

**IN THE MATTER OF AN INQUIRY
INTO THE HAZELWOOD MINE FIRE
CONDUCTED PURSUANT TO PART 3 THE *INQUIRIES ACT 2014* (Vic)**

**WITNESS STATEMENT OF MR RONALD CLYDE METHER
MADE ON BEHALF OF ENERGYAUSTRALIA YALLOURN PTY LTD**

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I, **RONALD CLYDE METHER** of EnergyAustralia Yallourn Pty Ltd (**EnergyAustralia**), Eastern Road, Yallourn in the State of Victoria, will at the hearing of the Board of Inquiry into the Hazelwood Mine Fire Inquiry, **SAY AS FOLLOWS**:

1. I am the registered Mine Manager of the Yallourn Mine (as that term is defined in the Terms of Reference of the Inquiry) and am employed by EnergyAustralia in that capacity. I have been a resident of the Latrobe Valley since 1964.
2. I have qualification as a mechanical design draftsman, having commenced my career working with the State Electricity Commission of Victoria (**SECV**) in 1974. My relevant experience in this field includes:
 - (a) working across all of the Latrobe Valley Mines; and
 - (b) holding the position of "Principal Draftsman - Yallourn" for the SECV.
3. I have worked in the power industry for over 41 years. Over the last 20 years my career, I have worked directly at the Yallourn mine and at various times held most of the management positions at the Yallourn Mine. For the past 12 years, I have held my current position as the registered Mine Manager/Manager Mining for the Yallourn Mine.
4. I am a State Councillor for the Minerals Council of Australia (**MCA**). I have been on the executive committee of the Victorian Division State Council of the MCA (or its predecessor) for over 15 years, currently holding the position of joint Vice-Chair.
5. On 9 October 2015, EnergyAustralia received a letter from the Principal Legal Advisor to the Hazelwood Mine Fire Board of Inquiry (**Board**) requesting a witness statement from EnergyAustralia. [**EAY.0006.001.0012**] is a copy of the Board's letter.

6. I am authorised to make this witness statement on behalf of EnergyAustralia in response to the Board's request.
7. I have made all the inquiries which I consider appropriate in order to make this witness statement. Where statements are not made from my own knowledge, they are made to the best of my belief after due inquiry and I have set out the source of my information where applicable.
8. I have read EnergyAustralia's submission to the Board dated 24 August 2015 **[EAY.0007.001.0254] (EnergyAustralia General Submission)**.
9. To assist the Board, set out in the following table is an index indicating the broad topics addressed in this witness statement.

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10. In addition, set out in a schedule to my witness statement is an index of defined terms used throughout my witness statement:

PART 1: BACKGROUND

OWNERSHIP AND MANAGEMENT OF THE YALLOURN MINE

11. In this section of my witness statement, I make various observations about EnergyAustralia and the EnergyAustralia Group (as defined below). I make these statements from information within my general knowledge and based on enquiries that I have made of relevant personnel within the EnergyAustralia Group.

The EnergyAustralia Group

12. EnergyAustralia Holdings Limited is the Australian holding company of the "**EnergyAustralia Group**" (being EnergyAustralia Holdings and its wholly owned subsidiaries, including EnergyAustralia), which is a vertically integrated energy company group in the National Electricity Market (**NEM**).
13. The EnergyAustralia Group has a \$7.9bn portfolio of customer and operational assets. It is Australia's third largest energy (electricity and gas) retailer, with approximately 2.6 million accounts. It is an energy retailer in every contestable market that is part of the NEM (being Victoria, South Australia, New South Wales (**NSW**), Queensland, the Australian Capital Territory and Tasmania).
14. It has a balanced, multi-fuel and multi-region portfolio of approximately 4.5GW generation assets.
15. The key operational assets of the EnergyAustralia Group include four wholly-owned power stations, comprising:
- (a) the Yallourn W Power Station, located in the Latrobe Valley, Victoria adjacent to the Yallourn Mine;
 - (b) Mt Piper Power Station, located near Portland in New South Wales (coal powered generation) ;
 - (c) Tallawarra Power Station, located near Shellharbour, New South Wales (gas powered generation); and
 - (d) Hallet Power Station, located in Canowie in South Australia (gas powered generation).
16. In addition, EnergyAustralia:
- (a) has an interest in the Cathedral Rocks Wind Farm, located in South Australia; and

- (b) has recently announced the sale of the 23.5PJ underground gas storage facility and 500TJ/day gas processing plant at Iona in Victoria. EnergyAustralia anticipates that the transaction will be completed before the end of 2015.
- 17. I have made inquiries of EnergyAustralia's human resources department and am informed that, as at the end of October 2015, the EnergyAustralia Group employed around 2,300 people in Victoria, South Australia and New South Wales.
- 18. The obligations of EnergyAustralia are guaranteed under a Deed of Cross Guarantee (in the form prescribed by the Australian Securities & Investments Commission) to which EnergyAustralia Holdings (which holds an investment grade credit rating from Standard & Poor's) and other relevant members of the Energy Australia Group are party. Under the Deed of Cross Guarantee, each EnergyAustralia Group company that is a party to the Deed guarantees the debts of other EnergyAustralia Group companies that have the benefit of the Deed where winding up proceedings are commenced against that company.

EnergyAustralia

- 19. EnergyAustralia is a company within the EnergyAustralia Group. The Yallourn Mine is owned by EnergyAustralia and operated to supply brown coal to the adjacent Yallourn W Power Station.
- 20. The Yallourn Mine was originally owned and operated by the SECV. A history of the development of mining in the Yallourn area, including the Yallourn Mine, is set out in greater detail in paragraphs 26 to 58 below.
- 21. In or about the early 1990s, the Victorian State Government determined that it would privatise some of its energy generation assets, including the Yallourn Mine and associated power station. In order to do so the Government created an unlisted public company, Yallourn Energy Ltd. Yallourn Energy Ltd was owned by the State of Victoria, and prior to privatisation all of the shares in the company were held by a State-owned corporation (State Trustees Limited).
- 22. In April 1996, State Trustees Limited transferred ownership of all of the shares in Yallourn Energy Ltd to AusPower Pty Ltd, which was owned by a consortium led by Powergen UK Plc. Following a series of changes in shareholders, AusPower Pty Ltd (now EnergyAustralia AusPower Pty Ltd) became a member of what is now the EnergyAustralia Group.
- 23. Since 1996, Yallourn Energy Ltd has undergone name changes as follows:
 - (a) on 9 April 1996 it changed its name to Yallourn Energy Pty Ltd;
 - (b) on 15 June 2005 it changed its name to TRUenergy Yallourn Pty Ltd; and

(c) on 3 October 2012 it changed its name to EnergyAustralia Yallourn Pty Ltd (i.e. EnergyAustralia).

24. Throughout this witness statement, I refer to EnergyAustralia without distinguishing between the names by which that entity was formerly known.

25. Document [EAY.0007.001.0382] is a current company search of EnergyAustralia.

HISTORY OF COAL MINING IN YALLOURN

26. Document [EAY.0003.001.0291] is an annotated aerial photograph showing the location of the Yallourn area.

27. In this section of my witness statement I make various historical observations about the history of mining in Yallourn. I make these statements from information within my general knowledge, from historical records I have located and from the following texts that I have read:

(a) Serle, G; *John Monash - A Biography*, Chapter 15;

(b) Vines, JA; *Technical History of Yallourn Open Cut - July 1965 to December 1987*; and

(c) Vines, JA; *Train Systems, Yallourn and Morwell Open Cuts*.

28. Coal mining has a long history at Yallourn, dating back to the late 1800s. The Yallourn North Open Cut Mine is located north east of the Yallourn W Power Station area as shown on Document [EAY.0003.001.0291].

29. From the early 1920s, mining commenced in the Old Yallourn Open Cut (discussed further below). At this time, consistent with my evidence at paragraph 20 above, mining was undertaken by the SECV.

30. The coal mined during this period was used in the production of electricity and briquettes. The coal used for the production of electricity supplied a number of power stations commissioned, built and operated by the SECV. These power stations were referred to as Yallourn A, Yallourn B, Yallourn C, Yallourn D and Yallourn E (**Old Yallourn Power Stations**). Before the Hazelwood Power Station was completed and commissioned in or about the 1960s, the Old Yallourn Power Stations provided the bulk of Victoria's electricity and briquette supply. Over time, the Old Yallourn Power Stations were decommissioned and progressively demolished.

31. In or around 1974, the SECV commissioned a new power station, known as the Yallourn W Power Station. The Yallourn W Power Station was so named because it is located slightly west of where the Old Yallourn Power Stations were (or had been) located. The Yallourn W Power Station is the only power station currently in use at Yallourn. Further information

concerning the generation of electricity at the Yallourn W Power Station is set out in section 69 to 70 below.

32. Further information about the SECV's plan for rehabilitating the Yallourn Mine during this period is set out in paragraphs to 152 to 161 below.

The Current Yallourn Mine

33. The Yallourn Mine, which supplies the coal required to generate electricity at the Yallourn W Power Station, is comprised of four main coal fields:

- (a) Yallourn Township Field;
- (b) East Field;
- (c) East Field Extension; and
- (d) Maryvale Field.

Document [EAY.0003.001.0291] is an annotated aerial photograph showing these fields. The following section contains more detail about each of these coal fields.

34. The Yallourn Mine is approximately 95 metres below ground level at its lowest point. This is relatively shallow compared with other Latrobe Valley coal mines (discussed further at paragraphs 59 to 62 below). It is approximately eight kilometres wide at its widest point and about 26 kilometres around the top perimeter.

Yallourn Township Field

35. The Yallourn Township Field was the first coal field within the Yallourn Mine to be mined. Mining ceased at the Yallourn Township Field in December 1997. As can be seen on the aerial photograph at [EAY.0003.001.0291], the Yallourn Township Field is located in the immediate vicinity around the location of the Old Yallourn Power Stations, and to the south of the Yallourn W Power Station.
36. At the time of mining operations, the Yallourn Township Field was broken down further into the following coal fields:
- (a) Old Yallourn Open Cut;
 - (b) Southern Field; and
 - (c) Township Field.
37. Document [EAY.0008.002.0039] is a map showing these fields within the Yallourn Township Field.

38. Mining commenced in the Old Yallourn Open Cut in or about the 1920s. Mining proceeded to the southern end of the Old Yallourn Open Cut, before progressing into the Southern Field. Upon reaching the southern section of the Southern Field, mining operations turned in a westerly direction, then proceeded north to close out the Southern Field. Mining then progressed in a northerly direction in the Township Field.
39. The decision to mine South Field required the relocation of the railway line and the Princess Highway further south of the mine.
40. By the time mining in the Yallourn Township Field ceased in December 1997, mining operations were centred on the East Field (where mining operations had already begun). Included at paragraphs 43 to 45 below is more information in relation to the East Field, and the transition of mining operations to that area.
41. While mining activity has long since ceased in the Yallourn Township Field, it nevertheless continues to play a significant role in EnergyAustralia's current fire management strategy, and in relation to the operation of the Yallourn Mine and Yallourn W Power Station more generally. For example, three operationally significant water storages, including the Yallourn Mine fire services pond and a flocculation pond, are located within the Yallourn Township Field. The fire services pond is connected to the significant fire protection infrastructure located around the Yallourn Mine which is used to prevent and combat fires. Substantial coal conveyor infrastructure also traverses the northern section of the Yallourn Township Field.
42. As the Yallourn Township Field is no longer used for coal extraction, where possible, EnergyAustralia has been able to progressively rehabilitate the area . This is discussed further at paragraphs 225to 256below.

East Field

43. By around the late 1970s, the SECV had identified the need to access further significant coal resources to the east of the Yallourn Township Field. At that time, the Morwell River ran close to the eastern boundary of the Yallourn Township Field, acting as a natural barrier to the expansion of coal mining to the east of the Yallourn Township Field.
44. In or about late 1983, the SECV began work to divert the Morwell River through a three (3) metre diameter pipe for 3.7 kilometres, commencing in an area to the south of the Yallourn Mine (**1983 Diversion**). The location of the 1983 Diversion, which took approximately four (4) years to complete, is shown at pages 0087 and 0110 of Document [EAY.0001.002.0079]. The 1983 Diversion was undertaken to access the low strip ratio coal reserves in the Morwell River flood plain located to the east of the Yallourn Township Field. The SECV named this area the East Field.

45. In or about May 1992, the SECV commenced stripping overburden in the East Field, and coal mining commenced in or around March 1994.

East Field Extension and Maryvale Field

46. In or about the late 1990s, EnergyAustralia resolved to exploit further coal resources to the south of the East Field in an area known as Maryvale. However, the Morwell River (after the 1983 Diversion), again acted as an impediment to the extraction of coal from this area.
47. EnergyAustralia explored options to further divert the Morwell River. As part of this proposed plan, EnergyAustralia considered commencing the diversion of the Morwell River further upstream (south of its then location) and then even further east, effectively around the eastern boundary of:
- (a) the newly proposed field in Maryvale (known as the "**Maryvale Field**"); and
 - (b) the East Field.
- (1999 Proposed Diversion).**
48. **[EAY.0012.001.0381]** shows the proposed course of the 1999 Proposed Diversion.
49. A new mining licence was obtained to facilitate the 1999 Proposed Diversion (MIN 5216, discussed further at paragraphs 81 to 84 below). However, for reasons set out in the following paragraphs, a diversion in this form was never undertaken.
50. As an alternative to the 1999 Proposed Diversion, EnergyAustralia considered diverting the Morwell River through the Yallourn Mine between the Yallourn Township Field and the East Field. As the Yallourn Mine was substantially mined out in this area, this proposal was to divert the Morwell River along an aqueduct, comprised mainly of overburden from the Yallourn Mine. The proposed aqueduct was to be 3.5 kilometres long and up to a maximum 35 metres high in some areas. This proposal had the dual purpose of allowing access to:
- (a) the Maryvale Field; and
 - (b) an additional coal field in an area further east of the East Field, known as the **East Field Extension**.
51. The East Field Extension is located to the immediate east of the East Field. However, as a consequence of the 1983 Diversion, and prior to the Morwell River diversion discussed at paragraph 52 below, the Morwell River ran over the area of the East Field Extension and acted as a barrier to the expansion of the East Field further east towards Latrobe Road.
52. The construction of the aqueduct, known as the **Morwell River Diversion** developed as an alternative to the 1999 Proposed Diversion, commenced in or about 2001 and was completed

in or around the middle of 2005. Completion of the Morwell River Diversion opened access to both the Maryvale Field and the East Field Extension. [EAY.0004.001.0045] and [EAY.0002.001.0159] show the current course of the Morwell River and the location of the Morwell River Diversion (marked "MRD" on [EAY.0002.001.0159]).

