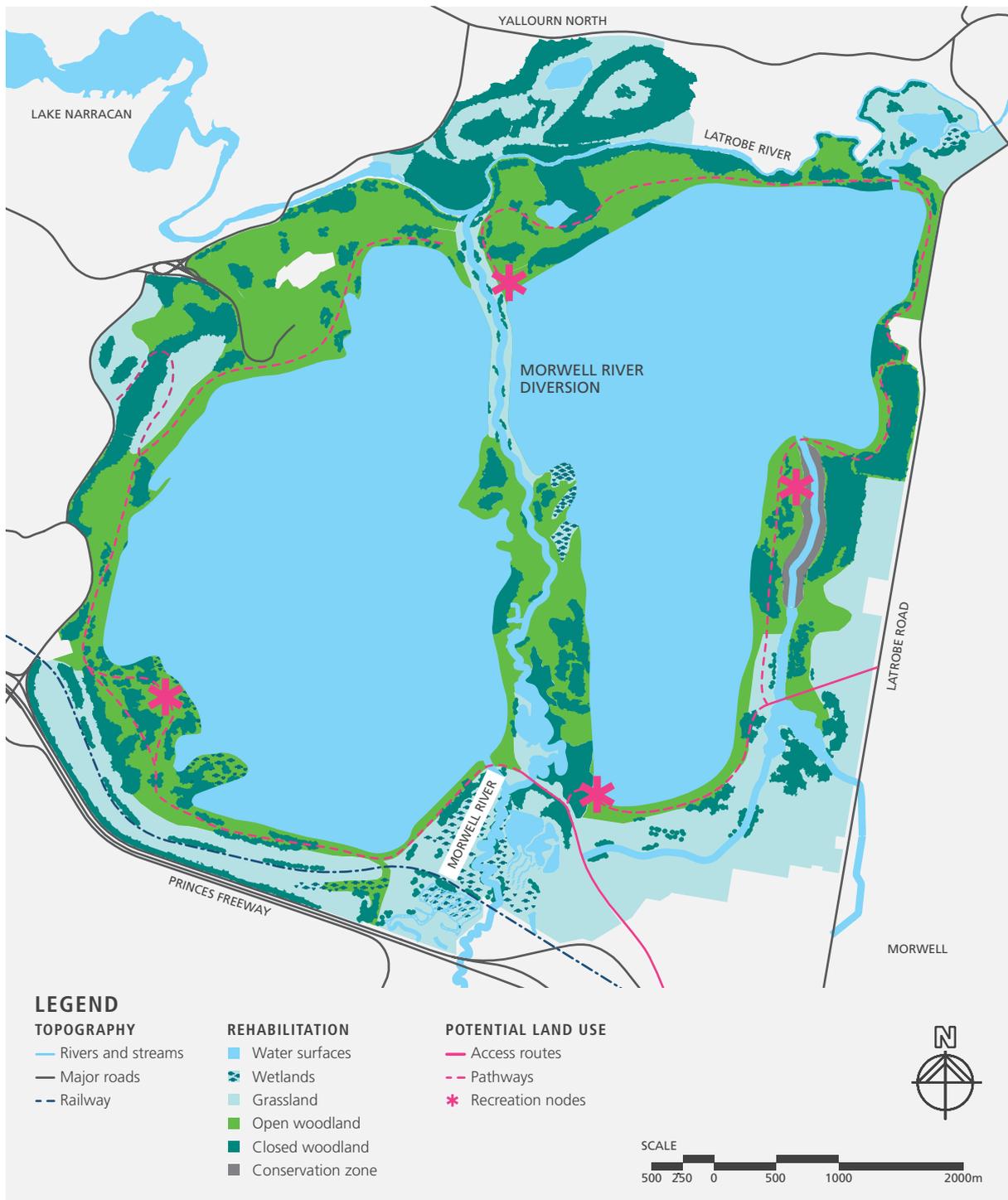
At the time the Yallourn mine was privatised, the rehabilitation plan envisaged the creation of a recreational lake as the final land use. The plan was to flood the mine pit to a high final water level just below the crest of the mine (known as relative level or RL +38m), and stabilise and landscape the batters and banks above the water level. The batters below RL +38m were to be progressively rehabilitated in readiness for flooding. This final landform and land use remains the rehabilitation outcome planned for the mine.⁴¹

Since privatisation of the mine, the Department Head has approved four work plan variations, the most significant of which were in 2002 and 2011.⁴² All work plan variations are to be read in conjunction with the original work plan.

The January 2002 work plan variation included an update to the mine rehabilitation master plan to reflect the addition of the Morwell River Diversion and the change in use of the Yallourn North Open Cut.⁴³ The variation specified the following rehabilitation requirements and final land use:

- Stabilise and rehabilitate the perimeter batter area above the future lake level to no steeper than 1v:3.5h.⁴⁴
- Overburden batters to be covered by a minimum of 100 millimetres of topsoil and revegetated.⁴⁵
- Edge protection around the future lake margin to minimise the risk of erosion by wave action, through a combination of flattening, beaching, compaction and revegetation.⁴⁶
- Maximum slope angle of 1v:3h in coal and overburden, particularly for slopes 30 to 40 metres in length.⁴⁷
- Overburden and waste coal to be placed in the mined out areas of the pit to minimise the risk of unstable conditions.⁴⁸
- Yallourn North Open Cut to be used for the disposal of fly ash from the power station, with the batter slopes for rehabilitation to vary between 1v:4h to 1v:6h, based on a history of slope instability at the site.⁴⁹
- Final mine flooding to form a large lake system connected to the local rivers (assumes eventual filling of the mine pit to spilling level).⁵⁰ See Figure 9 for a representation of the landform.
- Yallourn North Open Cut return water pond to be relocated to the northeast of the pit.⁵¹
- Adjacent mine areas (including the batters) to have multiple potential uses such as conservation, grazing, recreation, forestry, drainage corridors and industrial uses.⁵²

Figure 9. Yallourn mine's approved final landform⁵³



The 2002 mine rehabilitation master plan identified a number of environmental issues requiring further investigation to ensure the successful completion of the master plan. These related to water, land, air quality, and flora and fauna, and have in part already been addressed by studies completed to date by EnergyAustralia.⁵⁴ Of particular significance are the studies about water. EnergyAustralia identified key issues as:

- how the lake will be filled
- whether the water level is sustainable
- the likely impact on water quality (both surface and groundwater)
- the stability of the lake perimeter areas.⁵⁵

In the 2002 mine rehabilitation master plan, the water balance assessment estimated it will take 65 years to fill the Yallourn mine by rainfall only. Consequently, it proposed that water from either or both of the adjacent Morwell and Latrobe Rivers be diverted to fill the pit more quickly. EnergyAustralia estimated it will take 10 years to fill the mine by diverting an average of 10 per cent of the Latrobe River flow.⁵⁶

CURRENT YALLOURN WORK PLAN

In 2011, EnergyAustralia submitted a work plan variation to the Mining Regulator. The 2011 work plan variation incorporates changes to the Yallourn mine resulting from the 2007 northern batter collapse and the re-design of the Maryvale Field footprint.⁵⁷ The rehabilitation requirements and final end use have not changed from the 2002 rehabilitation master plan, with the final pit area comprising twin lakes dissected by the elevated Morwell River Diversion embankment.⁵⁸

The Mining Regulator approved the 2011 work plan variation subject to seven conditions relating to mine stability, native vegetation offsets and rehabilitation.⁵⁹ Condition 7 of the work plan variation requires that:

The Yallourn Mine Rehabilitation Plan is to be reviewed regarding the feasibility of the flooded mine scenario versus other alternatives within 12 months of the approval of this Mine Work Plan Variation. The review should include as a minimum:

- a. long-term water balance studies
- b. how to form safe and stable rehabilitated batters, including for the non-flooded mine scenario
- c. how to minimise mine floor heave, including for the non-flooded mine scenario
- d. strategic use of overburden in flooded and non-flooded mine scenarios
- e. advantages and disadvantages of the flooded and non-flooded mine scenarios regarding progressive rehabilitation opportunities.⁶⁰

In response to Condition 7, EnergyAustralia reviewed its mine rehabilitation master plan, which involved consideration of three final landform options—a fully flooded, partially flooded or non-flooded mine pit.⁶¹ In 2012, EnergyAustralia retained GHD to prepare a geotechnical peer review of the flooding options at Yallourn, titled *Report for Yallourn mine rehabilitation: Geotechnical assessment of flooding options*. The GHD review assessed the stability implications of each of the flooding options in the mine rehabilitation master plan.⁶² A summary of GHD's findings is presented in Table 4 below.⁶³

The GHD review confirms that the flooding to RL +37m (slightly adjusted from the previous RL +38m), approximately one metre below crest height, is the preferred option,⁶⁴ and that 'the majority of batters within the Yallourn mine will need minimal stabilisation work prior to the void being flooded.'⁶⁵ GHD also concludes that batter stability can vary dramatically during flooding, in which case 'additional significant stabilising works will be required regardless of which option is selected.'⁶⁶

Table 4. Summary of flooding options for the Yallourn mine, adapted from GHD⁶⁷

Factors	Option 1: Fully flooded RL +37m	Option 2: Partially flooded RL +20m – Yallourn Township Field only	Option 3: Un-flooded
Batter stability	Generally most favourable stability conditions apply. Lowest likelihood of major coal bench movements. Monitoring may manage risks sufficiently during filling to minimise interim stabilisation measures.	Lowest stability conditions within Yallourn Township Field. Adverse Permanent stabilisation of the Yallourn Township Field western batters required. Ongoing management and control of conditions or major stabilisation of berms in Yallourn East Field, Yallourn East Field Extension and Maryvale Field required.	Favourable stability conditions apply across most of the site, however ongoing management and control of groundwater conditions must apply. Otherwise major stabilisation berms in Yallourn East Field, Yallourn East Field Extension and Maryvale Field required.
Deep aquifer – floor stability	Best protection against floor heave in Maryvale Field. Negates need for full internal dump across Maryvale Field. Minimises risk of heave causing aquifer interconnection.	Insufficient protection against floor heave if deep aquifer recovers to RL +25m. Internal dump required across Maryvale Field to augment stabilising requirement.	Continued aquifer pumping may be required in Maryvale Field or placement of widespread internal dump.
Residual geotechnical risks	Best chance to minimise residual risks.* Minimise the impact of variable groundwater levels across the site without undertaking widespread stabilisation works.	Least favourable of flooding options. Significant stabilising works likely to ensure long term stability.	Most extensive landform modifications required.
Morwell River Diversion	May require additional stabilising measures implemented along the embankment role.	Best of flooding options. No flooding of the Morwell River Diversion toe anticipated.	Status quo.

* Residual risk is defined as the risks remaining after all mitigation measures have been applied

Contrary to the 2002 master rehabilitation plan, the GHD review concludes that it would take approximately 81 years to fill the pit through rainfall and run-off from the adjacent catchment area. The time to fill the pit could be significantly reduced (to a best case of five years) with the addition of water from Yallourn's bulk entitlement, and overflows from the Latrobe and Morwell Rivers during flood events.⁶⁸

In June 2012, EnergyAustralia submitted its response to Condition 7 to the Mining Regulator, indicating that the issues relating to sourcing water needed to be resolved.⁶⁹ The Mining Regulator's response is discussed in Part 10.3.1 of this report.

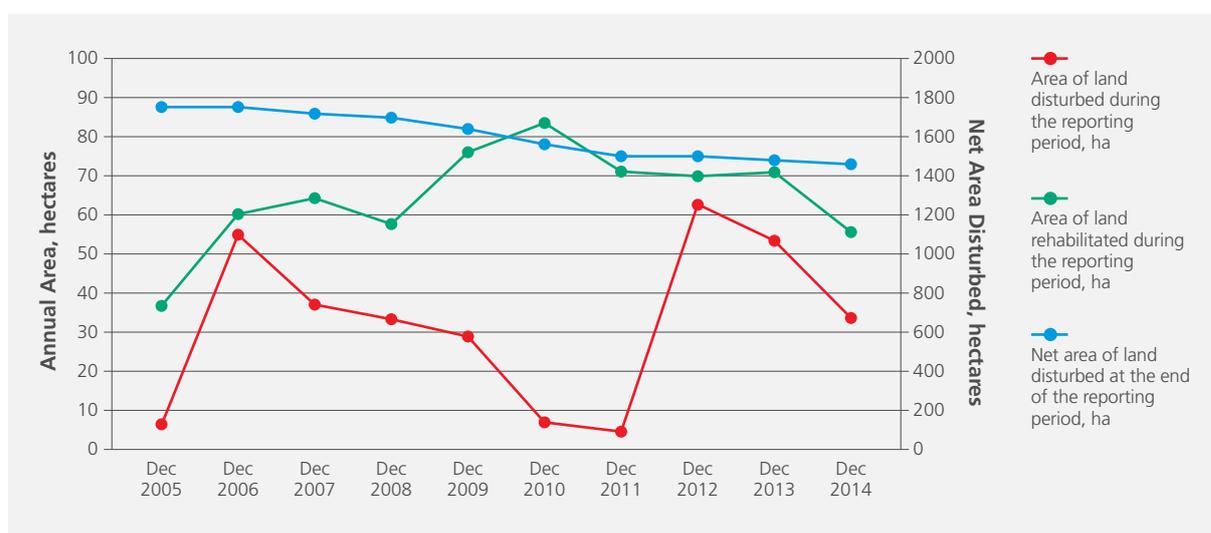
OVERVIEW OF PROGRESSIVE REHABILITATION

Since the 1990s, the Yallourn mine has been progressively rehabilitated towards the planned final landform of a fully flooded lake interconnected with the regional waterways.⁷⁰ Rehabilitation works to date can be divided into areas above or below the final lake level (RL +37m).

Above the final lake level, the focus has been on forming (and stabilising) final landforms, covering with overburden and topsoil, and revegetating with grasses (to stabilise the soil) and woodland corridors.⁷¹ Below the final lake level, the focus has been on covering exposed coal with overburden using conveyors, stackers (large machines that pile coal onto conveyors) and mobile plant to manage fire risk, dust, erosion, mining emissions and impacts on neighbouring landowners.⁷² Following placement in the mine pit, the overburden will be shaped and revegetated as grasslands, woodlands or wetlands, accompanied by internal lakes.⁷³ Mr Ronald Methner, Mine Manager at EnergyAustralia, indicated to the Board that EnergyAustralia has dumped overburden into 85 per cent of the mine.⁷⁴

Progressive rehabilitation has exceeded the rate of disturbance through mining, resulting in a steady net decrease of land disturbed over the last decade, as shown in Figure 10.⁷⁵ The green line demonstrates that EnergyAustralia is rehabilitating more land annually than it is mining (depicted by the red line). As a result, the overall balance of disturbed land is decreasing (shown by the blue line).

Figure 10. Balance of disturbed and mine rehabilitated areas, Yallourn mine⁷⁶



4.2.4 WATER

Currently, the Yallourn mine and power station have a total annual water allocation of 41.985 gigalitres. This is a combination of groundwater (pursuant to a groundwater licence), surface water (through a bulk entitlement sourced from Blue Rock Reservoir and Lake Narracan) and a volume of low and high quality water (through a water supply agreement with Gippsland Water).⁷⁷

The groundwater licence is valid for 30 years from 1 September 1995. The groundwater licence entitles the licence holder to take and use groundwater to 'facilitate mining for coal and generation of electrical energy' and incidental purposes. The volume of permitted groundwater for each year is included in the groundwater licence. In 2015, the permitted volume was 3.285 gigalitres. The permitted volume will decrease over time, and will reduce to 1.278 gigalitres in 2025.⁷⁸

EnergyAustralia's bulk entitlement was conveyed pursuant to the Bulk Entitlement (Latrobe-Yallourn) Conversion Order 1996. The bulk entitlement has no expiry date. It provides that EnergyAustralia can access percentage shares of the Blue Rock Reservoir and Lake Narracan, up to a maximum volume of 36.5 gigalitres per annum.⁷⁹

EnergyAustralia's water supply agreement with Gippsland Water is for the supply of water to support the Yallourn power station's operations. It expires when the power station ceases operating, and does not extend to the mine rehabilitation process. Gippsland Water provides EnergyAustralia with a maximum of 2.2 gigalitres of potable water each year.⁸⁰

4.2.5 MAJOR MINE INCIDENTS IN THE PAST DECADE

YALLOURN NORTHERN BATTER COLLAPSE

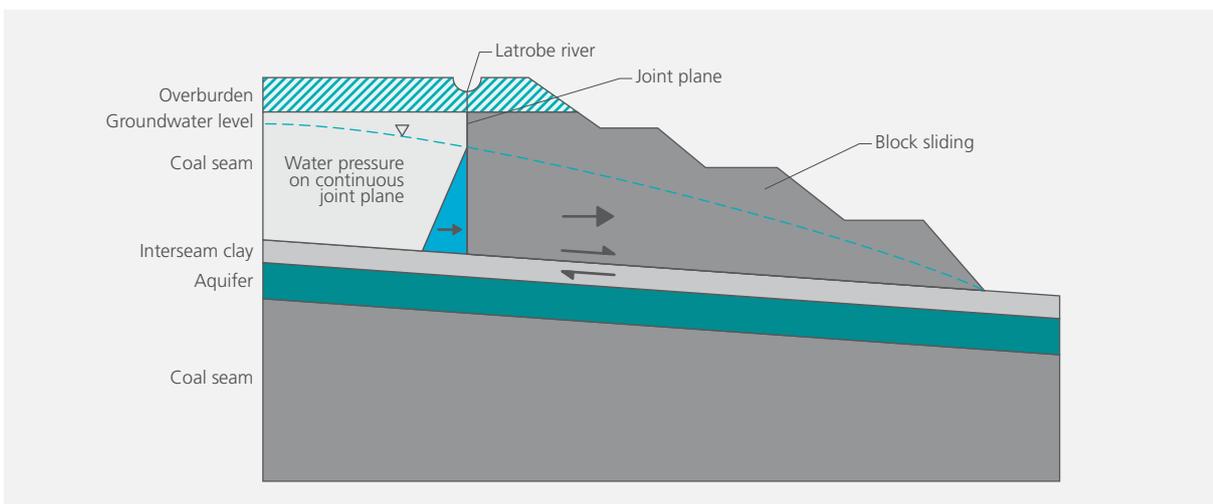
In late 2007, the northeast batter of the Yallourn mine's East Field was nearing the end of mining, having almost reached the permissible extent of coal extraction. On 14 November 2007, a section of the batter collapsed, resulting in a block of coal slipping into the pit (as shown in Figure 11). The block comprised an estimated six million cubic metres of material over a length of 500 metres, with a face height of 80 metres. The collapse resulted in the Latrobe River flowing into the mine, and the disruption of critical mine infrastructure, affecting coal supply to the Yallourn power station.⁸¹

Figure 11. Yallourn northern batter collapse



The collapse was a result of 'block sliding', where a large block of coal slides horizontally across the mine floor. This was caused by a build-up of water pressure in a joint along the rear of the block. The joint was hydraulically connected to the Latrobe River. Water pressure built up in the interseam clays underlying the block of coal. These water pressures caused a buoyancy effect on the block of coal, which reduced its resistance to sliding along its base. A diagram of the mechanism of block sliding is at Figure 12. Findings and recommendations about the Yallourn batter failure are documented in the report titled, *Mining Warden Yallourn Mine Batter Failure Inquiry*, prepared by Adjunct Professor Timothy Sullivan.⁸²

Figure 12. Example of block sliding⁸³



MORWELL RIVER DIVERSION FAILURE

In June 2012, the Morwell River Diversion was close to capacity due to significant rainfall and flooding in the Latrobe Valley.

On 6 June 2012, a section of the embankment of the Morwell River Diversion collapsed, and the river flooded the worked out Township Field (shown in Figure 13). This also caused partial flooding of the active East Field when the river flows exceeded the mine's pumping capacity. Consequently, coal supply to the Yallourn power station was disrupted, reducing the power station's generating capacity to a quarter of its usual capacity.⁸⁴ As an interim measure, works were undertaken to manage water flows across the mine, pump water out of the mine, and pipe water from the Morwell River directly into the Latrobe River. In October 2013, river flows were returned to the Morwell River Diversion, and by January 2014, the Diversion was fully restored.⁸⁵

The Mining Regulator's Lead Investigator and an independent geotechnical expert carried out an investigation into the failure. They found that a key cause of the failure was the manner of construction of the Morwell River Diversion's embankment. Findings of the investigation are contained in a report titled *Review of failure of Morwell River Diversion* released by the Department of Primary Industries (now known as the Department of Economic Development, Jobs, Transport and Resources).⁸⁶

Figure 13. Morwell River Diversion failure



4.3 HAZELWOOD MINE

4.3.1 OVERVIEW AND OWNERSHIP

The Hazelwood mine was established in 1949 by the SECV, and privatised in 1996.⁸⁷

The Hazelwood Power Partnership operates the Hazelwood mine and power station on behalf of the licence holder, Hazelwood Power Corporation Pty Ltd. Various partners have holding interests in the Hazelwood Power Partnership. The primary holding companies are:

- French-based Engie SA (previously known as GDF Suez SA)
- Japanese-based Mitsui & Co Ltd.⁸⁸

In this report, the mine operator and licence holder of the Hazelwood mine, including their predecessors, are referred to collectively as GDF Suez.

The Hazelwood power station is comprised of eight 200 megawatt units, and supplies approximately 25 per cent of Victoria's base load electricity.⁸⁹ Engie SA also owns and operates the 1,000 megawatt Loy Yang B power station.⁹⁰

The Mining Licence 5004 (MIN5004) was granted on 10 September 1996.⁹¹ A standard schedule of conditions is attached to the mining licence—including the requirement for minimising surface disturbance; obtaining a groundwater licence and monitoring groundwater levels; controlling erosion; establishing buffer zones and visual screening; conducting progressive rehabilitation and final rehabilitation; and lodging a rehabilitation bond.⁹²

In July 2006, additional Mining Licences 5449, 5450, 5451 and 5452 were incorporated into MIN5004.⁹³ The Minister for Energy and Resources varied MIN5004 on 20 January 2015. A new condition was added (1A Risk Management), requiring the licence holder to submit a Risk Assessment and Management Plan by 30 June 2015.⁹⁴

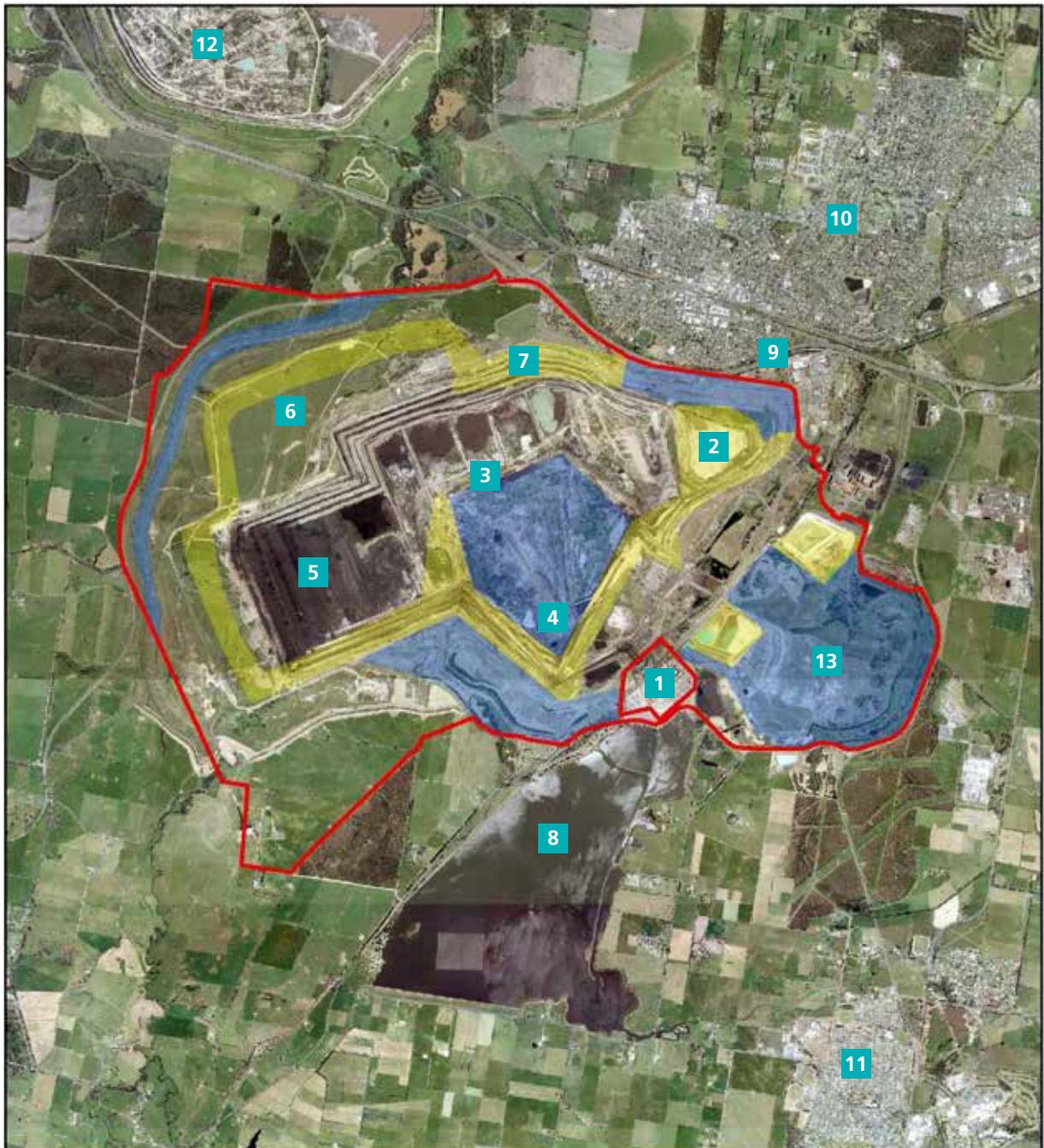
4.3.2 KEY FEATURES AND SETTINGS

The Hazelwood mine is located south of Morwell across the Princes Freeway. The mine has a perimeter of approximately 18 kilometres, with a depth of approximately 120 metres below ground level at its lowest point.⁹⁵

Since mining began, over 720 million tonnes of coal and 175 million cubic metres of overburden have been removed from the mine. Mining operations have disturbed 2,543 hectares of land, with 557 hectares of that land already rehabilitated.⁹⁶

It has been progressively mined from East Field (1955 to 1975), to South West Field (1975 to mid-1990s), then South East Field (mid-1990s to mid-2000s). Since the mid-2000s, GDF Suez has been mining West Field.⁹⁷ Mining is scheduled to commence in the North Field in 2016.⁹⁸ Figure 14 shows the mine licence boundary, the mining history and location of the power station.

Figure 14. Map of the Hazelwood mine and power station⁹⁹



Legend

- Mining Licence Boundary
- Rehabilitation - past
- Rehabilitation - future

Coordinate System: GDA 1994 MGA Zone 55
 Projection: Transverse Mercator
 Datum: GDA 1994

Produced by
 Earth Resources Information Centre
 Date: 30/07/2015

- | | |
|---------------------|------------------------------|
| 1. Power Station | 8. Hazelwood Pondage |
| 2. East Field | 9. Princes Freeway |
| 3. South West Field | 10. Morwell |
| 4. South East Field | 11. Churchill |
| 5. West Field | 12. Yallourn mine |
| 6. North Field | 13. External overburden dump |
| 7. Northern batters | |



The Hazelwood mine's coal has a moisture content of 62 per cent and a density between 1.11 to 1.14 tonnes per cubic metre. The coal typically has moderate to low permeability (the ease with which water flows through it), and does not have structural defects (such as fractures and joints). However, mining has exposed a number of structural defects in the seam in East Field, including eroded surfaces, faulting, cracking and a zone of intense jointing.¹⁰⁰

4.3.3 WORK PLAN AND REHABILITATION PLAN

When the Hazelwood mine was privatised, the initial 1996 rehabilitation plan envisaged fully flooding the mine pit to form a lake after removing operational infrastructure such as conveyors, power lines and sludge ponds to allow for beneficial community land uses. The 1996 work plan flagged the possible need for further studies to inform decision-making during rehabilitation—in particular, further investigation of the potential effects of flooding the mine pit relating to cost, timing, batter stability, water quality and groundwater impacts.¹⁰¹

Following privatisation, the Department Head approved seven work plan variations, the most significant of which was in 2009.¹⁰² These work plan variations are to be read in conjunction with the 1996 work plan.¹⁰³

The current 2009 Hazelwood work plan variation was developed after an Environment Effects Statement assessment was completed in 2004.¹⁰⁴ The requirement for an Environment Effects Statement assessment was triggered by the proposal to expand the footprint of the mine by 1.5 kilometres to the west, which required the diversion of the Morwell River and realignment of the Strzelecki Highway.¹⁰⁵ The 2009 work plan allows for mining to be expanded into the West Field of the mine.¹⁰⁶

MINE REHABILITATION REQUIREMENTS AND PRINCIPLES

A re-examination of the mine rehabilitation requirements was undertaken as part of the Environment Effects Statement assessment, and the findings incorporated into the 2009 work plan variation.¹⁰⁷

Key aspects of the 2009 rehabilitation plan include the following:

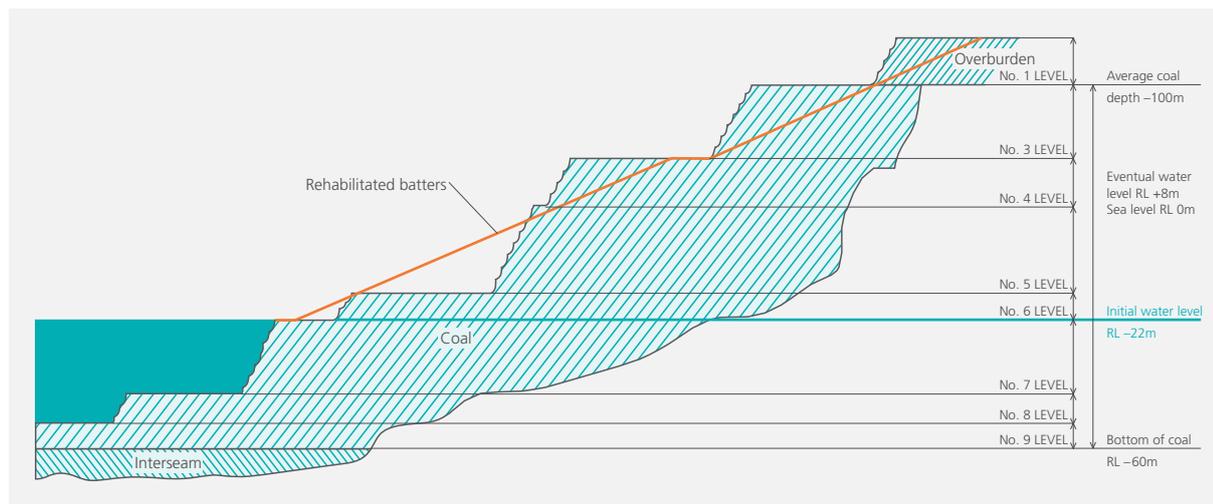
- Allowing the pit to fill with water to create a lake. It is estimated that a fill level to RL -22m (weight balance level) would provide enough weight to stabilise the batters. Aquifer depressurisation pumping would continue until this fill level was achieved. The final lake level is estimated to be at RL +8m.
- Overburden faces to be battered off to no steeper than 1v:3h, covered with topsoil and revegetated with native species.
- Permanent coal faces to be battered off to no steeper than 1v:2.5h and preferably 1v:3h, covered with topsoil and seeded.
- The area where ash is disposed is to be separated from the lake by an embankment.¹⁰⁸

See Figure 15 for a representation of the proposed final landform.

Mr James Faithful, Technical Services Manager – Mine, GDF Suez notes that a lake level of RL -22m will be approximately 38 metres deep or approximately one third of the depth of the mine pit. A lake level of RL +8m will be approximately 68 metres deep or approximately 50 to 60 per cent of the depth of the mine pit.¹¹⁰

As the current work plan envisages that the lower levels of the coal seam will be submerged by the future lake, only the exposed coal above the final fill level in the pit will be rehabilitated in the manner described below (Figure 16).¹¹¹ Modelling presented in the 2004 Environment Effects Statement predicted it would take six years to achieve a fill level of RL -22m, and 500 years to achieve RL +8m.¹¹²

Figure 16. Future water level of Hazelwood mine lake¹¹³



In 2015, GDF Suez retained GHD to undertake new modelling of predicted fill times based on a fill volume of 117 gigalitres to reach a revised depth of RL -20m (weight balance level). In its report titled *Hazelwood groundwater modelling report*, GHD found that, based on the most optimistic scenario, the mine pit could be filled to weight balance level within seven years. To fill the mine in this time would require:

- rainwater, groundwater seepage and groundwater pumping at a rate of 9.16 gigalitres per annum for the 2033–2034 period, and 6.47 gigalitres per annum for the 2035–2038 period
- 25 gigalitres from the Hazelwood Pondage
- ongoing run-off from the Hazelwood Pondage, at an estimated volume of 8.38 gigalitres per annum.¹¹⁴

Other scenarios indicated it would take between 160 and 200 years to reach weight balance level.¹¹⁵

PROGRESSIVE REHABILITATION

The sequence of progressive rehabilitation, to be undertaken between 2010 and 2031, is included in the 2009 work plan variation. Progressive rehabilitation corresponds with the stage of development of the mine; however it only includes areas which do not contain ‘critical infrastructure, safety and the mine’s operations’. The remaining areas will be rehabilitated after mine operations have ceased and as part of ‘final rehabilitation works’.¹¹⁶

Mr Faithful told the Board that the timing and sequencing of progressive rehabilitation is affected by the availability of suitable material and the proximity of that material to large-scale earth moving infrastructure.¹¹⁷

PLANNED 2016 WORK PLAN VARIATION

Mr Faithful indicated to the Board that GDF Suez is in the process of developing a work plan variation application, to be submitted in 2016. It will propose a variation in the sequence and timing of mining operations up until closure.¹¹⁸ This in turn will result in changes to the staging of rehabilitation activity. Under Schedule 15 of the Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic), GDF Suez will also be required to revise its rehabilitation plan, environmental management plan, closure concept and community engagement plan.¹¹⁹

Mr Ross McGowan, Executive Director of the Mining Regulator, advised the Board that it can be expected that approvals of future work plan variations, such as the proposed 2016 Hazelwood work plan variation, will have a series of conditions imposed upon them, similar to the conditions imposed on the approval of the 2015 Loy Yang work plan variation (see Part 4.4.3 of this report).¹²⁰

4.3.4 WATER

The Hazelwood mine and power station's current total annual water allocation is 36.484 gigalitres. This allocation is a combination of groundwater (held under a groundwater licence) and low and high quality surface water (through a water supply agreement with Gippsland Water).¹²¹

GDF Suez's groundwater licence is valid for 30 years from 1 September 1995. The groundwater licence entitles the licensee to take and use groundwater to 'facilitate mining for coal and generation of electrical energy' and incidental purposes. The volume of permitted groundwater for each year is described in the groundwater licence. The permitted volume in 2015 was 22.484 gigalitres, which will incrementally reduce to a permitted volume of 20.48 gigalitres in 2025.¹²²

GDF Suez's water supply agreement with Gippsland Water is for the supply of water to support the Hazelwood power station's operations to a maximum of 14 gigalitres of water each year.¹²³ The current agreement is for a term of 25 years, with provision for further terms of five years.¹²⁴ It expires when the power station ceases operating, and does not extend to the mine rehabilitation process.¹²⁵

GDF Suez also has a s. 51 licence to take and use 20 gigalitres of water for the Loy Yang B power station.¹²⁶

4.3.5 MAJOR MINE INCIDENTS IN THE PAST DECADE

HAZELWOOD NORTHERN BATTER INSTABILITY AND CLOSURE OF THE PRINCES FREEWAY

On 5 February 2011, following heavy rainfall in the Latrobe Valley, 'small but significant movement' occurred in the northern batters of the Hazelwood mine. This resulted in cracks appearing across the surface of the Princes Freeway and the adjoining area at the end of Hazelwood Road in southern Morwell. A section of the Princes Freeway between the mine and the Morwell township was closed pending further investigation.¹²⁷

A number of remedial actions were immediately taken to relieve water pressure in the coal, which is known to cause ground movement. Fifty horizontal bores were drilled into the coal to release the water from the area of instability, and an extensive system of highly sensitive monitors was placed both in the mine and along the freeway to measure ground movement. A land movement survey of residential areas was conducted within Morwell, to allow management of potential future hazards, and to provide a reference for checking any significant changes. Significant engineering works were also undertaken to prevent further water infiltrating the coal and northern batter. This included lining the median strip on the Princes Freeway and the Morwell Main Drain with a geomembrane (a layer of waterproof bitumen).¹²⁸

On 21 September 2011, the Princes Freeway was re-opened.¹²⁹

HAZELWOOD MINE FIRE

Victoria experienced one of its hottest and driest summers on record in 2014. The Hazelwood mine fire that began on 9 February 2014 was the largest and longest burning mine fire that has occurred in the Latrobe Valley to date. The fire was caused by embers spotting into the Hazelwood mine from bushfires burning in close proximity to the mine. The mine fire burned for 45 days. One of the reasons that the fire burned for so long was that there was a large amount of exposed coal. The areas within the Hazelwood mine that were either rehabilitated or contained fire services infrastructure did not burn.¹³⁰ Further discussion about the Hazelwood mine fire is contained in the Hazelwood Mine Fire Inquiry Report 2014.

Figure 17. Burning batters during Hazelwood mine fire

Source: Keith Pakenham, CFA Pix

4.4 LOY YANG MINE

4.4.1 OVERVIEW AND OWNERSHIP

In 1974, the SECV commenced planning for an open cut mine and two power stations at Loy Yang. The mine is currently owned by the AGL Loy Yang Partnership through a consortium of licence holders (AGL LYP 1 Pty Ltd, AGL LYP 2 Pty Ltd, AGL LYP 3 Pty Ltd and AGL LYP 4 BV).¹³¹ AGL Energy Limited is the ultimate holding company for the mine, and has been listed on the Australian Securities Exchange (ASX) since 12 October 2006.¹³² The mine operator and ultimate holding company are collectively referred to as AGL Loy Yang in this report.

AGL Loy Yang also owns and operates the 2,200 megawatt Loy Yang A power station.¹³³ As noted above, Engie SA (the ultimate holding company of the Hazelwood mine and power station) owns and operates the 1,000 megawatt Loy Yang B power station.¹³⁴ Contractual arrangements are in place for AGL Loy Yang to provide coal, ash and saline water management, disposal services and transport services to Loy Yang B.¹³⁵ The Loy Yang mine supplies coal for the generation of approximately 50 per cent of Victoria's base load electricity.¹³⁶

The Loy Yang mine operates wholly under Mining Licence 5189 (MIN5189), which was granted on 6 May 1997 for a period of 40 years. The standard schedule of conditions is attached to the licence—including the requirement for minimising surface disturbance; obtaining a groundwater licence and monitoring groundwater levels; controlling erosion; establishing buffer zones and visual screening; conducting progressive rehabilitation and final rehabilitation; and lodging a rehabilitation bond.¹³⁷

The Minister varied MIN5189 in January 2015. A new condition (1A Risk Management) was added, requiring the licensee to submit a Risk Assessment and Management Plan (including in relation to fire risk and management) by 31 October 2015.¹³⁸

4.4.2 KEY FEATURES AND SETTING

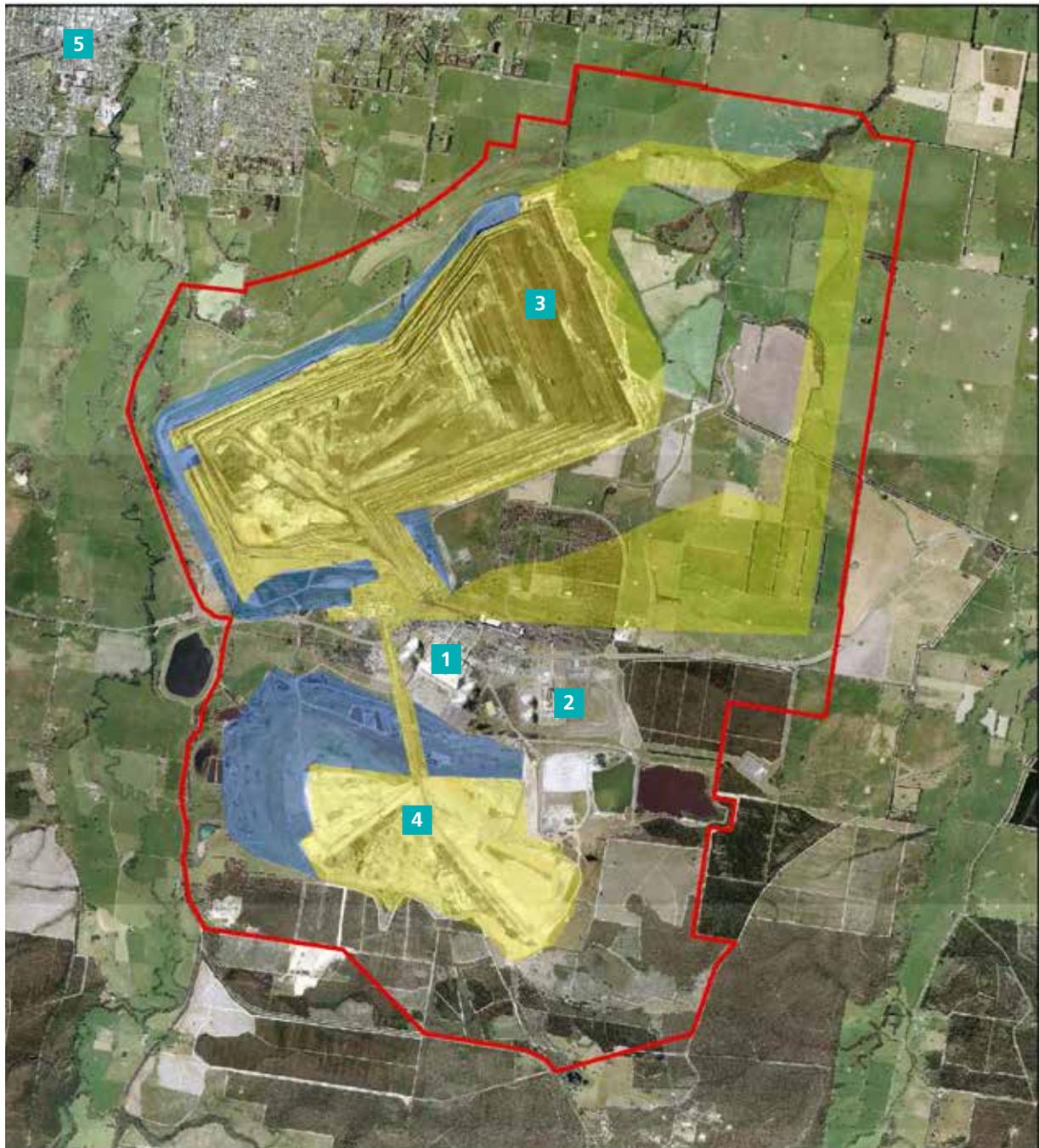
The Loy Yang mine is situated approximately four kilometres southeast of Traralgon, between the north-flowing Traralgon and Flynn's Creeks on undulating farm land.¹³⁹

The Loy Yang mine is currently four kilometres long and 2.5 kilometres wide at its widest point, with a planned completion size of six kilometres long and 4.5 kilometres at its widest point. The mine is approximately 175 metres deep at its lowest point. The final area of the mine will be approximately 2,200 hectares.¹⁴⁰ Mining operations have disturbed approximately 1,200 hectares of land, with 250 hectares of that land already rehabilitated. Figure 18 shows the mining licence boundary, the mining history and the location of the power station.

Mining commenced at Loy Yang in 1982, with the use of equipment such as bucket wheel excavators, stackers, mobile plant, and conveyor systems transporting coal to the power station and waste material to the external overburden dump. The pit was initially opened up in the southern area of the mine and proceeded in a north easterly direction. Development is now proceeding in an easterly direction before moving south.¹⁴¹

Between 1982 and 30 June 2014, 730 million tonnes of coal and 158 million cubic metres of overburden and interseam materials have been removed from the mine.¹⁴² The coal mined at Loy Yang has an average moisture content of 59.5 per cent.¹⁴³

Figure 18. Map of the Loy Yang mine and power stations¹⁴⁴



Legend

- Mining Licence Boundary
- Rehabilitation - past
- Rehabilitation - future

Coordinate System: GDA 1994 MGA Zone 55
 Projection: Transverse Mercator
 Datum: GDA 1994

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 Earth Resources Information Centre
 Date: 30/07/2015

1. Loy Yang A Power Station
2. Loy Yang B Power Station
3. Operating face
4. External overburden dump
5. Traralgon



4.4.3 WORK PLAN AND REHABILITATION PLAN

When the Loy Yang mine was privatised, the 1997 rehabilitation plan stated that at the end of mining operations, the intent was to gradually flood the pit to 'form a lake for community recreation purposes' and revert the overburden dump to 'grazing land and recreational areas'.¹⁴⁵ The plan did not contain details regarding batter angles, long-term stability, time needed to fill the pit with water, or treatment of the batters. Instead, the plan refers to other documents, such as the *Rehabilitation practices manual for open cuts and overburden*.¹⁴⁶

The Loy Yang mine operated under its original 1997 work plan until recently, when a revised and wholly updated work plan variation was approved by the Mining Regulator in November 2015.¹⁴⁷ Prior to that, the Department Head approved five minor work plan variations.¹⁴⁸

The 2015 Loy Yang work plan variation details progressive mine rehabilitation plans for the life of the mine and a concept for the final end use of the mine site. The 2015 work plan variation also sought approval to begin placing overburden into the mine pit.¹⁴⁹

The Mining Regulator approved the work plan variation subject to conditions, which prescribe a number of requirements including:

- operating within the approved extraction limit of the coal extraction area
- providing detailed schedules of works prior to the conclusion of each of the rehabilitation stages (see timing of stages below)
- updating risk assessment and management plans
- producing and reviewing ground control management plans
- preparing and maintaining a mine stability risk register
- designing and implementing a stability monitoring program
- completing a mine rehabilitation risk review
- developing a water resources risk assessment
- providing a final fire risk management plan.¹⁵⁰

Of particular note is the requirement that all exposed coal be covered by non-combustible inert material within 15 years of the cessation of coal mining, and the requirement to obtain 'the necessary licences and/or contracts for the quantity of water' needed to complete rehabilitation by no later than the end of 2023.¹⁵¹

Mr Luke Wilson, Lead Deputy Secretary, Agriculture, Energy and Resources at the Department of Economic Development, Jobs, Transport and Resources (DEDJTR), explained to the Board that these conditions reflect the Mining Regulator's shifting approach to risk-based work plans,¹⁵² under which the mine operator is required to identify risks and report them to the Regulator.¹⁵³ Under the conditions to which the approval is subject, timeframes are set, although they are broad and, for the most part, approximate.¹⁵⁴

MINE REHABILITATION REQUIREMENTS AND PRINCIPLES

In the 2015 work plan variation, AGL Loy Yang describes a rehabilitation design process, as shown in Figure 19.

Figure 19. AGL Loy Yang mine rehabilitation design process¹⁵⁵

Mr Stephen Rieniets, General Manager of AGL Loy Yang, stated that under the 2015 work plan variation, the 'end use concept is to partially flood the final open cut to form a lake and return the remaining land to agricultural use.'¹⁵⁶ This differs from the 1997 rehabilitation concept of a recreational lake.¹⁵⁷ AGL Loy Yang specifies the rehabilitation requirements necessary to achieve its current concept as follows:

- Permanent batters to be battered off to no steeper than 1v:3h or flatter, as measured from the top of mine crest to the base of mine.
- Internal dumping of overburden on the pit floor.
- Exposed coal on the permanent batters are to be covered and maintained to reduce the risk of fire, dust and erosion from water shedding above the 15 year fill mark.¹⁵⁸

AGL Loy Yang plans to continue groundwater dewatering after mining ceases. The pit will be flooded, with AGL Loy Yang estimating that the weight balance level of RL -22.5m will be reached within 10 years, based on the most optimistic scenario. This will be approximately 60 metres from the mine crest.¹⁵⁹ Water modelling conducted by GHD predicts that the lake will reach a final level of RL 0m, which it estimates will occur within 70 years, based on the most optimistic scenario.¹⁶⁰ This is further discussed in Part 6.

PROGRESSIVE REHABILITATION

AGL Loy Yang advised the Board that progressive rehabilitation will occur in stages, from 2014 to the end of mining operations and closure of the mine. These stages are detailed in the 2015 work plan variation as:

- Stage B—All progressive rehabilitation undertaken to date (to July 2015)¹⁶¹
- Stage C—Progressive rehabilitation to be undertaken to approximately 2023¹⁶²
- Stage D—Progressive rehabilitation to be undertaken to approximately 2030¹⁶³
- Stage E- to E—Progressive rehabilitation to be undertaken to the end of mining¹⁶⁴
- Closure—Closure plan depicting the current end use concept (Figure 20).¹⁶⁵

Figure 20. Loy Yang mine rehabilitation stage plan at mine closure (2015 work plan variation)¹⁶⁶



Similar to other Latrobe Valley mines, progressive rehabilitation at Loy Yang has been undertaken on areas that do not impact on coal production (for example, areas supporting conveyors, pumps, pipelines or active mining).¹⁶⁷ To date, 2,070 hectares of land have been disturbed by mining operations, with 530 hectares successfully rehabilitated and 630 hectares available for rehabilitation.¹⁶⁸ A breakdown of the areas progressively rehabilitated in the main pit and the external overburden dump is provided in Table 5.

Table 5. Progressive rehabilitation undertaken at Loy Yang mine to Mining Stage B (2015)¹⁶⁹

Area	Main pit (ha)	External overburden dump (ha)
Total area disturbed by mining operations	877	531
Rehabilitated	45	222
Rehabilitation in progress	70	309

4.4.4 WATER

Currently, the Loy Yang mine and the Loy Yang A power station have a total annual water allocation of 63 gigalitres. This is a combination of groundwater (held under a groundwater licence),¹⁷⁰ surface water (through a bulk entitlement sourced from Blue Rock Reservoir and Lake Narracan),¹⁷¹ and a small volume of high quality water (through a water supply agreement with Gippsland Water).¹⁷² The Loy Yang B power station (owned by Engie SA) also holds a bulk entitlement of 20 gigalitres.¹⁷³

AGL Loy Yang's groundwater licence is valid for 30 years from 1 September 1996.¹⁷⁴ The groundwater licence entitles the licensee to take and use groundwater to 'facilitate mining for coal and generation of electrical energy' and incidental purposes. The volume of permitted groundwater for each year is described in the groundwater licence. The permitted volume in 2015 was 19.996 gigalitres. The permitted volume in 2025 is 19.302 gigalitres.¹⁷⁵

AGL Loy Yang has a bulk entitlement conveyed pursuant to the Bulk Entitlement (Latrobe-Loy Yang A) Conversion Order 1996. The bulk entitlement has no expiry date. It provides that AGL Loy Yang can access percentage shares of the Blue Rock Reservoir and Lake Narracan up to a maximum volume of 40 gigalitres.¹⁷⁶

AGL Loy Yang's water supply agreement with Gippsland Water is for the supply of water to support the two Loy Yang power stations' operations. The water is supplied to Loy Yang A power station, which on-supplies the water to Loy Yang B power station through an infrastructure supply agreement.¹⁷⁷ The water supply agreement expires when the power stations cease operating, and does not extend to the mine rehabilitation process. Gippsland Water provides AGL Loy Yang with a maximum of three gigalitres of raw water each year.¹⁷⁸



Morwell River wetlands at the Yallourn mine
(source: *EnergyAustralia*)



PART FIVE
VIABLE
REHABILITATION
OPTIONS

PART 5 VIABLE REHABILITATION OPTIONS

5.1 OVERVIEW

Term of Reference 8 requires the Board to inquire into and report on short, medium and long-term options to rehabilitate land on which work has been, is being, or may lawfully be done in accordance with a work plan approved for the Hazelwood mine, the Yallourn mine, and the Loy Yang mine; and in relation to which an application for variation of the work plan is under consideration for the Hazelwood mine, the Yallourn mine, or the Loy Yang mine.

This Part identifies rehabilitation options for open cut mines, then assesses them to identify which are potentially viable options for the rehabilitation of the Latrobe Valley mines. In Part 6 of this report, the potentially viable options are assessed in detail against the criteria provided in Term of Reference 9.

Term of Reference 8 does not define 'short', 'medium' or 'long-term'. The Board has therefore adopted the following time periods:

Short-term: from now until the end of mining operations.

Medium-term: from the end of mining operations to 15 years after the end of mining operations.

Long-term: the period commencing 15 years after the end of mining operations.

The Board understands 'options for rehabilitation' under its Terms of Reference to mean options for final rehabilitated landforms. The Board considers that the 'final land use' of the mines is a separate consideration, which is dependent on the landform achieved.

In considering Term of Reference 8, the Board sought advice from a number of experts. The Board commissioned a report from Jacobs Group (Australia) Pty Ltd (Jacobs), titled *Review of future rehabilitation options for Loy Yang, Hazelwood and Yallourn coal mines in the Latrobe Valley*¹ (the Jacobs options report). The Jacobs options report also provides a high-level technical analysis of rehabilitation options against the criteria in Term of Reference 9.

In response to the Jacobs options report, AGL Loy Yang retained Adjunct Professor Timothy Sullivan, Director and Principal of Pells Sullivan Meynink, who produced a report titled *Hazelwood Mine Fire Inquiry: Expert report on rehabilitation relevant to Loy Yang mine*.² GDF Suez retained Dr Christopher Haberfield, Principal Geotechnical Engineer and Principal, Golder Associates, and Dr Clint McCullough, Associate and Principal Environmental Scientist, Golder Associates, who each produced a report, titled *Hazelwood Mine Fire Second Inquiry: Review of Jacobs' report and Hazelwood Mine Fire Inquiry – Terms of Reference 8 and 9* respectively.³ The State, EnergyAustralia and Environment Victoria did not provide any expert reports to the Board.

The Board also obtained statements from Professor Jim Galvin, Chair, Technical Review Board; Professor Rae Mackay, Director, Geotechnical and Hydrogeological Engineering Research Group (GHERG), Federation University Australia; and Ms Corinne Unger, a Board member of the Technical Review Board.

On 3 December 2015, the Board convened a meeting of technical experts to further inform its deliberations. Professor Galvin, Dr Haberfield, Professor Mackay, Dr McCullough, Adjunct Professor Sullivan, and Mr Greg Hoxley, Principal Hydrogeologist at Jacobs, participated in the meeting.

The Board posed a number of questions to these experts relevant to rehabilitation objectives and principles, technical issues, landform options, research needs, and the mine operators' rehabilitation plans. The experts drafted a report for the Board in response to these questions, referred to as the 'joint expert report' in this report. Areas where the experts agree and disagree on rehabilitation options are highlighted in the joint expert report. The same group of experts gave evidence as a panel at the Inquiry's public hearings in Traralgon. Mr Charlie Speirs, the Latrobe Valley Mine Operations Adviser for the Jacobs options report, also gave evidence as part of the panel.

This Part is further informed by the submissions and evidence of the mine operators, the State, key stakeholders, and the community.

When considering rehabilitation options, the Board has taken into account:

- the purposes and key principles of rehabilitation
- the features of the Latrobe Valley region, including its landscape, coal resource, hydrogeology and environmental context
- the specific features of the mines.

5.2 REHABILITATION DEFINITIONS, AIMS AND OBJECTIVES

The features of each of the Latrobe Valley mines (such as size, depth, stability, available overburden, intersection of aquifers and proximity to infrastructure) dictate the features of final landforms.⁴ In turn, the features of the final landform will to some extent limit potential final land uses. As discussed in Part 6 of this report, features of the Latrobe Valley mines, including their sheer size, their low strip ratio and their potential instability, have significant implications for the viability of landforms and therefore final land use options.

There is currently no definition of ‘rehabilitation’ in relation to coal mines in the *Mineral Resources (Sustainable Development) Act 1990 (Vic)* (Mineral Resources Act). The joint expert report records that there are no generally accepted criteria that define ‘safety’ and ‘stability’.⁵ In the absence of widespread agreement about effective rehabilitation, the operators of each mine have nominated specific rehabilitation goals and objectives in their rehabilitation plans.

