IN THE MATTER OF

The Hazelwood Coal Mine Fire Inquiry

STATEMENT OF STEPHEN GERARD RIENIETS

Date of Document: 30 October 2015
Filed on behalf of: AGL Loy Yang Pty Limited (ABN 62 077 985 758)

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I, Stephen Gerard Rieniets, of AGL Loy Yang, Bartons Lane, Traralgon South, Victoria 3844, General Manager of AGL Loy Yang operations for AGL Loy Yang Pty Limited (**AGL Loy Yang**), say as follows:

A. INTRODUCTION

1. My full name is Stephen Gerard Rieniets. My date of birth is 1 March 1963.

2. I am the General Manager at AGL Loy Yang's operations located at Bartons Lane, Traralgon South, Victoria, 3844.

3. In this role, which I have held since 1 April 2015, I am responsible for the overall management of the power station and associated coal mine at AGL Loy Yang. I previously held the role of Head of Mining AGL Loy Yang from 22 June 2014 to 1 April 2015.

4. I have held various senior technical and management roles in the electricity industry in the Latrobe Valley over the last 30 years.

5. I hold the qualifications of a Bachelor of Civil Engineering from Monash University and a Master of Business Administration from Deakin University.

6. My statement addresses matters 1-12 (inclusive) of the Board of Inquiry's letter dated 9 October 2015 to Jeff Lynn, Partner of Ashurst Australia. These matters relate to background information about AGL Loy Yang, rehabilitation of the AGL LY Mine, and rehabilitation liability assessments. I am providing the statement on behalf of AGL Loy Yang given I am the current General Manager of AGL Loy Yang, and as my responsibilities include mine rehabilitation at the AGL LY Mine.

B. BACKGROUND

(1) Provide a brief overview of the ownership and management of the Loy Yang Coal Mine (Mine)

7. AGL LY Mine has been operated by a number of corporate and government entities since it opened (see Table 1) and is currently owned by the AGL Loy Yang Partnership and operated by AGL Loy Yang.

8. Since September 2012, AGL Energy Limited (**AGL**) has been the ultimate holding company of GEAC Operations Pty Ltd (ACN 105 367 888), which owns 100% of each of the following partners in the AGL Loy Yang Partnership:

   a) AGL Loy Yang P 1 Pty Ltd (ABN 36 078 121 187);

   b) AGL Loy Yang P 2 Pty Ltd (ABN 26 078 377 572);

   c) AGL Loy Yang P 3 Pty Ltd (ABN 16 078 377 527) and

   d) AGL Loy Yang P 4 BV (ARBN 073 074 530).

9. AGL Loy Yang operates the Loy Yang Mine (**AGL LY Mine**) and the Loy Yang A Power Station (**AGL LYA**) in its capacity as agent for the AGL Loy Yang Partnership.

Table 1 AGL Loy Yang – Previous Owners and Operating Entities

Period	Entity
1982 to 1995	State Electricity Commission of Victoria (SECV)
1995 to 1997	Loy Yang Power Ltd
1997 to July 2003	Horizon Energy Partners, a partnership comprising the following partners: a) Horizon Energy Holdings Ltd (ARBN 078 377 527) b) CMS Generation Horizon Energy Holdings Ltd (ARBN 078 377 572) c) Horizon Energy Investment (No 2) Pty Ltd (ACN 078 121 187) d) NRGenerating Holdings (No 4) BV (ARBN 073 074 530) Loy Yang Power Management Pty Ltd (ABN 62 077 985 758) operated the Loy Yang Mine and Loy Yang A Power Station as agent for Horizon Energy Partners
July 2003 to Sept 2012	Loy Yang Power Partnership comprising the following partners: a) LYP Partner 1 Pty Ltd (ABN 36 078 121 187); b) LYP Partner 2 Pty Ltd (ABN 26 078 377 572); c) LYP Partner 3 Pty Ltd (ABN 16 078 377 527) and d) LYP Partner 4 BV (ARBN 073 074 530). Loy Yang Power Management Pty Ltd (ABN 62 077 985 758) operated the Loy Yang Mine and the Loy Yang A Power Station in its capacity as agent for the Loy Yang Power Partnership.

10. AGL Loy Yang is part of AGL Energy Ltd's Group Operations division that manages a diverse portfolio of power generation assets across Australia. The assets include base, peaking and intermediate generation plants, spread across traditional thermal generation

as well as renewable sources including hydro, wind, solar, landfill gas and biomass. It is also responsible for facilities, physical security and health, safety and environment.

(2) Provide details of the mining licences granted to operate the Mine, including a plan of the licence area

11. The AGL LY Mine operates under Mining Licence MIN 5189 (**Mining Licence**), which is due to expire in 2037. Annexed and marked **Annexure A** is a copy of the Mining Licence.

12. At the time of privatisation the proposed project life was through to 2048, however, under the MRSD Act it was only possible to grant a Mining Licence for a maximum of 40 years. An extension of the Mining Licence may be sought to enable AGL LYA to operate through to its planned closure of 2048 in accordance with the AGL Greenhouse Policy. ENGIE LYB is entitled to seek an extended coal supply beyond 2048 in accordance with the Coal Procurement Agreement (**CPA**).

13. Mining Licence details are provided in Table 2 – AGL Loy Yang Licence Details. The Mining Licence was granted on the 6th of May 1997 and expires on the 6th of May 2037 (40 years).

Table 2 AGL Loy Yang Licence Details

Tenement	Type	Owner	Issue date	Expiry date
MIN 5189	Mining Licence	a) AGL Loy Yang P 1 Pty Ltd (ABN 36 078 121 187); b) AGL Loy Yang P 2 Pty Ltd (ABN 26 078 377 572); c) AGL Loy Yang P 3 Pty Ltd (ABN 16 078 377 527) d) AGL Loy Yang P 4 BV (ARBN 073 074 530).	6/5/1997	6/5/2037

14. The Order granting the Mining Licence:

- approves an authority to undertake work;
- approves the Work Plan 1997 (WP 1997) (including a rehabilitation plan); and
- requires a rehabilitation bond (Bond) of $15M (in the form of a bank guarantee) by Loy Yang Power Limited.

15. The Mining Licence:

- requires an Environmental Review Committee (ERC) which includes State government, local government and community representatives, and reporting of environmental monitoring under the Environmental Management Plan to the ERC;
- requires all existing vegetation outside of the area subject to surface disturbance to be preserved and maintained provided due regard is taken of fire protection arrangements;
- requires progressive reclamation (or rehabilitation) to occur as per the rehabilitation plan; and
- requires a royalty to be paid on the energy value of coal mined on a per gigajoule unit basis.

16. AGL Loy Yang is also the holder of Exploration Licence - EL 4683 (**EL**), which was granted in 2005 over private land, roads and road reserves. The EL is located east of the existing Mining Licence. AGL Loy Yang has applied for a Retention Licence (**RL 2015**) over the resources contained in EL 4683, which places a hold over the EL area while the RL 2015 application is current. The RL 2015 external boundary is identical to that of EL 4683.

17. Annexed and marked **Annexure B** is a map of the AGL LY Mine indicating the licence boundaries for the Mining Licence and RL 2015.

(3) Provide details of the water licences or water entitlements held by the Mine, including details of the type and volume of water that the Mine is authorised to take and use under the licences or entitlements and any conditions governing the use of water, e.g. are the entitlements associated with power generation

18. AGL Loy Yang holds 2 primary licences for the supply of water to the AGL LY Mine and AGL LYA:

- a Groundwater Extraction licence 2007440 (**Groundwater Licence**) to allow the efficient depressurising of the Loy Yang open cut mine (the extraction volume is currently 19,996 ML per annum); and
- a Bulk Entitlement to extract up to 40,000 ML per annum of low quality water from the Latrobe River at Yallourn (**Bulk Entitlement**).

19. AGL Loy Yang's Groundwater Licence and Bulk Entitlement are administered by Southern Rural Water.

20. ENGIE LYB holds a diversion licence for 20,000 ML from the Latrobe River. AGL Loy Yang delivers low quality water through its water infrastructure to the Loy Yang Project site to meet its own requirements and LYB's requirements.

Groundwater Licence

21. Annexed and marked **Annexure C** is a copy of AGL Loy Yang's Groundwater Licence.

22. The objective of the Groundwater Licence is to "*allow the efficient depressurising of the Loy Yang open cut mine whilst minimising adverse impacts on the Gippsland Groundwater Basin*".

23. The Groundwater Licence is valid for a period of 30 years from 1 September 1996.

24. Clause 2 of the Groundwater Licence authorises the "*taking and use of groundwater to facilitate mining for coal and generation of electrical energy and purposes incidental thereto*".

25. The Groundwater Licence authorises AGL Loy Yang to take and use specified volumes of water from the Morwell Formation Aquifer System (**MFAS**) and the deep Traralgon Formation Aquifer System (**TFAS**).

26. The MFAS is a confined aquifer system that consists of interbedded sands and clays within main Morwell Formation coal seams.

27. The TFAS is a regionally extensive, confined, high-permeability aquifer located at depths of around 120 m below the AGL LY Mine floor (or in excess of 200m from natural surface).

28. Table 3 shows the volumes of authorised extraction under the Groundwater Licence from the MFAS and the TFAS during the specified time periods.

Table 3 AGL Loy Yang Groundwater Licence 2007440 – Extraction Volumes

Year	M2B Aquifer		M2C Aquifer		TFAS Aquifer		Total
	ML/mth	ML/y	ML/mth	ML/y	ML/mth	ML/y	ML/y
2012 - 2019	105	1,262	184	2,208	1,377	16,527	19,996
2020 - 2025	110	1,325	184	2,208	1,314	15,770	19,302

29. Groundwater pumped from aquifers is of good quality and is collected separately, wherever practicable.

30. Groundwater is pumped into the power station's low quality water system for use as cooling tower make up water, thereby reducing the use of Latrobe River water.

Bulk Entitlement

31. Annexed and marked **Annexure D** is a copy of the Bulk Entitlement which authorises AGL Loy Yang to extract up to 40,000 ML per annum of low quality water from the Latrobe River at Yallourn.

32. The Bulk Entitlement was issued to Loy Yang Power Ltd on 25 March 1996 in the form of a Bulk Entitlement (Yallourn Energy Ltd for Loy Yang Power Ltd) Conversion Order 1996 (**Order**). The Order is accompanied by an Explanatory Note which explains the history and conditions of the Bulk Entitlement.

33. The Order is a part conversion of the 1979 Order–in- Council which granted an entitlement to the SECV to divert water from the Latrobe River.

