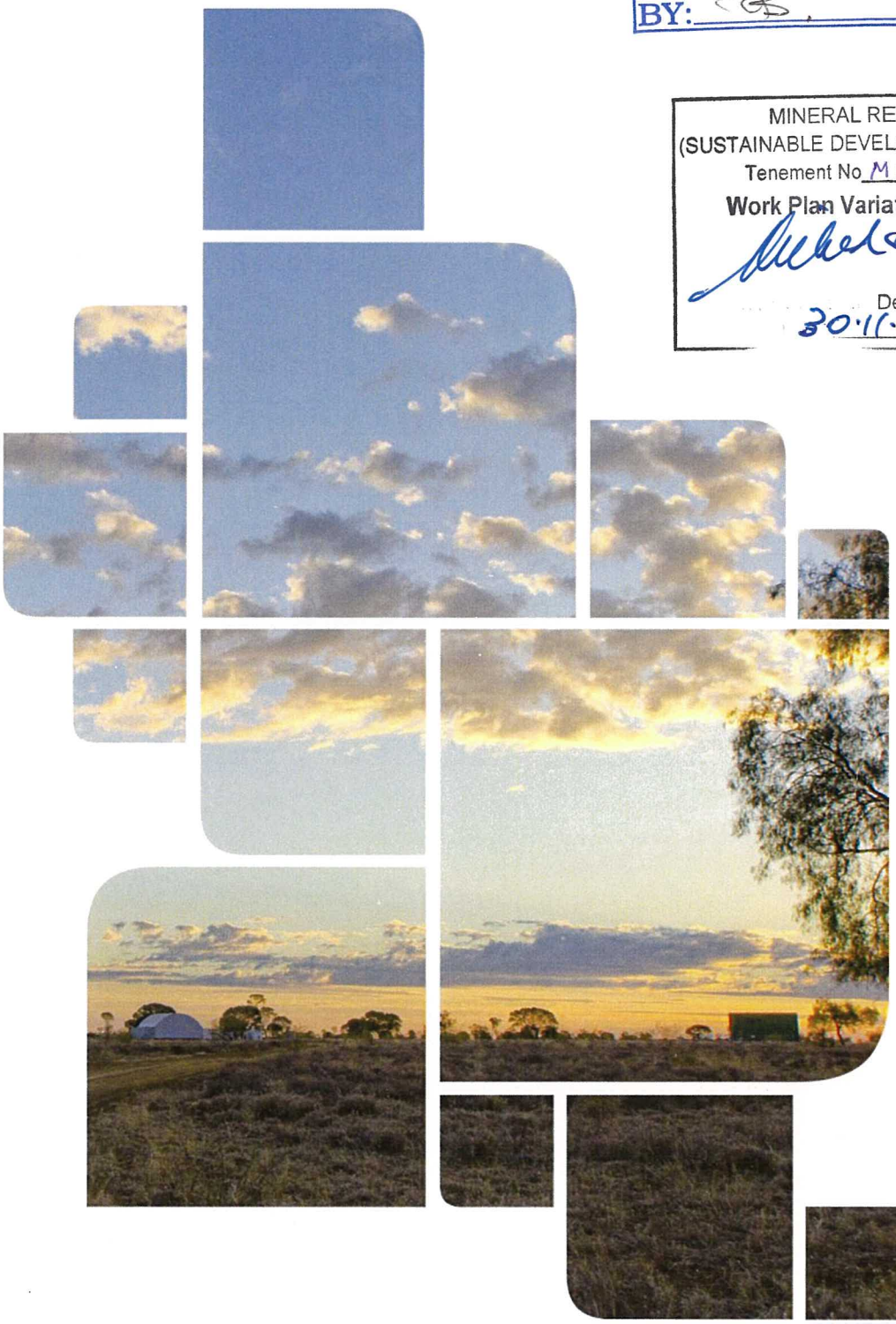

Loy Yang Work Plan Variation
Mining Licence 5189
Volume 1 Main Text and Figures

Date: 16 September 2015

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Figures

Appendices (separate volume)

1. Introduction

1.1. Background

The AGL Loy Yang coal mine (Loy Yang Mine) is situated in the Latrobe Valley approximately 160 km east of Melbourne (Figure 1). 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). The first coal production began in 1984. The AGL Loy Yang Partnership (AGL Loy Yang) (Table 1.1.2) currently owns the Loy Yang Mine, which provides coal to the 2200 MW Loy Yang A Power Station (also owned by the AGL Loy Yang Partnership), the 1050 MW Loy Yang B Power Station (owned by GDF Suez Australian Energy – Mitsui and Co), and other minor customers. Power stations currently fed by the Loy Yang Mine provide approximately 50% of the total coal-fired electricity generated in Victoria.

The primary mining operation comprises the excavation of material by BWE, transport via conveyors and dumping of waste by tripper stackers. Topsoil is currently pre-stripped, using mobile plant, nominally 250 m (18 months of development) ahead of mining. The upper BWE digs both overburden and coal followed by three other BWEs that dig coal and interseam material. Overburden, interseam and inferior coal from the mine is currently placed in an external disposal area located to the south of the mine using a conveyor and tripper stacker system. Coal is transported, using belt conveyors (Figure 4d), to the raw coal bunker (RCB) for short term storage (less than a day) then onto the crusher for sizing before delivery to the Power Station bunkers.

Operations continue 24 hours a day, 365 days a year. Coal is fed directly to the power stations and other customers via conveyor belt systems, which includes up to 18 hours of reserve supply held in the 80,000 t RCB. Each year approximately 28 to 32 Mt of coal is extracted from the open cut.

The Loy Yang Mine is currently about 170 m deep, 4 km long and 2.5 km wide at its widest (Figure 2).

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) (see Figure 11). Excavation is now being developed in an easterly direction (Stages B to D, Figures 12 to 14). In the future, excavation will swing further to the south (Stage E, Figure 15).

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

Between the commencement of mining in 1982 and 30 June 2014, some 730 Mt of coal and 158 Mm^3 of waste (overburden and interseam materials) have been removed from the mine. 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.

The open cut operations are covered by Mining Licence (MIN) 5189 and a Work Plan approved in May 1997 (which has been subject to minor variations, see Table 1.3.1.1). The area covered by MIN 5189 is 4,561.4 ha. The Loy Yang A and B Power Stations are located on an area excluded from MIN 5189.

The Loy Yang Mine has operated under a series of different mining legislation as shown in Table 1.1.1.

Table 1.1.1 Loy Yang Mine relevant legislation

Period	Relevant Act
1982 - 1993	*State Electricity Commission Act 1958* (Vic)
1993 - 1995	*Electricity Industry Act 1993* (Vic)
1995- present	*Mineral Resources (Sustainable Development) Act 1990* (Vic) and its predecessor the *Mineral Resources (Development) Act 1990* (Vic)
2001 - present	*Electricity Industry (Residual Provisions) Act 1993 (Vic)*
2013 - present	*Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013* (Vic) (MRSDMI Regulations)

The Loy Yang Mine has been operated by a number of corporate and government entities since it opened and is currently owned by AGL Loy Yang (Table 1.1.2).

Table 1.1.2 Loy Yang Mine owners and operating entities

Period	Entity
1982 to 1995	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 September 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.

Period	Entity
September 2012 to present	AGL Loy Yang Partnership, comprising the following partners: **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). AGL Loy Yang Pty Ltd (ABN 62 077 985 758) operates the Loy Yang Mine and the Loy Yang A Power Station in its capacity as agent for the AGL Loy Yang Partnership.

1.2. Mining licence

AGL Loy Yang holds Mining Licence MIN 5189 in the Loy Yang Coal Field, to the southeast of Traralgon, Victoria. Licence details are provided in Table 1.2.1 with the licence boundaries shown in plan in Figure 3. This licence expires in 2037.

Table 1.2.1 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) and **d)** AGL Loy Yang P 4 BV (ARBN 073 074 530).	6/5/1997	6/5/2037

1.3. Work Plan variations

1.3.1. History of the 1997 Work Plan

Since the work plan was approved in 1997, some five work plan variations (as set out in Table 1.3.1.1) have been registered. Since the last of these, in December 2007, a number of operational and legislative changes have occurred. One of these operational changes, overburden dumping on the northern batters, was partially addressed in a work plan variation approved on 15 January 2001. However, other changes have also necessitated this work plan variation.

Table 1.3.1.1 Approved Variations to 1997 Work Plan

Register Number	Date	Nature of Work
F11,094	15 January 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 November 2006	Blasting
F15,436	23 April 2007	Blasting
F16,052	31 December 2007	Blasting

1.3.2. Variations applied for in this work plan variation

This work plan variation seeks to vary all previously approved work plans and work plan variations.

This work plan variation defines the mine developments in five stages (A to E). The stage boundaries reflect changes in the conditions (direction of mining, overall seam dips, associated infrastructure etc.). The stage developments are described in Table 4.4.1.1 and Figure 9 illustrates the stage boundaries referred to in this work plan variation.

For ease of reference, changes since the original 1997 approved work plan addressed in this work plan variation are listed in Table 1.3.2.1, with cross-references to the sections of the work plan variation where they are addressed and notes on the current status of these changes.

Table 1.3.2.1 Key changes in this work plan variation

Variation	Section in this WPV	Status
Operational changes since 1997 approved work plan		
Variation for construction of bund using overburden north of northern batter	Section 4.2	Applied for in this variation
Variation to 1997 Potential Loy Yang Mine Development boundary	Section 4.3	Applied for in this variation
Internal and external overburden and ash dumping locations	Section 4.4.4 to 4.4.7	Included in this variation
Diversion of Sheepwash Creek	Section 4.4.8	Included in this variation
Revised mine development plans, including a including a program for the transfer of the final coal system into Stage B, and for completion of development in Stage A	Section 4.4	Included in this variation

Variation		Section in this WPV	Status
Revised overburden dump strategy that includes a program to transfer tripper stackers TS4/L710 and TS5 to internal dumping		Section 4.4.4 and 4.4.10	Included in this variation
Revised environmental management plan		Section 7	Provided in this variation
Additional information to address legislative changes			
Declared Mine information	**1.** Geological information	Section 5.1 Section 2	Provided in this variation
	2. Description of changes since being declared and a description of infrastructure or plant proposed to be associated with the declared mine	Section 5.2 Section 4 Section 5.3.3 Figures 4a, 4b, 4c, 4d,4e	Provided in this variation
	3. Assessment of geotechnical and hydrogeological risks	Section 5.3	Provided in this variation
	4. Description of controls	Section 5.5	Provided in this variation
	5. Monitoring plan	Section 5.4	Provided in this variation
	6. Review process	Section 5.6	Provided in this variation
Rehabilitation plan		Section 6	Applied for in this variation
Community engagement plan		Section 8	Applied for in this variation

1.3.3. Work plan variation requirements from Schedule 15

The MRSDMI Regulations Schedule 15 requirements are listed in Table 1.3.3.1 with cross-references to the relevant sections of this Work Plan Variation.

Table 1.3.3.1 Schedule 15 requirements

Schedule 15 requirement	Relevant section of work plan variation
PART 1—INFORMATION REQUIRED IN WORK PLAN FOR A MINING LICENCE	
1. A general description of geological information including, if available, estimates of ore resources and reserves.	Section 2

Schedule 15 requirement	Relevant section of work plan variation
2. A general location plan at scale of 1:100 000 or 1:50 000.	Figure 1(at 1:90,000)
3. A regional plan at scale of 1:25 000 showing the extent of Crown lands, private lands, private land allotments for the proposed work plan area, and, where possible, parks and reserves, within 2 km of the site.	Figure 2 (at 1:70,000) Figure 3 (at 1:30,000)
4. A site plan at 1:1000, 1:2500 or other appropriate scale, including cross-sections, showing and describing existing surface contours, etc., and also including—	Figure 3 (at 1:30,000) and Figure 12
(a) the proposed buildings and surface facilities; and	Figure 23
(b) the anticipated extent of open cut extraction, with proposed bench height, berm details and working batters; and	Figures 11 to 15
(c) the sequencing of open cut extraction; and	Figures 11 to 15
(d) the location of topsoil dumps, and waste dumps or stockpiles; and	Figure 11 to 15
(e) proposals for landscaping of the site, including buffer zones; and	Figures 16 to 21
(f) access roads; and	Figure 2
(g) if underground mining is proposed, a schematic drawing showing underground development and the proposed extent of stoping.	N/A
5. A description of the metallurgical and mineral recovery methods to be used.	N/A
6. A rehabilitation plan that—	Section 6
(a) addresses concepts for the end utilisation of the site; and	Section 6.3, Figure 19
(b) includes a proposal for the progressive rehabilitation and stabilisation of extraction areas, road cuttings and waste dumps, including re-vegetation species; and	Section 6.4, Figures 16 to 19
(c) includes proposals for the end rehabilitation of the site, including the final security of the site and the removal of plant and equipment.	Section 6.3, Figure 19

Schedule 15 requirement	Relevant section of work plan variation
7. An environmental management plan which—	Section 7
(a) identifies the key environmental issues for the proposal and includes details of background data, baseline studies or existing conditions in relation to environmental issues; and	Section 7.3, Table 7.3.1
(b) includes proposals for the management of environmental impacts including nomination of targets and proposals for the mitigation, control or reduction of impacts; and	Section 7.3, Table 7.3.1
(c) includes proposals for the management of wastes including consideration of the principles of waste minimisation; and	Section 7.3, Table 7.3.1
(c) includes a proposed monitoring program addressing the key environmental issues; and	Section 7.3, Table 7.3.1
(d) includes a proposal for reporting outcomes of the plan to the local community.	Section 7.6
8. A description of any significant community facilities that may be affected by the proposed works.	Section 7.7
9. A community engagement plan that—	Section 8
(a) identifies any community likely to be affected by mining activities authorised by the licence; and	Section 8.3, Appendix 3
(b) includes proposals for—	-
(i) identifying community attitudes and expectations; and	Section 8.4
(ii) providing information to the community; and	Section 8.5
(iii) receiving feedback from the community; and	Section 8.6.1
(iv) analysing community feedback and considering community concerns or expectations—	Section 8.6.2
in relation to mining activities authorised by the licence; and	-
(c) includes a proposal for registering, documenting and responding to complaints and other communications from members of the community in relation to mining activities authorised by the licence.	Section 8.6.3

Schedule 15 requirement	Relevant section of work plan variation
PART 2—DECLARED MINE STABILITY REQUIREMENTS AND PROCESSES	
1. A description of the geological information that is relevant to the stability of the declared mine and any variation of the geological information across the rest of the location plan, including a plan showing cross-sections and long sections of the proposed extraction area of the declared mine.	Section 5.1 and Section 2
2. If a mining licence was granted before the mine became a declared mine—	-
(a) a description of any proposed changes to the information under item 4 of Part 1 for mining licences exceeding 5 hectares; and	Section 5.2 and Section 4
(b) a description of any infrastructure or plant proposed to be associated with the declared mine.	Section 5.3.3 and Figures 4a, 4b, 4c, 4d, 4e
3. An assessment of the geotechnical and hydrogeological risks for the declared mine.	Section 5.3
4. A description of the controls that will be implemented to eliminate or reduce the geotechnical or hydrogeological risks to an acceptable level including—	Section 5.5
(a) a description of any proposed groundwater control system;	Section 5.3 Section 5.4.7 Section 2.5
(b) particulars of other measures to ensure the stability of the mine, associated infrastructure and adjacent land.	Section 5.3
5. A plan for monitoring the stability and groundwater management of the declared mine.	Section 5.4
6. A description of the process for reviews of the assessment, plan, actions and controls referred to in this Part relating to the declared mine.	Section 5.6

1.4. Location and regional plans

The Loy Yang Mine is located in the Latrobe Valley some 160 km east of Melbourne and approximately 4 km southeast of Traralgon (Figures 1 and 2). The Loy Yang Mine is situated between Traralgon and Flynn's Creeks on undulating land used primarily for grazing. As shown in Figure 1, this mine is one of three large open cut brown coal mines in the Latrobe Valley in Victoria.

1.5. Land use/ownership

The total area within the MIN 5189 outlying boundary is approximately 4,840 ha. However, the power stations and associated works areas, as shown in Figure 3, are excluded, resulting in a mining licence area of 4,561.4 ha.

Land ownership within MIN 5189 is set out in Table 1.5.1.

Table 1.5.1 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

AGL Loy Yang owns almost all the land within MIN 5189 (Figure 3) except a small area next to the eastern boundary, an area adjacent to the northern batters and various road reserves, as listed in Table 1.5.2, and shown as solid green polygons in Figure 3. AGL Loy Yang also owns large sections of land adjacent to and outside MIN5189, especially to the northwest and north. AGL Loy Yang aims to own land potentially impacted by mining operations and to maintain a buffer between Traralgon and the mine.

Table 1.5.2 Land titles within MIN 5189 not owned by AGL Loy Yang

Title	Owner	Location	Figure 3 Reference
Pt CA 2009	Basslink Pty Ltd	Entry to Basslink off Hyland Highway	Part 2009\PP3020
Pt 1/PS312556L	LL Farmer	Eastern boundary south of Hyland Highway	1\PS312556
Pt 1/PS312556L	LL Farmer	Eastern boundary south of Hyland Highway	1\PS312556
R1/PS449976W	VicRoads	Section of Hyland Highway east of the Power stations	3\PS449976
CA2012	DEPI	Southern section of Stuart Street	2012\PP3020
CA2013	DEPI		2013\PP3023

Title	Owner	Location	Figure 3 Reference
CA2051, CA2052, CA2054	DEPI	Various road reserves within Min5189	-
CA2053	DEPI	Chester Park Rd	2045\PP3020
R1/PS340417	Latrobe City	Access road to switchyard	1\PS340417
	Latrobe City	Depot road (Liddiard Road)	-
CA4D2 & CA4D3	Crown Land	Traralgon Transfer Station and former Landfill	4D2-A\PP3020 4D3-A\PP3020

1.6. Surrounding land uses

The Loy Yang Mine is located in a rural agricultural landscape which is used predominantly for grazing and forestry. Traralgon is located to the northwest of the mine as shown in Figure 2. A number of rural dwellings are located 1 to 2 km southeast of the external dump in Callignee North, with the township of Traralgon South approximately 3 km south of the external dump.

Land use neighbouring MIN5189 to the east, north and west is predominantly grazing. Plantations, State Forest and the Traralgon South Flora and Fauna Reserve are located to the south of MIN 5189 (Figure 2). Nearby plantations and remnant native vegetation is shown in Figure 20.

1.7 Community facilities

No community facilities are located within the Geotechnical Risk Zone (GRZ) (Section 5.3.3) or within 1 km of the MIN 5189 boundary. However, community facilities in the wider area are shown in Figure 2 and include several halls, churches and schools within Traralgon. These facilities are not expected to be adversely impacted by AGL Loy Yang's mining activities.

1.8 Latrobe Planning Scheme

The Latrobe Planning Scheme includes a Special Use Zone over the mine area and nearby environmental significance, public acquisition and state resource overlays as shown in Figure 10.

A key outcome of the Latrobe Planning Scheme is its provision of coal buffers where open cut coal mines are located near urban settlement (Latrobe Planning Scheme Section 21.07-4). The scheme requires a total separation between an urban settlement boundary

and the crest of any future open cut to be at least 1,000 m wide. This buffer comprises a 750 m (+/- 75 m) wide "urban (coal) buffer" measured from the boundary of a 250 m wide "coal operational area" measured from the future open cut crest (extraction limit). The buffer is shown in Figure 10 and is taken from the extraction limit as this represents the limit for any future pit crest. This buffer effectively only applies on the northern boundary of the Loy Yang Mine due to its proximity to Traralgon.

The purpose of the coal buffers is to reduce land use conflict by defining an area between urban development and the coal mining activity where there is potential for impact from noise, dust, earth subsidence, fire hazard and visual intrusion. Some mine services, such as power and water reticulation and access roads, and rehabilitation works, have been sited within the coal operational area.

The coal buffers are consistent with a condition of Schedule 1 of the special use zone that applies over the Loy Yang Mine (SUZ1), which requires the top of the excavation to be at least 1,000 m from the residential zone.

Within the coal buffers there is a Public Acquisition Overlay (PAO) for the proposed Princes Freeway by-pass of Traralgon (Figure 9). The PAO passes close to the mine and within the boundary of MIN 5189 and Retention Licence application RL2015 in two places.

2. Geological information

2.1. Regional geology

The MIN5189 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, an elongated, down-faulted, east-pitching syncline bounded to the south by the Lower Cretaceous sediments of the South Gippsland Hills and to the north largely by older marine sediments of Palaeozoic age.

The Gippsland Basin was probably initiated during the Jurassic, with rift-related graben development and subsidence occurring during the Cretaceous–Cainozoic. Lower Cretaceous Strzelecki Group sandstone rift-fill underlies and crops out south of the MIN5189 tenement. Episodic basin inversion, commencing in the mid-Cretaceous, folded and uplifted the Strzelecki Group forming the Strzelecki Ranges and causing changes in sedimentation patterns.

Latrobe Valley Group coal was deposited in swamps during renewed rifting in the Oligocene to Miocene. The Group contains up to 1,000 m of Eocene to Late Miocene terrestrial sediments within which a series of thick brown coal seams occur. Due to their size and location (individual seams commonly exceed 100 m thick and may be traceable laterally for more than 50 km), the coals provide a relatively cheap, readily accessible source of energy.

The Latrobe Valley Group coal seams are notable for their thickness and lateral extent. 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. A schematic geological section is shown in Figure 5(a). Non-coal deposits between seams is termed interseam. 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.

In a few places, mainly around the southern boundary of the Latrobe Valley Depression, flows of older basalt are encountered below and between some of the coal seams. Because the centre of coal formation shifted gradually from east to west during deposition, the sequence becomes older, on average, towards the east.

2.2. Regional structural features

The Loy Yang 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.

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 as shown in Figure 5(b). It is considered that the major monoclines developed in response to late Miocene faulting in the underlying 'basement' rocks (Barton 1979). This faulting was both high angle and reverse in nature and for the most part oriented in a northeast-southwest direction. Continued folding during the Pliocene 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 Haunted Hill Gravels.

Between the major structures, the development of broad open folding has resulted in a series of broad, gentle synclines and anticlines such as the Loy Yang Dome and Flynns Creek Syncline.

2.3. Loy Yang Mine geology

2.3.1. Major structures

Three main structures are recognised within the mining area, these are an unnamed monocline, the Loy Yang Dome and the Flynns Creek Syncline, Figure 6(a). 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.

Two main fault sets are recorded at the Loy Yang mine. Normal faulting occurs in a 600 m zone along the north flank of the Loy Yang Dome in the west of Loy Yang open cut 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 batters. Two small displacement reverse faults are mapped at the toe of the northern batters. 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.