EnergyAustralia describes its rehabilitation goal for the Yallourn mine as designing a landform that:

- protects the safety and health of the public by ensuring mining hazards and residual environmental impacts are minimised
- is compatible with the surrounding natural and altered landscape
- is compatible with the surrounding natural landscape and existing landforms created by overburden disposal operations
- is sustainable and requires minimal ongoing maintenance
- expresses, where practicable, the land uses and ecological values that existed on this site prior to mining, within the limits of final land capability
- [s]upports future beneficial uses
- provides a diversity of landform, vegetation and wildlife values that is sustainable
- at [Yallourn North Open Cut], accommodates the volume of ash targeted under the Yallourn Energy ash disposal strategy...⁶

GDF Suez describes its rehabilitation and mine closure goal as providing ‘a technically feasible, safe, stable and sustainable landscape that reflects the aspirations of stakeholders within the practical constraints of rehabilitation for the mine...’⁷ The Hazelwood mine’s rehabilitation plan states the following objectives of rehabilitation:

- A safe and stable self-supporting structure.
- To maximise the opportunities for establishment of a self-sustaining ecosystem.
- To minimise the use of natural resources.
- To minimise the cost of recovery of resources.⁸

AGL Loy Yang states that the aims of long-term rehabilitation of the Loy Yang mine are to:

- eliminate long-term exposed coal to reduce fire risk,
- create a geotechnical stable landform...
- [c]omplete the majority of the rehabilitation works within 15 years of closure; with a subsequent period of monitoring and maintenance as required.
- create a land form that provides access for maintenance and end use purposes.⁹

Drawing on applicable regulations and published guidelines, Adjunct Professor Sullivan proposed the following list of 'objectives and principles' that he considers 'appropriate for an open cut coal mine, regardless of its location and particular characteristics':

- a. Ensure the statutory requirements are met.
- b. The long term objective of rehabilitation is to convert the area to a safe and stable condition.
- c. Safety is a high priority and post closure the mine should be left in a condition that ensures public safety.
- d. Erosion must be minimised.
- e. Recognition that the physical attributes of the site place ultimate constraints on what can be achieved with rehabilitation.
- f. Absolute standards for stability are not set out rather there is recognition that because stability can be impacted by many elements including the site constraints (including the Setting), it is important to agree on the objectives for the landform associated with the final land use, including stability aspects.
- g. Rehabilitate the land in accordance with appropriate post-mining land uses.
- h. The final land use should be practical and achievable and the final landform should be compatible with the surrounding areas.
- i. Develop well-defined rehabilitation plans.
- j. Develop and create appropriate landforms, which will behave in a predictable manner.
- k. Consult stakeholders and develop a closure plan that clearly defines the post-closure land use.
- l. Agree success criteria with stakeholders.
- m. Rehabilitate progressively, but commensurate with the rate of mining and the nature of the mining operation.
- n. Undertake research into the land and water aspects.
- o. Use appropriate technologies to reduce negative impacts.
- p. Use appropriate standards.
- q. Monitor, review and report on performance.¹⁰

The experts advising the Board considered Adjunct Professor Sullivan's list of objectives and principles at the meeting on 3 December 2015. There was general consensus among the group that these objectives were appropriate for each of the Latrobe Valley mines, with some experts suggesting minor changes. For example, Professor Mackay, Adjunct Professor Sullivan and Mr Hoxley suggested that management of fire risk should be added to the list, and Professor Galvin and Adjunct Professor Sullivan suggested that objective (c) be expanded to include 'public health and safety'.¹¹

In the absence of a common definition of rehabilitation, the Board has taken into account the objectives agreed to by the experts, and the objectives under the mine operators' rehabilitation plans, when assessing potential options for rehabilitation.

5.3 POTENTIAL FINAL LANDFORMS AND THEIR VIABILITY

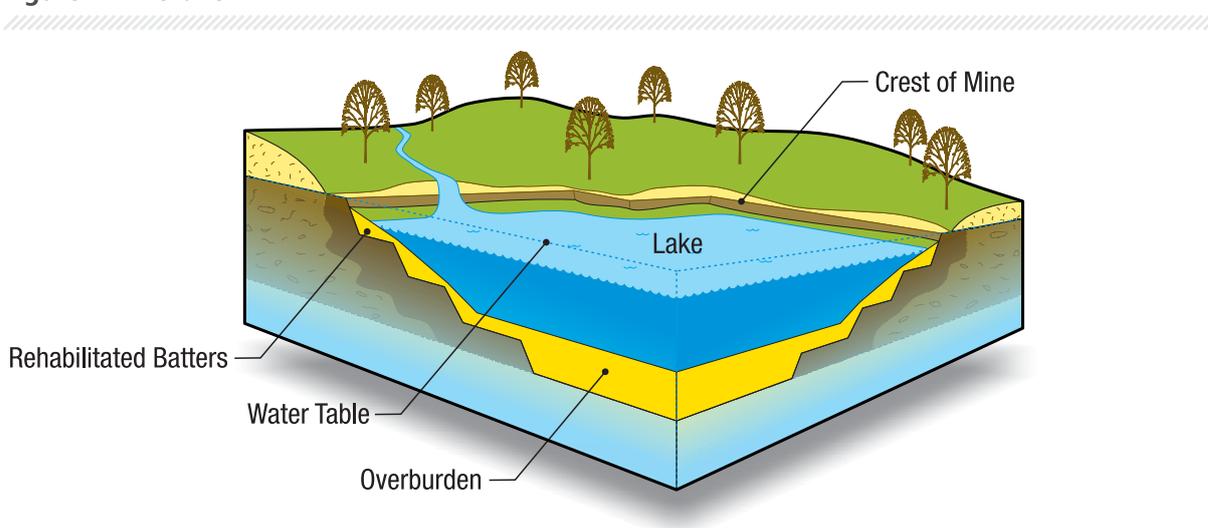
5.3.1 POTENTIAL FINAL LANDFORMS

The Jacobs options report identifies and assesses six final landforms that are potentially viable for rehabilitated open cut mines.¹² Each option is considered below.

PIT LAKE

Under this option, minimal overburden or non-polluting mine waste is placed back in the mine pit. A large, deep lake is then formed by filling the remainder of the mine pit to its crest with water.¹³ The groundwater is allowed to recover to its natural level (the level prior to the commencement of dewatering). Water is likely to be diverted from adjacent natural waterways to maintain the water level. The lake will extend across the full breadth and width of the pit, with underwater batters to remain steep. Batters above water level are reshaped to land use requirements.¹⁴ Disturbed areas outside the pit are reshaped and rehabilitated to meet land use requirements.¹⁵

Figure 21. Pit lake¹⁶



Pit lake case study – Lake Kepwari, Collie, Western Australia

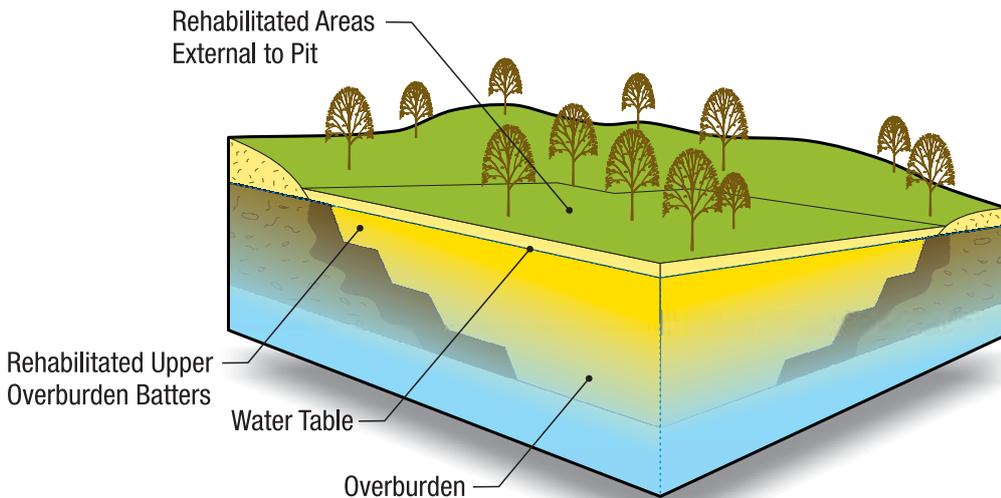
Lake Kepwari is an artificial lake situated in the southwest of Western Australia, approximately 10 kilometres southeast of Collie. The lake was an open cut coal mine from 1970 until 1996. It is approximately two kilometres long, one kilometre wide and 70 metres deep. It covers an area of around 100 hectares and holds roughly 30 gegalitres of water. Lake Kepwari took about five years to fill with water that was diverted from the Collie River South Branch.

Lake Kepwari's intended final land use was recreational uses such as boating and water skiing. However, public access to the lake has been delayed due to concerns about low pH levels and elevated metal levels. Lake Kepwari reconnected to Collie River South Branch during a flood event in 2011 and the subsequent improvement in lake water quality prompted an engineered lake–river flow through trial from 2012–14. The flow through trial proved successful in improving Lake Kepwari's water quality without adversely impacting on downstream water quality and beneficial uses.¹⁷

FULL BACKFILL

Under this option, the mine pit is fully filled to the crest level using all available overburden and non-polluting mine waste.¹⁸ This landform will return the mine void area to approximately natural relief (the original ground level), allowing for rehabilitation of all disturbed areas without any water body. The pit area is reshaped to be free draining, so that water drains, or is diverted, to natural adjacent waterways, and the groundwater is allowed to recover to natural levels.¹⁹ Disturbed areas outside the pit are reshaped and rehabilitated to meet land use requirements.²⁰

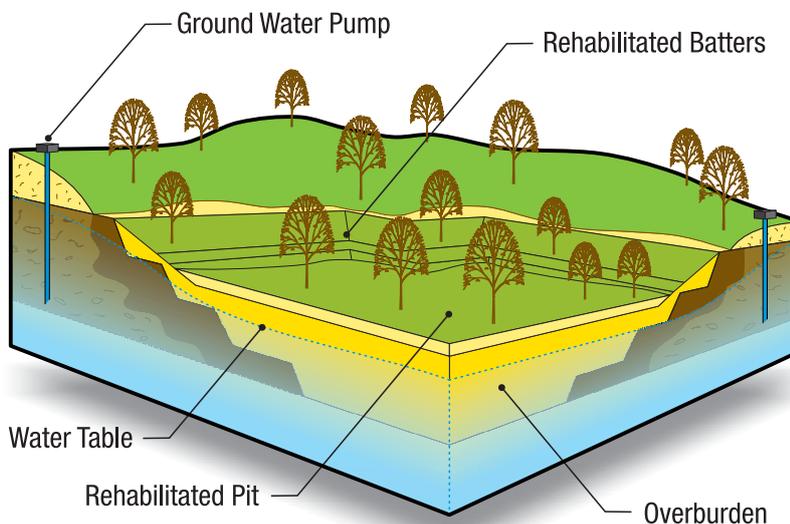
Figure 22. Full backfill²¹



PARTIAL BACKFILL ABOVE THE WATER TABLE

Under this option, the mine pit is partially filled with overburden and non-polluting mine waste to a level above the natural groundwater level. The groundwater is allowed to recover to natural levels. This creates a dry landform that is significantly lower than the mine crest and is not free draining (meaning that it will require active management, such as pumping, to remain dry). Batters above the filled area are reshaped to meet land use requirements. Disturbed areas outside the pit are rehabilitated to meet land use requirements.²²

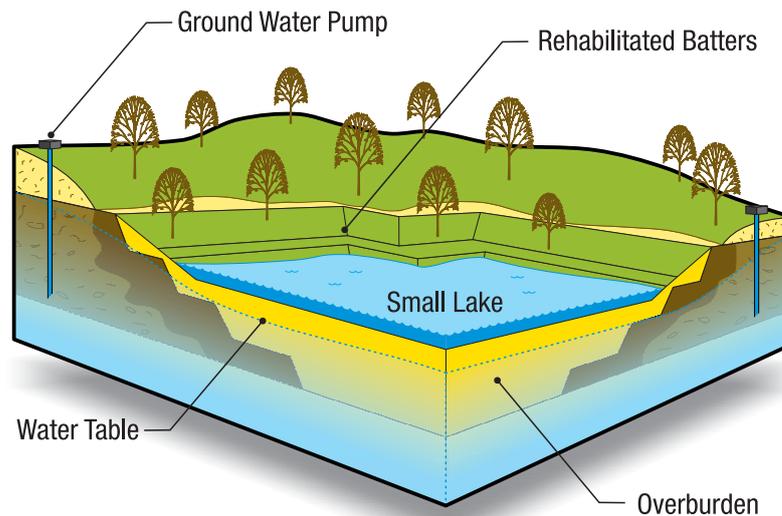
Figure 23. Partial backfill above the water table²³



PARTIAL BACKFILL BELOW THE WATER TABLE

Under this option, the mine pit is partially filled with overburden and non-polluting mine waste. Areas below the natural groundwater level are filled with water to form a shallow lake (usually less than 50 metres deep). Some areas that have been backfilled will remain dry, but will be significantly lower than the mine crest. The shallow lake is not free draining. Batters above the water level are reshaped to meet land use requirements, and underwater batters are likely to be shallow.²⁴

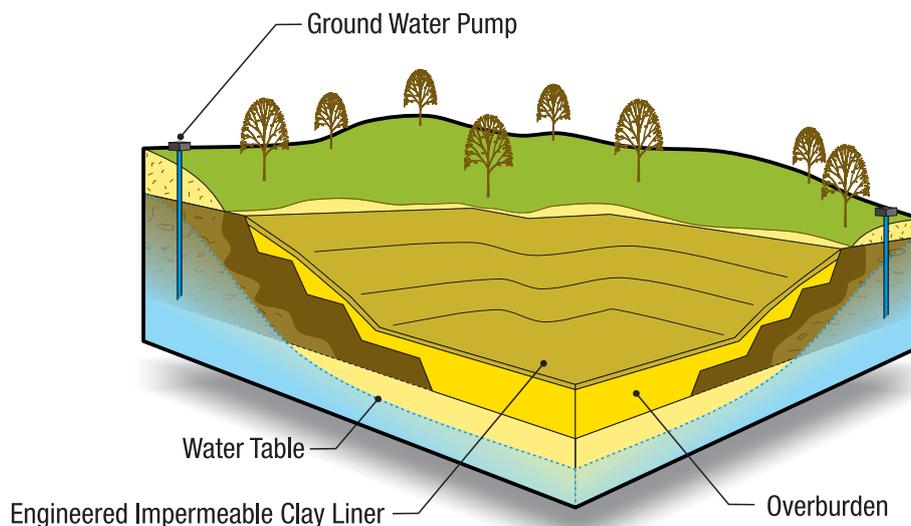
Figure 24. Partial backfill below the water table²⁵



LINED VOID

Under this option, the mine pit is partially filled with overburden and non-polluting mine waste. The pit is then lined with clay to form an impermeable seal that inhibits the flow of water into or out of the pit. The area inside the pit is a significantly lower relief and is not free draining. Ongoing groundwater dewatering is likely to be required.²⁶

Figure 25. Lined void²⁷



Lined void case study – Woodlawn Bioreactor, New South Wales

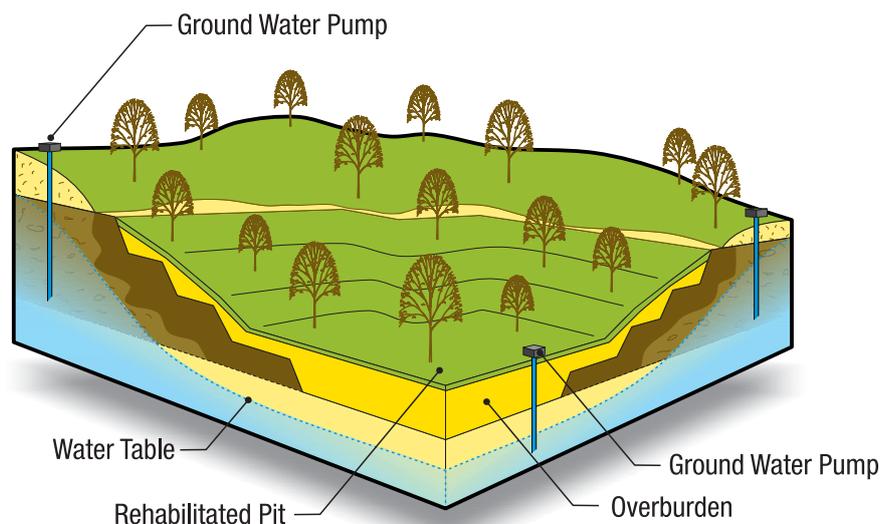
The Woodlawn Bioreactor is located south of Goulburn in New South Wales. It was formerly a copper, lead and zinc mine. In remediating the open cut mine, the site was re-graded, the road into the pit was secured, the water was pumped out, a liner was put in place and leachate and groundwater sumps were constructed.

The bioreactor was established in around 2004 at the site, which is capable of handling 400,000 tonnes of municipal waste from Sydney. The waste is hauled by train from Sydney, which is about 250 kilometres away. The facility, including the bioreactor and the wind farm, has the capacity to generate sufficient electricity to power an estimated 3,000 homes per year. The cost of the facility and associated remediation works was approximately \$60 million. Aside from generating electricity from waste at the site, the operator is also undertaking rehabilitation works and has established an innovative wind farm, aquaculture and horticulture projects.²⁸

REHABILITATED VOID

Under this option, the mine pit is partially filled and is rehabilitated as a dry lowered landform. The area within the pit is a significantly lower relief and is not free draining. Ongoing groundwater dewatering is likely to be required.²⁹

Figure 26. Rehabilitated void³⁰



5.3.2 VIABLE FINAL LANDFORMS

Jacobs assessed these six options against the criteria in Term of Reference 9. Jacobs provided a high-level analysis of the viability of each landform for the Latrobe Valley, without conducting a full risk assessment.

The options were considered in relation to each mine; however Jacobs made findings about the viability of each option that are consistent across all three mines.³¹ Jacobs concluded that four options are unviable—full backfill, partial backfill above the water table, lined void, and rehabilitated void. Jacobs provided a detailed analysis of why these options are unviable in its report, noting that:

[a]ll preliminary options can be implemented to achieve a safe and stable landform. It is the very substantial cost, high fire risk and sheer practicality of the [four] preliminary options above that currently preclude them being seriously considered potentially viable.³²

In summary, the key issues that render these landforms unviable are:

- Full backfill—unviable due to the lack of available fill material onsite or locally, and the significant costs associated with bringing in new material.
- Partial backfill above the water table—unviable due to the lack of available fill material onsite or locally, and the significant costs associated with bringing in new material. This landform will also require active management and extensive drainage to remain dry in perpetuity.
- Lined void—unviable due to the likely impact on environmental amenity, potential high costs associated with creating the lining, and limitations for end land use, as it would only support landfill or waste disposal.
- Rehabilitated void—unviable due to the need for ongoing landform stability works, such as dewatering in perpetuity.³³

Jacobs advised the Board that only two options are currently viable for each of the three mines—the pit lake or the partial backfill below the water table. In its report, Jacobs states that:

[t]he potential viability of the Pit Lake and Partial Backfill below the Water Table landforms acknowledges the fact that key risks (e.g. fire, stability, water) are most effectively mitigated and managed through the combination of in-pit overburden placement and filling of the residual void to achieve fire cover and weight balance. These options are close to the landforms that are proposed in the current work plans.³⁴

Jacobs further advised the Board that the pit lake and the partial backfill below the water table options also meet the aims of minimising risks to biodiversity and supporting beneficial future land uses of the rehabilitated mines.³⁵

Mr Hoxley told the Board that the pit lake option would have a higher water level than the partial backfill below the water table option, but 'it may or may not necessarily be full.'³⁶ He explained that:

the key differences between the pit lake and the landform below the water table is the ratio of fill and fill material that's placed in the pit as opposed to water that is in the pit...[The pit lake option] would use water as a primary means of achieving a weight balance or achieving stability. In the partial backfill below the water table there is a combination of fill material—could be overburden, could be a range of other things—and water, that is used to achieve a stable landform and it could be a lowered landform of some type.³⁷

Mr Hoxley was asked by Counsel Assisting what the position would be if the outcomes of future research about issues such as stability and water availability and quality were that a pit lake in one or more of the mines was not viable. He replied that:

[if] we found that the engineering was not possible or too difficult to bear to achieve that landform, then I would suggest that that would open up an ability to look at some of those other things that up to that point had been regarded as not moveable or not feasible.³⁸

In their joint expert report, the experts agree with Jacobs' assessment that the two options identified as viable by Jacobs are the only currently viable rehabilitation options for the Latrobe Valley mines.³⁹ Adjunct Professor Sullivan also noted that, while there are significant uncertainties about how these options can be achieved, the alternative options are less practicable.⁴⁰

Jacobs emphasised that there are key differences between the two options, namely the 'extent, area and depth of batters, above backfill and water level, to be reshaped, covered and rehabilitated.'⁴¹ This includes covering the exposed batters with non-polluting waste rock, such as overburden and interseam sediments (referred to collectively as 'overburden' in the remainder of this report).⁴²

The joint expert report records the consensus position of the experts that the two options identified as viable by Jacobs are variants of the one basic outcome, which is that the final mine pit for all mines will be backfilled with overburden and water to varying degrees. The experts emphasised that '[i]t is important that the Inquiry and the public understand that the water level in each of the mine voids will differ.'⁴³

5.4 BOARD'S DISCUSSION AND CONCLUSIONS

The Board accepts the evidence of Jacobs that there are six possible rehabilitation options for open cut mines.

The Board is persuaded by the expert evidence that the pit lake and the partial backfill below the water table options are currently the most viable. The Board notes that these options are most closely aligned with the mine operators' current rehabilitation plans.

The Board accepts the opinions of Professor Galvin, Adjunct Professor Sullivan, Professor Mackay, Dr McCullough and Dr Haberfield that the two viable options identified by Jacobs can be considered as one landform with variable elements. Therefore the Board refers to the option as the 'pit lake option' for the remainder of this report, while recognising that each lake will have varying levels of overburden and water, and different lake depths.

The Board accepts the evidence of Mr Hoxley and Adjunct Professor Sullivan that it is possible that the two options may be considered less attractive or viable in the future once additional research is undertaken. The Board accepts that there are many unresolved issues about how the lake option will be achieved. These issues are discussed in Part 6.

While the potential for beneficial final land use is a key criterion in assessing rehabilitation options, the Board considers the safety, stability and sustainability of the landform to be of paramount importance.

The pit lake option is assessed in detail against Term of Reference 9 in the following Part.



PART SIX
ASSESSMENT OF
REHABILITATION
OPTIONS

PART 6 ASSESSMENT OF REHABILITATION OPTIONS

6.1 OVERVIEW

This Part assesses the options identified in Part 5 of this report against Term of Reference 9, which requires the Board to consider:

- a. Whether, and to what extent, the option would decrease the risk of a fire that could impact the mine and if so, the cost of the option relative to the cost of other fire prevention measures.
- b. Whether, and to what extent, the option would affect the stability of the mine.
- c. Whether, and to what extent, the option would create a stable landform and minimise long-term environmental degradation.
- d. Whether, and to what extent, the option would ensure that progressive rehabilitation is carried out as required under the *Mineral Resources (Sustainable Development) Act 1990* (Vic).
- e. The estimated timeframe for implementing the option.
- f. The option's viability, any associated limitations and its estimated cost.
- g. The impact of the option on any current rehabilitation plans for each mine.
- h. Whether, and to what extent, the option would impact the future beneficial use of land areas impacted by the mines.
- i. Whether the option is otherwise sustainable, practicable and effective.

The Board notes that there is considerable overlap between some of these requirements. For example, the timeframe for filling a mine void with water (Term of Reference 9(e)) will inform the estimated cost (Term of Reference 9(f)). Given this overlap, this Part considers the requirements of Term of Reference 9 thematically, according to the following sequence:

- 6.2 Fire risk—Term of Reference 9(a)
- 6.3 Stability—Term of Reference 9(b) and 9(c)
- 6.4 Water sourcing—Term of Reference 9(f) and 9(i)
- 6.5 Water quality—Term of Reference 9(c)
- 6.6 Progressive rehabilitation—Term of Reference 9(d)
- 6.7 Timeframe—Term of Reference 9(e)
- 6.8 Impacts on current rehabilitation plans—Term of Reference 9(g)
- 6.9 Future beneficial use—Term of Reference 9(h)
- 6.10 Cost—Term of Reference 9(f)

Part 6.11 considers the knowledge gaps relevant to these areas.

In considering Term of Reference 9, the Board had regard to the evidence of the experts detailed in Part 5 of this report including:

- Mr Greg Hoxley, Principal Hydrogeologist, Jacobs Group (Australia) Pty Ltd (Jacobs), and Mr Charlie Speirs, consultant to Jacobs, and the Jacobs report titled *Review of future rehabilitation options for Loy Yang, Hazelwood and Yallourn coal mines in the Latrobe Valley*¹ (Jacobs options report)
- Adjunct Professor Timothy Sullivan, Principal, Pells Sullivan Meynink, retained by AGL Loy Yang, and his report titled *Hazelwood Mine Fire Inquiry: Expert report on rehabilitation relevant to Loy Yang mine*²
- Dr Christopher Haberfield, Principal Geotechnical Engineer and Principal, Golder Associates, retained by GDF Suez, and his report titled *Hazelwood Mine Fire Second Inquiry: Review of Jacobs' report*³
- Dr Clint McCullough, Associate and Principal Environmental Scientist, Golder Associates, retained by GDF Suez, and his report titled *Hazelwood Mine Fire Inquiry – Terms of Reference 8 and 9*⁴
- Professor Jim Galvin, Chair, Technical Review Board, and his statement⁵
- Professor Rae Mackay, Director, Geotechnical and Hydrogeological Engineering Research Group (GHERG), Federation University Australia, and his statement⁶
- Ms Corinne Unger, a member of the Technical Review Board, and her statement.⁷

The Board also considered the joint expert report that was developed at a meeting of technical experts convened by the Board on 3 December 2015.⁸ Professor Galvin, Dr Haberfield, Mr Hoxley, Professor Mackay, Dr McCullough and Adjunct Professor Sullivan participated in this meeting.

This Part is further informed by the submissions and evidence of the mine operators, the State, key stakeholders, and the community. When considering rehabilitation options, the Board has taken into account:

- the purposes and principles of rehabilitation
- the features of the Latrobe Valley community, including its landscape, coal resource, hydrogeology, planning requirements, history and environmental context
- the regulatory framework applicable to mines, and the roles of mine operators, government and key agencies under this framework
- the specific features of the mines
- current rehabilitation activity and future plans for the mines.

The joint expert report records that it is essential that decisions regarding rehabilitation are site-specific, as the unique features and settings of each mine mean that there is no 'one size fits all' approach. Proximity to towns or infrastructure, mine size and depth, and the characteristics of geological materials, geological setting and hydrology are just some of the factors that determine how a safe and stable landform will be achieved.⁹ To the extent possible, the Board has considered these factors when assessing the 'pit lake option' against each criterion in Term of Reference 9.

After reviewing all of the evidence (as outlined below), the Board documents its findings in relation to each consideration under Term of Reference 9 at Part 6.12 'Board's discussion and conclusions'.

6.2 FIRE RISK

Term of Reference 9(a) asks 'whether, and to what extent, the option would decrease the risk of a fire that could impact the mine and if so, the cost of the option relative to the cost of other fire prevention measures.' The pit lake option provides for partial backfilling with overburden on the mine floor, flooding the pit by water and reshaping the batters above the water level.¹⁰ Fire risks are therefore to be assessed as they relate to the exposed coal above the final lake level, and below the final lake level during filling, and the way in which the mines will be flooded.

As the 2014 Hazelwood mine fire demonstrated, uncovered coal represents a serious fire risk.¹¹ The Board heard evidence about covering coal with water or overburden to decrease that risk. In its report, Jacobs notes that water coverage will be important in the medium and long-term to mitigate fire risk, along with other controls. Jacobs observes that the proposed lake at the Yallourn mine will be filled nearer to the mine's crest than the other Latrobe Valley mines, meaning that there will be fewer batters to shape and cover.¹² In the short-term (that is, prior to closure), Jacobs recommends that all mines use overburden to cover the exposed coal and other operational controls to decrease the risk of fire.¹³

6.2.1 COVERING THE COAL WITH WATER

Under the approved rehabilitation plans of the mine operators, proposed rehabilitation of the Loy Yang and Hazelwood mines seeks to achieve 'weight balance' by creating a shallow lake that partially fills the mine pit.¹⁴

Weight balance is the level of fill that is required to counterbalance the upward pressure of the underlying, deeper aquifers by downward pressure from the water and/or backfill.¹⁵ The Hazelwood and Loy Yang mine operators have estimated this level based on the predicted aquifer pressures once dewatering ceases, and the density of the overburden that will be used to backfill the pit.¹⁶ They have modelled the minimum fill levels for their mines to achieve weight balance, as a relative level, and then modelled the length of time it will take for the lakes to fill to the 'weight balance level'.¹⁷

The Yallourn mine operator plans to fully flood the mine pit to provide the best batter stability conditions. Batter stability is a greater consideration than weight balance at the Yallourn mine due to relatively lower aquifer pressures.¹⁸

To reduce fire risk, exposed coal between the weight balance or batter stability level and the pit crest need to be covered. Current rehabilitation plans indicate that coal faces above the proposed weight balance level will be covered with overburden and/or topsoil, but coal faces below this level will be left exposed while the lake is filling, and until the weight balance level is reached.¹⁹ Both the Hazelwood and Loy Yang mine operators stated to the Board that they intend to maintain fire services to manage the fire risk below the weight balance level during this time.²⁰

The length of time it will take to reach weight balance or batter stability level varies for each mine. EnergyAustralia has estimated that it will take 17 years for the Yallourn pit to achieve batter stability level (approximately one metre below crest height), assuming natural fill (rainfall and run-off) and access to its bulk entitlement.²¹ The estimate for the Hazelwood pit to reach weight balance level (RL -22m) has been modelled at seven years, assuming natural fill, seepage, and continued access to its allocation under the mine's groundwater licence and water from the Hazelwood pondage.²² The current estimate for the Loy Yang pit to achieve weight balance (RL -22.5m) is 10 years, assuming access to Loy Yang A power station's bulk entitlement, the mine's groundwater licence and natural fill, and based on historic climate conditions.²³

In each case, these estimates assume access to current water entitlements for many years after the mines and associated power stations cease operating. If the assumptions about access to existing water allocations prove unfounded, the fill times will be considerably longer.²⁴ Environment Victoria points out that the worst-case scenario is that this may be as long as 200 years for the Hazelwood mine.²⁵ Differences between the assumptions each mine operator makes about water sources in its modelling are explained in Part 6.4.2 of this report. There will be a number of years during which coal below the weight balance level is exposed and may pose a fire risk that needs to be managed.²⁶

The weight balance level is different to the final predicted lake level, which can be considerably higher and will take longer to achieve. For example, GDF Suez has predicted the fill level required for weight balance at Hazelwood mine is RL -22m, which is a 38 metre deep lake approximately one-third of the depth of the mine pit. The surface of the RL -22m weight balance level lake will be approximately 80 metres below the pit crest. However, it has predicted that the lake will eventually reach RL +8m, which is 68 metres deep and between 50 and 60 per cent of the mine pit depth.²⁷ Figure 16 (in Part 4.3.3) shows GDF Suez's representation of these levels.

6.2.2 COVERING THE COAL WITH OVERBURDEN

The mine operators and some experts provided opinion to the Board about the appropriate depth of overburden and vegetation to be placed on rehabilitated batters above weight balance or batter stability level to manage fire risk. The Board heard that there is no agreed depth of overburden that is required to reduce the risk, to an acceptable level, of the coal igniting.²⁸ The Latrobe Valley mines have low strip ratios which means that rehabilitation costs could dramatically increase if more overburden is required than is available from mining activities.²⁹

Dr Haberfield identified some key considerations in choosing the depth of overburden and the type of vegetation to cover the coal. He explained that cracks could appear in the overburden due to instability or natural drying of the overburden materials, allowing a fire to gain access to the coal. He suggested that this be dealt with by monitoring and repairing cracks, and by selecting a sufficient overburden depth that is appropriate for the type of materials used.³⁰ Dr Haberfield also noted that deep tree roots that go through the full depth of the overburden could carry fire down to the coal. He recommended that shallow-rooted plants be used to prevent that risk.³¹

Mr James Faithful, Technical Services Manager – Mine, GDF Suez, gave evidence that the areas of coal covered by one metre of overburden did not catch fire during the 2014 Hazelwood mine fire.³² He believes that this demonstrates that one metre of overburden is a safe depth of coverage.

In contrast, the assessment by Jacobs concludes that two metres of overburden is a better estimate of the required depth.³³ Mr Speirs was the Latrobe Valley Mine Operations Adviser for the Jacobs options report, and between 1982 and 2009, he was the production manager and the general manager of mining at the Loy Yang mine.³⁴ Mr Speirs explained to the Board that the rationale behind choosing two metres over one metre as the appropriate overburden depth for fire protection is that ‘in this situation we are talking about treatment of a batter that’s got to last hundreds of years’, and it is currently unclear how overburden will behave on a batter at different layer thicknesses.³⁵ He added that ‘we really didn’t know the right answer so we went for a conservative depth that we thought was safe to achieve the outcome and wouldn’t be overly costly.’³⁶

The Board also heard from Professor Galvin that there is a tension between flattening the batter angle to minimise erosion (a priority in reducing fire risk) and maintaining slope stability.³⁷ The Board notes that this is one example of the interconnectedness between various factors relevant to rehabilitation, which adds complexity to the Latrobe Valley mine rehabilitation tasks.

6.2.3 RISK MANAGEMENT AND IMPACT ON FIRE SERVICES

The Board heard that, at present, each mine operator manages fire risk through a combination of mine design, training, on-hand expertise, equipment, vegetation management and monitoring.³⁸ Since the introduction of mining licence condition 1A in January 2015, each mine operator has prepared a Risk Assessment and Management Plan, which includes a focus on fire risks and controls. Mr Luke Wilson, Lead Deputy Secretary of Agriculture, Energy and Resources at the Department of Economic Development, Jobs, Transport and Resources (DEDJTR), indicated to the Board that the risk assessments undertaken ‘are likely to result in changes to operations at the mines as well as the mine rehabilitation plans’, and may result in the Department Head directing the mine operators to submit work plan variations to take into account any changed risks relating to the operations.³⁹

Fire services, including mains, pumps and pipes, are located throughout each mine, including on the mine floor.⁴⁰ Mr Faithful identified that the removal and relocation of in-pit fixed fire services will be an issue after the Hazelwood mine’s operations cease, and during the lake filling and rehabilitation of batters above the planned water level. The removal will reduce the existing fire protection capabilities of the mine operators.⁴¹ It will necessarily occur at a time when there will be fewer employees present, who often perform crucial roles⁴²—for example, at the Yallourn mine employees perform fire-spotting and fire suppression work.⁴³

For the Hazelwood mine, Mr Faithful proposed solutions including progressively removing pipes as the lake fills, placing pumps on floating pontoons, or limiting the size of the batter area being rehabilitated at any one time. The viability and cost of these and other alternative solutions for each mine are currently unknown.⁴⁴

6.3 STABILITY

Term of Reference 9(b) requires the Board to consider ‘whether, and to what extent, the [rehabilitation] option would affect the stability of the mine.’ Term of Reference 9(c) directs the Board’s attention to whether, and to what extent, the option would create a stable landform. This section addresses both 9(b) and 9(c).

6.3.1 COMPLEXITIES OF STABILITY IN THE LATROBE VALLEY MINES

The Board repeatedly heard that there are significant uncertainties and complexities regarding mine floor and batter stability, and how to create stable landforms in the long-term.⁴⁵

Professor Galvin informed the Board that ‘[m]ine stability is particularly important in the Latrobe Valley because of the closeness to mine crests of key infrastructure, such as highways, railway lines, power transmission lines, telecommunication systems, rivers, and drains.’⁴⁶

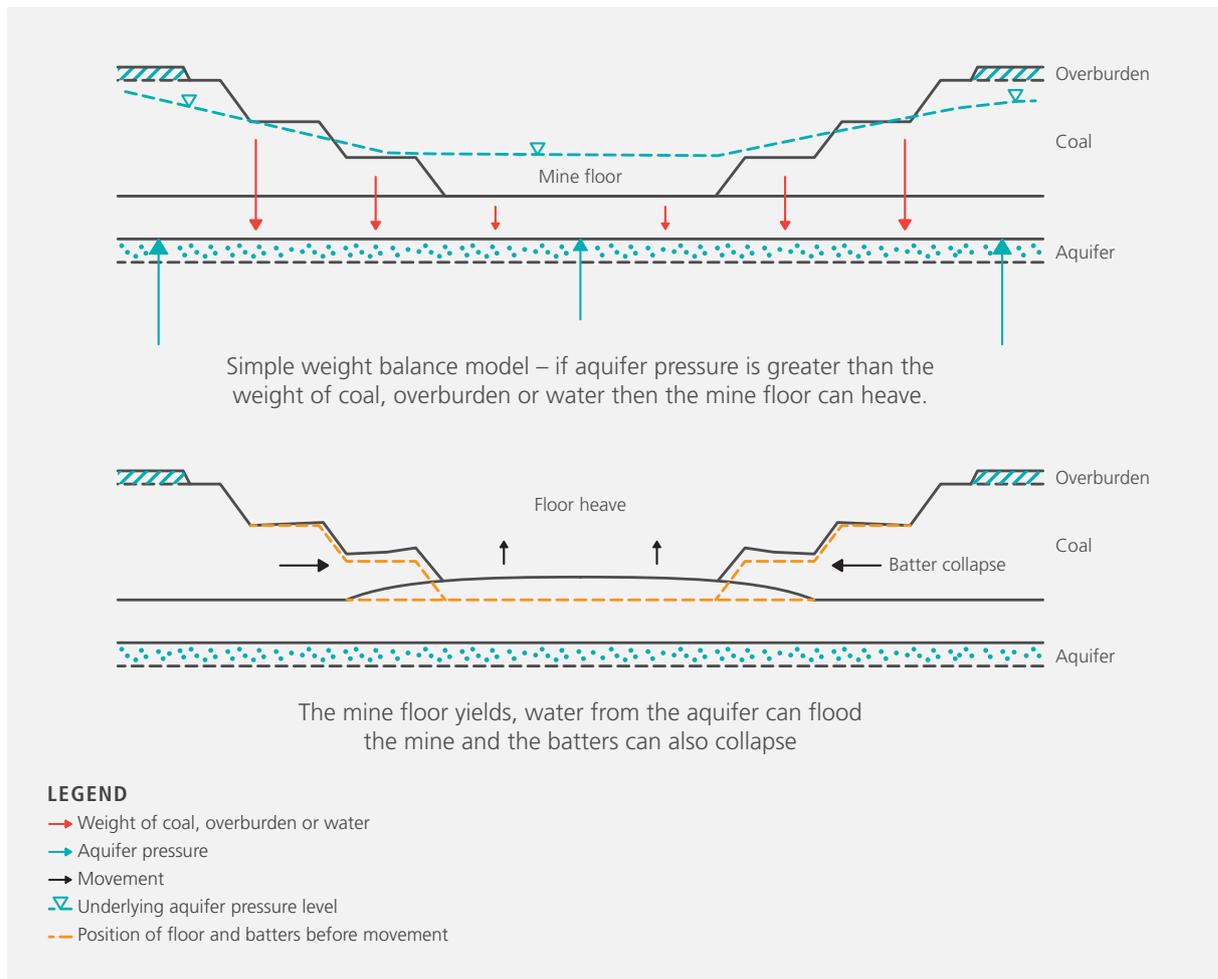
Adjunct Professor Sullivan described the Latrobe Valley as a ‘complex system’ due to the fact that there is interaction between each of the mines.⁴⁷ Each of the mines has groundwater pressure within the batters, coal joints and below the mine floor.⁴⁸ Adjunct Professor Sullivan explained that the stability of batters in the mines is very sensitive to water pressures:

This basic situation is exacerbated by three factors, the thick coal seams, the continuous joints in the coal and the very large stress related movements that have occurred and are continuing around all the mines. This means it is easy for groundwater pressures to build up under rainfall runoff events and to destabilize the mine batters. This also means it is easy for water to cause uplift pressures on the coal seams, basically because the coal almost floats in water.⁴⁹

Adjunct Professor Sullivan noted that there are two available scales for understanding stability—geotechnical stability (which refers to the large-scale stability of the landform) and erosional stability (which refers to local instability of the surface of the landform).⁵⁰ This Part focuses primarily on geotechnical stability.

The two principal modes of geotechnical instability are floor heave and batter instability.⁵¹

Floor heave occurs when there is an imbalance between the upward pressure of the aquifers underlying the mines, and the weight of the coal and interseam above the aquifers. As coal and interseam materials are removed, the aquifer pressure causes the mine floor to push upwards.⁵² Figure 27 demonstrates this imbalance.

Figure 27. Example of floor heave⁵³

Floor heave is primarily managed through dewatering (pumping water out of the aquifers).⁵⁴ Mr Ronald Methner, Mine Manager at EnergyAustralia, explained that due to the distance between the mine and the nearest aquifer, 'the risk of floor heave is not as significant at the Yallourn Mine compared to other Latrobe Valley mines, and is largely limited to specific identified areas. Consequently, dewatering of the aquifer at the Yallourn Mine is not a significant requirement.'⁵⁵

Batter instability can result in block sliding, which occurs when water pressure builds up in the batters, resulting in a block of coal shifting towards the centre of the mine pit.⁵⁶ Part 4.2.5 describes this mechanism further. The key methods of managing batter instability are dewatering (pumping water out of the batters) and horizontal bores (long drains drilled into the batters).⁵⁷

Instability can impact mining operations, or result in waterways breaching the mine, as seen when around six million cubic metres of coal collapsed during the 2007 Yallourn northern mine batter collapse. Instability can also lead to land movements beyond the mine. An example is the cracks that appeared on the Princes Highway and in southern Morwell as a result of the Hazelwood northern batter instability event in 2011 (see Part 4.3.5 of this report).⁵⁸

Specific batters have particular stability concerns. For example, the stability of the Hazelwood mine's northern batter has long been a concern of Adjunct Professor Sullivan.⁵⁹

The particular complexity associated with the stability of the Latrobe Valley mines is reflected in their special treatment as 'declared mines' under s. 7C of the *Mineral Resources (Sustainable Development) Act 1990* (Vic) (Mineral Resources Act), which refers to 'geotechnical or hydrogeological factors' within the mines that pose 'significant risk to public safety, the environment and infrastructure'. Consequently, each mine must report to the Mining Regulator every six months.⁶⁰

As noted by Adjunct Professor Sullivan in his report, the 'long-term objective of rehabilitation is to convert the area to a safe and stable condition.'⁶¹ In their joint expert report, all experts agree that in geotechnical engineering there is no universal definition of 'safe and stable', and therefore no clear criteria for what long-term safety and stability entails.⁶² Adjunct Professor Sullivan told the Board that subjective judgment contributes significantly to determining what constitutes a safe and stable landform.⁶³ The joint expert report also records that all experts agreed that:

The approved rehabilitation plans of the Latrobe Valley brown coal mines...do not deal adequately with the complex stability issues that impact on both progressive and final rehabilitation...[and] fall well short of what could reasonably be considered as adequate for achieving long-term safe and stable batters from a ground control perspective.⁶⁴

6.3.2 FLOODING THE MINES

The process of filling a mine with water may itself create 'undue risks' due to the coal's sensitivity to water, potentially resulting in movements.⁶⁵ Several experts noted the possible reactivation of the Lewis Anomaly—a 'vertical discontinuity' that runs underground through Morwell. The Anomaly caused movement in the 1960s, bending the gas pipes in Morwell towards the mine.⁶⁶

Professor Mackay told the Board that the flooding process will raise the groundwater levels in the surrounding area, and this 'will have an interesting effect in potentially reversing some of the subsidence that's taken place. These things never go back the way they started out, so it won't be just coming back to its original surface, it will go back to a different surface with different problems.'⁶⁷

The Jacobs options report states that the interconnectivity of the aquifers beneath the Latrobe Valley mines means that as one mine stops dewatering, increased dewatering may be required for one or both of the other mines.⁶⁸

Dr Friedrich von Bismarck, Head of Germany's Joint-Governmental-Agency for Coal Mine Rehabilitation, stated that the German experience is that a filled pit is easier to stabilise than an empty pit, and therefore it is desirable to fill the pits as quickly as possible.⁶⁹ However, the time taken to fill a mine pit may impact its stability, and as Mr Stephen Rieniets, General Manager of AGL Loy Yang's mining operations, noted, research has not yet identified a safe rate to fill the pit lake.⁷⁰ Mr Faithful recently undertook a study tour of brown coal mines in Germany. Based on his experience, he notes that 'the rapid filling of the mine void with water to form a lake is seen as an effective means of managing geotechnical stability throughout the final rehabilitation process'.⁷¹

EnergyAustralia submitted that the Board should have regard to the various studies it commissioned in response to Condition 7 of its approved 2011 work plan variation (referred to in Part 4.2.3). Condition 7 of the work plan variation requires EnergyAustralia to review its rehabilitation plan to consider the feasibility of the flooded mine scenario against other alternatives. EnergyAustralia submitted that the research developed in response to Condition 7 of the work plan variation is 'vital and shows that, at Yallourn, work towards the refinement and implementation of the Lake Option is well advanced and on track'.⁷²

One of the reviews obtained by EnergyAustralia to address Condition 7 is a 2012 report by GHD titled *Report for Yallourn mine rehabilitation: Geotechnical assessment of flooding options*.⁷³ Based on modelling, GHD found that flooding of the pit would increase the stability of some of the batters and decrease the stability of other batters.⁷⁴ Overall, GHD concludes in its report that '[s]table and safe batters can be achieved under a rehabilitation flooding option, but significant additional stabilising works will be required regardless of which option is selected.'⁷⁵ GHD notes that its report 'cannot and does not provide an overall recommendation with respect to the best rehabilitation strategy for the mine' and that considerable further work is needed in the form of assessments, reviews and modelling of stability issues 'prior to developing a full rehabilitation master-plan'.⁷⁶

6.3.3 USING OVERBURDEN TO COVER BATTERS AND BACKFILL THE PITS

The strategic placement of overburden on the batters and the pit floor may be one way to increase stability.⁷⁷ Adjunct Professor Sullivan told the Board that overburden must be used effectively as ‘it’s the one physical thing that can probably withstand the sort of critical loading events that will happen in the very, very long-term’.⁷⁸ However, as with fire risk, the depth of backfilling or overburden placement required to achieve stability in a pit lake is not known. It may be that different depths are required in different parts of each pit.⁷⁹ Backfilling could end up consuming a large amount of the limited available overburden, and have significant cost implications.⁸⁰

Even with backfilling, it is possible that the submerged batters could collapse.⁸¹ Dr Clint McCullough, Associate and Principal Environmental Scientist, Golder Associates, explained that such a collapse could impact water quality and result in ‘[d]angerous surge waves which of course can impact upon recreational users, leading to further instability and...direct life loss or property loss from that.’⁸² He informed the Board that monitoring for such issues will therefore need to occur ‘for a very long time.’⁸³

While Adjunct Professor Sullivan noted that it is ‘too early to talk about a layer thickness’ of overburden, he highlighted the importance of understanding the relationship between batter stability and overburden.⁸⁴ He explained that sinkholes can appear in overburden, and are a result of material being washed down into the coal joints. Adjunct Professor Sullivan told the Board that it is important to achieve stability so that the joints do not continue to open, allowing the overburden material to migrate into the coal beneath.⁸⁵

Mr Faithful stated that GDF Suez recognises that there are areas within the Hazelwood mine that may require additional support or buttressing with overburden to prevent instability in the mine during flooding. GDF Suez has retained GHD to undertake a study about stability, which is ongoing.⁸⁶

Mr Methel informed the Board that ‘stability at the Yallourn mine is a key consideration in relation to the overall rehabilitation strategy.’⁸⁷ Stability issues associated with rehabilitation include batter movement, toe saturation and floor heave.⁸⁸ Currently, EnergyAustralia is managing batter stability by drilling horizontal bores, buttressing batters with overburden and backfilling the pit with overburden.⁸⁹

6.3.4 BATTER ANGLE

The Board heard that when using overburden on the exposed batters, there is a tension between flattening the batter angle to minimise erosion (a priority in reducing fire risk), and maintaining slope stability. Professor Galvin explained that:

because the coal is so light and wants to slide when impacted by water pressure, batter stability decreases as a batter slope is made flatter. This is the opposite behaviour to that associated with most other mine slopes and surface excavations. Since steep batters are an impediment to covering the batters with soil materials, this conflict can present a serious impediment to undertaking rehabilitation that remains safe and stable in the long-term.⁹⁰

The batter angle that best ensures stability, including the angle at which overburden can be permanently retained on a batter, is presently unknown.⁹¹ Adjunct Professor Sullivan noted that AGL Loy Yang’s plans and some regulatory documents refer to 1v:3h (where the horizontal length of the batter is three times more than the vertical height) as being the preferred batter angle.⁹² However he and the other experts advised the Board in their joint expert report that there is no ‘scientific and engineering’ evidence to support the 1v:3h ratio as being the ‘generally accepted’ or ‘generally adopted’ long-term angle for all rehabilitated mines in the Latrobe Valley.⁹³ Further, Professor Galvin stated that the 1v:3h batter angle is ‘too simplistic’, as it is ‘extremely unlikely’ that each mine or even each batter will require the same angle. He noted that it is possible that multiple different angles would be required within a long batter ‘because of factors such as variation in joint direction, dip of the strata and groundwater.’⁹⁴

Establishing optimal batter angles for each mine, and potentially each batter or batter area, may impact significantly on the cost of rehabilitation.⁹⁵

6.3.5 EROSION

Another uncertainty related to stability is the potential impact of wave erosion. This form of erosion is caused by waves on the surface of the lake washing up against the batters during filling, and after the proposed lake level has been reached. It is unclear what, if anything, will be required to ensure any such erosion does not destabilise the walls of the lake.⁹⁶

To minimise the effect of erosion due to wave action, Jacobs advised that 'rip rap' should be installed at the lake level.⁹⁷ Rip rap is a conventional method for managing erosion in which a collection of loose rock or other material, such as concrete, is deposited on the waterline. The experts disagreed about the need for 'rip rap' in each pit.⁹⁸ Installing rip rap has significant cost implications.⁹⁹ GDF Suez indicated that it would undertake further work on the impact of wave erosion to ascertain whether rip rap is necessary for its pit lake option.¹⁰⁰ AGL Loy Yang's 2015 work plan variation states that rip rap will be used to protect sandy interseam from wave erosion, along with alternative protection measures.¹⁰¹

6.3.6 MAINTAINING AND MONITORING STABILITY

The Board heard about the need for ongoing maintenance and monitoring to ensure mine stability. Professor Mackay suggested that this 'will be a significant expense.'¹⁰² For example, monitoring and maintaining horizontal bores 'requires funding and a management system that provides for oversight by appropriately qualified personnel.'¹⁰³ The Jacobs options report notes that the significant aquifer pressures at the Hazelwood and Loy Yang mines would require ongoing management to achieve stability.¹⁰⁴

Mr Rieniets acknowledged that AGL Loy Yang's current presumption that maintenance requirements will 'taper off' as flooding occurs, assumes that once achieved, stability is permanent.¹⁰⁵ Mr Faithful notes that for the Hazelwood mine, to maintain batter stability and avoid floor heave during the flooding of the mine pit, active management and continual monitoring will be necessary, and that it will be done in accordance with its Ground Control Management Plan.¹⁰⁶

Professor Mackay stated that '[t]he research is simply not strong enough to give a clear indication of how quickly we can expect to see stability reached' and that it might be decades after the proposed water level is achieved.¹⁰⁷ Dr McCullough told the Board that monitoring would be required 'for a very long time.'¹⁰⁸ Similarly, Dr von Bismarck told the Inquiry that the Joint-Governmental-Agency for Coal Mine Rehabilitation anticipated having to monitor stability in the German mine pit lakes for a 'very long time.'¹⁰⁹

6.3.7 FURTHER RESEARCH ON STABILITY

Two studies will shortly commence to progress knowledge about stability. The first is the Mine Batter Stability Project (Batter Stability Project), which is being undertaken by the Mining Regulator in partnership with GHERG at the Yallourn mine. The project was established in response to a recommendation of the Technical Review Board in 2012, which identified the need for studies into mine stability 'in order to re-establish a robust technical platform to manage geotechnical risk.'¹¹⁰

The Batter Stability Project will look at issues such as the properties of overburden, interseam and coal over time and under stress, and investigate batter movement and other geotechnical risks, as well as controls and tools for ongoing monitoring.¹¹¹ The Batter Stability Project received funding of \$2.2 million in August 2014.¹¹² Part 6.11 discusses this further.

Professor Galvin told the Board that this study is 'the tip of the iceberg.'¹¹³ He noted that 'a significant amount of further research directed towards achieving mine stability in the long-term is required. Addressing this issue will require significant funding.'¹¹⁴

The second study is being conducted by AGL Loy Yang with Monash University and Federation University Australia. It will trial and monitor different approaches to rehabilitating the Loy Yang mine's batters above the waterline of the proposed lake. This includes looking at the optimal batter angle to minimise erosion and fire risk, as well as addressing dust issues and controlling water flows.¹¹⁵

In addition to these studies, the Board notes that GHD is also conducting a study in relation to the stability of the Hazelwood mine during the flooding of its mine pit.¹¹⁶

6.4 SOURCING WATER

Term of Reference 9(f) requires the Board to consider the viability of the rehabilitation option and any associated limitations. Term of Reference 9(i) directs the Board to assess 'whether the option is otherwise sustainable, practicable and effective.'

While a range of considerations is relevant, a strong theme in the evidence throughout this Inquiry was the viability and sustainability of sourcing water. Therefore this section focuses on that issue, as it is central to the question of whether the pit lake option can be implemented. In particular, it considers whether the mines' current water allocations would enable them to source water for the purpose of creating the pit lakes, and whether there will be sufficient water for that purpose. If sufficient water is not available to one or more of the mine operators, they may not be able to implement the pit lake option, or at least not at an affordable cost or within the anticipated timelines.

6.4.1 VOLUME OF WATER

The Board heard that an enormous amount of water will be required by each mine to fill its pit to the intended final lake depth. In the case of the Yallourn and Hazelwood mines, the volume of water required to reach crest height (RL +37m for Yallourn mine) and final partial fill level (RL +8m for Hazelwood mine) is 748 gegalitres and 740 gegalitres respectively. At the Loy Yang mine, approximately 700 gegalitres of water are required to reach weight balance level (RL -22.5m).¹¹⁷ In comparison, Sydney Harbour contains 500 gegalitres of water.¹¹⁸

6.4.2 WATER MODELLING

Each of the mine operators has proposed various water source scenarios in their rehabilitation plans to establish the rate at which the mine pits will fill. These include scenarios that combine rainfall and natural groundwater seepage (collectively known as 'natural fill'), and the water currently allocated to the mines and power stations pursuant to groundwater licences, bulk entitlements and water supply agreements. In addition, the mine operators have each considered using surface water to augment their water allocations and fill the pits, through, for example:

- diverting water from Latrobe and Morwell Rivers into the pit at the Yallourn mine¹¹⁹
- pumping water from the Hazelwood Pondage into the pit at the Hazelwood mine¹²⁰
- diverting flood water from Traralgon Creek and Sheepwash Creek into the pit at the Loy Yang mine.¹²¹

Each of the mines has commissioned water modelling to gain a better understanding of the time it might take to create pit lakes, as discussed below.