34. The Bulk Entitlement is a source entitlement to take water from the Latrobe River and to store water in Blue Rock Reservoir and Lake Narracan.

35. The Bulk Entitlement is granted for the purposes of supplying the power generation works at AGL Loy Yang.

36. AGL Loy Yang is entitled to divert an annual amount of up to 40,000 ML in any year from the Tanjil River between Blue Rock Reservoir and the Latrobe River, and the Latrobe River downstream of its confluence with the Tanjil River, including the pools formed by, and immediately upstream of, the Blue Rock and Narracan Dams and Yallourn Weir (known collectively as the 'System Waterway' under the Bulk Entitlement). The diversion of this volume is conditional on the regulated release from Blue Rock Reservoir not exceeding 18, 330 ML per annum.

37. Under Clause 7 of the Bulk Entitlement, AGL Loy Yang is entitled to 16.4% of the storage capacity of the Blue Rock Reservoir and 32.8% of the storage capacity of Lake Narracan.

38. Under clause 8 of the Bulk Entitlement, AGL Loy Yang is entitled to 16.4% of the inflow into Blue Rock Reservoir and 24.55% of the unregulated inflow into Lake Narracan after the minimum passing flows have been provided.

(4) Provide details about the location and size of the mine, the geological formation being mined including depth and footprint, and the characteristics of coal mined in the Mine.

Location and size of the mine

39. The AGL LY Mine is located in the Latrobe Valley some 160 km east of Melbourne and approximately 4 km southeast of Traralgon. The AGL LY Mine is situated between Traralgon and Flynn's Creeks on undulating land used primarily for grazing. The AGL LY ine is one of three large open cut brown coal mines in the Latrobe Valley in Victoria.

40. Annexed and marked **Annexure E** is a plan showing the regional location and size of the AGL LY Mine.

41. The total area within the Mining Licence outlying boundary is approximately 4,840 ha. However, the power stations and associated works areas, are excluded, resulting in a mining licence area of 4,561.4 ha. Annexed and marked **Annexure F** is a Site Plan- AGL Infrastructure which shows the mining licence boundary and these excluded areas.

42. Land ownership within the Mining Licence is set out in Table 4:

Table 4 Land ownership within MIN 5189

Area	Land area (ha)
Total area within the MIN 5189 boundary	4,840.0
Areas within MIN 5189:	
Power station and associated works exclusion areas	278.6
AGL Loy Yang freehold	2,617.4
Coal supply area	1,883.0
Other landowners (private, public, Crown)	61.0

43. AGL Loy Yang owns almost all the land within the Mining Licence except a small area next to the eastern boundary, an area adjacent to the northern batters and various road reserves. AGL Loy Yang also owns large sections of land adjacent to and outside the Mining Licence, especially to the northwest and north.

Geological setting

44. The Mining Licence tenement lies within the Gippsland Basin of south eastern Australia. This basin is notable for both its brown coal, oil and gas resources. The Latrobe Valley brown coals occur within an on-shore extension of the Gippsland Basin known as the Latrobe Valley Depression and in which up to 1,000 m of terrestrial sediments including a series of thick brown coal seams were deposited. Both during, and after deposition of the coal, the Gippsland Basin has been subject to significant regional deformation resulting in large scale folding and faulting.

45. The Latrobe Valley Group coal seams are notable for their thickness and lateral extent with individual seams commonly exceeding 100 m thickness and are traceable laterally for more than 50 km). The coal seams within the Latrobe Valley Group occur, for the most part, within a sequence of sands, clays and gravels. The Latrobe Valley Group is subdivided into three stratigraphic units - the Traralgon, Morwell and Yallourn Formations, which are unconformably overlain by the unconsolidated sediments of the Haunted Hills Formation, forming a thin veneer over the Latrobe Valley Group.

46. Non-coal deposits between seams are termed interseam and are named after the coal seam immediately above. The Latrobe Valley Group interseam sediments consist for the most part of semi-consolidated kaolinitic clays, silty clays, silts, sands and gravels and, in places, host major aquifer systems. Interseam lithology can change rapidly due to the mode of its formation, which included fluvial channels and over-bank deposits. Interseam is thin or absent in some areas resulting in large thicknesses of continuous coal. Interseam is important to coal utilisation, local hydrogeology and geotechnical stability. Thin non-coal intervals within coal seams are termed coal partings; coal partings are modelled as part of the seam.

47. The AGL LY Mine is located in the Latrobe Valley Depression on the south limb of the Latrobe Syncline, with beds generally dipping at 6° to 8° to the north.

48. The Latrobe Valley Depression is divided into a number of blocks by large-scale sub-parallel structures, notably the Yallourn, Morwell and Rosedale monoclines and the Baragwanath Anticline. It is considered that the major monoclines developed in response to faulting in the underlying 'basement' rocks. This faulting is sub-vertical and for the most part oriented in a northeast-southwest direction. Continued folding resulted in widespread erosion of uplifted areas in the Latrobe Valley Depression and the truncation of coal seams in many areas. Later, smaller scale differential movements rejuvenated streams in the surrounding areas, resulting in deposition of the Haunted Hill Gravels.

49. Between the major structures, three smaller structures are recognised within the Loy Yang mining area; these are an unnamed monocline, the Loy Yang Dome and the Flynns Creek Syncline. The Minniedale Dome is a smaller, 3 km-long structure that lies between the monocline and Loy Yang Dome. The Loy Yang Dome is considered to be a natural high formed during coal deposition. The sediments between the coal seams tend to thin and pinch out over the Loy Yang Dome. The AGL LYA and LYB power stations are strategically located on the dome to avoid sterilising potential coal resources.

50. Two main fault sets are recorded at the AGL LY Mine. Normal faulting occurs in a 600 m zone along the north flank of the Loy Yang Dome in the west of AGL LY Mine. These strike to 153° and dip east and west, with a predominant dip of 70° towards the east. These faults connect to those exposed on the northern slopes. Two small displacement reverse faults are mapped at the toe of the northern slopes. The displacement is in the order of 0.7 to 2.0 m. Strike is approximately east to northeast and dip is 10° to 34° north.

51. At AGL LY Mine the Yallourn coal seam overlies the Morwell Formation and is separated by the Yallourn interseam. Yallourn Formation seams are only preserved in the northern part of the AGL LY Mine, where they sub crop north of the Minniedale Dome and then steepen to a dip of 30° on the northern edge of the unnamed monocline.

52. The Morwell Formation seams comprise the majority of the mineable coal reserves within the mining area. They consist of the M2C (oldest), M2B, M2A, M1B and the M1A coal seams, which are generally separated by interseam sediments identified by the overlying coal seam. Morwell Formation seams sub crop throughout most of the AGL LY Mine and have been eroded in the core of the Loy Yang Dome.

53. The Traralgon Formation at Loy Yang consists of the T1 and T2 seams, with the T1 seam split into the Traralgon Upper and Traralgon Lower seams. The T2 seam is a thin (up to 2m) remnant at the edge of the basin, whereas the T1 seam is significantly thicker. Traralgon Formation seams are present at depth throughout the entire mining area, however, they sub crop within the Loy Yang Dome. In the Mining Licence area they are either too deep or too high an incremental strip ratio to be mined at present.

54. The coal seams are generally separated by interseams that tend to thicken towards the north and east. Interseams are named according to the overlying coal seam and their lithology can change rapidly due to the mode of formation, which includes fluvial channels and over-bank deposits.

55. The regional geological and tectonic forces responsible for the development of the major structures also gave rise to jointing within the coal seams. Most of this jointing is close to vertical, with individual joints sometimes extending through the full thickness of the coal seam and able to be traced laterally for up to a kilometre.

56. Extensive coal joint mapping from 1996 to 2013 at the AGL LY Mine indicates that the predominant major joint direction (strike) is approximately grid north, and the dip is sub-vertical (Defect Sets 1, 2 and 3). In the east-west direction (Defect Sets 4, 5 and 6), the joints are less frequent and flatter.

57. The AGL LY Mine extracts the (Yallourn Y1 and Y2) and Morwell (M1A, M1B, M2A and M2B) coal seams.

Characteristics of the Coal Resource

58. The Latrobe Valley Group coal is a soft brown coal. The coal seams have high moisture content (50% to 65%) and low wet specific energy (8 to 10 MJ/kg). Energy content measured on a dry basis generally between 24.1 and 27.6 MJ/kg (db). Ash content of the coal is generally between 0.2% and 5% (db). This is often considered low when compared to other coal resources. Significant changes in physical and chemical properties occur both laterally and vertically.

59. The average coal qualities for the AGL LY Mine are set out in Table 5.

Table 5 Average coal qualities for the AGL LY Mine

Quality	Bore		Block model	
	avg.	std. dev.	EL avg.	MIN avg.
Aluminium oxide (Al2O3) % (db)	0.38	0.63	0.44	0.44
Soluble aluminium (Al) % (db)	0.30	0.39	0.22	0.22
Ash (ma) % (db)	2.4	2.4	3.00	3.40
Ash (mi) % (db)	2.4	3.1	–	–
CaO% (db)	0.09	0.10	0.1	0.12
Carbon% (db)	66.1	4.3	66.3	65.2
Chloride% (db)	0.19	0.17	0.13	0.16
Non pyritic iron (Fe2O3) % (db)	0.19	0.20	0.21	0.30
Total iron (Fe2O3) % (db)	0.23	0.24	0.36	0.26
Gross dry specific energy MJ/kg	25.81	1.74	26.01	25.32
Hydrogen% (db)	4.7	0.3	4.7	4.7
MgO% (db)	0.13	0.09	0.12	0.13
Moisture %	61.5%	3.7	59.9	59.5
Nitrogen% (db)	0.6	0.0	0.6	0.6
Net wet specific energy MJ/kg	–	–	8.7	8.5
Potassium oxide% (db)	0.02	0.04	–	–
SiO2% (db)	0.75	1.70	1.53	1.09
Na2O% (db)	0.17	0.15	0.14	0.14
Sulphur% (db)	0.42	0.30	0.47	0.45
Titanium oxide% (db)	0.05	0.11	0.08	0.05
Volatile% (db)	50.3	3.5	50.1	50.1

Note: db = dry basis. EL = exploration licence. MIN = mining licence. Relates to all seamed coal with ash of 30% or less. Database transfer errors between the SECV mainframe database and the Latrobe Valley Coal Bore Database resulted in analyses with three decimal places being truncated to two decimal places. Consequently, values of 0% for potassium oxide and titanium oxide may be misleading.