2.3.2. Stratigraphy

The stratigraphic column for the Loy Yang mine is shown in Figure 6(b). 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 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.

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 mine and have been eroded in the core of the Loy Yang Dome.

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. These are either too deep or have a poor incremental strip ratio to be mined at present.

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. The interseams are predominantly silty or sandy, with minor clays, inferior coal and gravels also present. The interseams are generally continuous, but occasionally pinch out as coal splits merge. In some areas, the interseam material between seams is thin or absent resulting in large intervals of continuous coal. The interseams are important to: coal mining, coal utilisation and local hydrogeology.

Figure 7 shows four geological cross sections through the mine area, one of which extends through the Loy Yang A power station and external overburden dump.

2.3.3. Minor structures

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.

Extensive coal joint mapping from 1996 to 2013 at Loy Yang shown in Figure 22 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.

2.3.4. Coal quality

Around 2,800 bores have been drilled within the AGL Loy Yang tenements (Figure 8) and 1,972 of these have been used to generate the geological model. Coal quality and other investigation bores are drilled routinely to provide infill data and validate geological models. The drilling information is stored electronically in the Latrobe Valley coal bore

database, which is maintained on behalf of the Victorian Government by GHD.

The Mines Department drilled the first bore (Loy Yang 2) into the Loy Yang area in December 1917. This regional drilling program was based on a nominal 1 km grid and coarsely delineated shallow coal seams; as well as coal moisture and ash levels. Subsequently, the SECV closed this grid down to 400 m and then 200 m (east–west only) to provide further detail on coal geology and quality. Coal samples from these bores have been analysed for quality, including moisture and ash (samples taken over 3-m intervals), minerals and inorganics (over 6-m intervals) and proximates and ultimates (over 12-m intervals). Most drilling was carried out to an 'economic mining' depth; however, six bores have been drilled into Strzelecki Group basement.

The Latrobe Valley Group coal is a soft brown coal. The coal seams have high moisture content (50% to 65%) and low specific energy (8 to 10 MJ/kg). The ash levels are generally less than 5% (dry basis, db). Significant changes in physical and chemical properties occur both laterally and vertically. These impact on coal utilisation, influencing contained energy, efficiency, heat transfer surface fouling, low density fly-ash, etc. Average coal qualities for the Loy Yang tenements and including the Lower Traralgon Seam are presented in Table 2.3.4.1. Differences between bore and block model values are because bore averages are unweighted, whilst block model averages are weighted by coal mass.

In situ moisture of coal is generally between 58% and 65%. The moisture content in the coal varies with deposition history and depth of cover and is a key control on energy content. Younger Yallourn Formation seams generally have higher moisture contents (average 59.7–64.7%) than older Morwell Formation seams (average 59.3–63.6%) and Traralgon Formation seams (average 56.2%–57.6%).

Table 2.3.4.1 Average coal qualities for the Loy Yang Tenements

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.

Energy content measured on a dry basis is called gross dry specific energy (GDSE). GDSE is generally between 24.1 and 27.6 MJ/kg (db). Energy content is also expressed on a wet basis called net wet specific energy (NWSE), which takes into account the in situ moisture content and the energy required to evaporate the moisture. Trends in NWSE generally parallel trends in moisture.

Ash content of the coal is generally between 0.2% and 5% (db). This is very low considering seams included all coal with less than 30% (db) ash.

2.3.5. Coal reserves

The latest JORC report completed in March 2012, for the AGL Loy Yang MIN 5189 reports coal reserves shown in Table 2.3.5.1.

Table 2.3.5.1 Coal resources and reserves

Description	Inferred (Mt)	Indicated (Mt)	Measured (Mt)	Total (Mt)
Resource	118	948	4028	5094
Description		**Probable(Mt)**	**Proven(Mt)**	**Total (Mt)**
Reserves	-	18	1762	1780

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.

Coal reserves located within MIN 5189 assume mining to the eastern boundary of MIN 5189.

2.4. Loy Yang Mine hydrogeology

The hydrogeology of the Loy Yang Mine area is complex even though most of the sand bodies are readily identified and traced. The system is complicated by the number of small and large throw faults that disrupt the general stratigraphical sequence. The regional aquifers have been grouped into:

1. *Shallow Aquifer System (SAS)* - consists of unconfined to semi-confined aquifers within the Haunted Hill Formation, recent alluvial sediments and between the Yallourn and M1 coal seams (Yallourn Interseam). In the Loy Yang area, the SAS is generally comprised of low permeability sediments with no significant sand units present.

2. *Morwell Formation Aquifer System (MFAS)* - is a confined aquifer system that consists of interbedded sands and clays within main Morwell Formation coal seams. In the Loy Yang area, sand beds up to 30 m thick within the M2C and M2B aquifers have been historically depressurised and groundwater extraction from the M2C aquifer will continue as the mine expands. The M2B aquifer is no longer actively depressurised as it is now unconfined and exposed in the base of mine area. The M1B interseam sand becomes a significant aquifer to the east of the current Loy Yang Mine and is typically a medium to fine-grained sand up to a thickness of 25 m.

3. *Traralgon Formation Aquifer System (TFAS)* - a regionally extensive, confined, high-permeability aquifer located at depths of around 120 m below the mine floor. The TFAS extends across the Gippsland Basin and consists of interbedded sands, clays, coals and fractured basalts of the Older Volcanics. Groundwater is extracted from this aquifer system as part of mining operations at Loy Yang and Hazelwood mines for agricultural and industrial supplies in the southern Gippsland Basin, and offshore for

oil and gas production activities. The bulk of groundwater currently pumped as part of the mine depressurisation program to maintain floor stability is extracted from this aquifer with bore pump flow rates of between 75 and 120 L/sec, totalling up to 450 L/sec. Apart from structural highs on the basin margins where these sediments may be exposed, aquifers belonging to this system occur between 150 and 1,500 m beneath the present surface. The groundwater extractions from the TFAS at Loy Yang Mine fall within the Stratford groundwater management area (GMA) – Zone 1.

The withdrawal of groundwater from the aquifers associated with the Tertiary sediments in the Loy Yang field is essential for allowing coal mining to proceed at depth and reduce the potential for floor heave.

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 are considered in engineering designs.

Potential large-scale batter instability can 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 batters.

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

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 batter stability. Controlling surface water, monitoring of movement and crack water pressures and using horizontal drains is part of the on-going management strategy.

2.5. Groundwater

Mine depressurisation is required to lower aquifer pressures of the major aquifers in co-ordination with the mine development plan and maintain stable geotechnical conditions. Under the s 51 of the *Water Act 1989* (Vic), AGL Loy Yang and the other Latrobe Valley mines have obtained a groundwater extraction licence for the operation and management of their respective depressurisation systems.

AGL Loy Yang's groundwater extraction licence (Groundwater Licence 2007440) extends to 2025 and currently allows approximately 20 GL/y of groundwater to be extracted. Current licenced groundwater extraction volumes is shown in Table 2.5.1. AGL Loy Yang will apply for an extension of the groundwater licence beyond 2025 in due course.

The current pump bore network consist of 5 Traralgon Aquifer pump bores, 3 of which extract from the Upper Traralgon Aquifer across the northern batters and 2 from the Mid Traralgon Aquifer in the western part of the mine. Typically around 8 to 12 M2C pump bores are required to achieve the depressurisation necessary for the current base of mine development. The M2B aquifer has also been actively depressurised in the past using pump bores. The M2B aquifer is now exposed in the base of the mine and is no longer

depressurised via pumping and M2B seepage is managed via the drainage system. The depressurisation network will migrate eastwards with the mine and internal overburden dump development; the need to dewater M1A and M1B will be considered for inclusion into the request for any groundwater licence extension

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

Table 2.5.1 Groundwater License 2007440 Extraction Volumes

Year	M2B Aquifer		M2C Aquifer		Tr Aquifer		Total
	ML/mth	ML/y	ML/mth	ML/y	ML/mth	ML/y	ML/y
2012 - 2019	105	1262	184	2208	1377	16527	19996
2020 - 2025	110	1325	184	2208	1314	15770	19302

2.6. Loy Yang Mine geotechnical conditions

A significant aspect of assessing geotechnical risk is the definition of the geotechnical properties of the materials exposed in and around the open cut. The major geotechnical features within the Loy Yang Mine relate to the primary lithology and these are described below.

AGL Loy Yang has prepared a Ground Control Management Plan (GCMP). The GCMP documents and describes geotechnical and hydrogeological risks and the processes or controls to eliminate or reduce these risks to an acceptable level.

2.6.1. Overburden

The geotechnical conditions for mine surface activities, such as access, building footings and external dumps, around the future areas of the Loy Yang Mine are dependent on the properties of the Haunted Hill Formation on which they are founded. The Haunted Hill Formation consists of late Tertiary and early Quaternary sediments, comprised of sand and clay sediments. These have been extensively tested across the Latrobe Valley and determined from back-calculations from stability analyses conducted on mine slopes. The Haunted Hills Formation, when exposed, is subject to dispersion and erosion. When this condition is identified in the development of mine surface activities AGL Loy Yang will ensure the highly dispersive clays are appropriately utilised or managed.

Overburden dumps comprise a mixture of disturbed overburden, power station ash, interseam and inferior coal materials. The properties of this material have been determined from field and laboratory testing and back-analysis of existing overburden dump behaviour.

Material properties are regularly determined and published as part of the geotechnical program undertaken at the mine (see Table 2.6.4.1).

2.6.2. Coal

The majority of coal is contained in the Yallourn, Morwell M1 and M2 seams, with the M2B seam expected to be the deepest limit of mining at present in the eastern area of the expanded mine.

Coal properties have been determined from extensive field and laboratory testing programs and back-analysis of permanent and mine operating batter stability.

2.6.3. Interseam

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.

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

2.6.4. Loy Yang Mine geotechnical data management

Geotechnical data is collected as part of various programs summarised in Table 2.6.4.1. The data management process is described in the Ground Control Management Plan.

Table 2.6.4.1 Geotechnical data

Type	Purpose	Most recent reference	Period
Cracks	Record of cracks and features in the permanent batters and to a lesser extent in the operating batters	Appendix D of the GCMP	Fortnightly or sooner in the event of new cracking
Defects	Records face discontinuity mapping results	Appendix D of the GCMP	Annually
Borehole	For all bores within the AGL Loy Yang MIN and EL tenements	Appendix D of the GCMP	Annually

Type	Purpose	Most recent reference	Period
Geological model	Provides data to develop slope stability models that represent field conditions	Tenement scale geological model	2-yearly
Geotechnical tests	Records all geotechnical tests	GHD soil laboratory database	As required and annually archived
Faults	Records exposure of new faults as they are exposed	Appendix D GCMP for reference	Annual
Groundwater model	Model and record aquifer pressures and behaviour.	Hydrogeological master model	2 yearly
Mine batter stability	Assess stability for planned mine development in the next yearly period	2014	Annually
Operational coal batter stability	Assess stability for planned mine development in the next 2 yearly period	2013	2-yearly
Material properties - coal	Required for operational coal batter stability	2010	5 Yearly and as required
Material properties - interseam	Required for operational and permanent batter stability	2011	5 Yearly and as required
Material properties – overburden dump	Required for dump stability assessment	2011	5 Yearly and as required
Operational inspections	Shift supervision and operators inspection of work areas	Shift managers' report	Twice daily and as required
Operational inspections	Geotechnical staff inspection of operation and non-operational work areas to provide additional support to operations group.	Fortnightly geotechnical inspection report	Fortnightly
Geotechnical structural mapping	Provide geotechnical support to mine operations	Annual face mapping	Annually
Surface pin surveys – permanent mine batters	Maximum vertical and horizontal movements of permanent mine batters for assessment of risk to infrastructure	Minor pin line survey	Annually or sooner as required
Surface pin surveys – batters and grass level	Maximum vertical and horizontal movements and tilt and strain for assessment of risk to infrastructure	Major pin line survey	Annually or sooner as required
Surface pin surveys – major pin line survey extended to overlap with regional 5 year surveys	Maximum vertical and horizontal movements and tilt and strain for assessment of risk to infrastructure outside 1 km zone from the mine crest and up to the southern edge of Traralgon	Major pin line survey	3-yearly
Rainfall	Correlation with GW levels and flows Alerts for surface water issues		Measured Daily Compiled monthly / annually

Type	Purpose	Most recent reference	Period
Groundwater levels	Comparison to target, alert and critical levels	Hydrogeological database	Monthly and as required
Horizontal drains	Assessment of efficacy of slope drainage	Hydrogeological database	Every two months and as required
Geotechnical incident reports	Reports of geotechnical incidents and near misses	Major incident reporting system (MYHSE)	Updated as required

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3. Current site operations

3.1. Site plan

The current site plan is shown in Figure 2. This Figure shows the mining licence boundary, the existing pit crest, the major mine infrastructure and nearby residences and community facilities. Other information required in the site plan by Schedule 15 of the Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013 is provided in the following Figures: services and infrastructure are shown in Figures 4a to 4e, Figure 20; extent and sequencing of open cut extraction and overburden dump development is shown in Figures 11 to 15; waste dumps are shown in Figure 12; the rehabilitation plan is shown in Figures 16 to 19; buffer zones are shown in Figure 10; and access roads are shown in Figure 2. Public and AGL Loy Yang infrastructure near the Loy Yang Mine is shown in Figures 4a, 4b, 4c, 4d and 4e.

3.2. Mining sequence

The mining operation commences with pre-stripping of vegetation and topsoil stripping using conventional mobile plant. Topsoil is either used immediately or temporarily stored for later use in rehabilitation.

The next stage involves overburden removal using BWE D16, which digs the "silty/sandy/clay" overburden layer (nominally 10 m to 15 m in thickness) and the underlying coal to a total operating single face range of between 0 m to 27 m. The overburden and coal materials are transported to either the external overburden dump or the raw coal bunker using the upper level conveyor system (L100, L110 and L115) (Figure 4d). Overburden, inferior coals and interseam materials are sent to the overburden dump and are disposed using one of two travelling tripper stackers TS4 or TS5 in a series of levels. BWE D16 excavates along its face conveyor L100 digging a strip of approximately 50 m to 66 m in width. Individual face heights are generally 12 m, or up to 27 m in height.

The following stage involves coal mining using 3 other BWEs (D14, D15 and D27) and supporting conveyor systems (L200, L300 and L400 series). This generally involves mining to the floor of coal. The coal is not continuous and is interspersed with interseam (layers of clay, sand and silt of varying thickness) and inferior coal. Any such interseam material or inferior coal is excavated separately from the clean coal and conveyed to the overburden dump. D14 and D15 operate on a sequence of upper and lower cycles that allow for a vertical excavation range of up to 72 m for each of the L200 and L300 conveyor systems. Individual face heights are nominally either 12 m or 24 m up to a maximum of 27 m. Typically D14 and D15 excavate strips 50 m wide operating on benches up to 12 m above and 12 m below the conveyor grade. At present each upper and lower cycle consists of 3 x 50 m strips. The bottom BWE D27 undertakes basal mining and has an excavation range of 29 m with individual face heights of 5 m, 8 m or 16 m operating on benches 5 m

above and 8 m below the conveyor grade. The three BWEs all load to a 2 m wide conveyor transport system. The conveyor systems deliver coal to a 80,000 t raw coal bunker located to the south of the mine. Coal from the raw coal bunker is transported via a series of 1.4 m wide conveyors, through crushers, to the power stations. Mining activities extend to the conveyor transfer points for the power station rising conveyors.

The mine operates continuously 24 hours per day, 365 days per year. Loy Yang 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 called "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.

The BWEs D16, D15 and D14 have a nominal coal capacity of 60,000 tpd while D27 is nominally 30,000 tpd.

Post mining rehabilitation of final batters and levels occurs progressively and uses topsoil from pre-stripping, where possible.

3.3. Mine development

The mine development is outlined below and discussed in detail in Section 4.4 under work plan variations. The current mine development is shown in Figure 12, which shows the pit toe (at Base of Mine) and crest lines, with elevations for toe and crest and the overall slope shown at regular intervals along the crest/toe for the permanent batters. In this Work Plan Variation any references to the toe at the Base of Mine are intended to mean the original mine toe prior to any internal overburden back fill placed at the toe. This elevation is likely to be lower than the pit floor once overburden back fill is placed but will continue to be the reference point for measurement of permanent batter slopes following internal overburden placement.

3.4. Site infrastructure

The current site infrastructure is shown on Figures 4a, 4b, 4c, 4d and 4e.

3.4.1. Ash system and disposal

A waste stream of electricity generation is ash from the Power Station boilers, which is managed on site throughout the year. The transport to and operation of the ash ponds are regulated outside the ambit of MIN 5189 and are considered an industrial process of the Power Station.

Power station ash, from Loy Yang A and B, is pumped as slurry to a pair of dedicated ash ponds which settle out the ash and serve to leach out contaminants making it suitable for disposal on site. Saline water from Hazelwood and Yallourn is also disposed of via this pond. Settling lagoons are established on the ash delta to settle out and contain the ash

before removal to a permanent dump site, while retaining volume in the pond for saline water. Disposal of ash currently occurs within the external overburden dump inside MIN 5189. Ash storage and disposal is covered by AGL Loy Yang's EPA licence 11149. The ash generated by the Power Stations is around 600,000 cubic metres per annum, which traditionally has been removed by mobile plant (excavated and loaded into a fleet of trucks) and dumped under licence into nominated areas on the external overburden dump.

The saline water (decant) is recirculated through the ash system until the salinity increases to a level where it is pumped to the saline waste outfall pipeline (SWOP) (Figure 4b) for disposal to the ocean under Central Gippsland Region Water Corporation's (Gippsland Water) Licence 74253.

3.4.2. Fencing and security

3.4.3. Parking

To limit the number of vehicles accessing the power station and mine sites, parking areas for workers, contractors and visitors are provided adjacent to the mine and power station sites and are external to the site. Access to the parking areas is from Bartons Lane, and access into the power station and mine sites is via pedestrian gates.

3.4.4. Roads

Primary road access to the AGL Loy Yang site is obtained from Bartons Lane. Bartons Lane was originally a private road constructed for the AGL Loy Yang site and was converted to a public road. In 2001/2 the easterly development of the mine cut the existing Hyland Highway (Gormandale Road) and deviation of this highway was required. The Hyland Highway was deviated to utilise the existing Traralgon Creek Road, Bartons Lane and an eastern extension of Bartons Lane reconnecting with the existing Hyland Highway near Flynns Creek Road (see Figure 2). Road access within the AGL Loy Yang site is provided by

a number of different classes of roads:

- Permanent sealed roads are provided around the power station and mine building and facility complexes.
- An all-weather, heavy traffic, crushed rock road is provided around the perimeter of the permanent batters.
- Permanent roads are constructed along the trunk conveyors to the outlet area, these provide one of the main access points into the various levels of the mine.
- Crushed rock roads of a semi-permanent nature are provided along the worked out benches of the mine. These roads provide access to the working faces and various infrastructure facilities.
- Other transitory roads are used within the mine to provide access to the working faces. These roads may be on coal, clay-covered coal or a crushed rock cover, depending on the conditions and duration of use.

All crushed rock roads are regularly graded and repaired to maintain the standard of access and watered to minimise fugitive dust.

3.4.5. Fire service systems

Dry coal is flammable and with such large areas exposed, fire prevention is therefore a major activity for the Loy Yang Mine. The primary potential sources of fire ignition are bush fires spreading into the mine, faulty plant and equipment, or vehicle exhausts within the mine.

Fire protection of exposed coal in the operating areas is primarily provided by sprays (large scale sprinklers) and hydrants attached to a pipe reticulation system with water supply from the fire service reservoir. Spraying commences when indicated by meteorological conditions for fire or dust control. A backup water supply is provided by low quality water (LQW) from the high level reservoir (Figure 1). The fire service system within the mine is gravity fed with the pressure levels of the lower systems maintained using pressure reduction valves. Booster pump systems have built in redundancy and are used to feed the outlet area, rising conveyors, raw coal bunker and the conveyor system for the external overburden dump.

The fire services system / drainage system is a closed loop where the dirty run off water from within the mine is pumped to the Fire Services Reservoir before returning for use in the mine forming a closed system. This maximises the water usage within the fire system and minimises the requirement for make-up water.

Protection on plant and conveyor systems is via sprays and hydrants and hose reels throughout the machines.

Sprays are also used to keep the coal damp thus minimising dust emissions during high wind events.

Conveyor wash down water, rainfall and spray runoff from within the mine is pumped back into the fire service reservoir. The fire service reservoir and reticulation system capacity is based on the requirements of the AGL Loy Yang Fire Service Design Guidelines. The fire service reservoir also has additional storage capacity to accommodate a significant storm event and has an emergency spillway to Flynns Creek.

3.4.6. Surface drainage

The surface drainage system is based on risk based guidelines. The design guidelines are based on the design rainfall (both magnitude and duration), the surface storm water sub-catchment areas to determine an Average Recurrence Interval (ARI) and the potential consequences of failure.

A 100 year ARI event is equivalent to a one in 100 year event, that is, 1:100 AEP (Annual Exceedance Probability).

AGL Loy Yang uses the ARI criteria set out in Table 3.4.6.1 as its design standard.

Table 3.4.6.1 Surface water drainage system classification

Drainage System Consequence Category		Design ARI
Category No	**Description**	
1	Localised flooding which does not impact upon any significant structure i.e., infrastructure that do not have any significant impact upon failure	2 year or less
2	Inundation of infrastructure such as minor roads and mine access tracks i.e., roads and access tracks indicated by AGL Loy Yang to be of lesser import	2 year
3a	Inundation of structure such as major roads i.e., main access tracks indicated by AGL Loy Yang as the highest priority roads	20 year
3b	Inundation of major infrastructure such as permanent conveyor formations i.e. conveyors that run down the three 50 metre wide berms on the southern mine face.	100 year

Given the appropriate ARI the design of an appropriate surface drainage system follows the guidelines set out in VicRoads, 1999 Road Design Guidelines.

Figure 4e shows pit surface water drainage system (Stage B). Within the pit, the surface water drainage system entails a series of drainage trenches (longitudinal drains) excavated in coal and running parallel to the batters on each mining level. These are

linked via culverts (cross drains), forming a T intersection with pipes laid in backfilled trenches under the roads, taking water from the upper benches to a sump on the mine floor. From there it is reticulated to the fire service dam. The consequence category classification for each culvert is also shown on Figure 4e.

The drainage systems are monitored as per the requirements of the GCMP, which include regular inspection of drains (both open and closed) or as triggered by the Trigger, Action, Response Plan (TARP).

The surface water drainage system will be extended for Stages C to E following the same design guidelines.