YALLOURN MINE

The modelling undertaken by EnergyAustralia in response to Condition 7 of its 2011 work plan variation was based on a rehabilitation concept of a fully filled lake with a depth of RL +37m and capacity of 748 gegalitres.¹²²

A range of scenarios was considered, commencing with a natural fill scenario.¹²³ Each subsequent scenario combined the previous scenario with an additional water source, including:

- the power station's bulk entitlement¹²⁴
- excess water resulting from flood events from both the Latrobe and Morwell Rivers.¹²⁵

An alternative modelling scenario that has been undertaken is filling the pit to the RL +20m level (estimated to be 97.9 gegalitres) by using existing water that is stored in the mine's Township Field.¹²⁶

Table 6 summarises the results of the modelling, based on current climate conditions. Other scenarios based on wetter and drier climate conditions were also modelled.¹²⁷

Table 6. Yallourn mine modelled fill times for a pit lake (RL +37m, 748 GL) post-closure¹²⁸

Scenario	Years to fill
A Natural fill only	81
B (A) + bulk entitlement	17
C (B) + Latrobe River overflow	6
D (C) + Morwell River overflow	6

As shown in Table 6, the modelling found that the time it would take the Yallourn mine pit to fully fill to RL +37m is between six years (assuming all water sources can be used) and 81 years (assuming that only natural fill can be used). These findings were peer reviewed by expert consultants GHD.¹²⁹

HAZELWOOD MINE

In 2015, GDF Suez engaged GHD to predict the rate at which the future lake would fill under differing water supply scenarios.¹³⁰ A range of scenarios was considered, commencing with natural fill and adding additional water sources for each subsequent scenario. The additional water sources included:

- groundwater pumping at a rate of 9.16 gigalitres a year in 2033–2034 and 6.47 gigalitres a year in 2035–2038
- draining 25 gigalitres of water from the Hazelwood Pondage
- allowing runoff from the Hazelwood Pondage catchment to be directed into the pit.¹³¹

Climate variability was accounted for by a range of catchment runoff volumes with an average volume of 8.38 gigalitres a year used in the final scenario.¹³² Based on a fill volume of 117 gigalitres to a weight balance depth of RL -20m, cumulative fill time scenarios were modelled, as shown in Table 7. It is noted that the final lake has an intended fill volume of approximately 750 gigalitres.

Table 7. Hazelwood mine modelled fill times for a weight balance pit lake (RL -20m, 117 GL) post-closure¹³³

Scenario	Years to fill
A Natural fill only	> 200
B (A) + groundwater pumping	200
C (B) + 25 GL from Hazelwood Pondage	160
D (C) + catchment runoff from Hazelwood Pondage	7

LOY YANG MINE

AGL Loy Yang engaged GHD to complete a water balance assessment of the final mine pit as part of its 2015 work plan variation.¹³⁴ The modelling used six scenarios combining natural fill with a combination of:

- groundwater pumping (either 9.8 gigalitres a year for 10 years or 15 gigalitres a year until the lake reaches weight balance level of RL -22.5m)
- Loy Yang A power station's bulk entitlement (40 gigalitres a year)
- diversion of Traralgon Creek flood flows (4 gigalitres a year).¹³⁵

Four simulated climatic conditions (historic, wet, median and dry) were considered, but they only influenced those scenarios that are heavily reliant on natural fill (scenarios A and B as shown in Table 8).¹³⁶ Based on a 'median climatic conditions' scenario and a fill volume of approximately 700 gigalitres¹³⁷ to a weight balance depth of RL -22.5m, the following fill times were calculated for each combination of water sources (Table 8).

Table 8. Loy Yang mine modelled fill times for a weight balance pit lake (RL -22.5m, 700 GL) post-closure¹³⁸

Scenario	Years to fill
A Natural fill only	75
B (A) + 9.8 GL/yr groundwater pumping	65
C (A) + 15 GL/yr groundwater pumping	25
D (C) + 4 GL/yr flood flows from Traralgon Creek	25
E (C) + 40 GL/yr bulk entitlement	10
(E) + groundwater pumping, flood flows & bulk entitlement	10

For each mine, it is possible that, if evaporation exceeds inflows, an ongoing top up of water may be required once the lakes are filled to the desired weight balance or stability levels. The additional amount of water required will largely depend on whether there is flow through from another water source. Professor Mackay told the Board that the 'reasonably large catchment' around the Yallourn mine may bring it up 'fairly close to river level', which would enable it to be connected to the rivers.¹³⁹

However this is an area of uncertainty, as discussed further below.¹⁴⁰ The Jacobs options report notes that, based on current indications of mine closure dates, the Latrobe Valley mines (in particular the Yallourn and Hazelwood mines) are likely to be filling their pits at the same time, which could also impact water availability.¹⁴¹

6.4.3 ACCESS TO WATER ALLOCATIONS

The mines currently have access to groundwater by licences with Southern Rural Water, by the power stations accessing water through bulk entitlements, and water supply agreements with Gippsland Water. The allocations are summarised in Table 9 (and detailed in Part 4 of this report). It should be noted that currently the mines do not use their full groundwater licence allocations.¹⁴²

Table 9. Current water allocations to the Latrobe Valley mines and power stations by licence type¹⁴³

Site	Amount (GL/year) as at 2016			Total
	Groundwater licence ¹⁴⁴	Bulk entitlement ¹⁴⁵	Water supply agreement ¹⁴⁶	
Yallourn mine	3.285	-	-	3.285
Yallourn power station	-	36.5	2.2	38.7
Hazelwood mine	22.484	-	-	22.484
Hazelwood power station	-	-	14	14
Loy Yang mine	19.996	-	-	19.996
Loy Yang A power station	-	40	3	43
Loy Yang B power station	-	20	1.5	21.5

The Board heard that, for a variety of reasons, it is unclear whether the mines will be able to use their existing water allocations and the allocations to the power stations, for rehabilitation and filling the lakes.

The three groundwater licences expire in 2025.¹⁴⁷ The objective of each licence is 'to allow the efficient depressurising of the...open cut mine while minimising adverse impacts on the Gippsland Groundwater Basin.'¹⁴⁸ This means that the licence allows the mine operators to dewater the mine to release pressure from the aquifers underlying the mine floor. Condition 2 of each licence states that the licensee is authorised to 'take and use groundwater to facilitate mining for coal and generation of electrical energy and purposes incidental thereto.' Condition 5 states the licence applies only on land for which the licence is held.¹⁴⁹

Bulk entitlements do not expire.¹⁵⁰ They are issued to the relevant power generation companies associated with the three mines, and are tied to the purpose of operating the power station.¹⁵¹ Similarly, as stated by Mr David Mawer, Managing Director of Gippsland Water, the water supply agreements between Gippsland Water and the power stations 'do not extend to the mine rehabilitation process' and 'end when the power generating entity ceases operating.'¹⁵²

Southern Rural Water, the licensing authority for AGL Loy Yang's groundwater licence, recently raised these issues with the Mining Regulator. In a letter dated 24 August 2015, in relation to the 2015 Loy Yang work plan variation, Southern Rural Water advises the Mining Regulator that '[c]urrent Licences do not allow for ongoing depressurisation after the term of the licence. In addition [the] current Bulk Entitlement from the Latrobe system does not allow water use for mine flooding'.¹⁵³

AGL Loy Yang commissioned a report from GHD as part of its 2015 work plan variation application. In the report, GHD expresses concerns about the ability of the mine operators to use their existing water allocations to fill the mines post-closure.¹⁵⁴

AGL Loy Yang submitted that 'there is no rational reason why the [water] authorities would refuse to provide AGL with a continuing entitlement to fill its mine if it was in the net interests of the community of Victoria to provide access to that water.'¹⁵⁵

6.4.4 AVAILABILITY OF WATER

The Board heard that a key state policy, the 2011 *Gippsland Region Sustainable Water Strategy* (Sustainable Water Strategy) provides that '[c]urrent rehabilitation plans for open-cut coal mines involve flooding them to create artificial lakes. However, this is not considered to be an entirely viable option any longer because there is insufficient water to fill most of the mines.'¹⁵⁶

Action 6.8 of the Sustainable Water Strategy tasks the Department of Primary Industries (now DEDJTR) with reviewing the groundwater and surface water impacts of mine rehabilitation strategies, in partnership with the Department of Sustainability and Environment (now the Department of Environment, Land, Water and Planning (DELWP)), the Environment Protection Authority (EPA), and the mine operators.¹⁵⁷ However, the Board heard that Action 6.8 has not been progressed by any of the parties, despite its implications for mine rehabilitation.¹⁵⁸ This issue is discussed further in Part 10 of this report.

Similar concerns have been raised elsewhere, including by the Technical Review Board in a letter to the Minister for Energy and Resources, dated 2 February 2011. This letter states that 'the current Yallourn Mine rehabilitation strategy of flooding the mine has been shown to be not feasible because of insufficient water.'¹⁵⁹

The 24 August 2015 letter from Southern Rural Water to the Mining Regulator in relation to the Loy Yang work plan variation states that '[t]here are a significant number of risks related to the long-term availability of water for mine void filling and potential consequent impacts on regional water resources to achieve the proposed mine rehabilitation which are not addressed in the Plan'.¹⁶⁰

Southern Rural Water concludes this letter with the observation that the assessment of water availability for filling the mines 'should be undertaken well in advance of closure such that risk mitigation methods can be identified and incorporated into the closure strategy.' The letter also notes that Southern Rural Water was advised by DELWP that a meeting between them 'to discuss the amendment [to the work plan] and potential implication for water management is essential.' In the letter, Southern Rural Water expresses the hope that the meeting with DELWP could occur prior to any further correspondence with AGL Loy Yang.¹⁶¹

In evidence to the Board, Dr Sharon Davis, Executive Director of the Water Resources Division, Water and Catchments Group at DELWP, agreed that the meeting to discuss the implications of using large volumes of water to fill the mine pits in the future was essential, and that DELWP had received advice from Southern Rural Water to this effect in two emails.¹⁶² The Board was informed that this 'essential' meeting has not occurred and, as at 9 December 2015, had not been scheduled.¹⁶³ Dr Davis could not assist the Board to understand why this was the case.¹⁶⁴

DELWP and Southern Rural Water have confirmed in evidence to the Board that it is not clear to them, and they have not determined, whether any or all of the mines would be able to acquire the water they need to fill the mine pits.¹⁶⁵ Other than the Mining Regulator's referral of the 2015 Loy Yang work plan variation to Southern Rural Water, it appears that the water authorities have not been asked this question.¹⁶⁶

Even if existing bulk entitlements are available for mine filling, it is unclear what quantity of water will be available at the time it is needed. Each entitlement is limited by a percentage share of the water storage (at Blue Rock Reservoir and Lake Narracan), and by the water flow (from Tanjil River at Blue Rock Reservoir and the Latrobe River at Lake Narracan).¹⁶⁷

GDF Suez cautioned the Board against placing too much reliance on the concern expressed in the Sustainable Water Strategy about the availability of water for filling the mines. In oral submissions before the Board, counsel for GDF Suez described Action 6.8 in the Sustainable Water Strategy as no more than a 'thought bubble.'¹⁶⁸

EnergyAustralia also submitted that the Board should not place much weight on the Sustainable Water Strategy document, but for somewhat different reasons.¹⁶⁹ EnergyAustralia submitted that the authors of the document express 'no concluded view' about water availability and assume that the Hazelwood and Loy Yang mines will be 'filled entirely with water.'¹⁷⁰ EnergyAustralia further submitted that neither the authors of the Sustainable Water Strategy, nor the water authority representatives who gave evidence to the Board, had considered the studies that it commissioned in response to Condition 7 of the 2011 Yallourn work plan variation.¹⁷¹ It submitted that these studies included 'evidence...that water in the required volumes is expected to be available'.¹⁷²

However, in oral submissions to the Inquiry, counsel for EnergyAustralia accepted that accessibility to water is a 'principal unknown.'¹⁷³

Environment Victoria submitted that it may be more likely that water will be allocated to AGL Loy Yang to fill a lake that is of beneficial use to the public (as was planned under its 1997 work plan), rather than a 'private dam' (as planned under its 2015 work plan variation).¹⁷⁴

6.5 WATER QUALITY

Term of Reference 9(c) requires the Board to consider 'whether, and to what extent, the option would create a stable landform and minimise long-term environmental degradation'. The Board heard that the key concern in terms of environmental degradation is water quality, of both the pit lake and the surrounding waterways.¹⁷⁵

6.5.1 CLOSED AND INTERCONNECTED SYSTEMS

Water quality was identified as an area requiring management at the Yallourn, Hazelwood and Loy Yang mines.¹⁷⁶ Professor Mackay told the Board that he 'would not expect either Loy Yang or Hazelwood to have water levels which would allow a direct movement of water over land back into the river system. They will be enclosed lakes and their primary discharges if left to nature will be evaporation.'¹⁷⁷

This is known as a 'closed system'. In its assessment of the 2015 Loy Yang work plan variation, Southern Rural Water states that 'there are significant risks related to groundwater management' inherent in the proposed pit lake at the Loy Yang mine, including 'the maintenance of water quality given exposed coal batters'; a 'closed system water environment for many years of filling'; and 'potential risks to groundwater quality through interconnection between the pit lake and aquifers exposed within the mine void.'¹⁷⁸ Southern Rural Water observed that these issues are not addressed in the 2015 Loy Yang work plan variation.¹⁷⁹

The Yallourn mine's rehabilitation plan, however, proposes a higher lake level, which would allow it to be connected to the Morwell and Latrobe Rivers, providing a 'flushing' effect as the water passes through.¹⁸⁰ This is known as 'flow through' or an interconnected system. Professor Mackay advised the Board that it is 'definitely' less likely that water quality issues will develop where there is flow through but also noted that, with respect to the Yallourn mine, the desirability of connecting the pit lake to the river system to create flow through is 'yet to be determined.'¹⁸¹ The Board was advised by Mr Methers of water quality studies completed at the Yallourn mine, which conclude that '[t]he diversion of fresh river flows is identified as having several advantages, principally through neutralising salinity and acidification.'¹⁸²

The Board also heard that there are specific considerations regarding water quality associated with flow through. The Jacobs options report notes that for the Yallourn mine:

Water quality in the pit water body will be key to addressing long term risks. Given the proximity to surface water (the [Latrobe and Morwell] rivers) and considering that limited groundwater is pumped from the mine at present, it is likely that the water body in the final landform will require inflow from surface water in the long-term to maintain required water quality.¹⁸³

Dr McCullough gave evidence that flow through can create 'a number of dangers both for the lake and also for the river and for users of both of those entities.'¹⁸⁴ In part, this is because 'flow through may create new liabilities associated with contamination of the river downstream with [acid mine drainage] from the pit lake. Risks include increased acidity, metal/metalloid, nitrate and ammonia concentrations'.¹⁸⁵

Mr Mawer expressed similar concerns when asked by counsel for EnergyAustralia 'if the proposed lake were interconnected with the Latrobe River and the Morwell River and the Morwell River Diversion, would that alleviate concerns about stagnancy of water?' He replied: 'No' and explained that he would need information about 'the porous nature of the surface contact between the existing mine and the water', as well as other details.¹⁸⁶

6.5.2 PREDICTING WATER QUALITY

Dr von Bismarck gave evidence regarding the difficulties faced in Germany in predicting water quality when connecting pit lakes to river systems. He told the Board that the Joint-Governmental-Agency he heads was aware that there would be an effect on the groundwater quality when the overburden dumps were penetrated by groundwater during filling, because of the overburden's chemical composition. The Agency undertook modelling for each mine.¹⁸⁷ Dr von Bismarck told the Board that the rise in iron hydroxide content in the groundwater 'occurred earlier and more intensely than the hydrogeological model calculations had predicted and is entering the river system in some areas.'¹⁸⁸ Measures to reduce the iron hydroxide content in the groundwater and river system have now been implemented.¹⁸⁹ Figure 28 shows water contaminated by iron hydroxide from previously rehabilitated overburden dumps in the Lusatia river system.¹⁹⁰

Figure 28. Iron hydroxide in the Lusatia river system, Germany 2013¹⁹¹



6.5.3 ADDRESSING WATER QUALITY ISSUES

It was indicated to the Board that solutions to address water quality issues is an area that requires further investigation.¹⁹² Mr Rieniets advised the Board that ‘a lot of work’ needs to be done to better understand water quality issues, and that AGL Loy Yang is committed to doing this, but that it is too early to say what that work will entail.¹⁹³ Mr Faithful indicated that GDF Suez would make a similar commitment to consider the viability of the pit lake option from a water quality perspective in its proposed 2016 work plan variation.¹⁹⁴

Mr Methers stated that EnergyAustralia has commissioned a range of investigations, which ‘demonstrate that water quality outcomes for flooded lakes in the Latrobe Valley will generally depend on the quality of water inflows, the nature and extent of the void to be filled, and interconnectedness to other water systems’,¹⁹⁵ and that interconnection with nearby rivers would be ‘beneficial’ to the quality of the lake water.¹⁹⁶

Mr Ross McGowan, Executive Director of the Mining Regulator, noted that this issue had been addressed in Condition 7.1 of the 2015 Loy Yang work plan variation, which requires AGL Loy Yang to conduct a water resources risk assessment, and which states:

The Water Resources Risk Assessment must be to the satisfaction of the Department Head. The Water Resources Risk Assessment must, as a minimum:

- a. Include local catchment and regional assessment of risks to surface water and groundwater resources, and natural ecosystem services; and
- b. Be undertaken in accordance with Action 6.8 of the Gippsland Region Sustainable Water Strategy.¹⁹⁷

Condition 7.1 is discussed further in Part 10.3.2.

As with stability, the cost of monitoring water quality in the pit lakes is unknown, and represents an uncertainty in the assessment of rehabilitation liability for each mine.¹⁹⁸ Dr von Bismarck told the Inquiry that he anticipated having to monitor water quality in the German lakes for a significant length of time and that the cost of this would be substantial.¹⁹⁹

6.6 PROGRESSIVE REHABILITATION

Term of Reference 9(d) requires the Board to consider ‘whether, and to what extent, the option would ensure that progressive rehabilitation is carried out as required by the Mineral Resources Act.’

6.6.1 DEFINITIONS AND CRITERIA

As a starting point to addressing this Term of Reference, the Board considered the requirements of ‘progressive rehabilitation’ under the Mineral Resources Act. The term is not defined in either the Act or the Mineral Industries Regulations. Schedule 15 of the Mineral Industries Regulations requires mine operators to include proposals for both progressive and final rehabilitation in their work plans. The Act specifies that a licensee must, as far as practicable, complete rehabilitation during the period of the licence.²⁰⁰

There are advisory guidelines, but no specific criteria by which rehabilitation progress is measured by the Mining Regulator.²⁰¹ Further, there is no prescribed timeline for rehabilitation during the licence period; instead, mine operators propose timelines as part of the work plan approval process.²⁰²

DEDJTR’s rehabilitation guidelines state that progressive rehabilitation plans should detail the rehabilitation works, including their sequence and timing.²⁰³ The Hazelwood mine rehabilitation plan contains milestones for progressive rehabilitation; however, in his evidence, Mr Wilson noted that confusion had arisen between the Mining Regulator and GDF Suez about expectations with respect to those milestones.²⁰⁴ Mr Faithful stated that GDF Suez would be happy to have the Mining Regulator set performance criteria for progressive rehabilitation ‘providing that it’s done in a practical and measured fashion and it’s not dictated to us but it’s working with us’.²⁰⁵

Despite the requirements contained in the rehabilitation guidelines, Mr Wilson stated that the Loy Yang and Yallourn mines’ rehabilitation plans do not currently include milestones.²⁰⁶ Mr Methers indicated that EnergyAustralia already produced six-monthly milestone reports to the Mining Regulator and that he would be ‘[h]appy to have milestones in line with our rehabilitation plans.’²⁰⁷

Mr Rieniets disagreed with Mr Wilson's statement that milestones are not already in the AGL Loy Yang rehabilitation plan. He told the Board that 'I think it's quite clear in our work plan on the stage plan shows quite clearly the staging of rehabilitation at AGL Loy Yang. So I think the milestones are there already right up until closure showing which areas will be rehabilitated by when.'²⁰⁸

The Board also heard that it is unclear to the mine operators what the State considers to be progressive rehabilitation. This was apparent during the Inquiry's public hearings when mine operators were questioned on their reporting of progressive rehabilitation costs. As part of their mining licence conditions, licensees are required to submit an Annual Activity and Expenditure Return (Annual Return) to the Mining Regulator that includes an estimate of their rehabilitation liability—that is, how much they estimate it will cost to successfully complete their rehabilitation in accordance with their approved work plan. They are also required to report on how much had been spent in that financial year on progressive rehabilitation.²⁰⁹

Each mine operator noted that the expenditure it recorded in its Annual Return for 2014–15 did not accurately reflect its full expenditure on what it considered to be progressive rehabilitation.²¹⁰ There was uncertainty regarding whether aspects categorised under operational costs, such as moving overburden onto the pit floor, were seen as rehabilitation costs for the purposes of the Annual Return, despite this work 'serving a rehabilitation end goal'.²¹¹ Mr Mether told the Board that he had been in discussions with the Mining Regulator over the past 12 months to better understand this issue.²¹²

6.6.2 IMPACT OF THE PIT LAKE OPTION ON PROGRESSIVE REHABILITATION

Ms Unger outlined the benefits of effective progressive rehabilitation as including 'fire risk reduction, dust suppression, trialling final rehabilitation concepts and building community and regulatory confidence.'²¹³

The Board heard evidence about the extent to which the pit lake option could ensure that progressive rehabilitation is undertaken. The Jacobs options report states that progressive rehabilitation is possible with the pit lake option, and notes that the mine operators have been progressively rehabilitating the mine sites under their existing plans.²¹⁴ Jacobs also states that the rate of progressive rehabilitation undertaken during the mine's life will be a key factor in determining timeframes for achieving the final pit lake.²¹⁵

The joint expert report records that the approved rehabilitation plans of the Latrobe Valley mines 'do not deal adequately with the complex stability issues' that impact progressive rehabilitation.²¹⁶

The mine operators' evidence to the Board summarise their rehabilitation plans, including the progressive rehabilitation that they undertake. The primary focus of each rehabilitation plan is assessing stability, moving infrastructure, changing batter angles, adding overburden, conducting rehabilitation trials, and revegetating the area.²¹⁷ The mine operators identified a range of operational issues that limit their ability to undertake progressive rehabilitation, including the location of critical mining infrastructure such as conveyors, ash and overburden dumps, transport routes, power lines, pumping stations and fire services, dams, and bores.²¹⁸ Such infrastructure needs to be operational 24 hours a day, seven days a week, in order to continually supply coal to the power stations.²¹⁹ In addition, as Professor Galvin identified, the availability of suitable quantities of overburden can limit how much material can be placed in the mine pit.²²⁰

Professor Galvin gave evidence to the Inquiry that the Technical Review Board 'believes that there is scope to increase the rate of rehabilitation of exposed coal faces, albeit at an additional cost impost. The issues are complex but not insurmountable.'²²¹ The mine operators acknowledged that there could always be more progressive rehabilitation, where there are no constraints.²²² Jacobs also identified fire risk as an area that could be addressed through additional progressive rehabilitation.²²³

6.6.3 RESEARCH AND MONITORING

Ms Unger emphasised the benefits of trials and monitoring as a component of progressive rehabilitation, as they provide a 'feedback mechanism' for mine operators to systematically review their work.²²⁴ The benefits of research into stability and other areas related to progressive rehabilitation were reinforced by Mr Rieniets, who stated that at the Loy Yang mine, '[p]rogressive rehabilitation plans have evolved over the life of the project based on learnings from rehabilitation trials, improved understanding of geotechnical and hydrogeological factors and changing community expectations.'²²⁵ Adjunct Professor Sullivan also referred to trials that have taken place and are planned at the Loy Yang mine.²²⁶

6.6.4 IMPACTS OF PROGRESSIVE REHABILITATION ON FINAL LANDFORM OPTIONS

The Board heard that decisions regarding progressive rehabilitation can have major impacts on the final landform options available to the mine operators—at a certain point the decisions made regarding progressive rehabilitation will limit what is possible for final landforms, due to physical limitations or potential risks. Dr McCullough described this as a ‘Rubicon moment’—when an option is ‘irretrievably lost due to mining design or other achievements.’²²⁷ Mr Clinton Rodda, Managing Director of Southern Rural Water, provided the example of dumping overburden in the mine pits as part of rehabilitation efforts, as such dumping may affect water quality in the long-term.²²⁸

6.6.5 IMPACTS OF PROGRESSIVE REHABILITATION ON FIRE SERVICES

The issue of in-pit fixed fire services was also discussed in relation to progressive rehabilitation, and the potential risks of removing fire services during operations.²²⁹ Professor Galvin recognised that the fixed fire services limit the amount of progressive rehabilitation the mine operators can undertake, but noted that the rate of rehabilitation could be increased.²³⁰ In a letter to the Mining Regulator reviewing the draft 2015 Loy Yang work variation, Professor Galvin made the following observations about AGL Loy Yang’s planned fire mitigation plans:

It seems that the proponent has no intention of reducing the fire fuel load on the northern batters until the final rehabilitation is carried out at the completion of Stage C mining in about a decade’s time. The presence of a range of mining and other infrastructure on this batter has been put forward as the reason for this delay. Notwithstanding this, the proponent still claims to be undertaking progressive rehabilitation. The matter does not appear to have been independently tested to date from both technical and risk management perspectives.²³¹

6.7 TIMEFRAME

Term of Reference 9(e) requires the Board to consider the estimated timeframe for implementing the rehabilitation option. In considering this issue, it is necessary to first establish how the end point of that timeframe will be measured—that is, how to determine that implementation of the rehabilitation option has been successful.

6.7.1 CLOSURE CRITERIA

Ms Unger told the Board of Inquiry that ‘timeframes around the end of the life of a project are very unclear.’²³² Counsel Assisting submitted that one of the difficulties in establishing timeframes is that there are no clear criteria to indicate whether rehabilitation has been successful.²³³ The Board heard that establishing closure criteria is complex. Adjunct Professor Sullivan noted that there are ‘very, very many parts to this mine rehabilitation aspect,’ including safety, stability, water quality, erosion and revegetation, among others.²³⁴

Ms Unger told the Board that without criteria to determine whether rehabilitation has been successful ‘there’s no step-wise process of necessarily getting to an end point and there is no way of signing off on that end point. There must be mechanisms for agreement that they have been met. Without those mechanisms, it’s not clear who is deciding when it’s been done.’²³⁵

Adjunct Professor Sullivan advised the Board that, as each mine has unique features and settings, each mine requires separate criteria against which to assess completion of rehabilitation.²³⁶ He suggested that the success criteria for stability could potentially be at ‘a much lower level’ for the Loy Yang mine than the other mines, because it is further from infrastructure and residences than the other mines.²³⁷ Likewise, the unique characteristics of the Yallourn mine have meant the potential for impacts on stability relating to floor heave are relatively minor.²³⁸ Reflecting this, each of the mine operators has developed its own set of rehabilitation goals and objectives in its rehabilitation plan.²³⁹ These are discussed further in Part 5.2 of this report.

Dr McCullough stated to the Board that ‘the importance of developing closure criteria for pit lakes early in the planning process cannot be overstated, because all mine closure design and mitigation should be directed toward meeting these criteria.’²⁴⁰

The need for clear closure criteria that are developed early and are ‘fully integrated into the life of mine planning’ is reflected in the Western Australian *Guidelines for preparing mine closure plans*.²⁴¹ The guidelines state that closure criteria ‘usually include post-closure environmental outcomes together with measurement tools, and where applicable, final landform designs and construction specifications.’²⁴²

However, it was also suggested to the Board that closure criteria should be considered ‘preliminary’ and flexible to change over time. Dr McCullough told the Board that ‘[a] lot can happen in three decades.’²⁴³ He stated that if fixed criteria are established now, ‘people who are not even born who will live with those rehabilitated mines would be being influenced by criteria that they had no say in.’²⁴⁴

The issue of rehabilitation bonds, which is considered in Parts 7 to 9 of this report, is closely related to closure criteria. Section 82(1)(b) of the Mineral Resources Act provides that a bond must be returned to a licensee only when the Minister is satisfied that ‘rehabilitation is likely to be successful.’²⁴⁵

6.7.2 IMPACTS ON TIMEFRAMES

As already outlined in this Part, there are many factors that can influence rehabilitation timeframes. These factors can impact upon both the activity that needs to be done and its timing. For example, the water modelling conducted by the mine operators highlights the range in potential fill times based on combinations of water sources. Areas of regulatory uncertainty also impact timeframes, such as the absence of clear definitions of ‘safe’ and ‘stable’, as this will make it difficult to establish what constitutes a long-term successful rehabilitation outcome.

It was suggested to the Board that the rehabilitation plans themselves needed to allow for this uncertainty. Mr Rieniets explained that ‘a rehabilitation plan needs to have flexibility to go longer or shorter.’²⁴⁶ Professor Mackay noted that it was important that plans ‘allow for an extended period of monitoring and maintenance in order to effectively manage both expected and unexpected changes to conditions.’²⁴⁷

6.8 IMPACT ON CURRENT REHABILITATION PLANS

Term of Reference 9(g) requires the Board to consider the impact of the rehabilitation option on any current rehabilitation plans for each mine.

The Jacobs options report notes that significant changes to the mines’ work plans will require a work plan variation under the Mineral Resources Act, and can result in increased ‘operational and cost burdens’ to mine operators.²⁴⁸ Jacobs considered the extent to which the two pit lake options that it identified as viable vary from the mines’ current plans, and found:

- Yallourn mine—the pit lake landform option ‘requires some amendment to the existing work plan (e.g. inclusion of programmed maintenance of cover/capping, including monitoring or top up to mitigate fire risk).’ The partial backfill below the water table option ‘aligns most closely with the current work plan.’²⁴⁹
- Hazelwood mine—the pit lake option will require ‘some changes’ to the current work plan, and the partial backfill below the water table option ‘aligns most closely with the current work plan.’²⁵⁰
- Loy Yang mine—the pit lake option will require ‘some changes’ to the current work plan, and the partial backfill below the water table option ‘aligns most closely with the current work plan.’²⁵¹

The Jacobs options report records that the other four unviable landform options are not supported at all by the current work plans for all three mines, and would have significant impacts on progressive rehabilitation efforts.²⁵²

6.9 FUTURE BENEFICIAL USE

Term of Reference 9(h) directs the Board to consider whether, and to what extent, the rehabilitation option would impact the future beneficial use of land areas impacted by the mines. As discussed in Part 5 of this report, the landform dictates the final land uses that are possible within the constraints of safety, stability and sustainability.

6.9.1 COMMUNITY VISION

The Board sought feedback from the Latrobe Valley community about its vision for final land use, through community consultation sessions held on 4 and 5 August 2015 in Traralgon and Morwell, and by inviting written submissions. A range of organisations also provided submissions to the Inquiry.

Members of the community articulated a desire for the mine sites to become an asset for the community, by supporting employment, tourism opportunities, and recreational uses, or by creating an attractive landscape and habitat for native flora and fauna.²⁵³ The community identified the following potential final land uses:

- vegetation—aquaculture, silviculture, agriculture, wetlands, and wildlife conservation
- passive recreation—lakes, gardens, walking tracks, hiking, camping and hot springs and so on
- active recreation—extreme sports, hang-gliding, playing fields, mud racing, speedboat/dingy racing and golf
- nature reserve
- heritage or cultural parks, including interpretive centres and art galleries
- waste management—landfill, recycling, recovery and salvage
- flood retention structures or water storage
- technology industries or a rocket/satellite launching pad
- education, training and research (for example, a Cooperative Research Centre for low emissions technology, carbon capture and storage or alternative coal uses)
- power generation from non-coal sources—bioenergy, hydroelectricity, wind and solar.²⁵⁴

6.9.2 FINAL LAND USE OPTIONS

Jacobs assessed the impact of the pit lake option on multiple land uses. It found that, in general terms, a pit lake option could potentially support the uses, described in Table 10 with the caveat that this was not an assessment of viability for each of the Latrobe Valley mine sites.

Table 10. Potential final land uses for the pit lake and partial backfill below the water table options²⁵⁵

Land use	Pit lake	Partial backfill below the water table
Conservation and natural environment	✓	✓
Production from dryland agriculture and plantations		✓
Production from irrigated agriculture and plantations		✓
Residential		✓
Manufacturing and industrial		✓
Mining (future)		✓
Services (parklands, education, sport and/or cultural facilities)	✓	✓
Hydro electricity generation	✓	
Solar electricity generation	✓	✓
Lake – intensive use	✓	✓
Lake – production	✓	✓
Reservoir	✓	✓
Wetland – conservation	✓	✓

Land uses less likely to be available under the pit lake option include waste treatment, disposal and recycling; bioenergy electricity generation; and wind electricity generation.²⁵⁶ Jacobs noted that these land uses are not necessarily impossible, but they are improbable due to the 'significant financial, human and physical resources' required for successful implementation (such as additional materials, water or enabling infrastructure such as roads and utilities).²⁵⁷

The ability to create different landforms could, at a later date, result in different final land uses. Mr Hoxley considered that, 'lining the voids and leaving them open has been ruled out through our study because of some of the technical difficulties,' but that these difficulties may be solved over time.²⁵⁸ In his opinion, 'often a lot of those constraints come down to the cost that people will bear.'²⁵⁹ According to Dr McCullough, it is possible (though very unlikely) that the results of studies will show a pit lake is not desirable.²⁶⁰ He noted that there is no reason at this stage to take an option that requires dewatering in perpetuity off the table.²⁶¹

6.9.3 CURRENT FINAL LAND USE PLANS

The mine operators have identified potential land uses for the rehabilitated pit lakes and surrounding areas.

EnergyAustralia has identified conservation, grazing, recreation, forestry, drainage corridors and/or industrial uses as potential final land uses for the rehabilitated Yallourn mine site under the pit lake option.²⁶² EnergyAustralia submitted that the Yallourn pit lake option could provide a flood, drought and fire resource if and when required, and could be a water source for future industry.²⁶³

GDF Suez has identified grazing, conservation zones, recreation (active/passive), forestry (open woodland/plantation), and/or various watercourses and wetlands, as potential final land uses for the Hazelwood mine.²⁶⁴ However, Mr Faithful told the Board that GDF Suez is 'still working through' whether or not it intends, as part of its proposed 2016 work plan variation, to allow public access to the Hazelwood mine site after closure.²⁶⁵

As outlined in Part 4 of this report, Loy Yang's 1997 rehabilitation plan identified community recreation as a potential final land use, along with grazing.²⁶⁶ The 2015 Loy Yang work plan variation only specifies that the rehabilitated site will be suitable for agricultural uses, and that public access to the lake is not intended. Under the heading 'End Use Concept', the approved rehabilitation plan states that 'it is AGL's intention that the land will remain in private ownership at the completion of mining.'²⁶⁷ Adjunct Professor Sullivan told the Board that 'more detailed engineering may well show that [the lake] can come back into public access of some more limited form', but that he did not know when this might be achieved.²⁶⁸

The Board heard that the level of uncertainty about the Loy Yang mine's final land use is related to concerns around safety.²⁶⁹ The mine operators, State and experts agreed that extensive research and trials are needed to settle on a final land use, and that rehabilitation plans need to be flexible enough to incorporate changes that result from that research.²⁷⁰

Mr Rieniets accepted that AGL Loy Yang's intention not to provide for public access to the site under the recent work plan variation, was not actively communicated to the broader community prior to the approval of the variation.²⁷¹ This issue is discussed further in Part 10 of this report.

Ms Unger noted that community engagement regarding both progressive rehabilitation of the mines and the final land use is required throughout the mine's life. She explained that it was important that the community is involved in decision-making, and that knowledge is shared, so that locals understand what can be done with each mine site.²⁷²

6.10 COST

Term of Reference 9(f) requires the Board to consider the estimated cost of the rehabilitation option. The issue of cost is inextricably linked to the assessment of mine operators' liabilities in relation to rehabilitation, which will be discussed in Part 7 of this report. This section briefly discusses the costs relative to other options, and the factors that could impact those costs in the future.

In Jacobs' assessment of viable landforms, the four options deemed unviable (full backfill, partial backfill above the water table, lined void, and rehabilitated void) were assessed as having high costs compared to the pit lake and partial backfill below the water table options, collectively referred to as the 'pit lake option' in this report. The difference in the cost of these options is due to the need for additional overburden, clay cover and/or groundwater management.²⁷³ The costs of the pit lake and partial backfill below the water table options were assessed as being roughly the same.²⁷⁴

Considering the similarity of the pit lake option to the mines' current rehabilitation plans, the rehabilitation liabilities that mine operators report in their Annual Returns provide an indication of the cost of the pit lake option. The estimated rehabilitation costs in Annual Returns are calculated on the mines' current footprint, and take into account any progressive rehabilitation completed to date using existing infrastructure and equipment.²⁷⁵ The mine operators' 2014–15 reports provide the following cost estimates for rehabilitation:

- Yallourn mine—between \$46 million and \$91 million²⁷⁶
- Hazelwood mine—\$73.4 million²⁷⁷
- Loy Yang mine—\$53.7 million²⁷⁸

The rehabilitation liability assessment contained in the Loy Yang mine's Annual Return for 2014–15 reflects the estimated costs to implement the 1997 work plan. Subsequently, the 2015 Loy Yang work plan variation was approved. GHD developed a revised cost model based on the work plan variation, which estimated the rehabilitation liability as \$112 million. The model is only indicative, as it is based on a series of assumptions that are yet to be validated through detailed technical assessments.²⁷⁹

DEDJTR provided the Board with rehabilitation cost estimates developed by AECOM, an independent consultancy. AECOM calculated third party costings based on early closure, meaning that estimates reflect how much it would cost for an agency, other than the mine operator, to undertake rehabilitation now (as opposed to at the end of the mine's life), without the mine operators' infrastructure or personnel.²⁸⁰ The costings include decommissioning infrastructure, capping ash ponds, earthworks to establish final landforms, revegetation, lake filling, management costs, and post-closure maintenance and monitoring. Significant uncertainties are considered as 'risk costs'—these relate to batter failures, groundwater and surface water quality, coal fires, and securing and maintaining lake water levels.²⁸¹ AECOM estimated the cost of rehabilitation undertaken by a third party as follows:

- Yallourn mine—between \$167 million and \$262 million²⁸²
- Hazelwood mine—between \$264 million and \$357 million²⁸³
- Loy Yang mine—between \$221 million and \$319 million²⁸⁴

The differences in the two sets of estimates and their adequacy are discussed further in Part 7 of this report.

The Jacobs options report states that significant changes to the current rehabilitation plans could have financial implications for mine operators.²⁸⁵

Dr von Bismarck told the Inquiry that factors such as monitoring could have significant cost implications for mine rehabilitation, particularly if it involves long timeframes.²⁸⁶ He estimated that the cost of monitoring water quality and stability in the German rehabilitated mines would be in the vicinity of 'several million Euros.'²⁸⁷

6.11 KNOWLEDGE GAPS

As has been highlighted throughout this Part, the Board heard repeatedly from the mine operators, experts and other stakeholders that many areas relevant to rehabilitation require significant research. This will include translating existing knowledge from other settings, while recognising the unique settings and features of each mine.²⁸⁸

The Board was urged by several witnesses to ensure that relevant research is conducted in the short-term, so that key uncertainties are addressed, and decisions made now (such as those related to progressive rehabilitation or final landform) are not based on flawed knowledge.²⁸⁹

Some of the areas relevant to rehabilitation that were identified during the Inquiry as requiring further research and trials, include the following:

STABILITY

- The role of batter angles in geotechnical stability, and the effect of batter angles and profile on the erosion of overburden cover.²⁹⁰
- The role and optimal depth of overburden cover in terms of geotechnical stability and erosion, specific to each mine and/or batter.²⁹¹
- The implications of the changing water level during lake filling on mine stability.²⁹²
- The development of 'hazard maps' that identify infrastructure in close proximity to the mines and the risks posed to that infrastructure by ground movements caused by mining activity.²⁹³
- The lifespan of horizontal bores and alternative methods for ongoing batter drainage in the rehabilitated mine.²⁹⁴
- The potential for wave action to erode batters.²⁹⁵

GROUNDWATER

- Long-term geological changes, including the interactions between ground movements and groundwater pressure, and the development of hazards such as sinkholes that can take a long time to become apparent.²⁹⁶
- The impacts of ceasing aquifer dewatering in one mine on the dewatering needs of the other mines, and the recovered aquifer levels at which mine stability should be tested.²⁹⁷
- The impacts of batter instability below the surface of the lake.²⁹⁸

WATER MODELLING

- The availability of water for timely flooding of the mine pits.²⁹⁹
- Impacts of climate change on the water balance.³⁰⁰
- Site-specific climate data from the predicted lake surface level to inform water balance modelling.³⁰¹
- Lake fill rates and impacts on stability and the broader water system (including impacts of simultaneous pit filling).³⁰²

WATER QUALITY

- The implications of the changing water level during lake filling on water quality.³⁰³
- Long-term pit water quality.³⁰⁴
- Site-specific climate data from the predicted lake surface level to inform water quality modelling.³⁰⁵
- Impacts of interconnected pit lakes on the hydrology and water quality of nearby waterways.³⁰⁶
- The role of flow through from the rivers in pit lake and river water quality and its broader environmental impacts.³⁰⁷
- The use of power station fly ash waste in rehabilitation, and the impacts on the environment, erosion and revegetation.³⁰⁸
- Monitoring existing contaminants on the mine sites, such as fuels and other chemicals.³⁰⁹
- The risk of algal blooms in pit lakes, and management strategies if required.³¹⁰

OTHER ENVIRONMENTAL AND VEGETATION ISSUES

- The viability of rehabilitated sites as wildlife habitats.³¹¹
- Selection and trialing of vegetation, including vegetation around the edges of the lakes.³¹²
- The potential for wave action to impact wildlife habitats and amenity.³¹³

FIRE RISK

- Fire risk management in the short, medium and long-term and its links with progressive rehabilitation.³¹⁴
- The role and optimal depth of overburden cover to address fire risk, specific to each mine.³¹⁵
- Other approaches to protecting coal batters from fire risk other than overburden cover.³¹⁶

OTHER

- Alternative final land use options.³¹⁷
- Social and economic effects of closure and the proposed final land uses of the site.³¹⁸
- Strategies to remove barriers to progressive rehabilitation, such as fire services and other infrastructure.³¹⁹
- Timelines for long-term maintenance and monitoring of aspects such as stability and water quality.³²⁰

The Board heard that some of this work has already commenced. Mr Methner said that EnergyAustralia is addressing many of these issues: '[T]hey've been dealt with starting 20 years ago and we continue to improve our models and our planning.'³²¹ Mr Faithful agreed that this was also the case at the Hazelwood mine.³²²

However an important research project, the State's Batter Stability Project at the Yallourn mine, has been delayed.³²³ The Board was told that contractual issues between the State, EnergyAustralia and the research group (GHERG) have played a role in this delay.³²⁴ Professor Galvin described the Project as just the start in resolving knowledge gaps, and agreed that the length of time it was taking to commence was frustrating. According to Professor Galvin:

The bottom line is simple. Government is not the place to undertake research. This project has got caught up with all the bureaucracy, all the lawyers in the government department who don't understand research...The solution is had that project gone to a research institute it would have been finished by now. So, with government's best intentions, that project then should have been handed over to a professional research facility.³²⁵

Professor Galvin added that because of the delay, the Yallourn mine had to continue operations on the batter that was originally selected for the research, meaning that the 'site has now lost some of its value.'³²⁶ Professor Mackay indicated that the commencement of the Batter Stability Project was 'very close',³²⁷ with Mr Wilson advising that field work was expected to be completed by 30 June 2016.³²⁸

6.12 BOARD'S DISCUSSION AND CONCLUSIONS

In this section, the Board comments on the evidence outlined above, and articulates its findings relevant to criteria in Term of Reference 9.

6.12.1 FIRE RISK

The Board is cognisant of the importance of responding to Term of Reference 9(a), considering the substantial health, social, economic and environmental impacts of the 2014 Hazelwood mine fire. As the 2014 fire demonstrated, uncovered coal represents a serious fire risk to the mines, which can impact critical infrastructure and the communities situated next to the mines.

The proposed rehabilitation option of a pit lake presents benefits for fire prevention in the long-term, as covering the coal with water undoubtedly decreases fire risk.

The Board also recognises that the uncertainties relating to the management of fire risks mean that research, trials and adequate resources must be directed towards resolving these issues. This is of particular importance to the Board in the short and medium-term, considering the risks associated with worked out batters being exposed during mine operations and while lakes are filling. It is apparent that with each mine there will be years, and possibly decades, in which batters that will eventually be underwater, remain uncovered.

Ongoing monitoring and fire services will be vital throughout the entire period the pits are filling. Based on the evidence before the Board, it is not clear what the cost or practicalities are of maintaining these fire services post-mining. It is also unclear whether any detailed consideration has been given to these issues by anyone—regulators (including WorkSafe which shares the responsibility for regulating mine fires with the Mining Regulator) or mine operators. Alternative options, such as additional covering of exposed batters below the planned waterline during lake filling, need to be considered.

The Board heard divergent opinions about the optimal overburden depth for fire prevention, which is also relevant to stability issues. This will also require further investigation, so that the risks of overburden cracking or eroding are minimised over time, as far as is practicable and without unnecessarily onerous cost implications for the mine operators. In its report on the closure of the Anglesea mine (Hazelwood Mine Fire Inquiry Report 2015/2016 – Volume I), the Board found that the necessary depth of overburden for fire prevention purposes may depend on the nature of the overburden used—for example, the percentage of clay it contains.³²⁹ This is a matter that should also be examined in the Latrobe Valley.

The Board is concerned that the mine operators see fire services infrastructure as an impediment to progressive rehabilitation. This is discussed in Part 6.12.5.

Term of Reference 9(a) requires consideration of the cost of the pit lake option relative to the cost of other fire prevention measures. The difficulties in costing the pit lake option are examined in the Board's consideration of Term of Reference 9(f). There is little, if any, evidence before the Board about the costs of alternative fire prevention measures, largely because the work on identifying such alternatives has not been done.

6.12.2 STABILITY

The Board recognises that the issue of mine stability is fundamental to the Terms of Reference for this Inquiry, as it is a core objective of rehabilitation. The beneficial use of rehabilitated land, particularly land that will be accessed by the community or is in close proximity to communities and infrastructure, is based on a presumption that the final landform will be stable. Instability can have significant ongoing implications, as has been seen in recent events at the Yallourn and Hazelwood mines.

At this time, the evidence presented does not allow the Board to make an evaluation of the viability of the pit lake option for any of the mines from a stability perspective. The numerous uncertainties regarding stability lead the Board to conclude that this is clearly an area that requires significant investment and investigation. The GHD report cited by EnergyAustralia is consistent with the rest of the evidence before the Board in this regard, in that it highlights the amount of work that remains to be done in assessing stability issues at the Yallourn mine.

It appears to the Board that without clear definitions and criteria for 'safe' and 'stable', there is no way to assess whether mine rehabilitation has been successful. This is a critical area for resolution by the Mining Regulator, mine operators and relevant experts.

Studies must be conducted into groundwater management; optimal fill rates; the impact of submerging batters; batter angles; levels of overburden for backfilling and batter cover; wave erosion; and requirements of ongoing maintenance and monitoring. The results of these studies will have significant implications for the mines' rehabilitation plans and final costs.

The Board affirms the commitment of the Mining Regulator, the mine operators and the research groups to progress the Batter Stability Project at the Yallourn mine and the Loy Yang mine rehabilitation trials. What constitutes long-term stability is a fundamental issue that must be resolved in the short-term to inform successful progressive and final rehabilitation of the mines.

6.12.3 SOURCING WATER

The Board considers that the issue of sourcing water is key to the viability of the pit lake options. Based on the evidence before the Board and having regard to the submissions of the parties, the Board accepts that it is not at all clear that sufficient water will be available to any of the mines for the purpose of rehabilitation, in terms of both using existing water allocations and the quantity of water available in the water system at the time the mines are scheduled to be filled.

Prolonged years of drought combined with water restrictions, extreme weather events and a greater awareness of climate change have dramatically influenced society's views and expectations on current and future water usage. The original concept of all three coal mines being flooded with water to create artificial lakes may not be viable in light of changing environmental and regulatory constraints. This plan needs to be revisited, as recommended by the Sustainable Water Strategy.

It is not the task of this Board to interpret the conditions or scope of various water licences and entitlements. It is sufficient for present purposes to note that there is a real question about whether a licence with a limited life that was granted 'to facilitate mining for coal and generation of electrical energy and purposes incidental thereto' would authorise use of water to fill the former mine after mining and power generation has ceased. The Board notes the view of the administering authority (Southern Rural Water) that 'current licences do not allow for ongoing depressurisation after the term of the licence.'³³⁰ Until this issue is addressed, there are significant uncertainties about access to water, and therefore the viability of the pit lake option.

The Board is conscious that at various times the three mine operators will be filling the mine pits concurrently. At this point in time, the mine operators are not using their full water allocations under their groundwater licences, despite this being proposed under the rehabilitation plans for the Yallourn and Loy Yang mines. This means that the impacts on the water system of the full use of those allocations (assuming they are available) are unknown, and could be significant for the region. Further, if water is available under the current allocations but at a cost, or only over a certain period of time, this may impact the viability of this option as compared with others.

Based on the evidence of Professor Mackay, the Board acknowledges that the setting of the Yallourn mine means that it has a natural advantage in terms of accessing water that is not enjoyed by the other two mines. Whether the pit lake can be connected to the nearby waterways is, of course, another 'unknown' at the present time.

As with the other issues relevant to this Part, without certainty around this issue, it is difficult for the Board to determine Terms of Reference 9(f) and 9(i), other than to confirm that without reliable sources of water, the pit lake option will be unviable and unsustainable. The uncertainty in this area is a limitation of the option, particularly due to the volumes of water, the timeframes, and the potential for external factors to influence availability of water.

6.12.4 WATER QUALITY

In considering rehabilitation options, the Board recognises the importance of water quality, both in terms of its environmental effects, and its impact on the potential final land use. If water quality is unable to be maintained in one or more of the pits, the public will not be able to access those lakes for recreational use.

The Board heard evidence about the possible effects of flooding the mines on water quality. As was the case with the evidence about stability, sourcing water, fire risk and other issues, the Board considers that there are many important unanswered questions concerning water quality, within the proposed lakes and in external groundwater and river systems.

It is not presently clear how water quality will be maintained in each of the proposed pit lakes, nor the cost implications of both answering this question and maintaining required quality levels.

While the Board acknowledges that the prospect of the Yallourn mine successfully maintaining water quality is greater than for the other two mines (due to the potential for flow through), it is clear that further studies and trials will be required in order to determine if, and how, all of the pit lakes can be made safe from a water quality perspective. The Board notes that whether ongoing maintenance of water quality is needed is dependent on the end use of the pit lakes. The proposal for a recreational lake at the Yallourn mine, while providing the most benefit to the community, may also be the most challenging to achieve.

Due to these factors, it is not possible to make an assessment about the viability of the pit lake option as it relates to water quality for any of the mines.

6.12.5 PROGRESSIVE REHABILITATION

The Board recognises the importance of progressive rehabilitation throughout the operational life of a mine, to both reducing fire risk and to ensuring that final rehabilitation is achievable within an acceptable timeframe. It is clear to the Board that the rate and type of progressive rehabilitation that occurs now can greatly impact these timeframes for the rehabilitation process, as well as the associated costs.

Progressive rehabilitation was discussed throughout the hearings, and the Board is concerned that there was no clear agreement on its definition. The Board's view is that progressive rehabilitation must be seen as broader than moving overburden, changing batter angles and revegetation. It should include a focus on short, medium and long-term risk reduction, as well as research, trials, and building community and regulatory confidence.

The confusion that each mine operator expressed around progressive rehabilitation costs and operational costs is an indication that there is no consistently held view on what progressive rehabilitation entails. Considering that progressive rehabilitation is a requirement of the Mineral Resources Act, the Board believes that it would be of benefit to both the Mining Regulator and the mine operators if the scope of progressive rehabilitation was clarified, and associated criteria established in the short-term.

The Board considers research and trials to be essential components of progressive rehabilitation. The knowledge gained through this process will increase the likelihood that rehabilitation is effective and sustainable. Building certainty regarding what will work in each mine prior to closure will allow the mine operators to refine their rehabilitation plans, more accurately predict timeframes and costs, and clearly communicate their plans to the community. This communication and the physical evidence of trials, will build the community's confidence in the ability of the mine operators to achieve these plans.

The Board recognises that while a pit lake may be the most viable option at this time, this could change due to shifting expectations and knowledge—but by that point progressive rehabilitation choices could have eliminated any alternative as a possibility. The Board notes Dr McCullough's concept of a 'Rubicon moment', that is, that flexibility in progressive rehabilitation must be maintained wherever possible, so that no decisions are made that unwittingly restrict the mines from achieving the best possible final landform and land use.

The presence of fire services infrastructure has been cited by the mine operators as a barrier to greater progressive rehabilitation. The Board notes Professor Galvin's advice, and the mine operators' agreement, that more could be done to address this apparent obstacle to rehabilitation. The Board reiterates that identifying solutions to this issue must be a short-term focus of the mine operators and the Mining Regulator. The risk involved in not undertaking progressive rehabilitation (including further fire risk) must be a key consideration, particularly considering batters will be exposed while each lake is filling and will therefore pose a fire risk over a number of years.

The Board concludes that the pit lake option cannot be seen to 'ensure' progressive rehabilitation in a literal sense any more than any other long-term option. Instead, the mine operators must ensure that it is undertaken, overseen by the Mining Regulator, and that any barriers to its implementation are addressed. There are obvious short-term benefits to undertaking progressive rehabilitation from a knowledge, confidence and risk management perspective, as well as benefits in the medium and long-term to refine and enhance planning and provide a basis for successful final rehabilitation.

To ensure that the rate of progressive rehabilitation increases, the Board recommends that the Mining Regulator develops milestones within the mine operators' progressive rehabilitation plans. This will provide clear guidance for mine operators about the expectations for each mine, and achieving the milestones will build regulatory and community confidence.

The Board recommends that the State increase the rate of progressive rehabilitation by developing milestones within the mines' progressive rehabilitation plans in consultation with the mine operators and the Technical Review Board, and require the successful achievement of the milestones.

The Board recommends that the mine operators increase the rate of progressive rehabilitation by achieving milestones within the mines' progressive rehabilitation plans, as set by the Mining Regulator under the previous recommendation.

6.12.6 TIMEFRAME

Without some level of certainty around what constitutes safe, stable and non-polluting closure criteria, it is difficult for a meaningful assessment to be made of the estimated timeframe for the implementation of the pit lake option.

One measure of closure might be whether the landform can be used as planned. However, as discussed, there is uncertainty regarding what this land use may be. Further, public access can change what is considered acceptable in terms of water quality and stability. Without a clear understanding of the intended use and the associated acceptance criteria, it is impossible to predict a timeframe for implementation.

It is clear that there is currently no way to measure 'successful' rehabilitation. The Board does not consider the achievement of the weight balance lake level as a marker of successful implementation, particularly considering all that it has heard about the importance of timeframes for ongoing maintenance and monitoring—the estimates of which have ranged from decades to in perpetuity. The timeframes provided by mine operators in their lake modelling scenarios should be seen as distinct from rehabilitation timeframes.

Considering the complexity and enormity of the rehabilitation undertaking for the Latrobe Valley mines, it is perplexing to the Board that the Mining Regulator has not established mine closure planning principles from which operators could develop clear closure criteria. The development of these criteria was recommended by many of the experts, and it seems evident to the Board that this would have benefits to both the mine operators and the State in clarifying expectations and reaching optimal outcomes. The obvious links to rehabilitation bonds provide an added impetus to establishing closure criteria in the short-term.

The Board also acknowledges the need for flexibility in closure criteria, to reflect changing knowledge and expectations about rehabilitation in the future.

Another consideration in relation to timeframes is that rehabilitation will be occurring, to a large degree, at the same time across the three mines. As discussed above, this could lead to problems with groundwater management, access and availability of water and backfill material, and access to labour, equipment and other materials. The Board accepts the evidence of Jacobs that the potential for this or any of the above factors to extend timeframes will have significant implications on the costs of rehabilitation.

While there are many factors that will affect how long closure will take, it is clear that resolving the question about sourcing water may significantly change the estimated timeframe for filling each pit. The identification of appropriate monitoring and maintenance requirements and water quality standards will also be key.

6.12.7 IMPACT ON CURRENT REHABILITATION PLANS

The Board notes Jacobs' advice that the two pit lake options align relatively closely to the mine operators' current work plans. The Board recognises that some changes may be required to the work plans to ensure the landforms are achieved. This finding is consistent with the evidence the Board has heard regarding the many uncertainties and gaps in the current work plans, which require clarification.