60. The area of the Mining Licence and surrounds has been extensively drilled with around 2,800 bores. Coal samples from these bores have been analysed for quality and other hydrogeological and geotechnical information. Most drilling was carried out to an 'economic mining' depth; however, six bores have been drilled into Strzelecki Group basement.

61. The latest JORC report completed in March 2012, for the Mining Licence reports coal reserves shown in Table 6. The JORC Code is the *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves*; the JORC Code sets out minimum standards, recommendations and guidelines for the classification and reporting of Exploration Results, Mineral Resources and Ore Reserves in Australasia.

Table 6 Coal Resources and Reserves

Resource	Inferred (Mt)	Indicated (Mt)	Measured (Mt)	Total (Mt)
	118	948	4,028	5,094
Reserve		Probable (Mt)	Proven (Mt)	Total (Mt)
		18	1,762	1,780

62. Estimates are based on coal with less than 10% (db) ash and a 3 m minimum seam thickness. No account of other qualities has been made in assessing coal for inclusion in the estimate.

63. Coal reserves located within Mining Licence 5189 assume mining to the eastern boundary of the Mining Licence. Interseam sediments vary in thickness and are expected to consist of silty sand material with minor clay partings (i.e. minor separating layers). These clay layers when saturated are potentially the bedding plains of lowest strength.

64. Interseam properties have been determined from extensive field and laboratory testing programs and back-analysis of permanent and operating batters. Sampling and testing is on-going to monitor variation in interseam properties.

(5) Provide a brief history of the operation of the Mine including the variations and expansions to the mine, the mine's approved Work Plans including any Work Plan variation, and the relationship of the Mine with the Loy Yang A power station.

History of the Loy Yang Mine

65. The State Electricity Commission of Victoria (**SECV**) commenced planning for the Loy Yang Project in 1974 and sought formal ministerial approval for commencement in 1976. The Project encompassed the establishment of a new open cut coal mine and 2 new 2,000MW power stations (AGL LYA and ENGIE LYB). Only the first two units of LYB (1,000MW) were developed.

66. Mining operations commenced at the Loy Yang Mine, by the State Electricity Commission Victoria (SECV), in 1982 with the removal of overburden using bucket wheel excavators (BWE). Coal production began in 1984 to supply coal to the first unit of AGL LYA.

67. The Loy Yang Mine was initially opened up near the outlet in the southern area of the mine, with excavation developing in a north easterly direction (Stage A). Excavation is now being developed in an easterly direction (Stages B to D). In the future, excavation will swing further to the south (Stage E).

68. Mine operations use BWEs (or dredgers), tripper stackers, mobile plant and conveyor systems to dig and transport coal and dispose of waste.

69. Between the commencement of mining in 1982 and 30 June 2014, some 730 Mt of coal and 158 Mm3 of waste (overburden and interseam materials) have been removed from the mine.

70. The area disturbed by mining is approximately 1,200 ha (including 250 ha already rehabilitated). The area of the external overburden dump is approximately 665 ha (of which 220 ha has been rehabilitated). The final area of the mine will be approximately 2,200 ha, and the final external dump 850 ha.

71. AGL Loy Yang's operations run continuously 24 hours per day, 365 days per year. AGL LY Mine operates on "just in time" production principles, with a capacity in the bunker of less than 18 hours. A stockpile is maintained at the coal face and is referred to as operational reserves. The operational reserve is the coal exposed following the removal of overburden and which is available to be excavated by the BWEs without the need for major conveyor relocation.

Historic stages of Mine development

72. As additional power station units were developed, additional mining equipment was installed to meet increased coal demand. As the AGL LY Mine developed to the North and then the East, mining depth increased to the current depth of 175 m. The AGL LY Mine is currently 4 km long and 2.5 km wide at its widest. At the completion of mining the pit will be some 6 km long and 4.5 km at its widest.

73. Annexed and marked **Annexure G** is a plan showing the historic development of the pit and the overburden dump over time. The plan shows the approximate mine crest in 1982 and at 5 year intervals from 1985 to 2010.

History of variations to the approved 1997 Work Plan

74. AGL Loy Yang is currently working to WP 1997. Under WP 1997 five work plan variations (as set out in Table 7) have been registered and approved by DEDJTR and previous regulating departments. Since the last of these approved variations, in December 2007, a number of operational and legislative changes have occurred. One of these operational changes, overburden dumping on the northern slopes, was partially addressed in a work plan variation approved on 15 January 2001. However, other changes have also necessitated a more recent work plan variation (WPV 2015).

Table 7 Approved Variations to Work Plan 1997

Register Number	Approval Date	Nature of Work
F11,094	15 Jan 2001	To cover overburden removal by bucket wheel excavation and conveyor to an external dump.
F13,842	27 May 2005	Approval for ash storage
F15,018	21 Nov 2006	Blasting
F15,436	23 Apr 2007	Blasting
F16,052	31 Dec 2007	Blasting

75. WPV 2015 was submitted to the Department of Economic Development, Jobs, Tourism and Resources (**DEDJTR**) in early June and re-submitted in September 2015. The September submission incorporates suggestions and comments on the June submission as directed by DEDJTR. WPV 2015 is a comprehensive replacement of the approved WP 1997 and includes, amongst other things, a more detailed rehabilitation plan and a section on fire risk management.

76. Detailed in two volumes, WPV 2015 has been developed in response to recent geotechnical and fire events, changes in legislation and additional information gathered and management processes developed since 1997.

77. WPV 2015 details the current AGL Loy Yang rehabilitation plans and closure approach.

78. Since the Hazelwood Mine Fire in 2014, AGL LY Mine has reviewed the way it manages fire risk and is committed to identifying, controlling and monitoring all fire risks associated with the AGL LY Mine. This has been incorporated into WPV 2015.

Relationship between Mine and AGL LYA

79. AGL Loy Yang owns and operates the AGL LY Mine and AGL LYA at Traralgon, Victoria.

80. The General Manager AGL Loy Yang has responsibility for all activities undertaken at AGL LY Mine and AGL LYA, including operations, engineering, maintenance and civil activities. Corporate services such as Finance and OH&S are provided through a business partner arrangement.

81. AGL Loy Yang Mine supplies coal and infrastructure services to AGL LYA under agreed operating terms, practices and standards, but no formal contracts exist between the entities.

82. The power station includes four 500+ Megawatt generators which were brought into service between 1984 and 1988. Until the year 2000 AGL LYA had a base generating nameplate capacity of 2000MW. Upgrades through major maintenance programs and plant enhancements have taken generation capability to over 2200 megawatts.

Relationship between Mine and LYB

83. When the AGL LY Mine, AGL LYA and LYB were developed they were all owned by the SECV. The ENGIE LYB assets were divested from the SECV on completion of commissioning, circa 1992 and 1996. The separate ownership required various contractual arrangements to be put in place to ensure continuity in the provision of services to LYB.

84. AGL LY Mine provides coal and ash and saline water management and disposal services to LYB and transports LYB's water allocation to the site.

85. AGL LY Mine supplies coal to LYB under a CPA dated 29 March 1997. A related contract to the CPA is the LYCA also dated 29 March 1997, which is a tripartite agreement between the State of Victoria, and the then owners of AGL LYA and LYB.

86. AGL LY Mine's key contractual arrangements, which have some impacts on AGL LY Mine development and AGL LY Mine rehabilitation planning are set out below in Table 8.

Table 8 AGL Loy Yang Contractual Arrangements

Agreement	Parties	Implications on operations and rehabilitation
Coal Procurement Agreement	AGL LY Mine and LYB	The CPA sets out the requirement for the continuous supply, from the AGL LY Mine, of coal to meet a quality specification to Loy Yang B power station. This impacts short term mine planning (from production benches) and means that overburden stripping (to expose coal) must be a continuous operation and hence the pre-strip area along with the external and internal overburden dumps will be in constant operation, limiting areas for rehabilitation.
Infrastructure Supply Agreement	AGL LY Mine, LYB and other Latrobe Valley power stations	The ISA sets out the requirement for the supply of critical infrastructure to all power stations in the Latrobe Valley. This includes: disposal of saline water; supply of raw water; and the disposal of power station ash.
Loy Yang Complex Agreement	State Government, AGL LY Mine and LYB	The LYCA is a tripartite agreement between the State Government, AGL LYA and LYB and sets out numerous arrangements for the current operations of the AGL LYA and LYB power stations and future development at the site. Provides for the creation of another financial instrument to fund mine rehabilitation from 2023 onwards.

87. An important aspect of the LYCA, is an agreement between the owners of AGL LY Mine and LYB to establish a trust fund for the purpose of accumulating funds to meet AGL LY Mine site rehabilitation expenses. From 30 June 2023, the parties are to annually contribute 10% of the total site rehabilitation expenses until 30 June 2032. It is important to note that this rehabilitation fund is a private arrangement between the parties, separate to any government bond requirements. The funds set aside can be drawn upon from 2023 onwards.

88. The obligations to continue to supply coal under the CPA and infrastructure services under the ISA may have impacts on rehabilitation planning and timing. For example the AGL LY Mine operates under its Mining Licence, which runs through to 2037. An extension of the Mining Licence may be sought to enable AGL LYA to operate through to its planned closure of 2048 in accordance with the AGL Greenhouse Policy. LYB is entitled to seek an extended coal supply beyond 2048 in accordance with the CPA.

C. REHABILITATION

(6) Describe the rehabilitation plans for the Mine to date pursuant to the Mine's mining licence and Work Plan (and Work Plan variations)

89. Rehabilitation of the AGL LY Mine was considered during the project approval phase, which acknowledged that the permanent slopes of the open cut will be progressively stabilised as the open cut advances.

90. Progressive rehabilitation plans have evolved over the life of the project based on learnings from rehabilitation trials, improved understanding of geotechnical and hydrogeological factors and changing community expectations.

Approved rehabilitation plans for the Mine

91. The AGL LY Mine undertakes rehabilitation in accordance with the approved work plan WP 1997. The approved work plan authorises work under the Mining Licence.

92. WP 1997 contains a rehabilitation plan in Part 2. The rehabilitation plan describes a Rehabilitation Master Plan which included concept plans for the open cut and external dump.

93. The description of the Rehabilitation Master Plan in Part 2.2 - Rehabilitation Master Plan of WP 1997 refers to Figures 15, 16 and 17:

- Figure 15 shows a conceptual design for the pit to be completely flooded (Loy Yang Power Coal Extraction Area Extended Block 2 Option Rehabilitation Concept Plan);
- Figure 16 shows a conceptual design for a rehabilitated overburden disposal area; and
- Figure 17 shows a conceptual design for typical details.