3.4.7. Drainage - dewatering and wash down systems

Drainage collection and wash down systems handle dirty water from within the mine. The drainage system comprises the pump stations and pipelines used to pump dirty water from the bottom of the mine to the fire services reservoir (Figure 4b). The pumping effort is provided using a three stage pumping system:

- First Stage – pumps in sumps at the bottom of the mine. These pumps cater for a variable depth of water resulting from rainfall runoff and pump to semi-permanent staging sumps at higher levels.
- Second Stage – sled-mounted pumps that pump from staging sumps to a permanent sump near the outlet area via a dewatering main.
- Final Stage – high capacity pumps at a permanent concrete sump, that pump to the fire service reservoir.

As the mine develops, the pumps will be progressively moved to match mine development.

Part of the mine dewatering system is the wash down facilities for the outlet area. Spillage from the outlet area conveyors is washed into a drainage system and directed to the permanent concrete sump. On route to the sump, water passes through a corral/rotary screen system to remove the larger coal and clay lumps.

3.4.8. Overburden runoff system

Rainfall runoff and wash down water from the external overburden dump is collected and treated to meet EPA licence conditions prior to discharge into Traralgon Creek (Figure 20). This water is treated through a three-stage settlement system. The first stage is a retention pond which enables the larger particles time to settle out. The second stage includes the injection of liquid polymer to assist settlement of the suspended clay and coal particles in either of two flocculation ponds. The third stage provides additional settlement time before final discharge.

3.4.9. Aquifer depressurisation (Artesian) collection system

Groundwater is pumped from the aquifers exposed in and underlying the pit to maintain stability of the base levels of the mine. This water is of good quality and is collected separately, wherever practicable, and pumped into the power station's low quality water system for use as cooling tower make up water, reducing the use of Latrobe River water.

Aquifer pressures in the Traralgon and Morwell formation aquifer systems (TFAS and MFAS) have declined significantly in response to mine depressurisation from pre-mining levels of around 30 to 40 m AHD to levels of between -80 and -100 m AHD in the central mine area.

During mining, the Traralgon and M2C aquifer pressures are maintained by groundwater pumping to avoid floor heave. No active depressurisation of the M2B aquifer is currently required with pressures controlled by seepage to the mine drainage through outcrops in the mine floor. Aquifer depressurisation is managed in line with the AGL Loy Yang Ground Control Management Plan (see also Section 5.3.1).

The groundwater depressurisation system currently is defined in the groundwater extraction licence (Groundwater Licence 2007440) that is administered by Southern Rural Water.

3.4.10. Mine pumping requirements

Allowable extraction under the Loy Yang Mine Groundwater Licence 2007440 peaks at just under 20 GL/year in 2012 and remains at similar levels until 2025. An extension to the licence will be required to continue depressurisation after 2025. The current pump bore network consists of 5 Traralgon Aquifer pump bores: 3 bores extract water from the Upper Traralgon Aquifer across the northern batters; and 2 bores extract water from the Mid Traralgon Aquifer in the western part of the mine. Typically around 10 to 12 M2C pump bores are required to achieve the drawdown necessary for the current mine size. The average life of the current M2C pump bores is greater than 6 years and a regular replacement plan is in place. The depressurisation network will develop eastwards with the mine and internal overburden dump advancement.

Following the completion of mining, AGL Loy Yang's planning for closure includes maintaining mine stability while progressively ceasing aquifer pumping as described in Section 6.4.4.

3.4.11. Power distribution

All of the major conveying plant, coal excavation plant and pump stations are electrically driven. A 22 kV electrical distribution network extends around the perimeter of the mine, with regular spur lines feeding down to plant items (Figure 4c). Duplicate electricity supplies are provided to key infrastructure for improved reliability.

3.4.12. Cultural Heritage sites

An assessment of heritage sites in the AGL Loy Yang area was undertaken as part of the original project approval process for the Loy Yang Mine.

This WPV does not alter the footprint of approved land disturbance as outlined in the 1996/7 Work Plan, other than the variation as outlined in table 1.3.2.1.

A Registered Aboriginal Party (RAP) approved Cultural Heritage Management Plan (CHMP), has been developed for the diversion of Sheepwash Creek. A copy of the relevant CHMP plans is attached in Appendix 4. These plans involve the clearance and recovery of any artefacts that may be damaged by the mining activity. Cultural Heritage Management Plans are generally developed 5 to 7 years ahead of the mining operations to allow for any variations to the mining sequence, clearance of artefacts and recovery of topsoil.

3.4.13. Advanced lignite demonstration projects and other processing sites

In August 2012, the Victorian Government, in partnership with the Commonwealth Government, launched the Advanced Lignite Demonstration Program (ALDP). The program was designed to accelerate the development of pre-commercial brown coal upgrading technologies via large scale demonstration projects that will produce high value energy products from Victoria's vast coal reserves – including oil, fertiliser and upgraded coal for local and export markets.

The program fosters economic development in the Latrobe Valley with employment opportunities both in the construction and operational phases.

Applications to the ALDPs were carefully evaluated by an independent panel of national and international experts.

ALDP funding announcements were made earlier in 2014 and AGL Loy Yang has set aside a number of potential processing sites as shown in Figure 4a.

3.5. Risk management approach

AGL Loy Yang's operations cause environmental impacts and generate risks with the potential to affect nearby land users and infrastructure e.g., mining operations cause noise and dust amenity impacts and the open cut generates ground stability risks. AGL Loy Yang manages these impacts and risks through a holistic environmental and risk management approach that is summarised in Figure 25. This approach includes key elements of the International Standards Organisation standards for environmental management systems and for risk management (i.e., ISO 14001:2004 and ISO 31000:2009).

This approach is reflected in AGL Loy Yang's range of environmental and risk management plans. AGL Loy Yang commits to manage these risks through the management plans shown in Table 3.5.1.

Table 3.5.1 Risk Management

High Level Risk	Risk Management Plans	Discussion
Geology and geotechnical	Ground Control Management Plan	Section 5.3.1
Hydrogeology and surface water	Ground Control Management Plan	Section 5.3.1
Fire	Fire Risk Management Plan	Section 9.6
Environmental Impact	Environmental Management Plan	Section 7
Community	Community Engagement Plan	Section 8

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4. Variations to the approved 1997 Work Plan

The current work plan was approved in 1997 and five variations have been registered since that date. Since that time a number of operational and legislative changes have occurred. These changes have necessitated this work plan variation. The proposed variations are summarised in Table 4.1 and are detailed in the following sections.

Table 4.1 Variations to the approved 1997 Work Plan

Variation		Section in this WPV	Status
Operational changes since 1997 approved work plan			
Variation to northern permanent batter boundary		Section 4.1	Applied for in this variation
Variation for construction of bund using overburden north of northern batter		Section 4.1	Applied for in this variation
Variation to 1997 Potential Loy Yang Mine Development boundary		Section 4.2	Applied for in this variation
Internal and external overburden and ash dumping locations		Section 4.3.4 to 4.3.7	Included in this variation
Diversion of Sheepwash Creek		Section 4.3.8	Included in this variation
Revised mine development plans, including a including a program for the transfer of the final coal system into Stage B, and for completion of the bottom of mine development in Stage A		Section 4.3	Included in this variation
Revised overburden dump strategy that includes a program to transfer tripper stackers TS4/L710 and TS5 to internal dumping		Section 4.3.4 and 4.3.10	Included in this variation
Revised environmental management plan		Section 7	Provided in this variation
Additional information to address legislative changes			
Declared Mine information	**7.** Geological information	Section 5.1 Section 2	Provided in this variation
	8. Description of changes since being declared and a description of infrastructure or plant proposed to be associated with the declared mine	Section 5.2 Section 4 Section 5.3.3 Figures 4a, 4b, 4c, 4d,4e	Provided in this variation
	9. Assessment of geotechnical and hydrogeological risks	Section 5.3	Provided in this variation

Variation		Section in this WPV	Status
	10. Description of controls	Section 5.5	Provided in this variation
	11. Monitoring plan	Section 5.4	Provided in this variation
	12. Review process	Section 5.6	Provided in this variation
Rehabilitation plan		Section 6	Applied for in this variation
Community engagement plan		Section 8	Applied for in this variation

4.1. Overburden placement northern batters

In two periods since 1997 (in 2001 and 2009), overburden was placed between the northern batter and the 1997 Potential Loy Yang Development boundary to form a bund. The bund toe and crest are shown in Figure 10 and in an inset to that Figure (Figure 10a). Placement of overburden on the northern batters in 2001 was described in a work plan variation approved on 15 January 2001.

This placement was the third such placement in that area with a prior placement taking place before 1997. In all three cases the placement was as a result of significant operational issues that temporarily interfered with the overburden conveyor system preventing or reducing the volume of material that could be handled. The operational issues included a fire on D15 in 2001 and a gearbox failure on the D14 BWE in 2008. Under these circumstances, overburden removal was temporarily undertaken by mobile plant and dumped north of the northern permanent batter as shown in Figure 9. In all cases the dumps were designed to accommodate the overburden being delivered. The final landform covers a dump of approximately 2.1 Mbcm and northern slopes of approximately 1V:5H and southern slopes of 1V:5H to 1V:3H. A geotechnical analysis of the 2009 overburden placement on the northern permanent batter was undertaken due to its proximity to the final pit crest (letter to Loy Yang Power Reference 31/11466/09/164426 dated 9 April 2009 from GHD Principal Geotechnical Engineer). This analysis, a copy of which is attached in Appendix 4, showed that the bund did not represent a significant increase in batter stability risk.

There is currently no plans to undertake additional overburden dumping on the Northern batters. In the event that emergency placement is required AGL Loy Yang will seek an amendment to this Work Plan Variation.

The placement was generally within the 250 m "coal operational area" (Figure 10 and Figure 10a) as defined in the Latrobe Valley Planning Scheme (section 21.07-4) (see Section 1.8). Within this zone, mine activities are allowed except where they are in conflict with the objective of the buffer to minimise land use conflict or where such activities

generate noise, dust, earth subsidence, fire hazard or visual intrusion. The bund serves to divert water away from the northern batters and open cut. The low height of the bund compared to the rolling topography and its re-vegetation with grasses means the bund is visually unobtrusive and mitigates visual and noise amenity impacts of coal mining activities in the open cut.

4.2. Revision to "Potential Loy Yang Mine Development" boundary

In 1997, the crest of the pit development was established and the Potential Loy Yang Mine Development boundary should have reflected the existing open cut crest, however, mapping errors or simplification meant this was not accurately reflected in an additional two locations (Figure 9, locations 1 and 2), namely at:

1. The mine outlet area, where a small offset and cut out over the then existing conveyor ramp exists along roughly 570 m of the boundary and encroaching over that boundary by up to 50 m.
2. The north end of the western permanent batter of the open cut where the open cut crest over a rehabilitation trial area (undertaken in 2008) encroaches over the boundary by some 75 m along some 1,200 m of the western boundary.

This work plan variation redraws the mine extraction boundary to include these two areas, and the area on the northern permanent batter, so that the mine extraction limit in this work plan variation now accurately reflect the current open cut crest condition (Figure 9). No significant risks are associated with the changes to the extraction limit for the reasons described in Section 4.1.

4.3. Revised mine development plan

The mine development in this work plan variation seeks to vary that of the 1997 approved work plan. That plan shows the current east operating faces developing to the northeast within the area then designated as Block 2 (see Figure 9).

The mine development plan in this work plan variation was generated from AGL Loy Yang's mine development planning system. This system has a number of elements as shown in Figure 24. AGL Loy Yang's Strategic Planning Manager undertakes strategic planning for the whole of mine life annually. Strategic planning considerations include resource characteristics, the Ground Control Management Plan (GCMP), the approved work plan, MIN 5189 licence conditions and the Fire Risk Management Plan (FRMP).

Strategic planning informs conceptual planning by the Strategic Planning Manager for the upcoming 10 years of mining and this is reviewed annually to address updated information, for example, from the GCMP. Similarly, conceptual planning informs operational planning for the upcoming 24 months, which is updated continuously to address new information, for example, from mining operations. Operational planning

directs mining operations. Mining operations are reconciled daily against the mining plan by field survey, adjustment to the schedule, field inspection and compliance against design. Reconciliations are recorded as follows: survey face locations are recorded on the scheduler's excavation plans; mine inspections are recorded on a log sheet that is addressed during the course of the day; and design compliance checklists and risk assessment hardcopy records are kept for each excavation/dump plan.

No significant changes to the method of working the coal mine are proposed in this variation. However, there have been a number of changes since the 1997 Work Plan, as summarised below.

The 1997 Work Plan "potential Loy Yang mine development boundary" and the revised mine development (extraction limit) boundary are shown in Figure 9.

4.3.1. Mine Stage Development

The current mine development strategy is described by a number of stages as shown in Figures 11 to 15 and described in Table 4.4.1.1. The table and Figures show the mine development at the completion of each stage.

Table 4.3.1.1 Mine stage developments

Stage	Description	Indicative date of completion
Stage A	This stage represents the open cut development at the time of the 1997 Work Plan (Figure 11).	1997
Stage B	This stage represents the mine development up to the end of 2014 (Figure 12). This stage involved coal extraction as per the approved 1997 Work Plan, and saw the mine operating faces advancing east some 2,000 m in this period. Stage B is the open cut development at the time of this work plan variation.	2014

Stage	Description	Indicative date of completion
Stage C	During this stage the mine operating faces will advance to the east between 400 and 1,500 m to near the existing Sheepwash Creek Diversion Stage 1, with the option (as shown) to swing to be parallel to the eastern boundary of MIN 5189 (Figure 13). During this stage the mine operating faces will advance through the Minniedale Dome with some localised changes to allow for a wider lower bench(s) at the practicable cut off depth for mining of the Minniedale Dome area. Late in this stage both M1A and M1B interseam is likely to be encountered. These interseams may require further investigation for the management of aquifer pressures. Investigations are required at least 12 months prior to intersection of these interseams to address identified risks. This stage will see the development of the permanent batter on the north side of the mining licence boundary at an overall slope of 1:3 (V:H) (as measured from top of mine crest to the Base of Mine toe).	2023
Stage D	This stage will see the mine operating faces advance a further 1,400 m to the east beyond Stage C (Figure 14). Mining operations are expected to be similar to those experienced during other stages. This stage will see the development of the permanent batter on the east side of the mining licence boundary at an overall slope of 1:3 (V:H) (as measured from top of mine crest to the toe at the Base of Mine). The position of the crest of the permanent batter is subject to the final design for Sheepwash Creek Diversion Stage 2. Figure 14 shows the current conceptual design.	2030
Stage E	This stage will see operations move into the southern area (Figure 15). Designs for mine development in Stage E are currently at strategic planning level as per Figure 24. This stage will see the development of the permanent batter on the south side of the mining licence boundary at an overall slope of 1:3 (V:H) (as measured from top of mine crest to the toe at the Base of Mine). During this stage Sheepwash Creek will be diverted. Detailed designs for this have not been finalised.	2037

Stage B (Figure 12) has seen the development of some 6,500 metres of permanent batters in the south western, western and northern batters. As-built, the majority of batters have overall slopes of 1:3 or flatter, as measured from top of mine crest to the toe at the Base of Mine (BoM). The as-built measurements were taken at regular intervals along the batters and chose the worst case sections. Of some 14 sections only two sections show an overall slope less than 1.3 (V:H), as measured from top of mine crest to the toe at the Base of Mine (BoM). Thus, the permanent batters developed up to Stage B are at overall slopes of 1:3 or flatter, as measured from top of mine crest to the toe at the Base of Mine (BoM), except for one (900 metre long) section on the north permanent batter where they are 1:2.7 (V:H) or flatter, as measured from top of mine crest to the toe at the Base of Mine (BoM).

This revised mine development will see the following:

- Stage B may see the extraction of the remaining coal in Stage A to optimise coal operations. For example, if an alternative coal source was needed to supplement coal supplies.
- A program for the transfer of the final coal system into the Stage C open cut area. Stage C will involve continuation of mining towards the east, through the Minniedale Dome area, with the option to rotate the current operating faces to north-south to parallel the eastern MIN 5189 boundary.
- The design of the permanent batters will achieve the objective of an overall slope of 1:3 (V:H) (as measured from top of mine crest to the toe at the Base of Mine), or flatter, for all permanent batters in Stages C, D and E. In these mine development stages, the permanent batter rehabilitation design will be informed by the findings of the rehabilitation trials (Section 6.2) and geotechnical assessments. In these mine development stages, operating batters will use the current mine operating batter design of 45°.
- The completion of the Sheepwash Creek Diversion Stage 2 and 3, with a new alignment along the eastern boundary of the mining lease. This alignment is contained within the 250 metre buffer on the east boundary.
- An overburden dump development strategy that includes internal dumping, consequently reducing the overall planned height of the external overburden dump (see Section 4.4.10).
- During Stage C, the first tripper stacker (TS4) will be relocated from the external dump to the internal dump site and the conveyor system to the internal dump will be installed. The proposed stacker route is shown in Figure 13. The second tripper stacker (TS5) will be transferred to the internal overburden dump during Stage D when shaping and grassing on the external dump is well progressed.
- The 250 m coal operational area buffer between the final crest of the northern and eastern permanent batters and MIN 5189 will be retained (see Section 1.8 and Figure 9). On the existing northern batters, operational assets located within the coal operational area buffer include the mine perimeter road, power distribution

lines, fire protection water supply pipelines, drainage dewatering pipelines, catch drains, water treatment works, groundwater observation bores, aquifer depressurisation pump bores and an overburden bund. The operational buffer also provides for visual screening of the operations though landscaping and tree and shrub planting taking into account the fire protection policy requirements. A 750 m urban coal buffer between the coal operational area and Traralgon township provides a buffer to minimise the impacts of the mine's operation on the Traralgon township.

- The possible placement of additional overburden between the crest of the northern batter and the MIN 5189 boundary within the coal operational area buffer (see Section 4.2).
- A fire service water storage that collects storm water against a groyne in the base of the mine is shown in Figures 12, 13, 14 and 15. This water storage will be relocated using new groynes several times as the bottom mine operating batter moves eastwards. These water storages are primarily to keep storm water out of mine operating areas and away from internal dumping. Water storages also provide additional water for fire protection as the mine area increases and add to the weight balance required to resist the uplift forces generated by the confined M2C and Traralgon aquifers below. The water storages have been designed to contain water from a 1:100 year ARI storm event. A geotechnical investigation of the groyne and water storage, a copy of which is attached in Appendix 4, has confirmed the stability of groynes and nearby permanent batters (GHD ref: 31/11466/11/194690). Geotechnical investigations will be undertaken and available to the Department four months prior to the construction of future planned groyne designs.

References which demonstrate AGL Loy Yang's mine planning system are provided in Table 4.3.1.2.

Table 4.3.1.2 Mine development plans

Program	Most recent reference	Review period
Strategic mine planning	Strategic Mine Plan February 2014	Annually if required
Conceptual mine planning	Whole of life mine plan Rehabilitation Master Plan	5 Yearly Two-yearly
Operational mine planning	24-month mine schedule	On-going
Reconciliation with mine planning	Strategic Mine Plan February 2014	Annual as part of strategic mine plan

4.3.2. Minniedale Dome Mining Strategy

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 13). 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.

As a result it is expected that the permanent batter will incorporate a wide berm at depth over the centre of the dome (Figure 7. section 19). Consequently, the overall slope gradient will decrease from that created in the adjacent Stage B operations. It is expected that in this stage the overall slopes will transition between the existing slopes to 1:3 (V:H) overall slope or flatter, as measured from top of mine crest to the toe at the Base of Mine (BoM) (Figure 13, 14, and in sections 19 and B in Figure 7).

4.3.3. Mine floor coal recovery

To provide an alternative coal source when other coal supplies are constrained, coal remaining in the floor may be recovered from below the BWE excavation horizon.. Detailed excavation plans for the pit floor extraction will be designed according to AGL Loy Yang's geotechnical risk management process as described in Section 5. A geotechnical analysis, a copy of which is attached in Appendix 4, for the increased batter height has been conducted and shows no significant increase in risk (GHD Ref: 31/11466/11/194690).

4.3.4. Internal Overburden Dump

Internal dumping within the mine will commence during Stage C in approximately 2017. The internal dump will provide weight to assist in the reduction of aquifer depressurisation activities for the mine floor and allow the external dump to be completed.

Internal dumping will commence in the floor of the Stage B area north of the trunk conveyors and advance eastwards as the mine operating faces advance. TS4 will develop the initial two levels of the internal overburden dump in an easterly direction. TS5 will place overburden over the dump levels developed by TS4. The internal dump will fill across from the southern permanent batters to the northern permanent batter, with an access (i.e. drainage, transport, conveyor) slot developed on the southern permanent batters. Materials placed in the internal overburden dump will be approximately 46% overburden (clay or sandy clay), 33% interseam material, 11% inferior coal and a small proportion (5%) of leached ash material. The current ash disposal trial in the external overburden dump will provide data on the pH balance of the ash material. Part of the trial

involves mixing this with the overburden dump material to confirm that a more neutral pH balance in seepage can be achieved. This data will be used to support the final design of the internal dump.

Each operating level of the internal dump will be capped using clay material to minimise vertical water flow and to encapsulate any acid forming materials. The internal dump will be progressively rehabilitated in stages as the dump is completed to height and as stages are completed as the dump develops to the east. Storm water will flow away from the internal dump to a water storage formed by groynes in the floor of the open cut (see Figures 12 to 15). The internal overburden dump will be completed in a number of stages of multiple levels. The internal dump (GHD, Internal dump preliminary geotechnical assessment, Ref 31/11483/13/219982, Mar 2013) will be designed and managed according to AGL Loy Yang's geotechnical risk management process as described in Section 5.3 and 5.4 and including such issues as permanent batter pore water pressures and dewatering, mine floor preparation, and dump height.

4.3.5. Ash disposal – truck and excavator to external dump

To date, dried ash has been disposed to encapsulated cells within the external overburden dump within MIN 5189. Ash is recovered from the ash ponds by truck and excavator and buried in cells within the external overburden dump. The cells range in volume from 200,000 bcm to 1.5 million bcm. The location and geometry of each cell is surveyed and recorded. The design of each cell and construction details are approved as amendments to EPA licence 11149.

4.3.6. Ash disposal – dredge and pipeline to external dump

AGL Loy Yang sought and received approval from the EPA, as the relevant authority for a trial of the dredge disposal method of power station ash (EPA licence 11149). A copy of the approval is attached in Appendix 4. The purpose of the ash disposal trials is to determine if the disposal of ash can result in a beneficial use. This trial has developed as a result of discussions with the community through the Environmental Review Committee (ERC), as part of the AGL Loy Yang Environmental Improvement Plan, regarding reducing the fugitive dust from ash excavation and transport and the improvement of saline water quality. In addition, ash has the potential to manage overburden pH balance. For these reasons AGL Loy Yang is undertaking this trial within the mine lease.