6.12.8 FUTURE BENEFICIAL USE

The Board recognises the importance of final land uses that see the mine sites become assets to the community, particularly during the transition period after mining ceases. The Board is grateful to the Latrobe Valley community for its engagement and insights on this issue, and is conscious of the implications of its findings relevant to this Term of Reference.

Many of the options suggested by community members require landforms other than the pit lake option. For example, a golf course would require a greater area of relatively flat land (potentially a fully backfilled or partially backfilled above the water table landform option), and waste management would require a lined void landform. The Board accepts the evidence of the experts that the creation of safe, stable and non-polluting landforms is a fundamentally important component of mine rehabilitation, and based on the current level of knowledge, this will be best achieved by the pit lake option.

Unfortunately, it is not possible to adequately assess the viability of potential land uses due to the lack of clarity about whether or not implementing the pit lake option will impact the future stability and water quality of the lake and surrounding area. The ability of the public to safely access the rehabilitated sites will be affected by elements such as water quality, stability (for example, an unstable landform could potentially result in block sliding and batter collapse), and erosion controls (for example, if rip rap is deemed necessary, it would mean that people couldn't access the lakes easily, as rocks would be placed along the water line). These issues limit potential land uses, as was outlined in Jacobs' evidence. The final assessment depends on matters presently unknown, and a premature assessment could have ramifications for the community's safety and the land's amenity in the future.

What was clear throughout the Inquiry, however, was that the community is eager to be engaged in the process of identifying potential land uses and developing a vision for the future. The mines have been integral to the Latrobe Valley's landscape, economy and history over the past century, and the rehabilitated sites have the potential to be similarly integrated. The Board believes that the community should have an active role in developing a vision for the mines post-closure. To date the community has been almost entirely excluded from this process. While a definitive assessment of the mines' final land use cannot be made now, the conversation between mine operators, the community and the State must be ongoing and meaningful.

The Board is concerned that changes to the mines' work plans that affect the community are not the subject of public discussion. The 2015 Loy Yang work plan variation is a clear example of where adequate community engagement has not occurred. The community has anticipated that the site will be accessible to the public for recreational use after the mine's closure; however this is no longer the case. This example highlights the need for ongoing community engagement, and is discussed further in Part 10 of this report.

6.12.9 COST

The Board accepts Jacobs' assessment that at this stage the pit lake option appears to be the least expensive of the available options. However, uncertainty regarding a wide range of issues relevant to rehabilitation means that it is not possible for the Board to definitively assess the cost of the pit lake option for each mine. The Board considers it highly likely that the estimated costs of rehabilitation will change over time, as further research and trials are undertaken, and community and regulatory expectations are defined.

As outlined in each of the previous sections, rehabilitation costs will depend on a range of factors, such as stability, sourcing water, water quality, fire risk reduction, and the planned future beneficial use of the site—all of which, to greater or lesser degrees, are uncertain or unknown at this time. Some factors could greatly influence overall costs, such as the length of time it takes to fill the pits with water, optimal batter angles, or the need for rip rap or additional overburden. More certainty in these areas will provide more accurate cost estimates.

While the Board is unable to provide a definitive cost assessment, this does not mean it is impossible for the mine operators or the Mining Regulator to estimate rehabilitation costs. The Board sees this assessment as critical to effective rehabilitation planning and oversight.

Ultimately, it is clear that the complexities and uncertainties regarding mine rehabilitation make it a costly endeavour. There are risks to both the mines and the community more broadly if costs are not adequately forecast and budgeted for. Failure to accurately account for the costs of rehabilitation creates the possibility that the responsibility for undertaking rehabilitation will default to the State—a situation that the rehabilitation bond system aims to avoid. The Board has concerns about the current systems and practices regarding liability assessments as they relate to rehabilitation bonds under Term of Reference 10 of this Inquiry. These concerns are discussed in Parts 7 and 8 of this report.

6.12.10 KNOWLEDGE GAPS

Undertaking research to ensure effective rehabilitation of the mine sites is clearly a priority. The Board strongly agrees that research and trials must be conducted in the short-term wherever possible. The Board encourages the mine operators to prioritise research and trials within their rehabilitation plans, so that the issues that require resolution prior to mine closure (particularly around stability, sourcing water, water quality and fire risk) are thoroughly investigated, and where possible resolved.

The Board recommends that the mine operators, in consultation with the Mining Regulator and relevant research bodies and experts, develop an integrated research plan that identifies common research areas and priorities for the next 10 years. The plan should be reviewed every three years to reflect updated priorities and areas of uncertainty. The list of research topics identified in Part 6.11 can be used as a starting point for discussion. This will enable the mine operators to plan future joint research projects and co-funding opportunities, as well as identify areas in which knowledge can be shared and duplication minimised.

Funding this and other mine-specific rehabilitation research should be part of mine operators' expenditure on progressive rehabilitation, and should be reflected in the mine operators' Annual Returns as such.

The Board recommends that by 31 December 2016, the mine operators develop an integrated research plan that identifies common research areas and priorities for the next 10 years, to be reviewed every three years. The plan should be developed in consultation with the Mining Regulator and relevant agencies, research bodies and experts. The list of research topics identified in Part 6.11 can be used as a starting point for discussion. The Latrobe Valley Mine Rehabilitation Commissioner and Latrobe Valley Mine Rehabilitation Authority should promote and coordinate this research (see the recommendations in Part 11).

6.12.11 FINAL COMMENTS

Given the evidence before the Board, it is not presently possible to provide a definitive evaluation of rehabilitation options, in particular the pit lake option, against the criteria set out in Term of Reference 9.

The Board heard that there are many gaps in current knowledge of the technical issues related to mine rehabilitation, such as fire risk mitigation, mine stability, groundwater management, water availability, and water quality, at both a regional and mine-specific level. Therefore, while the Board acknowledges that the pit lake option is currently the most viable rehabilitation option, considerable further investigation is required, as new knowledge could result in an alternative preferred option.

The Board considers that the evidence provided during the Inquiry regarding Terms of Reference 8 and 9 represents an important step towards creating certainty around a range of issues that impact mine rehabilitation, and will be a valuable resource for the mine operators and the Mining Regulator.

As highlighted in this discussion, there are significant barriers and limitations to the regulation, planning and implementation of mine rehabilitation in the Latrobe Valley. Term of Reference 12 directs the Board to consider 'any other matter that is reasonably incidental' to the Inquiry's Terms of Reference. These practical limitations and uncertainties are evidently reasonably incidental to the issue of mine rehabilitation options. Therefore, in Parts 10 and 11 of this report, the Board considers a number of factors that need to be taken into account when implementing rehabilitation options, as well as changes that are necessary to ensure that rehabilitation is successful for the mine operators, the Mining Regulator, the residents of the Latrobe Valley and the broader community.



Source: Department of Economic Development, Jobs, Transport and Resources



Conveyor and stacker at the Loy Yang mine
(source: Department of Economic Development, Jobs, Transport and Resources)



PART SEVEN
REHABILITATION
LIABILITY
ASSESSMENTS

PART 7 REHABILITATION LIABILITY ASSESSMENTS

7.1 OVERVIEW

Term of Reference 10(a) requires the Board to inquire into, report on and make any recommendations it considers appropriate:

Having regard to the rehabilitation liability assessments that have been or will be reported in 2015 by the operators of each of the Hazelwood mine, the Yallourn mine, and the Loy Yang mine, as required by the *Mineral Resources (Sustainable Development) Act 1990* (Vic), and to the outcome of the Rehabilitation Bond Review Project:

a. whether the rehabilitation liability assessments referred to above are adequate.

The Rehabilitation Bond Review Project (Bond Review Project) is defined at paragraph 18 of the Terms of Reference as 'the current review into rehabilitation bonds and the methodology by which they are calculated, as referred to at page 1612, lines 7–8 of the transcript of the Hazelwood Mine Fire Inquiry dated 10 June 2014.'

The Board heard evidence from each of the Latrobe Valley mine operators and the State about the rehabilitation liability assessments submitted in 2015. The Board also heard from representatives of the State about the progress of the Bond Review Project.

This Part considers whether the mine operators' 2014–15 rehabilitation liability assessments are adequate, having regard to the outcome of the Bond Review Project. As discussed below, the Bond Review Project is incomplete. The Board's capacity to address this Term of Reference is impeded by this context.

Terms of Reference 10(b) and 10(c) are considered in Parts 8 and 9 of this report.

7.2 CURRENT REHABILITATION LIABILITY ASSESSMENTS

As discussed in Part 3 of this report, each mine operator is required to report annually to the Mining Regulator on the rehabilitation works completed that year, and to detail the cumulative area of the mine site that has been rehabilitated since mining commenced. Each mine operator is also required to report on the amount of the current bond for the mine site and the current estimated rehabilitation liability, and to describe the methods and assumptions used to calculate that estimate.¹ Under the Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic) (Mineral Industries Regulations), the mine operators are required to submit an Annual Activity and Expenditure Return (Annual Return),² which records these details.

For the Latrobe Valley mines, rehabilitation liabilities are determined in accordance with the *Establishment and management of rehabilitation bonds for the mining and extractive industries* (Bond Policy).³ The Bond Policy states that the Mining Regulator's Rehabilitation Bond Calculator (Bond Calculator) is the recommended method for assessing a site's rehabilitation liability.⁴ The Bond Calculator breaks down the costs across an operation into a series of 'domains' based on land use (such as workshops and plant, open pits or overburden dumps). Volumes and quantities are entered into the worksheet and costs calculated using the default third party contract rates.⁵ The Bond Calculator automatically tallies the costs from each of the operation's domains and has an allowance for project management, contingency and monitoring expenses based on a percentage of the total cost. Contingency costs are calculated at a rate of at least 10 per cent but a higher rate may be applied 'depending on the complexity of environmental management of the operation.'⁶

7.2.1 YALLOURN MINE

On 11 August 2015, EnergyAustralia submitted its Annual Return for 2014–15 to the Mining Regulator. In it, EnergyAustralia describes its current bond for the Yallourn mine site as \$11.46 million, and the current estimated rehabilitation liability as \$46–91 million.⁷ Mr Ronald Methner, Mine Manager at EnergyAustralia, details EnergyAustralia's calculation methods and assumptions in a letter to the Mining Regulator, dated 8 April 2015.⁸ The letter states:

Yallourn Mine is progressively rehabilitating the mine in line with its approved Master Rehabilitation Plan flooding model... There are still a number of studies and reviews that will be needed as the mine nears completion before final rehabilitation can be undertaken in a number of areas... The rehabilitation liability can change significantly depending on the final outcome of the reviews; however the current liability is within the range of \$46 million for minimum stability work required to a conservative position of \$91 million where significant stability treatment is required.⁹

EnergyAustralia's estimate is based on refinements it has made to a rehabilitation liability assessment model (Liability Cost Model), which was originally prepared by geotechnical consultants GEO-Eng in 2001, and modified by GHD in 2002.¹⁰

EnergyAustralia produced spreadsheets that demonstrate the application of the Liability Cost Model. The spreadsheets show the estimated costs for the areas of the mine pit that will be flooded and the areas that will be above the proposed lake waterline. For the areas that will be flooded, the works costed include earthworks; interim stabilisation; sow to pasture; tree/shrub planting; forestry; wetland development; and ongoing maintenance. The Liability Cost Model also allocates costs for stripping topsoil and stockpiling it for rehabilitation; water diversion facilities (including regulating water in the mine); removing buildings and plant; and the installation of public facilities (for example, access road, parking areas, and pathways).¹¹ The Liability Cost Model does not contain a line item for contingencies. Rather, Mr Methner explained to the Board that the rates adopted are conservative and provide for some contingency, when compared with the rates actually incurred at the Yallourn mine.¹²

Mr Methner explained to the Board that the costs of completing the engineering studies referred to in his letter dated 8 April 2015 are not included in the rehabilitation liability estimate, as he considers these to be operational costs.¹³ Mr Methner further explained that the Yallourn mine's rehabilitation plan assumes that the operator can access existing bulk entitlements to fill the mine after closure, and that it can connect its lake to existing rivers.¹⁴ The Liability Cost Model does not allocate any costs for the purchase of water or other costs relating to accessing water.

7.2.2 HAZELWOOD MINE

GDF Suez's Annual Return for 2014–15, dated 20 August 2015, describes its current bond for the Hazelwood mine site as \$15 million, with the rehabilitation liability estimated at \$73.4 million, representing a combined cost for progressive and final rehabilitation.¹⁵

Mr James Faithful, Technical Services Manager – Mine, GDF Suez, told the Board that rehabilitation estimates will vary depending on the assumptions made, such as the timing of rehabilitation works; final batter profile; the necessary volume of overburden (including sourcing and transporting it); fire risk management; the confidence levels employed; and any unexpected costs (such as works to remediate a batter failure).¹⁶

Mr Faithful stated that the estimated rehabilitation liability contained in the Annual Return for 2014–15 reflects the current areas of the mine; progressive rehabilitation to date; future mining operations; future progressive rehabilitation works to be undertaken; rehabilitation methods to be used at end of mine life; and reasonable estimates of the rates for materials and labour. He further stated that the estimate 'constitute[s] the most up-to-date and comprehensive costings with respect to the rehabilitation of the Mine Area.'¹⁷

GDF Suez produced spreadsheets detailing the cost items that make up its estimated rehabilitation liability assessment. The cost items include bulk earthworks; end of operations liabilities; rehabilitation works (including costs for top soil, seeds and fertiliser, and decommissioning infrastructure); fire service rehabilitation; mine flooding (including costs for bore sealing, new bores, decommissioning of new bores, and operation of bores in flooding phase); and ongoing rehabilitation expenses (including costs relating to pump maintenance, maintenance and remediation of rehabilitated areas, drainage and erosion, electricity pumping costs, fire mitigation and the 'DPI stability review group').¹⁸

Mr Faithful told the Board that the costs include a contingency of between 10 and 20 per cent.¹⁹

Mr Faithful stated that the estimate is premised on the assumption that GDF Suez's current water allocations will be available for the purpose of flooding the mine.²⁰ Based on that assumption, Mr Faithful indicated that GDF Suez has not undertaken any analysis about what the potential costs might be for sourcing water in the event that the current allocations are not available for rehabilitation.²¹

Mr Faithful stated that the costs of research projects about issues relating to rehabilitation, such as those identified by GDF Suez consultant Dr Clint McCullough, Associate and Principal Environmental Scientist, Golder Associates,²² may not all be currently included in the rehabilitation liability assessment. Mr Faithful told the Board that he was 'sure that some of that work is already covered' and that as a general proposition, research must be included as a cost of its future rehabilitation liability. Mr Faithful acknowledged that there was 'some work to progress on' in ensuring that the rehabilitation liability assessment adequately included research costs.²³

Mr Faithful maintained that while 'there is still a range of work that needs to be done' with respect to understanding the likely rehabilitation costs, the rehabilitation liability estimate provided in the 2014–15 Annual Return is 'the best estimate we can give at the time.'²⁴

7.2.3 LOY YANG MINE

AGL Loy Yang submitted its Annual Return for 2014–15 to the Mining Regulator on 31 July 2015. The Annual Return states that the current bond for the Loy Yang mine is \$15 million, and that the current estimated rehabilitation liability is \$53.7 million.²⁵ The Annual Return states: '[n]ote that the \$53.7 million is a non-discounted estimated liability.'²⁶

AGL Loy Yang's estimate of \$53.7 million is derived from modelling undertaken in 2011, titled *Loy Yang Power mine rehabilitation whole of life cost report – 2011 update*.²⁷ The modelling is based on the original 1997 rehabilitation plan that envisaged the mine pit being filled with water to the RL -10m level. The modelling assumes that mine equipment and infrastructure will be removed at the end of mine life and the area made safe for public access (save for areas where the slope will be steeper than 1v:3h); and that aquifer dewatering will be ongoing but progressively reduced as the mine floods. The modelling also assumes that AGL Loy Yang's current water allocation under its bulk entitlements and groundwater licence will be available, either totally or in part, to fill the mine pit.²⁸

The model adopts the rates in the Bond Calculator, except in circumstances where AGL Loy Yang has used its own experience of rates specific to a certain task.²⁹ The model includes costings for rehabilitation works, including the treatment of both covered and uncovered batters, and overburden dumps; removing plant and equipment and the fire service network; developing the lake including the continued aquifer dewatering until adequate weight balance is reached; and ongoing maintenance and monitoring of the site.³⁰

Mr Stephen Rieniets, General Manager of AGL Loy Yang, stated that the estimated liability assessment includes a contingency to account for additional costs.³¹ Mr Rieniets noted that costs for research can come from operating costs, rather than rehabilitation costs.³²

In 2015, GHD developed a revised cost model based on the 2015 Loy Yang work plan variation.³³ A series of preliminary cost estimates were prepared to reflect the rehabilitation liability over the life of the project that will coincide with the key development stages of the work plan.³⁴ Based on the model, if the mine ceased operations at Stage B (around 2015), the rehabilitation liability is estimated to be \$112 million.³⁵ The model is only indicative, as it is based on a series of assumptions that are yet to be validated through detailed technical assessments.³⁶ Mr Rieniets told the Board that the principal change to the rehabilitation plan in the 2015 work plan variation is the difference in water levels of the pit lake, and minor changes to the mine plan. The water levels of the lake will be lower by approximately 80 metres, leaving a much larger area of exposed batters. There will be more earthworks necessary as a result of that change, to batter off and cover the exposed coal faces.³⁷

Mr Rieniets indicated that a more detailed technical review and assessment of the rehabilitation plan will be undertaken, which will be based on geological modelling and will refine the assumptions used to inform a more accurate cost estimate of rehabilitation liability over the life of the mine.³⁸

Mr Rieniets agreed with Mr Faithful's evidence that the assumptions and method of the modelling are critical to an accurate outcome. He noted that experts familiar with the mines are best placed to estimate the rehabilitation liability because 'the inputs are very important and a good working knowledge of the mine and the stage development of the mine will assist you to get a better estimate.'³⁹

7.3 REHABILITATION BOND REVIEW PROJECT

In 2015, the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) commenced the Bond Review Project.⁴⁰

The aim of the Bond Review Project is to 'independently assess the rehabilitation liabilities of the three Latrobe Valley brown coal mines to determine an accurate liability for each site.'⁴¹ The project plan describes the project as comprising three stages:

1. Undertaking a desktop review of the approved work plans, rehabilitation plans and current state of rehabilitation works for the three mines.
2. Calculating the current rehabilitation liabilities for the three mines against the relevant approved work plans.
3. Reviewing key stages of progressive rehabilitation and critical rehabilitation objectives over the approved mine life for each of the three mines, and calculating costings for achieving mine closure under the rehabilitation plan. This is to include identifying the scope and timing of works necessary to carry out the rehabilitation plan, and calculating the costs of those works.⁴²

Counsel Assisting submitted to the Board that the 2015 Bond Review Project is essentially the same project that the Board heard DEDJTR had commenced in the 2014 Hazelwood Mine Fire Inquiry during the evidence of Ms Kylie White, former Executive Director of the Mining Regulator.⁴³

As part of the Bond Review Project, DEDJTR retained AECOM Services Pty Ltd (AECOM) to assess rehabilitation liability costs for each of the Latrobe Valley mines.⁴⁴ While not part of the Bond Review Project, DEDJTR also retained NERA Economic Consulting to provide advice in relation to potential bond systems. As at the date of public hearings for this Term of Reference, NERA Economic Consulting had not provided its advice to DEDJTR.⁴⁵

In October 2015, the Mining Regulator, AECOM and the mine operators met to discuss the AECOM methodology and preliminary liability estimates. The mine operators provided some data to AECOM to inform the assessment.⁴⁶ On 13 November 2015, AECOM provided an assessment for each of the Latrobe Valley mines.⁴⁷ In December 2015, AECOM provided an updated assessment for the Loy Yang mine, based on the approval of its work plan variation in November 2015.⁴⁸

AECOM's estimates are premised on the following assumptions:

- The costs are estimated as third party costs—namely the costs that would be incurred if someone other than the mine operator had to do the rehabilitation works, without the benefit of the mine operator's infrastructure and personnel.⁴⁹
- The final pit slopes of 1v:3h (described in the mines' rehabilitation plans) will have long-term geotechnical and erosional stability.⁵⁰
- The current bulk entitlements and groundwater licence allocations can be used for final rehabilitation.⁵¹

AECOM employed a 'probabilistic costing model' methodology to determine the rehabilitation liabilities for the three mines. The costing model incorporates a 'Monte Carlo simulation'—a statistical technique used to account for uncertainty in the model. The model 'recognises variables (in this case, the cost of individual mine closure items) as probability distributions rather than single numbers.'⁵² Dr Adrian Bowden, former Senior Principal at AECOM, explained that the model is internationally recognised and is 'becoming pretty well a standard approach to carrying out cost estimation.'⁵³

AECOM estimated the rehabilitation costs, based on the mine operators' final rehabilitation plans for both early closure and end of mine life closure, using cost information and documents from DEDJTR, data from the mine operators, the Bond Calculator rates, and AECOM's expert judgement and opinion.⁵⁴ The details of the cost components adopted by AECOM are set out in Appendix B in each of the reports, against various 'domains'.⁵⁵ The domains include infrastructure areas (for example, removal and demolition of conveyors, buildings and power lines); overburden and waste dumps; mine pits (for example, backfilling of mine pits, batter reshaping, fencing and landscaping); and execution maintenance and monitoring costs.⁵⁶

Mr Geoffrey Byrne, Principal Consultant at Niboi Consulting, was subcontracted to AECOM in the development of its reports. He accepted that three of the domains costed by AECOM are not domains in the Bond Calculator, namely filling the pit with water, maintenance and monitoring, and execution management costs (for both before and after mine closure).⁵⁷ Mr Byrne stated that he 'view[ed] the calculator as a guideline and there is nothing to stop you adding extra domains, for example, and particular circumstances may well require slightly different approaches.'⁵⁸

'Risk costs' were also factored into the rehabilitation cost estimates for both early closure and end of mine life closure scenarios. The risk costs are based on 'risk events with estimates of degrees of likelihood of occurrence and consequences.' AECOM identified risk factors such as 'batter failure in an area where infrastructure is affected'; 'batter failure in an area where no infrastructure is affected'; 'coal fire'; and 'inability to secure existing water licences'.⁵⁹ According to Dr Bowden, the assessment of these risk costs was made by 'expert judgment'.⁶⁰

The AECOM reports state that the 'wide range of cost estimates for each option is indicative of the degree of uncertainty inherent in the risk model.' The variation or range in cost estimates is the result of imprecise data being available to AECOM.⁶¹

Two thousand trials were conducted using the model to maximise the accuracy of the results.⁶² The outputs of the costing model are presented by reference to three confidence levels described as:

- P50 Optimistic
- P80 Conservative but realistic
- P95 Very conservative

The reference to 'P50' means that there is a 50 per cent chance that the actual figure will be more than the cost chosen by the model and a 50 per cent chance that it will be less. At the P80 confidence level, there is an 80 per cent chance that the actual cost will be less than the cost chosen by the model.⁶³ Results from the costing models are presented in Table 11.

Table 11. AECOM liability estimates plus risk costs by confidence level

Mine	Closure timing	Cost (\$M) by confidence level		
		P50 Optimistic	P80 Conservative but realistic	P95 Very conservative
Yallourn ⁶⁴	Early closure	167	199	262
	End of mine life	195	266	344
Hazelwood ⁶⁵	Early closure	264	305	357
	End of mine life	243	286	332
Loy Yang (1997 work plan) ⁶⁶	Early closure	246	270	298
	End of mine life	168	245	323
Loy Yang (2015 work plan variation) ⁶⁷	Early closure	221	256	319
	End of mine life	230	305	392

During the public hearings relevant to this Term of Reference, the mine operators questioned the accuracy of the assessments undertaken by AECOM.

One criticism made was that the AECOM estimates were derived from a desktop study and were not sufficiently informed by the mine operators.⁶⁸ GDF Suez submitted that Mr Faithful's attempts to raise concerns about the assumptions adopted by AECOM 'fell on deaf ears'.⁶⁹ Mr Byrne accepted that information obtained from site visits could improve the quality of the final estimates.⁷⁰

In relation to the estimate for the Hazelwood mine, GDF Suez was critical of the use of the probabilistic model. GDF Suez questioned Dr Bowden in relation to the probabilistic costing method and noted that, when looking at the P80 and P95 confidence levels, the dollar amounts for each of the domain costs are skewed towards deriving high values—that is, it provides higher predicted costs to provide greater confidence that the actual costs will not be more than the predicted amount. Dr Bowden agreed.⁷¹

GDF Suez also raised concerns about the lack of transparency in the method of adding the risk costs to the liability costs, and submitted that those costs are unjustified.⁷² Mr Bryan Chadwick, Technical Director at AECOM, agreed that the likelihood of each of the risks occurring is not set out in the report, but noted that this information could be identified from the model.⁷³

GDF Suez further submitted that the costings adopt a number of unsound assumptions, including:

- The likely time to fill the Hazelwood mine is assumed to be 21–28 years (weight balance level) and 500 years (final level). GDF Suez stated that the correct position is seven years (weight balance level) and 30–90 years (final level) based on GHD modelling.⁷⁴
- The risk that water may need to be purchased at a cost of \$6–8 million. GDF Suez stated that AECOM does not explain how it determined that sourcing water is a risk, nor how it calculated the cost of the risk.⁷⁵
- The requirement to install and reinstall rip rap in the pit lake over a 500 year period at a cost of \$85–107 million. GDF Suez referred to the evidence of Mr Byrne that the assumption was not based on any particular study and was made because there was no information to suggest that it was not needed.⁷⁶ Mr Faithful noted that this is an area of works that is yet to be identified as necessary and so including the ‘worst case’ is not justified at this stage.⁷⁷
- The risk that the vegetation planted on the rehabilitation slopes will need to be replaced or revegetated. GDF Suez submitted that notwithstanding that Mr Byrne gave evidence that the costs were assumed based on ‘industry practice and our experience’, Mr Byrne was not able to tell the Board that it was based on research or data.⁷⁸

Mr Faithful told the Board that the AECOM report assumes a ‘truck and shovel’ method of covering the batters, whereas GDF Suez intend to use both ‘truck and shovel’ and the ‘dozer push’ method, the second of which is significantly cheaper.⁷⁹

GDF Suez further submitted that the management and procurement fees of 15 per cent are too high, costing \$41–48 million.⁸⁰ It referred to the GHD report titled *Review of rehabilitation bond calculator use for brown coal mines*, dated December 2008,⁸¹ which suggests that 10 per cent management fees are too high (in that case, costs amounting to \$6–7 million).⁸² Mr Byrne told the Board that engineering procurement and construction management costs were calculated as 15 per cent of the project costs, and that the percentage was determined as a reasonable estimate based on industry practice and AECOM’s experience.⁸³ AECOM also included further closure execution management costs at five per cent of the project costs.⁸⁴

GDF Suez also referred to the assumption that it will have a 100-year liability to monitor the mine site at an estimated cost of \$38–60 million. GDF Suez stated that there is no sound basis for this assumption.⁸⁵

In relation to the Yallourn mine’s estimated rehabilitation liabilities, Mr Methel disagreed with AECOM’s inclusion of costs for the purchase of water to ‘top up’ the lake for a period of 100 years. Mr Methel told the Board that modelling carried out by both EnergyAustralia, in a report titled *Yallourn Mine: Final land rehabilitation lake filling model – Revision O* (dated 26 April 2012), and the peer review of that report by GHD, titled *Yallourn Mine, Lake filling model review – Findings of the model review* (dated 30 March 2012), indicates that there will be a net positive inflow, which has been tested against climate sensitivity.⁸⁶ The *Yallourn Mine: Final land rehabilitation lake filling model – Revision O* report states that rainfall and evaporation rates in the Yallourn region are variable and difficult to model with certainty.⁸⁷ The AECOM report states that AECOM conducted its own water balance review and determined that there will be a small net annual deficit of inflows during and after the pit lake is filled.⁸⁸

Mr Methers also disagreed with the following assumptions or costs included in the AECOM report concerning the Yallourn mine:

- The use of overburden coverage at a depth of between 0.75 and 1.5 metres over an area of 112 hectares. Mr Methers noted that this requirement is not explained.⁸⁹
- The assumption that overburden and clay will need to be long-hauled to the mine from outside of the mine. Mr Methers stated that there are substantial quantities of overburden in close proximity to the batters that need to be covered, and that overburden has been placed in the mine pit since 1940.⁹⁰ He said that given the access to overburden, the costs that will be incurred will be significantly less than assessed by AECOM, and in some cases, will be nil as some of the overburden will be dozer pushed over the batters.⁹¹
- The necessity for lime dosing. Mr Methers told the Board that, in his opinion, there will not be a need to treat the water based on his understanding of the river water quality and the likely effect of oxidisation on the lake water, once substantially full.⁹²

Counsel for AGL Loy Yang was also critical of the post execution monitoring and maintenance costs included in the AECOM reports, assessed as 'a raw cost' of \$100 million.⁹³ AGL Loy Yang submitted that there was no explanation in the AECOM reports for the differences in the rates over time selected for monitoring costs (\$325,000 and \$185,000 per annum).⁹⁴ Further, in relation to the AECOM assessment based on Loy Yang's 2015 work plan variation, there was no explanation as to why AGL Loy Yang would incur the monitoring costs at the higher rate for 70 years. It submitted that:

The exact same rates were adopted for the first five years at Hazelwood and Yallourn as were adopted for 70 years at Loy Yang, despite the different monitoring and maintenance regime that would undoubtedly occur at those mines over different timeframes...⁹⁵

AGL Loy Yang further submitted that the AECOM reports contain different assumptions for the mines, which are not explained:

Why assume that rip rap will progressively be applied at one mine but assume instead very high monitoring costs and maintenance costs at the Loy Yang Mine instead of the application of rip rap? We say that this example of inconsistency between the report [sic] showed that there was an uncertainty on the part of the authors of those reports as to how to deal with this erosion issue. We say neither approach is warranted on the evidence.⁹⁶

AGL Loy Yang was also critical of the AECOM liability estimates failing to account for the long-term costs being offset with income generated from beneficial use of the mine site (such as agricultural use that is already taking place); and for the assumption that the end of mine life will be 2037 and not 2048, the latter being the date that Loy Yang currently considers will be its closure date.⁹⁷

Mr Luke Wilson, Lead Deputy Secretary of Agriculture, Energy and Resources at DEDJTR, indicated that while the Mining Regulator had received the final reports from AECOM, it might need to consult further with the mine operators about the AECOM estimates before finalising the Bond Review Project.⁹⁸

In the project plan for the Bond Review Project, the final step is described as 'finalise bond levels for each brown coal mine', which was scheduled to occur by 30 November 2015.⁹⁹ However, for reasons including that obtaining advice from AECOM took longer than expected, this has not occurred.¹⁰⁰ The process has been described to the Board as 'ongoing.'¹⁰¹ Mr Wilson told the Board that completing the project 'will certainly be on the other side of Christmas [2015]'.¹⁰²

7.4 ADEQUACY OF THE REHABILITATION LIABILITY ESTIMATES

In light of the evidence about the incomplete state of the Bond Review Project, Counsel Assisting submitted that the Board has two options:

- Report that it cannot fulfil its Terms of Reference because the completion of the Bond Review Project (the outcomes of which the Board is required to consider) has not occurred and is unlikely to occur in time for it to be (fairly) considered; or
- Address the requirements of the Terms of Reference to the extent possible, based on progress to date under the Bond Review Project.¹⁰³

Counsel Assisting submitted that the Board should prefer the second option and conclude that ‘the rehabilitation liability assessments by the mines do not sufficiently account for the cost of rehabilitation’ because of the many uncertainties concerning mine rehabilitation. Examples of these uncertainties have been discussed in Part 6 of this report. The Board heard that a range of issues could have significant impacts on rehabilitation costs, such as timeframes for monitoring elements such as stability and water quality;¹⁰⁴ the need for extra overburden for fire risk reduction¹⁰⁵ and stability purposes;¹⁰⁶ work required to create optimal batter angles;¹⁰⁷ and the need for wave erosion solutions, such as rip rap.¹⁰⁸ The lack of closure criteria makes it difficult to establish at what point rehabilitation has been ‘successful’,¹⁰⁹ which has implications for timeframes for rehabilitation, returning the bond and the commencement of post-closure monitoring and maintenance.

Resolving these issues, therefore, may impact the mines’ rehabilitation plans. Jacobs Group (Australia) Pty Ltd notes in its report on rehabilitation options that significant changes to the mines’ work plans can result in increased ‘operational and cost burdens’ to mine operators.¹¹⁰

Counsel Assisting submitted that because these uncertainties are not accounted for in the mine operators’ liability assessments, ‘they are inadequate’.¹¹¹ GDF Suez and EnergyAustralia submitted that their rehabilitation liability assessments for 2014–15 should be assessed by the Board as ‘adequate’; AGL Loy Yang submitted that the question of adequacy need not be answered by the Board for the Loy Yang mine.¹¹²

GDF Suez submitted that ‘there is no evidence before the Board which is capable of being relied upon to demonstrate that the rehabilitation liability assessments for Hazelwood mine are not adequate.’¹¹³ GDF Suez further submitted that the Board should ensure that it compares ‘apples with apples’ with respect to comparing the rehabilitation liability assessments undertaken by the mine operators and by AECOM.¹¹⁴

EnergyAustralia submitted that ‘it has properly accounted for uncertainties in its rehabilitation cost assessment.’¹¹⁵ In response to the submissions by Counsel Assisting, EnergyAustralia submitted that ‘to the extent industry is expected to reflect [the expense of research] in its rehabilitation costings, this should be made known to the industry.’¹¹⁶

AGL Loy Yang submitted that its 2014–15 rehabilitation liability assessment is ‘all but irrelevant due to the new work plan variation now approved.’¹¹⁷

7.5 BOARD’S DISCUSSION AND CONCLUSIONS

The Board is required to consider the 2014–15 rehabilitation liability assessments against the outcome of DEDJTR’s Bond Review Project. The Board heard that the project has not been completed and it is not clear when it will be. The Board accepts the submissions of Counsel Assisting that not answering Term of Reference 10(a) is undesirable. Accordingly, the Board considers that it must report on Term of Reference 10(a) to the extent possible—that is, considering the 2014–15 assessments in light of the steps that have been taken to date in the Bond Review Project.

The Board must also consider the meaning of the words used in Term of Reference 10(a). The Board must judge the adequacy of the rehabilitation liability assessments. According to the Macquarie Dictionary, ‘adequate’ means ‘equal to the requirement or occasion; fully sufficient, suitable, or fit.’¹¹⁸

The 2014–15 Annual Returns submitted by each of the Latrobe Valley mines assess their current rehabilitation liability as \$46–91 million for the Yallourn mine; \$73.4 million for the Hazelwood mine; and \$53.7 million for the Loy Yang mine.

The Board notes that these estimates are based on detailed models with costs for works including earthworks, rehabilitation costs (such as topsoil, plants and fertiliser); fire services rehabilitation; mine flooding (such as bore sealing, new bores, decommissioning of new bores, and operation of bores in flooding phases); fire mitigation; and ongoing maintenance. Each of the assessments includes a contingency amount for unexpected costs, either as a separate percentage or, in the case of EnergyAustralia, built into the contract rates. The Board accepts that the mine operators have expended significant effort in assessing estimated rehabilitation liabilities, including obtaining expert opinion from consultants, such as GHD.

The Board notes that the modelling underpinning the 2014–15 Annual Returns is mostly based on the method set out in the Bond Calculator, and that the rates applied are a mix of the Calculator's default rates and actual rates incurred by the mines.

The Board accepts the submissions of Counsel Assisting that there are several areas of potential costs that are not currently included as a specific cost in each of the estimates provided by the mine operators, such as the cost of purchasing water. The mine operators are assuming that they will be given access to the same volumes of water to which they are currently entitled for the purpose of flooding the mines to the desired level, without additional cost. The Board notes that there remains considerable uncertainty about whether the mines will be able to access the required volume of water under their current groundwater licences and bulk entitlements at no additional cost (as discussed in Part 6 of this report).

Another area raised by Counsel Assisting as insufficiently accounted for in the estimates, is the cost of research necessary to inform the mine operators about the viability of their rehabilitation plans—for example research about stability. The Board notes that research is currently viewed by some of the mine operators as an operational cost and hence is not a cost item in the estimates.

The Board notes that the mine operators' estimates are not entirely 'third party' estimates—rather, a combination of third party rates from the Bond Calculator and estimated costs that assume that the mine operators will carry out the rehabilitation works. By contrast, the considerably higher AECOM cost estimates are entirely third party estimates. As GDF Suez has submitted, the Board needs to ensure that it compares 'apples with apples'.

Schedule 19 of the Mineral Industries Regulations requires that an Annual Return contains details of land disturbance and rehabilitation including 'an estimate of the current rehabilitation liability for the licence area.'¹¹⁹ It does not specify whether the estimates are to be third party costs or the costs that the mine operators will incur. The Board considers that estimates of the current rehabilitation liability should be based on third party costings, and that the default rates contained in the Bond Calculator should be used except in circumstances where the mine operator has provided written evidence to the Mining Regulator that another rate should be applied. In this regard, the Board considers that the mine operators should follow the procedure outlined in the Bond Policy.

The Board heard from AECOM about its assessments of the current rehabilitation liabilities of the mines for end of mine life and for early closure. The Board accepts that AECOM used an appropriate methodology (the Monte Carlo simulation method) for estimating liability, given that the estimates are based on unknown contract rates and prices that make it difficult to determine costs with pinpoint accuracy, particularly with respect to costs that will be incurred in the future. The Board considers that the probabilistic methodology is an appropriate way of assessing rehabilitation liabilities, as it more realistically reflects the potential risks associated with rehabilitation than is possible through the deterministic methodology (as used by the Bond Calculator).

As described in Part 6 of this report, the Board notes there are significant areas of the rehabilitation plans for each of the mines that are currently untested. On that basis, the estimates for rehabilitation costs are necessarily difficult to determine. The Board also notes that AECOM had limited opportunities to obtain information about the mines directly from the mine operators.

The Board has considered the submissions made by the mine operators disputing several areas of costs that AECOM has included.

7.5.1 HAZELWOOD MINE

GDF Suez disputes the need for rip rap. AECOM estimates this cost as \$85–107 million, for the initial and reinstallation costs over 500 years. The Board notes the discussion about rip rap and the modelled fill time for the Hazelwood mine in Part 6 of this report, where it is estimated that it will take between seven and over 200 years to reach weight balance level, depending on the fill scenario.¹²⁰ GDF Suez submitted that the time taken to reach the final lake level (at which time it could be assumed that rip rap would no longer need to be reinstalled), would be between 30 and 90 years. The Board notes that this is an optimistic scenario provided by the water modelling, and relies on the mine's groundwater licence allocation. As discussed in Part 6 of this report, it is not yet clear whether the mines can use their groundwater licences. Therefore, it is not possible for the Board to assess which fill scenario is the most likely.

As detailed in Part 6 of this report, the Board accepts the experts' evidence that the necessity for rip rap is uncertain. Further research is needed before there is any certainty about whether rip rap is required, whether it must be reinstalled periodically, and for how long. Given that uncertainty, the Board considers that it is appropriate that rip rap is included as a risk cost, rather than a line item, in the Hazelwood mine costing.

The Board further accepts that, based on the uncertainty regarding fill times, it is unclear what the period of necessary monitoring of the mine by the mine operator will be. It is possible that the monitoring and management costs post mine life will be less than \$60.65 million, as estimated by AECOM. However, it is also possible that some level of maintenance and monitoring will be required in the long-term, and potentially in perpetuity. It is currently unknown who will be responsible for that work.

7.5.2 YALLOURN MINE

EnergyAustralia disputes the estimated cost for 'top up water supply' for the Yallourn mine, on the basis that the nearby rivers will be connected to the pit lake. AECOM estimated the cost of water as in excess of \$77 million. The Board notes that whether the pit lake can be connected to the nearby rivers is yet to be determined, and will be the subject of further research and dependent on approvals by the State. The Board further notes that AECOM conducted its own water balance modelling, but does not identify how it did so or what information it relied on. The Board acknowledges the difficulty in accurately forecasting rainfall and evaporation rates in the Yallourn region, which leads to uncertainty about the veracity of the filling models. Therefore the Board concludes that the research does not yet support that a line item of \$77 million for water should be built into the estimate. However, the significant uncertainty regarding water availability means that it should be included as a risk cost at this stage.

EnergyAustralia also disputes the estimated costs for rip rap. Based on the Board's observations about the uncertainty around the use of rip rap, the Board considers that it is appropriate that it is included as a risk cost, rather than a line item, in the costing for the rehabilitation of the Yallourn mine at this time.

7.5.3 LOY YANG MINE

AGL Loy Yang disputes, among other matters, the cost estimate of \$100 million for monitoring and maintenance after rehabilitation is complete contained in AECOM's updated assessment for the Loy Yang mine (based on the 2015 work plan variation). However, the Board is not required to consider the adequacy of the any rehabilitation liability assessment for the Loy Yang mine based on its 2015 work plan variation—it is required only to consider whether the 2014–15 rehabilitation liability estimate is adequate (which is based on the 1997 work plan).

The Board notes that the criticism made by AGL Loy Yang about monitoring and maintenance costs could equally apply to the initial AECOM cost assessment (which is based on the 1997 work plan). There is no explanation of why AECOM ascribes higher monitoring rates for the first 22 years following closure, compared with the significantly shorter period of five years for monitoring costs for the Hazelwood and Yallourn mines.

7.5.4 SUMMARY

Based on the findings above, the Board is of the view that the rehabilitation liability estimates undertaken by the Latrobe Valley mine operators and recorded in their 2014–15 Annual Returns, are likely to be based on some unsound assumptions. The Board cannot compare the adequacy of the mine operators' estimates against the work of the Bond Review Project, as it is incomplete. The AECOM reports assessing the rehabilitation liability estimates contain significant costs that, in the Board's opinion, should not be included as line items based on current uncertainties. Further, the Board is concerned that it is not sufficiently clear how AECOM arrived at the costs it attributes to the various risks identified in its reports.

On closer inspection of the AECOM reports, the Board notes that there are several inconsistencies between the explanations provided in the body of the reports when compared to the detail in the appendices. For example, with respect to the Loy Yang mine, the post execution maintenance and monitoring is described as 'covering a 45 year period after completion of closure execution for the 1997 work plan scenario', whereas the costs described in Appendix B are calculated for 24 years.

The rehabilitation estimates must be contrasted with the rehabilitation bonds. They are two different amounts. As will be discussed in Part 8 of this report, the bond represents an amount that the State considers is appropriate having regard to the estimated rehabilitation costs and the risk of that cost being borne by the State (and not the mine operator). Accordingly, the Board cannot assess the rehabilitation liability estimates provided by the mine operators in the 2014–15 Annual Returns by reference to the bond amounts set by the State. However, the Board observes that the rehabilitation liability estimates in the 2014–15 Annual Returns are all significantly higher than the bond levels.

Significant further research and planning is required to accurately determine the likely rehabilitation costs for these mines. Consequently, it is not possible for the Board to determine whether the rehabilitation estimates provided by the mine operators are adequate, in the sense of being sufficient or appropriate for the current situation. Therefore, the Board cannot come to an unqualified conclusion that the estimates are inadequate. The Board does not accept the submissions of Counsel Assisting on this point.

The mine operators, the Mining Regulator and other relevant bodies, must undertake a significant amount of further work and discussion about the foundation for rehabilitation liability assessments in the short-term. The Board makes a number of recommendations to assist this process in Parts 8, 9 and 10 of this report.



Loy Yang mine
(source: Department of Economic Development, Jobs, Transport and Resources)



PART EIGHT
EFFECTIVENESS OF
THE REHABILITATION
BOND SYSTEM

PART 8 EFFECTIVENESS OF THE REHABILITATION BOND SYSTEM

8.1 OVERVIEW

Term of Reference 10(b) requires the Board to inquire into, report on and make any recommendations it considers appropriate:

Having regard to the rehabilitation liability assessments that have been or will be reported in 2015 by the operators of each of the Hazelwood mine, the Yallourn mine, and the Loy Yang mine, as required by the *Mineral Resources (Sustainable Development) Act 1990* (Vic), and to the outcome of the Rehabilitation Bond Review Project:

- b. whether the current rehabilitation bond system, being one of the measures to provide for progressive rehabilitation by end of mine life as required under the *Mineral Resources (Sustainable Development) Act 1990* (Vic), is, or is likely to be, effective for the Hazelwood mine, the Yallourn mine, and the Loy Yang mine.

The Board heard evidence and received submissions from each of the Latrobe Valley mine operators and representatives of the State about the current application of the rehabilitation bond system pursuant to the *Mineral Resources (Sustainable Development) Act 1990* (Vic) (Mineral Resources Act) and the Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic) (Mineral Industries Regulations); the progress of the Rehabilitation Bond Review Project (Bond Review Project) (discussed in Part 7 of this report); and reviews of the rehabilitation bond system undertaken to date.

The Board retained experts from Accent Environmental to provide opinions on whether there are alternative financial assurance mechanisms that could be employed to ensure that the Latrobe Valley mines are rehabilitated pursuant to the Mineral Resources Act. Accent Environmental provided a report to the Board titled *Hazelwood Mine Fire Inquiry: High-level assessment of alternative rehabilitation financial mechanisms* (Accent Environmental report). AGL Loy Yang retained Dr Robert Gillespie, Principal of Gillespie Economics, to provide his opinions on alternative financial assurance mechanisms.

This Part considers whether the current system of setting bonds is effective in providing security to the State should a mine operator default on its rehabilitation liability, and as an incentive for mine operators to progressively rehabilitate mine sites, having regard to the outcome of the Bond Review Project and the 2014–15 rehabilitation liability assessments submitted by the mine operators in their Annual Activity and Expenditure Returns (Annual Returns). As discussed in Part 7 of this report, the Board must undertake its assessment without the benefit of knowing the outcome of the State's Bond Review Project, as that project has not been completed. When considering Term of Reference 10(b), the Board must also take into account the fact that the Loy Yang 2014–15 rehabilitation liability assessment does not reflect the recently approved 2015 Loy Yang work plan variation.

Term of Reference 10(c) is considered in Part 9 of this report.

8.2 THE CURRENT REHABILITATION BOND SYSTEM

As discussed in Part 3 of this report, the Mineral Resources Act requires that the mine operators must enter into a rehabilitation bond for an amount set by the Minister for Energy and Resources.

Under s. 80(4) of the Mineral Resources Act, the Minister may increase a bond if the Minister is of the opinion that it is 'insufficient'. The Act does not contain criteria to guide the Minister in reaching such an opinion.

In 2010, the Mining Regulator revised the existing guidelines for the review of rehabilitation bonds, and developed its current bond policy, titled *Establishment and management of rehabilitation bonds for the mining and extractive industries* (Bond Policy).¹ According to the Bond Policy, the Mining Regulator is responsible for setting and reviewing bond levels on behalf of the Minister. Bonds are set having regard to the likely costs associated with completion of an approved rehabilitation plan submitted by a licensee.²

8.2.1 INITIAL BOND ASSESSMENT

The Bond Policy provides that, in setting a rehabilitation bond, the Mining Regulator will undertake an initial bond assessment, which is based on the maximum amount of land that can be disturbed by mining for a particular time period or stage of the work plan.³

The Mining Regulator calculates the likely cost of rehabilitation works required to implement the rehabilitation plan and achieve the planned final landform.⁴ As mentioned in Part 7, this calculation takes into account the potential that, if the mine operator is unable to meet its rehabilitation obligations, the State will incur higher costs to complete the work than the operator would have incurred. This is termed ‘third party costing’.⁵ As explained in the Bond Policy:

In establishing the rehabilitation liability it must be assumed that the operator is unable to complete the reclamation works and therefore rehabilitation must be managed by the [Mining Regulator] using a third party. In the majority of cases, the level of the rehabilitation bond will be significantly higher than the cost for the operator to undertake the work.

Where an operator has defaulted, the [Mining Regulator] would not have access to the operator's equipment or personnel on-site. The [Mining Regulator] would not be in a position to complete the works at the operator's costs, and instead be subject to current local market costs.⁶

The calculation does not include any pre-existing land disturbance that predates the current licence, unless it is specifically contained within the work plan or licence conditions.⁷

For mining licences on private land (as is the case for the Yallourn, Hazelwood and Loy Yang mines), the final bond amount is determined after consultation with the local council and the mine operator.⁸

8.2.2 REHABILITATION BOND CALCULATOR

The Rehabilitation Bond Calculator (Bond Calculator) is the State's recommended method for assessing the rehabilitation liability for mining operations, including open cut coal mining.⁹ The Bond Calculator contains several domains that the mine operator completes, and contains default rates that apply automatically unless another rate is nominated.¹⁰

The default rates are based on ‘typical current market “third party” contract rates as of July 2010 and will be periodically reviewed to take into account aspects such as inflation.’¹¹ The Mining Regulator must approve a variation to the default rate. A variation should be based on current market third party contract rates and assume that all staff and equipment must be brought onto the site.¹² The Bond Policy provides:

Where an operator proposes rates that are significantly lower than default rates, or make a significant difference to the overall site rehabilitation liability assessment, the [Mining Regulator] will require the submission of written costings from independent contractors in support of the assessment.¹³

The Bond Calculator sets project management costs at 10 per cent of the total rehabilitation liability. This amount covers ‘administration and legal process of calling in a bond’; ‘project management’ of rehabilitation (for example, preparing plans, surveys and contracts); and ‘management and maintenance of the mine site by the [Mining Regulator] prior to the awarding of rehabilitation contracts.’¹⁴

The Bond Calculator also sets 10 per cent as the minimum rate for contingency costs. This amount covers costs such as rehabilitation tasks not budgeted for, and failures in rehabilitation works.¹⁵ For larger sites, the Bond Calculator sets an additional monitoring cost of five per cent of the total rehabilitation liability to cover environmental monitoring during rehabilitation works.¹⁶

8.2.3 FORM OF REHABILITATION BOND

According to the Bond Policy, the State only accepts rehabilitation bonds in the form of an unconditional bank guarantee. Other forms of financial security, such as insurance bonds or cash bonds, are not currently accepted.¹⁷ Mr Luke Wilson, Lead Deputy Secretary of Agriculture, Energy and Resources at the Department of Economic Development, Jobs, Transport and Resources (DEDJTR), noted that '[o]n 2 December 2015, the Minister for Energy and Resources announced a new cash rehabilitation bond scheme as an option for eligible mining and extractive operations'—namely, small scale mine and quarry operators with a rehabilitation liability of up to \$20,000.¹⁸ This does not apply to the Latrobe Valley coal mines due to the size of their liability.

8.2.4 BOND REVIEW

According to the Bond Policy, the Mining Regulator periodically reviews a bond during the operational life of a mine to ensure that it remains 'at appropriate levels' throughout.¹⁹ The Bond Policy notes that 'regular assessment of the rehabilitation bond against rehabilitation liability provides incentives for the operator to minimise environmental impacts and undertake progressive rehabilitation.'²⁰

The frequency of bond reviews is based on the Mining Regulator's risk assessment of the likelihood of the rehabilitation liability falling to the State. Appendix 2 to the Bond Policy is titled *Assessment matrix for bond review periods*.²¹ Under the assessment matrix, periodic reviews for the Yallourn, Hazelwood and Loy Yang mines are scheduled to occur every 10 years based on an assessment that while the consequences of a default are high, the likelihood of it arising is 'negligible'.²² The Bond Policy also provides that a 'bond will also be reviewed when a work plan variation is submitted', a licence is transferred, or at the request of the licensee.²³

The Mining Regulator may also initiate a bond review based on the estimates of rehabilitation liability in an Annual Return, or where the Minister considers that the current rehabilitation bond is insufficient.²⁴

8.3 APPLICATION OF THE BOND SYSTEM TO THE LATROBE VALLEY MINES

At the time the Latrobe Valley mines were privatised, each of the mines' rehabilitation bonds was set at \$15 million.²⁵ These were 'interim figures' pending further consideration by the Mining Regulator.²⁶

8.3.1 YALLOURN MINE REHABILITATION BOND

The amount of the initial bond for the Yallourn mine was derived from a combination of the forecast end of mine life liability (assessed by the mine operator), and a portion of the expected increment in annual expenditure on progressive rehabilitation (also assessed by the mine operator).²⁷ Mr Wilson explained to the Board that:

Yallourn provided information to [the Mining Regulator] prior to the setting of the \$15M bond. The [Mining Regulator's] calculation was based upon the forecast expenditure at end of mine life (\$7M), as assessed by Yallourn, and a portion of the forecast annual increment expenditure on progressive rehabilitation works (\$9.5M), as assessed by Yallourn, to mitigate the financial risk in case of the mine closing sooner than expected...

With allowance for inflation, the figure of \$15M was determined for the bond.²⁸

Yallourn mine's 2002 work plan variation was the trigger for a bond review initiated by the Mining Regulator.²⁹ The mine operator retained mining consultant GHD to prepare a report, titled *Yallourn Energy Pty Ltd mining licence bond review "close now" liability at 30 Sep 2002 report*.³⁰ 'Close now' liability refers to the cost of rehabilitation if the mine was to close in September 2002. The GHD report notes that the model used to calculate the rehabilitation liability was based on the rehabilitation requirements under the 1999 Yallourn mine rehabilitation master plan, modified to include changes from the 2002 Yallourn work plan variation.³¹ The GHD report states:

Where possible, rates for works were based on actual experience in the Yallourn mine and these can be compared with the [Mining Regulator's] rates published in their 1997 document: "Guidelines for the Establishment of Rehabilitation Bonds for Mining and Extractive Industry". At the closure of the mine, coal handling equipment, pipelines and dredgers will need to be dismantled, rehabilitation finished and the mine made safe for ultimate public access. Dewatering will be progressively slowed and channels, weirs and other work carried out to allow the mine to be flooded. These activities have been itemised and costed.³²

GHD estimated the cost for rehabilitation under the 'close now' scenario at \$13,356,872. This estimate excluded the costs associated with installing public facilities (for example, car parks and walking tracks).³³

A later version of the GHD report, dated November 2002 and titled *Yallourn Energy mining licence rehabilitation bond "close now" rehabilitation costing*, estimated 'base costs' for rehabilitation under the 'close now' scenario as \$12.8 million.³⁴ This estimate excluded costs for rehabilitating a number of areas, including the Morwell River Diversion, public facilities (as listed above), and work relating to the East Field.³⁵ However the additional estimated costs for rehabilitation of these areas are provided in the report. The inclusion of these cost areas would have increased total liability to \$15.8 million.³⁶ This report was provided to the Mining Regulator in or around November 2002.³⁷

In 2003, staff from the Mining Regulator and the Yallourn mine participated in several consultations regarding the bond review. Some of the matters discussed during the consultations included a request from the mine operator for a revision of the fill time of the proposed lake 'due to bulk water entitlement', and a request from the Mining Regulator for further costing information relating to interconnecting the proposed pit lake with the local river system.³⁸ As a result of the consultations and the production of the 2002 GHD report, the Mining Regulator recommended that the Minister revise the bond to \$10,505,500.³⁹

In July 2004, the Mining Regulator reduced Yallourn mine's bond from \$15 million to \$11.46 million.⁴⁰ In its letter to the mine operator, the Mining Regulator explains that this assessment includes a contingency of 20 per cent rather than 10 per cent 'to cover uncertainties relating to the final rehabilitation of the site'. It was noted that there was a 'need for further research, in particular in hydrology, to address this uncertainty'.⁴¹ The Mining Regulator further explains that the 20 per cent contingency reflects the potential need for additional earthworks and revegetation in the event that the final lake level of RL +38m (as is planned in the Yallourn mine rehabilitation plan) is not achieved. The Mining Regulator's notice to the mine operator does not indicate the base estimate of rehabilitation costs that was used to calculate the bond level (with a 20 per cent contingency) of \$11.46 million.⁴²

In the same letter to the Yallourn mine operator, the Mining Regulator states that '[t]he Department will be happy to initiate another rehabilitation bond review and to reduce the contingency allowance once the research has been undertaken and the uncertainties related to final rehabilitation are resolved'.⁴³

Mr Wilson advised the Board that in 2010, the Mining Regulator reviewed Yallourn mine's rehabilitation bond using the Bond Calculator and decided not to change the bond amount.⁴⁴ Mr Wilson gave evidence that '[t]his is because in 2010 the Government commenced a review of rehabilitation bond policy'.⁴⁵ In its closing submissions to the Board, Environment Victoria submitted that Mr Wilson's explanation for the Mining Regulator not changing bonds (including the bond for Yallourn mine) is 'plainly untenable'.⁴⁶ It submitted that nothing in the evidence suggests that the 'bond system was incapable of being enforced or was untenable as a matter of principle' at the time of the reviews.⁴⁷

EnergyAustralia's 2013–14 Annual Return records that the total amount expended on rehabilitation for that period was \$204,000; however, it does not record its estimated 'close now' rehabilitation liability.⁴⁸ In a revised 2013–14 Annual Return dated 8 April 2015, EnergyAustralia records that its estimate of the rehabilitation liability is between \$46–91 million, and the total amount expended on rehabilitation for that period increased to \$1,093,000.⁴⁹ In its 2014–15 Annual Return, EnergyAustralia's estimated rehabilitation liability remains at \$46–91 million, with the total amount expended on rehabilitation for that period recorded as \$1,185,906.⁵⁰

8.3.2 HAZELWOOD MINE REHABILITATION BOND

In 1995, the Mining Regulator proposed that the bond for the Hazelwood mine would be set at \$15 million on the basis that:

It was stated at [a recent meeting] that the [Mining Regulator] would consider establishment of a bond to cover only the cost of the "end of life" rehabilitation works at the mine on the proviso that the rehabilitation programme was documented and continued at the maximum possible rate.