53. In November 2007, a failure occurred in the northern batters of the East Field, the result of which saw the these batters slip and the Latrobe River breached in this area (**2007 Batter Failure**). The long term solution to the 2007 Batter Failure was to divert the Latrobe River further north of its then location, thereby providing a greater buffer between the Latrobe River and the Yallourn Mine in this area.
54. In September 2011 EnergyAustralia began to remove overburden in Maryvale Field, while coal was first mined in or about August 2012. Coal mining ceased in the East Field Extension in January 2015. Since this time, all coal mining activities have been concentrated in the Maryvale Field. This is intended to remain the case for the remainder of the Yallourn Mine's life.
55. In June 2012, the Morwell River Diversion partially collapsed during a period of high rainfall (**2012 Morwell River Diversion Failure**). As a consequence of the 2012 Morwell River Diversion Failure, the Morwell River flowed directly into the Yallourn Township Field and then later into East Field when river flows exceeded the mine's pumping capacity. As an interim measure, significant work was required to:
 - (a) manage water flows to various areas of the Yallourn Mine;
 - (b) pump water out of the Yallourn Township Field and East Field; and
 - (c) divert water away from the Morwell River directly into the Latrobe River, bypassing the Morwell River Diversion (this was achieved through a 1.6 metre pipe).
56. In or about October 2013, river flows were returned to the Morwell River Diversion. By in or about January 2014, the Morwell River Diversion was fully restored with enhanced design features.
57. As a consequence of both the 2007 Batter Failure and the 2012 Morwell River Diversion Failure, EnergyAustralia gained a greater understanding of the following issues which influence its current operational and rehabilitation strategies:
 - (a) batter stability issues generally;
 - (b) the effect that filling the mine void with water may have; and
 - (c) the potential benefits that diverting the Morwell River into the Yallourn Mine could have on areas further downstream which are susceptible to flooding.

58. A summary of the four coal fields comprising the Yallourn Mine (after amalgamating the sub-fields which comprise the Yallourn Township Field) is set out in the following table:

	Coal Resource (million tonnes)	Surface Area (hectares)	Coal seam thickness (meters)	Year coal exhausted
Yallourn Township Field	670	1129	60	1997
East Field	200	281	75	2008
East Field Extension	115	143	80	2015
Maryvale Field	22 (to date) 322 (projected total)	378	85	(continuing)

Geological Formation

59. Coal in the Latrobe Valley is at varying depths from the surface and varying proximities from underground water sources. [EAY.0002.001.0001] is a schematic drawing representing the hydrogeological features of the Latrobe Valley. It is seen in cross section from a line drawn around Yallourn in the west to Loy Yang in the east. [EAY.0007.001.0374] indicates the area from which the cross section is taken.
60. The cross section demonstrates the following features of the Yallourn Mine:
- The relative shallowness of the Yallourn Mine in comparison with the other Latrobe Valley mines. This shallowness, combined with the proximity of the Yallourn Mine to the Latrobe and Morwell Rivers, has a significant bearing on EnergyAustralia's rehabilitation strategy. This is discussed further at paragraphs 182 to 186 below.
 - The significant buffer between the lowest point of the Yallourn Mine and the M1A aquifer (the closest unconfined aquifer to the Yallourn Mine).
61. Regular monitoring of groundwater and land levels is undertaken in the Latrobe Valley cooperatively by each of the mine operators. GHD prepare an annual report in relation to this monitoring. [EAY.0002.001.0001] (referred to above) has been taken from the 2012-2013 GHD report in relation to this issue.
62. The geological formation of the Yallourn Mine, including the buffer between it and the M1A aquifer system, is an important consideration in mining operations. Because:
- coal is close to the surface;

- (b) mining does not go as deep in the Yallourn Mine relative to other mines in the Latrobe Valley; and
- (c) the confined M1A aquifer is well below the base of the coal (approximately 40 - 50 metres),

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. At no stage during mining operations, or since mining operations ceased in relation to the Yallourn Township Field, has dewatering been necessary in relation to the Yallourn Township Field. EnergyAustralia and the SECV before it have placed a substantial volume of overburden material Yallourn Township Field. The weight of the overburden acts as a counterbalance (beyond that which is necessary) and further obviates the need for aquifer dewatering.

63. Some limited dewatering of the MIA aquifer is required in both East Field and Maryvale Field.

Characteristics of Coal Mined at Yallourn

64. Coal from the Yallourn coal seam is mined exclusively in the Yallourn Mine, and is burned in the Yallourn W Power Station.
65. Yallourn seam coal is approximately 7 to 20 million years old, originating from forest and swampy environments. In comparison to other Latrobe Valley coal, it is relatively immature. Yallourn seam coal is brown coal, which has a high moisture content (generally in the order of 65%). Its net wet specific energy value is approximately 7 MJ per kilogram.
66. Yallourn seam coal typically has the following further characteristics (calculated on a dry basis):
- (a) low ash content of between 1.5-2.5%;
 - (b) sulphur lower than 0.3%;
 - (c) sodium of 0.1%; and
 - (d) iron content of between 0.5-0.9%.
67. The Yallourn W Power Station is specifically configured to burn Yallourn seam coal. The relatively high moisture content of Yallourn seam coal requires it to be partially dried in large gas offtake ducts and pulverising mills prior to being blown into the Yallourn W Power Station's furnace.

68. It may be possible to burn coal from other Latrobe Valley mines in the Yallourn W Power Station, but this would need to be blended with Yallourn seam coal. Failure to blend coal sufficiently would unacceptably increase boiler fouling, which would in turn reduce the efficiency of the Yallourn W Power Station and reduce boiler run times between cleaning.

Power Generation at the Yallourn W Power Station

69. The Yallourn W Power Station comprises two 360 megawatt and two 380 megawatt units.
70. Every hour, approximately 2,300 tonnes of brown coal is used to boil water into superheated steam to drive four turbine generators. These turbines have a combined capacity to generate 1,480 MW of electricity. This is enough to supply approximately two million homes, and comprises approximately 22% of Victoria's base load electricity.

Mining Licences

71. The current Yallourn Mine is subject to three Mining Licences, being Mining Licence 5003 [EAY.0001.001.0018] (MIN 5003), Mining Licence 5216 [EAY.0007.001.0469] (MIN 5216), and Mining Licence 5304 [EAY.0007.001.0465] (MIN 5304) (together, the **Mining Licences**). Set out at paragraphs 79 to 88 below is a brief summary of each of the Mining Licences.
72. [EAY.0003.001.0291] is an annotated aerial photograph showing the location of the Yallourn Mine, overlaid with the boundaries of each of the Mining Licences. The combined total area under the Mining Licences is 5,595 hectares. This is comprised of:
- (a) 5,361 hectares in MIN5003;
 - (b) 151.1 hectares in MIN 5216; and
 - (c) 83.1 hectares in MIN 5304.
73. While some infrastructure works have occurred in relation to the land subject to MIN 5216 and Min 5304 (such as the construction of the Morwell West Drain referred to in paragraph 118, coal mining is exclusively carried out within the boundary of MIN 5003.
74. EnergyAustralia owns approximately 99% of the land within the boundary of the Mining Licences. The remaining land is predominately Crown Land, road and river easements. There is also a small portion of freehold land located near the coal bunker owned by a private third party.
75. It is a requirement associated with each Mining Licence that EnergyAustralia have a rehabilitation bond in place. EnergyAustralia has separate rehabilitation bonds lodged with the Department of Economic Development, Jobs, Transport and Resources (**Department**) in relation to each Mining Licence. This is discussed further at paragraphs 274 to 282 below.

76. Over the course of the past 20 years, the Department has had various name changes. Throughout this witness statement, a reference to the Department refers to the relevant Victorian Government Department responsible for the administration of the *Mineral Resources (Sustainable Development) Act 1990 (MRSDA)*.
77. The MRSDA was formally known as the *Mineral Resources Act 1990*. Throughout this witness statement, a reference to the MRSDA refers to both the *Mineral Resources (Sustainable Development) Act 1990* and the *Mineral Resources Act 1990*.
78. Set out below is more detail in relation to each of the Mining Licences.

Mining Licence 5003

79. On 19 March 1996, the Governor of Victoria on the recommendation of the then Minister for Energy and Minerals, the Honourable S J Plowman MP, made an order pursuant to the *Electricity Industry Act 1993 (Vic)* to grant MIN 5003 to Yallourn Energy Ltd. [EAY.0001.001.0017] is a copy of the Order granting MIN 5003.
80. MIN 5003:
- (a) is for a term of thirty years, commencing on 19 March 1996;
 - (b) relates to the area in and around Yallourn as indicated by the green line on [EAY.0003.001.0291]. The boundary of MIN 5003 is aligned with the land titles in the area;
 - (c) contains a condition requiring the establishment of an Environmental Review Committee (**ERC**) (see paragraph 1.3 of the Schedule of Conditions); and
 - (d) refers to a Mining Licence Work Plan dated 2 June 1995 at Schedule B [EAY.0001.001.0028], which was subsequently approved on 19 March 1994 with the granting of MIN 5003.

Mining Licence 5216

81. On 6 October 1999, the Minister administering the MRSDA, granted MIN 5216 to EnergyAustralia. MIN 5216 was subsequently registered by the Mining Registrar on 8 October 1999. [EAY.0007.001.0469] is a copy of MIN 5216.
82. MIN 5216:
- (a) is for a term of 20 years, commencing on 8 October 1999; and
 - (b) relates to the area in and around Yallourn at the south east corner of MIN 5003, as indicated by the pale blue line on [EAY.0003.001.0291].

83. MIN 5216 was sought by EnergyAustralia as part of the 1999 Proposed Diversion referred to at paragraphs 47 to 49 above. In order to construct the 1999 Proposed Diversion, EnergyAustralia identified that it required a further section of land beyond the south-eastern boundary of MIN 5003. While EnergyAustralia ultimately did not pursue the 1999 Proposed Diversion, this decision had not been made at the time MIN 5216 was granted. EnergyAustralia continues to hold MIN 5216.
84. On 14 July 2000, the Department wrote to EnergyAustralia enclosing an Authority to Commence Work among other documents relevant to EnergyAustralia's activities within MIN 5216. [EAY.0007.001.0433] is a copy of the letter dated 14 July 2000, and [EAY.0007.001.0446] is a copy of the Authority to Commence Work.

Mining Licence 5304

85. On 12 July 2000, the Minister administering the MRSDA granted MIN 5304 to EnergyAustralia. MIN 5304 was registered by the Mining Registrar on the same day. [EAY.0007.001.0465] is a copy of MIN 5304.
86. MIN 5304:
- (a) is for a term of 20 years commencing on 12 July 2000; and
 - (b) relates to an area in and around Yallourn as indicated by the pink line on [EAY.0003.001.0291].
87. MIN 5304 was sought by EnergyAustralia to allow the placement of screen mounds as part of the 1999 Proposed Diversion.
88. On 14 July 2000, (the same day that it wrote to EnergyAustralia in relation to MIN 5216 referred to in paragraph 84 above) the Department wrote to EnergyAustralia enclosing various documents in relation to MIN 5304, including an Authority to Work. Document [EAY.0007.001.0448] is a copy of this letter and document [EAY.0007.001.0463] is a copy of the Authority to Commence Work.

Work Plan Variations

89. At the time that the Authority to Commence Work in relation to each of the Mining Licences was granted to SECV (in the case of MIN 5003) and EnergyAustralia (in the case of MIN 5126 and MIN 5003), Approved Work Plans were also registered.
90. Since the grant of the Mining Licences, various changes have been made to the Approved Work Plans. Changes to the Approved Work Plans must be further approved by the Department and registered against the relevant Mining Licence(s).

91. In or about August 2001, EnergyAustralia sought to implement a different mining method within the Yallourn Mine. In broad terms, this related to the use of dozers in place of dredgers as part of its mining procedures, and necessitated a change to the Approved Work Plan (**2001 WPV**).
92. On or about 31 August 2001, the Department approved the transition to dozer mining as contemplated in the 2001 WPV, and registered it against each of the Mining Licences as follows:
- (a) as against MIN 5003, in **[EAY.0010.002.0191]**;
 - (b) as against MIN 5126, in **[EAY.0007.001.0373]**; and
 - (c) as against MIN 5304, in **[EAY.0007.001.0001]**.
93. In the later stages of 2001, EnergyAustralia submitted a proposal for a variation to the Approved Work Plans for the Mining Licences to construct the Morwell River Diversion. As I set out in paragraph 50 and 52 above, the Morwell River Diversion facilitated mining in the East Field Extension and the Maryvale Field. All of these proposed changes were incorporated into EnergyAustralia's proposal for changes to the Approved Work Plans (**2002 WPV**). Document **[EAY.0001.001.0076]** is a copy of EnergyAustralia's proposal for the 2002 WPV.
94. By letter dated 25 January 2002, the Department wrote to EnergyAustralia advising that the 2002 WPV had been approved, and enclosed the following relevant documents:
- (a) Approved Work Plan Variation for MIN 5003 **[EAY.0001.001.0073]**, registered on 24 January 2002;
 - (b) Approved Work Plan Variation for MIN 5216 **[EAY.0001.001.0074]**, registered on 24 January 2002;
 - (c) Approved Work Plan Variation for MIN 5304 **[EAY.0001.001.0075]**; registered on 24 January 2002; and
 - (d) Scheduled of Work Plan Conditions dated 18 January 2002 **[EAY.0001.001.0072]** registered on 24 January 2002 against each of the Mining Licences.
95. **[EAY.0001.001.0071]** is a copy of the Department's letter to Energy Australia dated 25 January 2002.
96. On 2 February 2005 I, on behalf of EnergyAustralia, wrote to the Department to provide it with a Work Plan update. The Work Plan update outlined EnergyAustralia's planning with respect to:

- (a) the establishment of the Morwell West Drain (discussed further at paragraph 118 below);
 - (b) coal face locations along the eastern boundary of MIN 5003, towards the Latrobe Road (these amendments were required in order to facilitate straight mining batters which facilitate more efficient mining operations); and
 - (c) the removal of the Morwell Hill Climb track.
97. Document [EAY.0001.001.0140] is a copy of my letter to the Department dated 2 February 2005.
98. On 4 February 2005, I again wrote to the Department on behalf of EnergyAustralia clarifying the Work Plan update provided on 2 February 2005 [EAY.0001.001.0141]. The Department subsequently advised that it would approve the grant of a Work Plan Variation (**2005 WPV**).
99. The 2005 WPV was formally approved on 27 May 2005, and was registered on 30 May 2005 on MIN 5003. The 2005 WPV was not relevant to MIN 5216 or MIN 5304. [EAY.0001.001.0132] is a copy of the approved 2005 WPV, while [EAY.0001.001.0133] is a copy of the Schedule of Work Plan Conditions in relation to the 2005 WPV.
100. In or about June 2011, EnergyAustralia submitted a further Work Plan Variation to the Department (**2011 WPV**). [EAY.0001.001.0147] is a copy of EnergyAustralia's submission in relation to the 2011 WPV. The 2011 WPV was required by EnergyAustralia as a consequence of the 2007 Batter Failure. As a result of the 2007 Batter Failure:
- (a) a new conveyor alignment of the bottom conveyor was required in the East Field;
 - (b) a block of coal was left to provide additional stability for the northern batters in the East Field Extension, by buttressing these batters; and
 - (c) mining was required to progress into the Maryvale Field sooner than otherwise anticipated, in order to ensure continuous supply of coal for the Yallourn W Power Station.
101. In anticipation of commencing mining in the Maryvale Field, EnergyAustralia undertook a review of the proposed area and its surrounds. The study concluded that a realignment of the Maryvale Field would provide for more efficient mining.
102. The 2011 WPV covered both the changes to the mining operations as a result of the 2007 Batter Failure, and the proposed realignment of the Maryvale Field.
103. By letter dated 17 June 2011 [EAY.0001.001.0142], the Department approved the 2011 WPV (with conditions) and enclosed:

- (a) the 2011 WPV, approved on 17 May 2011 and registered on 14 June 2011 [EAY.0001.001.0143]; and
 - (b) MIN 5003 Work Plan Variations Conditions (marked "Final - 17/05/2011"), approved on 10 June 2011 and registered on 14 June 2011 [EAY.0001.001.0144].
104. By letter dated 22 January 2015, the Minister wrote to EnergyAustralia in relation to MIN 5003 [EAY.0009.003.0001]. The letter informed EnergyAustralia that the Department intended amending certain conditions in MIN 5003, and that those amendments would take effect once they were registered. The letter also enclosed an Instrument of Variation and Addition of Licence Conditions [EAY.0009.003.0003] signed by the Minister. The changes to MIN 5003 related to two things:
- (a) various changes and references to positions, titles and names of Acts or Regulations which, since MIN 5003 had first been granted, had been amended. These changes were to ensure consistency with current terminology; and
 - (b) the requirement in a new Condition 1A to perform a Risk Assessment and Management Plan (**RAMP**) concerning public safety and the environment at the Yallourn Mine.
105. The Schedule of Conditions contained in Annexure 2 to the Instrument of Variation and Addition of Licence Conditions represents the current consolidated Schedule of Conditions attached to MIN 5003.
106. EnergyAustralia is currently preparing a RAMP pursuant to Condition 1A of the Schedule of Conditions attached to MIN 5003. It has received some feedback from the Department in relation to an earlier version of a RAMP it prepared in response to Condition 1A and intends submitting a revised RAMP early next year.
107. EnergyAustralia expects that a new work plan variation will be required after the RAMP is approved by the Department.
108. The letter from the Minister dated 22 January 2015 (referred to in paragraph 104 above) also sets out further reporting obligations relevant to progressive rehabilitation that EnergyAustralia and the Department have agreed upon. This new report will include:
- (a) the area of the rehabilitation completed in the reporting period;
 - (b) the cumulative area rehabilitated since mining commenced; and
 - (c) a map showing worked areas, areas cumulatively rehabilitated and areas rehabilitated during the reporting period.

109. These new reports in relation to progressive rehabilitation are to be provided to the Department annually by the end of September. EnergyAustralia provided its 2015 report to the Department on 10 September 2015 [EAY.0005.001.0002]. This is discussed further at paragraph 243 below.

WATER LICENCES AND ENTITLEMENTS

Water Resources in around Yallourn Mine

110. The Yallourn Mine is in close proximity to large volumes and sources of water. [EAY.0002.001.0160] is an annotated aerial photograph showing various bodies of water located in and around the Yallourn Mine.
111. The Yallourn Mine is bordered by the Latrobe River to the north, and is now dissected by the Morwell River, which flows along the Morwell River Diversion.
112. The Latrobe River is a perennial river which flows generally from west to east from the Great Dividing Ranges, through the Latrobe Valley into Lake Wellington to the east of Sale and ultimately into Bass Strait.
113. The Blue Rock Reservoir is a 200,000 ML reservoir located to the north-west of the Yallourn Mine. Water from Blue Rock Reservoir flows into the Tanjil River, which joins the Latrobe River at a confluence before the Latrobe River flows into Lake Narracan. Lake Narracan is a 7,230 ML lake immediately north-west of the Yallourn W Power Station.
114. A weir is also located at Yallourn on the Latrobe River in close proximity to the Yallourn W Power Station (**Latrobe River Weir**). This enables a reliable body of water to form immediately behind the Latrobe River Weir, referred to as the Yallourn Pond. The Yallourn Pond is closely monitored and the water levels are controlled so that water can be extracted and used at the Yallourn W Power Station.
115. Water from the Yallourn Pond is also extracted for use in the Loy Yang Power Stations. This water is pumped by pipe to Loy Yang, which is located approximately 17 kilometres to the east of the Yallourn Mine.
116. Blue Rock Reservoir, Lake Narracan and the Latrobe River Weir are part of the Upper Latrobe water catchment area, and are managed by Southern Rural Water (**SRW**).
117. Morwell River is also a perennial river. It rises in the Strzelecki Ranges below Boolarra South, and flows in a generally northern direction for approximately 40 kilometres. The Morwell River lower section runs through the Yallourn Mine and joins with the Latrobe River within the area subject to MIN 5003.
118. The Morwell West Drain is a man-made drain in the south east corner of the boundary to the Mining Licences. It collects storm water from the north west side of the town of Morwell,

beyond the southern boundary of the Yallourn Mine. Water from the Morwell West Drain flows through open wetlands to the south of the Yallourn Mine before flowing into the Morwell River along the Morwell River Diversion, and into the Latrobe River.

EnergyAustralia's Water Requirements and Operations

119. EnergyAustralia requires a reliable source of water to operate the Yallourn W Power Station. In order to meet power station requirements, up to 36.5 GL of water (the full amount of the Bulk Water Entitlement discussed further below) can be extracted from the Latrobe River at the Yallourn Pond each year. In a typical year, approximately 30 GL is extracted from the Latrobe River.
120. The majority of the water is used in the Yallourn W Power Station's cooling process where it is evaporated in the three cooling towers as part of normal operations. Based on year to date figures for 2015 (current as of October), around 67% of water extracted from the Latrobe River has evaporated through the cooling process.
121. Water extracted from the Latrobe River which does not evaporate as part of electricity generation, is drained back into the Yallourn Township Field. This water initially passes through a small pond, referred to colloquially at the Yallourn Mine as "Lake Placid" before it is drained into a much larger water storage known as the "fire services pond".
122. Water in the fire services pond is comprised of the used water from the Yallourn W Power Station, water from ground run-off and aquifer water from dewatering. The combined amount of water that typically enters the fire services pond is comprised of:
 - (a) used water from the Yallourn W Power Station – approximately 10GL per annum;
 - (b) run-off water – approximately 4GL per annum (increasing as mining progresses into Maryvale Field and the mine increases in size but is also dependant on rainfalls in any one year); and
 - (c) groundwater from dewatering – approximately 1GL per annum.

Accordingly, in any one year there is approximately 15GL of water entering the Yallourn Mine,. This amount will increase once the void in the Maryvale Field increases as a result of mining creating a greater catchment area for ground water run-off.
123. EnergyAustralia currently returns approximately 15GL of water back into the river system each year, the quality of which is regulated in accordance with EPA Discharge Licence No. 10961, as described in greater detail at paragraphs 140 - 141 below.
124. Water from the fire services pond is used for:
 - (a) fire suppression and management

- (b) dust suppression; and
 - (c) wash downs and other operational requirements associated with mining operations.
125. Some water in the fire services pond is pumped to a smaller lake called the flocculation pond. EnergyAustralia treats the water in the flocculation pond before it is discharged into the Morwell River in accordance with EnergyAustralia's EPA Accredited Licence No. 10961 (**EPA Discharge Licence**) [EAY.0001.001.0388].
126. The following annotated aerial photographs show:
- (a) the location of the Yallourn Pond, Latrobe River Weir and Lake Narracan relative to the Yallourn W Power Station [EAY.0004.001.0043]; and
 - (b) the discharge point where EnergyAustralia releases treated water back into the Morwell River [EAY.0004.001.0045].

EnergyAustralia's Water Licences and Entitlements

Bulk Entitlement (Latrobe –Yallourn) Conversion Order 1996

127. EnergyAustralia is entitled to extract water, subject to its availability, from the Latrobe River pursuant a bulk water entitlement (**Bulk Water Entitlement**) issued to it under sections 43 and 47 of the *Water Act 1989* (Vic) (**Water Act**). The Bulk Water Entitlement came into effect on 28 March 1996, and has no prescribed end date.
128. While EnergyAustralia extracts around 30 GL of water from the Latrobe River during a typical year, under the Bulk Water entitlement it is entitled to extract up to 36.5 GL.
129. Details of the Bulk Water Entitlement are contained in the Bulk Entitlement (Latrobe - Yallourn) Conversion Order 1996, Government Gazette S29 28/03/1993.3 (Consolidated Version as at 4 July 2013) (**Order**) [EAY.0004.001.0001].
130. The consolidated version of the Order was issued following the release of the Victorian Government Gippsland Region Sustainable Water Strategy (**GRSWS**). A key change arising from the GRSWS was the allocation of the previously unused 36% Government share of the Blue Rock Reservoir. The objectives of the GRSWS were to:
- (a) establish a 22% share of the Blue Rock Reservoir as a designated drought reserve, managed by SRW, to reduce the risk of water shortages affecting bulk entitlement holders; and
 - (b) establish a 9% share of the reservoir as an environmental entitlement for the Latrobe River to be held by the Victorian environmental entitlement holder.

131. The 2013 amendments did not alter EnergyAustralia's existing water entitlements. However, they did establish procedures to access the new drought reserve, and removed the annual Blue Rock Reservoir regulated releases cap.
132. Under the Bulk Water Entitlement, EnergyAustralia is entitled to specified shares of water drawn from different parts of the "System Waterway", as defined in the document. EnergyAustralia's share of capacity is set out in clause 7 of the Bulk Water Entitlement. Specifically, EnergyAustralia is entitled to:
- (a) a 14.97% share of the total water capacity of Blue Rock Reservoir, where the total storage capacity is 208,188 ML at full supply level of 140 metres AHD;
 - (b) a 29.94% share of the total storage capacity of Lake Narracan, where the total storage capacity is 7,230 ML at a full supply level of 47.7 metres AHD; and
 - (c) all water stored in its share of the storages specified above, less a share of losses as assessed in accordance with Schedule 1 of the Bulk Water Entitlement.
133. A table showing the various other entitlement holdings of these bodies of water is set out below¹:

Entitlement Holder	Inflow Share %	Outlet capacity share %	Storage capacity share%	Storage capacity (ML)
Gippsland Water	16.27	16.27	16.27	33,872
Loy Yang A	16.40	16.40	16.40	34,143
Loy Yang B (SRW)	8.20	8.20	8.20	17,071
Loy Yang 3-4 Bench (DTF)	10.43	10.43	10.43	21,714
SRW (licenced diverters)	2.00	2.00	2.00	4,164
Yallourn	14.97	14.97	14.97	31,166
Drought Reserve (SRW)	22.73	22.73	22.73	47,321
Environmental Water Holder	9.00	9.00	9.00	18,737
Total	100.00	100.00	100.00	208,188

134. In addition, EnergyAustralia is entitled to:
- (a) a "share of flow" on the terms and conditions set out in clause 8 of the Bulk Water Entitlement (see page 0005 of [EAY.0004.001.0001]);
 - (b) use more than its share of the capacity of outlet works of Blue Rock Reservoir if ~~agreed with~~ other Blue Rock Entitlement Holders, including Gippsland Water and

¹ I note that the allocation of water entitlements is currently under review. Revised allocations have been agreed between the entitlement holders, but are subject to Ministerial approval.

AGL, or (if there is no competing demand) the Storage Manager (clause 9) (see page 0006 of [EAY.0004.001.0001]); and

- (c) receive a supply from other Blue Rock Entitlement Holders during emergency situations, subject to an agreement being put in place with respect to operating arrangements, metering provisions and cost sharing for the emergency supply (clause 11) (see page 0007 of [EAY.0004.001.0001]).

135. Under the Bulk Water Entitlement, EnergyAustralia is required to:

- (a) implement a metering program approved by the Minister (clause 12) (see page 0007 of [EAY.0004.001.0001]);
- (b) report to the Minister in relation to various matters concerning the Bulk Water Entitlement including daily and/or annual amounts taken and returned to the System Waterway, any transfers or assignments of the Bulk Water Entitlement, any licences in respect of the System Waterway temporarily or permanently transferred to EnergyAustralia and any failures or difficulties in complying with the Bulk Water Entitlement (clause 13.1) (see page 0008 of [EAY.0004.001.0001]);
- (c) pay a portion of the Resource Manager's costs (clause 14.1) and the Storage Manager's costs (clause 15.1) (see page 0010 of [EAY.0004.001.0001]); and
- (d) make available to any person any data collected for the purposes of metering or reporting (Clause 18.2) (see page 0012 of [EAY.0004.001.0001]).

136. Under the terms of individual orders held by each Bulk Entitlement Holder, each Bulk Entitlement Holder pays SRW a share of the costs for operation and maintenance of the parts of the system where they are a beneficial user. In Yallourn's case, these payments include components associated with the ongoing operation and maintenance of Blue Rock Dam, Lake Narracan and Latrobe River Weir. Cost sharing is in proportion to the size of individual water entitlements.

Groundwater Licence No. 2007403

137. On 25 March 1996, the then Minister for Natural Resources issued EnergyAustralia with Groundwater Licence No. 2007403 (**Groundwater Licence**) under section 51 the Water Act. The Groundwater Licence authorises EnergyAustralia to extract groundwater from the Latrobe Valley, and is valid until 1 September 2025. Its objective is to allow the efficient depressurising of the Gippsland Groundwater Basin to avoid any stability and operational issues within the Yallourn Mine. A copy of the Groundwater Licence is at [EAY.0001.002.0200].

138. EnergyAustralia is authorised to extract groundwater under the Groundwater Licence from aquifers at the quantities and during the times specified in the First Schedule to Groundwater Licence.
139. EnergyAustralia's ability to take and use groundwater under the Groundwater Licence is subject to 17 conditions. Those conditions relate to, amongst other things, the period of validity (clause 1), purpose of entitlement (clause 2), process for variation (clause 4), annual fees (clause 6), metering and recordkeeping (clause 8), payment of compensation (clause 11), regional monitoring program (clause 12), maintenance of databases (clause 14) and costs recovery (clause 15).

EPA Discharge Licence No. 10961

140. On 19 June 1996, the Victorian Environment Protection Authority (**EPA**) issued the EPA Discharge Licence to EnergyAustralia under section 20 of the *Environment Protection Act 1970* (Vic) (**EP Act**) [**EAY.0001.001.0388**]. That section requires occupiers of "Scheduled Premises" to obtain a licence to discharge, handle, treat or dispose of waste to the environment. The Yallourn Mine and Yallourn W Power Station are deemed "Scheduled Premises".
141. On 16 December 2013, the EPA Discharge Licence was amended to allow for increased discharges, if required. The new licence conditions allow a mean daily discharge of 80.5 ML/day (29,382 ML/year) with a maximum daily discharge of 150 ML/day. As referred to above, as the void in Maryvale Field increases as a result of ground water run-off, more water is expected to accumulate in the Yallourn Mine which may need to ultimately be discharged under the terms of the EPA Discharge Licence.