The EPA approved a specific Environmental Improvement Plan, (EPA reference 31241 dated 25 September 2013) for a 12 month trial (following the establishment of the trial infrastructure, completed in November 2014), of ash dredging and disposal to a cell in the external overburden dump. During the trial, ash is remobilised from the ash pond by dredging (EPA licence 11149) and pumped into a single large cell within the external

overburden dump. The cell has a capacity of some 1.4 million cubic metres which equates to approximately two and a half years of power station ash supply. Decant water from this cell is directed back to the saline waste outfall pipeline (SWOP) as is normal procedure. After this time, the ash system will revert to the existing ash disposal methods.

The cell design has been assessed under Australian National Committee on Large Dams (ANCOLD) guidelines as having a very/low to low risk by AGL Loy Yang's geotechnical advisors as part of the dam surveillance and monitoring program (GHD Ref: Design Report 31/1146/14/232965).

A second cell trial is currently in concept stage and will form a second overburden ash storage area. This second cell is not yet designed and will consider any learnings from the building of the first cell and any issues during filling. By leaving an area of three full passes this cell will provide another opportunity to undertake wet dredging and disposal of ash on site. Another cell will further determine the viability of beneficial re-use of ash to regulate areas on site. It is proposed to prepare (clay cap and compact) the second ash cell to enable dredging in to the cell beyond FY18. This large scale trial will also help prove technology and issues associated with establishing an ash dumping area in the mine open cut.

The placement of ash in an overburden dump requires careful management to control water runoff and seepage from an environmental point of view. Similarly worked out ash dump sites need to be clay capped to prevent water infiltration. For these reasons trials to better manage the ash ponds and how we transport and dispose of the ash on site will be fully assessed and costed.

Subject to the trials of dredging to the overburden dump being successful, suitable sites within the mine to dispose of ash as slurry from the ash pond, approval will be sought from the EPA and DEDJTR.

4.3.7. Ash disposal – internal dump

Once the internal dump is established and developed to sufficient size, a number of ash disposal options including those set out in Table 4.4.7.1. will be considered. The selection of the option(s) will be undertaken during the Stage C mining development and implemented in Stage D. The ash disposal system will be designed according to AGL Loy Yang's geotechnical risk management process as described in Section 5.

Table 4.3.7.1 Internal dump ash disposal options

Option	Description
Wet Placement	Dredge ash and water from the ash ponds and place via pipeline directly into a cell within the internal dump. Design details for this will be informed from the current external dump trials.
Separated Ash co-disposal	Dredge ash and water from the ash ponds and transport into the pit by pipeline and there separating the ash and water. The ash will be mixed and co-disposed with the overburden and interburden on the conveyor lines. Water will be returned to the saline waste outfall pond (SWOP).

Option	Description
Separated ash with beneficial uses and co-disposal	Dredge ash and water from the ash ponds and separated there into ash and water. Ash designated for beneficial ash uses will be separated and transported by truck. The remaining ash will be mixed and co-disposed with the overburden and interburden on the conveyor lines. Water will be returned to the saline waste outfall pipeline (SWOP).

4.3.8. Sheepwash Creek diversions

Sheepwash Creek flows northwards across Stages D and E of the Loy Yang Mine. While the creek is ephemeral, it can carry high flows. For example, Sheepwash Creek flows peaked recently within 4 hours of an intense storm.

A diversion channel, as shown in Figure 12, has been developed and approved by the Catchment Management Authority, a copy of which is attached in Appendix 4. The diversion and retention basin have been designed to cater for a 1:1,000 ARI storm event (GHD Ref: 31/11466/10/184225).

As the mine advances east, a new diversion channel (Diversion Stage 2) will be created within the 250 metre wide zone on the east perimeter of the Mining Licence, and following the surface contours in the southern section of the mine licence area (Figure 13). The zone will accommodate an easement, up to 120 metres wide, for the channel for the Sheepwash Creek Stage 2 development. This will be completed before the face advances though the previous diversion stage. This conceptual design is based on minimising the sub-catchment area of Sheepwash Creek that is isolated by the diversions.

During Stage E the southern section of the Sheepwash Creek will be diverted through a cut channel within the 250 metre wide zone on the east perimeter of the Mining Licence (Figure 19). The zone will accommodate an easement, up to 120 metres wide, for the channel for the Sheepwash Creek. To accommodate the local surface topography the channel may be up to 15 metres deep in places and will be cut at 1:3 (V:H) with a 8 metre wide base.

Both Sheepwash Creek diversions (Stages 2 and 3) will be designed in consultation with the Catchment Management Authority and according to AGL Loy Yang's geotechnical risk management process as described in Section 5.3 and are subject to appropriate approvals being sought and granted.

4.3.9. Overburden placement on the northern batters

Overburden placement on the northern batters may be required to efficiently dispose of overburden from mobile plant following possible future interruptions to coal production. It was this situation that led to previous dumping of overburden on the northern batters (see Section 4.2). Such overburden placement would be within the coal operational area buffer and would be of a similar shape and design as the existing bund to merge with the existing topography. These bunds would provide visual, dust and noise amenity benefits. This additional overburden placement on the northern batters will be designed according to AGL Loy Yang's geotechnical risk management process as described in Section 5.3 and submitted as a work plan variation at the time.

4.3.10. External overburden dump

Mining, transporting, separating and dumping of overburden, interseam and inferior coal waste materials is a major part of AGL Loy Yang's mining operations. Beneath a thin topsoil layer, up to 30 m of clay and sandy clay material (average 15 m) overlies the coal deposit. Once the thin layer of topsoil has been stripped and used or stockpiled for later use, the overburden is mined using a BWE and transported via a conveyor network for placement by the tripper stacker on the overburden dump. Interseam materials between coal seams (thin layers of sand, silt, clay and inferior coal) are selectively excavated by the coal-winning BWEs and then diverted from the coal transport route where it is sent via another conveyor system for stacking at the overburden dump. The volumes of interseam and the frequency of encountering interseam material during coal digging will increase as the mine develops eastwards Stages B to D. This will require increased regularity of simultaneous (two) stacker operation.

The dump contains a range of materials, predominantly silt, clay, and sand, but also carbonaceous materials associated with interseam materials and discarded or waste coal. Leached ash from the power station ashing systems is also placed in cells within the external overburden dump. The anticipated plan view area of the external dump at closure is estimated to be 1,000 ha.

The development of the external overburden dump is shown in the stage development plans (Figures 11 to 15). Overburden and interseam materials have been placed in the external dump from the start of mining operations. Dumping practices include the placement of a capping clay layer at the top of each operating level and encapsulation of other materials. The dump has been progressively rehabilitated with surface drainage systems installed and 1V:6H final batter slopes topsoiled and planted.

TS4, handling some 70% of total waste quantities, is proposed to transfer into the mine with its associated conveyor system to develop the internal overburden dump around 2017 in Stage C, while TS5 will continue to operate on the external dump until level 5 is completed during Stage D, before transferring to the internal dump. This is required as there is insufficient working area to accommodate both stackers in the pit until the first stacker creates an adequate area.

The 1997 Work Plan provided a design for the external overburden dump up to level 7. This work plan variation sees the design for the external overburden dump reduced to level 5, as shown in Figure 9. This design reduces the height of the external overburden dump by up to 60 m. The lower dump will reduce noise and night light amenity impacts on neighbours. The dump footprint remains inside the ridgeline to the south.

The design of the external dump includes provision for the placement of a further 6 Mm^3 of leached ash, which equates to 10 to 12 years of ash dumping. Currently an alternative method of ash disposal is being undertaken in the external overburden dump (see Section 4.4.6). This involves the pumping out of the existing wet ash pond into a single large cell located in the external overburden dump. After the cell is filled this part of the dump will

be covered with several metres of clay and contoured as a final landform.

Options are being assessed for extending the life of the ash storage in other areas of the external dump or transferring ash disposal to the internal dump, including co-disposal of ash with overburden.

The optimum scenario for the external overburden dump would be continuation of dumping and ash disposal operations until around 2025 to help shape the final dump landform.

The external overburden dump is designed (GHD, "Report for External Overburden Dump, Geotechnical Studies to Support Limited Dozing Methodology", Report to Loy Yang Power No. 31/11460/06/114045, April 2006 and GHD (2011a) "External Overburden Dump – Material Parameter Review", Report to Loy Yang Power No. 31/11452/10/192317, June 2011) according to AGL Loy Yang's geotechnical risk management process as described in Section 5.3. Ash disposal within the dump will be positioned in consultation with the EPA.

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5. Declared mine stability requirements

In 2010 the Loy Yang Mine was regulated as a "Declared Mine" under changes to the MRSD Act and the MRSDMI Regulations. This declaration imposes additional requirements on declared mine licence holders to be addressed in a work plan variation. The additional information required under Schedule 15 of the MRSDMI Regulations is summarised in Table 5.1 and detailed in the following sections.

Table 5.1 Work plan variations for a declared mine

Additional information required	Relevant section of work plan variation
A description of the geological information that is relevant to the stability of the declared mine and any variation of the geological information across the rest of the location plan, including a plan showing cross-sections and long sections of the proposed extraction area of the declared mine.	Section 5.1 and Section 2
If a mining licence was granted before the mine became a declared mine—	
(a) a description of any proposed changes to the information under item 4 of Part 1 for mining licences exceeding 5 hectares; and	Sections 5.2 and 4 and Figures 4a, 4b, 4c, 4d, 4e
(b) a description of any infrastructure or plant proposed to be associated with the declared mine.	Sections 3.4 and 5.3.3 and Figures 3, 4a, 4b, 4c, 4d, 4e.
An assessment of the geotechnical and hydrogeological risks for the declared mine.	Section 5.3 and Appendix 1 2.
A description of the controls that will be implemented to eliminate or reduce the geotechnical or hydrogeological risks to an acceptable level including—	Sections 5.3, 5.4 and 5.5
(a) a description of any proposed groundwater control system;	Sections 2.5, 5.3, 5.4.7, 5.4.8 and 5.5
(b) particulars of other measures to ensure the stability of the mine, associated infrastructure and adjacent land.	Section 5.3
A plan for monitoring the stability and groundwater management of the declared mine.	Section 5.4
A description of the process for reviews of the assessment, plan actions and controls referred to in this Part relating to the declared mine.	Section 5.6

5.1. Geological information

The declared mine stability requirements require a description of geological information that is relevant to the stability of the mine (together with any variation of the geological information across the rest of the location plan) including a plan showing cross-sections and long-sections of the extraction area of the declared mine. This information is provided in Section 2 and Figures 5 to 7 of this work plan variation. Of particular interest are:

- The recent mapping of shear zones within the batters, these are now included in the defect database.
- The mine plan for Stage C will see mining through the Minniedale Dome. In this area there is a localised change (steepening) in the dip of the main coal seams and consequently a different floor composition than typically experienced. This will result in different floor heave behaviour. The Minniedale Dome area is a subdomain. Face mapping of defects will be a focus as the dome is exposed to inform predictions of geotechnical behaviour. Minor localised changes to the mining method are expected near the Minniedale Dome to accommodate the different geotechnical conditions.

5.2. Changes since the mine was declared

The changes to the mine development are described in Section 4 of this work plan variation.

5.3. Assessment of Geotechnical and Hydrogeological Risk

Risk management of the geotechnical and hydrogeological related issues at the Loy Yang Mine relies on effectively identifying, evaluating and controlling risks. Geotechnical risks at a mine or quarry are primarily those risks associated with ground movements.

The use of a risk based approach has a number of advantages in that it provides AGL Loy Yang management with the opportunity and responsibility to define acceptable levels of safety, environmental and economic risk at each stage. AGL's approach to Risk Management is outlined in the AGL Risk Management and Assessment Framework, (AGL, 2011). This framework is modelled on ISO 31000 and is summarised in Figure 26.

In order to enhance the hazard identification and management of risks across the mine, the current site development has been divided into risk management domains (Figure 23), which provides improved focus on specific areas and issues. The domain boundaries were determined through a consultative process and by consideration of potential hazards, key infrastructure, geotechnical, geological and hydrogeological features and mine development and planning aspects. The domain boundaries also extend beyond the Geotechnical Risk Zone (see Section 5.3.2) to ensure AGL Loy Yang captures and manages

key risks associated with the mine.

The potential geotechnical and hydrogeological risks and their current and target controls are detailed in the Ground Control Management Plan.

A summary of the risks, classified as High and above are shown in Table 5.3.1, with the breakdown of risks for each risk category presented in Figure 27.

The risk assessment process focused on higher risk and consequence levels rather than having detailed assessments of all (and particularly lower) levels of risk in each area. The geotechnical hazards along with their current and target controls provide an important input to the Ground Control Management Plan (GCMP). The domain in which each risk occurs was also recorded in order to develop domain specific controls.

The risk assessment matrices and templates that have been used in the analysis are defined in the AGL Risk Management Framework, and are contained in Appendices 1 and 2. The matrices define five magnitudes of risk (Low to Extreme), each with corresponding notification requirements and corresponding actions. Whilst the geotechnical risk register is maintained for all risks, those risk that have risk level of high or above (Risk Score >4.5) are entered into the Fully Integrated Risk Management (FIRM) program. This program ensures appropriate management notifications, assessment and treatment.

Table 5.3.1. Summary of Risks (December 2014) with a risk score of high and above.

Risk Description	Domains										Risk Score
	North West	North East	West	South West	South East	Mine Floor	External Dump	Power Station	Dams	External	
Risks External to the Mine Lease											
Traralgon Bypass and associated development - impact of Mine on Road. Ground movement impacting on integrity of road. Large scale and batter scale	✓	✓								✓	
Traralgon Creek - change of grade resulting from mining activities	✓		✓							✓	
High level (HL) storage dam and settling pond - failure			✓					✓	✓	✓	
High pressure natural gas to LYB – damage to infrastructure								✓		✓	
Low pressure distribution gas line to LYA – damage to infrastructure				✓				✓	✓	✓	
Rural Grazing Properties - flooding and drainage	✓	✓	✓	✓	✓					✓	

Risk Description	Domains										Risk Score
	North West	North East	West	South West	South East	Mine Floor	External Dump	Power Station	Dams	External	
Low Quality Water Supply - damage to infrastructure				✓				✓	✓	✓	
Hot Spot - deterioration of batter integrity, cavity formation. Introduction of water to batter.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Risks internal to the Mine Lease											
Coal block sliding or overburden slump/slip – mine permanent Southern Batters					✓	✓					
Stackers and dump Conveyors - damage or collapse							✓				
Mine dewatering system, fire service, artesian pipeline - intentional discharge of water	✓	✓	✓	✓	✓	✓					
Large-scale coal block sliding or coal mass / pseudo-circular failure/complex structural controls; overburden failure – mine permanent NE batters (area of current / future development).		✓				✓					
Large-scale coal block sliding or coal mass / pseudo-circular failure; overburden slump/slip – mine permanent north-western batters.	✓					✓					
Coal block sliding or toppling; overburden slump/slip – mine operating faces (batter to double-batter scale).						✓					
Smaller scale failure impacting on light vehicles, personnel, horizontal drill rig, localised failure of coal lump etc.	✓	✓	✓	✓	✓	✓	✓				
Undermining / fire holes etc. as a consequence of burnt or eroded material	✓	✓	✓	✓	✓	✓					
Old Latrobe City Council (LCC) Landfill / Transfer Station - ground movement exceeds tolerance limits	✓										
Mine dewatering system, fire service, artesian pipeline - Ground movement resulting in pipe failure	✓	✓	✓	✓	✓	✓					

Risk Description	Domains										Risk Score
	North West	North East	West	South West	South East	Mine Floor	External Dump	Power Station	Dams	External	
Mine dewatering system, fire service, artesian pipeline - failure in pipeline resulting in release of water	✓	✓	✓	✓	✓	✓					
Mine dredgers - damage or collapse due to geotechnical issues		✓			✓	✓					
Loy Yang "A" – damage due to geotechnical issues								✓			
Loy Yang "B"– damage due to geotechnical issues								✓			
Snowy Hydro (Valley Power) – damage due to geotechnical issues								✓			
Fire Fighting impacts – fire fighting water, increase in water level in coal joints	✓	✓	✓	✓	✓	✓					
Overhead Power - Loy Yang mine, damage	✓	✓	✓	✓	✓	✓	✓				
Main Drain – change in conditions				✓	✓				✓		
Internal dump (future)						✓					

5.3.1. Ground Control Management Plan (GCMP)

Through the risk assessment process outline above, AGL Loy Yang has identified slope stability and ground movement as key risks to the business with the potential to impact people, the environment, and economics of the operations. In response to these risks, the GCMP has been developed. The GCMP provides the minimum standards, guidelines and procedures to effectively manage geotechnical and hydrogeological risks in the Loy Yang Mine. It defines a systematic approach to the identification, evaluation and control of geotechnical hazards, monitoring, measurement, analysis and reporting of performance (Figure 28). The GCMP is a live document in that it is continually updated as new risks are encountered or risk profiles change. The document appended is the latest version that has been approved by AGL Loy Yang.

The aim of an open cut ground control program is to design and manage excavation and dumping so that the required levels of safety (workforce and general public), protection of the environment and economic extraction are achieved.

The main objectives of the GCMP under the "plan, do, check" cycle are:

- Understand the mining environment;
- Identify and understand risk and hazards;
- Develop, document and effectively implement controls to protect safety; and
- Develop, document and implement monitoring processes and targets (TARPS).

Triggered Action Response Plans (TARPs) have been developed that outline the process required should threshold or alarm values be reached. The current TARPs that are primarily used address the following events and risks:

- Rainfall (intensity and volume triggers);
- Rainfall like events; such as spray application or pipe leaks
- Groundwater levels;
- Seismic events;
- Batter instability;
- Ground movement; and
- Base of mine water levels.

As well as the TARPs, the GCMP aims to document geotechnical monitoring, inspection and design requirements in order to manage the risks shown above. Roles and responsibilities for site personnel, as well as authority levels are included. Incident reporting is completed using the standard site reporting system and is addressed and/escalated through this system.

Based on assessment by AGL, relevant, future infrastructure may also have TARP criteria and processes assigned.

AGL Loy Yang documentation regarding its management of ground control is provided in Table 5.3.1.1.

Table 5.3.1.1 AGL Loy Yang ground control management

Program	Most recent reference	Review period
Ground control management	Ground Control Management Plan (AGL, 2015)	Annually, or sooner if required.

5.3.2. Identification and review of the Geotechnical Risk Zone and Domains

The DEDJTR Guidance Material for the Assessment of Geotechnical Risks in Open cut mines and Quarries (2014) has been adopted for the definition of the Geotechnical Risk Zone (GRZ).

- Minimum guideline – an offset distance four times the final batter height from the

final toe of the excavation. This is shown in Figure 23 (Stage E excavation).

The GRZ defines the zone within which impacts on public safety, the environment and public infrastructure are to be examined. A wider zone, the external domain, has been defined that includes the GRZ and where established monitoring has determined that horizontal deformations are occurring. Details of the monitoring programs are given in Section 5.4. Within the GRZ there are no non-AGL assets identified. In this case, the external domain is the focus for the assessment of the mine on public assets associated with the mine. The identified assets are listed in Section 5.3.3.

In order to better manage geotechnical risk at AGL Loy Yang, the current (Stage B) mine area and surrounds have been divided into risk management domains (Figure 23).

A risk management domain is an area with generally similar geotechnical properties. It is envisaged that the domains will be used to refine the Ground Control Management Plan, with each domain, its characteristics, risk profile and management strategies, being considered individually. As such each domain will have a specific monitoring regime and acceptance criteria along with tailored triggered action response plans (TARPs).

In order to determine the domain boundaries AGL Loy Yang held a workshop in December 2013. The aim of the workshop was to determine domain and sub domain boundaries along with the rationale for these decisions. During the domaining process the following criteria were considered:

- geotechnical characteristics including material properties and structural setting;
- geology and hydrogeology;
- known areas of interest (e.g. previous movement, northern batters 'nose', Minniedale Dome); and
- progress in the mining cycle (active, inactive, final design etc.).

In order to address current mining conditions, along with future mine plans, two domain plans were developed. Figure 23 shows the current (2014) domain boundaries for the mine. Areas outside of the immediate mine boundary were also included in the process, including the power stations, dams and overburden dump.

5.3.3. Identification of assets within the GRZ/External Domain

The current assets identified in in or near the (Stage E) GRZ are listed in Table 5.3.3.1 and identified in Figure 23. The risk hazard register (Appendix 2) contains detailed risk assessments undertaken (risks and control measures) for these and other assets/issues. The risk Id numbers for the identified assets are shown in Table 5.3.3.1, which also includes the minimum offset distances to the GRZ. This shows that there are no current public infrastructure assets located within the GRZ, with the exception of Sheepwash

Creek. However, Sheepwash Creek diversions are required in Stages D and E, keeping the diversions outside the GRZ.

Table 5.3.3.1 Asset identification with respect to GRZ

Asset	Asset Type	Minimum Offset - GRZ (m)	Risk assessment
LCC Landfill and transfer station (disused)	Public	90	Risk ID 67 (Appendix 2)
Sheepwash Creek	Public	within	Risk ID 13 (Appendix 2) removed in Stage C
Sheepwash Creek diversion (Stages 2 and 3)	Public	30	-
Conveyors	Private	within	Shallow excavation only
Coal bunker	Private	120	Risk ID 57 (Appendix 2)
Overhead Power	Private	30	Risk ID 02 (Appendix 2)
SWOP	Public	1200	Risk ID 66 (Appendix 2)
Gas pipeline	Public	240	Risk ID 10 (Appendix 2)
Optic cable	Public	150	Risk ID 34 (Appendix 2)
Hyland Highway	Public	150	Risk ID 63 (Appendix 2)
Loy Yang A power station	Private	480	Risk ID 29 (Appendix 2)
Valley Power/Snowy Hydro	Private	420	Risk ID 38 (Appendix 2)
Loy Yang B power station	Private	660	Risk ID 33 (Appendix 2)
Ash pond	Private	1260	Risk ID 14 (Appendix 2)
Fire service reservoir	Private	1260	Risk ID 08 (Appendix 2)
External overburden dump	Private	1860	Risk ID 56 (Appendix 2)
Stackers and Conveyors	Private	1860	Risk ID 3, 7, 21, 54, 64 (Appendix 2)
Bass Link	Public	1170	Risk ID 38 (Appendix 2)
Optic fibre (west of LYA power station)	Public	0	Risk ID 34 (Appendix 2)
Loy Yang Mine offices	Private	210	Risk ID 43,51 (Appendix 2)
High Pressure Gas pipeline (west of LYA power station)	Public	120	Risk ID 10 (Appendix 2)
Low Pressure Gas pipeline (west of LYA power station)	Public	120	Risk ID 15 (Appendix 2)
High Quality Water to Traralgon South	Public	120	Risk ID 27 (Appendix 2)
Low Quality Water to power stations	Private	120	Risk ID 41 (Appendix 2)
Sewer (west of LYA power station)	Public	0	Risk ID 18 (Appendix 2)
Settling pond	Private	420	Risk ID 16 (Appendix 2)
Overburden treatment pond	Private	1290	Risk ID 19 (Appendix 2)
Transmission towers	Public	420	Risk ID 55 (Appendix 2)
Communications cable	Public	420	Risk ID 34 (Appendix 2)
High level storage pond	Private	3630	Risk ID 16 (Appendix 2)
Traralgon Creek road	Public	0	Risk ID 31,44,5 (Appendix 2)
Traralgon Creek	Public	240	Risk ID 60, 68 (Appendix 2)
Traralgon Township boundary	Public	840	Risk ID 24,52,53 (Appendix 2)

5.3.4. Undertaking regular Loy Yang Mine geotechnical stability analyses

AGL Loy Yang has an on-going program of regular reviews of the stability of the mine exposures and surrounding areas. Review programs for temporary and permanent batters are described below.