...

As these matters are not yet resolved we propose to set the rehabilitation bond for the [Hazelwood] mine at \$15million. This should be regarded as an interim figure until such time as we have assessed whatever additional information you are able to provide on these matters.⁵¹

In a letter to the Mining Regulator dated 10 October 1995, the Hazelwood mine operator indicates that 'life of mine' rehabilitation costs are \$11.7 million.⁵²

In a briefing note dated 4 December 1995, the Mining Regulator describes the basis for assessing the Hazelwood mine rehabilitation bond. Among other things, the note states:

The total current liability for rehabilitation is thought to be in the vicinity of \$20million. However, the company has a well managed progressive rehabilitation programme with annual expenditure of approximately \$1million. [Its] aim is to have all of the progressive rehabilitation work completed by the time the mine closes.

...

Bonds are usually based on an estimate of the worst case liability during the mine life. To set a bond for this site based only on the end of life costs would be a departure from this practice. However, the importance of the mine as a part of the State's power supply infrastructure means it is very unlikely to close before the scheduled end of life. It can therefore be argued that provided progressive rehabilitation is kept up, the potential liability to the State is only the cost at closure.⁵³

Therefore, the Mining Regulator recommended that the bond of \$15 million be maintained.⁵⁴

Mr Wilson advised the Board that the Mining Regulator undertook reviews of the Hazelwood mine's rehabilitation bond in 2009 and 2011 using the Bond Calculator, and decided not to change the bond.⁵⁵ As with the Yallourn mine, Mr Wilson advised that this was due to the review of rehabilitation bond policy which commenced in 2010.⁵⁶

GDF Suez's 2012–13 Annual Return dated 26 July 2013, does not describe the current estimated rehabilitation liability. The total amount expended on rehabilitation for that period is listed as \$206,499.⁵⁷ GDF Suez's 2013–14 Annual Return dated 4 September 2014, only provides an estimated rehabilitation liability limited to expenditure for the period 2014–15, in the amount of \$850,000.⁵⁸ The amount expended on rehabilitation in 2013–14 is listed as \$123,753.⁵⁹ In response to a letter from the Mining Regulator, GDF Suez provided a letter dated 9 April 2015 as an addendum to its 2013–14 Annual Return. That letter records the estimated rehabilitation liability (for progressive and final rehabilitation) as \$73.8 million.⁶⁰ GDF Suez's 2014–15 Annual Return records its current rehabilitation liability estimate as \$73.4 million. The total amount expended on rehabilitation for that period is recorded as \$570,516.⁶¹

8.3.3 LOY YANG MINE REHABILITATION BOND

In 1996, the Mining Regulator set an interim bond figure of \$15 million for the Loy Yang mine, 'based upon the calculation for Yallourn' and subject to the receipt and assessment of 'whatever additional information Loy Yang was able to provide.'⁶²

In 2008, the Mining Regulator engaged GHD to undertake a review of Loy Yang mine's rehabilitation liability and to comment on the suitability of the Bond Calculator for use for large brown coal mines.⁶³ GHD produced a report titled *Review of Rehabilitation Bond Calculator use for brown coal mines*, dated December 2008.⁶⁴ GHD calculated rehabilitation liability estimates for three time periods—as at May 1997 (at privatisation); as at November 2008 (the time of the review); and as at 2018.⁶⁵ GHD incorporated a third party management and contingency fee of 26 per cent to its calculations.⁶⁶ GHD's estimates are presented in Table 12 as both a base figure, and a total including the 26 per cent allowance for management and contingencies.⁶⁷

Table 12. 2008 GHD liability estimates—base and total figures (including management and contingencies)⁶⁸

Modelled review date	Base figures (\$M)	Total (\$M)
May 1997	24.4	30.5
November 2008	27.6	34.5
2018	28.4	35.5

GHD concluded that although the Bond Calculator was a sound way of estimating rehabilitation liability, it overestimates the allowance required for project management.⁶⁹ GHD noted that dismantling infrastructure constitutes a significant portion of rehabilitation costs, and queries whether this is appropriate in a context where mine closure is not anticipated for 30 years.⁷⁰ GHD also questioned whether the method in the Bond Calculator is appropriate for large brown coal mines on the basis that:

- The mines are critical to Victoria's electricity supply and are not likely to close. It is likely that the current operators would be replaced if they did decide to walk away.
- The cost incurred in maintaining such bonds is a substantial impost on mine operators, and over a long period of time, is likely to result in the mines incurring twice the actual cost of rehabilitation (being the cost of maintaining the bond as well as the actual cost of rehabilitation).
- A changed bond may discourage transparent discussions on appropriate rehabilitation measures, particularly if the outcome of those discussions has the potential to lead to a review, and likely increase, of the bond amount.⁷¹

GHD states that the bond should 'provide credit opportunities for completed rehabilitation.'⁷²

Despite GHD's assessments of Loy Yang's liability being greater than the bond set by the Mining Regulator, the Mining Regulator did not change the amount of the Loy Yang mine's bond.⁷³ Nor, on the evidence before the Board, did the Mining Regulator consider making changes to the Bond Calculator in light of GHD's comments that the calculator overestimates project management costs.

In its 2013–14 Annual Return dated 15 August 2014, AGL Loy Yang does not include an amount for its expenditure on rehabilitation, nor an amount for its current estimated rehabilitation liability for the site, noting that AGL Loy Yang was revising its work plan (including the rehabilitation plan) with the Mining Regulator.⁷⁴ However, a revised 2013–14 Annual Return dated 26 March 2015, describes the rehabilitation liability estimate as \$53.7 million, the same figure recorded in its 2014–15 Annual Return. The total amounts expended on rehabilitation for each period are recorded as \$1,478,935 and \$1,361,997 respectively.⁷⁵

Since submitting its 2014–15 Annual Return, AGL Loy Yang has reviewed its estimated rehabilitation liability to reflect changes in its approved 2015 work plan variation. The revised indicative liability assessment is \$112 million.⁷⁶

8.3.4 THE BOND POLICY

Counsel Assisting and Environment Victoria submitted that the Bond Policy contains simple and sensible provisions.⁷⁷ Environment Victoria considered the Bond Policy to be an effective mechanism to prevent the State from being exposed to the risk of having to pay the cost of rehabilitation.⁷⁸

Counsel Assisting submitted to the Board that it is 'entirely unclear' why the Mining Regulator has not applied the Bond Policy to review and adjust the Latrobe Valley mines' bonds.⁷⁹ Similarly, Environment Victoria submitted that the Mining Regulator has 'neither enforced the [Bond] Policy nor, in the period before the policy was expressed in the 2010 document, managed or enforced rehabilitation bonds in the manner described in the policy.'⁸⁰

Counsel Assisting submitted that one possible explanation for the Mining Regulator's failure to apply the Bond Policy may be a concern that mine operators may refuse to provide an increased bond.⁸¹ The project plan for the Bond Review Project contains a risk management review which was approved by Mr Ross McGowan, Executive Director of the Mining Regulator.⁸² In the risk management review, the likelihood of the Latrobe Valley mine operators refusing to enter into an increased bond is rated '50/50', as is the likelihood of the mine operators 'becoming insolvent, leaving the significant costs to be borne by the State' for rehabilitation.⁸³ Mr McGowan agreed with the proposition put by counsel for the State that the risks outlined in the document concern 'risks associated with this project and not matters generally.'⁸⁴

Counsel Assisting submitted to the Board that when the Executive Director of the Mining Regulator signed off on the project plan (on 3 July 2015), Mr McGowan would have likely been aware that the Inquiry's Terms of Reference (dated 26 May 2015) referred expressly to the Bond Review Project. Counsel Assisting submitted that therefore, 'Mr McGowan could have been in no doubt about the importance of the project plan and its likely scrutiny by this Inquiry.'⁸⁵

The risk ratings in the project plan are in contrast to the assessment matrix for bond review periods provided in the Bond Policy. The matrix states that the risk of the rehabilitation liability falling to the State is 'negligible' for major coal-fired power generators.⁸⁶

EnergyAustralia submitted that the Board should attach greater weight to the risk assessment in the Bond Policy than to the risk assessment in the 2015 Bond Review Project plan. It submitted that what it described as 'Mr McGowan's comment' was 'made on a superficial basis' without reference to EnergyAustralia's financial position.⁸⁷ AGL Loy Yang made similar submissions.⁸⁸

8.3.5 SECTION 79A OF THE MINERAL RESOURCES ACT

Section 79A of the Mineral Resources Act enables the Minister to require a licensee to undertake an assessment of the rehabilitation liability for the purposes of determining or reviewing the amount of a bond to be entered into.⁸⁹ Such assessments must be undertaken 'in the manner and form determined by the Minister' and take into account the works required to rehabilitate the land in accordance with s. 78 of the Mineral Resources Act.⁹⁰ In addition, pursuant to s. 79A(3), the Minister may require the licensee to engage an auditor to certify that a rehabilitation liability assessment has been prepared in the manner and form that is required and that 'it is accurate'.⁹¹ For more information on s. 79A see Part 3.2.7 of this report.

Counsel Assisting submitted that the s. 79A process has a number of positive features. It requires the mines, which are best placed to estimate their liability, to bear the cost of the estimate while enabling the Minister for Energy and Resources to require an independent audit of the estimate.⁹² GDF Suez and Environment Victoria raised similar points in their submissions.⁹³ Under s. 79A, audits are conducted by an environmental auditor accredited by the Environment Protection Authority (EPA), who prepares reports on the 'condition of the environment and any risks posed through detecting actual or potential environmental impacts.'⁹⁴

The Board heard evidence that the Mining Regulator has not used its powers under s. 79A to require the mine operators to estimate their rehabilitation liabilities in a 'manner and form' determined by the Minister.⁹⁵ Nor have they been required to have any such estimates independently audited under s. 79A(3).⁹⁶ Mr Duncan Pendrigh, Director of the Hazelwood Mine Inquiry Coordination Directorate at DEDJTR, explained that the s. 79A powers were introduced at about the same time as the Bond Calculator was updated. According to Mr Pendrigh, the Bond Calculator served the same function as the s. 79A powers.⁹⁷

Mr Pendrigh also told the Board that the s. 79A powers have not been exercised in relation to the Latrobe Valley coal mines because the Mining Regulator has been unsure of the 'manner and form' in which it wants the estimates to be made. Mr Pendrigh indicated that AECOM had been engaged to provide that knowledge to DEDJTR.⁹⁸

Counsel Assisting submitted that the Mining Regulator must enable the Minister to use the powers conferred by s. 79A of the Mineral Resources Act. Counsel Assisting submitted that in order for this to be done, the Mining Regulator must access expert advice to determine the manner and form in which the rehabilitation liability estimate must be made, and advise the Minister of the appropriate requirements.⁹⁹ For example, the Mining Regulator should retain one or more experts in mine closure and rehabilitation cost assessments.¹⁰⁰ Counsel Assisting further submitted that independent advice and guidance is also of paramount importance, and that the Technical Review Board, and in particular, Ms Corinne Unger, the Technical Review Board member with rehabilitation expertise, should be consulted about strategic rehabilitation and closure advice.¹⁰¹

GDF Suez submitted that the State should ensure that bonds are more regularly reviewed, and that 'there is a case for a process drawing on the powers also set out in s. 79A' of the Mineral Resources Act to assess the rehabilitation liabilities of the mines and for the mine operators' estimates to be audited.¹⁰² AGL Loy Yang also supported the use of s. 79A as suggested by Counsel Assisting.¹⁰³

8.3.6 REHABILITATION BOND REVIEW PROJECT

As discussed in Part 7 of this report, the Bond Review Project began in 2015 but has not been completed. While the Mining Regulator has received final reports from AECOM assessing the estimated rehabilitation liabilities for each of the mines, Mr Wilson told the Board that there might be further consultation with the mines before the Bond Review Project is finalised.¹⁰⁴

Mr Wilson also told the Board that DEDJTR retained NERA Economic Consulting in November 2015 to provide 'a policy analysis of options for strategic management of the Latrobe Valley coal resource, and related land use planning.'¹⁰⁵ Mr Wilson stated:

This analysis is examining the range of approaches, governance options and policy, legislative or other instruments that could be applied by Government, industry or both to integrate and coordinate the strategic management of coal resources and related land use planning in the Latrobe Valley...¹⁰⁶

The NERA Economic Consulting analysis was expected on 16 December 2015 but has been delayed.¹⁰⁷

8.4 EFFECTIVENESS OF THE REHABILITATION BOND SYSTEM

In its report for the Board, Accent Environmental advises that the current rehabilitation bonds for the Latrobe Valley coal mines present a 'risk to the State' because they are 'substantially lower' than the rehabilitation liabilities for the three mine sites.¹⁰⁸ It adds that 'the greater the gap between the rehabilitation bond and the rehabilitation liability, the greater the risk taken on by the State.'¹⁰⁹

Accent Environmental notes that this risk is one aspect of a broad range of considerations, including:

- geotechnical, hydrogeological and fire prevention risks at the three mines which result in a degree of technical uncertainty regarding appropriate methods of rehabilitation
- market uncertainty due to falling electricity demand (which has led to over supply), increasing competition from the renewables sector and the potential for future carbon pricing. Such uncertainty could result in the early closure of one or more sites.¹¹⁰

Accent Environmental also advises the Board that:

[w]hile the 2015 self-reported estimates of rehabilitation liability by the mines do factor in, to some extent, the emergence of the geotechnical, hydrogeological and fire prevention risk factors, there is still uncertainty regarding the best way of managing closure to minimize these issues. It is likely that further increases in estimated rehabilitation liability will occur as these risk factors are further investigated and resolved.¹¹¹

Environment Victoria submitted that the evidence before the Board clearly demonstrates that the purpose of a rehabilitation bond for a mine is to ensure that the State has sufficient money to rehabilitate the mine in circumstances where the mine operator 'walks away'.¹¹² The submission refers to the Bond Policy. As noted, the Bond Policy unambiguously provides that 'the amount of bond is calculated to address in full the rehabilitation liability'.¹¹³ According to Environment Victoria, a policy that requires a bond or financial assurance of 100 per cent of the assessed rehabilitation liability 'unarguably meets that objective'.¹¹⁴

Ms Unger stated that '[i]t is important that the value of a bond accurately reflects the true costs of rehabilitation'.¹¹⁵ She also told the Board that the best way to verify a rehabilitation bond is 'with an independent external audit'.¹¹⁶

Counsel Assisting submitted that the failure of the Mining Regulator to implement the Bond Policy is 'perplexing'.¹¹⁷ They submitted that 'it is difficult to understand why the rehabilitation liability assessments submitted by the mines have not triggered bond reviews'.¹¹⁸

In their opening statement to the Inquiry, Counsel Assisting informed the Board that the evidence called would demonstrate that 'on any view of the likely cost of rehabilitating the Latrobe Valley coal mines...the current bonds are inadequate'.¹¹⁹ In their final submissions to the Board, Counsel Assisting returned to this topic, noting that the gap between the current estimates and the bonds 'should have been ringing alarm bells' for the Mining Regulator.¹²⁰ Environment Victoria submitted that the bonds for each mine 'should be increased to 100% of the estimated rehabilitation costs as soon as practicable after' s. 79A assessments are completed.¹²¹

Environment Victoria further submitted that the fact that the State has the ability to recover any shortfall between the bond amount and the costs of rehabilitation under s. 83 of the Mineral Resources Act, does not necessarily provide real protection from the risk, as the 'entitlement to recover a debt is valuable only to the extent that there are assets available against which to recover'.¹²²

Dr Gillespie's report states that a bond system that reflects risk management principles would be more economically efficient than the current system.¹²³ In his opinion:

The current approach to mine site rehabilitation focuses on general identification of the potential risk (i.e. default on mine site rehabilitation), and case by case estimation of the consequence (i.e. the size of the liability), on a mine by mine basis. However, no consideration is given to case by case consideration of the likelihood of these consequences arising. This is inconsistent with risk management principles and results in economic efficiency losses.¹²⁴

Dr Gillespie identifies factors that should be taken into consideration when identifying the 'likelihood' of a risk occurring, such as the size, assets and ownership of the mine operator; the mine operator's history of compliance; demand for coal; and the nature of the mine operation.¹²⁵ He notes that while some documents identified early mine closure as a key risk, this did not necessarily equate to the mine operator defaulting on its liability, as that may depend on whether the mine operator is insolvent, or whether the liability can be recovered via a legal mechanism.¹²⁶ Dr Gillespie recognises that should default occur, a risk-based bond system may result in the State being left in a position of not having enough money in bonds to cover the costs of rehabilitation.¹²⁷

GDF Suez submitted that the rehabilitation bond system is not 'broken'.¹²⁸ It submitted that the bond for the Hazelwood mine was set using a 'version of a "discounted bond" system' and that the bond is sufficient on the basis that there is an 'extremely' low risk that GDF Suez will default on its obligations to rehabilitate the mine site.¹²⁹

Environment Victoria submitted that the legislative regime for the assessment of bonds is adequate; however, the Mining Regulator has failed to implement the Bond Policy and has not used the powers available to it under the Mineral Resources Act for that purpose.¹³⁰

Environment Victoria referred to the fact that the Mining Regulator has not:

- sought bonds in the amount of the full estimated rehabilitation liability
- conducted bond reviews in circumstances where the mines failed to provide the estimated rehabilitation liabilities assessments in Annual Returns submitted prior to 2015
- conducted bond reviews in circumstances where the initial bond was established on an ‘interim’ basis and work plan variations have subsequently been submitted by the mine operator.¹³¹

Environment Victoria submitted that the ‘history of the administration of the bond regime reveals a lack of rigour, inertia and delay.’¹³²

8.5 BOARD’S DISCUSSION AND CONCLUSIONS

The Board’s Terms of Reference ask it to report on whether the ‘current rehabilitation bond system’ is ‘effective’ for the three Latrobe Valley coal mines. The Board notes that it is not specifically asked to evaluate the *levels* of the existing bonds. However, the Board considers that it is difficult to separate the two issues, as the levels of the bonds are directly relevant to whether the bond system will provide effective protection for the State in the event that mine operators fail to meet their rehabilitation obligations. For this reason, the Board rejects the submission by GDF Suez that any consideration by the Board of the bond levels is beyond the Terms of Reference.¹³³ The Board’s consideration of the bond levels, and the recommendation below about an interim increase of the bonds, fall under Terms of Reference 10(b) and 12.

The current bond levels result from the way in which the Mining Regulator has administered the bond system, including its decision not to change bond levels in response to bond reviews. For this reason, an assessment of the effectiveness of the current rehabilitation bond system requires the Board to review the regulatory framework and its implementation.

8.5.1 THE CURRENT REHABILITATION BOND SYSTEM

As submitted by Counsel Assisting and Environment Victoria, the Bond Policy appears to the Board to be a simple and sensible tool to enable the Mining Regulator to exercise the important functions under Part 7 of the Mineral Resources Act, and to ensure that rehabilitation can be undertaken in the event that the mine operator is unable to meet its rehabilitation obligations. The Board notes the historical context in which the Mining Regulator has set the bonds for the Latrobe Valley mines. There is very little evidence before the Board about the criteria used by the Mining Regulator to set the initial ‘interim’ bonds. Based on the Mining Regulator’s briefing note dated 4 December 1995 regarding the Hazelwood mine bond, it appears that when setting the initial interim bond levels, the Mining Regulator used an approach that takes into account the likely rehabilitation costs at the end of the mine life; an assessment of the progressive rehabilitation plans of the mines; and an assessment of the likelihood of default. The Board assumes that a similar process was adopted for the Yallourn and Loy Yang mines.

The Board recognises that the Minister has historically applied a risk-based approach to setting bond levels. The Board accepts that a risk-based approach has utility in the context of mine rehabilitation bonds, a topic that is discussed in Part 9 of this report. However this approach is at odds with the current Bond Policy. The Board considers it surprising that the State should consistently fail to implement its own policy. Should it be applied consistently, the bonds would be set at a level that represents 100 per cent of the third party costings for rehabilitation—a level far higher than the current bond levels. However, for the reasons set out below, the Board considers that the Bond Policy is not an appropriate mechanism for assessing the bond levels for the Latrobe Valley mines. It should be reconsidered insofar as it relates to the Latrobe Valley mines (as discussed further in Part 9).

8.5.2 EFFECTIVENESS OF THE REHABILITATION BOND SYSTEM

The gap between the bond levels and the levels of the liability assessments (both those of the mine operators and particularly those of AECOM) exposes the State to the risk that it will bear a significant proportion of the cost of rehabilitation in the event of default by one or more of the mine operators.

The Board is conscious of the distinction between the consequence and the likelihood of this risk, as explained by Dr Gillespie. While the consequence of the risk (a mine operator defaulting on its obligations and its liability transferring to the State) is great, the Board recognises that the likelihood of this risk eventuating is less so, when factors such as the mine operators' financial stability are taken into account. The mines are currently essential to meeting the power needs of Victoria, and while market demand may change in the future, it seems unlikely to the Board that the mine operators will default before the Bond Review Project is completed. The Board accepts the submissions of the mine operators in this regard.¹³⁴

Acknowledging the likelihood of default and the arguments put by the mine operators regarding the appropriateness of the bonds, the Board still considers that the failure of the State to increase bond levels has meant that any financial incentive the mines may have had to accelerate progressive rehabilitation has been removed. As noted above, in the absence of any bond increase, a significant gap has emerged over time between the existing bond levels and the reported estimated rehabilitation liabilities. The Board finds that the current bond levels are ineffective because they do not meet what Accent Environmental describes as their primary purpose of providing a high degree of certainty that adequate funding will be available to undertake final rehabilitation in the event of default by a mine operator.

The Board is concerned that the Mining Regulator has not been able to provide any reassurance to the Board that the bonds are set at an amount that it considers 'sufficient' based on its own risk analysis, as it is entitled to determine under s. 80 of the Mineral Resources Act. There is no transparency in the manner in which the Mining Regulator conducted its reviews of the bonds, particularly given that they appear to have been conducted at odds with the Bond Policy.

The Board notes that 20 years have passed since the Hazelwood and Loy Yang mines' bonds were set at \$15 million on an 'interim' basis. The Yallourn mine's bond, originally set at \$15 million at the same time, was reduced in 2004 to its present level of \$11.46 million. It is inconceivable to the Board that the liability estimates have not increased since the bonds were set. If the Bond Policy and its key tool, the Bond Calculator, have any utility, they must have shown that liabilities had increased; this ought to have justified an increase in rehabilitation bond levels.

The Board further notes that the Mining Regulator has conducted reviews of the mine operators' liabilities using the Bond Calculator (Hazelwood in 2009 and 2011, Yallourn in 2010 and Loy Yang in 2008). The Board was not provided with any evidence about the outcome of those reviews, save that the Mining Regulator determined not to make any change to the bonds pending the Bond Review Project.

The Board considers that the decision to reduce the Yallourn mine bond does not appear to have taken into account the cost modelling undertaken by the Yallourn mine's independent expert, GHD. It appears that the reduction of the bond is based on a base cost estimate of about \$9.5 million with a 20 per cent contingency amount added—this base amount reflects the estimate of costs used at the time of setting the initial bond at privatisation and not the 2002 cost estimate of GHD, which is in excess of \$12 million.

The Board is also concerned that in 2015, the Mining Regulator perceived the risk of a mine operator refusing to enter an increased bond or defaulting on their rehabilitation obligations as '50/50'. While such a rating seems to pay insufficient regard to the statutory obligation imposed by s. 80 of the Mineral Resources Act, it provides a valuable insight into the views of the Mining Regulator.

While it is true, as pointed out by EnergyAustralia, that the Board does not have a detailed explanation of the risk assessment methodology, the Board notes the submissions of Counsel Assisting that Mr McGowan must have been aware that the project plan would be scrutinised closely by this Inquiry. The Board assumes that the risk assessment in the project plan would not have been prepared lightly. At the very least, the risk assessment assists the Board to evaluate the opinion of Accent Environmental about the risk posed to the State by the current gap between the bonds and the assessments. This is a gap which must be closed or, at the very least, reduced in the short-term.

The Board finds that the rehabilitation bond system, namely the Bond Policy, is ineffective by virtue of the fact that the Mining Regulator is not effectively implementing it. If the Bond Policy was implemented, the Board accepts the submissions by Counsel Assisting and Environment Victoria that it is a simple and workable policy, which would ameliorate the risk of the State having to pay for rehabilitation works in the event of default by the mine operators. Full implementation of the Bond Policy would see the current bonds set at 100 per cent of the current liability assessments.

The Board does not find that the legislative framework itself (that is, s. 80 of the Mineral Resources Act) is ineffective, as the issues raised in this Part relate to the application of the Bond Policy. However the Board recognises that other financial assurance mechanisms, such as risk-based approaches, could be more effective than a rehabilitation bond. This is an area that is currently under review by the State, and is discussed in Part 9 of this report.

8.5.3 EFFECTIVENESS OF LIABILITY ASSESSMENT PROCESSES

As noted in Part 7 of this report, there is a significant gap between the mine operators' own estimates of their rehabilitation liabilities and the independent estimates produced by AECOM. The Board accepts the submissions made by the mine operators and Counsel Assisting that there are deficiencies in AECOM's work as described in the evidence before the Board. However, the Board accepts the evidence of Accent Environmental that the current estimates are likely to increase as various geotechnical, hydrogeological and fire prevention risk factors are further investigated and resolved. The Board concludes that the 2014–15 Annual Return estimates are likely to be at best the minimum rehabilitation costs.

In order for the mine operators to provide consistent rehabilitation estimates, the Mining Regulator must come to a transparent and clear determination about the manner and form in which rehabilitation cost estimates are provided. The expertise of AECOM and its work on rehabilitation liability assessments should inform this determination.

The Board heard that the Mining Regulator has not specified the 'manner and form' in which it requires the coal mine operators' estimates to be made or to seek an audit of the mines' rehabilitation liability assessments under s. 79A of the Mineral Resources Act. Given the potential usefulness of s. 79A to the process of setting bonds, the explanation for the absence of any such requirements and audits is unsatisfactory.

The Board considers it desirable that the Mining Regulator:

- specify the manner and form (that is, the structure, content areas and methods) in which it wants liability assessments to be made under ss. 79A(1) and 79A(2) of the Mineral Resources Act
- require each mine operator to undertake a rehabilitation liability assessment in that manner and form for the financial year 2016–17
- require each mine operator to engage an auditor to conduct an audit of its 2016–17 liability assessments under s. 79A(3).

The Board considers that these steps need to be commenced prior to the completion of the current Bond Review Project. However, they raise an area of concern for the Board, about the expertise required to conduct s. 79A assessments and audits.

The evidence from Mr Pendrigh and Mr Wilson is that there is insufficient expertise within the Mining Regulator to enable the Minister to request s. 79A assessments and audits. The Board recommends that this insufficiency should be remedied immediately by the Mining Regulator taking steps to employ or engage suitably experienced personnel in mine closure and rehabilitation liability assessments, and by the Mining Regulator obtaining regular advice and guidance from the Technical Review Board. The issue of regulatory expertise is discussed in more detail in Part 10 of this report.

Once the criteria for estimating rehabilitation liabilities are determined through expert consultation, the mines should be required to complete their 2016–17 rehabilitation liability assessments using this process, and those assessments should be audited. The Board notes that, pursuant to s. 77U of the Mineral Resources Act, the auditor engaged will be an ‘environmental auditor’ within the meaning of s. 53S of the *Environment Protection Act 1970* (Vic). The Board considers that s. 79A(3) audits should be comprehensive, scrutinising the assessment’s compliance with the requirements of the ‘manner and form’ set by the Minister under s. 79A(2) of the Mineral Resources Act, and its accuracy.

It is not clear to the Board whether a current EPA-accredited environmental auditor will have the necessary skills and experience to undertake the functions described in s. 79A(3) of the Mineral Resources Act and determine whether a rehabilitation liability assessment is accurate. The Board recommends that the State review the skills and experience required of its accredited environmental auditors, in consultation with the EPA, the Mining Regulator and the Technical Review Board. If appropriate, the Mineral Resources Act and the accreditation process should be amended to ensure such auditors have the required expertise to conduct mine rehabilitation liability assessment audits. Current auditors should be assessed against these criteria and, if required, further auditors should be appointed.

The Board recommends that by 31 December 2016, the State specify the manner and form of rehabilitation liability assessments for use by the Latrobe Valley mine operators in their 2016–17 rehabilitation liability assessments and future assessments.

The Board recommends that the State require that the 2016–17 rehabilitation liability assessments provided by mine operators are conducted in accordance with the requirements developed under the recommendation above.

The Board recommends that by 30 June 2017, the State require each of the Latrobe Valley mine operators to engage an auditor, under s. 79A(3) of the *Mineral Resources (Sustainable Development) Act 1990* (Vic), to certify that its 2016–17 rehabilitation liability assessment has been prepared in accordance with the rehabilitation liability assessment guidelines (as per the recommendations above); to certify that the assessment is accurate; and pursuant to s. 79A(4) of the Act, to forward a copy of the certificate to the Minister for Energy and Resources.

The Board recommends that the State redress gaps in expertise by employing or engaging suitably skilled and experienced personnel in mine closure and rehabilitation liability assessments, and obtaining regular advice and guidance from the Technical Review Board.

The Board recommends that by 31 December 2016, the State review whether the criteria for accreditation of auditors under s. 53S of the *Environment Protection Act 1970* (Vic) are appropriate having regard to the necessary skills and expertise required to conduct an audit under s. 79A of the *Mineral Resources (Sustainable Development) Act 1990* (Vic). If necessary, the Mineral Resources Act and the accreditation process should be amended to ensure appropriately qualified auditors can be engaged for s. 79A audits.

8.5.4 MOVING FORWARD: INTERIM BOND INCREASES

While the Board considers that the implementation of these recommendations will address the concerns it has about the bond system in the medium to long-term, it is concerned about the existing gap between the bonds and the rehabilitation liability assessments remaining until those recommendations are implemented.

For the Yallourn mine, the higher figure in its liability estimate range is more than seven times its bond. Put another way, the bond represents 12.5 per cent of the upper range of the mine operator's self-assessed liability. The evidence before the Board is that, under the existing Bond Policy, it should represent 100 per cent. While the gap between the Hazelwood mine's bond and its liability is not as great, it remains a very significant shortfall. The position with AGL Loy Yang is more complicated. As noted earlier, its 2014–15 Annual Return's liability assessment is \$53.7 million against a bond of \$15 million. However, the figure of \$53.7 million was based on the 1997 work plan, which has now been significantly varied by the 2015 work plan variation. The revised indicative liability assessment is \$112 million, which is more than seven times the bond.

As noted, the advice received by the Board from Accent Environmental is that these shortfalls represent a risk to the State. The State should not continue to be exposed to that level of risk while the Board's recommendations are implemented. The Board is conscious of the time that will be needed to adequately complete the s. 79A process given the evidence it has heard about the lack of expertise within the Mining Regulator and the need for the Mining Regulator to consult with the mine operators and other government agencies, such as the EPA. Based on the evidence before the Board concerning the time the Mining Regulator has taken to complete similar tasks in the past, the Board does not share the confidence of GDF Suez that the various recommendations will be implemented in full 'before the end of 2016'.¹³⁵

Under s. 80(4) of the Mineral Resources Act, if the Minister is of the opinion that the current bonds are insufficient, the Minister may serve a notice on the mine operators requiring each of them to provide an increased bond within 28 days of receiving notice of the bond increase. The Board recommends that, on the evidence it has heard, the Minister should, pursuant to s. 80(4) of the Mineral Resources Act, consider the sufficiency of the existing bonds on an interim basis pending the completion of the Bond Review Project.

Each of the mine operators made submissions opposing such a recommendation.

EnergyAustralia submitted that there is no basis in the evidence before the Board to recommend an interim increase to its bond as there is 'no imminent risk to the State' justifying such a recommendation. It points to the 'ample evidence before the Board of the financial capability of EnergyAustralia'.¹³⁶ It submitted that 'the proper course would be for the Board to allow the Bond Review Project to proceed, no doubt influenced by the findings of the Board and the engagement of the other mine operators, including EnergyAustralia'.¹³⁷

AGL Loy Yang made similar submissions. It submitted that there is 'no basis for the Board to conclude that an interim increase in the current bond is necessary to adequately protect the State's interest'.¹³⁸ It referred to the Loy Yang Complex Agreement (as discussed in Part 9 of this report) as a source of security for the State that the State will not be left with the responsibility for rehabilitating the site.¹³⁹ It further submitted that it would be sufficient for the Board to allow the Bond Review Project and the implementation of the Board's recommendations regarding s. 79A to proceed.¹⁴⁰

GDF Suez also submitted that the Board could only make a recommendation for an interim increase in its bond level if it is 'satisfied that there exists a real risk that a mine operator might default in the period between implementation of the Board's recommendations pertaining to the s. 79A process and the conclusion of that process.'¹⁴¹ It submitted that such a conclusion cannot be reached on the evidence before the Board.

None of the mine operators submitted that the Board should disregard the advice from Accent Environmental that the State is exposed to a risk due to the current bonds being 'substantially lower than the rehabilitation liability of the sites' and that the greater the gap between the two, the greater the risk.

Based on the evidence from Accent Environmental, and the evidence about the gap between the bonds and the mine operators' own rehabilitation liability assessments, the Board considers that there is a basis to recommend to the Minister that the bonds should be set on an interim basis at 100 per cent of the current rehabilitation liability assessments, as provided in the 2014–15 Annual Returns in the case of EnergyAustralia and GDF Suez, and the liability estimate that relates to the 2015 work plan variation in the case of AGL Loy Yang. This would give full effect to the current Bond Policy.

However, having regard to the submissions of the mine operators, the totality of the evidence and the factors noted below, the Board accepts that it is not appropriate that bond levels should be increased to the full 2014–15 rehabilitation liability assessment levels as an interim measure, prior to the Mining Regulator's review of bonds being completed. In particular, the Board notes:

- These are interim bonds—they are designed to reduce the risk to the State only until the Board's recommendations in Part 8.5.3 are implemented and the State is able to set new bonds or other financial assurance mechanisms based on accurate liability assessments.
- The mines provide essential services to the State—therefore it is unlikely that demand for coal will decrease to a degree that would result in early closure of one or more of the mines before the Board's recommendations in Part 8.5.3 can be implemented.¹⁴²
- The mine operators are not likely to default in the interim—even if early closure were to occur, the mine operators and their parent companies appear to be financially stable and have considerable assets, decreasing the likelihood that the responsibility and financial liability for rehabilitation will revert to the State.¹⁴³
- A high bond level could potentially have negative financial impacts for the mine operators, with resulting opportunity costs. The bond could potentially tie up funds in the immediate short-term that could otherwise be used for progressive rehabilitation and vital research.¹⁴⁴

However, contrary to the submissions of the mine operators, the Board does not accept that bond levels should be maintained at their current levels in the interim for the following reasons:

- There is a clear gap between the current bond levels and the mine operators' own liability assessments.
- There is uncertainty about the accuracy of the mines' liability assessments—the AECOM modelling suggests that third party costings for rehabilitation could be significantly higher, and there is a major body of research that will need to be conducted as part of rehabilitation to resolve complex issues, which Accent Environmental considers is likely to result in increases to the current estimates.
- There will be a considerable period of time until new bond levels or other financial assurances will be set—the Bond Review Project, reassessment of liabilities, attracting the necessary expertise to the Mining Regulator, resolving the question of appropriate auditors, identification of the optimal financial assurance mechanism and setting of financial assurance levels, will all take some time.
- There are major consequences of default—while the likelihood may be low, a default would have significant consequences for the State financially.

The Board has chosen to recommend that the Minister considers a bond level that recognises these two sets of somewhat competing considerations, while emphasising that it is an interim level that requires review as soon as practicable. The Board recommends that, in relation to EnergyAustralia and GDF Suez, the Minister should reconsider the sufficiency of the existing rehabilitation bonds pursuant to s. 80(4) of the Mineral Resources Act, having regard to this report and any other relevant material. If, as a result of that consideration, the Minister is of the opinion that the bond levels are insufficient, the Minister should consider requiring that the mine operators enter into further rehabilitation bonds on an interim basis at a rate of at least 50 per cent of the rehabilitation liability assessment provided by those mine operators in their 2014–15 Annual Return for Hazelwood and Yallourn mines (as set out in Table 13).

The position with AGL Loy Yang is more complex. During the course of this Inquiry, the Mining Regulator approved the 2015 Loy Yang work plan variation. The rehabilitation plan in the 2015 work plan variation is very different to that contained in the earlier 1997 work plan. For example, because the level of the proposed lake is much lower in the 2015 work plan, the area of exposed batters is correspondingly greater and so will cost more to rehabilitate. AGL Loy Yang's own estimate for the implementation of its 2015 work plan is \$112 million, more than double the assessment based on its earlier 1997 work plan of \$53.7 million.

Counsel for AGL Loy Yang correctly submitted that the 'reported rehabilitation liability assessment [of \$53.7m] is all but irrelevant due to the new work plan variation now approved.'¹⁴⁵ This submission was made in relation to Term of Reference 10(a). However, AGL Loy Yang has also submitted that if, contrary to its primary submissions, the Board is intending to recommend an interim increase in the AGL Loy Yang bond, 'any such increased bond should be set at 50% of the last rehabilitation liability assessment provided to the Mining Regulator of \$53.7m.'¹⁴⁶ The Board fails to see how that figure could be 'irrelevant' for the purposes of Term of Reference 10(a) but relevant for Term of Reference 10(b). It rejects this submission. The most relevant estimate is the \$112 million prepared by mining consultants GHD. The Board notes the evidence of Mr Rieniets that 'the GHD model utilises data...which is more accurate than approximations...used in some other models.'¹⁴⁷

Table 13. Current estimated rehabilitation liabilities

Mine	Current estimated rehabilitation liability*	50% of estimated rehabilitation liability
Yallourn mine	\$46–\$91 million	\$34.25 million [†]
Hazelwood mine	\$73.4 million	\$36.7 million
Loy Yang mine	\$112 million	\$56 million

* Sources: Hazelwood and Yallourn mines' Annual Returns 2014–15; Loy Yang's revised liability assessment based on the 2015 Loy Yang work plan variation

[†] This represents 50 per cent of the midpoint (\$68.5 million) of the range provided in the 2014–15 Annual Return.

The Board recommends that upon completion of the Bond Review Project, the Minister should review the amount of the bond required by each mine operator. This should be in accordance with the mine operators' 2016–17 rehabilitation liability assessments, conducted as per the Board's recommendations in Part 8.5.3. The Minister should then require the mine operators to enter into new bonds.

The Board recommends that by 30 June 2016, the State request the Minister for Energy and Resources to consider the sufficiency of the existing rehabilitation bonds pursuant to s. 80(4) of the *Mineral Resources (Sustainable Development) Act 1990* (Vic) having regard to this report and any other relevant material.

- If the Minister for Energy and Resources deems the existing rehabilitation bonds insufficient, the Minister should consider increasing the rehabilitation bonds on an interim basis to at least:
 - Yallourn mine: \$34.25 million
 - Hazelwood mine: \$36.7 million
 - Loy Yang mine: \$56 million

The interim increase should be undertaken in accordance with s. 80(4) of the Mineral Resources Act.

- If the Minister deems the existing rehabilitation bonds sufficient, the Minister should publish a statement setting out the reasons for that conclusion on the website of the Department of Economic Development, Jobs, Transport and Resources.

The Board recommends that upon completing the Bond Review Project, the State review the bond amount required by the mine operators. This should take into account the mine operators' 2016–17 rehabilitation liability assessment, conducted in accordance with the Board's recommendations in Part 8.5.3 and the findings of this Inquiry. The Minister for Energy and Resources should then require the mine operators to enter into further rehabilitation bonds, if the rehabilitation bonds are deemed to be insufficient.

PART NINE
ALTERNATIVE FINANCIAL
ASSURANCE MECHANISMS

PART 9 ALTERNATIVE FINANCIAL ASSURANCE MECHANISMS

9.1 OVERVIEW

Term of Reference 10(c) requires the Board to inquire into, report on and make any recommendations it considers appropriate:

Having regard to the rehabilitation liability assessments that have been or will be reported in 2015 by the operators of each of the Hazelwood mine, the Yallourn mine, and the Loy Yang mine, as required by the *Mineral Resources (Sustainable Development) Act 1990* (Vic), and to the outcome of the Rehabilitation Bond Review Project (Bond Review Project):

- c. any practical, sustainable, efficient and effective alternative mechanisms to ensure rehabilitation of the mines as required by the *Mineral Resources (Sustainable Development) Act 1990* (Vic).

The Board heard that the bond system has been repeatedly questioned and considered. The Mining Regulator and the Department of Economic Development, Jobs, Transport and Resources (DEDJTR), have obtained expert opinions about the system and reforms have been proposed. The Board heard evidence from the Environment Protection Authority (EPA) about assurance mechanisms implemented under the *Environment Protection Act 1970* (Vic) (Environment Protection Act).

The Board retained experts from Accent Environmental to provide opinions on whether there are alternative financial assurance mechanisms that could be employed to ensure that the Latrobe Valley mines are rehabilitated pursuant to the *Mineral Resources (Sustainable Development) Act 1990* (Vic) (Mineral Resources Act). Accent Environmental provided a report to the Board titled *Hazelwood Mine Fire Inquiry: High-level assessment of alternative rehabilitation financial mechanisms* (Accent Environmental report). AGL Loy Yang retained Dr Robert Gillespie, Principal of Gillespie Economics, to provide his opinion on alternative financial assurance mechanisms.

This Part considers what alternative financial assurance mechanisms might be employed to ensure rehabilitation is carried out as required under the Mineral Resources Act.

9.2 STATE CONSIDERATION OF ALTERNATIVE FINANCIAL ASSURANCE MECHANISMS

In 2000, the Department of Natural Resources and Environment (as DEDJTR was then known) reviewed the rehabilitation bond policy in light of concerns about the commercial impact of bonds on industry (the cost of providing financial assurances was estimated as being between 0.37 per cent and 1.5 per cent of the face value of the bond), and the cost to government of setting and reviewing bonds. The review sought to identify new approaches that reduced the costs to industry and government wherever possible, while still guaranteeing the rehabilitation of mines and quarries.¹ It included the release of a 'discussion paper', dated April 2002, seeking stakeholder views on the type, setting and reviewing of rehabilitation bonds.²

In 2002, following consideration of submissions received in response to the discussion paper, analysis of departmental needs and state policy, the Department of Primary Industries (DPI, as DEDJTR was then known) released a 'position paper' articulating its conclusions.³ The position paper identified a number of principles that should inform policies on rehabilitation bonds, including that bonds:

- ensure that the cost of rehabilitation is borne by the mine operator
- cover the actual and foreseeable liability based on the works required by the approved work plan
- are reviewed as appropriate to ensure their adequacy
- encourage good environmental performance and progressive rehabilitation
- are secure, easily retrievable and applied consistently
- are assessed on a site-by-site basis
- are consistent with other interstate jurisdictions wherever practical.⁴

After releasing its position paper, DPI decided to develop new guidelines for the establishment of rehabilitation bonds, as well as a schedule of requirements for assessors. DPI also decided to establish an initial bond for proposed mining or extractive industry operations, to act as a starting point for later assessments. DPI's position was that the full rehabilitation liability should always be covered by the bond and be assessed on a case-by-case basis. In addition, mine operators should provide their annual rehabilitation liability using an independent assessor in accordance with the guidelines (except in the case of small mines), and costing should not be unnecessarily complex.⁵

In 2011, DPI again investigated alternative options for the bond system as part of its broader review of the Mineral Resources Act. It commissioned KPMG to conduct a review to identify the principles of a successful financial assurance model that provides security in the event that a mine operator fails to rehabilitate its land.⁶

KPMG identified 10 principles for a good security model:

- The system should reflect the fact that it is unlikely that all mine operators will fail to achieve their rehabilitation obligations.
- The system should avoid creating moral hazard (for example, the mine operator avoiding discharging rehabilitation obligations without penalty).
- The system should reward past good behaviour.
- The system should encourage future good behaviour and discourage future bad behaviour.
- The system should be based on risk management principles.
- The system should avoid cross subsidies (for example, exposing mine operators to the risk that they may not receive the full amount of their bond back, even where they have met their rehabilitation obligations).
- The system should attempt to avoid large and uncertain increases in the amount of financial assurance.
- The government should seek to manage its financial risks to minimise any budgetary impact.
- Any new model should, where possible, not materially increase the administrative burden for the State.
- Financial assurance should be readily converted into cash, as opposed to security being provided by personal property or operating equipment.⁷

KPMG stated that not all attributes will be met in any one model but that '[b]y changing the models slightly or using a combination, [DPI] and stakeholders can determine which system is appropriate for their purposes.'⁸

KPMG investigated six models that could be used in Victoria:

1. The current system—a rehabilitation bond.
2. Discounted performance bond system—a rehabilitation bond discounted to reflect past performance.
3. Government-owned site rehabilitation sinking fund system—a discounted rehabilitation bond that is refunded upon satisfactory compliance with rehabilitation obligations, together with non-refundable contributions into a statewide government rehabilitation sinking fund in an amount proportional to the operator's liability.
4. Industry-owned site rehabilitation bond pool system—a discounted rehabilitation bond that is refunded upon satisfactory compliance with rehabilitation obligations, together with refundable contributions into a statewide industry rehabilitation bond pool in the form of a performance bond as opposed to cash.
5. Predefined liability proportion performance bond system—a rehabilitation bond, with contributions to the bond made over the life of the mine based on two tracks. Where performance is in line with expectations, the contributions are smaller (track 1); however, if performance deviates from that expectation, contributions are immediately increased (track 2).
6. Insurance-based system—all mine operators are required to take out an insurance policy against the risk of default on their respective rehabilitation liabilities.⁹

KPMG described a 'common sinking fund' as one where all mine operators contribute to one fund, but which may bring about a cross-subsidy risk resulting in responsible mine operators 'footing the bill for those who have not met their rehabilitation obligations.'¹⁰ KPMG noted the benefit of a pooled fund is that there is unlikely to be a situation where all mine operators fail to rehabilitate and so the amount contributed to the fund will be less than the full amount of the rehabilitation costs.¹¹

KPMG measured each of the models against the 10 principles that it had identified for a good security model. None of the models satisfied all of the 10 principles. The models that satisfied the least number of principles were the discounted performance bond system and the insurance-based system.¹²

In 2012, the Victorian Parliament's Economic Development and Infrastructure Committee (EDIC) conducted an inquiry into greenfields mineral exploration and project development, which included consideration of rehabilitation bond levels. The final report of the inquiry states:

A commonly held view in submissions, particularly those from the extractives industry, was that rehabilitation bonds are considered deterrents to investment in mineral and extractive developments in Victoria.

...

In contrast, Environment Victoria's (EV) submission...strongly supported a review of mining and exploration rehabilitation bonds to ensure they accurately reflect rehabilitation costs.¹³

The EDIC inquiry report recommended that the State 'review the current rehabilitation bond system in comparison with alternative existing mechanisms, taking into account the end of mine life environmental legacies, whilst honouring obligations for rehabilitation of specific sites.'¹⁴

In 2014, the Mining Regulator prepared a rehabilitation bond policy reform package, which recommends the introduction of a two-track bond model and cash bond model. The reform package does not apply to the Latrobe Valley mines.¹⁵

As noted in Part 8 of this report, Mr Luke Wilson, Lead Deputy Secretary of Agriculture, Energy and Resources at DEDJTR, told the Board that DEDJTR is obtaining advice from NERA Economic Consulting about potential bond systems; however that advice has been delayed.¹⁶

9.3 OPTIONS FOR ALTERNATIVE FINANCIAL ASSURANCE MECHANISMS

The Accent Environmental report states that 'the primary purpose of financial assurance for mining projects is to provide a high degree of certainty that adequate funding will be available to undertake final rehabilitation in the event of default by the operator.'¹⁷

In its report to the Board, Accent Environmental explains that a financial assurance mechanism is 'the system by which governments manage risks associated with rehabilitation liability, including determining the required amounts of financial assurance, regulating the provision of financial assurance and encouraging progressive rehabilitation.'¹⁸ A financial instrument is 'the means by which the agreed amount of financial assurance is guaranteed to be available.'¹⁹

The Accent Environmental report highlights a number of issues that have emerged in relation to traditional financial assurance mechanisms. These include the underestimation of rehabilitation liability; difficulties in meeting requirements for completed rehabilitation; and problems faced by regulators in encouraging progressive rehabilitation.²⁰

Accent Environmental found that in recent years, other jurisdictions have increased their focus on the risks involved with post-closure and unplanned events. There has been an increase in the use of trust funds to fund post-closure monitoring and maintenance (which typically fall outside the scope of a rehabilitation bond), including funds that can be used in perpetuity.²¹ Accent Environmental found that there has also been a trend towards rewarding good performance and encouraging progressive rehabilitation through the adoption of discount bond systems.²²

Accent Environmental also considers the financial assurances and instruments administered by the EPA.²³ Under s. 67B of the Environment Protection Act, the EPA has a range of financial assurance mechanisms available to it. The evidence before the Board is that despite this, the EPA has almost invariably sought bonds in the form of bank guarantees.²⁴ Mr Christopher Webb, Executive Director, Regulatory Practice and Strategy at the EPA, agreed that this is primarily because of the high level of security that bank guarantees provide.²⁵ However, the EPA is currently expanding the forms of financial assurances (and instruments) that it will accept.²⁶ According to Mr Webb, this is because establishing bank guarantees is sometimes problematic for operators, and an expanded range of financial instruments will allow for greater flexibility, while still minimising the risk to the State.²⁷

The Accent Environmental report assesses a range of financial mechanisms that meet the requirements of the Mineral Resources Act and have the potential to ensure that action is taken to rehabilitate the Latrobe Valley mines. These options are:

- Single-step increase—a single-step increase of existing rehabilitation bonds to achieve full financial assurance coverage.
- Multi-step increase—a pre-defined schedule of bond increases to progressively achieve full financial assurance coverage.
- Bond discount—the single-step or multi-step increase options with additional bond discount.
- Trust fund for rehabilitation—using a trust fund to provide supplementary financial assurance coverage.
- Insurance-based coverage—using insurance to provide supplementary financial assurance coverage.
- Pooled fund coverage—using a pooled fund to provide supplementary financial assurance coverage.
- Unplanned events insurance—using insurance to mitigate the risk of unplanned post-closure costs.
- Unplanned events fund—using a trust fund to provide funds for unplanned post-closure costs.
- Post-closure trust fund—using a trust fund to cover the costs of post-closure management, maintenance and monitoring of the sites.²⁸

The report states that:

Financial assurance systems have commonly been criticized for under-estimating actual mine closure costs. The only way to ensure a bond does not fall short is to develop a system that can accurately calculate the cost of mine closure and for this to be annually reviewed and adjusted reflecting performance milestones or non-compliance with any incremental mine closure requirements.²⁹

The alternative financial assurance mechanisms identified by Accent Environmental are detailed below.

9.3.1 SINGLE-STEP AND MULTI-STEP BOND INCREASES

The implementation of the two bond increase options would require the current rehabilitation bonds of the Latrobe Valley mines to be increased in either a single step or multiple steps to a level that is equal to their current rehabilitation liability. Reviews of the bond amount could occur and the bonds would be reset based on recalculations of rehabilitation liabilities.³⁰

Accent Environmental identifies the advantages of this approach as:

- covering the State for 100 per cent of the agreed rehabilitation liability, either immediately, or after the multiple steps are complete
- maintaining consistency with the current administration of the bond system
- potentially providing financial incentives for operators to undertake progressive rehabilitation in order to reduce the rehabilitation liability assessment, leading to a reduction in the bond.³¹

Accent Environmental identifies the disadvantages as:

- for the single-step increase, obliging the operators to provide a large one-off increase to the bond which could potentially create financial hardship depending on the gap
- putting the operators in the position in which the costs of progressive rehabilitation to reduce the bond are likely to be greater than the financial benefits that come from having a reduced bond.³²

9.3.2 BOND DISCOUNT

A bond discount mechanism would require each of the Latrobe Valley mines to increase their current rehabilitation bond in a single or multiple steps, to equal a discounted current rehabilitation liability tied to performance. Accent Environmental suggests that a 25 per cent discount could apply to the Latrobe Valley mine bonds, but that if the mine operators fail to reach performance criteria, the discount would be forfeited.³³

Accent Environmental identifies the advantage of this option as reducing the financial hardship on mine operators. The disadvantages include exposing the State to rehabilitation liability during the period when the discount applies; and that the costs of rehabilitation to reduce the bond and achieve eligibility for the discount are likely to be greater than the financial benefits that come from having a reduced bond.³⁴ Dr Gillespie states that 'it is not obvious what the rationale for a maximum of 25% discount on bond levels would be' and suggested that discounts should reflect individual risk reviews of the mine operator, and that 'where there is negligible risk there is an economic efficiency argument for exclusion from the bond system.'³⁵

9.3.3 TRUST FUND FOR REHABILITATION

Accent Environmental reports that a trust fund could be established to supplement the use of rehabilitation bonds.³⁶ A trust fund 'if established appropriately, sits towards the secure end of the spectrum of risk.'³⁷ Accent Environmental identifies the following advantages:

- If established correctly, the funds would be protected even in the event of one of the signatories becoming insolvent.
- Demonstrates operator commitment.
- Increases the level of assurance that funds will be available to undertake site rehabilitation.
- Can be used to supplement other financial assurance instruments, such as rehabilitation bonds.
- As funds can only be used for rehabilitation, this option provides incentive for progressive rehabilitation to be undertaken.³⁸

While acknowledging that there are some disadvantages associated with trust funds—such as opportunity costs because funds are held in trust and cannot be put to alternative use; additional financial imposition on the operator; and additional administrative burden for the regulator and the operator—Accent Environmental advises that at least some of these disadvantages could be ameliorated if the trust is properly established.³⁹ Accent Environmental refers to the Loy Yang Complex Agreement as an example of this mechanism.