PART 2: REHABILITATION

REHABILITATION STRATEGY

Rehabilitation Master Plan

142. EnergyAustralia's overarching rehabilitation strategy for the Yallourn Mine is set out in its Mine Rehabilitation Master Plan dated December 2001 (**Rehabilitation Master Plan**) [**EAY.0001.002.0079**].
143. In or about December 2001, EnergyAustralia submitted the Rehabilitation Master Plan to the Mining Registrar² under the MRSDA as part of its submission for the 2002 WPV, referred to at paragraph 93 above in relation to the transition of mining into the Maryvale Field and the construction Morwell River Diversion.

² The Mining Registrar was a statutory position established at the relevant time under the *Mineral Resources (Sustainable Development) Act 1990* (Vic). Subsequent amendments to this Act have removed the position of Mining Registrar.

144. The Rehabilitation Master Plan, along with the 2002 WPV, was approved by the delegate to the Department Head on 18 January 2002. On 24 January 2002, it was registered by the Mining Registrar against each of MIN 5003, MIN 5216 and MIN 5304.
145. The Rehabilitation Master Plan envisages that the Yallourn Mine will be rehabilitated at the end of its life into a fully-flooded lake up to the level of the Latrobe River and interconnected with the Latrobe River and Morwell River. Conservational opportunities are available with the Mining Licence areas above the level of the proposed lake. The fully flooded lake solution has the potential to yield public recreational amenity outcomes (both on the lake itself and in the surrounding areas). It may also provide significant flood mitigation benefits.
146. Figure 7.2.1.2 in the Rehabilitation Master Plan (at page 0102 of [EAY.0001.002.0079]) provides a visual representation of what a fully flooded lake solution may ultimately look like at the Yallourn Mine. It is an aerial photograph of the Yallourn Mine which has had the image of the lake superimposed.
147. Figure 10.1.6 in the Rehabilitation Master Plan (at page 0123 of [EAY.0001.002.0079]) provides a further visual representation of what a rehabilitation strategy of a fully flooded lake may ultimately look like at the Yallourn Mine.
148. The underlying objectives of the rehabilitation strategy outlined in the Rehabilitation Master Plan are to achieve a final landform that:
- (a) protects the safety and health of the public by ensuring mining hazards and residual environmental impacts are minimised;
 - (b) is compatible with the surrounding altered and natural landscape;
 - (c) is sustainable and requires minimal ongoing maintenance;
 - (d) expresses, where practical, the land uses and ecological vegetation classes that existed prior to mining;
 - (e) supports future beneficial uses; and
 - (f) provides a diversity of landform, vegetation and wildlife values.
149. These aims are consistent with the objectives underlying the MRSD Act. Such objectives include ensuring that resources are developed in a way that minimises adverse environmental impacts (s.2(b)(i)) and ensuring that land which has been mined is rehabilitated (s.2(b)(iii)). Relevantly, the MRSD Act also requires that rehabilitation plans take into account special characteristics of land, the surrounding environment and the need to stabilise that land (s.79(a)), as reflected in the approved Rehabilitation Master Plan.

150. Since its approval and registration by the Department, EnergyAustralia has:
- (a) continued to review the viability of the fully flooded lake solution (details of which are set out in paragraphs 162- 172 below); and
 - (b) undertaken various progressive rehabilitation measures with the dual purposes of:
 - (i) ensuring the Yallourn Mine is safe and otherwise achieving necessary environmental outcomes; and
 - (ii) achieving the fully flooded lake solution details of which are set out in paragraph 225 - 256 below.
151. As EnergyAustralia is undertaking these activities during the mine life, as opposed to waiting until the Yallourn Mine closes, this means that significant work towards the final flooded lake solution is occurring while mining operations continue. A key element of this is a focus on moving overburden at the time of initial disturbance to locations that will assist with the delivery of the final flooded lake. Progressive rehabilitation activities are discussed in detail at paragraphs 246 to 256.

History of the fully flooded lake solution

152. The Rehabilitation Master Plan was developed after careful consideration of a significant body of work that the SECV had undertaken in relation to the Yallourn Mine. My understanding of that history is set out below.
153. By the time of privatisation in 1996, the SECV already had a clear vision to transform the Yallourn Mine, at the conclusion of mining, into a flooded lake.
154. **[EAY.0005.001.0001]** is titled "Yallourn Mine - Rehabilitation Plan 1994/95 to 1996/97". It is an annotated map of the Yallourn Mine (as it was in around 1994) which was created by the SECV and shows the SECV's plan for the final rehabilitation of the Yallourn Mine. The lake included in the plan is indicated by the blue line.
155. In or around June 1995, Yallourn Energy Ltd (then still owned by the SECV) created a Mining Licence Work Plan **[EAY.0001.001.0028]**. **[EAY.0001.001.0051]** is Figure 12 of the Mining Licence Work Plan, being a drawing showing the size and location of the Yallourn Mine. Figure 12 was included as a schedule to the Mining Licence Work Plan dated June 1995. Included on the Figure 12 plan is a note which reads:

"HWL (High Water Level) of Lake Proposed by Rehabilitation Plan

- *prepare areas above RL 38 to function as stable landscaped batters & banks*
- *interim management of area below RL 38 & progressive rehabilitation preparation for inundation"*

156. The Mining Licence Work Plan was approved by the Governor in Council as part of granting MIN 5003 to Yallourn Energy Ltd (now EnergyAustralia), and was included as Schedule B to the Order (see paragraph 2(b) of the Order Granting a Mining Licence in [**EAY.0001.001.0017**]).
157. Based on the records from this period that EnergyAustralia has been able to locate, it is apparent that while the SECV operated the Yallourn Mine and shortly thereafter, it commissioned various reports and undertook studies into whether the lake solution was viable at Yallourn and in other Latrobe Valley mines. [**EAY.0001.003.0081**] is a report dated June 1997 titled "Literature Review on Mine Rehabilitation by Flooding" prepared by HRL Technologies Pty Ltd for the SECV Office of the Administrator (**HRL 1997 Report**).
158. The HRL 1997 Report considers various studies from Australia and internationally in relation to the feasibility of rehabilitating disused coal mines into lakes. Section 2.5 of the HRL 1997 Report (commencing on page 0093 of [**EAY.0001.003.0081**]) headed "Research carried out by the SECV" and provides a summary of studies that the SECV performed or commissioned to be done in relation to the Latrobe Valley mines. It is clear from a review of this section that the SECV considered the following issues in relation to fully flooded lakes in voids left by coal mines:
- (a) rehabilitation studies;
 - (b) flooding of the Yallourn North Extension;
 - (c) leaching studies on ash and overburden; and
 - (d) coloration of water in contact with coal.
159. The SECV was particularly interested in the effect that a flooded lake would have on batter stability, and commissioned the following reports by Geo-Eng Pty Ltd (**Geo-Eng**) in relation to this issue:
- (a) "Mine Rehabilitation Assessment of Open Cut Stability Proposed Flooding Option" dated May 1993 (**1993 Geo-Eng Report**) [**EAY.0002.001.0044**]. Not surprisingly, given the time at which the 1993 Geo-Eng Report was commissioned, it focusses exclusively on the Yallourn Township Field.
 - (b) "Assessment of Mine Batter Stability During Proposed Flooding to RL 38m" dated June 1995 (**1995 Geo-Eng Report**) [**EAY.0002.001.0010**]. The 1995 Geo-Eng Report built upon the analysis performed in relation to the 1993 Geo-Eng Report and considered further stability issues in the East Field.

160. The conclusion reached in both the 1993 Geo-Eng Report and the 1995 Geo-Eng Report was that batter stability could be achieved within the Yallourn Mine under flooded conditions. I discuss these findings further in paragraphs 178- 181 below.
161. By the time that the SECV transferred ownership of the Yallourn Mine to EnergyAustralia, the concept of a fully flooded lake had been considered in some detail, and research into its feasibility had been undertaken.

Review and refinement of the Rehabilitation Master Plan by EnergyAustralia

162. EnergyAustralia has, over more than a decade, actively pursued the rehabilitation strategy in the Rehabilitation Master Plan, and continued to develop a greater understanding of the effect flooding the Yallourn Mine void will have.
163. In or about late 2004, EnergyAustralia engaged consultants GHD to undertake a concept review of the Rehabilitation Master Plan. [EAY.0001.003.0105] is a copy of the report prepared by GHD titled "Yallourn Mine Rehabilitation – Concept Review Report" dated January 2005 (**2005 GHD Report**). The 2005 GHD Report is a review of the plan contained in the Rehabilitation Master Plan.
164. On or about 30 March 2011, EnergyAustralia submitted to the Department the 2011 WPV referred to in paragraph 100 above. As set out in paragraph 100, the Approved Work Plan Variation [EAY.0001.001.0143] in relation to the 2011 WPV came with a number of conditions set out in a schedule [EAY.0001.001.0144]. Condition seven (**Condition Seven**) of the approval of the 2011 WPV required a review of the Rehabilitation Master Plan which considered:
- (a) the feasibility of the flooded mine scenario versus other alternatives;
 - (b) long term water balance studies;
 - (c) how to form safe and stable rehabilitated batters, including for the non-flooded mine scenario;
 - (d) how to minimise mine floor heave, including for the non-flooded mine scenario;
 - (e) strategic use of overburden in flooded and non-flooded mine scenarios; and
 - (f) the advantages and disadvantages of the flooded and non-flooded mine scenarios regarding progressive rehabilitation opportunities.
165. EnergyAustralia commenced a thorough review of the Rehabilitation Master Plan in accordance with Condition Seven. By letter dated 5 June 2012 [EAY.0007.001.0081], I wrote to the Department enclosing a copy of a report dated 5 June 2012 titled "Review of the

Yallourn Mine Rehabilitation Master Plan" (2012 Rehabilitation Master Plan Review)
[EAY.0001.002.0237].³

166. The 2012 Rehabilitation Master Plan Review considered the following different scenarios for the rehabilitation of the Yallourn Mine at the conclusion of its life:
- (a) full flooding of the Yallourn Mine;
 - (b) flooding of the Yallourn Mine to RL20 (Yallourn Township Field only), with a transition of the Yallourn Mine void into a lake; and
 - (c) an un-flooded solution.
167. The 2012 Rehabilitation Master Plan Review confirmed that the fully-flooded lake solution (being the solution contained in the registered Rehabilitation Master Plan) was the most suitable for the Yallourn Mine. In coming to this conclusion, consideration was given to the requirements associated with the 2011 WPV. In addition to items that EnergyAustralia was required to review in relation to Condition Seven, EnergyAustralia also considered the flooding impact on the Morwell River Diversion.
168. The 2012 Rehabilitation Master Plan Review identified the following benefits associated with the fully-flooded lake solution:
- (a) flood control for the Latrobe River;
 - (b) water source for future industry;
 - (c) best visual solution for the rehabilitated Yallourn Mine;
 - (d) least ongoing maintenance option;
 - (e) significant source of water for fire suppression; and
 - (f) potential conservation and recreational benefits
- (see page 0248 of [EAY.0001.002.0237]).
169. As part of the process of developing the 2012 Rehabilitation Master Plan Review, EnergyAustralia prepared or commissioned the following reports:
- (a) Yallourn Mine - Final Land Rehabilitation Lake Filling Model - Revision O, dated 26 April 2012 (**Lake Filling Model Report**) which commences on page 0254 in document [EAY.0001.002.0237]. The Lake Filling Model Report considers various

³ EAY.0001.002.0237 is redacted to protect against privacy.

different possible sources to fill the Yallourn Mine void in order to create a flooded lake.

- (b) Yallourn Mine, Lake Filling Model Review, Findings of the Model Review, prepared by GHD, dated 30 March 2012 (**GHD Peer Review**) which commences on page 0274 in document [EAY.0001.002.0237]. EnergyAustralia commissioned the GHD Peer Review in order to review the Lake Filling Model Report.
 - (c) TRUenergy Yallourn, Report for Yallourn Mine Rehabilitation, Geotechnical Assessment of Flooding Options, prepared by GHD, dated May 2012 (**2012 GHD Report**) which commences on page 0284 in document [EAY.0001.002.0237]. The 2012 GHD Report considers various issues in relation to the stability of the proposed lake solution (at two different lake levels and the non-flooded scenario). It also considers issues around deep aquifer dewatering, floor heave and filling rates for the lake solution.
 - (d) Yallourn Mine Final Rehabilitation, Review of the Morwell River Diversion, prepared by SMEC dated 31 May 2012 (**SMEC 2012 Report**) which commences on page 0338 in [EAY.0001.002.0237]. The SMEC 2012 report focussed exclusively on the stability of the Morwell River Diversion under the various rehabilitation options. The conclusion reached in the SMEC 2012 Report was that the "flooded mine option offers a major benefit compared to the non-flooded option".
170. By way of clarification, on or about 15 March 2012, Revision 3 [EAY.0003.001.0276], being an earlier version of the Lake Filling Model Report, was provided to GHD for peer review. The GHD Peer Review was based on that document. It contained various comments and suggestions in relation to how this report could be improved. EnergyAustralia considered these suggestions before finalising Version O of the Lake Filling Model Report.
171. The above reports form part of EnergyAustralia's rehabilitation strategy. EnergyAustralia has undertaken its rehabilitation works pursuant to the regulatory framework and in accordance with the Rehabilitation Master Plan. While the Rehabilitation Master Plan was initially developed by the SECV, EnergyAustralia has subsequently engaged in an ongoing process of technical review, refinement and scrutiny. EnergyAustralia had progressed its remediation strategy in consultation with key stakeholders, including relevant Departments, other mine operators, water and planning authorities, the EPA and through the ERC.
172. Whilst works are well progressed and based upon a solid technical and scientific understanding of the unique site conditions, the process is a continuing one. The remediation plan will require ongoing analysis to be undertaken and work to be performed. Consistent with rehabilitation planning and works already undertaken, this will be performed progressively and

as part of an ongoing dialogue with all relevant stakeholders, including the Department and other relevant government departments.

Rehabilitation Issues Identified by EnergyAustralia

173. The various reports referred to above focus on three major issues:

- (a) batter stability
- (b) water; and
- (c) the environment.

174. In the section below, I set out what those various reports have considered in greater detail and the conclusions reached in those reports. EnergyAustralia continues to rely upon the content of these reports to pursue its ultimate approved strategy for the rehabilitation of the Yallourn Mine into a fully flooded lake.