The stability experienced in the temporary mine operating coal batters is reviewed every 2 years (2008, 2011 and 2013) with most recent review published in 2013 (GHD, AGL Loy Yang – Open Cut Coal Operating Face Stability Assessment Block 2, 31/11470/13, 2013). On alternate years, these faces are mapped for detailed cracks and faults and these are analysed for consistency with defects and face stability modelling. Those reviews have determined that a 45^0 batter angle produces an acceptable minimum factor of safety of 1.2 for individual operating batters. It is noted that batter angles can be increased to 55^0 where the population density and extents of D4 and D5 minor defect sets are suitable.

Annual reviews of permanent batters use data collected from surface pin monitoring, stability analyses, operational assessments, groundwater level monitoring and face mapping. The locations of the stability assessment lines and surface survey pins are shown in Figures 8a and 8b. The latest review (GHD, Report for AGL Loy Yang - Mine Geotechnical Performance Report, 31/11463/15, September 2014) reported that the factor of safety for the northern and southern batters, was estimated at 1.95 and 2.07 respectively, both well above the threshold of 1.5 set in AGL Loy Yang's GCMP. Under seismic loading (quasi-static analysis), the factors of safety for both batters are above 1.2.

AGL Loy Yang considers that deterministic methods are the most relevant for slope stability analysis for both temporary and permanent batters at the Loy Yang Mine. Currently this includes analyses undertaken with software products such as Slope/W, PLAXIS, and earlier UDEC and FLAC modelling. The most recent PLAXIS models simulate the progressive mine development sequence. These methods employ both laboratory-determined properties and a large number of back-calculated slope studies to determine the appropriate geotechnical parameters for the analysis and the relevant failure criteria. This approach uses the experience built up over the life of the mine. Loy Yang is currently reviewing data for the adoption of probabilistic methods.

Key representative cross sections are analysed for various ground conditions and slope aspects including:

- Additional mine development, undertaken or planned in the next period, in the batter toe region or interseam exposure area;
- Long-term mine design requirements with possible modified batter configuration and/or location;
- Significant water table/pore pressure fluctuations over the 12-month period (particularly rises);
- Magnitude of previous factors of safety (FOS);

- Any monitoring data of concern or visual signs of change; and/or
- Location of infrastructure (change in risk profile).

To assess the stability of the permanent batters in the event of an earthquake, a series of pseudo-static analyses are carried out annually for the northern, southern and western batters. Loy Yang Mine has established an Annual Return Interval (ARI) of 1000 years (5% exceedance in 50 years). This is effectively represented in the assessment of batter stability by adopting a Peak Ground Acceleration (PGA) of 0.11g.

Experience shows that the interseam variability, interseam thickness and their location within the mine batters has the potential to impact on the stability of the overall batter slope.

Sandy interseam materials are stronger and could allow steeper overall slopes to be dug, whilst the high clay materials are weaker and may require a flatter slope design in parts. Current slope designs are based on relatively conservative interpretation of residual clay interseam materials that have been tested to date at Loy Yang. It is possible that slightly weaker clay materials may be encountered in the future and if so may require a flatter slope design.

The issue of thicker and variable interseam strength on batter stability has been reviewed as part of the long term mine planning. The expected interseam profile through the proposed annual excavation program is reviewed each year and any stability impacts assessed. To date no "special" excavation treatments have been necessary. Future designs assume that this condition will not change.

Individual batters, within the overall mine batter profile, that are primarily cut into interseam materials may need to be cut at a lower angle in order to maintain stable local conditions (i.e. batter cut at the mine batter into predominantly sandy interseam will be flatter than one cut into a coal seam). The net effect is that the overall mine batter slope that contains significant thicknesses of sandy interseam materials may end with a flatter profile than the anticipated slope.

Experience to date indicates that seepage from sandy interseam can cause local piping of the interseam, with a consequential risk of local coal wedge failure. In the past 10 years there have been only two such events and appropriate operational controls has prevented batter failure. It is recognised that such events not appropriately controlled could result in significant bench scale failures, which in turn could impact long term overall stability. Operational systems are therefore in place to mitigate this risk. It should be noted that access roads and other requirements tend to limit the overall mine batter slope and current overall slope angles are partly limited by those constraints. In addition, the individual coal batters are excavated at a slightly flatter angle than what is required for an acceptable level of stability against local coal wedge failures. As a result the interseam slope is also excavated at a flatter angle.

Interseam strength testing is undertaken adopting saturated conditions. Therefore the interseam material after mine closure, if saturated, will only revert to the conditions the stability of the batters have already been designed for.

Table 5.3.4.1 Accepted minimum factors of safety

Mine Batter Examples	Consequence of Failure	Minimunm Design FoS
Temporary, interim or operating batters not carrying major infrastructure, where all potential failures can be contained within the containment structures. Personnel and equipment can operate adjacent to these areas under specific controls (for example: stand-off distances) to manage potential risk.	Not Serious	FOS = 1.1
Permanent or final mine batters not carrying major infrastructure.	Moderately Serious	FOS = 1.2
Permanent or final mine batters carrying major mine infrastructure (for example: treatment plant, conveyors, major power lines, major fire service, major haul roads, etc.)	Serious	FOS = 1.3
Permanent or final mine batters carrying critical infrastructure, located near public infrastructure and adjoining land owners (for example: public roads, rivers and streams, transmission lines, etc.) The FoS represents a scale of failure that could impact the public infrastructure.	Extreme	FOS = 1.5

5.3.5. Establishing and maintaining a material strength properties database

A significant issue in the analysis of slope stability is in the correct determination of the in-situ material properties relevant to the analysis methodology adopted. At the Loy Yang Mine, the material properties determinations are undertaken by its geotechnical consultant, currently GHD, usually as part of regular stability reviews. GHD maintain a database of material properties from all laboratory testing and back-calculated material properties from analyses. These properties are updated regularly in face and batter stability assessment studies, as shown in Table 5.3.5.1.

Table 5.3.5.1 Material property references

Material properties	Most recent reference	Review period
Mine operating batters – static	Operating Face Stability Assessment 2013	Annually

Material properties	Most recent reference	Review period
Permanent batters – static	Mine Batter Performance 2014	Annually
Permanent batters – dynamic	Mine Batter Performance 2014	Annually

5.3.6. Establishing and maintaining a geotechnical/hydrogeological hazards register

The geotechnical and hydrogeological hazards register is a key planning document for AGL Loy Yang to identify and manage current and future geotechnical and hydrogeological hazards within the Loy Yang Mine. The geotechnical and hydrogeological hazards register allows for the identifying geotechnical and hydrogeological hazards and provides a basis for prioritising programs to reduce unacceptable risks to acceptable levels.

The geotechnical and hydrogeological hazards register records the geotechnical and hydrogeological hazards, their impact, and their current level of risk based on the current controls. The geotechnical and hydrogeological hazards register informs the setting of triggers, which are listed in the GCMP. Key tools supporting the geotechnical and hydrogeological hazards register are the geotechnical and hydrogeological hazard map and the geotechnical and hydrogeological hazard plan. A hazard map is described below. A geotechnical and hydrogeological hazard plan provides a simple visual tool to communicate the assessed geotechnical and hydrogeological risks within an area, with four colour-coded levels of risk (i.e., Extreme, High, Medium and Low).

AGL Loy Yang documentation regarding its geotechnical and hazard register is provided in Table 5.3.6.1.

Table 5.3.6.1 Geotechnical and hydrogeological hazards register

Program	Most recent reference	Review period
Geotechnical hazard register	Risk assessment report (December 2014)	Annually
Geotechnical domain plan	Program risk assessment and management – geotechnical domains (2014)	Annually or more frequently if hazard conditions change significantly

AGL Loy Yang's current geotechnical and hydrogeological hazard register is attached in Appendix 2.

As a result the annual review of the geotechnical risks, AGL Loy Yang will update the geotechnical hazard register as required.

5.3.7. Permanent batter design

The geometry of the permanent batters is generally designed in the Strategic Mine Plan to address geotechnical and operational matters. (AGL Loy Yang's mine design process is described in Figure 24.) Geotechnical considerations include the major known defects, joint sets, faults and bedding planes. Operational requirements influence bench width and batter slopes, for example. This design is varied locally in the 24-month mine schedule to address small-scale variations in response to information from the annual geotechnical reviews and fortnightly geotechnical inspections.

The permanent batter design for the mine is based on exceeding the published Factor of Safety (or Probability of failure) criteria for the permanent batters (GCMP) given the geotechnical and risk assessment data that applies for each slope domain.

The published guidelines relied on are: Geotechnical Considerations in Open cut Mines Guideline. Department of Minerals and Energy, WA 1999 (Table 1); and Read J. and Stacey P. Guidelines for open cut slope design 2009 CSIRO Publishing (Table 9.9).

Currently, all the slope domains meet or exceed the published design guidelines given the slope category (GHD, Report for AGL Loy Yang - Mine Geotechnical Performance Report, 31/11463/15, September 2014). Figure 12 shows the estimated overall slope angles for the permanent batters as-built. There have been no overall slope failures in these existing permanent batters. There has been one block movement in the South Eastern domain but that movement was not related to the overall slope angle but the ingress of water behind the slope.

AGL Loy Yang will achieve an overall slope design for the permanent batters in Stages C, D and E of 1:3 (V:H) or flatter (as measured from top of mine crest to the toe at the Base of Mine).

To achieve this, batter design configurations for the Loy Yang Mine generally lie within the following ranges:

- 10 to 50 m wide berms/benches and up to 30 m high individual batters (typically 10 to 24 m);
- Overall (crest – toe) slope/batter slopes at 1:3 V:H, as measured from top of mine crest to the toe at the Base of Mine (BoM);
- Individual permanent batter angles in coal (including interseam): typically batters >12 m in height are 45° and batters <12 m in height are 52°; and
- Individual permanent batter angles in overburden from ~ 15 to 20° (compared with operational batters at 45° to 52°).

AGL Loy Yang documentation regarding its permanent batter design is provided in Table 5.3.7.1.

Table 5.3.7.1 Permanent batter design

Program	Most recent reference	Review period
Permanent batter designs	Strategic Mine Plan - Loy Yang February 2014	Annually

5.3.8. Mine operating batter design

Structural stability analyses and continued performance-based information have resulted in the following single batter scale design configuration:

- A maximum height of 27 m;
- Individual side and end batter angles in coal (including interseam): typically batters >12 m in height are 45° and batters <12 m in height are 52°.
- Overburden batters are 45°.

An example of operating batter design documentation is provided in Table 5.3.8.1.

Table 5.3.8.1 Mine operating batter design

Program	Most recent reference	Review period
Mine operating batter designs	GCMP 2013 and Strategic Mine Plan (2014)	Annually

5.4. Establishing and maintaining a geotechnical and hydrogeological monitoring program

AGL Loy Yang's geotechnical monitoring program is based on the overall risk assessment of mining development with the monitoring plans (location, frequency, etc.) determined by the expected ground behaviour. The locations of the stability assessment lines and surface survey pins are shown in Figures 8a and 8b. Key elements of this program are listed in Table 5.4.1. Actions developed from the reviews are scheduled into the mine operations as part of the on-going risk review program and the annual review of the strategic mine plan.

Table 5.4.1 Geotechnical and hydrogeological monitoring program

Program	Most recent reference	Review period
Levels for AGL Loy Yang A Power Station and raw coal bunker	Structural surveillance survey	Annually
Surface movement within the GRZ	Batter Performance Report	Annually
Surface movement outside the GRZ (northern batter to Traralgon township boundary)	Batter Performance Report (includes 3-yearly movement survey)	6-monthly and annually
Subsurface monitoring (shear and extensometer)	Batter Performance Report	Monthly with results presented annually

Program	Most recent reference	Review period
Dams (ash pond, fire service reservoir, settlement pond, high level storage reservoir)	Routine surveillance and reporting to ANCOLD guidelines Annual Dam Surveillance Program	Annually and after trigger events (rainfall and earthquake)
Slope stability water level monitoring	Batter Performance Report	According to the risk level attributed to the walls/bores
Aquifer water pressure monitoring	Depressurisation Review	Annually
Geotechnical features and defects	Operating Face Stability Assessment (2013)	2 yearly
Aquifer depressurisation	Aquifer depressurisation annual report 2014	Annually

5.4.1. Monitoring mine floor heave

The mine floor will heave if the aquifer pressure becomes greater than the weight of material overlying the aquifer, as the coal is removed during mining operations. Excessive heave can result in yielding of the mine floor, potential machine instability, subsequent failure of the batters and aquifer mixing.

Fortnightly geotechnical inspections identify emerging geotechnical issues and these are entered into the crack database to inform operational planning for mine development.

Long-term excavation and depressurisation plans are reviewed to ensure groundwater extraction and aquifer depressurisation occurs prior to excavation. The current aquifer pressure target levels are based on groundwater modelling of aquifer recovery during selected risk events and observed water level recovery after pumping outages. The target levels are set at 10 m and 16 m below weight balance pressures for the Traralgon and M2C aquifers respectively.

5.4.2. Assessing overburden dump stability

Overburden dumps are assessed through circular/pseudo-circular analyses using a 2-D software package. The assessment takes into account the potential for excess pore water pressure build up (and dissipation over time) in the foundation as a new level of dumped overburden is placed on top.

On the external overburden dump the permanent western batters consist of several levels and the stability of this face is critical to overall dump stability. Better quality material has been placed along the western batter to assist in maintaining the stability of this face.

The operating faces of the dump can consist of overburden, interseam or inferior coal material. A nominal 2 m thick layer of better quality overburden is placed on the surface of the dump to provide a working platform for the stackers to operate on. This layer also minimises surface water ingress into the dump and seepage into this level from future

overlying dump levels.

Material properties for the overburden dumps are primarily determined from laboratory testing and back-calculations of existing geometries. These properties are reported regularly as evidenced by documentation listed in Table 5.4.2.1. The overburden dump material properties are used to inform future and confirm current dump design and rehabilitated landform stability.

Table 5.4.2.1 Overburden dump stability

Program	Most recent reference	Review period
Overburden dump material properties	Batter performance report 2014	Annually

The capacity of the external overburden dump is directly affected by the slopes of the batters required to maintain adequate dump stability. The currently approved safe maximum overall batter slopes up to the fifth level of the external dump is 1V:10H. This work plan variation shows that the dump is now restricted to level 5, potentially 60 m lower than previously licensed under the 1997 Work Plan. This design revision will be to the current design criteria as detailed in the GCMP. Past performance has shown that these criteria provide a safe and stable slope once rehabilitated.

AGL Loy Yang's overburden dump design includes:

- Dump levels constructed from 18 m to 22 m design heights (depending on the stacker used and stability conditions) with final slopes graded to 1V:6H; and
- The overall dump design slope will be closer to 1V:12H.

This overall slope of the external overburden dump is consistent with the maximum overall slope angle of 1V:10H set by the 1997 Work Plan.

AGL Loy Yang reviews its overburden dump designs regularly as evidenced by documentation listed in Table 5.4.2.2.

Table 5.4.2.2 Overburden dump design

Program	Most recent reference	Review period
Overburden dump designs	GCMP (2013)	Annually

5.4.3. Excavation controls

Controlled excavation to the designed batter profile through use of BWEs is essential. Excavation control is achieved by providing the design angle, toe and crest position on a routine basis as a survey plan to mining crews and then reconciling this with accurate as-constructed surveys.

Faces are scaled and berms cleaned of remaining material before completing each mining area. The responsible mining person inspects the limits excavation process, particularly in

the latter stages, to ensure that adequate quality and design positions within acceptable mining specific tolerances have been achieved. The responsible mining person also considers obvious geological defects as part of excavation control.

Face excavation plans to create the batter slopes using the BWEs called "Dredger Terrace Digging Charts" are created by AGL Loy Yang's mine planners and are provided to operators on a regular basis. Excavation plans are created to show the location of material to be removed and include details of grade, batters to be developed, types of materials and other requirements (and may include major defects). These plans are produced on a daily to weekly basis depending on the nature and difficulty of the planned operation.

Auxiliary excavation is undertaken by mobile plant, where required. Auxiliary excavation is generally by either back-hoe (e.g., for shallow drains) or by track-mounted excavators of various sizes. Auxiliary excavation is occasionally used to trim final batters to the design profile. Auxiliary excavation is carried out within machine limits as specified by the manufacturer, and to the profiles shown in the digging charts referred to above.

Documentation used by AGL Loy Yang to control excavation is listed in Table 5.4.3.1.

Table 5.4.3.1 Excavation controls

Program	Most recent reference	Review period
Excavation practices	PRWD016M, PRWD018M, PRWD020M, PRWD023M	As required
Face excavation plans	MSW001	Daily or weekly

5.4.4. Controlling blasting

Loy Yang Mine has encountered silicified horizons within the Haunted Hill Formation. This has occurred at approximately 8 to 10 year intervals. These horizons have proved problematic for excavation by BWEs. A number of trials were conducted in 2006/07 whereby low level explosive "bumping" was used to loosen the overburden where silification was known to occur or was likely to occur. A risk assessment that considered protection of adjacent final batter integrity during bumping was carried out in September 2006. Overburden bumping has not been carried out since the 2006/07 trial.

5.4.5. Maintaining mine access

Access to the operational pit consists of ramps and haul roads. These access ways are regarded as "life of mine" excavations. The condition of road surfaces for these access ways are inspected according to AGL Loy Yang's Road and Traffic Management Guidelines (G000004) regime. These inspections and ad hoc observations reported to the road manager inform road maintenance activities to ensure on-going safe access to the open cut. There are designated route markers on major access routes defining safe egress from

the operational areas. A road map showing the major roads is maintained and all major roads signposted.

Documentation of how AGL Loy Yang's of mine access ways are developed and managed is listed in Table 5.4.5.1.

Table 5.4.5.1 Mine access

Program	Most recent reference	Review period
Ramp and Haul Road Access	AGLLY Road and Traffic Management Guidelines (G000004)	Annually

5.4.6. Undertaking hydrogeological risk assessment

Hydrogeological risks identified are listed in Table 5.3.1 and in the risk register (Appendix 2)

5.4.7. Groundwater targets

To provide early warning or trigger levels for batter instability based on groundwater levels in Loy Yang Mine, coal water levels have been determined for the various Trigger Levels to provide the required stability condition for key monitoring bores. The required FoS (Factor of Safety) and PoF (Probability of Failure) for the relevant Trigger Level stability condition are shown in Table 5.4.7.1. The link between FoS and TARP levels is determined by static numerical modelling. Three qualitative levels have been set between the accepted long term FoS for the slope and the FoS at which failure may be imminent. The TARP levels and associated actions for boreholes are setout in the GCMP (Dataset Names and Locations table).

Table 5.4.7.1 Coal Water Trigger Level Criteria

Location	levels	FoS	PoF P[FoS≤1]
Northern, western and southern batters	Normal	> 1.5	
	Level 1	1.3 - 1.5	5-10%
	Level 2 - Alert	1.1 - 1.3	10-15%
	Level 3 - Critical	< 1.1	>15%

The trigger levels are reviewed annually. Where trigger levels are exceeded or where monitoring and measurement results indicate adverse trends against nominated trigger levels the frequency of monitoring may need to be increased to more closely monitor performance trends. Where "adverse" trends are observed corrective actions are implemented. This monitoring shall confirm the effectiveness of the corrective action taken.

5.4.8. Groundwater depressurisation program

Groundwater and ground movement monitoring involves monthly field monitoring of stability related groundwater and subsurface ground movement bores in key operational areas (approximately 98 bores, 85 in mine, 13 in external dump) and quarterly monitoring of the remaining bores (approximately 49 bores).

Weekly monitoring of key aquifer observation bores (approximately 67 bores), and monthly or quarterly monitoring of remaining bores (approximately 15 bores) are performed according to the monitoring schedule. This aims to gather and evaluate the necessary data to determine the potential for heave in the mine floor, flooding and batter instability resulting from excessive aquifer pressures and ensure the depressurisation system is effective for current and projected mine development.

The key hydrogeological related monitoring processes and techniques include:

- Pump bores
    - In addition to extending the pump bore network eastwards, the current pump bore network must be retained in order to maintain aquifer target pressures and ensure sufficient spare capacity is available in the system to cover any bore failures. Pump bores historically fail due to differential sub-surface ground movement. The requirement for replacement pump bores is assessed continually to ensure suitable alternative bore sites are available when individual bores fail.
- Piezometers (aquifer pressures, groundwater levels and pore water pressures)
    - In order to determine if aquifer pressures are below the required target levels, a network of aquifer pressure monitoring bores has to be maintained around the mine. Each year a number of observation bores are drilled to maintain and extend the monitoring bore network in conjunction with mine development.
    - For assessment of the long-term external waste dump stability, the pore water pressure in the external waste dump is monitored on monthly basis. One groundwater monitoring bore is installed each year in the external waste dump. The new bore is located to match the dump development to provide pore water pressure data as the subsequent levels of the dump are placed.
    - Within the Loy Yang Mine, groundwater monitoring bores are installed for geotechnical purposes and are known as "Coal Water Monitoring Bores". This network of bores generally targets the water level in each of the coal seams, shallower aquifers and perched water tables within the batters and provides information on hydrogeological conditions. Stability monitoring bores generally indicate a response to rainfall in the form of:

- A sharp rise in water levels following the rainfall event.
- An equally sharp drop in levels after the cessation of rainfall and dissipation of the groundwater.
- The decline of groundwater levels (assuming a reduced rainfall rate) during the following month.
- A return to relatively static levels in a reasonably short period.