The Loy Yang Complex Agreement is a 1997 tripartite agreement between the operators of the Loy Yang A power station (AGL Loy Yang), Loy Yang B power station (Engie SA, the ultimate holding company of the Hazelwood mine and power station), and the State.⁴⁰ Part 5 of the Loy Yang Complex Agreement (Site Rehabilitation) provides that rehabilitation costs for the Loy Yang mine are to be proportionally met by users of the coal (the power stations) and paid into a trust fund. It states that ‘Site Rehabilitation Expenses shall be met by each of the Parties in proportion to the amounts of Coal used by the Parties during the life of the Loy Yang Mine. The Parties may draw on the Fund to meet the Site Rehabilitation Expenses.’⁴¹

The Loy Yang Complex Agreement requires the parties to open a joint bank account with a trading bank. The parties must then proportionally pay into the account one-tenth of the Loy Yang site’s rehabilitation expenses on an annual basis for a 10 year period, from June 2023 to 2032. Any interest, dividends or other proceeds earned on the fund are to be paid into the fund.⁴²

As the entity responsible for the rehabilitation of the Loy Yang mine, AGL Loy Yang is entitled to use the fund to pay for rehabilitation activities as required.⁴³

Mr Stephen Rieniets, General Manager of AGL Loy Yang, informed the Board that ‘this obligation is unique amongst all other brown coal mines in Victoria and provides an additional financial assurance instrument to the State to ensure that rehabilitation will be completed.’⁴⁴

The Loy Yang Complex Agreement does not specify how the rehabilitation liability is to be calculated in 2023. Evidence before the Board suggests that the State is yet to consider how it will establish and administer the Loy Yang Complex Agreement, given that the obligation to contribute to the fund does not start until 2023.⁴⁵

Counsel Assisting submitted that a trust fund mechanism is worthy of consideration as an appropriate alternative to the current bond system, such as an extension to the Loy Yang Complex Agreement involving the three mines.⁴⁶ However Counsel Assisting also cautioned the Board against ‘recommending change for change’s sake.’⁴⁷

EnergyAustralia submitted that adopting such a mechanism without further detailed consideration is premature.⁴⁸

GDF Suez submitted that there is not sufficient evidence to support the establishment of a trust fund applying to the Latrobe Valley mines, as either an extension of the Loy Yang Complex Agreement, or a pooled trust fund (discussed below).⁴⁹ GDF Suez referred to KPMG’s principle that a good mechanism avoids cross-subsidies.⁵⁰ GDF Suez agreed with Accent Environmental’s comments that this mechanism would present an opportunity cost to the mine operators, as it affects their ability to use funds for other purposes.⁵¹

AGL Loy Yang submitted that a common trust fund would not ‘incentivise the mines to perform because underlying that method is an assumption that one mine may need to foot the bill of the defaulting mine.’⁵²

9.3.4 INSURANCE-BASED COVERAGE

Accent Environmental identifies that insurance coverage could replace or supplement the use of bonds. Accent Environmental lists the advantages of insurance as providing the State with funds to carry out rehabilitation in circumstances where the mine operator defaults on its rehabilitation obligations.⁵³

The disadvantages include:

- no incentive for progressive rehabilitation
- insurance products may not be available, and where they are, premiums may be expensive and subject to fluctuation
- potential legal costs related to making a claim on the insurance policy
- potential for moral hazard—namely, that the mines may default on their rehabilitation obligations as a less expensive option given the coverage provided by the insurer.⁵⁴

9.3.5 POOLED FUND COVERAGE

Under this mechanism, the three mine operators would pay an annual levy into a government-owned rehabilitation fund. The State could use the fund to carry out rehabilitation works in the event that any of the mines default on their rehabilitation obligations.⁵⁵ Accent Environmental describes the mechanism that operates in the Northern Territory where the operators pay one per cent of their rehabilitation bond as an annual levy and are provided with a 10 per cent discount on their bond as compensation.⁵⁶ Accent Environmental notes that this option is only viable where there are multiple operators; otherwise the levy amount will be too high and create too great a financial burden on the operators, unless the discount on the bond is significant. Such a discount would leave the State exposed.

9.3.6 POST-CLOSURE TRUST FUND

Accent Environmental advises that a post-closure trust fund could provide long-term coverage of costs, including any in perpetuity management, maintenance and monitoring costs, which 'will almost certainly be required' in the Latrobe Valley.⁵⁷ Mine operators could be required to maintain a bond to guarantee the availability of funds for the post-closure trust fund. Once rehabilitation was completed, the mine operator would provide funds to pay to the post-closure fund and the bond would be returned.⁵⁸

Post-closure community funds can also be established to fund programs that meet the future needs of the community, which can assist to minimise the social and economic impacts of mine closure.⁵⁹ Mr Michael Cramer, Director of Accent Environmental, explained that these funds can be used to address issues such as unemployment.⁶⁰

The advantages of post-closure trust funds include minimising risk for the State with respect to post-closure costs, and enabling the mine operators to relinquish the site after their rehabilitations obligations are fulfilled. The disadvantages include greater financial burden on the mine operators, and greater administrative burden on the Mining Regulator and the mine operators.⁶¹

Environment Victoria submitted that the use of post-closure trust funds 'is a sensible and indeed necessary mechanism in circumstances in which rehabilitation and monitoring will be required long after the licensees have ceased operating the mines', but it did not agree that a single trust account should be used for the three mines to avoid cross-subsidies.⁶²

9.4 PRACTICALITY, SUSTAINABILITY, EFFICIENCY AND EFFECTIVENESS OF ALTERNATIVE FINANCIAL ASSURANCE MECHANISMS

In addressing the practicality, sustainability, efficiency and effectiveness of alternative financial assurance mechanisms, the Board heard consistent themes about what should be considered, including the incentive to undertake progressive rehabilitation, the risk of mine operators defaulting on their rehabilitation obligations, and the financial impediments to the State and the mine operators.

9.4.1 INCENTIVE TO CARRY OUT PROGRESSIVE REHABILITATION

Mr James Faithful, Technical Services Manager – Mine, GDF Suez, told the Board that the current system does not provide incentives for progressive rehabilitation.⁶³ Mr Ronald Mether, Mine Manager at EnergyAustralia, agreed.⁶⁴ Mr Faithful indicated that a system that provided bonuses for completing progressive rehabilitation would be desirable.⁶⁵ Mr Rieniets agreed that a good system would 'factor in progressive rehabilitation and take that into account when reviewing the bond.'⁶⁶

The Accent Environmental report states that it is not clear whether the financial mechanisms assessed would provide a strong financial incentive for undertaking significant progressive rehabilitation.⁶⁷

However, the report concludes that '[t]here are inherent risks in leaving untested aspects of rehabilitation until the end of operations and it is important that such a situation is avoided in the Latrobe Valley.'⁶⁸

9.4.2 COSTS

Dr Gillespie notes that the current bond system has transactional costs to both the mine operators and the State. Those costs include the estimation of the rehabilitation liability (for example, using the Bond Calculator), documentation and administration, and establishing the bond with an appropriate financial institution.⁶⁹ Mr Rieniets gave evidence that bank fees of between 0.65 and 1 per cent were payable for the establishment and maintenance of the rehabilitation bonds.⁷⁰ Mr Rieniets also told the Board that an additional cost to the mine is the effect that the bank guarantee has on the company's ability to obtain further credit.⁷¹

In its submissions, EnergyAustralia acknowledged that rehabilitation bonds are intended to secure the performance of rehabilitation obligations, but that financial costs associated with large bonds can be significant, particularly when bonds are required over long periods of time. It argued that 'requiring large rehabilitation bonds can have a negative effect of actually consuming potentially substantial financial resources that could otherwise be used for direct active progressive rehabilitation.'⁷²

EnergyAustralia further submitted that its business is supported by the significant financial resources of its holding company, the EnergyAustralia Group, and therefore 'they will be capable of performing, and are appropriately incentivised to perform, their rehabilitation obligations.'⁷³

9.4.3 RISK OF DEFAULT

Each of the mine operators submitted that any system of financial assurance used by the Mining Regulator should be 'risk-based'.⁷⁴

GDF Suez submitted that the 'central question' that the Board should consider is 'what is the likelihood that the State will be required to bear any liability for rehabilitation of the three coal mines in the Latrobe Valley?'⁷⁵ According to GDF Suez, the risk of this occurring is 'very low'.⁷⁶

Accent Environmental acknowledges that it is necessary to consider both the likelihood and consequences of default.⁷⁷ However, Accent Environmental identifies that 'the future of brown coal as a source of energy is currently subject to a greater than usual degree of market uncertainty'⁷⁸ (as discussed in Part 2.3.5 of this report). According to Accent Environmental, these uncertainties mean that 'the risk of one or more of the three mines ending operations prior to the exhaustion of current [coal] reserves has to be taken into consideration when assessing financial mechanisms for rehabilitation.'⁷⁹ Accent Environmental also points out:

One of the major issues requiring management by industry and regulators is the issue of premature closure. An Australia-wide study of approximately 1000 sites that closed between 1981 and 2005 found that...around 75% of site closures were premature or unplanned. The potential consequence of this scenario is that liability may fall on the State if the sites are not rehabilitated effectively.⁸⁰

Dr Gillespie stated that a bond that is calculated by reference to risk management principles would be more economically efficient, but that the State may be left in a position of not having enough money in bonds to cover the costs of rehabilitation, should the worst case scenario take place.⁸¹ Dr Gillespie further states that measures such as reducing the bond as rehabilitation progresses, and setting bond amounts that reflect the risk of insolvency and non-compliance, would make the bond process more economically efficient.⁸²

Dr Gillespie identifies the factors that may impact on the likelihood of default as:

- the past conduct of the mine operator
- degree of financial stability of the mine operator
- assets held by a mine operator and its parent company
- other indications of good corporate governance
- legislative requirements for progressive rehabilitation and the quantum of rehabilitation costs at any point in time
- stability of demand for the product and other market conditions and hence probability of unplanned closure.⁸³

Dr Gillespie states that if the State is willing to adopt a risk-based approach, conducting periodic risk reviews to revise the rehabilitation bond would be preferable to single-step or multi-step increases in the bond amount. The risk reviews would need to take place frequently to ensure that the risk to the State is minimised.⁸⁴

Counsel for Environment Victoria raised potential issues in the practical application of risk reviews, particularly regarding the assessment of risk related to parent companies. Mr Wilson agreed that it could be difficult for the Mining Regulator to determine, in a transparent manner, the structure and assets of the mine operator's parent company.⁸⁵ The Mining Regulator would also require expertise (either internal or external) in understanding corporate structures and insolvency issues.⁸⁶ Counsel for Environment Victoria asked Mr Wilson if the Mining Regulator could potentially incur greater transaction costs in assessing and monitoring risks for international parent companies than would be incurred for Australian companies.⁸⁷ Mr Wilson stated that this is a valid consideration.⁸⁸

Accent Environmental concludes that '[a]ll financial assurance systems rely on the accurate estimation of rehabilitation liability',⁸⁹ and that in the interests of more accurately determining rehabilitation liability, there has been an increased use in other jurisdictions of more sophisticated liability calculation tools and probabilistic cost estimation methods.⁹⁰ This approach may be contrasted with the Mining Regulator's current 'deterministic' methodology, which accounts for any cost uncertainty in a contingency allowance.⁹¹

The Accent Environmental report suggests that probabilistic cost estimations linked to quantitative rehabilitation risk assessments could be adopted in rehabilitation liability calculations for the Latrobe Valley coal mines.⁹²

According to Accent Environmental, '[t]he greater the gap between the rehabilitation bond and the rehabilitation liability, the greater the risk taken on by the State.' In considering alternative financial mechanisms, it is therefore necessary for the State to decide what risk it is willing to bear, the likelihood of rehabilitation default, and the effects of the mechanism on the mine operator's commercial needs or interests.⁹³

AGL Loy Yang submitted to the Board that any revision to the existing bond system should account for progressive rehabilitation works already undertaken and the risk of default.⁹⁴ It submitted that there is no basis to conclude that an increase in the current bond provided by AGL Loy Yang is necessary to protect the State's interest.⁹⁵ AGL Loy Yang further submitted that the establishment of the Loy Yang Complex Agreement rehabilitation trust fund in 2023 will result in a dedicated fund covering the entire rehabilitation liability of the site by around 2031. AGL Loy Yang argued that, therefore, any change to the bond could only be justified if there was a plausible risk of permanent mine closure prior to 2023.⁹⁶ AGL Loy Yang submitted that as Victoria's largest energy generator, at a facility of national significance, and with the strength of its balance sheet, this outcome would be extremely unlikely.⁹⁷

GDF Suez submitted that ‘there is no evidence before the Board which suggests that the adoption of a new system for rehabilitation bonds is essential, let alone urgent, in order to protect the State’s interests.’⁹⁸ GDF Suez further submitted that, if the Board is minded to recommend a new bond system, then:

A robust risk assessment approach ought to be applied to setting and reviewing bonds and such assessment ought not be applied in a one size fits all manner. The requisite risk assessment must be conducted on a case by case basis, having regard to the size, financial strength and reputation of the mine operator and their ultimate parent companies.

Further, any new system ought to include a capacity for operators to access a bond discount model, based on satisfaction of criteria including:

- a. the degree of financial stability of the operator (together with its parent entities);
- b. the operator’s track record in relation to progressive rehabilitation of the mine; and
- c. whether there is demand for the mine’s “product”.⁹⁹

GDF Suez agreed that the 10 principles identified by KPMG in its 2011 report ‘provide reasonable guide to developing or refining the policy applicable to setting rehabilitation bonds’ and noted that one of those principles is ‘the system should be based on risk management principles.’¹⁰⁰

GDF Suez submitted that:

A bond system which permits eligibility for a discount to be accessed by reference to clear eligibility criteria including adherence to progressive rehabilitation targets is likely to provide precisely the right kind of “carrot and stick” mechanism to achieve the dual goals of: (a) ameliorating risk of liability to the State in a manner which properly recognises the real level of risk; and (b) encouraging progressive rehabilitation.¹⁰¹

9.5 BOARD’S DISCUSSION AND CONCLUSIONS

The Board is required to consider whether there are practical, sustainable, efficient and effective alternative financial assurance mechanisms that will ensure the mine operators will carry out the required rehabilitation of the mine sites. The Board is required to consider the Bond Review Project in its deliberations on this Term of Reference.

As has been noted in Parts 7 and 8 of this report, the Bond Review Project is incomplete. The Board notes that the Mining Regulator is also awaiting advice from NERA Economic Consulting about its policy review of the bond system. In the Board’s opinion, that work will provide the Mining Regulator with valuable assistance in its consideration of bonds. The Board affirms this important work, which should be completed as soon as possible.

9.5.1 PRINCIPLES FOR ALTERNATIVE FINANCIAL ASSURANCE MECHANISMS

Given this context, the Board can articulate the general principles that it considers should be part of any review of the current rehabilitation bond system. The Board is not in a position to make a finding that preferences one specific mechanism over another.

To the extent that it can provide its opinions on an alternative mechanism, the Board considers that any financial assurance mechanism must be based on a sound understanding of the likely costs of rehabilitation—without that, the mechanism will not adequately provide outcomes in line with the intentions of the Mineral Resources Act. In order to maintain the foundation of robust rehabilitation cost estimates, the mechanism must mandate periodic reviews of those costs and the progressive rehabilitation works within the mines.

The Board notes the general acceptance of the principles set out by KPMG in its 2011 report for a good security model. It also acknowledges KPMG's opinion that one mechanism is unlikely to satisfy all 10 principles. The Board does not consider that this is a reason not to adopt one or a combination of mechanisms to suit a particular set of circumstances—indeed, as KPMG states, the Mining Regulator and the mine operators need to consider the mechanism and determine what best suits their situation.

The Board is also cognisant of the relative uncertainty of the future of brown coal as a source of electricity across the world, and in Victoria. In that regard, the Board has considered the matters referred to in Part 2.3.5 of this report, which could increase the risk of early closure of one or all of the Latrobe Valley mines. As discussed in Part 8.4 of this report, there are also factors that reduce the likelihood of mine operators defaulting on their liabilities, such as their financial stability. In noting these factors, the Board is careful to state that it has not undertaken any risk assessment of the mine operators defaulting on their rehabilitation obligations.

However the Board considers that a risk-based financial assurance mechanism is appropriate for the Latrobe Valley mines. The Board accepts the submissions of GDF Suez that under the financial assurance mechanism, bonds should be established on a case-by-case basis. The mechanism itself should be consistent and transparent. The Board recommends that the Mining Regulator takes these factors into consideration when identifying the preferred financial assurance mechanism for the Latrobe Valley mines.

The Board has considered the conclusions reached by KPMG in its 2011 report and Accent Environmental's review of the various mechanisms as alternatives to the existing bond system. In line with the conclusions reached by KPMG and Accent Environmental, the Board considers that the alternative mechanisms that are more likely to be 'practical, sustainable, efficient and effective' are the bond discount mechanism and a post-closure trust fund.

9.5.2 BOND DISCOUNT MECHANISM

A bond discount mechanism adopting the KPMG two-track model, could address the financial opportunity costs faced by the mine operators, as well as providing the State with a greater sense of risk control. It recognises the past performance of the mine operators and the likelihood of default, while also providing a financial incentive to the mine operators to complete the identified performance steps, which would likely include progressive rehabilitation.

The Board notes that applying the bond discount mechanism would require, as its foundation:

- An agreed estimated rehabilitation liability assessment, undertaken in consultation with the Mining Regulator, upon which any further consideration of a discount would be based.
- An assessment of the risk factors that may impact on the likelihood of the mine operators defaulting on their rehabilitation obligations—in this respect, the Board accepts the list of factors identified by Dr Gillespie as relevant to this exercise.
- A detailed plan for performance, against which the compliance can be measured.

The Board considers that in order to achieve the agreed rehabilitation liability estimate, the procedures described in the recommendations in Part 8 of this report would need to be followed. The Board also considers that a risk assessment would need to be undertaken using a detailed risk assessment methodology, most likely set by an expert in this field. The complexity of the methodology must be matched by expertise and capacity available to the Mining Regulator, either internally or externally. Processes must be clear and transparent, and not overly onerous to the mine operators, or for the Mining Regulator to administer. Finally, the Board observes that ensuring that a detailed performance plan is documented may be challenging, having regard to the various current uncertainties about progressive and final rehabilitation discussed in this report. This may be more achievable once further research and planning is conducted, as discussed in Part 6 of this report.

9.5.3 TRUST FUNDS

The rehabilitation trust fund to be established under the Loy Yang Complex Agreement provides an alternative model to the State's existing rehabilitation bond system. If established and administered appropriately, such a fund could provide an alternative mechanism for each of the Latrobe Valley mines. The Board is attracted to the idea of such a fund because:

- The mine operators could directly draw down on the fund for rehabilitation (in contrast to locking up working capital via a rehabilitation bond).
- The funds will still be available even in the event of one of the signatories becoming insolvent.
- The ongoing contributions will demonstrate operator commitment to rehabilitation.
- It will increase the State's level of confidence that funds will be available to undertake rehabilitation.
- It can be used to supplement the rehabilitation bond.
- It provides incentive for progressive rehabilitation to be undertaken, as funds can only be used for rehabilitation.

The Board recognises that the mine operators do not support a trust fund that applies to all three mines, due to the potential for cross-subsidies and the risk that one mine operator defaulting would adversely impact the other mine operators. The Board rejects the submission of Counsel Assisting that a common trust fund would be an appropriate alternative to the current bond system.

However the Board accepts that a post-closure trust fund could have significant benefits for the Latrobe Valley, as it could mitigate the likely costs arising from ongoing monitoring, maintenance and management of the rehabilitated mine sites. A post-closure community fund could also have broader benefits for the Latrobe Valley, by mitigating likely impacts to the community that will occur as part of mine closure.

The Board recommends that the Mining Regulator establishes a post-closure trust fund for the Latrobe Valley mines. The Mining Regulator should also consider establishing a post-closure community fund.

The Board suggests that both the State and the mine operators contribute to the post-closure trust fund and community fund. The legacy of the decisions and actions of the State—such as the SECV's low levels of rehabilitation, and the decision to place the Princes Freeway close to Hazelwood mine (see Parts 2 and 6)—have affected the amount and type of rehabilitation the mine operators will need to undertake. This legacy will also impact the need for monitoring and maintenance in the medium and long-term—for example, the location of the Princes Freeway will mean that stability will be of greater importance at the Hazelwood mine, and may require extra monitoring and maintenance. The Board considers that the State cannot abdicate its responsibility for these legacy issues.

The Board notes that the State receives, and is likely to continue to receive, substantial income from the mine operators for rent and royalties, currently in excess of \$32 million per annum (as discussed in Part 3 of this report). Unless there is regulatory change, it can be expected that the State will continue to receive similar amounts over the coming decades, reducing as each mine closes.

Considering the income generated from the mines, and the legacy of State decisions and activity related to the mines, the Board considers that it is reasonable for the State to make contributions to the post-closure trust fund and community fund, if implemented. The mine operators should also make contributions as part of their responsibilities for ongoing monitoring and maintenance.

The Board recommends that the State include risk-based financial assurance mechanisms in the revised financial assurance system, as a method of encouraging progressive rehabilitation. The mechanisms should take into account the size, assets and ownership of the mine operator; the mine operator's history of compliance; demand for coal; and the nature of the mine operation. The mechanisms should also be consistent and transparent, with the level of the financial assurance assessed on a case-by-case basis.

The Board recommends that the State establish a post-closure trust fund to mitigate the likely costs arising from ongoing monitoring, maintenance and management of the rehabilitated mine sites after closure. The State should also consider establishing a post-closure community fund for the Latrobe Valley, to mitigate the likely social and economic impacts of mine closure. The mine operators and the State should contribute to both of these funds.



Hazelwood mine
(source: GDF Suez)



Hazelwood mine
(source: GDF Suez)

PART TEN
OUTSTANDING
ISSUES REQUIRING
RESOLUTION

PART 10 OUTSTANDING ISSUES REQUIRING RESOLUTION

10.1 OVERVIEW

Earlier in this report, the Board discussed and assessed whether the current regulatory framework (legislation, regulations, guidelines and policies), is effective for regulating the Latrobe Valley mines, and in particular, for regulating progressive and final rehabilitation. The Board found that the framework is adequate, however the Mining Regulator has inadequately applied aspects of the regulatory framework and the mine operators have inadequately implemented some of the framework's requirements. As a result, the framework's effectiveness has been compromised.

Therefore, this may reduce the likelihood of successful progressive and final rehabilitation of the three Latrobe Valley mines. To the extent that the Mining Regulator's and the mine operators' actions or omissions fall outside the scope of Terms of Reference 8, 9 and 10, these actions and omissions are reasonably incidental to those Terms of Reference, and therefore fall within the scope of Term of Reference 12.

This Part considers the following issues:

- The adequacy of the work plans and rehabilitation plans approved by the Mining Regulator.
- The consideration and action of the mine operators and the State to verify water availability for the purpose of rehabilitation.
- The Mining Regulator's application of expert advice in relation to work plans and rehabilitation plans.
- The adequacy of the mine operators' engagement with the Latrobe Valley community about final rehabilitation.

In relation to these issues, the Board makes several adverse findings against the Mining Regulator and the mine operators. As noted in Part 1 of this report, s. 76 of the *Inquiries Act 2014* (Vic) imposes a procedure which must be followed if adverse findings are proposed by a Board constituted under Part 3 of the Act. This is an important aspect of the requirements of procedural fairness. The Mining Regulator and the mine operators were provided with the opportunity to consider the Board's proposed adverse findings, and to provide responses for the Board's consideration, before the Board determined to make any adverse findings.¹ The Board considered the various responses provided to it pursuant to the Act, before making the adverse findings set out in this Part.² The Board did not receive any submissions from the State about the Board's proposed adverse findings against the Mining Regulator.

10.2 ADEQUACY OF WORK PLANS

Schedule 15(1) of the Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic) (Mineral Industries Regulations), prescribes the content and level of detail to be contained in a mine licensee's work plan, including its rehabilitation plan. The licensee must address the following in its rehabilitation plan:

- 'Concepts' for the end utilisation of the site.
- A 'proposal' for the progressive rehabilitation and stabilisation of extraction areas.
- 'Proposals' for final rehabilitation and closure of the site.³

In its evidence to the Board, the Technical Review Board was critical of the insubstantial technical detail contained in work plans.⁴ In its annual reports since 2011–12, the Technical Review Board has identified that there are areas of uncertainty and a number of assumptions contained in the mines' work plans and that 'considerable study, assessment, evaluation, implementation and ongoing monitoring with action plans are required' to test and monitor these uncertainties.⁵ In its 2011–12 Annual Report, the Technical Review Board advised that this will 'take time to develop and will be a costly process' and recommended that 'steps are taken immediately to begin an assessment of the issues.'⁶

In a letter to the Mining Regulator, dated 12 October 2015, regarding AGL Loy Yang's 2015 work plan variation application, the Technical Review Board raises its concerns about the lack of performance criteria (among other things) being set by the State:

[T]he application is highly conceptual and based heavily on descriptions of proposed activities and statements of intent. The underpinning technical information is scant and, furthermore, the reader is required to distil for [itself] the little technical information that there is from the appendices. In the main, performance criteria appear to have been set by the proponent rather than by an independent assessing body...A range of aspects critical to successful rehabilitation are not assessed or even discussed.

...

A fundamental problem appears to me to be that a detailed set of performance criteria are yet to be set by government. For example, the current performance criteria for rehabilitation batters is simply that they are required to be *safe and stable in the long-term*.⁷

Professor Jim Galvin, Chair of the Technical Review Board, told the Board that the Mining Regulator has not implemented performance measures for work plans:

Four years ago the [Technical Review Board] gave formal advice to the department when we were working with work plans that we considered the detail in them to be insufficient, inadequate. We thought that the information they were referring through to us had not been properly distilled and sorted through by the department before it ever got anywhere near us. We gave the department model approval conditions for mines recently approved, other open-cut mines...four years later...nothing had changed...there were things in that plan that should never have got through a regional office as part of the approval process, let alone come to a [Technical Review Board].⁸

The Technical Review Board has also been critical of the content and form of conditions set by the Mining Regulator in relation to work plan variations. In relation to the 2015 Loy Yang work plan variation, Professor Galvin noted that although the conditions attached to the approval are 'a big step in the right direction', they are convoluted and lack clarity.⁹ Many of the conditions in the current work plan require AGL Loy Yang to complete a report or take some other step 'to the satisfaction of the Department Head.'¹⁰ Professor Galvin told the Board that there is no guidance or criteria for determining the outcomes or outputs of the various risk assessments required of AGL Loy Yang in the approved work plan variation conditions.¹¹ When Mr Luke Wilson, Lead Deputy Secretary of Agriculture, Energy and Resources at the Department of Economic Development, Jobs, Transport and Resources (DEDJTR), was asked how the Mining Regulator would establish whether these conditions were met, he stated that 'there would be conversations with the proponent to talk through each condition and lay out what the expectations are...[I]f there are points where it is unclear, then we would work through those.'¹² Mr Stephen Rienets, General Manager of AGL Loy Yang, stated that AGL Loy Yang planned to 'engage with [DEDJTR] to come to a resolution on those conditions.'¹³

Professor Galvin stated that the Mining Regulator currently has a reactive approach to responding to mine instability and rehabilitation issues. He told the Inquiry that the Technical Review Board believes that the Mining Regulator 'needs to be more proactive in adopting contemporary rehabilitation policies and practices, in promoting research and collaboration between all stakeholders, in conditioning work plan approvals, and in regulatory oversight of rehabilitation.'¹⁴

Professor Galvin further told the Inquiry that, in his opinion, 'Victoria is a decade behind practice in mine approval processes.'¹⁵ Professor Galvin produced an approved work plan for the 2012 Maules Creek Coal Project in New South Wales to demonstrate the required administrative, environmental performance and management, and reporting and auditing conditions that a new mining project in New South Wales requires.¹⁶ He stated that the New South Wales approach provides for greater clarity and allows the reader to easily find key information and navigate between relevant sections.¹⁷

Ms Corinne Unger, a member of the Technical Review Board, produced a copy of the *Western Australian guidelines for preparing mine closure plans 2015*, which she submitted contain principles worthy of review in the Victorian context.¹⁸ Some relevant features of the guidelines include state-established standards and frameworks for closure processes and closure plans; the requirement that all affected state agencies sign off closure plans; and the requirement that mine operators plan for mine closure upfront and review plans regularly.¹⁹

Counsel Assisting submitted that the issue with work plans is not that the mine operators have failed to meet their legal obligations; instead the problem is that ‘the legal obligations are so minimal. It is a minimal compliance regulatory scheme under which the mines do what they have to do.’²⁰ Counsel Assisting noted that this is in contrast to other regulatory regimes, such as that for occupational health and safety, under which:

a person has to do what is reasonably practicable, has to proactively manage risk rather than just doing what the regulator tells them they have to do. This is a very important aspect of the existing scheme. It shows that the scheme is quite out of date when measured against current and sound best-practice regulatory approaches.²¹

10.3 SOURCING WATER FOR REHABILITATION

An area of particular concern to the Board was the manner in which the plans to flood the Latrobe Valley mines have been assessed and regulated, in circumstances where there may not be sufficient water available and mine operators may not be entitled to their current water licensing arrangements.

The 2011 *Gippsland Region Sustainable Water Strategy* (Sustainable Water Strategy), a key state policy, states that the pit lake options for the mines are not ‘an entirely viable option any longer because there is insufficient water to fill most of the mines.’²² The Sustainable Water Strategy identifies a number of actions to be undertaken by key stakeholders to address water availability. Of particular relevance to this Inquiry is ‘Action 6.8 Open-cut coal mine closure and restoration strategies’, which provides that DEDJTR:

will review mine rehabilitation strategies, in consultation with [the Department of Environment, Land, Water and Planning], the Environment Protection Authority and companies that mine coal in the Latrobe Valley. The mine closure and restoration strategies will consider impacts on groundwater and surface water resources.²³

As discussed below, the Board heard that the Mining Regulator approved the rehabilitation plans without adequately consulting relevant stakeholders about water availability (that is, whether there will be enough water in the water system to flood the mines) and accessibility (that is, whether the mine operators can access that water under their existing water allocations). The Board also heard that the mine operators did not proactively follow up these issues with the Mining Regulator to ascertain whether their current rehabilitation plans were viable.

10.3.1 YALLOURN WORK PLAN VARIATION

In a letter dated 2 February 2011 about the 2011 Yallourn work plan variation application, the Technical Review Board advised the Minister that ‘[t]he current Yallourn Mine rehabilitation strategy of flooding the mine has been shown to be not feasible because of insufficient water.’²⁴ The Mining Regulator subsequently approved the Yallourn mine’s 2011 work plan variation with conditions.²⁵ One of the conditions (Condition 7) required EnergyAustralia to review the feasibility of the plan to flood the mine versus other rehabilitation options.²⁶ In response, EnergyAustralia prepared or commissioned four studies:

- *Yallourn mine—Final land rehabilitation lake filling model*, prepared by EnergyAustralia in April 2012.
- A peer review of that report, undertaken by expert consultants GHD in March 2012, titled *Yallourn mine—Lake filling model review: Findings of the model review*.
- *TRUenergy Yallourn: Report for Yallourn mine rehabilitation—Geotechnical assessment of flooding options*, prepared by GHD in May 2012.
- *Yallourn mine final rehabilitation—Review of the Morwell River Diversion*, prepared by expert consultants SMEC in May 2012.²⁷

The studies informed the development of a report titled *Review of the Yallourn mine rehabilitation master plan*, which was submitted to the Mining Regulator in 2012.²⁸ The report states:

In a major assessment of the potential development of the Latrobe Valley coal fields in this century (Latrobe Valley 2100 Coal Resource Project, GHD 2004), a range of issues were identified...It was put forward that “Using water for final rehabilitation is another possible solution, however fully flooding all mine areas is unlikely to be viable due to the magnitude of water required. Designs would need to identify the source of the water and demonstrate appropriate management of any environmental issues before flooding should proceed.”

...

[EnergyAustralia] has recently commenced further work to better quantify the geotechnical design requirements of our preferred fully flooded mine rehabilitation option. What remains critical for [EnergyAustralia] is ensuring that the currently approved [rehabilitation master plan] is re-affirmed by [DEDJTR] and that more certainty regarding our access to water resources can be gained...²⁹

Mr Wilson conceded that this was an indication that EnergyAustralia ‘was looking to [DEDJTR] for some certainty’ about access to water for the purpose of its rehabilitation plan.³⁰ Despite the ‘critical’ concerns raised in the letter from EnergyAustralia, the Mining Regulator did not formally respond.³¹ Mr Wilson indicated that there was informal contact between the Mining Regulator and EnergyAustralia; however he could not provide the Board with information about the nature and purpose of this contact.³²

10.3.2 LOY YANG WORK PLAN VARIATION

The issue of water availability was also raised during the approval process for the 2015 Loy Yang work plan variation. AGL Loy Yang’s application included a copy of a report it commissioned from GHD, titled *Report for AGL Loy Yang—Loy Yang mine rehabilitation: Mine lake water balance modelling*.³³ The GHD report states that:

the likelihood of accessing full Bulk Entitlement post mine closure is unknown at this stage and could potential [sic] be affected by actual climate sequences, in particular during drought periods so their [sic] is some uncertainty associated with relying on this allocation for mine closure planning.³⁴

The Mining Regulator referred the Loy Yang work plan variation to Southern Rural Water for comment. In reply, Southern Rural Water advised the Mining Regulator, in a letter dated 24 August 2015, that ‘[t]here are a significant number of risks related to the long-term availability of water for mine void filling’ which are not addressed in the Loy Yang work plan variation application.³⁵

The letter also notes that Southern Rural Water was advised by the Department of Environment, Land, Water and Planning (DELWP) that a meeting between it and DELWP to consider the work plan variation is ‘essential.’³⁶ Dr Sharon Davis, Executive Director of the Water Resourcing Division, Water and Catchments Group at DELWP, told the Board that she agreed that such a meeting was essential, and the same issue was raised on two earlier occasions.³⁷ As at 9 December 2015, the ‘essential’ meeting between Southern Rural Water and DELWP had not occurred; nor had it been scheduled.³⁸

Despite the correspondence from Southern Rural Water, the Mining Regulator approved the 2015 Loy Yang work plan variation but with conditions. Condition 7.1 of the Loy Yang work plan variation requires the mine operator to perform a ‘Water Resources Risk Assessment’, to be undertaken in accordance with Action 6.8 of the Sustainable Water Strategy (as discussed in Part 6).³⁹ Counsel Assisting questioned Mr Wilson on whether the Mining Regulator was delegating its responsibilities under Action 6.8 to AGL Loy Yang. Mr Wilson stated that Condition 7.1 was ‘not intended to be read that way’, and that responsibility remained with DEDJTR.⁴⁰

In response to questions about why the 2015 Loy Yang work plan variation was approved in light of the concerns raised by Southern Rural Water, Mr Ross McGowan, Executive Director of the Mining Regulator, stated that:

On the face of it, it would appear that they contradict each other, but over time application of water from particular water authorities and particular companies changes. So, at the end of mine life I would have thought there would have been conversations with respect to the use of water and the use of entitlements and perhaps the use of those entitlements for other matters, including mine flooding.⁴¹

10.3.3 LIAISON WITH KEY STAKEHOLDERS

The Board heard that DEDJTR has not yet consulted with DELWP or any of the mines to undertake Action 6.8 of the Sustainable Water Strategy.⁴² Further, DELWP (which has statutory responsibility for the Sustainable Water Strategy) has not progressed the issue with DEDJTR.⁴³ This is despite s. 22J of the *Water Act 1989* (Vic) (Water Act), which requires DELWP to comment on measures being taken to implement the State's current 'Sustainable Water Strategies' in its annual report. The State advised the Board that the failure by DELWP to report as required was because its annual reports are 'by necessity at a high level' due to the 'breadth of issues' that needed to be addressed.⁴⁴

The only evidence before the Board that the Mining Regulator has led some discussions about water availability for rehabilitation plans is the exchange between Southern Rural Water and the Mining Regulator (referring to advice from DELWP), in relation to the 2015 Loy Yang work plan variation.⁴⁵

The Mining Regulator has not otherwise had discussions about the availability of water (generally or through current allocations) with Dr Davis, Mr Clinton Rodda, Managing Director of Southern Rural Water, or Mr David Mawer, Managing Director of Gippsland Water. The Board heard:

- Dr Davis and Mr Rodda stated that it is not clear whether any or all of the mine operators would be able to use their existing water allocations to access the water they needed to fill their pits.⁴⁶
- Dr Davis and Mr Rodda have not been asked formally for their views on whether the mines will be able to use their present water allocations,⁴⁷ or be able to divert one or more rivers for the purpose of filling the lakes.⁴⁸
- Dr Davis, Mr Rodda and Mr Mawer were unaware of the volume of water that mine operators had proposed was required for each lake.⁴⁹
- Mr Rodda stated that it is difficult to speculate on the future available quantity of water, and accordingly, it is possible that the volume of water available to the mines could diminish as each allocation is a percentage, not a set amount.⁵⁰

Mr Wilson conceded to the Board that the issues identified throughout the Inquiry regarding water access are 'not new issues, they have been around for a number of years', but that they need to be resolved for rehabilitation plans to be implemented.⁵¹

Professor Rae Mackay, Director, Geotechnical and Hydrogeological Engineering Research Group (GHERG) at Federation University Australia, explained to the Board why it is crucial for agencies to work together on this question:

These mines will become fairly significant sinks for water in the sense that they will become open lakes and those lakes will have significant evaporation. That means that there will be a change in the hydrology of the area for a period of time. It may be that change in the hydrology will become a permanent feature of the region and that will have implications, both positive and negative, for the region's water users. The potential that the stability of the mines and the management and maintenance of the mines in their rehabilitated closed form will be a significant expense exists and therefore there will need to be some reconciliation of that.

So there is a whole series of reasons why all the stakeholders who are involved in the consideration of what closure will mean for the Valley should come together to actually address those issues.⁵²

10.3.4 MINE OPERATORS

The Board heard that, with the exception of EnergyAustralia, the mine operators have not initiated any formal conversations with DEDJTR or DELWP to obtain an assurance that water can be accessed under current allocations for rehabilitation purposes or that there is an adequate supply of water for each lake.⁵³

The Board notes that regardless of the Mining Regulator's failure to respond to EnergyAustralia's concerns about water availability in 2012,⁵⁴ EnergyAustralia has taken no further action to raise that issue again.⁵⁵ When Mr Ronald Mether, Mine Manager at EnergyAustralia, was asked if EnergyAustralia had sought to follow up this issue since then, during its many subsequent interactions and correspondence with the Mining Regulator, he said that 'it hasn't been front of mind at those discussions in the last three years.'⁵⁶ Mr Mether informed the Board that EnergyAustralia has not actively initiated discussion with the State due to 'other activities', such as the repair of the Morwell River Diversion after its failure in 2012.⁵⁷

Mr James Faithful, Technical Services Manager – Mine, GDF Suez, agreed that the current rehabilitation plans for Hazelwood mine assume access to its current water allocations.⁵⁸ Counsel Assisting asked Mr Faithful what steps had been taken by GDF Suez to confirm access to water sources for the purposes of rehabilitation. Mr Faithful told the Board that 'there has been no formal request of government officials to secure access to that water.'⁵⁹ He told the Board that he was aware of discussions between a colleague and a representative of Southern Rural Water at a recent Regional Groundwater Management Committee meeting about the licensing process for groundwater.⁶⁰ In additional evidence to the Board, Mr Faithful stated that his understanding was based on 'the discussion that we had or one of my colleagues had with Southern Rural Water which indicated that you could roll those water licences over for a period of 15 years.'⁶¹ Mr Faithful could not say whether the use of groundwater licence allocations was discussed.⁶²

In answer to a question from counsel for GDF Suez, Mr Faithful told the Inquiry that GDF Suez would 'of course' liaise with the water authorities or get some assurance regarding access to water if the Mining Regulator asked it to.⁶³ However, when asked by Counsel Assisting about the same matter, Mr Faithful accepted that GDF Suez did not have to 'wait until it is a condition of a work plan to ask the question.'⁶⁴

Mr Rieniets informed the Board that water from Loy Yang's current bulk entitlements and groundwater licence are 'more than sufficient' to fill the mine to achieve stability,⁶⁵ and that he assumed that Loy Yang mine 'will have access to that water.'⁶⁶ When asked if AGL Loy Yang had received any assurance from the administrators of its allocations in this regard, Mr Rieniets responded that AGL Loy Yang 'haven't had any official discussions with the government on that.'⁶⁷

In response to further questioning from Counsel Assisting regarding discussions with the State about accessing existing allocations, Mr Rieniets told the Board that AGL Loy Yang had not done so 'at this point.'⁶⁸ Mr Rieniets stated to the Board that it was a condition of the 2015 work plan variation that AGL Loy Yang engage with the regulators and other authorities about sourcing water but that obligation arises at the end of stage C of the rehabilitation plan, which is expected to be in 2023.⁶⁹ Mr Rieniets accepted that the level of proposed water in the Loy Yang mine pit might change in the future, depending on answers to questions about sourcing water.⁷⁰

Counsel Assisting submitted that the mine operators have not been sufficiently proactive in resolving the issue of sourcing water.⁷¹ In their closing submissions to the Inquiry, each of the mine operators advocated against the finding that they should be criticised by the Board for their failure to be more proactive in this regard.⁷²

EnergyAustralia rejected the submissions of Counsel Assisting that it was not proactive, in particular referring to its communications with the Mining Regulator about the studies completed under Condition 7 of its 2011 work plan variation.⁷³ EnergyAustralia submitted that it has undertaken a substantial body of work in relation to the identification of potential water sources and issues associated with flooding the mine, and has determined that there is sufficient water available to fill the Yallourn mine.⁷⁴ EnergyAustralia submitted that the substance of that work should reassure the Board that there will be sufficient water to flood the Yallourn mine at the end of mine life.⁷⁵

EnergyAustralia further submitted that it is not in a position to lead discussions with the Mining Regulator in relation to the management of the State's water resources.⁷⁶ EnergyAustralia stated there are too many unknown factors, which render holding detailed conversations about water availability and access premature, and that 'it is not practical to achieve a greater level of certainty at this point in time.'⁷⁷ It also submitted that 'there is no evidence before the Board to support the proposition that the issue of sourcing water should be any further advanced at this juncture.'⁷⁸

EnergyAustralia also stated that the Sustainable Water Strategy erroneously assumes that the Hazelwood and Loy Yang mines will be filled entirely with water, and it should not be relied upon as it implies that a greater volume of water is needed.⁷⁹

GDF Suez submitted that 'it is somewhat galling for the mine operators to be criticised for an alleged failure to discuss these matters with government.'⁸⁰ GDF Suez further submitted that it should not be criticised for using the Regional Groundwater Management Committee as an appropriate forum for discussing, on an informal basis, issues about water with Southern Rural Water.⁸¹

GDF Suez stated that its groundwater licence is granted 'for the purpose of achieving safe and stable conditions at the Hazelwood mine.'⁸² It further stated that filling the void after mining ceases is crucial to the long-term stability of the Hazelwood mine, and therefore the Board should accept that filling the mine is 'entirely consistent with the purpose for which the groundwater licence has been issued.'⁸³

GDF Suez submitted that '[t]he Water Act provides that on the application of the holder of a licence for renewal of the licence, the Minister must renew the licence unless there are good reasons not to do so.'⁸⁴ GDF Suez stated that it was Counsel Assisting who had sought 'to inject an element of uncertainty into the viability of the rehabilitation plans' by questioning whether the various current water allocations could be used after mining and power generation ceases.⁸⁵

In relation to the uncertainties highlighted in its 2015 work plan variation (including the source and quality of water to fill the pit), AGL Loy Yang stated that:

AGL readily agrees that there are uncertainties which remain which require further work, but there is no evidence to suggest that these issues will not be addressed or that they are incapable of resolution. AGL has made significant commitments, both within the body of the work plan variation 2015 and in allocating substantial resources to address these issues.⁸⁶

In acknowledging that uncertainties exist about using water entitlements for lake filling, AGL Loy Yang submitted that 'in a practical sense it seems to be an artificial concern for the reason that there is no alternative rehabilitation, other than to rehabilitate the mine voids in a manner that includes a lake in the mine void.'⁸⁷ AGL Loy Yang relies on the Jacobs Group (Australia) Pty Ltd options report commissioned by the Board of Inquiry (see Parts 5 and 6) as evidence that there is no alternative option.⁸⁸

AGL Loy Yang also submitted that 'at this stage AGL has not received any indication from the authorities that it will not be able to use at least some of the water currently available to the site by way of bulk entitlements or groundwater licence.'⁸⁹ It further submitted 'that it is entirely appropriate for it to put forward its preferred scenario for lake filling in its work plan and to work with the authorities to aim to achieve that outcome.'⁹⁰ AGL Loy Yang stated that 'there is no rational reason why the authorities would refuse to provide AGL with a continuing entitlement to fill its mine if it was in the net interests of the community of Victoria to provide access to that water.'⁹¹

AGL Loy Yang further stated that it is entitled to assume that water will be provided by the State, because the Loy Yang mine site, when originally designed and constructed by the State Electricity Commission of Victoria, proposed a lake at end of mine life. AGL Loy Yang contended that had obtaining water been considered a risk at that point in time, the mine would have been designed differently to reduce the requirement for water when the mine closed.⁹² AGL Loy Yang submitted that on the basis of this history, it is entitled to assume that water will be available to fill the mine pit.⁹³ AGL Loy Yang submitted that 'the question is really about the length of time [the mine pit] will take to fill' when considering climate change and other factors that may impact water availability over time, not whether water will ultimately be available.⁹⁴ AGL Loy Yang submitted that it will be able to access water from the Blue Rock Reservoir (which is a water source for the Latrobe Valley power stations) and the Traralgon Creek.⁹⁵

AGL Loy Yang submitted that as a result of this Inquiry, the information about mine closure plans ‘can now assist with the scheduling of water resources allocation whilst maintaining current environmental flows. AGL Loy Yang will work with the Government agency tasked with this scheduling and co-ordination activity.’⁹⁶ It submitted that ‘this context supports the making of assumptions about the availability of water to the Loy Yang site, and that the Board ought not to make findings that criticise AGL Loy Yang for making such assumptions.’⁹⁷

10.4 COMMUNITY ENGAGEMENT

A further matter raised with the Board relevant to the regulation and implementation of work plans, is the adequacy of community engagement plans and processes. Throughout the Inquiry process, a consistent theme raised was the desire for the community to be better informed of, and included in discussions about, rehabilitation of the Latrobe Valley mines.

Ms Sara Rhodes-Ward, General Manager of Community Services at Latrobe City Council, stated that ‘if it’s about us, you need to involve us.’⁹⁸ Mr David Langmore, Latrobe Valley resident, emphasised that work plan variations should be part of ‘clear, formal, public processes’ and ‘not a matter of striking a deal between a particular single department of the State Government and a particular private company.’⁹⁹

Environment Victoria submitted that ‘[e]ducating the community about what the rehabilitation options are, what is technically feasible and what the risks and opportunities are is the necessary first step to effective community engagement.’ In its submission, Environment Victoria states that the trust of the community is a prerequisite to successful community engagement, and refers to the evidence of Mr Craig Lapsley, Victoria’s Emergency Management Commissioner, that ‘trust is gained in these situations by developing an understanding of the community being engaged, and then having ongoing discussions.’¹⁰⁰

The Board heard about successful examples of community engagement in mine rehabilitation in Germany, outlined in the case study below.

Case study: Community engagement projects in Lusatia, Germany

In Germany, there has been a focus on integrating communities into the mine rehabilitation process. Several projects have been undertaken in the Lusatia region to help build residents’ connection with the new landscape. A number of choirs in the region joined to create a united choir, with around 500 singers performing a new anthem in the post-mining landscape. In another project, residents were invited to welcome the creation of the new pit lake by joining in a light show performance. Community members brought their own torches, which lit up the perimeter of the new lake (see Figure 29). Dr Friedrich von Bismarck, Head of the Joint-Governmental-Agency for Coal Mine Rehabilitation in Germany, told the Board that the majority of the population in the region now see rehabilitation as a ‘very positive development.’¹⁰¹

Figure 29. Pit lake in Lusatia, Germany, lit by torches as part of community engagement project



Source: IBA-See

10.4.1 REGULATORY REQUIREMENTS

As discussed in Part 3 of this report, the *Mineral Resources (Sustainable Development) Act 1990* (Vic) (Mineral Resources Act) requires that a work plan must include a ‘community engagement plan’.¹⁰³ Schedule 15 of the Mineral Industries Regulations requires that the community engagement plan:

- a. identifies any community likely to be affected by mine operations; and
- b. in relation to the mine operations, includes proposals for—
 - i. identifying community attitudes and expectations; and
 - ii. providing information to the community; and
 - iii. receiving feedback from the community; and
 - iv. analysing community feedback and considering community concerns or expectations;
- c. includes a proposal for registering, documenting and responding to complaints and other communications from members of the community in relation to the mine operations.¹⁰⁴

Further, a mine operator is required to share information with the community about ‘any activities authorised by the licence that may affect the community’, and give members of the community a ‘reasonable opportunity’ to express their views about those activities.¹⁰⁵ The mine operators’ licence conditions require the establishment of an ‘Environmental Review Committee’ constituted by representatives from the community and government, including DEDJTR, DELWP, the Environment Protection Authority (EPA), water authorities and Latrobe City Council. Each Environmental Review Committee receives reports on environmental monitoring and progressive rehabilitation undertaken by that mine operator.¹⁰⁶

Ms Rhodes-Ward highlighted that community members involved in committees and consultations were often expected to disseminate information through their networks.¹⁰⁷ She told the Board that this can be onerous for community members, and that ‘we need to potentially rethink the expectations that we place on those individuals, that we can’t somehow assume that their attendance at those meetings removes from us the obligation to more broadly engage and interact with the community.’¹⁰⁸

Mr Langmore stated that it is important that people ‘genuinely feel that they have some power in the process’, rather than having tokenistic involvement.¹⁰⁹ However, Mr Langmore also indicated to the Board that sometimes, community members can become overwhelmed by the number of consultations they are asked to participate in.¹¹⁰ He told the Board that it was important that consultation processes are well considered, structured and phased, and that participants ‘shouldn’t be overworked in the process.’¹¹¹ Ms Rhodes-Ward noted that there should be a range of options for community members to engage, so that they can participate at a time and in a format that suits them.¹¹²

10.4.2 COMMUNITY ENGAGEMENT MECHANISMS EMPLOYED BY THE MINE OPERATORS

The Board heard that the mine operators are engaged in various community engagement processes and activities, and have complied with the Mineral Resources Act by including a community engagement plan in their work plans. The mines have also each formed an active Environmental Review Committee.¹¹³

The 2015 Loy Yang revised community engagement plan details each of the requirements of the Mineral Industries Regulations, and highlights the Environmental Review Committee and an annual public engagement forum as the primary means of providing information to the community and receiving community feedback.¹¹⁴ AGL Loy Yang also undertakes an annual independent community perception survey to assess the ‘effectiveness of its stakeholder and community engagement.’¹¹⁵ Under the section ‘Providing information to the community’, the Loy Yang mine community engagement plan states:

AGL Loy Yang commits to on-going engagement with its community to identify attitudes, expectations and concerns about its operations. With the project being in the Loy Yang Mine's operational phase, most of the information generated by the project relates to routine and on-going matters such as environmental monitoring and reporting with occasional, minor changes to operational activities.¹¹⁶

When questioned by Counsel Assisting about the importance of communicating with the community, Mr Rieniets stated that '[w]e have an [Environmental Review Committee], as I mentioned. We also have public forums to talk about environmental matters every year. The whole community is invited. We get 50 to 60 people as a minimum turn up to those sessions each and every year.'¹¹⁷

GDF Suez informed the Board that it undertakes additional community engagement processes, such as its community briefings, which are aimed at updating the community 'on responses to the [2014 Hazelwood Mine Fire] Inquiry, fire management and preparedness and rehabilitation works.'¹¹⁸

Mr Mether told the Board that EnergyAustralia produces a voluntary Social and Environmental Performance Summary report annually, which provides the community with a description of its health, safety, environment and community activities, and includes a report from the independent chair of its Environmental Review Committee on the activities and considerations of that committee.¹¹⁹

The Board notes that in 2015 AGL Loy Yang did not consult with the community about a change to its final rehabilitation plan—namely, that it was no longer intended that the mine site would be accessible to the public at the end of mine life.

Mr Rieniets told the Board that he understood that the change to public access at the end of mine life was discussed with AGL Loy Yang's Environmental Review Committee.¹²⁰ When asked directly by Counsel Assisting if the proposed change had been conveyed to the community in the Latrobe Valley, Mr Rieniets replied 'I can't answer whether it has or hasn't'.¹²¹ Mr Rieniets accepted that if AGL Loy Yang wants to ensure that a message reaches the community, it has to take additional steps beyond 'having a conversation with two community members present' at an Environmental Review Committee meeting.¹²² He added that he assumed that the work plan variation would be a public document once it was approved.¹²³

Mr Rieniets referred to AGL Loy Yang's annual public forums as a consultation mechanism for the mine. He conceded that the change to planned final land use had not been raised at any of those sessions.¹²⁴

Mr Wilson was asked whether a significant change to final land use such as that contained in the 2015 Loy Yang work plan variation should be the subject of community engagement. He responded that it should, and that both the Mining Regulator and the mine operator have a responsibility in that regard.¹²⁵

Counsel Assisting submitted to the Board that there was 'a lack of community consultation or transparency' associated with the approval process concerning AGL Loy Yang's 2015 work plan variation.¹²⁶ Environment Victoria supported this submission and pointed out that because the variation had occurred very recently, it is an important part of the evidence about current practices by the mine operators and the Mining Regulator.¹²⁷

AGL Loy Yang submitted that the duty under s. 39A of the Mineral Resources Act to consult with the community only extends to activities undertaken during the licence period, and does not extend to a duty to consult 'about a change in the proposed end land use at the cessation of mining in a work plan variation which precedes the intended closure date of the mine by 32 years.'¹²⁸ It submitted that the meaning of the phrase 'mining activities authorised by the licence' does not include 'final land use at the cessation of mining.'¹²⁹ AGL Loy Yang accepted that as part of the closure planning process, the community should be consulted about potential end land uses, however it is currently many years from the closure planning phase.¹³⁰ AGL Loy Yang submitted that it 'anticipates that it will consult about post-closure land use as the proposed closure timing moves closer and its rehabilitation plans become more detailed and refined.'¹³¹

AGL Loy Yang also submitted that as there is no current regulatory requirement to consult the community about work plan variations, 'it was not required or requested by the Department to consult with the community about the 2015 [work plan variation]', but that it will do so now that it has been approved.¹³²

In submissions to the Board, AGL Loy Yang accepted that 'the right to mine is a social licence which entails a moral commitment...to engage in meaningful dialogue with the local community.'¹³³

GDF Suez acknowledged that the 'community has an earnest desire to be part of the conversation about rehabilitation at the Mine'; however it submitted that the purpose of any such engagement 'is not to seek 'agreement' as this will never be forthcoming.'¹³⁴ GDF Suez referred to the evidence of Dr Clint McCullough, Associate and Principal Environmental Scientist at Golder Associates, in support of this submission.¹³⁵ The Board notes that Dr McCullough stated that stakeholder agreement will never reach agreement on closure criteria because 'there will always be either poorly informed people or people with extreme views.'¹³⁶

In its closing submissions, GDF Suez urged the Board to recommend that the State develop a 'Strategic Action Plan' with a number of objectives, including to ensure that 'the coal mines engage with communities as an integral component of planning for mine rehabilitation.'¹³⁷

10.5 THE MINING REGULATOR'S 2015–16 ACTION PLAN

The Board heard that the State proposes to improve the way it addresses issues about regulatory processes and structures. This intention is outlined in the *Earth Resources Regulation 2015–16 Action Plan* (Mining Regulator's Action Plan).¹³⁸ The Action Plan includes a focus on:

- role clarity (including the establishment of a community advocate role)
- building capability and culture (including the engagement of expert advice)
- risk-based strategies (including risk-based work plans)
- clear and consistent regulatory activities
- stakeholder consultation and engagement
- timeliness of decision-making
- communication and transparency.¹³⁹

The Action Plan highlights 'transparency' as a 'compliance principle',¹⁴⁰ and recognises the need for assessment criteria, applications, reports submitted by mines, and regulatory decisions, to be published.¹⁴¹ The Action Plan further indicates that the Mining Regulator has committed to drafting a guideline that provides clear information to industry about requirements under risk-based work plans.¹⁴²

The Action Plan records that the Mining Regulator will take steps to lead and strengthen its relationship with DELWP and other regulators (for example, the EPA and WorkSafe), to ensure that information is shared, and that there is consistency and cooperation in carrying out regulatory functions.¹⁴³

Under the Action Plan, the Mining Regulator aims to build its operational technical capability by drawing on the Technical Review Board to provide more strategic technical advice.¹⁴⁴ The Mining Regulator will also establish an external technical expert panel, which will 'provide operational technical capability in areas such as mine stability and water and chemical risks, and also support development of staff skills in these areas.'¹⁴⁵

Under the Action Plan, greater emphasis will be placed on risk management through the development of a holistic risk management framework for all regulatory activities. This will be supported by the implementation of risk-based work plans, as required by recent changes to Mineral Resources Act and Mineral Industries Regulations.¹⁴⁶ The Action Plan flags the establishment of a work plan assessment taskforce to '[s]elect the highest risk sites (approximately 50 sites) to submit risk based work plans.'¹⁴⁷

The Mining Regulator will also investigate the introduction of a cash bonds system for rehabilitation, and has committed to consider '[o]ther options to tailor bonds to reflect risk, informed by the Hazelwood Mine Fire Inquiry' in 2016.¹⁴⁸

The Action Plan states that DEDJTR will clarify the roles of its separate regulatory, industry development and independent dispute settlement arms, to assist community and industry to better understand the distinct roles.¹⁴⁹ A Community Advocate's role will be established to '[s]upport informed community participation in earth resources regulatory decisions.'¹⁵⁰ Mr Wilson explained that this was in response to DEDJTR identifying that community input is 'something that we need to do better', and that the Community Advocate's role would generate, coordinate and test community input.¹⁵¹

Also detailed within the Action Plan are strategies to increase technical capabilities related to fire safety, as recommended by the 2014 Hazelwood Mine Fire Inquiry.¹⁵² One strategy is the establishment of a Mine Fire Safety Unit, the role of which is to 'lead regulatory, compliance and education activities related to fire safety, and to provide advice to [the Mining Regulator's] staff, industry and the public.'¹⁵³ The Unit will have a staff of six and an annual budget of \$1.6 million.¹⁵⁴ The Unit will contribute to the Mining Regulator's assessment of fire risk in the Risk Assessment and Management Plans submitted by the mine operators.¹⁵⁵ Risk and fire experts will support the Unit by advising on 'best practice in other Australian jurisdictions.'¹⁵⁶

10.6 BOARD'S DISCUSSION AND CONCLUSIONS

The current regulatory scheme encourages a formalistic 'minimal compliance' approach. There were several examples before the Board that demonstrate that the regulatory framework is inadequate. In other instances, the framework is adequate, however it has not been adequately applied by the Mining Regulator or effectively implemented by the mine operators.