Stability

175. The stability of the Yallourn Mine is a key consideration in relation to the overall rehabilitation strategy. To manage stability, EnergyAustralia has prepared a comprehensive Ground Control Management Plan (**GCMP**) [EAY.0012.001.0031]⁴.

176. Stability issues associated with rehabilitation can be divided into the following sub categories:

- (a) batter movement;
- (b) toe saturation; and
- (c) floor heave.

Stability - Batters

177. Batter stability within the Yallourn Mine is an ongoing management issue for EnergyAustralia. Stability is currently managed by ongoing monitoring of the batters, and through various progressive rehabilitation and operational techniques, such as:

- (a) drilling of horizontal bores to reduce water pressure from building up within coal joints;
- (b) surcharging the base of batters;
- (c) buttressing of fill against batters; and

⁴ Document EAY.0012.001.0031 has been redacted to protect against privacy.

- (d) backfilling of overburden.
178. As I set out in paragraph 159 above, assessments of the effect that flooding the Yallourn Mine will have on batter stability have been ongoing since at least 1993. Early studies conducted by Geo-Eng in 1993 and again in 1995 concluded that batter stability can be achieved with a fully flooded solution in relation to the Yallourn Township Field and the East Field.
179. The 2012 GHD Report analysed the potential stability issues that a flooded mine may create for specific batters through the different coal fields within the Yallourn Mine. The outcome of that analysis is included in Appendix B titled "Stability Analysis" to the 2012 GHD Report (at page 325 of [EAY.0001.002.0237]). The 2012 GHD Report confirmed that the majority of batters within the Yallourn Mine will need minimal stabilisation work prior to the void being flooded. Further, of the batters which the 2012 GHD Report identified as needing some stabilisation work, it is concluded that by employing some of the measures which are already undertaken at the Yallourn Mine, such as those outlined in paragraph 177 above, EnergyAustralia will be able to address stability issues.
180. The major advantages of having a fully flooded mine are that:
- (a) the weight of the water within the Yallourn Mine will act as a counterbalance and distribute weight evenly around the void left after mining;
 - (b) groundwater pressure within the batter will be equalised with that within the lake;
 - (c) the need for ongoing active water management (for example, pumping) will be circumvented;
 - (d) it provides a cost effective means of achieving stability without the need to completely backfill with fill material; and
 - (e) coal batters are less susceptible to changing groundwater levels (which is the major trigger for coal block movements).
181. In comparison with the other rehabilitation options assessed for the Yallourn Mine, the 2012 GHD Report concludes that the fully flooded lake solution provides:

".... the greatest level of confidence of maintaining stable batters and minimising the additional remedial works."

Stability - Floor heave

182. Floor heave occurs when groundwater pressure from deep underwater aquifers places upward pressure on the mine floor, increasing the chances of instability within the mine. In an undisturbed state, the pressure within the aquifer is maintained by the earth being on top of the

aquifer. As coal is mined and the weight of the earth above the aquifer removed, the pressure from the aquifer below increases.

183. The risk of floor heave is mitigated in the following ways:

- (a) dewatering of the aquifer - pumping water out of the aquifer which releases the pressure within it; and
- (b) strategically placing overburden around the mine floor to create a downward pressure which helps stabilise the mine.

184. Floor heave is not as significant a problem in the Yallourn Mine as it is in other Latrobe Valley mines. This is largely the result of the geological features of the Yallourn Mine discussed at paragraph 59 and 60 above, and shown on [EAY.0002.001.0001], particularly the relative shallowness of the Yallourn Mine and the distance between the floor of the Yallourn Mine and the most proximate significant aquifer (the M1A aquifer).

185. For that reason, EnergyAustralia (and the SECV before it) have not undertaken, and are not required by any work plan or licence condition to undertake, any dewatering in the Yallourn Township Field. Relatively little dewatering has been undertaken in the remaining coal fields within the Yallourn Mine.

186. The 2012 GHD Report concludes that allowing the Yallourn Mine to be flooded will act as a further mitigating factor against floor heave. This is because the weight of the lake will effectively create a counterbalance to the pressures emanating from the aquifer below.

Stability - Toe batter saturation

187. Toe batter saturation, in broad terms, is where the base (or toe) of a batter is submerged in water, while the remainder of the batter is exposed above water. This can reduce the effective strength of the inter-seam material. This weakens the strength of the inter-seam under the coal, and consequently increases the risk of coal block movements and other stability issues. Filling the void quickly reduces the differential pressure that will be applied to the batters.

188. The 2012 GHD Report identifies that the Yallourn Mine is most susceptible to toe batter saturation whilst the lake is being filled, and that the factor of safety increases as the lake progressively fills. This is because once a coal batter is fully submerged, the opportunity for hydrostatic imbalance significantly reduces.

189. Along with reducing the time that it takes to fill the lake, toe batter saturation can be effectively managed through buttressing the toe of batters with overburden.

Water

190. EnergyAustralia has considered the following issues in relation to water as part of its rehabilitation strategy for the Yallourn Mine:

- (a) availability of water;
- (b) lake filling times; and
- (c) water quality.

191. Further information in relation to each issue is provided below.

Availability of Water

192. The fully-flooded lake solution will have an approximate capacity of 748 GL. A range of scenarios have been considered by EnergyAustralia and its independent technical consultants in relation to water sources potentially available to achieve this solution (see page 0255 of **[EAY.0001.002.0237]**).

193. The Yallourn Mine is well placed to achieve a flooded lake solution, as it is surrounded by several significant watercourses and water bodies. I have described these sources and bodies of water in more detail at paragraphs 110 to 126 above.

194. EnergyAustralia's ability to secure suitable water sources remains critical to the final design and implementation of the overall rehabilitation strategy for the Yallourn Mine.

195. Deep aquifer dewatering volumes under EnergyAustralia's Groundwater Licence are not proposed to be source of water for the purposes of lake filling (page 0259 of **[EAY.0001.002.0237]**). In order to avoid interaction between the aquifers and the water within the Yallourn Mine formed by the lake, it is proposed to seal the bores between the aquifer and the surface of the Yallourn Mine.

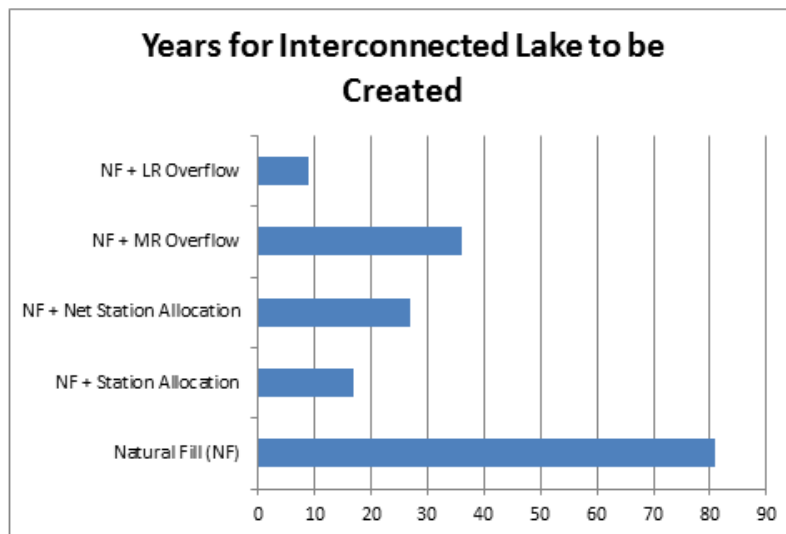
Water - Lake filling times

196. EnergyAustralia has modelled a number of different filling scenarios including:

- (a) natural filling - filling from groundwater run-off and rain;
- (b) natural filling with the station allocation - the full amount of the Bulk Water Entitlement;
- (c) natural filling with the net station allocation - the amount of the Bulk Water Entitlement less the full amount of the EPA Discharge Licence (at that time); ;
- (d) natural filling with above 90th percentile Latrobe River flood overflows; and

(e) natural filling with above 90th percentile Morwell River flood overflows.

197. A detailed summary in relation to each scenario, including timeframes, is contained within the Lake Filling Model Report referred to in paragraph 169(a) above which was peer reviewed by GHD in the GHD Peer Review referred to in paragraph 169(b) above.
198. The different scenarios modelled by EnergyAustralia each involve assumptions about water availability and the timing for the implementation. EnergyAustralia's investigations, supported by the GHD Peer Review indicate that to fill the void naturally, a period of approximately 81 years would be required. Assuming, however, the occurrence of flood events and an ability to draw from EnergyAustralia's existing Bulk Water Entitlement, this period could be reduced to as little as 5 –6 years. These estimates reflect the two ends of the spectrum of options, and are subject to a range of variables. For example, rainfall and evaporation rates in the Yallourn region are variable and difficult to model with certainty [page 0258 of **EAY.0001.002.0237**].
199. A breakdown of the different filling scenarios modelled on different assumptions around water availability is contained at page 0271 of [**EAY.0001.002.0237**]. In addition, different filling rates have different risk profiles page 0271 of [**EAY.0001.002.0237**].
200. The following chart provides an indication of the variable timing associated with each of these alternatives.



201. A further aggressive fill option that could be considered, which would significantly reduce the time for filling the lake, involves the full diversion of the Morwell River, the diversion of 10% of the flood flow from the Latrobe River, the diversion of EnergyAustralia Yallourn's water entitlement from the Latrobe River and natural inflows from around the Yallourn Mine and the Yallourn W Power Station site. This could result in the lake filling with as little as 2 to 2.5 years.

202. As noted above and as demonstrated by the table at paragraph 200, the key determinative factor with respect to lake filling times is water availability and source.

Water quality and environmental issues

203. A range of investigations with respect to potential water quality issues associated with a flooded lake solution have been commissioned. These investigations, which I summarise below, 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.

204. The reports each identify the diversion of fresh river water as the preferred water source. The diversion of fresh river flows is identified as having several advantages, principally through neutralising salinity and acidification. The reports indicate that lake acidification is not likely to be a significant problem for the Latrobe Valley mines. These factors, together with good mining, land management and rehabilitation practices with respect to the areas to be filled, is are predicted to produce favourable water quality outcomes. Based on these studies, it is considered that the overall water quality risk profile for its final rehabilitation solution is low. An overview of key reports commissioned in relation to the Yallourn Mine is set out below.

HRL Reports

205. As set out in paragraph 157 above, the HRL 1997 Report was commissioned by the SECV [EAY.0001.003.0081]. The HRL 1997 Report involved a literature review with respect to mine flooding and water quality issues, considering a range of case studies. The HRL 1997 Report states that the hydrogeological conditions of the Latrobe Valley are unique, as compared to other countries. It does note that experience in the Latrobe Valley, particularly at the Yallourn Mine, had revealed good water quality. It also concludes that using fresh river water, rather than natural fill methods, generally leads to superior water quality in flooded mines. The HRL 1997 Report recommends the development of a model used to predict water quality in relation to the Latrobe Valley mines specifically.

206. A further report from HRL in relation to each of the Latrobe Valley mines was commissioned by the SECV in or around 2000. The final report is dated August 2001 and titled "Prediction of Water Quality in Flooded Open Cut Brown Coal Mines in Victoria" [EAY.0001.003.0001] (**HRL 2001 Report**). The HRL 2001 Report examines, among other things, water availability and water quality issues in relation to the rehabilitation solution, addressing also water chemistry and hydrodynamic and biogenic processes chemical cycling in the lakes. It provides background on water issues in the Latrobe Valley, noting that Victorian coal seams are highly impermeable to water flow and act as barriers or aquitards. Any inflows or outflows from the mines are associated with either cracks in the coal seams, or horizontal bores drilled into mine walls to drain groundwater.

207. Consistent with the HRL 1997 Report, the HRL 2001 Report states that the flooding of the Yallourn North Extension Open Cut provides an insight into the final water quality of flooded coal mine voids. The HRL 2001 Report also states that precipitation alone would be insufficient for filling the lake, and that without diversion works, none of the Latrobe Valley mines are likely to fill completely, meaning that over time, through evaporative losses, the lakes could become increasingly saline. On that basis, the HRL 2001 Report examines sources from surrounding rivers and catchments and the potential sourcing from groundwater aquifers to assist with a timely fill.
208. The HRL 2001 Report concludes that the Yallourn Mine is best filled by using available water resources for filling purposes, and notes that it could be filled in an approximate 10 year period using water from local catchments without adverse impacts on downstream water use.
209. In relation to salinity, the HRL 2001 Report examines the general water chemistry for the Latrobe Valley region, noting that river waters are less saline, and that a mixture of water sources would likely still produce salinity readings in a relatively low band. Potential causes of higher salinity in flooded mines generally include leached salts, interaction of water with clay and interaction with overburden. The HRL 2001 Report concludes that it is preferable to procure river water inflow in order to maintain salinity at appropriate levels. By way of case study, the HRL 2001 Report examines the two lakes formed in respect of the Yallourn North Extension Open Cut. These lakes demonstrated stable salinity stratification on account of density gradients whereby saline levels are higher at deeper levels and lower closer to the surface, and provide an example of what is likely to occur with respect to the final flooding of the Latrobe Valley mines, with less saline river water establishing a buoyant plume overlying denser more saline waters below. The HRL 2001 Report also notes that revegetation works in future catchment areas could lead to a reduction in salinity. This is consistent with EnergyAustralia's current progressive rehabilitation strategy, under which vegetation plantations provide a range of short and long term benefits.
210. The HRL 2001 Report also examines:
- (a) the chemical processes of the Yallourn North Extension Open Cut lakes, and concludes a range of complex chemical processes are occurring at different parts of the lake, consistent with typical lake behaviour. It also concludes that the lakes will be stratified due to the density gradients resulting from more saline water accumulating at depth;
 - (b) acid mine drainage, which generally involves the oxidation of sulphide minerals producing sulphuric acid, usually attributed to overburden dumps. The HRL 2001 Report considers that acidification in the flooded lakes is unlikely to be a major issue, with resultant lakes likely to demonstrate near neutral pHs, provided good mining practices for identification and handling of pyritic materials are followed. In

addition, rehabilitation works, particularly with respect to the plantation of vegetation in exposed areas and strategic placement of lime, directly contribute to neutralising lake acidification; and

- (c) potential water quality issues associated with sealed ash dumps at the base of the mines, and concludes that provided these dumps are encapsulated they are not likely to have a major influence on the water quality of the lakes. The HRL 2001 Report concludes that coal in the mine walls and any loose coal are both expected to have a negligible impact on acidification of the lake water. In addition, loose coal was determined to lead to much less salt in the water as compared to clay, given rapid release of salts from loose coal, and is therefore not likely to be of significance with respect to salinity.