94. The current approved rehabilitation plan is to gradually flood a lowered land form at the end of operations to form a lake for community recreational purposes. It also provides that the overburden dump would be reverted to grazing land and recreational areas.

95. The approved mining processes (WP 1997) created a landform that comprises:

- the creation of an extensive area of deep extraction; and
- the creation of a large external overburden dump south of the open pit.

96. Figure 18 and Table 2 in Part 2.2 (WP 1997) shows the targeted progressive rehabilitation over a Five Year Program 1996/7-2001/2. Further progressive rehabilitation of approximately 15 Ha per annum is required for all future years beyond the five year period.

97. Part 2-3 is entitled 'Rehabilitation Techniques' and states that works are to be carried out in accordance with the Rehabilitation Practices Manual for Open Cuts and Overburden Dumps.

98. The subsequent approved work plan variations have not varied the approved rehabilitation plan.

99. Between 1997 and 2015, a number of rehabilitation plans and assessments were produced by the operator of the AGL LY Mine, but none of these plans were formally approved by the mining regulator of the day under the work plan. Some of these plans include the *Strategic Framework for Rehabilitation and Closure Planning for the Loy Yang Mine* (2003), and the *Loy Yang Mine Rehabilitation Master Plan* (2011).

100. The assessments considered a number of land use options, including:

- Grazing
- Native Vegetation
- Solar power generation
- Hydro power generation
- Animal/Plant/Bird sanctuary
- Flood management
- Water Storages
- Community Recreation facilities
- Forestry
- Horticulture
- Wind power generation
- Aquaculture
- Cattle/stock dams
- Hydroponics
- Landfill

Rehabilitation plans for the Mine in WPV 2015

101. The proposed WPV 2015, includes an updated and comprehensive rehabilitation plan.

102. WPV 2015 envisages:

- a similar mine footprint and depths of mining to WP 1997; and
- the initiation of in pit placement of overburden materials.

103. Overburden will be placed to a depth in the pit that counteracts aquifer pressures to address long term stability.

104. With the limited volume of overburden available this depth can only be achieved in the western half of the pit, leaving the eastern half an open void.

105. AGL LY Mine proposes that the eastern portion of the mine area becomes a lake and be filled to a level that assists with recovering hydrostatic pressures (modelled to achieve minimum weight balance at -22.5 RL, a safety margin on this has yet to be confirmed). On this basis the whole area of the pit will have long term stability from groundwater pressures. Thus at closure the landform will be a partially water-filled lowered landform.

106. The landform proposed in the AGL LY Mine WPV 2015 is intended to be suitable for agricultural land use. Subject to a detailed technical assessment, other land use options may be possible on the landform.

107. AGL Loy Yang currently proposes that the land owned by AGL Loy Yang within the mining lease will remain in private ownership on the completion of mining and rehabilitation activities at the site.

108. AGL LY Mine differs from other coal mines in the Latrobe Valley in that the landform created by mining over the past 33 years has had no significant geotechnical failures in the landforms created to date. Future mine development plans will continue the practices that have resulted in this long term stability.

Rehabilitation/Mine Design Process

109. The mine design process at AGL LY Mine is now centred on the creation of the final landform as proposed in the WPV 2015.

110. AGL LY Mine's rehabilitation design process is shown in Table 9 (below).

Table 9 AGL LY Mine Rehabilitation Design Process

Post-mining **Land form** is determined by:

- Setting
- Geology
- Hydrogeology
- Mining Fleet and Practice
- Inherited mine rehabilitation
- Material properties

⇩

Land Use is determined by AGL LY Mine's rehabilitation principles:

- Create a safe, stable and sustainable landform
- Return the land in the Mining Licence to uses that are sympathetic to the pre-mining land use
- Minimise exposed overburden to mitigate dust
- Cover exposed coal

⇩

Which results in the **final rehabilitation option (WPV 2015)**:

- A lowered land form within the open pit containing replaced overburden and a lake. The overburden is returned to pasture/grazing.
- Levels for the overburden and lake are set to ensure long term stability by balancing aquifer pressures. This means that long term aquifer pumping is not required.
- A reduced height external overburden dump returned to pasture/grazing.
- Areas outside the pit/overburden dump to continue as a variety of pasture/grazing and plantation areas.

(7) Describe the rehabilitation work completed at the Mine to date pursuant to the Mine's mining licence and Work Plan (and Work Plan variations).

111. Progressive rehabilitation has been undertaken on areas not required by production (such as those areas supporting the trunk conveyor, artesian pumps, dams and pipelines, mine production faces and floors areas and operating dumps).

112. AGL Loy Yang has a good record of rehabilitation, within those areas of the AGL LY Mine which are available for rehabilitation.

113. AGL Loy Yang has a final landform concept for the site which could, pending technical and other assessments, accommodate multiple land uses such as energy production (solar/wind/hydro), agriculture and cropping, return to native vegetation or industrial developments.

114. AGL LY Mine's current end use concept is to return the site to primarily agricultural land use.

115. To date, mining operations have disturbed some 2070 hectares of land. Of this, some 630 hectares is available for rehabilitation and 530 hectares of land (or 84% of available land) has been successfully rehabilitated. Progressive rehabilitation is conducted at a rate of approximately 16 ha/year, which is in excess of the WP 1997 requirement of 15 ha/year.

116. AGL Loy Yang has progressively rehabilitated available final overburden slopes above the coal. Annexed and marked **Annexure H** are photographs numbered as Plates 1-8 showing examples of rehabilitation. Progressive rehabilitation is typically undertaken within 18 months of exposing the area. The treated areas continue to improve and no failures have occurred. The slopes are grazed or slashed and regular inspections are undertaken as part of the geotechnical and fire risk inspection programs.

117. Since its commencement of operations in 1982, the external overburden dump has been developed up to Level 4.

118. Rehabilitation commenced on the external overburden dump in the late 1980s. The external overburden dump has a current area of 550 hectares with approximately 220 hectares (42%) having been rehabilitated. All rehabilitation has included re-contouring, coverage with topsoil and re-grassing (Plates 1, 2, 3, 7 and 8). The slopes are grazed or slashed and regular inspections are undertaken as part of the geotechnical inspection program.

119. No significant failure has been reported on the rehabilitated slopes or in the dump itself, and all key objectives continue to be met.

120. Annexed and marked **Annexure I** is a plan showing the progressive rehabilitation undertaken to date (July 2015). The areas are superimposed over the most recent aerial photograph of the site (Nov 2014), and categorised as: mining operations, main transport corridors, water management areas, support infrastructure, interim rehabilitation and rehabilitated areas.

121. Progressive rehabilitation to date has included:

- Overburden bunds placed outside the northern slope crest;
- Most exposed in-situ overburden above coal on the northern and western slopes;
- Clay capping on overburden placed in the south-east corner of the pit floor;
- Return to pasture grasses for the works areas south of the southern slopes; and
- Small rehabilitation trials on the western slopes.

122. Active production areas include:

- Eastern production slopes;
- Proposed new ramp access for tracker/stacker access (Stage C) on northern slopes;
- Southern slopes carrying the trunk conveyors and artesian pipelines;
- Northern slopes; and
- Pit floor (water storage, artesian pumps and pipelines, conveyors, roads).

123. The pit floor hosts a water storage area that collects storm water against a groyne in the base of the mine. This water storage will be extended using new groynes several times as the bottom mine operating slope moves eastwards. These water storages are primarily to keep storm water out of mine operating areas and away from internal dumping.

124. Water storages also provide additional water for fire protection as the mine area increases. The water storages have been designed to provide retention for a 1:100 year ARI storm event. A geotechnical investigation of the groyne has confirmed the stability of both the groyne and the nearby permanent slopes.

125. Table 10 summarises the respective areas in the base categories at the conclusion of Stage B (current operations).

Table 10 Progressive Rehabilitation – to Mining Stage B (2015)

	Mining Stage	Stage B - Current			
	Area	Outside Pit Crest and External Overburden Boundaries	Main Pit	External Overburden Dump	Total Mining Licence Area
	Total Area	3152 Ha	877 Ha	531 Ha	4560 Ha
	Undisturbed	2803 Ha			2803 Ha
	Rehabilitated	198 Ha	45 Ha	222 Ha	465 Ha
	Interim Rehabilitation		70 Ha	309 Ha	379 Ha
Production Area	Mining Operation		320 Ha		320 Ha
	Transport Corridors	151 Ha	134 Ha		285 Ha
	Water Management		164 Ha		164 Ha
	Support Infrastructure		144 Ha		144 Ha

126. In the early 2000's a rehabilitation trial was conducted on the western slopes in the open pit. The trial extended over a length of some 120 metres along the slope and extended down some 60 metres of the slope. The slope was dozed down to a 1:3 (V:H) slope and a 0.6 metre clay layer placed over the exposed coal. A top soil layer (100 mm) was placed over that and seeded with pasture grass. Key learnings and experience from this trial includes:

- the slope has remained intact for the period to date;
- access along an access berm was cut off as a result of the trial;
- the grass needs annual maintenance (slashing etc…) to mitigate fire risks and manage the quality of the vegetation;
- the slope allows wheeled machinery to run up and down the slope, however, erosion gullies form as a result of this activity on the slope, resulting in the degradation of the slope;
- horizontal borehole drains have not been able to be placed in the rehabilitated slope, due to the nature of the fill material used and this has resulted in a localised increase in pore water pressure behind the slope;
- the fire service pipes on the berm required relocation which means they provide poorer coverage of the exposed coal on the batter above during construction;
- batter toe drains fill up with silt and are rendered ineffective without periodical maintenance;
- the clay and top soil layer has slumped on the coal in localised areas, encroaching on the berm below and reducing vehicular access for fire and maintenance vehicles on the berm. The slumping also locally increases slope angles to more than 1:3 (V:H) and makes vehicular access, on the slope, problematic;
- at the 1:3 (V:H) overall slope angle, wheeled machinery or firefighting trucks are restricted from traversing the slope or undertaking an active ground based fire fight; and
- the horizontal holes in the slope adjacent to the trial have provided some dewatering of the slope.

127. In summary, the rehabilitation trial has demonstrated that long-term rehabilitation can be effectively undertaken in the AGL LY Mine, with the range of materials available at the site. However, the trial also indicates that there are multiple interacting issues and that rehabilitation can be a complex and dynamic exercise (such as rainfall catchment area, surface and subsurface drainage, fuel and erosion management).