- Horizontal Drain hole Flows
  - Routine drilling of horizontal bores is deemed necessary to achieve sufficiently favourable conditions in the batters and will continue to aid in:
    - Lowering the water table in the batters, improving batter stability and controlling ground movements;
    - Drainage of water from coal joints and localised transient pressure relief following heavy rain or leakage due to pipe failure etc.; and
    - Batter stability for protection of pump bores where they are located close to batters.

The depressurisation program review is referenced in Table 5.4.1 (Geotechnical and Hydrogeological Monitoring program).

5.5. Geotechnical and hydrogeological risk controls

Current and target controls for each of the domains are described in the GCMP and summarised in Appendix 2. The risk assessment (Section 5.3) has facilitated the identification of triggers and contributing factors to risks and to determine controls that could be used to both monitor and prevent the hazards from impacting the business and materialising into risks. Triggered Action Response Plans (TARPs) have been developed that outline the process required should threshold or alarm values be reached. The current TARPs that are primarily used to address the following events and risks:

- Rainfall (intensity and volume triggers);
- Rainfall like events; such as spray application and pipe leaks
- Groundwater levels;
- Seismic Events;
- Batter Instability; and
- Ground Movement.

AGL Loy Yang documentation regarding its geotechnical and hydrogeological risk controls is provided in Table 5.5.1

Table 5.5.1 Geotechnical and hydrogeological risk controls

Program	Most recent reference	Review period
Geotechnical and hydrogeological risk controls	GCMP 2014	Annually

5.6. On-going review of geotechnical and hydrogeological risk assessments

The process for reviews of the assessment, plan, actions and controls relating to geotechnical and hydrogeological risk is defined in the GCMP. These processes are undertaken in line with AGL Loy Yang's Risk Management Policy (HS.PCY013), which aims to establish and maintain a sound risk management framework consistent with the principles of the Australian Standard for risk management (AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines). More importantly, this policy provides the framework under which AGL Loy Yang will ensure that decision-making processes consider potential risks, together with the anticipated benefits and costs associated with managing those risks.

All business risk items identified reside electronically on the risk software database (Periscope). AGL Loy Yang section and divisional managers periodically review the data. Business risks rated as 'Extreme' or 'High' are included in a business risk register to be tabled with the AGL Loy Yang risk management panel. Focused risk management exercises are comprehensively documented in the risk register.

Documentation associated with AGL Loy Yang's reviews of geotechnical and hydrogeological risks are listed in Table 5.6.1.

Table 5.6.1 Risk reviews

Program	Most recent reference	Review Period
Risk policy	Risk Management Policy HS.PCY013	As required
Risk review	Ground Control Management Plan CPW001M Rev01 April 2013	Annually

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6. Rehabilitation plan

6.1. Purpose

Section 40(3)(c) of the MRSDA requires mining licence holders' work plans to include a rehabilitation plan. This rehabilitation plan has been prepared in accordance with Schedule 15 of the MRSDMI Regulations and the Work Plan Guidelines for a Mining Licence – Exceeding 5 Hectares prepared by the Earth Resources Regulations Branch of DEDJTR.

Section 6 of Part 1 of Schedule 15 to the MRSDMI Regulations requires the rehabilitation plan to:

- Address concepts for the end utilisation of the site;
- Include a proposal for progressive rehabilitation and stabilisation of extraction area, road cuttings and waste dumps, including re-vegetation species; and
- Include proposals for the end rehabilitation of the site, including the final security of the site and the removal of plant and equipment.

6.2. Key objectives

The key objectives for long term rehabilitation are:

- eliminate long term exposed coal to reduce fire risk,
- create a geotechnical stable landform (refer to processes as outlined in Section 5)
- Complete the majority of the rehabilitation works within 15 years of closure; with a subsequent period of monitoring and maintenance as required.
- create a land form that provides access for maintenance and end use purposes.

AGL Loy Yang is committed to the progressive and long term rehabilitation of the Loy Yang open cut mine. AGL Loy Yang recognises that there are challenges in achieving the key objectives as outlined above. As a result AGL Loy Yang commits to work with government bodies, researchers and the operators of the Yallourn and Hazelwood mines to better understand the risks.

In order to assist in resolving some of these technical issues, AGL Loy Yang will conduct, during Stage C, a comprehensive trial of rehabilitation options on sections of the 2.5 km long south western and western permanent batters. The trials will assist in further determining the final rehabilitation designs (inter-slope angle, clay and topsoil coverage, infrastructure layout, drainage and maintenance) for batters and maintenance requirements to achieve the key objectives for long term rehabilitation. Following the transition through Stage C, all future permanent batters will be designed for stability, ideally with an overall slope of 1:3 (V:H), or flatter, as measured from top of mine crest to the toe at the Base of Mine (BoM). The results from the aforementioned trials will be used to inform the rehabilitation design for these permanent batters on the northern, eastern and southern slopes (about 14 km).

At mine closure and final rehabilitation the slopes can be divided into three domains – above the final lake water level, below the final lake water level and at the final lake water level.

Above the final lake water level the interseam material will not be re-saturated, although some increase in moisture can be expected to occur due to material covering the final slope preventing water evaporation from the interseam. Therefore it is expected that there will be no adverse impacts on stability.

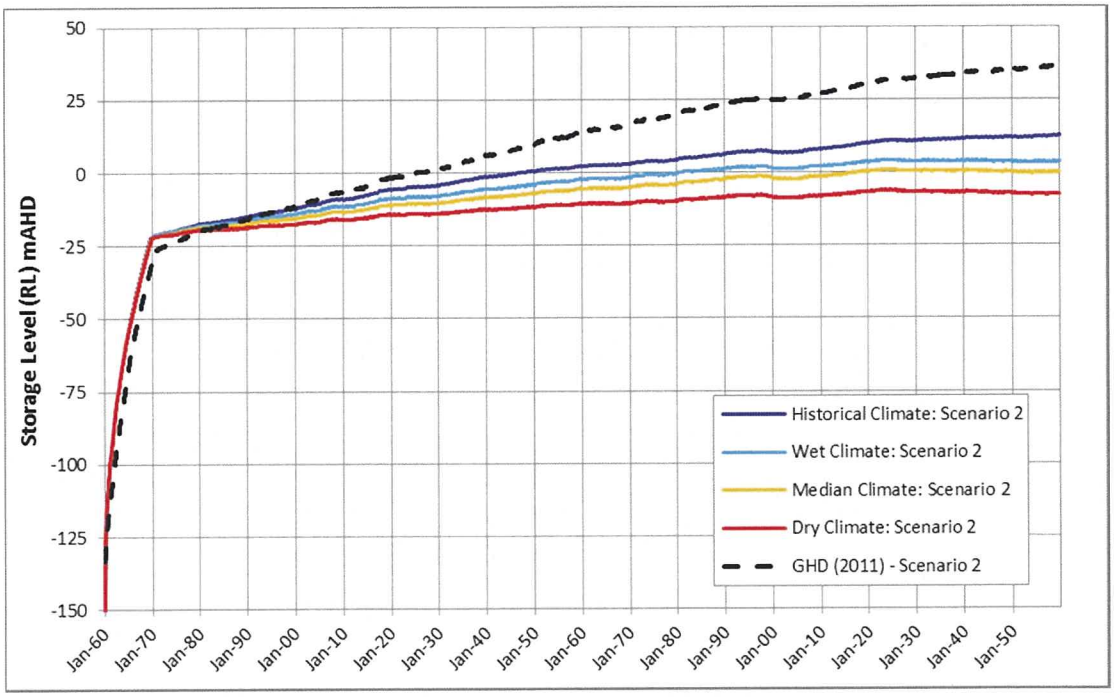
Below the final lake water level the interseam will be saturated, but as noted above, the batter slopes have been designed for this condition. Therefore no significant impact is expected.

Around the final lake water level there will be some variation in the water level due to seasonal impacts plus wave action. It is expected that protection of the sandy interseam will be required. It is considered that at some locations the interseam will need to be covered with geotextile and rock beaching (rip rap). However, alternative protection measures are possible where the interseam is located high up in the bench scale batter. Trials of potential protection measures will be undertaken when the lake level is well below the final lake water level. These trial areas will be flooded as the lake level increases. Therefore the extent and size of the works at the final lake water level will be gauged during progressive lake water level increase after mine closure. In addition, it is expected that if any instability issue occurs within the interseam, it will only be local/small and would not cause significant slope stability concerns.

Batter slopes are categorised based upon the consequence of failure. The consequence of failure has a corresponding acceptable minimum FOS. Currently the minimum FOS for the various slopes within the mine, as set by the GCMP, are shown in Table 5.3.4.1.

6.3. End use concept

The end use concept is to partially flood the final open cut to form a lake and return the remaining disturbed land to agricultural use. It is AGL's intention that the land will remain in private ownership at the completion of mining. AGL Loy Yang commits to flooding the mine as soon as practicable after the completion of mining and earthworks associated with rehabilitation. One concept is based on all existing water licences and entitlements being available to flood the pit. On this basis, the study (Scenario 2 - GHD report 31/11418/15 – Loy Yang Mine rehabilitation Mine Lake Water balance modelling, January 2015) shows the lake level will be at –18 m RL to -20 m RL, 15 years after flooding commences and depending on a range of expected climatic conditions. The study also shows that the final lake level, could be achieved within a further 70 years, will be up to RL 0 (assuming historical climate conditions). A copy of this study is attached in Appendix 4 and Figure 11 (Appendix C) showing the results, for Scenarion2, is reproduced below.



Prior to lake filling, the floor of the pit will be covered with overburden from the in pit dump. This will see final overburden levels varying from about 0 m RL in Stages A and B to about -50 m RL in Stages C and D. The end use concept is shown in plan in plan in Figure 19 with cross-sections 21(a), 21 (b) and 21(c).

AGL Loy Yang commits to investigating and seeking approvals for all water sources to reduce the time for lake filling.

6.4. Rehabilitation plan

6.4.1. Progressive rehabilitation plans

AGL Loy Yang is committed to the progressive rehabilitation of the mine areas (both permanent batters and dumps) when they are no longer required for mine operations.

The rehabilitation plans are based on the following:

- The existing permanent batters, developed up to Stage B (2014), have as-built overall slopes at 1:3 or flatter (V:H), as measured from top of mine crest to the toe at the Base of Mine (BoM), except for some small areas. These areas will be treated to achieve 1:3 slopes, as measured from top of mine crest to the toe at the Base of Mine (BoM).
- The permanent batters to be developed in Stages C, D and E will be designed to a 1:3 (V:H) overall slope angle, as measured from top of mine crest to the toe at the Base of Mine (BoM).

- Internal dumping will place backfill on the floor of the mine and partially against permanent batters.

The areas currently rehabilitated are shown in plan in Figure 16, with cross sections through the northern batters rehabilitation shown in Figure 7a. The area for proposed rehabilitation trials is shown in Figure 17. Subject to the outcome of rehabilitation trials technical assessments and scheduled progressive rehabilitation for the northern, eastern and southern batters is shown in plan and cross-sectional views in Figures 16, 17, 18, 19 and 21. These depict the progressive rehabilitation at the completion of stages B, C, D, E (Note that the achievement of the staged toe position should represent completion of the previous section) and at closure. The coal and overburden coverage schedule is summarised in Table 6.4.3.1, this recognises the current (as-built) permanent batters and those to be developed in Stages C to E.

This plan will see all coal exposed in the permanent batters covered and maintained for fire, dust and water shedding above the 15 year fill mark. Below this level the permanent batters will be covered by water or overburden.

Evidence of AGL Loy Yang planning for and progressively rehabilitating mine areas is provided in Table 6.4.1.2.

Table 6.4.1.2 Rehabilitation planning, implementation and reporting

Program	Most recent reference	Review period
End use concept	Figures 19 and 21 WPV AGL Loy Yang's Rehabilitation Master Plan (2015)	 3-yearly
Rehabilitation planning	AGL Loy Yang's Rehabilitation Master Plan (2015) Western batter rehabilitation trials	3-yearly In planning, undertaken during Stage C
Progressive rehabilitation	Strategic Mine Plan 2014 Environmental Review Committee Report (May 2015) MRSDMI Regulations 2013 Schedule 19 – Information required for expenditure and activities return	Annually Quarterly Annually

These reports and rehabilitation plans represent AGL Loy Yang's commitment to rehabilitation.

AGL Loy Yang's decommissioning and rehabilitation plans are described below for the following closure domains:

- External and internal overburden dumps;
- Open cut batters ;
- Lake filling and aquifer depressurisation;
- Infrastructure; and
- Other areas.

Rehabilitation planning is linked to the Ground Control Management Plan (section 5.3.1) regarding batter profiles, movement triggers, mine floor weight balances and dewatering criteria.

6.4.2. External and internal overburden dumps

The end use concepts for the external and internal overburden dumps are:

- An external overburden dump supporting pasture for grazing use; and
- An internal overburden dump in the western portion of the open cut supporting pasture for grazing.

A plan of the end use concept and cross-sections including the internal overburden dump are shown in Figures 19, 21 (a) and 21(b).

The closure objectives for the external overburden dump and proposed internal overburden dumps are:

- Landforms geotechnically stable and safe;
- Landforms compatible with the existing landscape;
- Vegetation cover stabilises the surface to minimise erosion and dust emissions;
- Seepage and runoff does not adversely impact adjacent vegetation communities, surface water ecosystems or groundwater quality;
- Supports pasture and grazing land use; and
- Fire risk mitigation and minimisation.

The external overburden dump has a current area of 665 hectares of which some 220 hectares (33%) has been rehabilitated. Rehabilitation has included re-contouring, coverage with topsoil and re-grassing. These operations are shown in Plates 1, 2, 3, 7 and 8. To date no slope failures have occurred and all key objectives (Section 6.5.1) continue to be met. The slopes are grazed or slashed and regular inspections are undertaken as part of the geotechnical inspection program (Section 5.4).

Since its inception in 1982, the external overburden dump has been developed up to Level 5. Rehabilitation commenced in the late 1980s. With the exception of minor operational failures no significant failure has been reported on the rehabilitated batters. This behaviour confirms the geotechnical analyses, a copy of which is attached in Appendix 4, of the external dump stability (GHD 2011b, Report 31/11452/10/192317) to Level 5.

AGL Loy Yang's risk mitigation approach for rehabilitating the internal and external overburden dumps is outlined in Table 6.4.2.1.

Table 6.4.2.1 Approach to address overburden dump risks and issues

Risks/Relevant Issues	Approach
1. Geotechnical stability	• External overburden dump: shape the northern, western and eastern slopes with 1V:6H final batter slopes. As defined in section 4.4.10. Internal overburden dump: • Abut pit walls to the west and north. • Extend the lower level of the dump as far as possible over the floor of the mine to counterbalance underlying aquifer pressures. Progressively reduce and flatten batters to achieve a stable landform, especially towards the northeast and southeast, where it will eventually be inundated by the lake.
2. Erosion and sediment/water movement	• Use topsoil to support establishment of stabilising vegetation cover. • Monitor erosion to determine whether additional management is required through regular inspections as defined in Table 7.3.1. • Utilisation of AGL's Water Management Plan for design and maintenance of drainage systems External overburden dump: • Construct a drainage system, incorporating the existing runoff channels and treatment ponds, to control runoff and minimise erosion. • Maintain existing runoff treatment ponds as wetlands to provide passive water treatment (Section 6.4.1). Internal overburden dump: • Direct surface water runoff to the lake. • Design the lake shoreline to minimise beach erosion.
3. Acidic leachate	• Encapsulate overburden with clay caps for each operating level and batter seals to minimise water ingress into the dump and control acidic leachate. • Maintain the external dump's subsurface leachate collection system during dump building • Place leached ash in cells within the dumps to dispose of it, encourage dump drainage and provide some additional acid neutralising capacity. • Inundate lower levels of the internal overburden dump to final water level m to minimise oxygen ingress into the dump thereby controlling acid generation. • Monitor seepage quality from underdrainage system to determine whether additional management is required.
4. Spread of weeds and pest animals	• Aggressively control invasive weed and pest species in the first two years following revegetation. • Monitor revegetated areas to determine when to control weeds and pest animals.
5. Revegetation failure	Monitor revegetated areas for survival and diversity to determine if repair, enhancement or replacement is required

Risks/Relevant Issues	Approach
6. Ash leachate	• Maintain external dump's subsurface leachate collection system during dump building. • Monitor seepage quality from underdrainage system to determine whether additional management is required.
7. Fire risk	No coal exposure on rehabilitated dump, graze/slash dumps to limit fire fuel load.
8.Revegetation	• Cover final dump surfaces with topsoil and sow pasture species. • Install fencing around areas nominated for grazing to manage stock.
9.Completion criteria	Rehabilitation will be deemed to be complete when pasture has survived grazing for two years on the overburden dumps and seepage quality meets EPA requirements.
10.Progressive rehabilitation	• Rehabilitate and revegetate levels of the external overburden dump as they are completed. (To date, the lower levels of the western and northern sides of this dump have been revegetated with pasture and tree species) • Monitor erosion, water quality and vegetation of rehabilitated land to identify successful techniques for future application.
11.Land ownership and future access	• This site will remain in private ownership.
12.Site security	No special security measures are required for the overburden dumps.
13.Decommissioning of plant and equipment	Dismantle and remove conveyors and tripper stackers from overburden dumps.
14.Long-term management	Assume land stays in private ownership, long term management will be continued grazing.

6.4.3. Open cut batters

AGL Loy Yang has progressively rehabilitated all permanent overburden slopes above the coal for developments to Stage B, with the exception of the southern batters, which are not permanent. Examples of this rehabilitation are shown in Plate 4, 7 and 8. Progressive rehabilitation is typically undertaken within 12 months of exposing the area. The 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 monitoring program (Section 5.4).

Areas already rehabilitated are shown in Figure 16 and typical examples of dump rehabilitation works are shown in Plates 1 to 3. AGL Loy Yang's plans for progressive rehabilitation are tabulated in Table 6.4.3.1 and are shown in plan in Figures 17, 18 and 19 which correspond to Stages C, D and E of the mining development plan (see Section 4.4). The detailed rehabilitation plans for the northern, eastern and southern batters will be further informed by the results of the trial and GHERG projects.

Table 6.4.3.1 Progressive rehabilitation program

Area	Time period
The areas shaded green, as shown in Figure 16, show a rehabilitated area of approximately 420 ha (pit areas 200 ha and external overburden dump 220 ha).	Stage B (Current)
Rehabilitation trials – undertake scoping of the trial for Western and southern batters west of conveyors (multiple trial strips within the approximate 2000 metre trials area length). By the end of Stage C an area rehabilitated of approximately 70 ha. This area will be confirmed/determined by the outcomes of rehabilitation trials (Figure 17).	During Stage C
By the end of Stage D, Northern batters, Stages A, B and C (approximately 3,500 metres and 120 ha) as determined by the Stage C rehabilitation trials. Rehabilitate remainder of external overburden dump (approximately 445 ha) (Figure 18).	During Stage D
Eastern and Southern Batters and all other areas (Figure 19).	At mining completion

AGL Loy Yang proposes the approach for rehabilitating the open cut batters outlined in Table 6.4.3.2 to address risks and issues.

Table 6.4.3.2 Approach to address open cut batter risks and issues

Risks/Relevant Issues	Approach
1. Geotechnical stability	• Continued geotechnical investigation, across domains, to determine the long term and stable slope gradient. • Largely fill the western portion of the open cut with the internal overburden dump, which will allow optimisation of adjacent batter slopes. • Subsurface drainage systems will be used where this is essential to relieve hydrostatic pressures behind the batters. • Treat/shape all batters to provide a long term and stable landform. • Reshape southern batters of the open cut in Stage A above the internal overburden dump to a long term and stable gradient. • Monitor batter stability to determine whether additional management is required.
2. Fire hazard	• Cover all areas of coal benches and batters with clay, above the final water level, for fire protection to minimise the area of exposed coal • AGL Loy Yang commits to covering coal with either water or "non ligneous and non-flammable" material as soon as possible after closure but not leave coal exposed for a period longer than 15 years. • For coal that is exposed during this aforementioned period AGL Loy Yang will undertake comprehensive risk assessments and implement required controls in line with relevant MIN5189 conditions to manage the risk of coal fire. • Apply learnings of the rehabilitation trials. • Design covers so that they do not interfere with the subsurface drainage system.
3. Public safety (commensurate with future planned private land ownership)	• Install signage and fencing to advise no right of entry to private freehold land including the open cut lake.
4. Erosion and sediment/water movement	• Establish stabilising vegetation cover on the upper batters and plant appropriate vegetation on the berms between lower batters above the lake shoreline. • Implement controls to reduce shoreline erosion. • Utilisation of AGL's Water Management Plan for design and maintenance of drainage systems • Monitor erosion to determine whether additional management is required through regular inspections as defined in Table 7.3.1.
4. Spread of weeds and pest animals	• Aggressively control invasive weed and pest species in the first two years following revegetation. • Monitor revegetated areas to determine when to control weeds and pest animals.
5. Re-vegetation failure	• Monitor (Table 7.3.1) revegetated areas for survival and diversity to determine if repair, enhancement or replacement is required.

Risks/Relevant Issues	Approach
6. Revegetation	• Cover all batters above the final water level with topsoil and sow pasture and native vegetation species. • Install fencing to keep stock off steeper, less stable areas.
7 Completion criteria	• Rehabilitation will be deemed to be complete when slope stability has been maintained and pasture on upper batters has survived for two complete years and when vegetation on berms between lower batters has survived four complete years.
8 Progressive rehabilitation	• Rehabilitate and revegetate mine batters above RL -10 m as they are completed. (To date, the overburden faces on the western and northern batters of the mine have been dozed and covered with pasture grasses.) • Monitor rehabilitation to identify successful techniques for future application as per Table 7.3.1.
9 Land ownership and future access	• This site will remain in private ownership.
10 Site security	• See "Public safety" above.
11 Contaminated soil management	• Identify any contaminated soil will not be buried by the internal overburden dump and will be removed to an appropriate site or treated. • Exposed interseam will be covered by clay or covered by water during the pit filling process.
12 Long-term management	• Assume land stays in private ownership, long term management is expected to be natural re-growth.

AGL Loy Yang will monitor the rehabilitation in accordance with the Batter Performance Report (Table 5.4.1), land use monitoring (Table 7.3.1.) and fire risk management (Table 9.6.1).

6.4.4. Lake filling and cessation of aquifer depressurisation

The end use concept for lake filling and cessation of aquifer depressurisation is:

- Ceasing aquifer depressurisation when the lake level reaches stable level for balancing aquifer pressures. Current modelling (section 6.3) indicates this level will be achieved in the medium term (10 years, assuming existing water licences and entitlements) and could be accelerated by flooded creek diversions etc.
- Creating a lake in the remaining open cut with an ultimate surface level at RL 0 m.