2005 GHD Report

- 211. The 2005 GHD Report (referred to above at paragraph 163, [EAY.0001.003.0105]), also considered water issues, including water sources and quality. Consistent with the above, the GHD Report also indicates that water quality will depend on the source of water for the fill, and the measures taken to control any associated issues.
- 212. The 2005 GHD Report specifically considers water quality issues associated with a flooded lake solution which involves no river diversions. Consistent with the HRL reports discussed above, it notes throughout the report that diverting river water through the lake system would be beneficial.
- 213. The 2005 GHD Report also notes that groundwater is unlikely to be impacted by the flooded lake solution due to the low permeability of Yallourn's coal seam and underlying interseams, which limit significant infiltration.
- 214. In relation to salinity, the modelling in the 2005 GHD Report finds that salinity levels in the Yallourn Mine's existing ponds are generally low. It notes however that where rivers are not diverted, salinity would increase while the lakes were operated as a closed system. However, once filled those salinity levels would stabilise. The 2005 GHD Report states that surface water run-off areas with ground cover will generally have low salinity and sediment load. However, note that internal catchment may result in sheet flow overburden capping layers and exposed coal and ash dumps that may leach salts, acid mine water and trace metals. The 2005 GHD Report notes that diverting approximately 10ML per day of river flow through the lake system would stabilise any salinity, and recommends investigating approval for this. The 2005 GHD report also indicates that once the lakes are established, stratification would effectively quarantine salinity at deeper levels.
- 215. In relation to acidity, GHD note that acid production would be halted once the overburden dumps are submerged. Before being submerged, the 2005 GHD Report indicates that a range

of measures are available to neutralise or halt the production of sulphuric acid. Methods available include covering overburden dumps to reduce infiltration, stabilise materials and neutralise seepage, and water treatment during lake filling. Further investigation into measures to maintain the pH of the lake water is also encouraged.

Current approaches

216. As noted above, EnergyAustralia's current rehabilitation strategy considers the impact of particular measures on the final solution. Efforts are made to achieve rehabilitation outcomes with the dual purpose of satisfying Rehabilitation Master Plan requirements in the short and medium terms, which also contribute to creating favourable conditions for delivery of the long term rehabilitation solution. An example of this is EnergyAustralia's revegetation program, summarised at paragraphs 232 to 235 below, which would contribute to neutralising acidification in the final lake.
217. In relation to other environmental considerations, a flooded lake also provides conditions that will encourage vegetation growth surrounding the lake. The quality of soil in the Yallourn Mine varies depending on location, which directly affects the viability of vegetation options. Topsoil is saved and is currently deployed as part of the progressive rehabilitation works on areas above the level of the proposed lake. This will result in better quality soil being left above the level of the proposed lake. Accordingly, although the areas of land capable of fostering vegetation are reduced under the fully flooded model (as most of the mine is submerged in the lake), the quality of conditions for vegetation will be improved above the level of the proposed lake with greater access to better quality topsoil.
218. In relation to amenity considerations, a final lake solution has the potential to become a valuable community asset, compatible with the surrounding natural and altered landscapes of the Latrobe Valley. As set out in the rehabilitation objectives of the Rehabilitation Master Plan, the intention behind the design of the final flooded landform is to support future beneficial uses and provide a diversity of landform, vegetation and wildlife values that are sustainable. A flooded lake presents opportunities for future commercial, recreational and environmental use.

Other limitations and constraints

Mining infrastructure and other operations

219. Ongoing construction and mining operations at the Yallourn Mine, including the location of mining infrastructure, is another key constraint on final rehabilitation measures. Such infrastructure includes fire service pipework, coal and overburden conveyors, power lines, access roads and ramps and other geotechnical and associated equipment. This infrastructure restricts EnergyAustralia's ability to undertake all final batter profiling for rehabilitation while the Yallourn Mine remains operational, and also its ability to commence flooding of the Yallourn Mine.

220. Other constraints on rehabilitation include the on-going need to provide temporary set-down and water storage areas.

Fire suppression infrastructure

221. The nature and extent of fire infrastructure located in and around the Yallourn Mine also acts as a constraint on being able to implement flooding rehabilitation activities in those areas. Fire suppression infrastructure is installed and maintained in accordance with:

- (a) EnergyAustralia's Fire Control Management Plan (**FCMP**), which is at [EAY.0009.002.0001]; and
- (b) EnergyAustralia's Bushfire Mitigation Plan (**BMP**), the latest version of which is at [EAY.0009.002.0130].⁵

222. The FCMP forms an integral component of EnergyAustralia Yallourn's safety, health and environmental management system and provides the framework, procedures and processes to effectively prevent and manage fire-related risks.

223. The BMP outlines the measures that EnergyAustralia employ to reduce the risk of bushfire damage to assets and personnel on the Yallourn site from bushfires, and sets out a detailed system of asset inspection and management, fuel reduction, ignition source containment and fire control.

224. Critical to the implementation of both the FCMP and the BMP is the installation of various forms of fire infrastructure throughout different areas of the Yallourn Mine. This includes fire services pipe, sprays and extinguishers, pump systems and other facilities.

REHABILITATION WORK COMPLETED TO DATE (PROGRESSIVE REHABILITATION)

Progressive Rehabilitation as required under Rehabilitation Master Plan and Mining Licences

225. Progressive rehabilitation requirements are governed by the Rehabilitation Master Plan and the Mining Licences. The Rehabilitation Master Plan requires a program for progressive rehabilitation, and the integration of mine planning and land rehabilitation to ensure optimum business and community benefit. The Rehabilitation Master Plan contains specific references to the progressive rehabilitation program, including in relation to air quality (section 8.3), as well as vegetation plantings, forestry and pest management (8.4).

226. The Rehabilitation Master Plan segregates areas of the Yallourn Mine into different categories, including:

- (a) open woodland;

⁵ EAY.0009.002.0130 is redacted to protect against privacy.

- (b) closed woodland;
- (c) conservation zone;
- (d) wetlands;
- (e) grasslands;
- (f) interim stabilisation; and
- (g) final lake.

227. The Mining Licences requires rehabilitation to be undertaken in accordance with the Work Plan, the Rehabilitation Master Plan and Five Year Rehabilitation Plans. In addition, they require that in consultation with the ERC ((see paragraph 242, EnergyAustralia must prepare Annual Rehabilitation Plans and undertake rehabilitation in accordance with those plans.
228. The Annual Rehabilitation Plans are finalised prior to budget deadlines to ensure adequate financial provision is made to deliver progressive rehabilitation year-on-year.
229. EnergyAustralia also prepares Five-Year Rehabilitation Plans, which are updated on an annual basis. The intention of these plans is to provide an overview of future rehabilitation efforts and outcomes planned for within the upcoming five year period. An example of measures set out in a Five Year Rehabilitation Plan includes future needs forecasts for seeding programs, enabling the planning and implementation of seed works, and also major planning considerations to achieve successful rehabilitation outcomes.

EnergyAustralia's Management of Progressive Rehabilitation

General rehabilitation management

230. As detailed in the EnergyAustralia General Submission, EnergyAustralia is committed to a range of short, medium and long-term measures to achieve progressive rehabilitation. Progressive rehabilitation efforts at and around the Yallourn site are implemented in accordance with established management practices, which are reviewed and updated regularly. The current approach to rehabilitation management consolidates and builds upon the concepts of the Rehabilitation Master Plan to allow timely rehabilitation works to the landforms set out in the Rehabilitation Master Plan. Future final landforms include open woodlands, closed woodlands, conservations zones, wetlands, grasslands and the final flooded lake.
231. As noted above, as the flooding elements of a flooded lake cannot be implemented until after mining has ceased, interim stabilisation and other measures in relation to future underwater areas are also actively implemented, which are relevant to progressive rehabilitation and the

final solution under the Rehabilitation Master Plan. Interim stabilisation works typically include removing weeds, shaping and capping materials, sowing of native seeds, batter reshaping and placement of topsoil.

Vegetation management and control for rehabilitation

232. EnergyAustralia has an established approach and methodology in relation to vegetation establishment and control, designed to meet the following objectives:
- (a) maintaining a safe working environment;
 - (b) ensuring public safety and infrastructure is acknowledged and maintained;
 - (c) complying with all relevant legal and other obligations;
 - (d) decreasing the risk profile of safety and environmental hazards;
 - (e) providing sustainable landscapes into the long term; and
 - (f) providing habitat opportunities for native fauna.
233. Planning for progressive rehabilitation at the Yallourn Mine is informed by the categories noted in the Rehabilitation Master Plan. EnergyAustralia oversees a robust vegetation establishment program which requires that following construction and earthworks being completed on a designated rehabilitation area, it must be established with vegetation to protect against risks including erosion, dust and water quality issues. The major vegetation establishment methods used at the Yallourn Mine include:
- (a) direct seeding to natives;
 - (b) sowing to pastures; and
 - (c) individual tube planting (up to 10,000 plants in some years).
234. Vegetation is selected to align with local indigenous species and ecological vegetation classes that existed prior to the disturbance, or which remain in remnant patches. Where possible, EnergyAustralia actively collects seeds to replant the species within the Yallourn Mine and surrounding areas. EnergyAustralia implements a detailed species selection process for each type of rehabilitation category. In addition, vegetation planting is also designed to achieve the dual purpose of providing interim stabilisation. All plantations are recorded within a Geographical Information System (**GIS**), to allow targeted modelling for future periods. A GIS is a system designed to store, present, and analyse all different types of spatial data, such as digital plans, maps, photos, points-of-interest. The data can be referenced from multiple locations and sources and brought together to create a single simplified user interface to interpret and analyse the data.

235. EnergyAustralia has implemented an established weed management program over a number of years. It does this by segregating the mine into several "management areas". These areas are further broken down to enable daily works to be targeted to specific areas. Grassed areas which are not fenced or grazed are generally slashed once or twice a year prior to and during the high risk fire season. This information is similarly recorded within the GIS, consistent with the requirements of the Bushfire Mitigation Plan.

Construction and earthworks for rehabilitation

236. As part of its rehabilitation management, EnergyAustralia also oversees a program for constructing different landforms to achieve successful rehabilitation outcomes. EnergyAustralia's approach acknowledges that the landforms which are left post-mining are rarely acceptable final land forms under the Rehabilitation Master Plan. Against this background, EnergyAustralia implements landform shaping activities to allow for sustainable rehabilitation to be progressed.

Landform shaping

237. Initially, areas disturbed by mining activity are managed to minimise fire risk, dust emissions, weeds and for water runoff control. Landform shaping generally involves reshaping and sowing areas down to pasture grasses, as a means of providing a rapid and stable initial vegetation cover.

238. As part of site preparation, before rehabilitation works are progressed, redundant plant and services, toxic or hazardous materials and inert hard rubbish are removed. Following this, a batter shaping phase will generally occur. This stage of works is critical to the long-term sustainability of the landforms. Steep overburden and coal batters are reshaped to a sustainable and manageable form, with appropriate fill, cut to fill or cut to excavation to provide surfaces conforming with stable design specifications. The finished shape generally allows complete surface drainage and avoids the need for an uneven thickness of topsoil placement.

239. Prior to topsoil placement, the subsoil is suitably scarified along the contour to mix in the lime to a nominal 150 mm depth and provide a physical key for topsoil retention. Topsoil is then excavated from the future mining footprint ahead of the overburden development area. The topsoil is then generally transported and spread evenly over the prepared subsoil surfaces to a nominal average depth of 100 mm. This generally applies to areas above the planned lake water level and where the finished vegetation cover is to be improved pasture grasses. Other areas are subject to individual review and approval.

240. Where mine development works do not allow direct removal and replacement of topsoil, it is to be removed and stockpiled. The topsoil is used at a later date when suitable areas are prepared and available for rehabilitation. The stockpiles are grassed and managed to minimise weed infestation.

241. Prior to vegetation sowing, final drainage shaping and protection works are conducted using approved materials and practices. Where steeper drainage paths are necessary, a combination of flat drain sections with protected drop structures or weirs are usually constructed. Alternatively, steeper drains are completed with appropriate protective surfacing.

Reporting and Accountability

242. EnergyAustralia produces the following reports in relation to its progressive rehabilitation work, which updates stakeholders in relation to the progress of rehabilitation at the Yallourn Mine:

- (a) ERC Mine Environment Presentation. The ERC was established by EnergyAustralia in response to condition 1.3 of MIN 5003. The ERC meets quarterly, and is attended by a range of interested community and government stakeholders (including representatives of the Department, the Department of Environment and Primary Industries, Environment Protection Authority Victoria, SRW, Latrobe City Council). EnergyAustralia produces a report which is distributed to attendees at the meeting;
- (b) Report to the Department. This report is a condition of the Mining Licences, and is prepared every six months. A copy of EnergyAustralia's most recent letter provided to the Department dated 10 September 2015 is at [EAY.0005.001.0002] together with enclosure at [EAY.0005.001.0008] and [EAY.0005.001.0009], and is discussed further below; and
- (c) Social and Environment Performance Summary Report. This is a voluntary report produced annually and provided to the community. It describes various aspects of the Yallourn Mine and Yallourn W Power Station. The latest such report is at [EAY.0012.001.0001].

243. EnergyAustralia's current approach to rehabilitation reporting is reflected in the letter to the Department dated 10 September 2015 [EAY.0005.001.0002] together with its enclosures [EAY.0005.001.0008] and [EAY.0005.001.0009], which describe the area of rehabilitation completed within the reporting year and the cumulative area rehabilitated since the commencement of mining. It includes maps and graphs showing worked out areas, areas cumulatively rehabilitated and areas rehabilitated within the reporting period.

244. Rehabilitation data is also collected by the Yallourn Mine's environmental engineering team, who manage a number of internal documents and databases, which are updated throughout the year. The monitoring and measurement of rehabilitation efforts, including earthworks and vegetation establishment, allows for continuous improvement of works implementation and final landforms.

245. To ensure the success of its vegetation establishment and management practices, and to drive continuous improvements, EnergyAustralia also uses a Landscape Functional Analysis (**LFA**) monitoring tool, that allows EnergyAustralia to track the progress of its progressive rehabilitation efforts. LFA is a monitoring tool developed by the CSIRO, and assesses how effectively rehabilitation areas operate with vegetation as a biophysical system. Key aspects of the LFA include stability, infiltration, nutrient cycling and vegetation. LFA monitoring results are entered into a database to allow for continual monitoring. Graphs are generated showing whether extra work is required for some areas, or whether modifications are required for future rehabilitation projects.

Overview of Progressive Rehabilitation Achieved to Date

246. Since the early 1990s, the rehabilitation program for the Yallourn Mine has been extensive and consistent with the intent of the Rehabilitation Master Plan. The rehabilitation program has been progressing towards a fully-flooded lake concept, interconnected with the regional river network.

247. Progressive rehabilitation efforts have focused in part on rehabilitating areas above the anticipated final lake level, supported by interim measures below the final lake level. In addition, progressive rehabilitation (both above and below the anticipated level of the proposed lake) has been aimed at providing erosion control, dust mitigation and improved visual amenity for the further life of the Yallourn Mine.