(8) Describe the future rehabilitation work to be done under the Work Plan, identifying the date by which rehabilitation of the Mine is required to be completed. Include any details of modelling (including ground stability, water modelling and fill times) or expert assessments undertaken concerning rehabilitation of the Mine.

Future rehabilitation work to be done under the approved Work Plan

128. The approved plan for rehabilitation work is set out in WP 1997.

129. The approved plan for rehabilitation work under WP 1997 includes rehabilitation concept plans for the open cut and external overburden dump at the end of operations, but does not include a date by which rehabilitation of the AGL LY Mine is required to be completed.

130. The approved work plan in WP 1997 requires 15 Ha of rehabilitation per annum. Currently AGL Loy Yang progressively rehabilitates more than 15Ha per year in line with the approved plan.

131. AGL Loy Yang's current plans for future rehabilitation work are set out in WPV 2015, and described below. AGL Loy Yang expects that WPV 2015 will be approved in the near future.

Future rehabilitation work to be done under WPV 2015

132. The AGL LY Mine development strategy is framed on the forecast demand for coal for current power generation projects, which is impacted by the market demand for electricity. An overview of rehabilitation plans in the key mining stages of Stage B, Stage C, Stage D, Stage E- and Stage E is set out below.

133. An overview of the key future mining stages follows. Mining Stage B – Rehabilitation up to present is discussed above at paragraph 125.

Mining Stage C - Rehabilitation during the operating life of the mine

134. Annexed and marked **Annexure J** is a plan showing the progressive rehabilitation to be undertaken in Stage C. The areas are superimposed over a recent aerial photograph of the site (Nov 2014), and categorised as: mining operations, main transport corridors, water management areas, support infrastructure, interim rehabilitation and rehabilitated areas.

135. The progressive rehabilitation in Stage C will include:

- rehabilitation of part of the northern slopes;
- extending the rehabilitation of the external overburden dump as the relocation of the tripper/stacker makes area available for rehabilitation;
- conducting rehabilitation trials on the western and south western corner of the southern slopes;
- detailed technical rehabilitation assessments (sub-surface and surface drainage, geotechnical, hydrogeological assessments of the landform proposed); and
- development of detailed closure plans.

136. Active production areas will include:

- Eastern production slopes.
- Proposed new ramp access for tracker/stacker access (Stage C) on northern slopes.
- Southern slopes carrying the trunk conveyors.
- Northern slopes.
- Pit floor (water storage, artesian pumps and pipelines, conveyors, roads).

137. In Mining Stage C:

- The pit continues to expand to the east.
- A rehabilitation trial will be undertaken on the western slopes and will consist of multiple (6-8) trial strips of approximately 0.6Ha each over the next 5 years.
- The final lift on the external overburden dump using the second travelling stacker continues.
- Internal dumping of overburden onto the pit floor will commence. This will progressively cover the pit floor and the lower coal final slopes on the southern, western and northern slopes.

138. Table 11 provides an overview of the areas in the respective categories at the conclusion of Stage C (approximately 2023).

Table 11 Progressive Rehabilitation – to Mining Stage C

	Mining Stage	Stage C			
	Area	**Outside Pit Crest and External Overburden Boundaries**	**Main Pit**	**External Overburden Dump**	**Total Mining Licence Area**
	Total Area	2775 Ha	1095 Ha	690 Ha	4560 Ha
	Undisturbed	2426 Ha			2426 Ha
	Rehabilitated	198 Ha	102 Ha	296 Ha	596 Ha
	Interim Rehabilitation		205 Ha	394 Ha	599 Ha
Production Area	**Mining Operation**		437 Ha		437 Ha
	Transport Corridors	151 Ha	139 Ha		290 Ha
	Water Management		154 Ha		154 Ha
	Support Infrastructure		58 Ha		58 Ha

Mining Stage D - Rehabilitation during the operating life of the mine

139. Annexed and marked **Annexure K** is a plan showing the progressive rehabilitation to be undertaken in Stage D. The areas are superimposed over the most recent aerial photograph of the site (Nov 2014), categorised as: mining operations, main transport corridors, water management areas, support infrastructure, interim rehabilitation and rehabilitated areas.

140. The progressive rehabilitation in Stage D will include:

- Rehabilitation of the northern slopes.
- Complete rehabilitation of the external overburden dump.
- Initial rehabilitation of the toe of the internal overburden dump.

141. Active production areas will include:

- Eastern production slopes.
- Southern slopes carrying the trunk conveyors.
- Northern slopes.
- Pit floor (water storage, artesian pumps and pipelines, conveyors, roads).

142. The pit further expands to the east to the final extraction limit.

143. Overburden dumping on the external overburden dump is complete and progressive rehabilitation of the external dump is complete.

144. A small area of the initial in-pit dump will be rehabilitated.

145. Table 27 provides an overview of the areas in the respective categories at the conclusion of Stage D (2030).

Table 12 Progressive Rehabilitation – to Mining Stage D

	Mining Stage	Stage D			
	Area	Outside Pit Crest and Ext Overburden Boundaries	Main Pit	External Overburden Dump	Total Mining Licence Area
	Total Area	2441 Ha	1443 Ha	676 Ha	4560 Ha
	Undisturbed	2092 Ha			2092 Ha
	Rehabilitated	198 Ha	139 Ha	632 Ha	969 Ha
	Interim Rehabilitation		399 Ha	44 Ha	443 Ha
Production Area	Mining Operation		570 Ha		570 Ha
Production Area	Transport Corridors	151 Ha	156 Ha		307 Ha
Production Area	Water Management		76 Ha		76 Ha
Production Area	Support Infrastructure		103 Ha		103 Ha

Mining Stage E- to E, Rehabilitation during the operating life of the mine (end of mining)

146. Annexed and marked **Annexure L** is a plan showing the progressive rehabilitation to be undertaken in Stage E-, and annexed and marked **Annexure M** is a plan showing progressive rehabilitation in Stage E . The plan categorises land into a number of categories: mining operations, main transport corridors, water management areas, support infrastructure, interim rehabilitation and rehabilitated areas.

147. The progressive rehabilitation in Stage E- to E will include:

- Rehabilitation of all final slopes with the exception of a small area on the southern slopes containing trunk conveyors.
- Rehabilitation of the upper berm in the south eastern corner.
- Completion of rehabilitation of the external overburden dump.

148. Active production ceases at the end of this stage with some trunk conveyors still in place.

149. Pit flooding to commence with water made available from surface catchment, ground water allocations and any other relevant sources as made available at that point in time.

150. Annexed and marked **Annexure N** is a copy of the *Loy Yang Mine rehabilitation Mine Lake water balance modelling* by GHD (January 2015).

151. Stage E- to E is taken as the cessation of coal mining, which will depend on coal demand over the life of the Loy Yang Project. During the stage the final southern slopes will be created. Note that in this area the pit shallows following the coal seams. To accommodate this two large berms will be created, the lowermost of which will remain un-rehabilitated as the area will be flooded (under the current closure concept) while the uppermost will be rehabilitated. At the completion of this stage coal is no longer being extracted and the conveyors and coal bunker have been removed. However, the artesian pumping and dams and fire service dam and ash ponds are required and will remain operational. The plant is not considered as part of this submission as it lies outside the Mining Licence.

152. Table 13 provides an overview of the areas in the respective categories at the conclusion of Stage E- (end of mining).

Table 13 Progressive Rehabilitation – to Mining Stage E- (end of mining)

	Mining Stage	Stage E-			
	Area	Outside Pit Crest and External Overburden Boundaries	Main Pit	External Overburden Dump	Total Mining Licence Area
	Total Area	4560 Ha	1798 Ha	676 Ha	4560 Ha
	Undisturbed	4211 Ha			2086 Ha
	Rehabilitated	198 Ha	355 Ha	632 Ha	987 Ha
	Interim Rehabilitation		399 Ha	44 Ha	443 Ha
Production Area	Mining Operation		570 Ha		570 Ha
	Transport Corridors	151 Ha	295 Ha		295 Ha
	Water Management		76 Ha		76 Ha
	Support Infrastructure		103 Ha		103 Ha

Mining Stage - Rehabilitation Stage Plan at Mine Closure

153. Following cessation of production, final mine closure operations will begin. The operations will be determined by the closure concept that has been adopted.

154. Annexed and marked **Annexure O** is a plan showing the current end use concept. The end use concept is to partially flood the final open cut to form a lake and return the remaining land to agricultural use.

155. Artesian pumping will continue after mining, with the return of the water into the open pit void left after completion and shaping of the final internal overburden dump. It is estimated that when the resulting lake reaches levels above -22.5 m RL that hydrostatic balance will be achieved and that the dewatering operation could be stopped.

156. A concept model was undertaken that utilised all existing water licences and entitlements to flood the pit. On this basis, modelling shows the lake level will be at –18 m RL to -20 m RL, 15 years after flooding commences (depending on a range of expected climatic conditions). The modelling also shows that a final lake level up to RL 0 (assuming historical climate conditions) could be achieved within a further 70 years,. This could be accelerated by the introduction of sources of water other than rainfall, for example, diversion of flood water from Traralgon Creek, Sheepwash Creek and the continued use of artesian pumping and current water entitlements.

157. Rehabilitation works will also be undertaken at the lake level to ensure wave erosion is not a long term issue.

158. The internal overburden dump will be rehabilitated at this time.

159. During the closure stage the fire services pond will be discontinued. The fires services pond will be drained and the area rehabilitated and returned to pasture.

(9) Describe any limitations or matters that may affect the future rehabilitation work to be done under the Work Plan, including ground stability and water.

160. The limitations and matters that may affect the success of future rehabilitation work are generally:

- the setting;
- geological and geotechnical challenges;
- hydrogeological challenges;
- surface water and flooding challenges; and
- operational constraints.

161. These limitations and matters are interrelated risks that AGL Loy Yang currently manages and will manage into the future.

162. Progressive rehabilitation can only be planned and undertaken in response to a number of influences, mine design, on-going access, fire mitigation, stability and proposed land use.

163. Sustainable rehabilitation outcomes (progressive and final) require a stable landform both before and after rehabilitation. Stability in the AGL LY Mine is dictated by geological, geotechnical and hydrogeological conditions and the final slope design.

164. The AGL LY Mine has been operational since 1982 and no significant final slope failures or floor heave has been recorded in that time. This shows that the current mine design, monitoring, dewatering and management practices adopted by the SECV up to 1996 and then enhanced by AGL LY Mine have resulted in the stability of the evolving landform.