A plan of the end use concept is shown in Figures 19 with cross-sections 21 (b) and 21(c) including the mine lake.

The following closure objectives will be pursued, for lake filling and cessation of aquifer depressurisation:

- Pit void lake filled as soon as practicable (see scenario 2 - GHD 2015 Ref:31/11418/15, a copy of which is appended in Appendix 4);
- Deep aquifer pressure balanced with the overlying weight of the internal overburden dump and lake water to avoid mine floor heave and aquifer mixing and to allow aquifer depressurisation pumping to cease; and
- During filling maintain lake water quality to support relevant beneficial uses such as pasture irrigation and stock watering and protection of groundwater beneficial uses.

AGL Loy Yang commits to investigating and seeking approvals for other water sources to reduce the time for lake filling.

AGL Loy Yang proposes the approach for lake filling and cessation of aquifer depressurisation outlined in Table 6.4.4.1 to address risks and issues. Note that a number of approaches will need to be completed prior to the filling activities being undertaken.

Table 6.4.4.1 Risk mitigation approach for lake filling and cessation of aquifer depressurisation

Risks/Relevant Issues	Approach
1 Lake filling	• Progressively fill the western portion of the open cut with the internal overburden dump extending it eastwards as far as practicable to the east. • After completing the internal overburden dump, fill the remaining open cut with water. • Source water from aquifer pumping, local runoff and seepage from shallow groundwater systems to create a lake. From preliminary modelling, the lake water level is predicted to stabilise between RL 0 and RL -10 m. • Investigate alternate water sources and develop lake filling scenarios (GHD 2015, Report 31/114418/15). • Investigate and seek approvals for diverting extracted groundwater, bulk entitlement flows, and other potential sources. • Identify filling zone (final lake footprint) and include beaching design. • Design any inlet structures for each approved water source in accordance with relevant design requirements.
2 Aquifer pressures rebound sooner than expected	• Depressurise aquifers until the combined weight of the internal overburden dump and lake is sufficient to balance the aquifer pressures. • Set trigger aquifer pressures during final stages of the lake filling at which aquifer pumping recommences and monitor aquifer pressures.
3 Failure of depressurisation bores	Maintain and, if necessary, install new aquifer depressurisation bores if they are compromised by ground displacement.

Risks/Relevant Issues	Approach
4 Poor lake water quality	• Develop water quality objectives and water level criteria prior to lake filling. • Identify sources of poor quality water and develop mitigation options. • Revegetation of open cut as described under "open cut batters" to minimise erosion and sediment runoff into the lake. • Use lake water where necessary to support agricultural land use associated with the rehabilitated internal overburden dumps. • Identify filling zone and include beaching design in final rehabilitation plans.
5 Lake level fluctuations	• Review water balance model periodically during filling
6 Shoreline erosion	• The internal dump faces will be assessed, designed and constructed for shoreline erosion protection, for example rip rap, during the lake filling process. • Placement of suitable material, for example rip rap, at the 15 year water level and coverage for lake level fluctuations to RL 0 m. • Shoreline material to be suitable for end use purposes and erosion.
7 Completion criteria	• Rehabilitation of the pit void will be deemed to be complete when the lake has filled to -10 m (lake shoreline level) and aquifer depressurisation is no longer required and native and pasture grasses have been established above this on the batters for 2 years. • Lake water quality meets water quality objectives.
8 Progressive rehabilitation	Lake filling will commence as soon as practicable after rehabilitation and when revegetation works in the pit are complete.
9 Land ownership and future access	This site will remain in private ownership.
10 Site security	Install signage and fencing to discourage public access to all private freehold land including the pit void lake.
11 Long-term management	Assume land stays in private ownership, long term management is expected to be natural water level.

6.4.5. Infrastructure

The end use concept for plant, services, workshops, administrative buildings and other infrastructure is to:

- Redevelop building infrastructure for industrial or commercial use; alternatively
- In the event redeveloping building infrastructure for industrial or commercial use is not permitted the decommissioning and removal of infrastructure and establishing pasture for grazing use over these sites.

A plan of the end use concept is shown in Figure 19. Current mine infrastructure is shown in Figures 20, 4b and 4c.

The closure objectives for infrastructure sites, subject to planning approval, are as follows:

- Useful buildings and associated infrastructure retained;
- Unwanted infrastructure decommissioned, demolished and removed;
- Equipment and materials salvaged, re-used and recycled where possible;
- No sources of contamination; and
- Supports pasture and grazing land use.

AGL Loy Yang proposes the approach for rehabilitating the infrastructure sites outlined in Table 6.4.5.1 to address risks and issues.

Table 6.4.5.1 Approach to address infrastructure risks and issues

Risks/Relevant Issues	Approach
1. On-going structural integrity and safety	• Assess structural integrity and safety of buildings and infrastructure during care and maintenance or to satisfy due diligence requirements of subsequent owners. • Assess sites where buildings and infrastructure has been demolished and removed to satisfy due diligence requirements of subsequent owners and/or regulatory requirements for changes in land use.
2. Demolition structural integrity and safety	• Maintain mine site security during demolition to prevent public access. • Dismantle and remove above and below ground infrastructure in accordance with relevant guidelines. • Assess structural integrity and safety of buildings and infrastructure during demolition. • Salvage equipment (e.g., bucket wheel excavators and conveyors), plant and material where practicable. • Retain existing infrastructure, services and buildings in the mine industrial area such as offices, workshops and warehouses where these buildings are in suitable condition for future use. • Retain roads and hardstand areas where these support future land uses. • Where roads and/or hardstand areas are redundant, they will be decommissioned
3. Waste generation	• Reuse, recycle and/or dispose of waste materials in accordance with Victorian EPA Industrial Waste Resource Guidelines, June 2009 (Publication IWRG621). (For example, recover steel and concrete during coal handling and storage infrastructure demolition for re-use for lake shoreline erosion protection, road base material, etc.) • by excavation and reuse or disposal of materials.

Risks/Relevant Issues	Approach
4. Contaminated soil	• Coal handling and storage infrastructure will be decontaminated (if necessary) and washed down prior to removal or demolition. • If the fuel depot is not re-usable, demolish underground fuel storage tanks in accordance with Australian Standard AS 4976 2008, "*The removal and disposal of underground petroleum storage tanks*". • Identify any contaminated soil and remove or treat it.
5. Spread of weeds and pest animals	• Aggressively control invasive weed and pest species in the first two years following revegetation. • Monitor revegetated areas to determine when to control weeds and pest animals.
6. Revegetation failure	Monitor revegetated areas to determine when to repair revegetation.
7 Revegetation	• Shape and topsoil disturbed areas and establish stabilizing vegetation cover comprising appropriate pasture species for grazing. • Install fencing around areas nominated for grazing to manage stock.
8 Completion criteria	Rehabilitation will be deemed to be complete when pasture has survived grazing for two years on the infrastructure sites.
9 Progressive rehabilitation	Rehabilitate as infrastructure site become available.
10 Land ownership and future access	This site will remain in private ownership.
11 Site security	See "Land ownership and future access" above.
12 Long-term management	Assume land stays in private ownership, long term management will be natural re-growth and pasture.

6.4.6. Other areas

Northern permanent batter boundary

The 1997 Work Plan identified a "Potential Loy Yang Mine Development" boundary (Figure 7 and 9) that has been taken as the limit of extraction. This boundary was a simplified version of the original SECV freehold title area.

In 2008, the northern batter was excavated, over a length of about 730 m, by some 170 m outside the 1997 Potential Loy Yang Development boundary, but within the MIN 5189 boundary (Figure 9 - Location 3). The excavation did not breach the 1 km coal buffer between the mine crest and Traralgon.

This area of development has been substantially rehabilitated with further works planned during Stage E.

There is no significant geotechnical consequence for this variation to the extraction limit. In addition, the variation to the extraction limit preserves the 1 km coal buffer, does not encroach on native vegetation and has had negligible impact on amenity as residences are

outside both the Geotechnical Risk Zone (GRZ) (Figure 23) and the Environmental Significance Overlay (ESO) (Figure 10). The Latrobe City Council has confirmed that this variation is exempt from the requirement of a planning permit (LCC Ref: Property 1334894 and 43799, 19 February 2015).

Controls to ensure the extraction limit is not exceeded in future are described in Section 5.4.3.

The open cut development since 1997 has seen two further changes to the 1997 Potential Loy Yang Development boundary and these are discussed in Section 4.3.

Former dredger erection site

The former dredger erection site (Figure 20) will be retained as an industrial area, subject to obtaining the appropriate rezoning of the land and planning consent. The area is visually shielded from the nearby Traralgon Creek Road. The area is mostly open asphalt and hardstand, with power and water services connected. Its proximity to the existing mine office and workshops complex, and the local road network make this a desirable site for industrial use.

Fire service reservoir

The fire service reservoir (Figure 20) will not be retained with the site and will be returned to a pasture/plantation area.

External dump treatment and retention ponds

The external dump treatment and retention ponds (Figure 20) will be retained as a wetland reserve with the added benefit of providing passive treatment of runoff from the rehabilitated external overburden dump area prior to discharge to the river. This proposal will be subject to further investigation, including predictions of water quality, water balance and long-term geotechnical stability, to determine its feasibility.

Undisturbed pasture and plantation areas

Areas of existing pasture/grazing and forestry plantation that have not and will not be disturbed by mining operations (Figure 19) will not require rehabilitation at mine closure and it is envisaged that contemporary land uses will continue at these locations.

Remnant vegetation areas will be utilised as a seed source for revegetation of disturbed areas during rehabilitation.

6.5. Closure plan

The closure plan is based on the end use concept and the retention of the mine licence area under private ownership.

Detailed planning, providing milestones and completion criteria is not currently developed and will be developed during Stage C.

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7. Environmental management plan

7.1. Purpose

Section 40(3)(a) of the MRSDA requires mining licence holders' work plans to include the prescribed information. This environmental management plan has been prepared in accordance with Schedule 15 of the MRSDMI Regulations, which requires an environmental management plan, and the *Work Plan Guidelines for a Mining Licence – Exceeding 5 Hectares* prepared by the Earth Resources Regulations Branch, DEDJTR.

Section 7 of Part 1 of Schedule 15 of the MRSDMI Regulations provides that the environmental management plan must:

- Identify the key environmental issues for the proposal and include details of background data, baseline studies or existing conditions in relation to environmental issues;
- Include proposals for the management of environmental impacts including nomination of targets and proposals for the mitigation, control or reduction of impacts;
- Include proposals for the management of wastes including consideration of the principles of waste minimisation;
- Include a proposed monitoring program addressing the key environmental issues; and
- Include a proposal for reporting outcomes of the plan to the local community.

The purpose of this environmental management plan is to outline how AGL Loy Yang manages the potential environmental impacts of its activities, which include:

- Mining operations;
- Water treatment operations; and
- Waste storage and disposal operations, including ash, overburden and interseam and non-mineral waste.

7.2. Key commitments

AGL Loy Yang's key commitments to environmental management are provided in Table 7.2.1.

Table 7.2.1 Key commitments for environmental management

Issue	Commitments
Environmental management planning	Annual review of AGL Loy Yang's Site Environmental Plan so that it reflects any changes to the mine operations or monitoring, auditing or stakeholder feedback.
Environmental monitoring	Annual review of AGL Loy Yang's Environmental Monitoring Program, as above.
Environmental auditing	Annual review of AGL Loy Yang's Environmental Audit Program, as above.
Environmental performance	Quarterly performance reporting the Environment Review Committee, annual reporting to the EPA of Annual Performance Statements and AGL Energy Limited's annual sustainability report to be placed on AGL's web site and accessible to the public.

7.3. Identification, management and monitoring of key environmental issues

AGL Loy Yang has identified key environmental issues associated with its operations and these are listed in Table 7.3.1. The table outlines AGL Loy Yang's commitments and management measures to control potential environmental impacts, along with corresponding performance indicators and monitoring activities. Evidence of AGL Loy Yang's environmental management of each of these impacts is also provided in Table 7.3.1. This table is based on AGL Loy Yang's Site Environmental Plan, which is reviewed and updated at least annually.

Key issues(s)	Management measures	Performance indicators	Monitoring	Most recent references	Reference review period
Air quality					
No loss of visual amenity due to air emissions	• Maintenance of 1 km buffer between Traralgon and the open cut crest (Figure 10) • Wet mine surface and unsealed roads • Minimise traffic movement during periods when weather conditions are likely to generate high dust levels • Place mulch over exposed coal surfaces • Progressively rehabilitate exposed surfaces in the mine and overburden dump • Trigger Action Response Plan (TARP)	Compliance with EPA licence 11149, Protocol for Environmental Management: Mining and extractive industries (EPA publication 1191) and DEDJTR guidelines Community complaints	Monitoring weather conditions Dust deposition monitoring Support for the Latrobe Valley Air Monitoring Network	AGL Loy Yang's Dust Suppression Control Procedure (CPG001M) AGL Loy Yang Mine Dust Suppression (PRWF044M) Operational Controls for Dust Suppression (CPG001M) Trigger Action Response Plan (TARP)	2-yearly 2-yearly As required As required
Waste management					
Non-mineral wastes minimised and disposed appropriately	Train AGL Loy Yang personnel in waste minimisation and management procedures Use EPA accredited waste disposal contractors Regularly undertake "housekeeping" audits Maintain waste management infrastructure	Compliance with AGL Loy Yang's recycling and waste disposal procedures	Audit waste management practices	Recycling Procedure HSP0014C Waste Disposal Procedure AGL Loy Yang Waste Disposal Guide	As required
Ash is contained on site and disposed so as to minimise surface water, groundwater or soil impacts	• Manage ash collection so as minimal ash flows through to the Eastern Clarification Pond • Excavate ash ponds annually to ensure there is capacity for one year of ash deposition from the power stations. • Place ash in pits within the overburden dump and cap with 2 m of clay on top and 6 m of clay at the toe of the batter • Ensure there is 90 days or 2,300 mega litres of emergency SWOP storage available in the ash pond.	Compliance with EPA licence 11149 conditions Delivery of monitoring results and reports on time	Dump surveys (annual) and periodic ash testing properties.	Leached Ash Management Operational Procedure (EMP003) Overburden Dumping Operational Procedures	As required
Reduce the release of acid mine drainage to the environment	Cap overburden and interseam materials with at least 2 m of clay on top and 6 m of clay at the toe of the batter to minimise acid drainage. Dose acid runoff with caustic and other alkaline materials to raise pH Remediate seepage points	Compliance with EPA licence 11149	Periodic monitoring of seepage points and water discharge.	Overburden Dumping Operational Procedures Site Water Plan (2014 draft)	As required
Land use	•				
Control soil erosion	Control slopes to a long term and stable slope gradient Progressively rehabilitate and revegetate disturbed areas	Progressive rehabilitation implemented in accordance with Rehabilitation Master Plan	Monthly Visual inspection Auditing of Rehabilitation Master Plan	Site land capability assessments 2013	Monthly 2-yearly
Hazardous substances and dangerous goods					

Key issues(s)	Management measures	Performance indicators	Monitoring	Most recent references	Reference review period
Prevent hazardous substances from causing contamination to land/water/air through appropriate storage, use and disposal	Assess all dangerous goods/hazardous substances introduced to the site Control risks associated with the dangerous goods/hazardous substances by applying the hierarchy of control. Use alarms and bunding to control spills. Maintain plant and pumps to prevent spills. Install and maintain oil-water separators to treat oil-contaminated runoff.	EPA appointed auditor approved monitoring program Compliance with EPA licence 11149 Compliance with AS1940	Visual inspections Water monitoring Air monitoring Rehabilitation monitoring Dangerous goods audits (annual reviews and 2 year audits)	Procedure for the Purchase of Hazardous Substances (HSP700) Procedure for the Purchase of Hazardous Substances (Activity Flow Chart) (HSP701) Hazardous Materials Incident Control Guide (HAZMIG) (HSP702) Management of Dangerous Goods and Hazardous Substances (HSP703) MSDS and materials register	annual reviews and 2 year audits

Table 7.3.1 Summary of AGL Loy Yang's commitments, control strategies and evidence of these strategies

Key issues(s)	Management measures	Performance indicators	Monitoring	Most recent references	Reference review period
Cultural heritage					
Cultural heritage values and interests are recognised and respected	• Obtain approvals prior to disturbing any land for mining • Conduct archaeological surveys, sub-surface testing and salvage programs, as required • Involve Aboriginal people with a cultural and/or legislated interest in the site • Procedure for uncovering cultural heritage material in accordance with legislative requirements	Compliance with Cultural Heritage Management Plan Compliance with *Traditional Owner Settlement Act 2010*	In line with Cultural heritage Management Plan actions (archaeological surveys)	Cultural Heritage Management Plan (2014)	As required
Flora and fauna					
Protect and revegetate indigenous vegetation communities Identification and management of rare, threatened and significant species for preservation along with other flora and fauna communities Wildlife habitats and corridors should be maintained and improved	• Provide for the management and removal of native vegetation in accordance with a property vegetation plan; and • Manage vegetation near buildings to reduce the threat to life and property from bushfire. • In the event that native vegetation located outside the mining licence will be impacted, or in areas not directly impacted by mining, obtain a planning permit from Latrobe City Council.	Compliance with Federal and Commonwealth legislation regarding flora and fauna including: Latrobe Planning Scheme Victoria's Native Vegetation Management – A Framework for Action (DNRE 2002). AGL Loy Yang's MIN 5189 Environmental Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) Flora and Fauna Guarantee Act 1988 (Vic) (FFG Act)	Flora and fauna surveys and annual inspections	Site Flora and Fauna Plan (2014 draft) Site Vegetation Manual (2014)	3-yearly
Water					
Maintain water quality in the Traralgon Creek downstream of AGL Loy Yang discharge points (see Figure 20)	• Collect and treat surface runoff from the power station, external overburden dump and mine areas in a settling pond • Dose collected surface runoff with chemical to treat water to acceptable quality • Store surface runoff in settling ponds prior to discharge to ensure water quality is within licence limits • Continuously monitor water quality within the site and upstream and downstream of discharge points (see Figure 20)	Compliance with EPA licence 11149 limits EPA appointed auditor approved monitoring program	Continuous monitoring of discharge water quality and quantity as specified in EPA Licence EW11149.	Water Management Operational Procedure (EMP002) Site Drainage Procedure (EMP005) Mine Runoff Water Management & Treatment Overburden Drainage Operational Procedures LY Main Drainage System, Site Drainage & Dosing, Settling Pond to Traralgon Creek Operational and Maintenance Procedures High Level Storage Dam Operational Procedures	As required
Ensure saline wastewater and ash does not impact surface water quality	• Recirculate saline wastewater through the AGL Loy Yang and LYB power stations as part of the ash removal systems • Place ash as per dump design • Separate ash from surface drainage • Divert high salt load water away from surface drainage • Pump excess saline water to Bass Strait at McGauran's Beach via the SWOP	Compliance with Trade Waste Licence held by Gippsland Water (EPA Licence 74253).	Gippsland Water waste monitoring program	Waste Disposal Procedure Leached Ash Management Operational Procedure (EMP003) Ash Pond Operational Procedures (EMP004) Site Drainage Procedure (EMP005) Saline Waste Procedure (EMP006) Low Quality Water, High Level Reservoir & Pipeline Operational Procedure Ash Water Discharge & Return Pipeline Operational Procedure	As required

Key issues(s)	Management measures	Performance indicators	Monitoring	Most recent references	Reference review period
Ensure SWOP waste discharges comply with EPA licence EW449 conditions	Online controls to stop SWOP pumps if turbidity or pH limits exceeded	Compliance with: • SWOP agreement with Gippsland Water • Saline waste management agreements with Hazelwood and Yallourn mines • EPA licence EW74523 (Gippsland Water Licence for Management of Saline Waste Disposal)	Continuous SWOP system water quality monitoring in accordance with the requirements of EPA Licence 74523.	Saline Waste Operational Procedures (EMP006)	As required
Minimise ash pond seepage	• Model groundwater plume • Inspect dam safety • Return leachate to ash pond	EPA appointed auditor approved monitoring program Compliance with the EPA licence 11149 requirements for the ash pond attenuation zone. Compliance with Australian National Committee on Large Dams (ANCOLD) guidelines	Monitoring of groundwater quality around the ash pond to meet EPA licence 11149 requirements for the attenuation zone Monitoring and management of the ash pond in accordance with the ANCOLD guidelines	Ash Pond Operational Procedures (EMP004)	As required
Maintain environmental flows in Traralgon Creek	Maintain discharge of treated drainage from the site to Traralgon Creek	Compliance with the EPA licence 11149 requirements at 40 ML/day	Continuous on-line monitoring of flows to meet EPA licence 11149 requirements	Site Water Plan (2014 draft)	As required
Maintain drainage system to pass maximum design flood event	• Maintain automatic by-pass facility for the external overburden drainage system to operate when design flood is reached • Maintain drainage system to preserve design features or limits	Compliance with design drawings	Monitoring dam levels	Flood Alert Procedure (HSP0005M) Flood Preparedness Index Procedure (HSP0009M)	As required
Artesian water and use as a resource	• Develop groundwater model • Maintain aquifer depressurisation system • Maintain groundwater reticulation system • Minimise groundwater extraction to allow for mine stability purposes	Compliance with Southern Rural Water Groundwater Licence 2007440	Monthly groundwater usage monitoring Regional subsidence monitoring (5 year in conjunction with Hazelwood and Yallourn mines) Annual Groundwater bore monitoring	Groundwater model of drawdown Regional groundwater report	Annual Annual and 5 yearly
Noise					
No impact offsite from mining activities	• Maintenance of 1 km buffer between Traralgon and the open cut crest (Figure 10) • Noise source identification and plant modelling • Regular maintenance of plant • External monitoring of noise levels • Complaints process including investigation, reference to the noise signature study, specialist advice (if required), response and feedback.	Community complaints Noise from industry in regional Victoria (EPA publication 1411) and compliance with EPA Licence 11149	Baseline noise monitoring Major noise emitting plant monitoring Monitoring noise levels, as required	Noise Signature Analysis Report (GHD 2009) Noise Control Management Plan Vibration Control Management Plan	As required by changes to plant condition and complaints. 2-yearly 2-yearly

7.4. Record management, auditing and reporting

AGL Loy Yang has an Environmental Management System (EMS) that is designed to manage environmental impacts in a detailed, systematic, planned and documented manner that supports continuous improvement. The EMS is critical to supporting AGL Loy Yang's environmental and social responsibility objectives, underpinning its on-going environmental performance and meeting the requirements of the Environment Protection Authority of Victoria (EPA). AGL Loy Yang's EMS supports systematic record management, auditing and reporting to the local community and these are described below.