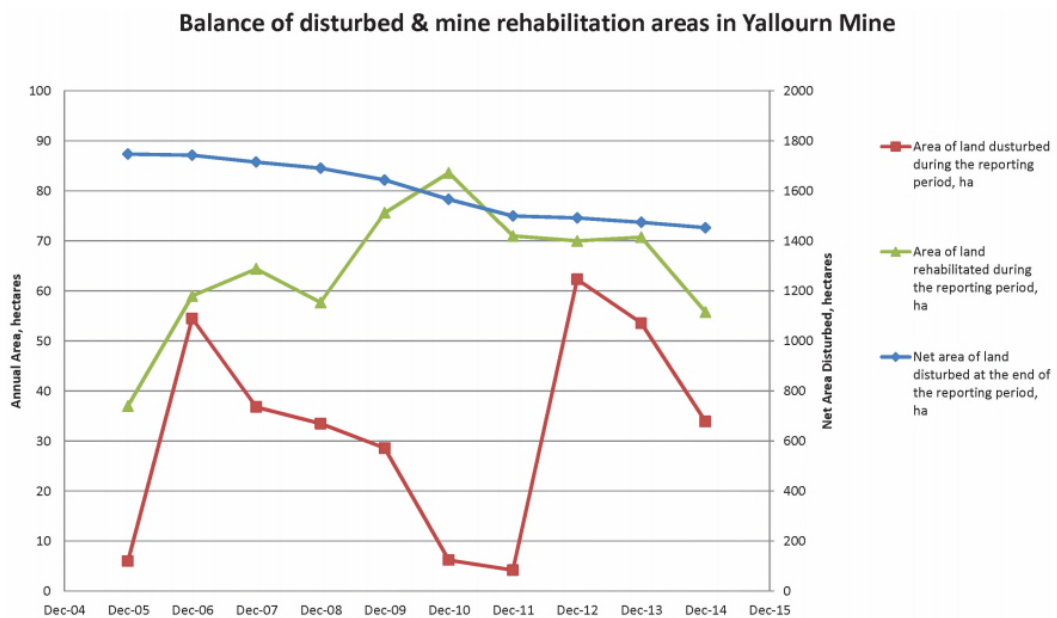
248. Fire management and prevention is also a key consideration, and has resulted in a reduction to the amount of exposed coal, improved fire tracks and the installation and maintenance of fire control systems, in line with the FCMP (discussed further below at paragraphs 267 to 271).

249. Rehabilitation work undertaken to date over the exposed coal at the Yallourn Mine has been extensive. An aerial photograph of the Yallourn Mine annotated to reflect current exposed coal areas in orange, was included in the EnergyAustralia General Submission at page on page 0281 in **[EAY.0007.001.0254]**. This photograph shows that the majority of mined areas within the Yallourn Mine have now been covered with overburden. The result of EnergyAustralia's progressive rehabilitation program is that only a relatively small area of exposed coal is left at the Yallourn Mine. The remaining area, being approximately 85% of the total area disturbed by mining, has now been covered.

250. **[EAY.0007.001.0123]** is a copy of the Victorian Government submission to this Inquiry dated 25 August 2015. I have read a copy of these submissions in so far as they relate to the Yallourn Mine and EnergyAustralia. I note that Figure 8, titled "Yallourn rehabilitation map" on page 0154 of **[EAY.0007.001.0123]** is a visual representation of rehabilitation activities at the Yallourn Coal Mine. This representation shows in yellow, the areas of the Yallourn Mine which are part of the future rehabilitation (in effect the inverse of the photograph discussed at

paragraph 249 above). I consider that this representation contained in the Victorian Government Submissions is consistent with EnergyAustralia's rehabilitation activities to date.

251. At the Yallourn Mine, the current rates of rehabilitation generally exceed the rate at which land is disturbed during mining operations. These rates are shown in the graph below. The red line shows the rates of disturbance while the green line demonstrates the amount of rehabilitation works during a particular reporting period. The blue line shows a trend of reduction in the amount land disturbed during the period. The graph demonstrates the significant downward trend in net disturbed land over the last 10 years.



252. The majority of progressive rehabilitation to date has focussed on stabilising landforms through earthworks shaping. Once an area is stabilised through measures such as the shaping of batters and the placement of overburden material in appropriate locations, topsoil and grass cover are introduced (concentrated above the anticipated lake level) to assist landform stability. This is often accompanied by woodland development in vegetation corridor areas. These measures are consistent with both the progressive rehabilitation requirements of the Rehabilitation Master Plan, and also the long-term implementation of the approved fully-flooded lake solution.

253. Other rehabilitation works are undertaken below the anticipated level of the proposed fully flooded lake, as required by the Rehabilitation Master Plan. Within the mine void, EnergyAustralia's rehabilitation efforts have aimed to cover coal in accordance with fire management and environmental risk management protocols. This coverage is generally provided by overburden, whereby a series of conveyors and stackers place excavated overburden into mined out areas. There is also a large mobile plant fleet at the Yallourn Mine

which gives flexibility to selectively dump overburden in areas of exposed coal which present a higher risk of fire, dust, erosion and adverse amenity impacts.

254. Internal overburden areas are shaped to manageable landscapes, and are rehabilitated to grassland, open woodland and wetland landforms with a number of internal lakes created for further coal coverage and to assist in water and fire management. These progressive rehabilitation measures are implemented in accordance with other plans and procedures, such as EnergyAustralia's GCMP referred to in paragraph 175 above.

255. **[EAY.0003.001.0292]** is an aerial photograph showing various locations within the Yallourn Mine where a photographic record of EnergyAustralia's rehabilitation activities has been maintained, as reflected in the table below. For those areas marked in white, EnergyAustralia has been able to locate a "before" photograph of what that approximate area looked like prior to progressive rehabilitation, which can be contrasted with photos taken recently. The table sets out a brief description of the areas, together with a document reference:

Ref	Description of location of photograph	Document reference
A	Township Field Northern Batters (view looking north-east towards the Power Station). Batters rehabilitated with grass with some scattered trees	Before: [EAY.0003.001.0006] After: [EAY.0003.001.0071]
B	Closed woodland area above Township Field Western Batters.	Before: [EAY.0003.001.0002] After: [EAY.0003.001.0070]
C	Interim Stabilisation in Township Field Overburden Dump.	Before: [EAY.0003.001.0005] After: [EAY.0003.001.0072]
D	Lake Placid Waterbody with Interim Stabilisation through direct seeding and grassland in the background	Before: [EAY.0003.001.0004] After: [EAY.0003.001.0073]
E	East Field Extension Batters coal capping and selective rehabilitation with grass.	Before: [EAY.0003.001.0012] After: [EAY.0003.001.0074]
F	Grassland and Closed woodland area north of East Field Extension.	After: [EAY.0003.001.0078]
G	Grassland between Latrobe River Levy and Overburden Batter in East Field Extension.	After: [EAY.0003.001.0075]
H	Grassland with some woodland at Yallourn North Open Cut.	Before: [EAY.0003.001.0081] After (H1): [EAY.0003.001.0076] After (H2): [EAY.0003.001.0077]
I	Wetlands in the Southern Overburden Dump.	After: [EAY.0003.001.0079]
J	Acid sulphate soils shaped, treated and sown to interim stabilisation woodland.	Before: [EAY.0003.001.0010] After: [EAY.0003.001.0080]
K	Morwell River Wetlands looking south towards Hazelwood Mine.	Before: [EAY.0003.001.0003] After: [EAY.0003.001.0011]
L	Grassland and drainage line stabilisation on Morwell	After: [EAY.0003.001.0009]

Ref	Description of location of photograph	Document reference
	River Levy and Mid Field Overburden Dump.	
M	Interim stabilisation grassland with some woodland in Southern Overburden Dump.	After: [EAY.0003.001.0082]
N	Constructed wetlands and direct seeding stabilisation in Southern Overburden Dump	After: [EAY.0003.001.0083]
O	Direct seeding of native species in Southern Overburden Dump.	After: [EAY.0003.001.0085]
P	Recently planted tree species to open woodland in Southern Overburden Dump.	After: [EAY.0003.001.0084]

256. An overview of the disturbed and rehabilitated mining areas at the Yallourn Mine by hectare over the 2005-2014 period is set out in the table below:

REHABILITATION AND DISTURBED MINING AREAS BY HECTARE										
	Dec-05	Dec-06	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11	Dec-12	Dec-13	Dec-14
Total area disturbed at start of reporting period	1778	1747	1743	1715	1691	1644	1566	1500	1492	1475
Area of land disturbed during reporting period	6	54.5	36.8	33.5	28.6	6.2	4.2	62.3	53.6	33.9
Area of land rehabilitated during reporting period	37	59	64.4	57.7	75.6	83.6	71	70	70.7	55.8
Net area of land disturbed at end of reporting period	1747	1743	1715	1691	1644	1566	1500	1492	1475	1453

Financial provision for rehabilitation

257. EnergyAustralia allocates significant funds to progressive rehabilitation as part of its annual budget.
258. On 28 July 2015, EnergyAustralia wrote to the Department in relation to rehabilitation figures for provision to the Board [EAY.0003.001.0290]. In that letter, EnergyAustralia set out its expenditure on rehabilitation over the preceding nine year period. Those figures show a steady increase in rehabilitation spend year-to-year, with the highest rehabilitation spend being \$1,185,906 during the 2014-2015 accounting period, and a total of \$9,069,878 over the whole period.
259. EnergyAustralia accounts for only direct rehabilitation as part of its progressive rehabilitation budget. These are specific measures undertaken which are for the sole purpose of rehabilitation, for example seeding and rehabilitation-specific earthworks.

260. In addition to this direct rehabilitation work, EnergyAustralia performs extensive work through its ordinary operational and maintenance mining program which assists in the rehabilitation of the Yallourn Mine. In this sense, EnergyAustralia's operational and management measures often achieve dual outcomes. For example placing overburden strategically around the Yallourn Mine is part of EnergyAustralia's ordinary mining operations, however conducting these works in this way also contributes to progressive rehabilitation measures. The cost of shaping batters to allow for the grass and other plant species to be planted is another example of a measure that indirectly contributes to the implementation of the Rehabilitation Master Plan, but is generally not treated as a rehabilitation cost. These extensive works are generally not accounted for in the rehabilitation budget.
261. These accounting measures mean that significant indirect expenditure on rehabilitation is not recognised or accounted for as a rehabilitation cost because it is attributable to operational activities. In other words, some items of expenditure that are incurred in the course of operational activities, and are directly associated with coal mining activities, also contribute towards the achievement of rehabilitation outcomes. This demonstrates that rehabilitation efforts are greater than those taken into account in calculating the figure noted at paragraph 258 above.

FUTURE REHABILITATION WORK

262. Future rehabilitation works at the Yallourn Mine are developed as part of EnergyAustralia's five year rehabilitation plans. A map detailing areas to be the subject of rehabilitation works at the Yallourn Mine over the 2016-2020 period is at [EAY.0009.001.0003].
263. EnergyAustralia prepares detailed land rehabilitation and management plans once a year, setting out specific rehabilitation measures to be undertaken within that year. These are in addition to the five year rehabilitation plans, which provide a high-level overview of the intended rehabilitation strategy for specific areas.
264. As part of these plans, specific rehabilitation measures are described for approximately 20 specific rehabilitation areas. These plans include detailed area descriptions, end use details, rehabilitation works descriptions, hectare measurement, allocated spend and other notes. Key specific rehabilitation measures selected for the 2016-2020 period include:
- (a) interim stabilisation measures;
 - (b) preparation of access tracks and other measures for plantings;
 - (c) topsoiling of steep batters;
 - (d) sowing seeds to pasture;
 - (e) interim management of plantings and seeding;

- (f) establishment of earthworks associated with rehabilitation;
- (g) dozer works associated with batter stabilisation;
- (h) rehabilitation repairs;
- (i) slashing of heavy weed infestations;
- (j) fire mitigation slashing and other activities; and
- (k) various subcontractor works.

265. Other more general rehabilitation measures to be undertaken within the 2015-2020 period include:

- (a) design and research measures including commissioning research and studies for the Rehabilitation Master Plan, consultations with respect to rehabilitation designs (e.g. batter designs and vegetation overlays);
- (b) removal of infrastructure and associated assets and facilities; and
- (c) earthworks.

FIRE RISK ASSESSMENTS

266. EnergyAustralia has undertaken a detailed review and assessment of fire risk arising from the Yallourn Mine, including rehabilitated areas.

267. EnergyAustralia's overarching fire management strategy is found in the FCMP [EAY.0009.002.0001]. The FCMP is expressed to be a live document that is intended to be updated regularly. The FCMP states (at page 0012) that it:

"...provides a systematic approach to the identification, evaluation and control of fire hazards, monitoring, measurement, analysis and reporting of performance and the continual review of processes required to further improve performance."

268. The FCMP is a document that has not been prepared in response to any one particular legislative requirement. It is rather a plan that addresses EnergyAustralia's general statutory obligations under such legislation as the MRSDA, *Occupational Health and Safety Act 2004* (Vic), *Country Fire Association Act 1958* (Vic) and the *Electricity Safety Act 1998* (Vic). It has been, and will continue to be, updated and revised as part of the risk assessment work currently being undertaken by EnergyAustralia in response to condition 1A of MIN 5003, discussed further at paragraph 106 above.

269. The FCMP divides the Yallourn Mine into a series of fire risk areas, or "domains", the boundaries of which are identified at Figure 10 of the FCMP (at page 0020). Those domains are:
- (a) the working area of the Yallourn Mine;
 - (b) the worked-out area of the Yallourn Mine;
 - (c) associated mining operations (monitoring and access);
 - (d) areas where work is yet to be done; and
 - (e) perimeter areas located outside the Yallourn Mine area.
270. The FCMP outlines the approach adopted towards the identification, control and management of fire risks, and contains details in relation to matters such as the roles, responsibilities and required competencies of specified personnel, communication and stakeholder liaison and monitoring, measurement and compliance arrangements.
271. Section 4.7 of the FCMP contains an overview of the operational control measures that have been identified for specific risk areas. The most directly relevant of these measures to areas that have either been rehabilitated, or that are proposed to be rehabilitated, are those focusing upon:
- (a) exposed coal, which is dealt with at section 4.7.3 (page 0070). Specific measures identified in this section include ensuring that water and tanker filling points are readily available, fire break zones, access ramps and wetted areas are provided and loose dumped coal on overburden dumps is covered with at least 300mm cover of sand or clay material; and
 - (b) land rehabilitation, which is dealt with at section 4.7.16 (see page 0102 of **[EAY.0009.002.0001]**). Specific measures identified in this section include ensuring that areas of exposed coal are reduced where practicable. It is specifically noted that progressive rehabilitation may impact on the integrity of the fire services main, and that alternative fire protection measures may be required, such as through fire tankers and mobile plant depositing and spreading sand material. It also provides that where rehabilitation activities have resulted in the loss of fire protection coverage within an area, the fire service system will be established in the relevant area to ensure that not more than 500 metres of unprotected batter will exist, where practicable.
272. In addition to the FCMP, other fire risk assessments have been undertaken in relation to the Yallourn Mine, each of which deal to some extent with rehabilitated areas. These include:

- (a) a general risk assessment undertaken in relation to the three main Latrobe Valley brown coal mines at Yallourn, Hazelwood and Loy Yang. This assessment was undertaken on a generic basis to identify risks at a regional level, and was intended to be used to inform site-specific risk assessments for each of the mines. It was prepared following workshops attended by representatives of each of the mine operators in April 2015, and the results were summarised in a report entitled *Energy Australia Yallourn, GDF Suez Hazelwood, AGL Loy Yang Latrobe Valley Mine Fire Risk Assessment Workshop Summary Report* (June 2015) [EAY.0011.002.0204]⁶; and
- (b) a specific fire risk assessment undertaken in relation to the Yallourn Mine dated July 2015 [EAY.0011.002.0073]. This assessment was prepared as a site specific follow-up report to the generic fire risk assessment. This assessment concluded that the current level of risk was below the Department's threshold of "medium" imposed in the new Condition 1A of MIN 5003, and that on this basis no additional controls were required to reduce the current level of risk. In terms of scope, the assessment looked at both working and worked out areas, both of which are subject to rehabilitation measures consistent with EnergyAustralia's Rehabilitation Master Plan.