Geological and Geotechnical challenges

165. All permanent slopes are required to be safe and stable. The design of rehabilitated slopes will consider slopes and geometries that have proven to be safe and stable over the past 33 years of operation.

166. Surface drainage systems are a critical component to maintain slope stability and these systems must remain in place during the operating life of the AGL LY Mine.

167. Pit slope dewatering, though horizontals bores is a critical component to maintain slope stability and these systems must be extended and maintained as the AGL LY Mine develops. The systems and areas they cover are required to be in place until the cessation of mining and until closure.

168. Three main structures are recognised within the mining area, these are an unnamed monocline, the Loy Yang Dome and the Flynns Creek Syncline. The Minniedale Dome is a smaller, 3 km-long structure that lies between the monocline and Loy Yang Dome. The Loy Yang Dome is considered to be a natural high formed during coal deposition. The sediments between the coal seams tend to thin and pinch out over the Loy Yang Dome.

169. Mining through the Minniedale Dome will see different and localised geological conditions. Typically the coal seams dip gently over the Mining Licence area (as part of the Flynn's Creek syncline). However in the localised Minniedale Dome region coal seam dips will steepen around the dome structure. Locally this will result in a change to the mine design. In this local area increased monitoring will determine any significant change to stability of the final slopes. No change to the progressive rehabilitation design for the final slopes in this local area is expected.

170. Overall slope geometry can also be constrained by exposed material properties, geological structures and their stability, given accepted modes of failure and analysis. The AGL LY Mine has been operating since 1982 and has not recorded any significant slope failures during that time.

Hydrogeological Challenges

171. Hydrogeological issues can affect floor heave in the open pit, stability of the final slopes and subsidence.

172. The AGL LY Mine is developed in the vicinity of three regional aquifers. The withdrawal of groundwater from these aquifers is essential for allowing coal mining to proceed at depth and to reduce the potential for floor heave and geotechnical stability. The three key regional aquifers identified earlier in this submission are the SAS, MFAS and TFAS.

173. Within the pit floor, no records of significant floor heave (from groundwater pressure) have been reported to date. This operational record reflects the efficacy of the existing slope and regional dewatering programs. WP 1997 sets out the requirements to continue to dewater the area as required as the pit expands. Thus the final slopes and floor are expected to remain stable throughout the life of the AGL LY Mine and into closure as weight balance continues to be actively managed.

174. AGL LY Mine dewatering requirements will change as overburden is introduced onto the final pit floor. This overburden provides a weight on the floor to counteract the groundwater pressures from the underlying aquifers and consequently as internal dumping progresses dewatering requirements may reduce. Once that weight balance (minimum weight balance has been modelled at -22.5 RL) is achieved a stable condition will exist and the groundwater pumps could be de-commissioned.

175. The pressure drawdown of these deep aquifers and the large size and depth of open cut development activities will result in subsidence. Horizontal strain and subsidence at and beyond the mine crest is monitored and influence the dewatering program. Once dewatering ceases subsidence will stop and some rebound may occur as groundwater levels rebound/recover in the long term.

Surface water and flooding challenges

176. Sumps are developed and maintained on the pit floor to accommodate surface runoff. These storages are designed to withstand 100 year ARI events. As the mine expands further sumps will be developed and maintained to prevent flooding of equipment required for continued energy supply. Once mining ceases surface runoff will contribute to lake filling.

Impacts on rehabilitation

177. The geological/geotechnical, surface water and groundwater issues impact on rehabilitation as follows.

178. Surface water must be controlled to avoid erosion and seepage into slopes. Failure to control erosion results in poorer rehabilitation outcomes. Failure to manage water seepage can result in instability in the landform. All surface water within the lowered landform is currently directed to sumps at the base of the mine. Sheepwash Creek is diverted around the open pit and future diversions will be needed as the pit expands will be outside the Geotechnical Risk Zone for the open pit. Other creeks in the region including Traralgon Creek and Flynns Creek are currently planned to remain in their original water courses.

179. Permanent sumps and dewatering pumping stations must be maintained on the pit floor to accommodate both groundwater pumping and surface water flows into the pit. These sump areas and above benches are not available for progressive rehabilitation. As the mine develops in the future the area of the sumps will change commensurate with the increased floor area.

180. Dewatering will have to be maintained until mining ceases to prevent floor heave. Potential large-scale slope instability can also result from large coal blocks, defined by coal joints, faults or sub horizontal cracking or shearing, sliding on interseam clays and sands as a result of raised hydrostatic forces in joints behind the slopes.

181. After coal extraction operations cease, the pumps will be required to continue to operate to maintain a stable landform for rehabilitation until a balance of pressures is obtained. This balance of pressures can be developed through either backfilling with overburden (internal overburden dump) or allowing the pit void to fill with water.

182. Internal dumping of overburden will commence in Stage C and will see the development of an internal dump progressing north from the southern slopes toe. This internal dump will expand northwards and eastwards, at a rate dictated by the overall production rate of the mine, and covering the pit floor at the conclusion of Stage D. This depth will achieve sufficient pressure balance on the pit floor to balance the groundwater pressures. This development means that the pit floor at the west end of the pit will only become available for rehabilitation at the conclusion of Stage D. Similarly, the final pit slopes below the nominal level will be covered with overburden at the conclusion of Stage D.

183. Small to medium-scale slope instability is likely to be governed by the local geological structural setting, consisting of planar slides or wedges.

184. Whilst interseam is expected to be predominantly silty or sandy, where clay layers exist they are assessed in detail, as their low shear strength is likely to impact large scale slope stability. Controlling surface water, monitoring of movement and crack water pressures and using horizontal drains is part of the on-going management strategy.

185. The Minniedale Dome will be exposed in the open cut over an area of about 2km (E-W) x 1km (N-S) adjacent to the northern batters during Stage C (Figure 5). In this area the local geological conditions will vary from that exposed in the current open cut. In the area the local bedding dip of the coal and interseams will increase and the strike will also change around the dome. In this area coal mining will not proceed to the base of the M2B seam as this will:

- be uneconomic due to the increased stripping ratio, and
- impose an increased risk of floor heave resulting from the exposure of aquifers below the M2B seam.

186. As a result, the planned permanent slope will incorporate a wide berm at depth over the centre of the dome. Consequently, the overall slope gradient will decrease from that created in the adjacent Stage B operations.

Operational constraints on rehabilitation

187. The development and infrastructure requirements of the AGL LY Mine governs the timing and nature of progressive rehabilitation that can be undertaken. Key considerations include:

- Active production areas - Areas reserved for coal winning and coal conveyor transport corridors;
- Water Management areas – Temporary water storage areas with graded surface to direct water to fixed and mobile pump stations;
- Infrastructure corridors – for access roads, machine transport corridors, water and electricity supply networks;
- Maintenance areas – Hard stand areas established to undertake major maintenance activities in the AGL LY Mine.
- Interim Rehabilitation areas - reserved for the placement of overburden material prior to rehabilitation.

188. The factors are key determinants of progressive rehabilitation and determine which slopes are available for rehabilitation at any given point in time, establishing the location and extent of the final pit slopes, floor areas and overburden placement areas that are available for progressive rehabilitation.

189. Specific considerations for operational constraints impacting the timing of progressive and final rehabilitation include:

- Must maintain sufficient exposed coal, that is, overburden stripping must be well in advance of coal recovery. This area is in the order of some 60 ha and is typically exposed for up to 18 months.
- Continuity of electricity generation requires continuity of supply of coal from the AGL LY Mine to AGL LYA and LYB. Areas that are in use as part of the production process are not available for rehabilitation until production ceases.
- The eastern batters are the current production faces.
- The southern permanent slopes are currently unavailable for rehabilitation. The permanent coal conveyor system is located on the southern slopes (east of grid I12, Ref 11). These slopes carry the trunk conveyors, electrical and fire services infrastructure for the conveyors. Access is required to all conveyor benches for periodic maintenance. The existing trunk conveyor system will be extended along the southern slopes during Stages C and D.
- The floor adjacent to the northern slopes and the northern slopes themselves contain significant operational assets including flood retention areas, artesian and surface dewatering pumps, pipelines and major road access. The northern slopes will also provide future ramp access for the travelling stackers to be relocated into the open pit. The progressive rehabilitation of the worked out slopes in the coal cannot be completed as that process may compromise those assets on the slope and below.
- The rehabilitation of the north western corner of the western slopes is constrained by the need to maintain a flood water pump station.
- The pit floor carries operational infrastructure such as water storages, artesian pump systems and pipelines and access roads which can-not currently be rehabilitated.
- The external overburden dump is active and areas required for use as future lift areas are currently unavailable for rehabilitation.
- Power supply to the mining operation is supplied from the ring main which lies beyond the pit crest. Spur feeder lines regularly run down the slopes and these prevent rehabilitation of the slopes at these locations.

Other Considerations

190. The Latrobe Planning Scheme currently maintains a minimum 1000 metre coal buffer between the Mining Licence and Traralgon through the application of an Environmental Significance Overlay – Schedule 1 (ESO1). AGL Loy Yang has also purchased much of this buffer land to ensure that the buffer is maintained. Within this buffer no significant operations are allowed. AGL Loy Yang maintains a minimum 250 metre buffer inside the Mining Licence for all extraction limits.

191. AGL Loy Yang's Environmental Review Committee also provides input and feedback on AGL LY Mine Rehabilitation activities.

(10) Provide details of whether there have been any risk assessments conducted with respect to fire hazards in relation to the rehabilitation undertaken to date or proposed to be done, including progressive rehabilitation.

192. For the purposes of managing fire risk at the AGL LY Mine, AGL Loy Yang has risk assessed and treated rehabilitated areas and previously undisturbed land in the same manner, given that rehabilitated areas and undisturbed land within the Mining Lease are predominately grassed areas.

193. Risk assessments undertaken in relation to fires in these areas, have considered grass and bush fire risk on rehabilitated areas of land.

194. AGL regards rehabilitation of land as being an effective risk mitigant of coal fire, but it does not eliminate all risk of fire because it substitutes one fuel source risk (coal) for another fuel source risk (vegetation).

195. AGL Loy Yang has included the clay capping of coal as an effective separation control to assist in mitigating coal fire risk, in its risk assessment and management processes. The capping of coal utilising non-combustible clay can assist in both fire and geotechnical risks. However it can create drainage and water management issues.