There are also examples of inadequate communication between the Mining Regulator and other key stakeholders such as DELWP. The 2014 Hazelwood Mine Fire Inquiry Report examined in detail the lack of communication between the Mining Regulator and the Occupational Health and Safety Regulator in Victoria, concerning the management of fire risk at the Hazelwood mine.¹⁵⁷ It is disappointing to the Board to see parallels between that situation and the present situation. The Board finds that the Mining Regulator has at times acted in isolation from other relevant state agencies, to the detriment of the mining industry and ultimately the broader community. This must be addressed as a matter of priority and is considered further in Part 11.

10.6.1 ADEQUACY OF WORK PLANS AND REHABILITATION PLANS

The Board agrees with the opinions of the Technical Review Board that the mines' work plans are conceptual and lack detail. The Board considers that this is a consequence of the framework, rather than reflecting the level of planning and modelling that has been undertaken by the mine operators.

A clear and systemic process would provide obvious benefits to the Mining Regulator and the mine operators, and avoid, for example, the 'convoluted and unclear' 2015 Loy Yang work plan variation conditions. Mr Wilson's suggestion that the Mining Regulator would 'talk through' its expectations under the work plan variation conditions with AGL Loy Yang, shows that the conditions themselves should have been better crafted, or that the work plan variation should not have been approved in its current form. The approach to regulation reflected in the conditions does not ensure transparency, accountability, consistency or certainty for mine operators.

Another example of the 'minimal compliance' approach of the current regulatory scheme is the State's failure to carry out Action 6.8 of the Sustainable Water Strategy. The Board reiterates that DEDJTR, DELWP and the relevant water authorities, in consultation with the mine operators, need to address the issues of water availability and accessibility in the immediate short-term. The Mining Regulator must strengthen arrangements with key agencies to formalise the way in which work plan variations are referred to agencies for review and approval. This needs to be appropriately documented to ensure accountability.

Condition 7.1 of the Loy Yang work plan variation requires AGL Loy Yang to conduct a water resources risk assessment in accordance with Action 6.8 of the Sustainable Water Strategy. However Action 6.8 is the responsibility of DEDJTR. The Board considers the Mining Regulator's inclusion of Condition 7.1 in the Loy Yang work plan variation as an example of DEDJTR failing in its responsibility to itself undertake the steps required by Action 6.8.

The issue of water availability is of profound importance to the mine operators' ability to implement their approved plans, however the current regulatory scheme does not support good practice in this area. The mine operators are required under the existing law to submit a rehabilitation plan for approval. They have each done so and their plans assume the availability of large quantities of water for rehabilitation. The Mining Regulator has not taken adequate steps to assess the viability of those rehabilitation plans. It has not adequately consulted with any of the key stakeholders in relation to water availability or access.

The Mining Regulator does not require the mine operators to satisfy it that they have made any inquiries of the water authorities. As a result the mine operators have not done so. Each mine operator has informed the Board that it would make such an inquiry but only if it was required by the Mining Regulator. The Board acknowledges that in 2012, EnergyAustralia urged the Mining Regulator to consider issues around water availability for final rehabilitation. EnergyAustralia's inquiries went unanswered. As Mr Wilson indicated, the issues raised by EnergyAustralia were of critical importance to the viability of its rehabilitation plans. Its importance should have resulted in timely action by the Mining Regulator. Despite the lack of response, EnergyAustralia did not follow up this issue with the Mining Regulator. The Board considers that it would have been prudent for EnergyAustralia to follow up these inquiries with the Mining Regulator.

A further example of shortfalls in the current regulatory framework arises from the 2015 Loy Yang work plan variation approval process. The Mining Regulator referred the proposal to Southern Rural Water for comment. Southern Rural Water raised a number of fundamental concerns with the proposal. It requested that there be a meeting to discuss these concerns before the Mining Regulator corresponded further with AGL Loy Yang. Despite these concerns and this request, the Mining Regulator approved the proposal without any such meeting and without requiring AGL Loy Yang to address the concerns raised in the correspondence from Southern Rural Water. The Board notes that there is no mechanism under the current regulatory framework requiring the Mining Regulator to act on the concerns of an agency that it has sought comment from, such as Southern Rural Water.

10.6.2 ADEQUACY OF ACTIONS TAKEN BY MINE OPERATORS ABOUT WATER AVAILABILITY

The Board accepts that a representative of GDF Suez had an informal discussion with a representative of the water licence administrator through the Regional Groundwater Management Committee about access to water. However, the Board does not accept that this discussion was all that GDF Suez ought to have done to deal with concerns around sourcing water. Equally, the Board does not accept that renewal of the groundwater licences held by the mine operators will automatically occur when they expire. The Board notes that the process for renewing a groundwater licence is more complex than an automatic renewal, as discussed in Part 3.3 of this report.

Mr Rieniets' evidence that AGL Loy Yang had assumed water would be available through its current entitlements, despite no discussions with the State, is of concern to the Board. This is particularly the case in light of Southern Rural Water's very recent correspondence to the Mining Regulator stating that 'there are a significant number of risks relating to the long-term availability of water for mine void filling.' The Board considers that the assumptions about access to water inherent in each mine's plan are merely that—assumptions. This approach is inadequate considering the fundamental requirement for large volumes of water to achieve the rehabilitation plans.

The Board considers that, notwithstanding that EnergyAustralia has undertaken the various studies in relation to water availability and access, and sought feedback from the Mining Regulator, there remain significant uncertainties. These uncertainties warrant further discussion between EnergyAustralia and the regulating agencies (DEDJTR and DELWP). As discussed in Part 7.3, the Board has received evidence from AECOM Services Pty Ltd that contradicts the water modelling relied upon by EnergyAustralia. The Board does not find that EnergyAustralia's information is incorrect—it merely notes that the Board cannot conclude that the position on water availability and access is resolved sufficiently enough to entitle the mine operators to cease actively seeking certainty.

The Board accepts that EnergyAustralia genuinely sought to engage with the Mining Regulator about this important issue. However, it remains concerned that EnergyAustralia has made no attempt to follow up its request since it wrote to the Mining Regulator in 2012. The Board accepts EnergyAustralia's submission that the Mining Regulator has the primary obligation to lead and facilitate discussions with respect to water, which arises under Action 6.8 of the Sustainable Water Strategy. However, the Board considers that the mine operators have a responsibility to have conversations about matters such as this that significantly affect their rehabilitation plans.

The Board rejects EnergyAustralia's submission that there is a lack of evidence to support the proposition that the issue of sourcing water should be further advanced at this stage. The Board notes that EnergyAustralia itself wrote to the Mining Regulator on 5 June 2012 describing the 'critical' need to have more certainty regarding access to water resources. The Board agrees that this need was critical in 2012. It is even more so in 2016.

The Board finds that given the central importance of access to water to fulfil their rehabilitation plans, the mine operators should have discussions with the water authorities as part of preparing those plans for approval by the Mining Regulator. As noted above, it recommends that the Mining Regulator engages with the mine operators and other relevant authorities to complete Action 6.8 of the Sustainable Water Strategy as soon as possible, and at the very latest by 31 December 2016.

10.6.3 ADEQUACY OF COMMUNITY ENGAGEMENT

Under the current regulatory framework there is an obligation to consult with, and listen to responses from, the community in respect to any activity that is authorised under a mining licence that may affect the community. Considering this, the level of community engagement in relation to the 2015 Loy Yang work plan variation, which limits public access to the mine site post-closure, was inadequate.

The Board does not agree with the submission of AGL Loy Yang that rehabilitation plans (which have a determining effect on the use of the land post mine closure) do not fall within the ambit of s. 39A of the Mineral Resources Act. The Board considers that the change in the proposed final lake level is the reason for the change in end use of the mine site, and therefore should have been the subject of consultation. The Board rejects the submission of AGL Loy Yang that its obligation to consult with the community about the approved 2015 work plan variation arises only after its approval.

The Board does not consider that it is sufficient for a licensee to rely on an Environmental Review Committee to convey information about changes that will affect Latrobe Valley residents to the broader community. This is inadequate community consultation. It is contrary to the duty imposed by s. 39A of the Mineral Resources Act.

The Board notes the suggestion by GDF Suez that the State should develop a 'strategic action plan' that includes an objective to ensure that 'the coal mine operators engage with local communities as an integral component of planning for mine rehabilitation.' The Board is not convinced of the need for this. The existing law already imposes such a duty on the mine operators. What is needed is for the operators to comply meaningfully with their duty and for the Mining Regulator to enforce such compliance. The Board's recommendations at Part 10.6.6 reflect this.

10.6.4 APPLICATION OF INDEPENDENT ADVICE

Relevant to the concerns about communication between the Mining Regulator and other relevant agencies, the Board notes that it has benefited greatly from the evidence of Professor Galvin, the current Chair of the Technical Review Board, as well as that of its former Chair, Adjunct Professor Sullivan, and members Professor Mackay and Ms Unger. The Board commends the Technical Review Board for its important role in providing robust and independent advice to the Mining Regulator.

The Board finds that the Mining Regulator has not adequately accessed or used the technical expertise that is available to it. This includes failing to sufficiently heed advice, such as the Technical Review Board's ongoing advice regarding stability, and Professor Galvin's and Southern Rural Water's advice regarding the 2015 Loy Yang work plan variation.

The Board considers that an independent expert advisory board, such as the Technical Review Board, is of fundamental importance to the success of mine rehabilitation. Its expertise must be respected, valued and appropriately used. Rehabilitation expertise, as currently contributed by Ms Unger, must be embedded in the Technical Review Board, so that rehabilitation and closure issues are part of the independent strategic advice provided to the Mining Regulator. The Board recommends that the Mining Regulator provide appropriate and ongoing resources to the Technical Review Board, particularly for the purpose of providing strategic advice on mine stability and rehabilitation.

10.6.5 REVIEW OF THE REGULATORY SCHEME

Some of the examples set out above demonstrate to the Board that the current regulatory scheme is ill-suited to contemporary needs. The legislation should be more concerned with ensuring that relevant risks are addressed by mine operators. The Board notes that the licence requirement to prepare and submit a Risk Assessment and Management Plan may go some way to achieving this outcome. In addition, the legislation should require that the Mining Regulator must act on the concerns of a referral authority, such as Southern Rural Water.

The evidence suggests a degree of passivity on the part of the mine operators in relation to seeking out answers to important questions such as sourcing water. Any criticism of the mine operators in this regard must be tempered by an understanding of the existing regulatory system. The mine operators have not failed to comply with the legislation in relation to their rehabilitation obligations through their conduct regarding issues of sourcing water. While the mines may be complying with their obligations, there is more that must be done to ensure rehabilitation is successful, and the regulatory framework should reflect that. This is clearly an area the State must address.

The Board notes the Mining Regulator's Action Plan identifies that the legislative framework will be reviewed. The Board recommends that improvements to legislation and subordinate regulations should address issues that have been raised throughout the Inquiry, such as the need for:

- definitions and criteria for progressive and final rehabilitation
- definitions and criteria for closure
- improved transparency and stakeholder engagement, including processes for referrals of work plans and work plan variations to relevant State agencies and referral authorities
- effective community consultation and engagement
- clarity regarding the roles of mine operators and the State in ongoing post-closure monitoring and maintenance
- clarity regarding the role and required skills and expertise of auditors of rehabilitation liability assessments and relevant accreditation processes (see Part 8.5.3).

The Board affirms DEDJTR's commitment to establish a Mine Fire Safety Unit to provide advice and lead regulatory, compliance and education activities related to fire safety. The work of the Unit will be supported by risk and fire experts who will provide a conduit between the Mining Regulator and best practice in other Australian jurisdictions. These initiatives, arising out of the 2014 Inquiry's recommendations, are welcomed.

The Board also affirms the commitments contained in the Mining Regulator's Action Plan to:

- Lead and strengthen its relationship with DELWP and other regulators (for example, the EPA and WorkSafe) to ensure information is shared, and there is consistency and cooperation in carrying out regulatory functions.
- Draft a guideline for providing clear information to industry about requirements under risk-based work plans.
- Build its operational technical capability by drawing on the Technical Review Board to provide more strategic technical advice.

- Implement risk-based mining work plans as required by recent changes to the Mineral Resources Act and the Mineral Industries Regulations.
- Establish a work plan assessment taskforce to identify relevant high risk sites to submit risk-based work plans.

The Board supports the Mining Regulator's commitment to expanding its sources of expert advice. It is important that the Mining Regulator's external technical expert panel is not conflated with the Technical Review Board, as the Technical Review Board's independence and ability to provide strategic, high-level advice is of great importance to the State. The Board strongly supports the online publication of the Technical Review Board's annual reports.

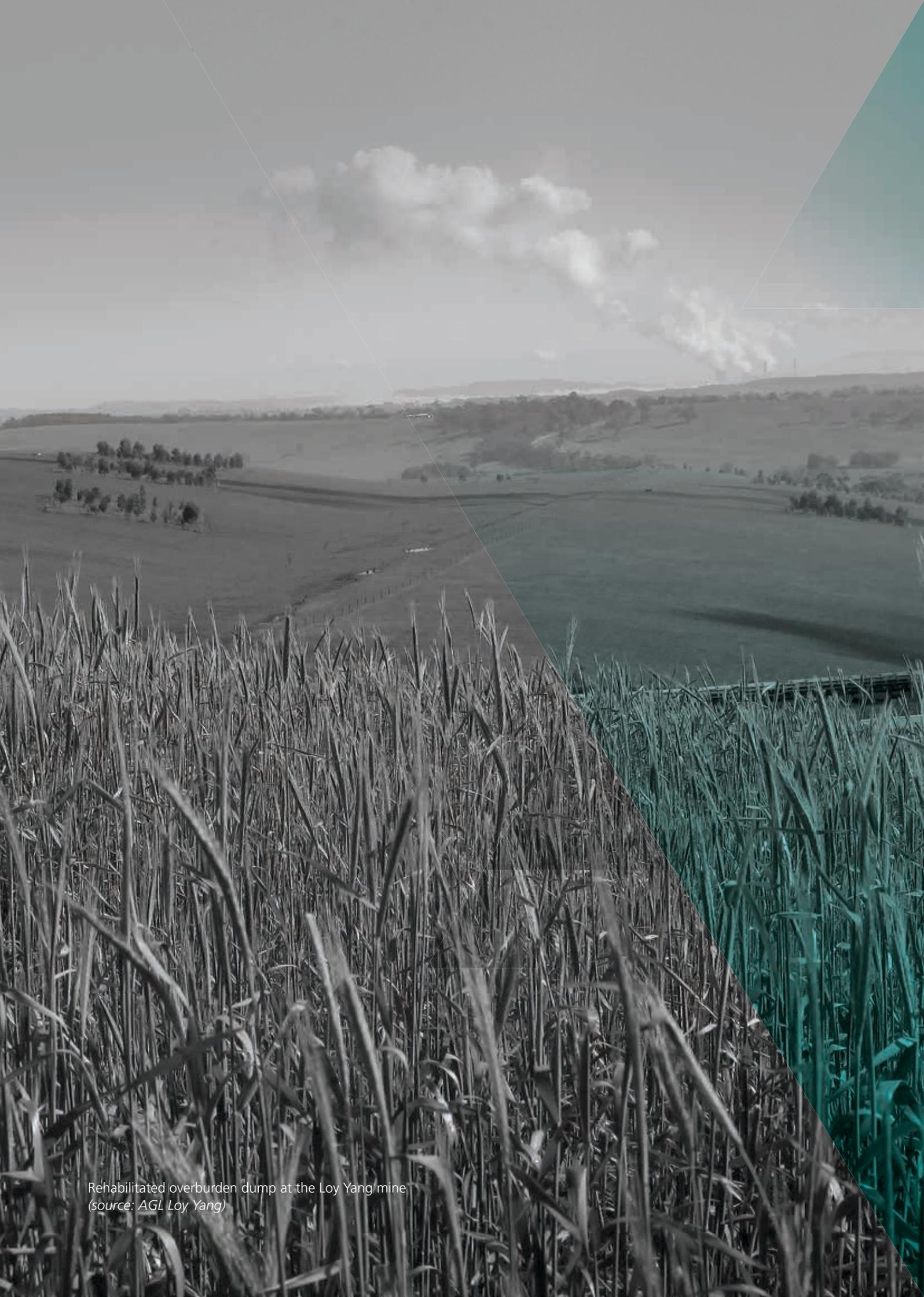
The Board notes that under the Mining Regulator's Action Plan, at least 50 of the highest risk mine sites in Victoria will be required to submit risk-based work plans. Considering the evidence the Board has heard regarding the risks and uncertainties in the Latrobe Valley mines, it seems highly likely that they will be part of this group. This initiative will require many of the deficiencies highlighted in the current work plans, such as sourcing water, to be addressed, and any identified remaining risks to be mitigated. The Board believes that this is an opportunity to resolve a number of issues. However, it is important that the Mining Regulator and the mine operators do not wait until risk-based work plans are introduced to begin addressing these issues—work to resolve them can commence now.

The Board recommends that by 31 December 2016, the State undertake Action 6.8 of the 2011 *Gippsland Region Sustainable Water Strategy*, to review the mines' rehabilitation strategies and consider impacts on groundwater and surface water resources.

The Board recommends that the State provide appropriate and ongoing resources to the Technical Review Board, particularly for the purpose of providing strategic advice on mine stability and rehabilitation.

The Board recommends that the State amend the *Mineral Resources (Sustainable Development) Act 1990 (Vic)* and the *Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic)* to address the issues that have been raised throughout the Inquiry, such as the need for:

- a dedicated Part of the Mineral Resources Act that exclusively regulates the Latrobe Valley mines
- definitions and criteria for progressive and final rehabilitation
- definitions and criteria for closure
- transparent processes for the referral of work plans and work plan variations to relevant State agencies and referral authorities, which compel the Mining Regulator to act on the advice received
- strengthened criteria for community consultation and engagement under s. 39A of the Mineral Resources Act and/or in community engagement plans
- clarity about the roles of the mine operators and the State in ongoing post-closure monitoring and maintenance
- clarity about the role and required skills and expertise of auditors of rehabilitation liability assessments and the auditor accreditation process (see the recommendations in Part 8).



Rehabilitated overburden dump at the Loy Yang mine
(source: AGL Loy Yang)

PART ELEVEN
COORDINATION
AND COLLABORATION

PART 11 COORDINATION AND COLLABORATION

11.1 OVERVIEW

Each of the Latrobe Valley mines is complex and unique; however there are aspects of rehabilitation planning which are common to all. Increased collaboration and coordination between the mine operators, the Mining Regulator, experts, key agencies and the community, could improve mine rehabilitation outcomes in the Latrobe Valley. The Board considers that these issues are matters that are reasonably incidental to its Terms of Reference 8, 9 and 10 and that they are required to be addressed under Term of Reference 12. This Part looks at the ways in which such coordination and collaboration might be implemented and progressed as the Latrobe Valley mines approach mine closure.

This Part discusses formal mechanisms that could ensure that coordination takes place. The Board commissioned Jacobs Group (Australia) Pty Ltd (Jacobs) to conduct an independent review into mechanisms to coordinate rehabilitation. Jacobs' report, titled *Analysis of potential coordination and planning models for Latrobe Valley brown coal mines* (Jacobs coordination report),¹ examines three areas of government policy in disparate sectors, where different forms of coordinating structures are utilised.²

The Board heard from Ms Carolyn Cameron, Director of Cameron Strategies, one of the authors of the Jacobs coordination report, who gave evidence about the range of coordination models that could be applied for the purpose of coordinating rehabilitation in the Latrobe Valley. The Board also heard from the mine operators and technical experts about the types of matters that could be the subject of coordination and collaboration, and the need for, and likelihood of success of, a coordinating structure.

11.2 THE NEED FOR COORDINATION AND COLLABORATION

A consistent theme in evidence before the Board was the need for the Mining Regulator, mine operators, the Department of Environment, Land, Water and Planning (DELWP), the water authorities, expert bodies and planning agencies, to work better together to ensure that appropriate rehabilitation outcomes are achieved.³ Latrobe Valley resident Mr David Langmore told the Board that '[i]t's going to require a lot of good research, a lot of good planning, a lot of good coordination to do it well.'⁴ GHD's submission to the Board notes the need for a strategic and holistic approach to rehabilitation, including the development of a regional mine rehabilitation plan.⁵

The joint expert report records the need for coordination and planning in relation to materials management, water and climate change impacts, timing of mine closure, ensuring safe and stable final landforms, and transitioning to beneficial post mining land uses.⁶ Professor Rae Mackay, Director of the Geotechnical and Hydrogeological Engineering Research Group (GHERG), Federation University Australia, identified the importance of the Mining Regulator, key agencies and the mine operators working together to solve complex issues. An example of such an issue is the coordination of water allocations. As filling the lakes may affect groundwater and surface water in the region, Professor Mackay told the Board that he would expect to see the establishment of 'some sort of overarching coordinating group' to oversee this.⁷

Professor Jim Galvin, Chair, Technical Review Board, told the Board that the mine operators have traditionally approached research and sharing knowledge competitively, and that they 'were islands that didn't engage or share even the most basic information.'⁸ He also told the Board that since the establishment of the Technical Review Board in 2011, it is a 'completely different culture now',⁹ noting that:

[s]ince the 2011–2012 Annual Report of the [Technical Review Board] was provided to the Government, there have been some significant positive signs of changing culture in regard to managing mine stability in the Latrobe Valley. These include mines collaborating much more closely with each other on hydrogeological and geotechnical issues and demonstrating commitment to education and research. Some of this research has been directed towards rehabilitation issues.¹⁰

Mr Ronald Mether, Mine Manager at EnergyAustralia, told the Board that reports are not shared as a matter of course.¹¹ However, in their evidence, Mr Mether, Mr James Faithful, Technical Services Manager – Mine, GDF Suez, and Mr Stephen Rieniets, General Manager of AGL Loy Yang, indicated that, in general terms, sharing of information could provide benefits and they are happy to work with the other mine operators.¹² However, they each also qualified this by saying that knowledge sharing needs to be relevant¹³ and based on ‘elements that apply to us all’¹⁴ or ‘where there’s common issues.’¹⁵

GDF Suez submitted that:

[it] is unsurprising that there is considerable commonality in the issues facing each of the mine operators given similarities in operations and locational, geotechnical and hydrogeological setting. Considerable benefits can be derived by the sharing of experiences and research. An understanding of the wider context of the mines is also fundamental for planning closure strategies, particularly in relation to issues such as the availability of water and community engagement.¹⁶

Professor Mackay told the Board that he has observed a demonstrated commitment by the mine operators to examining a number of geotechnical and hydrogeological issues that have been raised by the Technical Review Board, particularly regarding stability.¹⁷ Professor Mackay suggested that, considering the significant body of research that needs to be undertaken, it would be of benefit if there was a greater level of knowledge sharing among the mine operators.¹⁸ He explained that:

[t]here are considerable benefits to be gained from establishing an open access knowledge management system and database that is accessible by all parties and into which all new data can be entered. This should integrate the existing databases held by government departments, the mines, the consultants and GHERG and should be maintained as part of a wider consortium agreement covering knowledge management and mine rehabilitation closure planning.¹⁹

EnergyAustralia submitted to the Board that it would welcome greater coordination about access to water, and research about common issues, for example stability issues, within the existing framework.²⁰ It further submitted that it is:

committed to working with fellow mine operators, regulatory agencies, Government and the local community to deliver a final land form that benefits the community...EnergyAustralia joins in the call for clear and coordinated decision-making as it progresses towards the implementation of the Lake Option...²¹

GDF Suez submitted that:

[t]here should be co-ordinated consultation between the three Latrobe Valley coal mine operators, and involving [the Department of Economic Development, Jobs, Transport and Resources], the water authorities, local government, the community and, where necessary and appropriate, the [Country Fire Authority], and other entities such as VicRoads.²²

11.3 COORDINATION MECHANISMS

The Jacobs coordination report states that proactive coordination is necessary when the following characteristics are present:

- Priorities and timeframes are unclear
- Stakeholder views are diverse
- Information bases and rules for decision making are contested
- There is a lack of clarity on preferred outcome(s).²³

The report states that these are characteristics of the rehabilitation of the Latrobe Valley mines, and that there is a 'need for coordinated planning, allocation of resources, implementation of actions and monitoring of rehabilitation progress.'²⁴

Jacobs identifies the primary functions of coordinating bodies as:

- Planning
- Delivery and implementation
- Information and reporting
- Performance management and continuous improvement.²⁵

Ms Cameron advised the Board that of these functions, the planning function would be the most important area of focus for the Latrobe Valley mines.²⁶ She advised that a coordinating body should not have a regulatory function, as 'regulatory assessments and approvals should remain at arm's length (to protect integrity and neutrality of the regulatory function) from entities with a policy development or coordination functions.'²⁷

Jacobs identifies three potential coordination models:

Self-governing: responsibility for internal relationships and managing engagement with external parties is accepted by a significant number stakeholders (if not all) and depends on their active, sustained involvement and commitment. There is no stand-alone entity accepting responsibility for overseeing the coordination program. Power is symmetrical and decision making is shared.

Lead agency: all major activities and decision making are coordinated through and by a single participating party. Coordination arrangements are "brokered". This model is best suited to resolving differences of opinion between stakeholders, such as where all are not fully committed to the same goals. It applies where trust is not shared but is centred on one or two organisational members.

Established authority: an independent entity is established specifically to govern the network and its activities, but sits external to the network. This model has a clear authorising legal framework. It is established either under legislation, by high-level governmental agreement or as a private legal entity.²⁸

The key structural attributes of these three models are shown in Table 14:

Table 14. Key structural attributes of potential coordination models²⁹

	Self-governing	Lead agency	Established authority
Authorising environment	Self-generated	Cabinet or Ministerial	Cabinet or Ministerial or Board of Directors
Legislative mandate	N/A	Work within existing legislation	Yes if public entity, no if private entity
Leadership and decision-making	Shared with elected or revolving chair drawn from membership	Rarely independent, usually appointed from the Lead Agency	Appointed Chair, independent of involved parties and funding entity
Structure and membership	Ad hoc structure, all affected parties involved	Distributed structure, with lead agency working on behalf of all affected parties	Hierarchical structure, nominated core with representatives from affected parties
Tenure	As long as shared objectives continue and trust is maintained	Long-term entity, oversees full implementation of plan	Finite – expires after certain outputs are achieved
Participation (collaboration, engagement, consultation)	Cooperation/collaboration among parties. Information sharing outside of the network requires collective approval	Coordination, with identified clearinghouse/information broker for the network	Overseen by independent entity, requires certain information to be produced and establishes rules for sharing/publishing information outside of the network
Funding	Membership levy or fees (financial or in-kind)	Funds provided by authorising environment (comes from relevant Department(s))	Can solicit funding from Government and/or private sector

Ms Cameron told the Board that the self-governing model is more ‘ad hoc’ than the other models, with shared power and accountability.³⁰ Under the lead agency model, there is structured decision-making that is transparent to all parties, using methods such as consultative forums and groups.³¹ The established authority model has the clearest terms of references and functional roles.³² However, Ms Cameron noted that the established authority model has a vulnerability in that political change can lead to it being defunded.³³

The Jacobs coordination report explains that, over time, different models will lend themselves to different aspects of the coordination work being undertaken, and that ‘the structure and tenure will most likely evolve based on the phase of the rehabilitation effort.’³⁴ Jacobs states that early high-level planning may be best undertaken using a self-governing model, while detailed planning, resolution of technical issues and identification of final land uses, could suit a lead agency. Physical implementation might best fit an established authority model.³⁵

Ms Cameron emphasised the importance of a leader to provide clarity, stability and transparency, and inspire confidence. She noted that this leadership function is much more difficult within the self-governing model.³⁶

11.4 COORDINATION MODELS

The Board heard evidence about various existing models of coordination.

One example is the established authority that coordinates coal mine rehabilitation in Germany. The Joint-Governmental-Agency for Coal Mine Rehabilitation acts on behalf of the federal government and the provincial states in Eastern Germany where the coal mines are situated.³⁷ It has been tasked with coordinating rehabilitation of these mines, the responsibility for which passed to the government after the reunification of East and West Germany in 1990.³⁸ Dr Friedrich von Bismarck heads the Joint-Governmental-Agency. He told the Board that the Agency has been involved in the rehabilitation and monitoring of approximately 52 large-scale mines.³⁹ The Joint-Governmental-Agency's role includes prioritising the filling of lakes according to factors such as water availability.⁴⁰

The Jacobs coordination report identifies similar issues that need coordination in the Latrobe Valley—for example, coordinating 'regional water resource goals and studies to inform...allocation and management planning...'.⁴¹ Ms Cameron noted that she considered the role of the coordinating body to be informing water allocation and management, rather than doing the work of the water authorities.⁴²

Ms Cameron told the Board that a Commissioner is another example of an established authority.⁴³ Commissioner roles are generally established by a state or federal government to focus on a particular area or issue. Commissioners' roles vary—for example, current Commissioners in Victoria have a range of functions, such as industry oversight, complaint resolution, continuous improvement, auditing, reporting, or inquiring into particular issues.⁴⁴

Ms Cameron identified examples of existing Commissioner models in Victoria, the Australian Capital Territory (the Commissioner for Sustainability and the Environment), and in Queensland (the GasFields Commission). She stated that it is important that Commissioners have clear terms of reference.⁴⁵

Table 15 describes the roles and functions of existing Commissions and Commissioners, in areas of similar scope and/or complexity to the Latrobe Valley mines.

Table 15. Examples of Commissioner roles

Commissioner	Role	Functions
GasFields Commission Queensland	The Commission is an independent statutory body formed to manage and improve sustainable coexistence among rural landholders, regional communities and the onshore gas industry. The Commission is comprised of a chair and six part-time commissioners, and is not subject to outside direction. ⁴⁶	<ul style="list-style-type: none"> • Reviews legislation and regulation • Publishes factual information • Identifies and advises on coexistence issues • Convenes parties to resolve issues • Promotes research to address knowledge gaps • Advises government and industry • Community engagement⁴⁷
Emergency Management Commissioner (Vic)	The Commissioner has overall responsibility for coordination before, during and after major emergencies, including management of consequences of an emergency. The role sits within the structure of Emergency Management Victoria, a statutory entity. ⁴⁸	<ul style="list-style-type: none"> • Coordinates the response to major emergencies • Coordinates management of the consequences of and recovery from major emergencies • Advises the Minister • Leads actions to improve operational standards, procedures and capability of emergency response agencies • Coordinates data collection and impact assessment processes⁴⁹

Commissioner	Role	Functions
Commissioner for Environmental Sustainability (Vic)	The Commissioner is an independent voice that advocates, audits and reports on environmental sustainability in Victoria, ⁵⁰ including the overall condition of areas such as air quality, biodiversity, coastal waters, inland rivers and streams, land, and climate change. ⁵¹	<ul style="list-style-type: none"> • Reports on the condition of Victoria's natural environment • Encourages decision making that facilitates ecologically sustainable development • Enhances knowledge and understanding of issues relating to ecologically sustainable development and the environment • Encourages Victorian and local governments to adopt sound environmental practices and procedures⁵²
Commissioner for Sustainability and the Environment (ACT)	The Commissioner's role is to ensure regular and consistent reporting on environmental matters and progress towards ecologically sustainable development by the ACT and ACT authorities. ⁵³	<ul style="list-style-type: none"> • Investigates complaints about the management of the environment by the Territory or a territory authority; and issues relating to ecologically sustainable development in the ACT • Conducts investigations as directed by the Minister • Conducts on the Commissioner's own initiative, investigations into actions of an agency where those actions would have a substantial impact on the environment of the ACT • Delivers <i>State of the environment reports</i>⁵⁴
Commission for Children and Young People (Vic)	The Commission promotes continuous improvement and innovation in policies and practices relating to the safety and wellbeing of children and young people generally, and in particular those who are vulnerable; and the provision of out of home care services for children. It is comprised of a Principal Commissioner and a Commissioner for Aboriginal Children and Young People. ⁵⁵	<ul style="list-style-type: none"> • Advises the Ministers, departments and services • Promotes child-friendly and child-safe practices • Promotes the interests of vulnerable children and young people • Monitors the implementation and effectiveness of strategies • Reviews, reports and educates on legislation • Investigates and reports on out of home care services • Conducts inquiries into major issues and incidents⁵⁶

These Commissioners are statutory positions established by legislation.⁵⁷ Each has nominated powers, such as the power to require information from government or other entities;⁵⁸ to require others to consult with them around key decisions;⁵⁹ to establish advisory bodies and committees;⁶⁰ to publish information;⁶¹ and to enter premises to carry out investigations.⁶² They each produce public reports, including annual reports,⁶³ special reports on investigations⁶⁴ or major reports such as the *State of the environment reports*.⁶⁵

Counsel Assisting submitted 'that there is a present need for a coordinating structure to exist outside of government' (that is, an established authority), with a focus on ensuring the Mining Regulator's Action Plan is progressed, necessary research is undertaken, and the mine operators work collaboratively to develop an integrated rehabilitation plan and share knowledge.⁶⁶

Counsel Assisting submitted that 'a Commissioner for the Rehabilitation of the Latrobe Valley Coal Mines' was an option for coordination, however 'it may be thought that, at least presently, there is insufficient need to justify' establishing a Commissioner's role, noting that it may become more necessary as mine closure approaches.⁶⁷

The mine operators accepted the need for greater coordination but questioned the need for a new body to be established. Mr Rieniets stated: 'I would welcome the coordination, but I don't see that it needs to be a new body. There are sufficient bodies in place already that could pick up on that aspect.'⁶⁸ Mr Methers stated: 'I don't think it needs to be new bodies, but we would certainly welcome coordination.'⁶⁹ Mr Faithful agreed.⁷⁰

GDF Suez submitted that the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) and Coal Resources Victoria, despite having failed to take a leadership role in the past, should be responsible for coordinating 'engagement between the relevant groups', rather than another organisation or department duplicating this function.⁷¹

In contrast, Environment Victoria submitted that there is a need for a 'new, purpose built body, set up under legislation, with appropriate and adapted functions and powers [that] would be the most effective vehicle for undertaking the coordination of the review of end of life concept plans and rehabilitation plans.'⁷² It suggested that the role of the body should include the 'review of the end of mine life concept plans, including facilitating community engagement' and commissioning relevant research.⁷³ Environment Victoria further suggested that the body should have an independent board, with relevant expertise, with a strong leader as chair,⁷⁴ and that the body should be supported by legislation describing its roles and powers.⁷⁵ It submitted that Coal Resources Victoria is unsuited to performing the required functions, as its role as a promoter of the coal industry presents a conflict of interest.⁷⁶

11.5 BOARD'S DISCUSSION AND CONCLUSIONS

It is important that activities relating to rehabilitation planning for the Latrobe Valley mines are effectively coordinated. As discussed throughout this report, the mine operators face a number of challenges in effectively rehabilitating the Latrobe Valley mines. Addressing these challenges requires collaboration between the Mining Regulator, other government departments and agencies, the mine operators, researchers and the broader community. As identified in the Jacobs report, coordination is necessary when there is a lack of clarity and diverse views regarding priorities, timelines, decision-making and preferred outcomes, as is evident in relation to the rehabilitation of the Latrobe Valley mines.

The Board accepts the evidence of the experts that coordinated planning and management is required for the complex issues of stability, water, materials, climate change, closure timing, and final land use. As Professor Mackay noted, issues such as lake filling and water allocation are interconnected between the three mines, and could have far-reaching implications if not adequately resolved. The Board does not consider that the mine operators will be able to address these issues alone. Coordinated planning involving the Mining Regulator and water authorities is needed to ensure the best outcomes for the mines and the Latrobe Valley more broadly.

The Board accepts that there are clear benefits from sharing knowledge between the mine operators. The Board welcomes the advice of Professor Galvin that there have been some improvements in the ways that mine operators share research findings, but notes that the mine operators have some reluctance to share all relevant information. Considering the many common elements of the mines and the sheer volume of research that will be required in the short-term, it will be highly advantageous if the mine operators increase the amount of research findings that they share. The Board acknowledges that there will be elements of research that are site-specific.

The Board recognises the benefits of Professor Mackay's recommendation to establish an open access database that captures this research for the benefit of the mine operators and researchers. GHERG is the obvious vehicle for this, considering its present role as a repository for knowledge on the Latrobe Valley mines. GHERG will no doubt continue to play a key role in resolving some of the uncertainties that have arisen throughout this Inquiry, and could be further utilised by the mine operators and the State to share research findings in the coming years. The Board encourages the State to make available, to the mine operators and other key stakeholders, all research that it conducts.

The Board recognises and affirms the mine operators' support and commitment to increase coordination and collaboration between themselves and the regulatory authorities. While acknowledging that some of the issues each mine faces are site-specific, the Board believes that the many areas of common uncertainty call for further collaboration. This will increase the likelihood of resolving complex issues, as well as reducing duplication of effort between the mines.

11.5.1 THE NEED FOR A NEW COORDINATING BODY

Considering the range of areas that require greater coordination, their potential regional impacts, and the diversity and competing priorities of the organisations that are involved, the Board finds that there is a need for a new coordinating body for mine rehabilitation in the Latrobe Valley.

The Board notes that, aside from the Mining Regulator and Coal Resources Victoria, there are several agencies and authorities that are involved in some way with the Latrobe Valley mines—for example, the Hazelwood Mine Fire Implementation Monitor and Inspector-General of Emergency Management (who oversee the implementation of the 2014 Hazelwood Mine Fire Inquiry recommendations), the Emergency Management Commissioner (who chairs the Latrobe Valley Coal Mine Fire Taskforce), and the Technical Review Board. The Board notes that the proposed external technical expert panel that is to be established under the Mining Regulator's Action Plan will also play a role relevant to the Latrobe Valley mines. The Board does not consider that any of these agencies or authorities satisfy the criteria needed for a successful coordinating body, for reasons such as a lack of independence, insufficient expertise, or inadequate resourcing.

The Board has considered the three models that were presented by Jacobs as potential coordination mechanisms. It is concerned that the self-governing model may not ensure that contentious rehabilitation issues are resolved, and that there will be insufficient accountability and transparency. The lead agency model has the potential to duplicate or obscure member agencies' roles. The Board notes that the obvious lead agency is the Mining Regulator, but accepts Ms Cameron's advice that a coordinating structure should remain at 'arm's length' from the regulatory function. The Board also accepts Environment Victoria's submission that Coal Resources Victoria is not well placed to lead coordination due to perceived conflict of interest. Therefore the Board accepts that neither the Mining Regulator, nor Coal Resources Victoria, are appropriate agencies to lead this coordination role. The lead agency model is therefore not suitable.

The Board accepts Jacobs' evidence that the established authority model will provide the greatest 'authorising environment', have the capacity to consult with the community and key stakeholders, and be able to play a brokering role between agencies. The Board recommends that the State should use an established authority mechanism to coordinate the rehabilitation planning and implementation for the Latrobe Valley mines.

11.5.2 THE LATROBE VALLEY MINE REHABILITATION COMMISSIONER

The Board accepts the advice of Ms Cameron that the mechanism must be able to evolve over time and have strong leadership, independence and well-defined functions. A Commissioner model is a clear example of an established authority mechanism with the necessary elements of leadership, independence and a defined statutory role.

The Board recommends that the Mining Regulator establish a Commissioner for Latrobe Valley Mine Rehabilitation (the Commissioner), as a statutory appointment under an amendment to the *Mineral Resources (Sustainable Development) Act 1990* (Vic) (Mineral Resources Act). The Commissioner should be an independent role that leads and coordinates planning and improvements to mine rehabilitation in the Latrobe Valley, and have necessary expertise in mine rehabilitation. The Board considers that the Commissioner should have an office based in the Latrobe Valley.

The Commissioner's role and functions could include providing periodic advice to the Minister for Energy and Resources; providing publicly available periodic reports; and having powers to compel the State, mine operators and other prescribed entities to produce information. The State should be compelled to consult with the Commissioner about all work plan variations, and about the development of policy, legislation or regulation relating to mine rehabilitation in the Latrobe Valley.

The Commissioner could have a key coordination role relevant to several of the issues and recommendations raised throughout this report, such as:

- Coordinating adequately funded and timely research, initially through coordination of the development of an integrated research plan (see the recommendation in Part 6 of this report).
- Coordinating knowledge sharing, by working with mine operators to share research findings and identify other opportunities to transfer learnings about mine rehabilitation.
- Coordinating the establishment of closure criteria, and processes for assessing the mines' rehabilitation against the closure criteria. This will involve working in collaboration with the Mining Regulator, the mine operators, water authorities, Latrobe City Council, key experts and the community.
- Working with mine operators and Latrobe City Council to improve community engagement. This could include coordination or support of community education so that there is an enhanced understanding of potential final land uses; processes for community consultation regarding work plan variations; and working with Latrobe Valley residents to create a regional community vision for the rehabilitated mines.
- Coordinating the development of a regional mine rehabilitation plan.
- Conducting inquiries into significant and persistent issues, for example, issues related to sourcing water or barriers to progressive rehabilitation.

It is important that the Commissioner's role does not unnecessarily duplicate that of the Mining Regulator, the Hazelwood Mine Fire Implementation Monitor, the Emergency Management Commissioner, the Inspector-General for Emergency Management, Coal Resources Victoria, the Technical Review Board or the external technical expert panel that is to be established under the Mining Regulator's Action Plan. However, the Commissioner should work closely with each of those entities, the mine operators and with the Latrobe Valley community in undertaking its role.

The Commissioner's role should be in place until such time that it is superseded by the Latrobe Valley Mine Rehabilitation Authority, as discussed below.

11.5.3 THE LATROBE VALLEY MINE REHABILITATION AUTHORITY

The Board is aware that as the mines near closure, there will be greater complexities and priorities that will need to be addressed. The Board considers that mine closure will require a commensurate increase in coordination and oversight. The Board recommends that the State establish a statutory body, such as a Latrobe Valley Mine Rehabilitation Authority (Statutory Authority) to replace the Commissioner.

The Statutory Authority should be established well in advance of the first mine closing, so that it can effectively plan and prepare for mine closure. However, as discussed in Part 2.2.5, there are a range of factors that could result in one or more of the mines closing prior to their planned date. This presents difficulties in accurately predicting the date at which the Statutory Authority should be introduced. The Board recommends that the State establish the Statutory Authority by 2026, six years prior to the first mine closing. However the Statutory Authority should be established earlier should one or more of the mines close prematurely.

The Board considers that the Statutory Authority's responsibilities should include those of the Commissioner, with increased or additional focus on:

- Planning for post-closure monitoring and maintenance, including clarifying roles and financial obligations for the mine operators and the State.
- Identifying processes for community and key stakeholder input into the assessment of rehabilitation against closure criteria.
- Addressing key issues that arise as a result of final rehabilitation, such as the effect of one mine flooding on the aquifer system and the dewatering needs of the other mines.
- Monitoring water availability and conducting regional water modelling that more accurately estimates pit lake fill times.

The Board accepts Ms Cameron's evidence that established authorities (such as the Commissioner or the Statutory Authority) are vulnerable to political change, and their tenure can be cut short. The complexities and significance of the Latrobe Valley mines mean that the success of their rehabilitation must not be unduly impacted by changes in government. This is not just an issue for the mines—it is an issue for the Latrobe Valley community, the broader community, the environment and the State. If it is not solved now, there are very real risks that if manifested, could have repercussions that are felt for generations.

The Board considers that the Statutory Authority must have ongoing tenure until all mines have been successfully rehabilitated, and monitoring and maintenance of the Latrobe Valley mines is no longer required. It is foreseeable that this could be decades after the last mine has closed.

The Board recommends that by 30 June 2017, the State establish an independent Latrobe Valley Mine Rehabilitation Commissioner, until the Statutory Authority is established under the following Recommendation. It should be a statutory appointment by amendment to the *Mineral Resources (Sustainable Development) Act 1990* (Vic) with the following core functions relevant to mine rehabilitation:

- Advising the Minister, State and industry on a range of matters, including policy, legislation and regulation.
- Monitoring the implementation and effectiveness of strategies.
- Undertaking strategic audits of State departments and mine operators.
- Conducting investigations into significant issues with powers to obtain information.
- Coordinating parties to resolve outstanding issues.
- Promoting and coordinating research to address knowledge gaps, as contained in the recommendation in Part 6.
- Sharing and publishing information including research findings.
- Undertaking public education and community engagement.
- Publishing an annual report.

The Board recommends that the State establish an independent Latrobe Valley Mine Rehabilitation Authority, as a statutory body by amendment to the *Mineral Resources (Sustainable Development) Act 1990* (Vic), to commence no later than 2026, or earlier in the event of premature closure of one of the Latrobe Valley mines. The Statutory Authority's responsibilities should include those of the Commissioner, with increased or additional focus on the following:

- Planning for post-closure monitoring and maintenance, including clarifying roles and financial obligations.
- Identifying processes for community and key stakeholder input into the assessment of rehabilitation against closure criteria.
- Addressing key issues that arise as a result of final rehabilitation.
- Monitoring water availability and conducting regional water modelling that more accurately estimates pit lake fill times.

The Board recommends that the State consult with the Commissioner and subsequent Statutory Authority about all work plan variations for the Latrobe Valley coal mines, and the development of policy, legislation and regulation relating to mine rehabilitation in the Latrobe Valley.



Mine rehabilitation trial site at the Loy Yang mine
(source: AGL Loy Yang)

PART TWELVE
RECOMMENDATIONS,
AFFIRMATIONS AND
COMMENDATIONS

PART 12 RECOMMENDATIONS, AFFIRMATIONS AND COMMENDATIONS

Rehabilitating coal mines is essential for creating safe, stable and non-polluting landforms that can be used for other beneficial purposes into the future. Without successful rehabilitation, the Latrobe Valley community may be left with worked out mines that pose risks to the public and local infrastructure—from fire, land and mine instability, issues with water quality, and impacts to the environment. Planning and implementing effective rehabilitation now will have positive impacts for generations of Latrobe Valley residents.

During this Inquiry, the Board heard from a range of experts and witnesses who provided insight into the key issues about rehabilitation, from geotechnical and hydrogeological aspects through to regulatory issues and community engagement.

Under Term of Reference 8, and based on current knowledge, the Board finds that a pit lake is the most viable rehabilitation option for each mine, with lake depths varying by mine. This aligns closely with the mines' current rehabilitation plans, with the Yallourn mine intending to create a fully filled lake, and the Loy Yang and Hazelwood mines planning partially filled lakes.

The Board considered the pit lake option against the criteria in Term of Reference 9, to assess whether the option is sustainable, practical and effective for each mine. A definitive assessment is not possible because of the many areas of uncertainty, such as mine stability, sourcing water, water quality and fire risk. To be confident that the pit lakes are achievable, these uncertainties need to be resolved through research and trials, preferably in the short-term. The knowledge gained from these investigations may result in another rehabilitation option being assessed as the most viable option for one or more of the mines. Evolving community expectations might also influence which option is seen as the most attractive.

The Board has particular concerns about mine stability, sourcing water and water quality, considering the huge volume of water required to fill the mines under the mines' rehabilitation plans, and the very significant potential impacts to the community and the environment if these issues are not addressed in the short to medium-term. The Board finds that DEDJTR and DELWP have failed to address the key issue of sourcing water. The Mining Regulator has also failed to heed the advice of experts and State agencies regarding sourcing water and stability. The Board finds that the mine operators should have been more proactive in ascertaining their likely access to water for flooding the mines at the end of mine life.

The Board concludes that a significant amount of research must be conducted into these issues to provide certainty about the rehabilitation options. This must be done in the short to medium-term and in a coordinated manner.

In answering Term of Reference 10, the Board has been disadvantaged by the State's Rehabilitation Bond Review Project being incomplete. However, the Board has taken into account the information obtained from the completed parts of the Bond Review Project to assess the mine operators' 2014–15 rehabilitation liability assessments, the current rehabilitation bond system and alternative financial assurance mechanisms that could be employed.

Based on the information before the Board, it cannot determine whether the rehabilitation liability assessments completed by the mine operators in their 2014–15 Annual Activity and Expenditure Returns (Annual Returns) are adequate or inadequate.

The Board concludes that the current rehabilitation bond system is ineffective because the Mining Regulator:

- has set bond levels based on an assessment of risk of default together with past conduct and expected future conduct. This is contrary to the Mining Regulator's current Bond Policy, which requires 100 per cent of the rehabilitation liability assessment to be paid as a bond
- has not provided transparent reasons for not increasing the bond levels, despite there being increases in assessments of mine operators' rehabilitation liabilities.

The Board finds that an effective rehabilitation bond system requires the Mining Regulator to:

- Amend its Bond Policy, insofar as it relates to the Latrobe Valley mines, to reflect its practice of assessing risk of default and the conduct of the mines when setting bond levels.
- Provide the mine operators with clearer guidance on the structure, content areas and methods (manner and form) for the conduct of rehabilitation liability assessments pursuant to s. 79A of the *Mineral Resources (Sustainable Development) Act 1990 (Vic)* (Mineral Resources Act).
- Require the mine operators to regularly engage auditors to audit their estimated rehabilitation liability assessments pursuant to s. 79A of the Mineral Resources Act.
- Ensure that the required skills and expertise of s. 79A auditors, and the processes for accreditation, are appropriate, and if not, review the regulatory requirements and that process.
- Conduct periodic reviews of the Latrobe Valley mines' bond levels with respect to rehabilitation liability assessments provided in the mine operators' Annual Returns.

In the meantime, while the Board's recommendations are being implemented, the Board concludes that the Minister for Energy and Resources should consider increasing, on an interim basis, the existing bonds to provide greater security to the State. The Board considers that the rehabilitation bonds should be increased to an amount representing at least 50 per cent of the mine operators' estimated rehabilitation liabilities. For the Yallourn and Hazelwood mines, this should be based on their rehabilitation liability assessments provided in their 2014–15 Annual Returns. For the Loy Yang mine, it should be based on the indicative rehabilitation liability estimate for the 2015 Loy Yang work plan variation.

Throughout this Inquiry, it became evident to the Board that there were a range of issues incidental to Terms of Reference 8, 9 and 10 that may impact the likelihood of successful rehabilitation of the Latrobe Valley mines. These were considered by the Board under Term of Reference 12, which requires it to review issues that are reasonably incidental to the Inquiry's Terms of Reference.

The Board finds that the current regulatory system is ill-equipped to solve complex problems regarding rehabilitation. An effective regulatory system requires:

- transparency
- role clarity
- systematic processes
- clear definitions and criteria (including for progressive and final rehabilitation and closure)
- timelines and milestones
- stakeholder engagement and community consultation
- monitoring and review processes.

Independent expertise and advice is essential to addressing rehabilitation issues in the Latrobe Valley. The Board finds that the Technical Review Board should be resourced to provide ongoing strategic advice.

The Board finds that more collaboration and coordination between the mine operators, the State, and other key stakeholders, is fundamental to achieving successful rehabilitation of the Latrobe Valley mines. The Board concludes that an independent coordinating structure is required, which can ensure that the necessary changes occur and are maintained in the long-term.

The Board finds that community engagement by the mine operators should be improved. In particular, Latrobe Valley residents should be informed about rehabilitation plans, and be part of an ongoing conversation about the future vision for the rehabilitated mines.

Based on these findings, the Board makes the following 19 recommendations, three affirmations and one commendation.

12.1 RECOMMENDATIONS

The Board's recommendations take into account the issues raised in Parts 5 to 11 of this report.

The term 'State' is used broadly to encompass the Victorian Government and the Victorian public service.

12.1.1 STATE OF VICTORIA

The Board recommends that the State:

RECOMMENDATION 1

Empower the Hazelwood Mine Fire Implementation Monitor, in a legislated role independent from the Victorian public service, to:

- oversee the implementation of these recommendations and the commitments made by the State and the mine operators during this Inquiry for the next three years
- report publicly on an annual basis on the progress made in implementing the recommendations and commitments for the next three years.

RECOMMENDATION 2

Redress gaps in expertise by employing or engaging suitably skilled and experienced personnel in mine closure and rehabilitation liability assessments, and obtaining regular advice and guidance from the Technical Review Board.

RECOMMENDATION 3

Provide appropriate and ongoing resources to the Technical Review Board, particularly for the purpose of providing strategic advice on mine stability and rehabilitation.

RECOMMENDATION 4

Increase the rate of progressive rehabilitation by developing milestones within the mines' progressive rehabilitation plans in consultation with the mine operators and the Technical Review Board, and require the successful achievement of the milestones.

RECOMMENDATION 5

By 31 December 2016, specify the manner and form of rehabilitation liability assessments for use by the Latrobe Valley mine operators in their 2016–17 rehabilitation liability assessments and future assessments.

RECOMMENDATION 6

By 31 December 2016, review whether the criteria for accreditation of auditors under s. 53S of the *Environment Protection Act 1970* (Vic) are appropriate having regard to the necessary skills and expertise required to conduct an audit under s. 79A of the *Mineral Resources (Sustainable Development) Act 1990* (Vic). If necessary, the Mineral Resources Act and the accreditation process should be amended to ensure appropriately qualified auditors can be engaged for s. 79A audits.

RECOMMENDATION 7

Require that the 2016–17 rehabilitation liability assessments provided by mine operators are conducted in accordance with the requirements developed under Recommendation 5.

RECOMMENDATION 8

By 30 June 2017, require each of the Latrobe Valley mine operators to engage an auditor, under s. 79A(3) of the *Mineral Resources (Sustainable Development) Act 1990* (Vic), to certify that its 2016–17 rehabilitation liability assessment has been prepared in accordance with the rehabilitation liability assessment guidelines (as per Recommendations 5 and 7); to certify that the assessment is accurate; and pursuant to s. 79A(4) of the Act, to forward a copy of the certificate to the Minister for Energy and Resources.

RECOMMENDATION 9

By 30 June 2016, request the Minister for Energy and Resources to consider the sufficiency of the existing rehabilitation bonds pursuant to s. 80(4) of the *Mineral Resources (Sustainable Development) Act 1990* (Vic) having regard to this report and any other relevant material.

- If the Minister for Energy and Resources deems the existing rehabilitation bonds insufficient, the Minister should consider increasing the rehabilitation bonds on an interim basis to at least:
 - Yallourn mine: \$34.25 million
 - Hazelwood mine: \$36.7 million
 - Loy Yang mine: \$56 million

The interim increase should be undertaken in accordance with s. 80(4) of the Mineral Resources Act.

- If the Minister deems the existing rehabilitation bonds sufficient, the Minister should publish a statement setting out the reasons for that conclusion on the website of the Department of Economic Development, Jobs, Transport and Resources.

RECOMMENDATION 10

Upon completing the Bond Review Project, review the bond amount required by the mine operators. This should take into account the mine operators' 2016–17 rehabilitation liability assessment, conducted in accordance with Recommendations 5, 7 and 8 and the findings of this Inquiry. The Minister for Energy and Resources should then require the mine operators to enter into further rehabilitation bonds, if the rehabilitation bonds are deemed to be insufficient.