273. The various fire risk assessment documents referred to above, including the FCMP, are currently being reviewed as part of the broader review being undertaken in response to new condition 1A in MIN 5003, referred to at paragraphs 104 - 106 above. The documents will be updated to the extent required as a result of this review.

PART 3: REHABILITATION LIABILITY ASSESSMENT

Current and past rehabilitation liability assessments performed by the Department

274. EnergyAustralia has a separate rehabilitation bond lodged with the Department in relation to each of the Mining Licences. The amount of the bonds currently provided are as follows:

- (a) MIN 5003 - \$11,460,500;
- (b) MIN 5126 - \$83,000; and
- (c) MIN 5304 - \$6,000.

275. The large disparity between the bond amounts reflects the relative size of the different Mining Licences and the estimated cost to rehabilitate the area within the respective Mining Licences. As noted above, no mining works are currently being carried out within the boundary of either MIN 526 or MIN 5304.

⁶ EAY.0011.002.0204 has been redacted to protect against privacy.

276. The bonds for both MIN 5126 and Min 5304 were required at the time that the licences were granted to EnergyAustralia (see paragraphs 81 to 87 above). These bonds have not changed since they were first provided to the Department and no coal mining is planned for the areas contained within the licences.

277. As set out in paragraph 80 above, MIN 5003 was granted to Yallourn Energy Ltd on 19 March 1996. Condition 3 of the Order for Granting Mining Licences [EAY.0001.001.0017] (the instrument granting MIN 5003) provides that a bond in the form of a bank guarantee would need to be entered into by Yallourn Energy Ltd upon the SECV ceasing to own the company. The amount of the bond was set at \$15 million.

278. The amount of the bond for MIN 5003 was the subject of correspondence between the Department and EnergyAustralia (then Yallourn Energy Ltd) prior to the granting of MIN 5003. That correspondence reveals that the amount of \$15 million was intended to be an "interim" measure, and the Department would assess the appropriate amount of the bond at some later stage. This is made clear from the following correspondence between the Department and EnergyAustralia prior to the granting of MIN 5003:

- (a) by letter to the Department dated 2 June 1995 [EAY.0008.001.0060], EnergyAustralia described its proposal to rehabilitate the Yallourn Mine, and the then-current assessment of the cost of those works in the amount of \$7 million. A site restoration cost model demonstrating how EnergyAustralia had calculated the liability assessment was enclosed with this letter, along with two visual representations as to what a final rehabilitated lake concept may look like [EAY.0008.001.0064] and [EAY.0008.001.0065]; and
- (b) by letter dated 7 July 1995 [EAY.0008.001.0005], the Department advised that it was not satisfied that the information provided by EnergyAustralia was sufficiently detailed to support its assessment. The Department set the bond amount at \$15 million, but in doing so expressly acknowledged that this amount would need to be assessed further. The Department states in this letter that:

"As these matters are not yet resolved we propose to set the rehabilitation bond for the Yallourn mine at \$15M. This should be regarded as an interim figure until such time as we have assessed whatever additional information you are able to provide on the above matters."

279. In or about 2001 GEO-Eng provided EnergyAustralia with a report titled "Costing of Yallourn Mine Rehabilitation Master Plan" [EAY.0008.002.0001]⁷ (**GEO-ENG Liability Assessment**). The GEO-Eng Liability Assessment examined the cost of rehabilitating the Yallourn Mine as at

⁷ EAY.0008.002.0001 contains confidential and commercially sensitive material and EnergyAustralia objects to this document being disclosed to any other party or the published by the Board.

that time. The GEO-Eng Liability Assessment also contained a suggested model as to how rehabilitation liability assessments could be calculated (**Rehabilitation Cost Model**).

280. In or about 2002, GHD produced a further report for EnergyAustralia titled "Mining Licence Bond Review 'Close Now' Liability at 30 Sep 2002" [EAY.0011.002.0001]⁸ (**GHD Liability Assessment**). I understand that in 2002 (and before the GHD Liability Assessment Report was prepared), GEO-Eng and GHD merged. The GHD Liability Assessment built upon the work performed in the GEO-Eng Liability Assessment including updating the Rehabilitation Cost Model.

281. By letter dated 30 July 2004, and following a review by the Department, the Department informed EnergyAustralia that, based on the substantial work that EnergyAustralia had performed in order to demonstrate the extent of its rehabilitation liability, it would reduce the bond for MIN 5003 from \$15million to \$11,460,500 [EAY.0012.003.0001].

282. The amount of \$11,460,500 is the current amount of the bond for MIN 5003.

Assessments of rehabilitation liability assessments

283. EnergyAustralia reviews its rehabilitation liability annually. This is in addition to the various reports it has commissioned, referred to above.

284. Pursuant to Regulation 35 of the *Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013*, EnergyAustralia submits to the Minister an annual return in relation to various items set out in Schedule 19 to the Regulations (**Schedule 19 Report**). Relevantly, under the Schedule 19 Report, EnergyAustralia reports on:

- (a) rehabilitation expenditure (paragraph 7);
- (b) details of land disturbance and rehabilitation (paragraph 11); and
- (c) the estimated current rehabilitation liability for the licence area (paragraph 11(e)).

285. By letter dated 8 April 2015 (document [EAY.0001.002.0070]), I provided the Department with:

- (a) EnergyAustralia's Schedule 19 Report for the period 2013 to 2014 (this had been updated after some queries from the Department in relation to a previous draft) [EAY.0001.002.0071]⁹; and

⁸ EAY.0011.002.0001 contains confidential and commercially sensitive material and EnergyAustralia objects to this document being disclosed to any other party or the published by the Board.

⁹ EAY.0001.002.0071 contains confidential and commercially sensitive material and EnergyAustralia objects to this document being disclosed to any other party or the published by the Board..

(b) a summary of monitoring programs undertaken at the Yallourn Mine
[EAY.0001.002.0078].

286. On 27 July 2015 a further update of the Schedule 19 Report was provided to the Department
[EAY.0012.002.0001].¹⁰

287. As set out in the Schedule 19 Report referred to in paragraph 285 and 286 above, EnergyAustralia currently estimates its rehabilitation liability to be between \$46 million to \$91 million. The reason for the range in the amount of liability is explained in my letter. Essentially, while EnergyAustralia has identified that some work is required to provide batter stability within the Yallourn Mine, it has not yet had a detailed engineering solution prepared that demonstrates the extent of the work required.

288. EnergyAustralia has taken the Rehabilitation Cost Model created by GEO-Eng, developed by GHD and has made further refinements to it. The revised Rehabilitation Cost Model enables EnergyAustralia to calculate its current liability with respect to the rehabilitation of the Yallourn Mine which ultimately forms the basis of its Schedule 19 Report. [EAY.0012.001.0027] and [EAY.0012.001.0028] are spreadsheets which comprise the current Rehabilitation Cost Model while [EAY.0012.001.0030] and [EAY.0012.001.0029] provides a visual summary breaking down the assessed liability by area within the Yallourn Mine.¹¹

289. The Department is currently undertaking a review of EnergyAustralia's rehabilitation liability. As part of that review, the Department has engaged consultants URS to assist it. As part of that process, the Department (and URS) have sought various clarifications and other general assistance with regards to information from EnergyAustralia. EnergyAustralia continues to work cooperatively with the Department and URS in order for the Department's to finalise its review.

290. I verify that I have read the contents of this my witness statement and the documents referred to in it and that I am satisfied that this is the evidence I wish to give at the hearing and that, to the best of my knowledge and belief, the statement is true and correct.

Dated

Mr Ronald Clyde Mether

¹⁰ EAY.0012.002.0001 contains confidential and commercially sensitive material and EnergyAustralia objects to this document being disclosed to any other party or published by the Board.

¹¹ Each of EAY.0012.001.0027, EAY.0012.001.0028, EAY.0012.001.0030 and EAY.0012.001.0029 contains confidential and commercially sensitive material and EnergyAustralia objects to these documents being disclosed to any other party or published by the Board.

SCHEUDLE 1 - DEFINED TERMS

Abbreviation	Definition
1983 Diversion	Work completed by SECV to divert the Morwell River through a three metre diameter pipe for 3.7 kilometres, commencing in an area south of the Yallourn Mine
1993 Geo-Eng Report	Report prepared by Geo-Eng titled "Mine Rehabilitation Assessment of Open Cut Stability Proposed Flooding Option" dated May 1993
1995 Geo-Eng Report	Report prepared by Geo-Eng titled "Assessment of Mine Batter Stability During Proposed Flooding to RL 38m" dated June 1995
1999 Proposed Diversion	EnergyAustralia's proposal to divert the Morwell River further upstream and then even further east, effectively around the eastern boundary of the Maryvale Field and the East Field
2001 WPV	Change to approved work plan in or about August 2001
2002 WPV	EnergyAustralia's proposal for changes to approved work plan in 2002
2005 GHD Report	Report prepared by GHD titled "Yallourn Mine Rehabilitation - Concept Review Report" dated January 2005
2005 WPV	Work plan variation granted by the Department in 2005
2007 Batter Failure	Failure which occurred in the northern batters of the East Field in November 2007
2011 WPV	Work plan variation submitted by EnergyAustralia in or about June 2011
2012 Morwell River Diversion Failure	The partial collapse of the Morwell River Diversion in June 2012
2012 GHD Report	Report prepared by GHD titled "TRUenergy Yallourn, Report for Yallourn Mine Rehabilitation, Geotechnical Assessment of Flooding Options" dated May 2012
2012 Rehabilitation Master Plan Review	Report titled "Review of the Yallourn Mine Rehabilitation Master Plan" dated 5 June 2012
Board	Hazelwood Mine Fire Board of Inquiry
Bulk Water Entitlement	Bulk Water Entitlement issued to EnergyAustralia under section 43 and 47 of the Water Act that came into effect 28 March 1996
Condition Seven	Condition seven of the Department's approval of the 2011 WPV
CFA Act	<i>Country Fire Authority Act 1958 (Vic)</i>

Abbreviation	Definition
Department	The relevant Victorian Government Department responsible for the administration of the MRSDA, currently the Department of Economic Development, Jobs, Transport and Resources
East Field Extension	Additional coal field in an area further east of the East Field
EnergyAustralia	EnergyAustralia Yallourn Pty Ltd
EnergyAustralia General Submission	EnergyAustralia's submission to the Board dated 24 August 2015
EP Act	<i>Environment Protection Act 1970 (Vic)</i>
EPA	Victorian Environment Protection Authority
EPA Discharge Licence	EPA accredited licence No. 10961
ERC	Environmental Review Committee
FCMP	Mine Fire Control Management Plan
GCMP	Ground Control Management Plan
Geo-Eng	Geo-Eng Pty Ltd
GEO-Eng Liability Assessment	Report prepared by Geo-Eng titled "Costing of Yallourn Mine Rehabilitation Master Plan"
GHD Liability Assessment	Report prepared by GHD titled "Mining Licence Bond Review 'Close Now' Liability at 30 Sep 2002"
GHD Peer Review	Report prepared by GHD titled "Yallourn Mine, Lake Filling Model Review, Findings of the Model Review" dated 30 March 2012
GIS	Geographical Information System
GPSWS	Victorian Government Gippsland Region Sustainable Water Strategy
Groundwater Licence	Groundwater Licence No. 2007403
HRL 1997 Report	Report dated June 1997 titled "Literature Review on Mine Rehabilitation by Flooding" prepared by HRL Technologies Pty Ltd for the SECV Office of the Administrator
HRL 2001 Report	Report dated August 2001 titled " Prediction of Water Quality in Flooded Open Cut Brown Coal Mines in Victoria" prepared by HRL Technologies Pty Ltd for the SECV Office of the Administrator

Abbreviation	Definition
Lake Filling Model Report	Report commissioned by EnergyAustralia titled "Yallourn Mine - Final Land Rehabilitation Lake Filling Model - Revision 0" dated 26 April 2012
Latrobe River Weir	Weir located at Yallourn on Latrobe river in close proximity to Yallourn W Power Station
LFA	Landscape Functional Analysis
Maryvale Field	The newly proposed field in Maryvale
MCA	Minerals Council of Australia
MIN 5003	Mining Licence 5003
MIN 5216	Mining Licence 5216
MIN 5304	Mining Licence 5304
Mining Licences	Mining Licence 5003, Mining Licence 5216 and Mining Licence 5304 together
Morwell River Diversion	Construction of an aqueduct commenced in 2001 and completed in or around the middle of 2005
MRSDA	<i>Mineral Resources (Sustainable Development) Act 1990 (Vic)</i>
NEM	National Electricity Market
NSW	New South Wales
OHS Act	<i>Occupational Health and Safety Act 2004 (Vic)</i>
Old Yallourn Power Stations	Yallourn A, Yallourn B, Yallourn C, Yallourn D and Yallourn E
Order	Bulk Entitlement (Latrobe - Yallourn) Conversion Order 1996, Government Gazette S29 28/03/1993.3 (Consolidated version as at 4 July 2013)
RAMP	Risk Assessment and Management Plan required to be prepared in response to Condition 1A on the Schedule of Conditions to MIN 5003.
Rehabilitation Master Plan	Mine Rehabilitation Master Plan dated December 2001
Schedule 19 Report	The annual return EnergyAustralia is required to provide to the Minister in relation to various items set out in Schedule 19 to the <i>Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013</i>
SECV	State Electricity Commission of Victoria

Abbreviation	Definition
SEPP	State Environment Protection Policy
SMEC 2012 Report	Report prepared by SMEC titled "Yallourn Mine Final Rehabilitation, Review of the Morwell River Diversion" dated 31 May 2012
SRW	Southern Rural Water
Water Act	<i>Water Act 1989 (Vic)</i>