196. AGL Loy Yang has undertaken risk assessments that consider the Major Mining Hazard of fire risk to employees and equipment on the site. This has been in accordance with relevant Occupational Health and Safety Legislation and obligations.

197. Following the Hazelwood Mine Fire Inquiry in 2014 and the Mining Licence amendment in 2015, the issues of rehabilitation and fire risk have been considered in a more integrated fashion than they have been historically.

198. In response to the first Hazelwood Mine Fire Inquiry and associated recommendations the Minister for Energy and Resources, Lily D'Ambrosio, amended the Mining Licence to include provisions to undertake comprehensive Risk Assessments on effects to land (fire, geotechnical and hydrogeological), water (pollution), air (fugitive dust and noise) and criminal acts (including terrorism). This requirement and associated guidelines have been designed to assist the mines in quantifying risks both inside and extending beyond the Mining Licence boundary.

199. Prior to the Mining Licence amendment in 2015, AGL Loy Yang already undertook detailed risk assessments in accordance with comprehensive Risk Management Framework and process that complies with ISO31000:2009. AGL Loy Yang has since revised its risk assessment criteria to meet the DEDJTR Resource Rights Allocation and Management (**RRAM**) database framework.

200. AGL Loy Yang has been provided with draft Requirements for Compliance with Risk Management Conditions by DEDJTR, which provide guidance regarding the development of the risk assessment and management plan, and the associated work plan variation and compliance standards. AGL Loy Yang has prepared its first risk assessment and management plan in response to the amended Mining Licence, and this was provided to DEDJTR at the end of October 2015.

D. REHABILITATION LIABILITY ASSESSMENT

(11) Provide details of the current and past rehabilitation liability assessments for the mine together with any variations to those assessments.

Rehabilitation Bond and Liability

201. A rehabilitation bond of $15m was declared for the AGL LY Mine in 1997 (**Rehabilitation Bond**); the Bond was negotiated and agreed with the Department (then DPI) as part of the approval of WP 1997.

202. In 2015 AGL Loy Yang assessed the rehabilitation liability for the AGL LY Mine Licence area based on WP 1997 commitments to be circa $53.7. This assessment was based on modelling undertaken in the *Loy Yang Power Mine Rehabilitation Whole of Life Cost Report – 2011 Update* .

203. AGL Loy Yang has not been able to identify any historical information confirming the relationship between the level of the rehabilitation bond for AGL LY Mine rehabilitation declared in 1997 and contingent liability for AGL LY mine rehabilitation in 1997, or at any other stage of development of the AGL LY Mine.

204. AGL Loy Yang therefore believes that the Rehabilitation Bond is not set at a level to reflect the contingent liability of AGL LY Mine rehabilitation.

205. The Department briefed AGL Loy Yang on 14th of October 2015 regarding the draft findings of a Rehabilitation Bond Review project that it had engaged consultants URS to undertake on its behalf. AGL Loy Yang understands that the purpose of the draft report is to provide an independent estimate of the WPV 2015 Loy Yang rehabilitation costs.

206. URS requested AGL Loy Yang to provide some additional data to refine the study, as the study did not have all of the required information available, requiring some assumption to be made by URS. AGL Loy Yang is in the process of responding to URS with the additional data requested. Other than this request for data AGL Loy Yang has not participated in the review, or provided data or assumptions to URS.

Other Rehabilitation Bond and Liability considerations

207. AGL has existing financial obligations and commitments with respect to the rehabilitation obligations for the AGL LY Mine in the form of the LYCA between AGL, SECV and owners of Loy Yang B (**Parties**). The LYCA requires the Parties to the contract to contribute 10% of the cost of the Loy Yang site rehabilitation expenses into a trust fund on an annual basis for a 10 year period, commencing in June 2023. The contributions are in proportion to the coal usage by each party. This obligation is unique amongst all other brown coal mines in Victoria and provides an additional financial assurance instrument to the State to ensure that rehabilitation will be completed.

Other Rehabilitation Liability assessments

208. Annexed and marked **Annexure P** is a copy of modelling undertaken by GHD for Loy Yang Power dated 6 February 2008 which used the DPI's Rehabilitation Liability Calculator. The total rehabilitation liability for the operation was estimated to be $34,948,655.

209. In 2011 GHD prepared a Loy Yang Mine Rehabilitation Master Plan and an associated draft cost assessment. Annexed and marked **Annexure Q** is a copy of that draft cost assessment entitled "Loy Yang Power Mine Rehabilitation Whole of Life Cost Report – 2011 Update" dated February 2012. The draft cost assessment presented a cost model for the whole of life rehabilitation of the land covered by the Mining Licence.

210. The 2011 cost model was based on the long term proposal to flood the mine after completion of mining activities. It adopted a final water level of RL-10.0 on the basis that would provide for adequate weight balance against heave from rebounding aquifer pressures. It also assumed that:

- rock beaching would be the treatment for the ultimate erodible shoreline areas;
- at the closure of the mine, coal handling equipment, pipelines and dredgers will be dismantled, rehabilitation completed and the mine made safe for ultimate public access to areas suitable for this purpose;
- areas such as final batters steeper than 1:3 would be restricted from public access; and
- groundwater depressurisation would be ongoing but progressively reduced as the mine void flooded.

211. The cost model applied rates for rehabilitation works taken from the then DPI's Rehabilitation Liability Calculator, unless actual experience in the AGL LY Mine had shown that different rates applied.

212. The draft cost assessment calculated that the total planned expenditure on rehabilitation of land covered by Loy Yang Power's mining licence from 2011 onward was approximately $61 million. However due to progressive rehabilitation work, the maximum liability at any point in time over the remaining life of the mine and beyond was estimated to be $32 million.

213. The draft cost assessment also found that post mining rehabilitation work would peak in the years immediately after mine closure with demolition and removal of buildings and structures, including the raw coal bunker, and then settle to a steady annual provision mainly for the ongoing depressurisation of aquifers and associated filling of the lake in the mine void.

214. The draft cost assessment also recommended that future reviews of the whole of life mine plan should consider the placement of internal dump material to minimise the amount of water required to achieve post-mining weight balance against ultimate rebounded aquifer pressures.

WPV 2015 Rehabilitation Liability Assessment

215. The recently submitted WPV 2015 sets out a more comprehensive and advanced progressive rehabilitation plan to that proposed in 1997; WPV 2015 is currently awaiting approval from Department.

216. The key differences between WPV 2015 and WP 1997 are as follows:

- WPV 2015 further details rehabilitation, geotechnical and hydrogeological management;
- WPV 2015 incorporates learnings from recent fire events including the Hazelwood Mine Fire – for example, covering all exposed coal surfaces to reduce fire risk; and
- WPV 2015 was prepared with an increased understanding of the expected water inflows and available volumes at the time of closure. The modelled water level in the lake based on recent engineering analysis (January 2015) is lower than that anticipated in WP 1997 and the area of exposed slopes is now considerably higher.

217. Given changes between the respective work plans, the current AGL LY Mine work plan (WP 1997) no longer represents AGL's current thinking on rehabilitation.

12) Provide details of any assessments obtained or undertaken by the mines in relation to the likely or estimated costs of the rehabilitation planned (including progressive rehabilitation).

Preliminary Rehabilitation Concept and Cost Model

218. In preparation for the Hazelwood Mine Fire Inquiry 2015 AGL Loy Yang engaged GHD to undertake a preliminary cost estimate based on the base development concept as discussed below in the section Preliminary Rehabilitation Concept and Cost Estimate.

219. The briefing to GHD was to prepare a rehabilitation costing model to reflect the rehabilitation liability of AGL Loy Yang Mine over the life of the project, considering the following key inputs:

- WOL Mine Plan and Work Plan variation;
- Total area of the Mine;
- Exposed areas – Bottom and Batter surface areas;
- Area currently covered, but not to final rehabilitation profile;
- Area rehabilitated to final;
- Area required for water storage;
- Current operating area;
- Area reserved for internal overburden dump material placement;
- Area reserved for Stacker Relocation – TS4 / TS5;
- Area required for Infrastructure Corridors; and
- Financial obligations - Bond level and Special Rehabilitation LYCA Reserve account.

220. The Preliminary Rehabilitation Concept and Cost Estimate Model (**Model**) reflects the planned works described in WPV 2015, but can only be considered as indicative, based on a series of assumptions that are yet to be validated through more detailed technical assessments and the approval of WPV 2015.

221. This preliminary cost estimate was undertaken after the submission of the Annual Activity Statement (required under Schedule 19 of the *Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013*) in July 2015.

222. Upon the Department's approval of the WPV 2015, AGL LY Mine will undertake a detailed technical review of the proposed rehabilitation plan, which will ultimately result in a revised cost estimate for rehabilitation.

223. The Model is framed on the revised base development concept and is reflective of the planned works described in WPV 2015. The Model can only be considered as indicative, based on a series of assumptions that are yet to be validated through more detailed technical assessments. The Model considers rehabilitation from 2015 through to closure of the mine.

224. The Model and key considerations are discussed under the following headings:

- Description of Mine Rehabilitation Cost Model;
- Purpose of Indicative Cost Model;
- Mine Rehabilitation Stage Plans;
- Key Model Considerations and Constraints;
- General Model Approach and Assumptions;
- Notional Stage Timings;
- Rehabilitation Model Outcomes; and
- Discussion of Model Findings.

Description of Mine Rehabilitation Cost Model

225. An indicative rehabilitation costing model was prepared to reflect the rehabilitation liability of AGL LY Mine over the life of the project.

226. Key inputs of the model included:

- Whole of Life (WOL) Mine Plan and WPV 2015;
- Total area of the Mine;
- Exposed areas – bottom and batter surface areas;
- Area currently covered, but not to final rehabilitation profile;
- Area rehabilitated to final;
- Area required for water storage;
- Current operating area;
- Area reserved for internal overburden dump material placement;
- Area reserved for Stacker Relocation – TS4 / TS5; and
- Area required for infrastructure corridors.

Purpose of Indicative Cost Model

227. The aim of the Mine Rehabilitation Cost Model is to end up with an indicative commercial model that reflects the expected rehabilitation liability over the WOL of the AGL LY Mine operation.

228. Key Model considerations are as follows:

- Documentation and plans to be in line with WPV 2015 and the current rehabilitation plan.

- Model to be underpinned with a visual snapshot of the AGL LY Mine detailing key development, operational and rehabilitated areas.
- A visual representation of the typical batter concepts showing infrastructure for ongoing maintenance (transport corridors and key infrastructure - dewatering, drainage, electricity network, etc).
- Costing to be based on ~100 m linear sections.
- Model should tabulate the changes in liability from period to period including summary of what has been done.