RECOMMENDATION 11

Include risk-based financial assurance mechanisms in the revised financial assurance system, as a method of encouraging progressive rehabilitation. The mechanisms should take into account the size, assets and ownership of the mine operator; the mine operator's history of compliance; demand for coal; and the nature of the mine operation. The mechanisms should also be consistent and transparent, with the level of the financial assurance assessed on a case-by-case basis.

RECOMMENDATION 12

Establish a post-closure trust fund to mitigate the likely costs arising from ongoing monitoring, maintenance and management of the rehabilitated mine sites after closure. The State should also consider establishing a post-closure community fund for the Latrobe Valley, to mitigate the likely social and economic impacts of mine closure. The mine operators and the State should contribute to both of these funds.

RECOMMENDATION 13

By 31 December 2016, undertake Action 6.8 of the 2011 *Gippsland Region Sustainable Water Strategy*, to review the mines' rehabilitation strategies and consider impacts on groundwater and surface water resources.

RECOMMENDATION 14

By 30 June 2017, establish an independent Latrobe Valley Mine Rehabilitation Commissioner, until the Statutory Authority is established under Recommendation 15. It should be a statutory appointment by amendment to the *Mineral Resources (Sustainable Development) Act 1990* (Vic) with the following core functions relevant to mine rehabilitation:

- Advising the Minister, State and industry on a range of matters, including policy, legislation and regulation.
- Monitoring the implementation and effectiveness of strategies.
- Undertaking strategic audits of State departments and mine operators.
- Conducting investigations into significant issues with powers to obtain information.
- Coordinating parties to resolve outstanding issues.
- Promoting and coordinating research to address knowledge gaps, as contained in Recommendation 18.
- Sharing and publishing information including research findings.
- Undertaking public education and community engagement.
- Publishing an annual report.

RECOMMENDATION 15

Establish an independent Latrobe Valley Mine Rehabilitation Authority, as a statutory body by amendment to the *Mineral Resources (Sustainable Development) Act 1990* (Vic) to commence no later than 2026, or earlier in the event of premature closure of one of the Latrobe Valley mines. The Statutory Authority's responsibilities should include those of the Commissioner, with increased or additional focus on the following:

- Planning for post-closure monitoring and maintenance, including clarifying roles and financial obligations.
- Identifying processes for community and key stakeholder input into the assessment of rehabilitation against closure criteria.
- Addressing key issues that arise as a result of final rehabilitation.
- Monitoring water availability and conducting regional water modelling that more accurately estimates pit lake fill times.

RECOMMENDATION 16

Consult with the Commissioner and subsequent Statutory Authority about all work plan variations for the Latrobe Valley coal mines, and the development of policy, legislation and regulation relating to mine rehabilitation in the Latrobe Valley.

RECOMMENDATION 17

Amend the *Mineral Resources (Sustainable Development) Act 1990* (Vic) and the *Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013* (Vic) to address the issues that have been raised throughout the Inquiry, such as the need for:

- a dedicated Part of the Mineral Resources Act that exclusively regulates the Latrobe Valley mines
- definitions and criteria for progressive and final rehabilitation
- definitions and criteria for closure
- transparent processes for the referral of work plans and work plan variations to relevant State agencies and referral authorities, which compel the Mining Regulator to act on the advice received
- strengthened criteria for community consultation and engagement under s. 39A of the Mineral Resources Act and/or in community engagement plans
- clarity about the roles of the mine operators and the State in ongoing post-closure monitoring and maintenance
- clarity about the role and required skills and expertise of auditors of rehabilitation liability assessments and the auditor accreditation process (see Recommendation 6).

12.1.2 MINE OPERATORS

The Board recommends that the mine operators:

RECOMMENDATION 18

By 31 December 2016, develop an integrated research plan that identifies common research areas and priorities for the next 10 years, to be reviewed every three years. The plan should be developed in consultation with the Mining Regulator and relevant agencies, research bodies and experts. The list of research topics identified in Part 6.11 can be used as a starting point for discussion. The Commissioner and Statutory Authority should promote and coordinate this research (see Recommendations 14 and 15).

RECOMMENDATION 19

Increase the rate of progressive rehabilitation by achieving milestones within the mines' progressive rehabilitation plans, as set by the Mining Regulator under Recommendation 4.

12.2 AFFIRMATIONS

During this Inquiry, the State and the mine operators committed to actions related to mine rehabilitation. The Board affirms:

- The commitments of EnergyAustralia, GDF Suez and AGL Loy Yang to increase coordination and collaboration between themselves and the regulatory authorities.
- The commitments of the Mining Regulator contained in the *Earth Resources Regulation 2015–16 Action Plan* to:
 - lead and strengthen its relationship with the Department of Environment, Land, Water and Planning and other regulators (for example, the Environment Protection Authority and WorkSafe) to ensure information is shared, and there is consistency and cooperation in carrying out regulatory functions
 - draft a guideline for providing clear information to industry about requirements under risk-based work plans
 - build its operational technical capability by drawing on the Technical Review Board to provide more strategic technical advice
 - implement risk-based mining work plans as required by recent changes to the Mineral Resources Act and the Mineral Industries Regulations
 - establish a work plan assessment taskforce to identify relevant high-risk sites to submit risk-based work plans (which will most likely include the Latrobe Valley mines)
 - establish a Mine Fire Safety Unit to provide advice and lead regulatory, compliance and education activities related to fire safety.
- The commitment of the Mining Regulator, the mine operators and research groups to progress key studies such as the Mine Batter Stability Project at the Yallourn mine and the Loy Yang mine rehabilitation trials.

12.3 COMMENDATIONS

The Board commends the work of the Technical Review Board, in particular its provision of robust and independent advice to the Minister for Energy and Resources and the Department of Economic Development, Jobs, Transport and Resources on mine stability and rehabilitation.



Bucket wheel excavator
(source: Department of Economic Development, Jobs, Transport and Resources)

APPENDICES

APPENDICES

APPENDIX A: INQUIRY PERSONNEL

NAME	ROLE
BLACKMAN, Joel	Paralegal Support
HORSFIELD, Sam	Editor
JACKSON, Candice	Business and Paralegal Support
KELLY, Monica	Health Lead
MITTEN, Spencer	Communications Manager
NICHOLLS, Cassie	Senior Policy Officer
RADOJKOVIC, Andrew	Technical Officer – Mines
ROZEN, Peter	Counsel Assisting
RYAN, Genelle	Head of Secretariat
SHANN, Ruth	Counsel Assisting
STANSEN, Justine	Principal Legal Advisor
WELLINGTON, Bethany	Legal Advisor

APPENDIX B: PUBLIC SUBMISSIONS

ORGANISATIONS
AGL Loy Yang Pty Ltd
Australian Labour Party (Morwell and Traralgon Branch)
Construction, Forestry, Mining & Energy Union
EnergyAustralia Yallourn Pty Ltd
Environment Victoria
Federation University Australia
GDF Suez Australian Energy
GHD Australia
Gunaikurnai Land and Waters Aboriginal Corporation
Haztech Environmental
Indigenous Design
Latrobe City Council
Latrobe Valley Prefabricated Energy Efficient Buildings
Minerals Council of Australia Victorian Division
Victorian Government
West Gippsland Catchment Management Authority

INDIVIDUALS

BARBARA, Gilio

BULL, Lorraine

BURNS, Fred

BUSH, Kyle

CAFFREY, Daniel

CAFFREY, Jane

GAULTON, Margaret

LANGMORE, David

SAIT, Ron

WEDROWICZ, Elise

APPENDIX C: WITNESSES APPEARING AT THE PUBLIC HEARINGS

TITLE	NAME	ROLE
Dr	BOWDEN, Adrian	Director, FuturesPlanner Pty Ltd (consultant to AECOM)
Ms	BURTON, Jane	Director, Coal Resources Victoria
Mr	BYRNE, Geoffrey	Principal Consultant, Niboi Consulting (consultant to AECOM)
Dr	BYRNES, Joel	Associate Director, Marsden Jacob Associates (consultant to Accent Environmental)
Ms	CAMERON, Carolyn	Director, Cameron Strategies (consultant to Jacobs Group (Australia))
Mr	CHADWICK, Bryan	Technical Director, AECOM
Mr	CRAMER, Michael	Director, Accent Environmental
Dr	DAVIS, Sharon	Executive Director, Water Resources Division, Water and Catchments Group, Department of Environment, Land, Water and Planning
Mr	FAITHFUL, James	Technical Services Manager – Mine, GDF Suez
Emeritus Professor	GALVIN, Jim	Chair, Technical Review Board
Dr	GILLESPIE, Robert	Principal, Gillespie Economics
Dr	HABERFIELD, Christopher	Principal Geotechnical Engineer and Principal, Golder Associates
Mr	HOXLEY, Greg	Principal Hydrogeologist, Jacobs Group (Australia)
Mr	LANGMORE, David	Latrobe Valley resident
Mr	LAPSLEY, Craig	Emergency Management Commissioner
Professor	MACKAY, Rae	Director, Geotechnical and Hydrogeological Engineering Research Group, Federation University Australia
Mr	MAWER, David	Managing Director, Gippsland Water
Dr	McCULLOUGH, Clint	Associate and Principal Environmental Scientist, Golder Associates
Mr	McGOWAN, Ross	Executive Director, Earth Resources Regulation Branch, Department of Economic Development, Jobs, Transport and Resources
Mr	METHER, Ronald	Mine Manager, EnergyAustralia

TITLE	NAME	ROLE
Mr	PENDRIGH, Duncan	Director, Hazelwood Mine Inquiry Coordination Directorate, Department of Economic Development, Jobs, Transport and Resources
Ms	RHODES-WARD, Sara	General Manager, Community Services, Latrobe City Council
Mr	RIENIETS, Stephen	General Manager, AGL Loy Yang
Mr	RODDA, Clinton	Managing Director, Southern Rural Water
Mr	SPEIRS, Charlie	Consultant to Jacobs Group (Australia)
Adjunct Professor	SULLIVAN, Timothy	Director and Principal, Pells Sullivan Meynink
Ms	UNGER, Corinne	Board member, Technical Review Board
Dr	VON BISMARCK, Friedrich	Head of Agency, Joint-Governmental-Agency for Coal Mine Rehabilitation, Germany
Mr	WEBB, Christopher	Executive Director, Regulatory Practice and Strategy, Environment Protection Authority
Mr	WILSON, Luke	Lead Deputy Secretary, Agriculture, Energy and Resources, Department of Economic Development, Jobs, Transport and Resources

APPENDIX D: EXHIBITS TENDERED AT THE TRARALGON PUBLIC HEARINGS

EXHIBIT	TITLE
1	Submission of David Langmore, 11 November 2015
2	Statement of Sara Rhodes-Ward, 2 December 2015
3	Letter to editor, Latrobe Valley Express
4	Statement of Craig Lapsley, 1 December 2015
5A	Statement of Luke Wilson, 20 November 2015 <i>Department of Natural Resources and Environment – Discussion paper Rehabilitation bonds for the mining and extractive industries Inquiry into greenfields mineral exploration and projection development in Victoria Options for financial assurance for rehabilitation of mine and quarry sites in Victoria</i>
5B	Supplementary statement of Luke Wilson, 30 November 2015
5C	Further supplementary statement of Luke Wilson, 7 December 2015
6	Statement of Ross McGowan, 4 November 2015
7A	Statement of Sharon Davis, 2 November 2015
7B	Supplementary statement of Sharon Davis, 4 December 2015
8A	Statement of Clinton Rodda, 4 December 2015
8B	Letter from Southern Rural Water dated 24 August 2015
9	Outline of evidence from David Mawer, 7 December 2015
10	Emails from Department of Environment, Land, Water and Planning to Southern Rural Water dated 30 July 2015 and 21 August 2015
11	<i>Gippsland Region Sustainable Water Strategy</i> , November 2011
12A	Statement of Stephen Rieniets, 30 October 2015
12B	Supplementary statement of Stephen Rieniets, 3 December 2015

EXHIBIT	TITLE
12C	Second supplementary statement of Stephen Rieniets, 4 December 2015 Email from AGL Loy Yang to Department of Economic Development, Jobs, Transport and Resources dated 22 June 2015
12D	Written submission of AGL Loy Yang, 24 August 2015
13	Statement of James Faithful, 13 November 2015 Draft 2016 Hazelwood work plan variation
14	Statement of Ronald Mether, 16 November 2015
15	Plan of the Yallourn mine with Jacobs report options superimposed (together with indicative cross sections)
16	GDF Suez Australian Energy community briefings slides 24 October 2014, 17 February 2015 & October 2015
17	Statement of Jim Galvin, 24 November 2015
18	Joint expert report, 3 December 2015
19	Statement of Rae Mackay, 27 November 2015
20	Technical Review Board relationships diagram
21	Report of Christopher Haberfield, 27 November 2015
22A	Draft report of Clint McCullough, 28 November 2015, vB
22B	Report of Clint McCullough, 30 November 2015, vO
23	Report of Timothy Sullivan, November 2015
24A	Report of Jacobs Group (Australia), 16 November 2015
24B	Curriculum vitae of Greg Hoxley
24C	Curriculum vitae of Charlie Speirs
24D	Letter from Jacobs Group (Australia) to Hazelwood Mine Fire Inquiry dated 16 November 2015 Jacobs Group (Australia) note dated 16 November 2015
25	Statement of Friedrich von Bismarck, 1 December 2015
26	Project Approval Section 75J of the <i>Environmental Planning & Assessment Act 1979</i> re Maules Creek Coal Project 23 October 2012
27	Report of Jacobs Group (Australia), 26 October 2015 Curriculum vitae of Carolyn Cameron
28A	Statement of Corinne Unger, 26 November 2015
28B	Curriculum vitae of Corinne Unger
28C	The Winston Churchill Memorial Trust of Australia – Report by Corinne Unger
29	Western Australian Department of Mines and Petroleum and Environmental Protection Authority, <i>Guidelines for preparing mine closure plans, May 2015</i>
30	Report of Meredith Fletcher, 28 October 2015
31A	Schedule 19 Annual Activity and Expenditure Return 2013–14 – Hazelwood mine
31B	Schedule 19 Annual Activity and Expenditure Return 2013–14 – Loy Yang mine
31C	Schedule 19 Annual Activity and Expenditure Return 2013–14 – Loy Yang mine (revised version, dated 18 August 2014)
31D	Schedule 19 Annual Activity and Expenditure Return 2014–15 – Loy Yang mine
31E	Schedule 19 Annual Activity and Expenditure Return 2014–15 – Yallourn mine (redacted)

EXHIBIT	TITLE
31F	Schedule 19 Annual Activity and Expenditure Return 2014–15 – Yallourn mine (revised version – redacted)
31G	Letter from GDF Suez to Department of Economic Development, Jobs, Transport and Resources dated 9 April 2015
32	<i>Hazelwood Mine Fire Inquiry Implementation Monitor – Annual Report, October 2015</i>
33	Letter from GDF Suez Australian Energy to Department of Economic Development, Jobs, Transport and Resources dated 7 December 2015 attaching bundle of emails
34	Email chain between the Department of Economic Development, Jobs, Transport and Resources and AGL Loy Yang dated 14 October 2015
35	Department of Agriculture, Energy and Minerals Briefing Note, Annexure to statement of Kylie White, 6 June 2014
36	Curriculum vitae of Duncan Pendrigh
37	<i>Earth Resources Regulation 2015–16 Action Plan</i>
38	Letter from Victorian Government Solicitor's Office to Hazelwood Mire Fire Inquiry dated 14 December 2015
39	Statement of Christopher Webb, 17 November 2015
39B	Supplementary statement of Christopher Webb, 27 November 2015
40	Email from D Guy (EPA) to D Addis (GDF Suez Australian Energy) dated 14 August 2013; EPA Inspection Report dated 29 May 2015
41A	Statement of Bryan Chadwick, 7 December 2015
41B	AECOM Report – Yallourn mine, 13 November 2015
41C	AECOM Report – Hazelwood mine, 13 November 2015
41D	AECOM Report – Loy Yang mine, 13 November 2015
41E	AECOM Report – Loy Yang mine, 7 December 2015
42	<i>Risk assessment and management: Leading practice sustainable development program for the mining industry</i> , Department of Resources, Energy and Tourism
43	Email from Ashurst to Victorian Government Solicitor's Office dated 12 December 2015
44	Report of Accent Environmental, 6 November 2015 Curriculum vitae of Michael Cramer Curriculum vitae of Joel Byrnes
45	Statement of Robert Gillespie, 11 December 2015
46	Financial documents pertaining to GDF Suez Australian Energy
47	AGL Loy Yang Mining Licence Application 1996

**SHORTENED FORMS,
GLOSSARY AND
BIBLIOGRAPHY**

SHORTENED FORMS

SHORTENED FORM	CONTRACTIONS
Accent Environmental	Accent Environmental Pty Ltd
Accent Environmental report	Report prepared by Accent Environmental titled <i>High-level assessment of alternative rehabilitation financial mechanisms</i>
Action Plan	The <i>Earth Resources Regulation Branch 2015–16 Action Plan</i> , which is the Mining Regulator's proposed means to improve regulatory practice
AECOM	AECOM Services Pty Ltd
AGL Loy Yang	AGL Loy Yang Pty Ltd
Annual Return	Schedule 19 Annual Activity and Expenditure Return submitted in accordance with r. 35 of the Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic)
Batter Stability Project	The Mine Batter Stability Project at the Yallourn mine, conducted by the Mining Regulator in partnership with Geotechnical and Hydrogeological Engineering Research Group at Federation University Australia
Bond Calculator	The Mining Regulator's Rehabilitation Bond Calculator
Bond Policy	The Mining Regulator's 2010 policy titled <i>Establishment and management of rehabilitation bonds for the mining and extractive industries</i>
Bond Review Project	Department of Economic Development, Jobs, Transport and Resources' Rehabilitation Bond Review Project is the current review into rehabilitation bonds and the method by which they are calculated
Commonwealth Environment Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
Condition 7	Work plan condition imposed by the Mining Regulator in response to the EnergyAustralia Yallourn Pty Ltd 2011 work plan variation
Condition 7.1	Work plan condition imposed by the Mining Regulator in response to the AGL Loy Yang Pty Ltd 2015 work plan variation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
Department Head	Secretary of the Department of Economic Development, Jobs, Transport and Resources
DNRE	Department of Natural Resources and Environment
DPI	Department of Primary Industries
DSDBI	Department of State Development, Business and Innovation
EDIC	Economic Development and Infrastructure Committee
Electricity Act	<i>Electricity Industry Act 2000</i> (Vic)
Emergency Management Act	<i>Emergency Management Act 2013</i> (Vic)
EnergyAustralia	EnergyAustralia Yallourn Pty Ltd
Environment Protection Act	<i>Environment Protection Act 1970</i> (Vic)
Environmental Review Committee	A committee established by a mine operator constituted by representatives from the community and State, including DEDJTR, DELWP, EPA, water authorities and Latrobe City Council
EPA	Environment Protection Authority
GDF Suez	GDF Suez Australian Energy
GHERG	Geotechnical and Hydrogeological Engineering Research Group at Federation University Australia

SHORTENED FORM	CONTRACTIONS
GL	Gigalitre
Inquiries Act	<i>Inquiries Act 2014 (Vic)</i>
Inspector-General	Inspector-General for Emergency Management appointed under the <i>Emergency Management Act 2013 (Vic)</i>
Jacobs	Jacobs Group (Australia) Pty Ltd
Jacobs coordination report	Report prepared by Jacobs Group (Australia) Pty Ltd titled <i>Analysis of potential coordination and planning models for Latrobe Valley brown coal mines</i>
Jacobs options report	Report prepared by Jacobs Group (Australia) Pty Ltd titled <i>Review of future rehabilitation options for Loy Yang, Hazelwood and Yallourn coal mines in the Latrobe Valley</i>
Joint expert report	Report prepared by the experts on 3 December 2015 in response to questions from the Board on mine rehabilitation
Loy Yang Complex Agreement	A tripartite agreement between the operators of the Loy Yang A power station (AGL Loy Yang), Loy Yang B power station (Engie SA, the ultimate holding company of the Hazelwood mine and power station), and the State established in 1997. Includes the establishment of a rehabilitation trust fund
Liability Cost Model	Rehabilitation liability assessment model developed for EnergyAustralia Yallourn Pty Ltd by GEO-Eng in 2001, and modified by GHD in 2002
MIN5003	Mining Licence 5003
MIN5004	Mining Licence 5004
MIN5189	Mining Licence 5189
Mineral Industries Regulations	Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic)
Mine operator	Operators of Yallourn mine (EnergyAustralia Yallourn Pty Ltd), Hazelwood mine (GDF Suez Australian Energy) and Loy Yang mine (AGL Loy Yang Pty Ltd). The term 'mine operators' is also used to refer to licence holders of the Yallourn mine, the Hazelwood mine and the Loy Yang mine
Mineral Resources Act	<i>Mineral Resources (Sustainable Development) Act 1990 (Vic)</i>
Mining Regulator	The Earth Resources Regulation Branch of DEDJTR and its various predecessors
ML	Megalitre
Mt	Megatonne
MW	Megawatt
OHS Act	<i>Occupational Health and Safety Act 2004 (Vic)</i>
OHS Regulations	Occupational Health and Safety Regulations 2007 (Vic)
Regional Groundwater Management Committee	A committee comprising representatives from each of the Latrobe Valley mines, Southern Rural Water and DELWP. The committee reports on groundwater extraction rates and volumes, and actual and predicted settlement rates
RL	Relative level
SECV	State Electricity Commission of Victoria
Sustainable Water Strategy	<i>Gippsland Region Sustainable Water Strategy</i>
The State	The Victorian Government and the Victorian public service
Water Act	<i>Water Act 1989 (Vic)</i>

GLOSSARY

TERM	EXPLANATION
Aquifer	Naturally occurring underground layer of water-bearing permeable rock (such as sand or gravel) through which groundwater can flow
Aquitard	Naturally occurring underground layer of low permeability rock that restricts the flow of groundwater from one aquifer to another
Bank guarantee	A financial surety guaranteed by bank or other lending institution that if the borrower defaults on a loan, the bank will cover the loss
Batter	The overall mine wall from the floor (bottom of the mine pit) to the crest (top of the mine), also referred to as the face or slope. Includes benches and berms
Batter angle	The overall angle or steepness of the coal face. Can be measured as an angle (in degrees from the horizontal) or as a ratio between the vertical and horizontal length of that slope (see 'v:h')
Batter off	The process of flattening or reducing the angle of the batter
Batter stability	The potential of a batter to withstand movement
Benches	Individual working levels of the mine
Berms	The relatively flat surfaces created in batters between working levels of the mine to stabilise the batter
Block sliding	Mechanism by which a large block of coal slides horizontally across the mine floor due to the influence of water
Bond discount mechanism	A financial assurance mechanism that provides those mine operators that meet eligibility criteria with a performance-based discount on their rehabilitation bond
Bore	Long cylindrical hole drilled into the coal to assist in dewatering the mines
Brown coal or lignite	A combustible mineral that forms over millions of years when vegetable matter partially decomposes in conditions of restricted air and increased pressure and temperature. Widely used as a fuel to generate electricity
Bulk entitlement	A right to take, use and supply water. Issued by the Minister for Water to an authority, which can include water corporations and electricity generation companies
Closed system	Enclosed lakes where the primary discharge of water if left to nature will be evaporation, as the lakes are not connected to any natural surface drainage
Coal bunker	Large concrete storage structure for coal
Coal seams	Coal beds thick enough to be mined
Conveyor system	A system of belts and pullies used to transport coal to the power station and waste material to the overburden dump
Cover/backfill	The process of filling the mine pit with available overburden and non-polluting mine waste
Crest	Top or edge of a mine
Critical loading event	Extreme rainfall or flood event that increases water pressure in the coal
Declared mine	A mine declared under s. 7C of the Mineral Resources Act because there are geotechnical or hydrogeological factors within the mine that pose a significant risk to public safety, the environment or infrastructure
Dewatering	The process of pumping groundwater out of aquifers both below and within the coal seams to reduce water pressure pushing up on the mine floor and batters
Deterministic cost estimates	An approach that assigns cost components to standard rates. This approach often uses a percentage contingency rate to cover unforeseen costs. The Mining Regulator's Rehabilitation Bond Calculator is an example of a deterministic approach

TERM	EXPLANATION
Domain	A cost area that includes similar land uses in a mine site. For example, infrastructure (e.g. administration buildings, processing plants or coal bunkers), overburden dumps, or mine pits. Used in the Mining Regulator's Rehabilitation Bond Calculator
Dozer push	A method of mine rehabilitation where coal from one bench is redistributed to the bench above or below to achieve the planned batter angle
Dredger/bucket wheel excavator	Very large and heavy machinery that continuously digs the coal, using a large wheel covered with buckets that scoop the coal as the wheel rotates
Established authority model	Coordination model where an independent entity is established to govern a network and its activities, which sits external to the network. It has an authorising legal framework and is established either under legislation, by governmental agreement or as a private legal entity
Final land use	Ultimate end use of the site after final rehabilitation
Final rehabilitation	Occurs after mining has ceased and results in the final landform (as distinct from progressive rehabilitation)
Financial assurance mechanism	The method by which the State manages risks associated with rehabilitation liability, including determining the amount and provision of a financial assurance
Financial instrument	The means by which the agreed amount of financial assurance is guaranteed to be available to the State in the event of operator default
Fire services	Firefighting infrastructure, including mains, pumps and pipes, located throughout each mine, including on the mine floor
Floor	Bottom of the mine pit
Floor heave	Where the mine floor moves upward due to the pressure of the water in the aquifers below the coal pushing against the floor and batters of the mine
Flow through	Flow through the effect of an external water body, such as a river, flowing through a pit lake
Free draining	The effect of water draining, or being diverted, from a mine pit to natural adjacent waterways
Geotechnical	The branch of engineering concerned with the behaviour of earth materials
Groundwater	Water located beneath the Earth's surface
Groundwater licence	The Latrobe Valley mine operators and their associated power stations have access to water through bulk entitlements and s. 51 licences to take and use groundwater
Hydrogeology	The branch of geology that deals with the distribution and movement of groundwater
Interseam	Thin layer of non-coal material between coal seams
Iron hydroxide	Chemical compound comprising ferrous iron and hydroxide
Jointed	Multiple continuous cracks through the coal
Landform	Shape of the land created through the mine rehabilitation process
Lead agency model	Coordination model where all major activities and decision making are coordinated through or by a single participating party. Coordination arrangements are 'brokered' between party members
Long-term	The period commencing 15 years after the end of mining operations
Medium-term	The period commencing at the end of mining operations to 15 years post mining
Minimal compliance	The minimum regulatory requirements to comply with the licence conditions and work plan
Mining licence	A licence that allocates Crown rights to resources, such as coal, to the licence holder
Mobile plant	Any mobile piece of mining equipment, such as trucks and excavators

TERM	EXPLANATION
Natural fill	Rainfall and natural groundwater seepage that fills the pit post-mining
Natural level	The groundwater level prior to the commencement of dewatering
Natural relief	The original ground level
Open cut mining	Surface mining method that involves removing overburden prior to the extraction of coal by digging a pit into the ground
Overburden	The clay, gravel and soil that covers coal that is removed in the mining process
Overburden dump	Where the overburden from mining is stockpiled
Pit	The void in the ground left from open cut mining
Pit lake option	A mine rehabilitation option that involves filling the pit primarily with water and some overburden to create an artificial lake
Post-closure	The point in time commencing after all closure criteria have been met
Potable water	Water that is safe for human consumption
Probabilistic cost estimates	An approach that takes into account the uncertainties associated with different cost components of rehabilitation, and the probability of particular costs being incurred
Progressive rehabilitation	The incremental process of mine rehabilitation undertaken during the life of the mine; can only occur on worked out areas of the mine
Rehabilitation	The process of returning land disturbed by mining to a safe, stable, productive and/or self-sustaining condition, consistent with how the land will be used post-mining
Rehabilitation bond	A financial security provided by a mine operator to ensure that rehabilitation can be undertaken by the State should the operator default on its obligations to complete rehabilitation
Rehabilitation liability	The cost of completing rehabilitation in accordance with an approved work plan
Rehabilitation liability assessment	The process and methodology used in calculating the cost of completing the rehabilitation works
Residual risk	Risk remaining after implementation of risk treatment
Rip rap	A collection of durable, loose rock or other material, such as concrete, deposited on the waterline of a water body to reduce wave erosion
Self-governing model	Coordination model where the responsibility for internal relationships and managing engagement with external parties is accepted by a significant number of members (if not all). There is no stand-alone entity accepting responsibility for overseeing the coordination program. Power is symmetrical and decision making is shared
Short-term	Now until the end of mining operations
Stackers	Large machine used to pile coal and waste rock onto a stockpile; typically connected to a conveyor
Strip ratio	The ratio of waste rock to coal
Surface water	Any water on the surface of the earth such as in a stream, river, lake, wetland, or ocean
Third party costing	An estimate of the amount it would cost the State to engage a third party to undertake rehabilitation works in the event of operator default. This is in contrast to 'first party costing', which is based on the costs for the mine operator, who would have the benefit of using their own infrastructure and personnel
Toe	Where the mine face and floor meet
Truck and shovel	A rehabilitation technique where a large quantity of material excavated, placed into a truck, transported and dumped elsewhere

TERM	EXPLANATION
v:h	The ratio between the vertical height and horizontal length of the mine face, which measures the overall angle or steepness of the face or 'batter angle'
Water supply agreement	Commercial agreement between Gippsland Water and the mine operators for the supply of raw and potable water to the power stations
Wave erosion	Erosion caused by wave action of a water body washing up against the land
Weight balance	Where the upward pressure of the aquifers is either decreased by dewatering, or counterbalanced by the downward pressure of the water and/or backfilled overburden
Work plan	A statutory enforceable document approved by the Department Head that details how mining and rehabilitation will take place under a mining licence
Worked out or permanent batter	The areas (or faces) within the mine where coal mining no longer takes place

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- 151 Exhibit 20 – Technical Review Board relationships diagram

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- 1 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, Annexure D, p. 58
- 2 Exhibit 6 – Statement of Ross McGowan, 4 November 2015, Annexure C
- 3 Exhibit 6 – Statement of Ross McGowan, 4 November 2015, Annexure C
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- 8 Methers T257:21
- 9 Faithful T257:22
- 10 Rieniets T257:23
- 11 Exhibit 8A – Statement of Clinton Rodda, 4 December 2015, para 23.2
- 12 Exhibit 8A – Statement of Clinton Rodda, 4 December 2015, para 23.1
- 13 Exhibit 8A – Statement of Clinton Rodda, 4 December 2015, para 23.2
- 14 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, para 40
- 15 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, paras 38 & 40
- 16 Exhibit 9 – Outline of evidence of David Mawer, 7 December 2015, para 14
- 17 Exhibit 9 – Outline of evidence of David Mawer, 7 December 2015, para 14. GDF Suez also has a 20 gigalitre bulk entitlement for use at Loy Yang B power station
- 18 Exhibit 9 – Outline of evidence of David Mawer, 7 December 2015, para 14
- 19 Exhibit 14 – Statement of Ronald Methers, 16 November 2015, paras 28 & 29; Exhibit 30 – Report of Meredith Fletcher, 28 October, p. 2
- 20 Exhibit 14 – Statement of Ronald Methers, 16 November 2015, paras 19–23
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- 25 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexures EAY.0001.001.0017 & EAY.0001.001.0018
- 26 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, para 82
- 27 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 34
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- 33 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 58
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- 37 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 62
- 38 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 63
- 39 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 67
- 40 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 68
- 41 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, paras 153–155 & 216–218
- 42 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, paras 93, 94 & 100–103
- 43 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexures EAY.0001.001.0076 & EAY.0001.002.0079
- 44 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, p. 20
- 45 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, pp. 45–49
- 46 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, p. 20
- 47 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, p. 45
- 48 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, p. 20
- 49 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, p. 19
- 50 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, p. 21
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- 78 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, Annexure 3.1
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- 97 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 81
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- 100 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 60–63
- 101 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 10, p. 0346
- 102 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 86
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- 104 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 15
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- 110 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 105
- 111 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 103
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- 113 Adapted from Exhibit 13 – Statement of James Faithful, 13 November 2015, para 155
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- 116 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 108 & 109
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- 122 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, Attachment 3
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- 137 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, paras 11 & 15
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- 139 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 39
- 140 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, paras 70 & 72
- 141 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 68
- 142 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 67
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- 145 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, paras 92–94
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- 149 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, paras 75 & 102
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- 151 Exhibit 12C – Second supplementary statement of Stephen Rieniets, 4 December 2015, Annexure A, p. 0011
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- 159 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 155 & Annexure N, pp. 0202 & 0203
- 160 Exhibit 12B – Supplementary statement of Stephen Rieniets, 3 December 2015, Annexure B-1, p. 0091
- 161 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure I
- 162 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure J
- 163 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure K
- 164 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexures L & M
- 165 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure O
- 166 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure O, p. 0235
- 167 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 111
- 168 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 115
- 169 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 125
- 170 Exhibit 8A – Statement of Clinton Rodda, 4 December 2015, para 23.2
- 171 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, paras 38 & 40
- 172 Exhibit 9 – Outline of evidence of David Mawer, 7 December 2015, para 14
- 173 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, para 40
- 174 Exhibit 8A – Statement of Clinton Rodda, 4 December 2015, para 23.2(d)
- 175 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, Annexure 3.2
- 176 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, Annexure 2
- 177 Written submission of AGL Loy Yang, 24 August 2015, para 149, Table 10
- 178 Exhibit 9 – Outline of evidence of David Mawer, 7 December 2015, paras 12–14

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- 1 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015
- 2 Exhibit 23 – Report of Timothy Sullivan, November 2015
- 3 Exhibit 21 – Report of Christopher Haberfield, 27 November 2015; Exhibit 22B – Report of Clint McCullough, 30 November 2015
- 4 See, for example, Exhibit 23 – Report of Timothy Sullivan, November 2015, para 34; Exhibit 19 – Statement of Rae Mackay, 27 November 2015, para 5
- 5 Exhibit 18 – Joint expert report, 3 December 2015, p. 5
- 6 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, p. 0088
- 7 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 9, p. 0257
- 8 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 9, p. 0257
- 9 Exhibit 12B – Supplementary statement of Stephen Rieniets, 3 December 2015, Annexure B-1, p. 0090
- 10 Exhibit 23 – Report of Timothy Sullivan, November 2015, para 127
- 11 Exhibit 18 – Joint expert report, 3 December 2015, pp. 2 & 3
- 12 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, pp. 9, 10 & 59–67
- 13 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 9
- 14 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, pp. 50 & 51
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- 30 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 10
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- 33 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, pp. 11, 58 & Appendix C
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- 35 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 13
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- 37 Hoxley T395:25–396:6
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- 39 Exhibit 18 – Joint expert report, 3 December 2015, p. 5
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- 41 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 12
- 42 See, for example, Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, Appendix G1, p. 0261
- 43 Exhibit 18 – Joint expert report, 3 December 2015, p. 5

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- 1 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015
- 2 Exhibit 23 – Report of Timothy Sullivan, November 2015
- 3 Exhibit 21 – Report of Chris Haberfield, 27 November 2015
- 4 Exhibit 22B – Report of Clint McCullough, 30 November 2015
- 5 Exhibit 17 – Statement of Jim Galvin, 24 November 2015
- 6 Exhibit 19 – Statement of Rae Mackay, 27 November 2015
- 7 Exhibit 28 – Statement of Corinne Unger, 26 November 2015
- 8 Exhibit 18 – Joint expert report, 3 December 2015
- 9 Exhibit 23 – Report of Timothy Sullivan, November 2015, paras 34 & 35; Exhibit 19 – Statement of Rae Mackay, 27 November 2015, para 5
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- 15 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, Appendix A, p. 0136
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- 29 Faithful T274:9–21
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- 37 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 18
- 38 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 158–161 & 198; Exhibit 12B – Supplementary statement of Stephen Rieniets, 3 December 2015, Annexure B-1, p. 0135; Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0009.002.001
- 39 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, paras 81–83
- 40 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 98 & 203; Exhibit 12B – Supplementary statement of Stephen Rieniets, 3 December 2015, Annexure B-1, pp. 0047 & 0048; Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.001.0147, pp. 0179 & 0180
- 41 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 203
- 42 McCullough T446:9–13 & T452:27–29
- 43 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0009.002.0001, p. 0030
- 44 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 203 & 204
- 45 Rieniets T254:7–10; Faithful T357:12–13; Mether T357:27–358:5
- 46 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 22
- 47 Sullivan T439:25
- 48 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 177; Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 42, 73 & 74; Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, paras 171–175
- 49 Exhibit 23 – Report of Timothy Sullivan, November 2015, para 129
- 50 Exhibit 23 – Report of Timothy Sullivan, November 2015, para 4
- 51 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 22, pp. 0019 & 0020
- 52 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, pp. 36 & 37
- 53 Adapted from Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 22, p. 0099
- 54 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 22, pp. 0117 & 0118
- 55 Exhibit 16 – Statement of Ronald Mether, 16 November 2015, para 62
- 56 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 22, pp. 0019, 0111 & 0269
- 57 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 22, pp. 0117 & 0118
- 58 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 16
- 59 Sullivan T439:30–440:3
- 60 Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic), r. 45
- 61 Exhibit 23 – Report of Timothy Sullivan, November 2015, para 127
- 62 Exhibit 18 – Joint expert report, 3 December 2015, p. 7
- 63 Exhibit 23 – Report of Timothy Sullivan, November 2015, para 103
- 64 Exhibit 18 – Joint expert report, 3 December 2015, p. 7
- 65 Sullivan T434:9–15
- 66 Mackay T442:15–25; Galvin T406:24–31; Sullivan, T 2015, *Latrobe Planning Scheme Amendment C87: Traralgon Growth Area Review – Submission 22*, viewed 22 February 2016, http://www.latrobe.vic.gov.au/files/ed54786c-e07d-489f-afe0-a47b011c649e/Expert_Evidence_Report_-_AGL.pdf, p. 17
- 67 Mackay T442:16–23
- 68 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 57
- 69 von Bismarck T554:2–9
- 70 Rieniets T270:2–3
- 71 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 242(g)
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- 73 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Attachment EAY.0001.002.0237, p. 0284
- 74 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Attachment EAY.0001.002.0237, p. 0315
- 75 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Attachment EAY.0001.002.0237, p. 0317
- 76 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Attachment EAY.0001.002.0237, p. 0319
- 77 Galvin T437:20–31
- 78 Sullivan T444:19–28
- 79 Speirs T504:26
- 80 Galvin T437:20–31; Faithful T274:13–21
- 81 Galvin T457:27–T458:6
- 82 McCullough T459:15–17
- 83 McCullough T459:23–28
- 84 Sullivan T507:1–2

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- 86 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 190–194
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- 88 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, paras 175 & 176
- 89 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 177
- 90 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 18
- 91 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 19
- 92 Exhibit 23 – Report of Timothy Sullivan, November 2015, para 135
- 93 Exhibit 18 – Joint expert report, 3 December 2015, pp. 3 & 4
- 94 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 20
- 95 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 19
- 96 Hoxley T527:7–19; McCullough T527:27–T528:19; Haberfield T528:21–529:8
- 97 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, Annexure E, pp. 0205, 0215 & 0225
- 98 Sullivan T529:19–27; Hoxley T526:16–527:19; McCullough T527:28–528:13; Haberfield T528:27–30
- 99 Exhibit 41B – AECOM Report – Yallourn mine, 13 November 2015, p. 0126
- 100 Faithful T355:26–27 & T356:2–5
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- 102 Mackay T412:3–6
- 103 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 17
- 104 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, pp. 15 & 16
- 105 Rieniets T268:26–31
- 106 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 170, 172–173 & 195; Confidential Annexure 3
- 107 Mackay T456:16–22
- 108 McCullough T459:26–28
- 109 von Bismarck T547:6–7
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- 111 Exhibit 5B – Supplementary statement of Luke Wilson, 30 November 2015, para 55
- 112 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, Annexure D, p. 0074; Galvin T408:7–9
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- 115 Mackay T431:29–432:14
- 116 Exhibit 13 – Statement of James Faithful, 13 November 2016, paras 192–194
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- 120 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 14, p. 0390
- 121 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 156
- 122 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0237, p. 0255
- 123 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0237, p. 0262
- 124 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0237, p. 0264
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- 127 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0237, p. 0272
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- 130 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 177
- 131 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 14, pp. 0406 & 0407
- 132 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 14, p. 0403
- 133 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 14, pp. 0406, 0407 & Figure 12
- 134 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure N
- 135 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure N, pp. 0202, 0203 & 0206
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- 137 Rieniets T687:1
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- 139 Mackay T451:26–452:10
- 140 Exhibit 8B – Letter from Southern Rural Water to Department of Economic Development, Jobs, Transport and Resources dated 24 August 2015
- 141 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, pp. 83 & 84
- 142 GHD 2014, *Regional Groundwater Committee report: Latrobe Valley groundwater and land level monitoring annual report July 2013 to June 2014*, GHD, Melbourne, p. 7
- 143 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, paras 38–42
- 144 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, Annexure 3, Annexure 3.1 & Annexure 3.2

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- 146 Exhibit 9 – Outline of evidence of David Mawer, 7 December 2015, paras 12 & 14
- 147 Exhibit 7A – Statement of Sharon Davis, 2 November 2015, para 46
- 148 Exhibit 8A – Statement of Clinton Rodda, 4 December 2015, para 23, Annexure 3, Annexure 4 & Annexure 5
- 149 Exhibit 8A – Statement of Clinton Rodda, 4 December 2015, para 23, Annexure 3, Annexure 4 & Annexure 5
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- 151 Davis T197:23–25
- 152 Exhibit 9 – Outline of evidence of David Mawer, 7 December 2015, para 13
- 153 Exhibit 8B – Letter from Southern Rural Water to Department of Economic Development, Jobs, Transport and Resources dated 24 August 2015, p. 2
- 154 Exhibit 12B – Supplementary statement of Stephen Rieniets, 3 December 2015, Appendix B-2, pp. 0588–0605
- 155 Forsyth T1224:11–15
- 156 Exhibit 11 – *Gippsland Region Sustainable Water Strategy*, p. 132
- 157 Exhibit 11 – *Gippsland Region Sustainable Water Strategy*, p. 132
- 158 Wilson T799:29–800:9
- 159 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 10, p. 9
- 160 Exhibit 8B – Letter from Southern Rural Water to Department of Economic Development, Jobs, Transport and Resources dated 24 August 2015, p. 2
- 161 Exhibit 8B – Letter from Southern Rural Water to Department of Economic Development, Jobs, Transport and Resources dated 24 August 2015, p. 3
- 162 Davis T201:2–12
- 163 Davis T200:31–201:1
- 164 Davis T203:10–12
- 165 Rodda T193:21–31; Davis T197:288–198:3
- 166 Rodda T194:1–5; Davis T194:6–16 & T198:9–15
- 167 Rodda T197:7–14; Exhibit 7A – Statement of Sharon Davis, 2 November 2015, para 40
- 168 Doyle SC T1200:13–14; Final submissions of GDF Suez, 15 January 2016, para 113
- 169 Collins QC T1245:22–28
- 170 Final submissions of EnergyAustralia, 15 January 2016, paras 13(a) & 13(b)
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- 175 See, for example, Written submission of GHD, 19 August 2015, p. 11; Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 15; Exhibit 19 – Statement of Rae Mackay, 27 November 2015, para 13
- 176 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, pp. 15 & 16
- 177 Mackay T451:29–452:2
- 178 Exhibit 8B – Letter from Southern Rural Water to Department of Economic Development, Jobs, Transport and Resources, 24 August 2015, pp. 2 & 3
- 179 Exhibit 8B – Letter from Southern Rural Water to Department of Economic Development, Jobs, Transport and Resources, 24 August 2015, p. 2
- 180 See, for example, Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 59; Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 145
- 181 Mackay T451:26–452:10
- 182 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 204
- 183 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 15
- 184 McCullough T452:23–25
- 185 Exhibit 22B – Report of Clint McCullough, 30 November 2015, Annexure C, p. 0061
- 186 Mawer T217:31–218:12
- 187 von Bismarck T546:19–31
- 188 von Bismarck T542:30–T543:1
- 189 von Bismarck T546:31–547:2
- 190 Exhibit 25 – Statement of Friedrich von Bismarck, 1 December 2015, para 24 & Attachment 1, p. 0024
- 191 Exhibit 25 – Statement of Friedrich von Bismarck, 1 December 2015, Attachment 1
- 192 See, for example, Rieniets T250:1–3. In relation to water quality management, Mr Faithful stated at T341:8–11: ‘I can’t help you in that regard. All we have committed to or we will commit to in our 2016 work plan variation is an area of work we have ahead of ourselves, so we will address it’. See also Exhibit 8B – Letter from Southern Rural Water to Department of Economic Development, Jobs, Transport and Resources, 24 August 2015
- 193 Rieniets T250:1–18
- 194 Faithful T341:8–14
- 195 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 203
- 196 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, paras 205 & 212
- 197 Exhibit 12B – Supplementary statement of Stephen Rieniets, 3 December 2015, Annexure A, para 7.1; McGowan T127:19–26
- 198 Byrne T935:9–18
- 199 von Bismarck T547:6–16 & T548:13–16
- 200 *Mineral Resources (Sustainable Development) Act 1990* (Vic), ss. 81(1) & (2)
- 201 Statement of Luke Wilson, 20 November 2015, paras 55, 56 & Annexure 17
- 202 Statement of Luke Wilson, 20 November 2015, Annexure 17; Wilson T138:22–27

- 203 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, para 73 & Annexure 17
- 204 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, para 101; Wilson T137:23–138:7
- 205 Faithful T283:28–284:6
- 206 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, para 102
- 207 Methers T283:12–26
- 208 Rieniets T284:8–13
- 209 Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic), r. 35(2)(b); Schedule 19, clauses 7 and 11(e)
- 210 Methers T291:15–292:15; Faithful T333:7–21; Rieniets T292:26–29
- 211 Faithful T333:12–15
- 212 Methers T291:19–27
- 213 Exhibit 28A – Statement of Corinne Unger, 26 November 2015, para 5
- 214 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 14
- 215 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 14
- 216 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, paras 121, 135–137, 139–144, 146–151 & 155–159; Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 99–105; Exhibit 14 – Statement of Ronald Methers, 16 November 2015, paras 164, 173, 177 & 246–256
- 217 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 98–99 & 109; Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 111; Exhibit 14 – Statement of Ronald Methers, 16 November 2015, paras 219, 220 & 231; Methers T322:10–25
- 218 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 98
- 219 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 98
- 220 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 24
- 221 Methers T290:7–8; Faithful T290:10; Rieniets T290:12–13
- 222 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 14
- 223 Exhibit 18 – Joint expert report, 3 December 2015, p. 7
- 224 Unger T621:19–28
- 225 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 90
- 226 Exhibit 23 – Report of Timothy Sullivan, November 2015, paras 82–88
- 227 McCullough T452:27–453:2
- 228 Rodda T224:28
- 229 Methers T322:10–25
- 230 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 24
- 231 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 15, p. 0561
- 232 Unger T622:23–24
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- 234 Sullivan T401:1–2
- 235 Unger T613:7–11
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- 237 Sullivan T435:8–12
- 238 Exhibit 14 – Statement of Ronald Methers, 16 November 2015, para 62
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- 240 Exhibit 22B – Report of Clint McCullough, 30 November 2015, Annexure C, p. 3
- 241 Exhibit 29 – Western Australian Department of Mines and Petroleum and Environmental Protection Authority, *Guidelines for preparing mine closure plans, May 2015*, p. 12
- 242 Exhibit 29 – Western Australian Department of Mines and Petroleum and Environmental Protection Authority, *Guidelines for preparing mine closure plans, May 2015*, p. 92
- 243 McCullough T402:3–4
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- 246 Rieniets T259:30
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- 248 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 57
- 249 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 59
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- 251 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 65
- 252 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, pp. 60–61, 63–64 & 66–67
- 253 Hazelwood Mine Fire Inquiry mine rehabilitation community consultations, 4 & 5 August 2015 – Summary of discussions; See Appendix B for a list of written submissions
- 254 Hazelwood Mine Fire Inquiry mine rehabilitation community consultations, 4 & 5 August 2015 – Summary of discussions; See Appendix B for a list of written submissions
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- 256 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 69
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- 258 Hoxley T448:15–T449:3

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- 260 McCullough T446:9–10
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- 262 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0079, p. 13
- 263 Final submissions of EnergyAustralia, 15 January 2016, pp. 5 & 6
- 264 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 114
- 265 Faithful T275:11–13
- 266 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 94
- 267 Exhibit 12B – Supplementary statement of Stephen Rieniets, 3 December 2015, Annexure B-1, p. 0091; Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 154
- 268 Sullivan T455:24–456:7
- 269 Sullivan T455:27–28
- 270 Sullivan T399:13–29; Exhibit 18 – Joint expert report, 3 December 2015, pp. 3 & 4; Wilson T155:19–21; Rieniets T229:6–10; Rieniets T249:23–26; Mether T249:2–4; Faithful T250:23–29
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- 275 Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic), r. 35 & Schedule 19; Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 29, p. 0009
- 276 Exhibit 31F – Schedule 19 Annual Activity and Expenditure Return 2014–15 – Yallourn Mine (revised version – redacted)
- 277 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 18, p. 1227
- 278 Exhibit 31D – Schedule 19 Annual Activity Expenditure Return 2014–15 – Loy Yang, p. 3
- 279 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, paras 223 & 244
- 280 Byrne T927:15–27
- 281 Exhibit 41B – AECOM Report – Yallourn mine, 13 November 2015, pp. 0101–0106
- 282 Exhibit 41B – AECOM Report – Yallourn mine, 13 November 2015, p. 0108
- 283 Exhibit 41C – AECOM Report – Hazelwood mine, 13 November 2015, p. 13
- 284 Exhibit 41E – AECOM Report – Loy Yang mine, 7 December 2015, p. 11
- 285 Exhibit 24A – Report of Jacobs Group (Australia), 16 November 2015, p. 57
- 286 von Bismarck T547:6–16
- 287 von Bismarck T548:13–16
- 288 Mackay T524:20–T525:4; McCullough T452:29–453:2; Unger T615:14–24; Galvin T405:7–18
- 289 McCullough T453:1–2; Unger T615:15–24; Galvin T405:7
- 290 Exhibit 22B – Report of Clint McCullough, 30 November 2015, p. 16; Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 19
- 291 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 19; Haberfield T501:3
- 292 Exhibit 19 – Statement of Rae Mackay, 27 November 2015, para 14
- 293 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 22
- 294 Written submission of GHD, 19 August 2015, p. 12
- 295 Exhibit 22B – Report of Clint McCullough, 30 November 2015, p. 16
- 296 Exhibit 19 – Statement of Rae Mackay, 27 November 2015, para 7
- 297 Written submission of GHD, 19 August 2015, p. 12
- 298 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 21
- 299 Written submission of GHD, 19 August 2015, p. 12
- 300 Exhibit 22B – Report of Clint McCullough, 30 November 2015, p. 15
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- 303 Exhibit 19 – Statement of Rae Mackay, 27 November 2015, para 14
- 304 Exhibit 22B – Report of Clint McCullough, 30 November 2015, p. 17
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- 310 Exhibit 22B – Report of Clint McCullough, 30 November 2015, p. 16
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- 312 Exhibit 22B – Report of Clint McCullough, 30 November 2015, p. 16
- 313 Exhibit 22B – Report of Clint McCullough, 30 November 2015, p. 16
- 314 Lapsley T87:24–29
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- 318 Exhibit 22B – Report of Clint McCullough, 30 November 2015, p. 17

- 319 Exhibit 17 – Statement of Jim Galvin, 24 November 2015, para 24; Lapsley T95:28–96:8 & T87:29
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 321 Mether T259:21–22
 322 Faithful T259:25–27
 323 Galvin T408:7–408:12
 324 Galvin T408:21–409:3
 325 Galvin T407:20–408:12 & T408:25–409:3
 326 Galvin T408:9–11
 327 Mackay T409:24
 328 Exhibit 5B – Supplementary statement of Luke Wilson, 30 November 2015, para 58
 329 Hazelwood Mine Fire Inquiry Report 2015–2016, Volume 1, pp. 34, 42 & 43
 330 Exhibit 8B – Letter from Southern Rural Water to Department of Economic Development, Jobs, Transport and Resources dated 24 August 2015, p. 2. Although the letter was concerned with the AGL Loy Yang licence, the terms of the GDF Suez licence are relevantly identical

PART 7

- 1 Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic), r. 35 & Schedule 19
 2 Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2013 (Vic), r. 35
 3 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 29
 4 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 29, p. 0006
 5 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 29, pp. 0006 & 0007
 6 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 29, p. 0008
 7 Exhibit 31F – Schedule 19 Annual Activity and Expenditure Return for 2014–15 – Yallourn mine (revised version – redacted), p. 3
 8 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, Annexure EAY.0001.002.0070
 9 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, para 285 & Annexure EAY.0001.002.0070
 10 Exhibit 14 – Statement of Ronald Mether, 16 November 2015, paras 279, 280 & 288
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 12 Mether T740:27–30
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 14 Mether T263:30–264:1
 15 Exhibit 13 – Statement of James Faithful, 13 November 2015, Annexure 18
 16 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 226
 17 Exhibit 13 – Statement of James Faithful, 13 November 2015, paras 208 & 209
 18 Exhibit 13 – Statement of James Faithful, 13 November 2015, para 208 & Confidential Annexure 5
 19 Faithful T693:29 & T697:24
 20 Faithful T695:23–27
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 22 Exhibit 22B – Report of Clint McCullough, 30 November 2015, pp. 15–17
 23 Faithful T695:1–22
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 25 Exhibit 31D – Schedule 19 Annual Activity and Expenditure Return 2014–15 – Loy Yang mine, pp. 1 & 3
 26 Exhibit 31D – Schedule 19 Annual Activity and Expenditure Return 2014–15 – Loy Yang mine, p. 4
 27 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 202 & Annexure Q
 28 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 202 & Annexure Q, pp. 0248 & 0253
 29 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure Q, p. 0248
 30 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, Annexure Q, pp. 0249–0255
 31 Rieniets T716:6–7
 32 Rieniets T716:17–18
 33 Exhibit 12C – Supplementary statement of Stephen Rieniets, 4 December 2015, para 27
 34 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, paras 243 & 244
 35 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 244
 36 Exhibit 12A – Statement of Stephen Rieniets, 30 October 2015, para 223
 37 Rieniets T711:27–712:6
 38 Exhibit 12C – Supplementary statement of Stephen Rieniets, 4 December 2015, paras 30 & 31
 39 Rieniets T721:26–722:6
 40 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, para 130
 41 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 36, p. 0884
 42 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, Annexure 36, p. 0885
 43 Final submissions of Counsel Assisting, 17 December 2015, para 16
 44 Exhibit 41A – Statement of Bryan Chadwick, 11 December 2015, para 5
 45 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, paras 175–177; Exhibit 5C – Statement of Luke Wilson, 5 December 2015, para 56
 46 Exhibit 5A – Statement of Luke Wilson, 20 November 2015, paras 161–164
 47 Exhibit 41A – Statement of Bryan Chadwick, 11 December 2015, para 20; Exhibit 41B – AECOM Report – Yallourn mine, 13 November 2015; Exhibit 41C – AECOM Report – Hazelwood mine, 13 November 2015; Exhibit 41D – AECOM Report – AGL Loy Yang mine, 13 November 2015

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PART 8

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- 108 Exhibit 44 – Report of Accent Environmental, 6 November 2015, p. 38
- 109 Exhibit 44 – Report of Accent Environmental, 6 November 2015, p. 39
- 110 Exhibit 44 – Report of Accent Environmental, 6 November 2015, p. 38
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- 124 Exhibit 45 – Statement of Robert Gillespie, 11 December 2015, para 55
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- 139 Submissions of AGL Loy Yang Pty Ltd in response to proposed adverse findings, 15 February 2016, paras 39–41. The Loy Yang Complex Agreement is discussed in Part 9 of this report
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PART 9

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- 6 Exhibit 5A – KPMG 2011, *Options for financial assurances for rehabilitation of mine and quarry sites in Victoria*, pp. 5–10

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- 19 Exhibit 44 – Report of Accent Environmental, 6 November 2015, p. 4
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PART 10

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Rehabilitated overburden dump at the Loy Yang mine
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