Mine Rehabilitation Stage Plans

229. Rehabilitation Stage Plans have been prepared in line with the stages adopted in WPV 2015, with 2 additional stages shown:

- **Stage A**: 1997 (Stage Plan not prepared).
- **Stage B**: current (December 2014).
- **Stage C**: part way through block 2 pivoting clockwise.
- **Stage D:** end of block 2 development.
- **Stage E-**: part development into Block 3.
- **Stage E:** End of mining showing planned development at completion of mining, including final rehabilitation activities that cannot be undertaken until mining has ceased.
- **Stage F**: Final rehabilitation.

230. Areas on the stage plans define:

- Mining operations;
- Main transport corridor (conveyors, travel paths);
- Water and support infrastructure;
- Interim rehabilitation (including overburden placement areas); and
- Rehabilitated land.

Key Model Considerations and Constraints

231. The cost model is based on staged plans which represent the shape of the development assuming ongoing operation with the exception of Stage E.

232. The stage plans do not represent a closure plan at these earlier points in the development. For example, in an early closure scenario, overburden removal may cease in the order of 5 years ahead of final coal and the coal faces would then compress to achieve the desired overall final shape.

233. If and when a planned closure timing is known, specific strategies to optimise the closure development would be implemented. By way of example, if the closure timing was near stage E-, an alternate development would be implemented to minimise the final batter rehabilitation length.

234. The rehabilitation from surface down to RL 0m is in line with hydrogeological studies undertaken on lake filling with various inputs and climate conditions. In this work RL 0m is considered a reasonable mid-range position of final lake filling, when considering the minimum weight balance and added contingency to ensure an adequate factor of safety is applied.

235. Input cost rates are based on available assumptions, noting that treatment of individual batters will require more extensive modelling to be undertaken based on actual geological models, available materials and agreed end land-use to achieve a safe and stable landform.

236. Remaining liability is the cost modelled to complete all outstanding rehabilitation work to close the site with cessation of mining at the date. That is, the liability at 2030 is based on the development at that date plus all remaining rehabilitation work not yet completed and the closure rehabilitation items.

237. Current liability is the cost modelled to finalise all mined areas but not including the closure costs for that point in time.

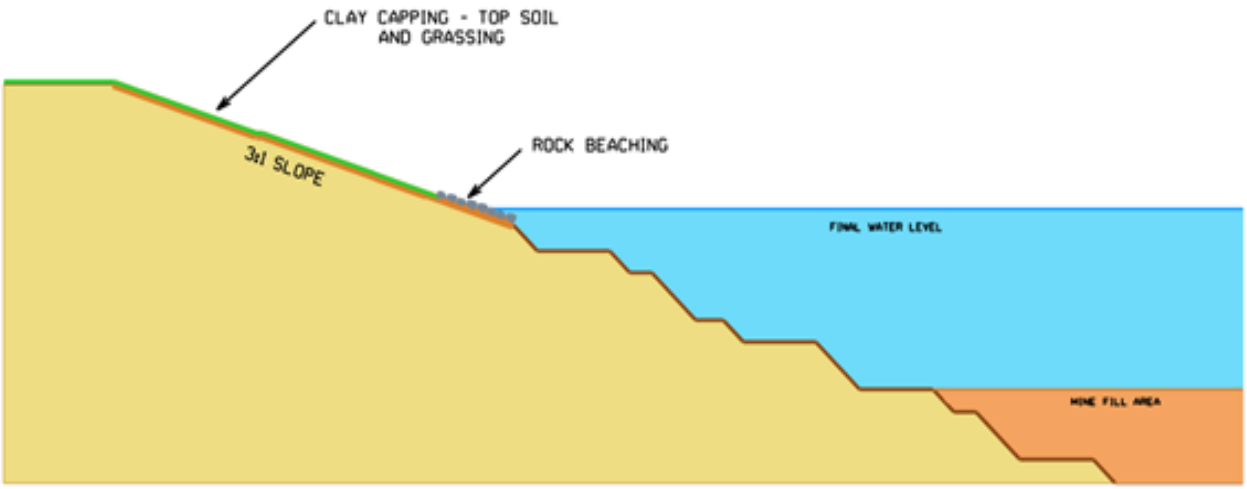
General Model Approach and Assumptions

238. An overall 1 in 3 slope has been adopted for final rehabilitation of mine batters above RL 0. A 1 m thick covering of clay has been applied for the overall 1 in 3 slope on exposed coal areas for fire protection and rehabilitation purposes. All batters are top soiled and grassed. No detailed consideration has been given to the availability of suitable clay for capping and the availability of suitable topsoil. Topsoil alternatives could be explored to promote growth.

239. Where possible, balanced cut and fill has been adopted, however there are substantial areas of existing worked out batters where balancing of earthworks is not possible and accordingly there is an excess of cut over fill volumes. An opportunity exists to reduce the amount of cut (and therefore reduce earthworks costs, and the ultimate mine footprint) by extending the fill onto the top of the future internal overburden dump, however this would mean deferring much of this work until the internal dump has reached its maximum height adjacent to these batters late in the life of the AGL LY Mine.

240. Earthworks volumes to achieve a 1 in 3 overall slope above the overburden level have been calculated separately from those below, which are generally located on top of coal, as a different cost rate for these 2 activities would apply. Also, the 1 m clay cover is not applied to the cut and fill earthworks at the overburden level, as these areas would not leave exposed coal after reshaping and suitable quantities of clay material is available.

241. The following figure illustrates the general concept for AGL LY Mine batter rehabilitation considered in the model:



Nominal Stage Timings

242. Development is in stages and the timing of the stages is determined by the coal utilisation rate. Four example timings are shown below in Table 14. The cost model is currently set up with a 30 Mtpa coal usage rate. The duration of the final stage is set manually and is currently set at 10 years.

Table 14 Nominal Stage Timings

Stage Name	Total Coal Volume from stage B (Mt)	Coal Volume in Stage (Mt)	End of Stage Dates Based on Annual Coal Volume				
			Mtpa 30	Mtpa 27	Mtpa 25	Mtpa 20	
B	0	0	2015	2015	2015	2015	
C	199	199	2022	2022	2023	2025	
D	482	283	2031	2033	2034	2039	
E-	982	500	2048	2051	2054	2064	
E	1369	387	2061	2066	2070	2083	
F	0	0	2071	2076	2080	2093	10 Years

Rehabilitation Model Outcomes

243. The Model provides an indicative staged expenditure from 2015 – 2072. The three curves shown are:

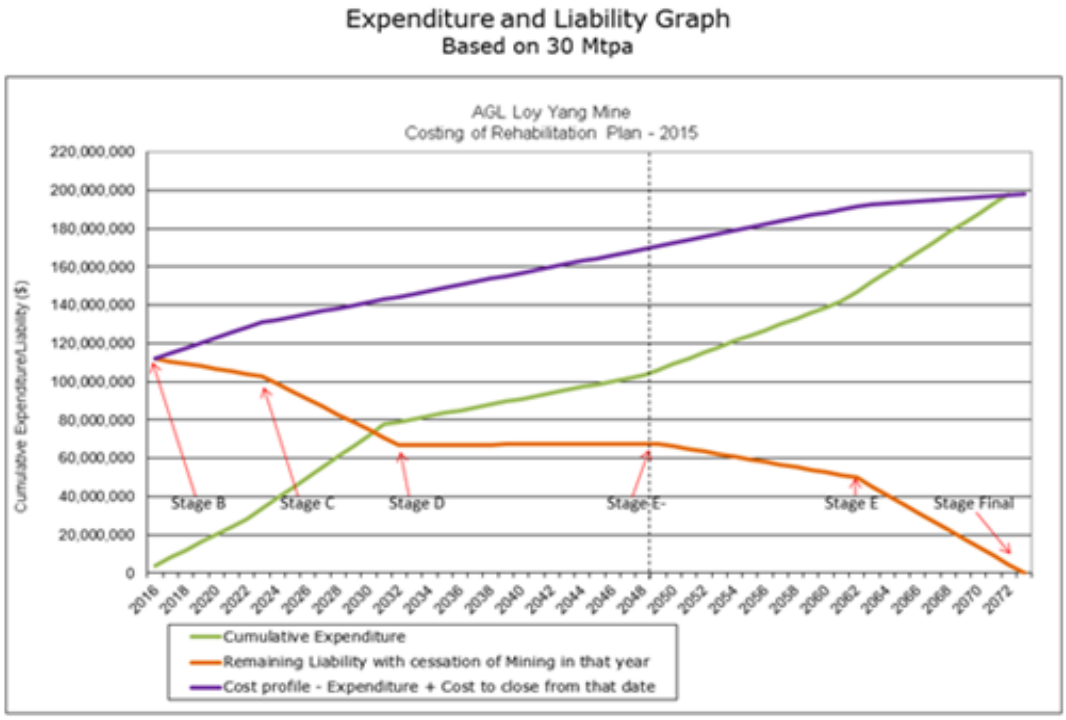
- Cumulative Expenditure.
- Remaining Liability with cessation of Mining in that year.
- Total Rehabilitation Cost Profile (Remaining Liability and Cumulative Expenditure).

244. An overview of the positions at the respective stages based on 30Mt annual Coal Demand is as follows:

- **Stage B:** If the AGL LY Mine were to cease operations in Stage B (circa 2015) the indicative rehabilitation liability would be ~ $112M.
- **Stage C:** If the AGL LY Mine were to cease operations in Stage C (circa 2022) the indicative rehabilitation liability would reduce to ~ $103M. Stage B to C Rehabilitation Expenditure would average ~$4M per annum.
- **Stage D:** If the AGL LY Mine were to cease operations in Stage D (circa 2031) the indicative rehabilitation liability would further reduce to ~ $66M. Stage C to D Rehabilitation Expenditure would average ~$5.5M per annum.
- **Stage E-:** If the AGL LY Mine were to cease operations in Stage E- (circa 2048) the indicative rehabilitation liability remains at ~ $66M. Stage D to E- Rehabilitation Expenditure would average ~$1.5M per annum.
- **Stage E:** reflects the position at the planned closure of AGL LYA in 2048, noting that LYB may elect to continue operating beyond this point. In summary from the current

development at Stage B (2015) through to Stage E- (circa 2048), AGL would have expended circa $103M in progressive rehabilitation.

245. The overview of the positions at the respective stages based on 30Mt annual coal demand is illustrated in the following graph:



Dated: 30 October 2015