7.5. Environmental Auditing

An independent audit of controls and implementation of AGL Loy Yang's Environmental Management Plan is undertaken every 2 to 3 years by AGL corporate or an external party. An external review of AGL Loy Yang's environmental documents and an audit of controls is undertaken every five years.

AGL Loy Yang also audits particular aspects of its environmental management framework including EMS, risk, impacts, waste management, compliance and monitoring.

Any non-compliance with site procedures and legislative requirements are captured through a range of AGL Loy Yang procedures.

7.6. Reporting to the local community

AGL Loy Yang primarily reports on its environmental performance to the community via its Environment Review Committee (see Section 8.5). However, AGL Loy Yang also reports on its performance to the broader community via its annual public engagement forum (see Section 8.5), submission of Annual Performance Statements to the EPA and AGL Energy Limited's annual corporate sustainability reporting.

Evidence of AGL Loy Yang managing its records, auditing and reporting is provided in Table 7.6.1.

Table 7.6.1 Record management, auditing and reporting

Program	Recent relevant references	Review period
Record management	Loy Yang Mine Environmental Management System	2 to 3 years
Auditing	Environmental Audit Program Legal and Other Requirements Procedure (P000064) Environmental Aspects and Impacts Procedure (P000065) Environmental Operational Controls (P000067) Environmental Aspects and Impacts Register (EMS431-2) Legal and Other Requirements Register (EMS432-1) Environment Improvement Plan (EIP) FY 14 Actions Environmental Management System Awareness Training Compliance Calendar Legal Register	2-yearly As required
Reporting to the local community	Environment Review Committee meeting notes Environment Review Committee presentation Sustainability report Annual Performance Statements to the EPA National Pollution Inventory Report	Quarterly Quarterly Annually Annually Annually

7.7. Significant community facilities

No significant community facilities have been identified that will be affected by mining activities as outlined in this work plan (see Section 5.3.3).

8. Community engagement plan

8.1. Purpose

Section 39A of the MRSDA specifies that licensees have a duty to consult with their community across the entire lifecycle of a project, from exploration, through to development, operation, closure and rehabilitation by:

- Sharing with the community information about any activities authorised by the licence that may affect the community; and
- Giving members of the community a reasonable opportunity to express their views about those activities

Section 40(3)(d) of the MRSDA requires mining licence holders' work plans to include a plan for consulting with the community in accordance with Schedule 15 of the MRSDMI Regulations 2013 and the *Community Engagement Guidelines for Mining and Mineral Exploration in Victoria.*

Section 9 of Part 1 of Schedule 15 of the MRSDMI Regulations requires the Community Engagement Plan to:

- Identify any community likely to be affected by mining activities authorised by the licence;
- Include proposals for:
    - Identifying community attitudes and expectations;
    - Providing information to the community;
    - Receiving feedback from the community; and
    - Analysing community feedback and considering community concerns or expectations,

  in relation to mining activities authorised by the licence; and
- Include a proposal for registering, documenting and responding to complaints and other communications from members of the community in relation to mining activities authorised by the licence.

This Section 8 addresses these requirements.

AGL Loy Yang's community engagement objectives are to:

- Engage with stakeholders in an open and meaningful manner;
- Understand the views and concerns of the local community to improve these relationships; and
- Collaborate with the community on beneficial projects.

8.2. Key commitments

AGL Loy Yang's key commitments to community engagement are provided in Table 8.2.1.

Table 8.2.1 Key commitments to community engagement

Issue	Commitment
Community engagement	Annual update of community engagement plan (P000081). The Environment Manager and Environmental Business Partner are responsible for community engagement regarding environmental and leaseholder issues. The Infrastructure, Civil and Environment Manager is accountable for environmental and leaseholder engagement. The Communications Officer and the Communications Manager Merchant Energy is accountable for corporate communications and the support program.
Identify affected community	Annual review of key stakeholders
Community attitudes and expectations	6-monthly independent community monitor survey
Providing information	Annual public engagement forum
Community initiatives	Community Support Program
Receiving and responding to feedback	Maintain stakeholder register (Appendix 3) and complaints register

8.3. Identification of affected community

AGL Loy Yang recognises the importance of accurately identifying stakeholders to engage effectively with those affected by the normal operation either directly or through a more general interest that is influenced by AGL Loy Yang's operations.

As a first priority, AGL Loy Yang needs to understand which landowners it is directly affecting through its normal operations, for example, from dust, noise, water discharge or traffic. This is informed by AGL Loy Yang annually assessing potential environmental impacts through a risk assessment and Environmental Improvement Plan process. From past impact assessments, AGL Loy Yang has determined that direct impacts could extend up to 1000 m from the Mining Licence boundary thus including all mining up to Stage F. Some 31 titles within this potentially impacted area is listed in Table 8.3.1.

Performance indicators from the risk assessment process are reviewed monthly by AGL Loy Yang's Environment Working Group, including identifying any new potentially impacted landowners.

Table 8.3.1 Titles potentially affected by mining

Address	Area (ha)
	11.80
	26.23
	7.85
	3.89
	4.56
	14.9
	22.62
	11.3
	10.23
	28.4
	4.28
	2.52
	6.91
	1.31
	40.21
	30.25
	1.32
	7.88
	64.23

Address	Area (ha)
	11.78
	28.29
	11.50
	100.66
	72.61
	33.65
	5.99
	0.48
	23.35
	12.06
	0.64

No community facilities are expected to be impacted by AGL Loy Yang's mining activities.

However exceptional circumstances may arise, for example the 2014 Hazelwood Mine fire, where a wider community was affected. AGL Loy Yang recognises the potential for wider community impact and this is reflected in the stakeholder register (Table 8.3.2 and detailed in Appendix 3).

Table 8.3.2 Community groups register

Organisation	Contact Group	Organisation	Contact Group
Landholders potentially affected by mining (see Table 8.3.1)	Neighbours	Vline	Business/Community Leaders
Traralgon Lions Club	Business/Community Leaders	Latrobe Regional Hospital	Business/Community Leaders

Organisation	Contact Group	Organisation	Contact Group
Advance Morwell	Business/Community Leaders	APEX	Business/Community Leaders
Traralgon Chamber of Commerce & Industry Inc.	Business/Community Leaders	Latrobe Regional Hospital	Business/Community Leaders
Gippsland Regional Executive Forum	Business/Community Leaders	Latrobe Community Health Service	Business/Community Leaders
Regional Development Australia (VIC)	Business/Community Leaders	Lifeline Gippsland	Business/Community Leaders
Traralgon South and District Association	Business/Community Leaders	Latrobe City Basketball Association	Business/Community Leaders
Traralgon Rotary Club	Business/Community Leaders	Quantum Support Services	Business/Community Leaders
Traralgon Neighbourhood Learning House	Business/Community Leaders	Australian Paper, Maryvale Mill	Business/Community Leaders
Traralgon & District Historical Society	Business/Community Leaders	Call Centres - Centrelink	Business/Community Leaders
VicRoads	Business/Community Leaders	DHS Public Housing Call Centre	Business/Community Leaders
Baw Baw Latrobe Local Learning and Employment Network	Business/Community Leaders	HVP Plantations	Business/Community Leaders
Gippsland Water	Business/Community Leaders	Branstrans	Business/Community Leaders
Anglicare	Business/Community Leaders	Willaton Transport	Business/Community Leaders

Organisation	Contact Group	Organisation	Contact Group
Maryvale Private Hospital	Business/Community Leaders	Victoria Farmers Federation	Business/Community Leaders
Church Street Post Office	Business/Community Leaders	Gippsland Asbestos Related Disease Support (GARDS)	Community Support Partners
Traralgon Post Office	Business/Community Leaders	Latrobe Theatre Company	Community Support Partners
Westpac, Traralgon	Business/Community Leaders	Lifeline Gippsland	Community Support Partners
Bendigo Bank, Traralgon	Business/Community Leaders	Traralgon Tennis Association	Community Support Partners
ANZ, Traralgon	Business/Community Leaders	Strzelecki Showtime	Community Support Partners
Bank of Melbourne, Traralgon	Business/Community Leaders	The Smith Family	Community Support Partners
NAB, Traralgon	Business/Community Leaders	Traralgon & District Cricket Association	Community Support Partners
Traralgon & District Cricket Association	Community Support Partners	GHD	Contractors
Traralgon City Band	Community Support Partners	MSS Security	Contractors
Traralgon Little Athletics Centre	Community Support Partners	Deanmac	Contractors
Traralgon RSL Men's Bowls	Community Support Partners	Diamond Power	Contractors
Traralgon Swimming Club	Community Support Partners	Traralgon Auto Group	Contractors

Organisation	Contact Group	Organisation	Contact Group
The Smith Family	Community Support Partners	ODG Haden	Contractors
Transfield Worley Power Services	Contractors	Nilsen	Contractors
RTL	Contractors	Assetlink Services	Contractors
Lend Lease	Contractors	Claxton Design	Contractors
Siemens	Contractors	EDR	Contractors
Belle Banne	Contractors	Drilltec	Contractors
Veolia	Contractors	Optimum Drafting	Contractors
Birdon	Contractors	Progility Pty Ltd	Contractors
Conco	Contractors	Traralgon College	Education
Konecranes	Contractors	Kurnai Precinct Campus	Education
BMC Welding and Construction	Contractors	Kurnai Morwell Campus	Education
Transpacific Industrial Solutions	Contractors	Federation University	Education
Gippsland lifts and Cranes	Contractors	Traralgon South Primary School	Education
SGS Australia	Contractors	Hazelwood North Primary School	Education

Organisation	Contact Group	Organisation	Contact Group
Silvertec	Contractors	Liddiard Road Primary School	Education
Boom Logistics	Contractors	Flinders Christian Community College	Education
Pro Draft	Contractors	Gormandale & District Primary School	Education
Sage Technologies	Contractors	Federation Training	Education
HRL	Contractors	Lavalla Catholic College	Education
Mecrus	Contractors	Federation University	Education
Kurnai College	Education	Victoria Police	Emergency Services
Department of Education and Early Childhood Development	Education	Victoria State Emergency Services	Emergency Services
Federation University	Education	Flynn Farm Discussion & Landcare Group	Environmental Groups
Victoria Police	Emergency Services	Flynn Farm Discussion & Landcare Group	Environmental Groups
Ambulance Victoria	Emergency Services	Voices of the Valley	Environmental Groups
St Johns Ambulance	Emergency Services	Friends of Tarra Bulga National Park	Environmental Groups

Organisation	Contact Group	Organisation	Contact Group
VicRoads	Emergency Services	Agribusiness Gippsland	Environmental Groups
Country Fire Authority - Morwell	Emergency Services	ERC	ERC Members
Country Fire Authority - Traralgon	Emergency Services	West Gippsland Catchment Management Authority	Government Agencies
Country Fire Authority Sale Hq - Gippsland Headquarters - District 10	Emergency Services	EPA	Government Agencies
Wellington Shire Council	Government Agencies	Department of Economic Development, Jobs, Transport and Resources	Government Agencies
Coal Resources Victoria, DEDJTR	Government Agencies	Department of Transport, Planning and Local Infrastructure	Government Agencies
Bass Coast Shire Council	Government Agencies	Southern Rural Water	Government Agencies
CarbonNet	Government Agencies	Wellington Shire Council	Government Agencies
AusIndustry	Government Agencies	WGCMA	Government Agencies
Department of Industry	Government Agencies	Energy Supply Association of Australia (ESAA)	Industry Associations
DEDJTR	Government Agencies	Minerals Council of Australia (MCA)	Industry Associations
DTPLI	Government Agencies	VECCI	Industry Associations
EPA Gippsland	Government Agencies	Brown Coal Innovation Australia	Industry Associations

Organisation	Contact Group	Organisation	Contact Group
Department of Human Services	Government Agencies	Latrobe City Council	Latrobe City
DEPI	Government Agencies	Department of Economic Development, Jobs, Transport and Resources	Government Agencies
Latrobe City Council	Latrobe City	Coal Valley Seeds	Leaseholders
Energy Australia	Latrobe Valley Generators	AF Sheridan & Partners	Leaseholders
GDF Suez Loy Yang B	Latrobe Valley Generators	Latrobe City Council	Leaseholders
GDF Suez	Latrobe Valley Generators	HVP Plantations	Leaseholders
Energy Australia Yallourn	Latrobe Valley Generators	Traralgon Motorcycle Club	Leaseholders
GDF Suez Hazelwood	Latrobe Valley Generators	The Nationals	Local Politicians
GDF Suez	Latrobe Valley Generators	Liberal Party	Local Politicians
AJ & MM Bolton Pty Ltd	Leaseholders	Latrobe Valley Express	Media
R&H and R&T EDGAR	Leaseholders	Southern Cross Ten	Media
Riverview Pastoral Pty Ltd	Leaseholders	ABC Gippsland	Media
GWF Enterprises Pty Ltd	Leaseholders	WIN TV	Media

Organisation	Contact Group	Organisation	Contact Group
Hodgson Agricultural Contracting	Leaseholders	Latrobe Valley Express	Media
Millring Pastoral Pty Ltd	Leaseholders	TRFM	Media
Latrobe Resources Pty Ltd	Project Partners	Victorian District Mining & Energy Division (CFMEU)	Unions
CSIRO	Project Partners	Electrical Trade Union	Unions
Kawasaki Heavy Industries	Project Partners	Australian Services Union	Unions
Shanghai Electric Australia Power and Energy Development	Project Partners	GTLC	Unions

Other key stakeholders with an interest in AGL Loy Yang's operations, including any other interested nearby landowners are also identified based on their previous expressions of interest in or potential to be indirectly impacted by AGL Loy Yang's operations. These interests may be based on physical, social, historical, cultural or political aspects of the community. These stakeholders are entered into the stakeholder register, a summary of the December 2014 version of the stakeholder register is provided in Appendix 3.

Evidence of AGL Loy Yang identifying affected community members is provided in Table 8.3.3.

Table 8.3.3 Identification of community members

Program	Most recent reference	Review period
Potential impacts	Environmental Improvement Plan Environment Working Group agenda and notes	Annually
Community mapping	Stakeholder register contact groups	Continuous
Stakeholders	Stakeholder register Community Engagement Plan (AGL Loy Yang, 2013)	Continuous Annually

8.4. Identification of community attitudes and expectations

AGL Loy Yang employs numerous methods to identify community attitudes and expectations. These expectations inform key decisions by the business.

For example, AGL Loy Yang commissions an annual independent community monitor survey to understand community values and their attitudes and expectations about AGL Loy Yang and its operations. Understanding these values and perceptions allows AGL Loy Yang to evaluate its relationships with the community and identify opportunities to improve relationships by working with them on common values and addressing negative attitudes about, for example, how AGL Loy Yang is managing environmental impacts or engaging with the community. This survey is undertaken confidentially and independently by the local university with the aim of fostering open expression of attitudes. Attitudes and expectations identified by the survey are compiled by the university at community sector level and used by AGL Loy Yang to inform its community engagement activities described in Section 8.5 below.

AGL Loy Yang also identifies community attitudes and expectations through its direct engagement with stakeholders. This process is described further in section 8.6.1.

Evidence of AGL Loy Yang identifying community attitudes and expectations is provided in Table 8.4.1.

AGL Loy Yang acknowledges that the engagement process involves managing differences between AGL Loy Yang's and the community's expectations. AGL Loy Yang will engage with the community at an early stage in relation to new issues and be clear about the reasons for engagement and what it will achieve.

Complaints are managed through AGL Loy Yang's complaints register, which provides for follow-up with stakeholders including actions to address issues, where possible. AGL Loy Yang will address the issues through modifying its activities where practicable.

Table 8.4.1 Identification of community attitudes and expectations

Program	Most recent reference	Review period
Community perceptions	Independent community monitor survey (Federation University (Nov 2014)	Quarterly

8.5. Providing information to the community

AGL Loy Yang commits to on-going engagement with its community to identify attitudes, expectations and concerns about its operations. With the project being in the Loy Yang Mine's operational phase, most of the information generated by the project relates to routine and on-going matters such as environmental monitoring and reporting with occasional, minor changes to operational activities. However, AGL Loy Yang continues to assess potential impacts and identify directly impacted and other interested parties as described in Section 8.3.

AGL Loy Yang recognises that each stakeholder group is impacted differently by the operations and wants information about the project in different formats. AGL Loy Yang generally follows the community engagement guidelines set out in Table 8.5.1.

Table 8.5.1 Community engagement spectrum

Level of Engagement	Inform	Consult	Involve	Collaborate	Empower
Community engagement plan	Provide balanced and objective information	Obtain feedback	Work directly with community to understand their concerns and aspirations	Partner with community	Place final decision making in the hands of the community
Promise to the community	Keep informed	Keep informed, listen and acknowledge concerns and aspirations	Concerns and aspirations directly reflected in decisions	Seek advice and incorporate into decisions to the maximum possible extent	Implement community decisions
Techniques adopted	Fact sheets Website Advertisements	Surveys Public meetings Informal interactions	Environmental Review Committee Face to face meetings	Advisory committees (Clean Coal Vic) Community activities	Community development initiatives

AGL Loy Yang uses a combination of community engagement techniques to provide information to a range of community members. A key objective of providing information is to stimulate two-way communication with stakeholders where AGL Loy Yang is listening as well as talking. AGL Loy Yang is planning the following proactive community engagement activities, which will be modified over time to address feedback from the community on how they want to be engaged:

- AGL Loy Yang has held and plans to continue holding annual public engagement forums to provide information of general interest to the community about its operations, which will be advertised through the local media and via email to key stakeholders.
- When a topic of interest is identified by stakeholders or other means, AGL Loy Yang plans the community engagement based on which stakeholders are expected to be interested and how best to reach them. Communication methods include media releases, face to face meetings and fact sheets. Feedback from stakeholders on communication methods is sought for some events.
- Lessee contact details are compiled on a register and they are contacted as required about access, issues of interest or complaints.
- AGL Loy Yang will brief strategic stakeholders from time to time on topics relevant to their interests. For example, AGL Loy Yang is represented on the Latrobe City Landfill Consultative Committee and the Latrobe Valley Air Monitoring Network and provides

information to these committees as required.

- AGL Loy Yang has established and will maintain an Environment Review Committee (ERC) that reviews AGL Loy Yang's environmental performance, as required under AGL Loy Yang's mining licence. Regulator, local council and community representatives are members of this committee and use this forum to provide feedback to AGL Loy Yang.
- AGL Loy Yang will facilitate site visits by key stakeholders and the wider community to increase familiarity with its site and.
- Public reporting of corporate performance through AGL Energy Limited's Annual Report and Sustainability Report.
- Contacting local, state and federal regulatory authorities through official letters and as needed and also through participation in industry working groups.
- Collaborating with a number of community organisations through AGL Loy Yang's Community Support Program.
- Engaging with the local media to provide information of interest to the general public.
- Providing information on the Loy Yang page of the AGL website (http://www.agl.com.au), which is updated regularly with information about the operation.
- Providing a telephone contact number (03 5173 2000) or email address loyyang@agl.com.au for members of the public to bring issues to the attention of the Head of Mining.

AGL Loy Yang also engages with the community in response to issues arising through complaints (see Section 8.6.3 below), enquiries, media articles or other sources. AGL Loy Yang addresses these issues where appropriate, with the method of its response dependent on how the issue arose.

Evidence of AGL Loy Yang informing the community is provided in Table 8.5.2.

Table 8.5.2 Informing the community

Program	Recent references	Review period
Forum, meetings, briefings and ERC agendas, releases and notes	Media releases, for example: on unit 4 major outage (19 September 2014)	As required
	Site visit by Latrobe City Council in February 2014 (employee newsletter article)	Periodic
	ERC meeting agenda	Quarterly
	ERC Charter	As required
	Quarterly environmental performance report against EIP	Quarterly
Community support	Community support committee sponsorships	Annually
Official letters		Continuous

8.6. Receiving and analysing feedback and complaints from the community

AGL Loy Yang values the feedback it receives from the community and uses it to inform decision-making. The key elements of AGL Loy Yang's community engagement system that supports AGL Loy Yang's community engagement activities (Section 8.5) and its response to issues or complaints that could arise at any time are as follows:

8.6.1. Receiving feedback

AGL Loy Yang receives feedback from stakeholders from a range of engagement activities. Stakeholder feedback from formal engagement activities is recorded in the stakeholder register. AGL Loy Yang uses feedback to inform how it responds to issues and complaints. Stakeholders are advised of AGL Loy Yang's responses and how stakeholder feedback influenced those responses and this too is recorded in the stakeholder register.

AGL is committed to actively engaging with the community in which it operates.

The following processes and procedures have been put in place by AGL Loy Yang to receive feedback from key stakeholders and the wider community. These include:

- **Continuous stakeholder mapping**: AGL Loy Yang undertakes a regular mapping process which checks the status of existing stakeholders and adds new stakeholders so engagement techniques can be adapted accordingly;
- **Environmental Review Committee**: As a condition of its Mining Licence, AGL Loy Yang has established an Environmental Review Committee. The Environment Review Committee's (ERC) responsibility includes reviewing environmental performance relating to the mine, discussing any community concerns, endeavouring to resolve those concerns and also engaging with the community on issues where appropriate;
    - Key stakeholders represented on the ERC comprise AGL Loy Yang staff, community representatives, Environmental Protection Authority, Latrobe City Council, Department of Economic Development, Jobs, Transport and Resources Economic Development, Jobs, Transport and Resources and West Gippsland Catchment Management Authority representatives;
- **Annual public engagement forums**: forums are held by AGL Loy Yang as part of the company's commitment to community engagement, providing further opportunity to engage with the key stakeholders and community members potentially impacted by the mine's operations and receive feedback;
    - The public engagement forums feature presentations on the company's performance and business direction, and a range of topics of interest to the community. The forums may also include external speakers on a range of relevant topics;
    - The public engagement forums, media releases and stakeholder meetings are used to update stakeholders on any major decisions which could

potentially impact on them;

- **Community Support Program**: AGL Loy Yang offers financial and other support to community groups in the Latrobe Valley catchment area through its Community Support Program (CSP). While the primary aim of the CSP is to support the community in which AGL Loy Yang operates, beneficiaries of the CSP provide valuable feedback on the company's performance, including anything mine-related;
- **Community Perception Survey**: AGL Loy Yang assesses the effectiveness of its stakeholder and community engagement through its regular Community Perception Survey, conducted in conjunction with the local university;
- **Other:** AGL Loy Yang representatives engage with a range of regulatory groups via meetings, correspondence and representation on industry groups; briefings with federal, state and local government representatives; and feedback from embedded employees who are part of the catchment community;
    - Opportunity is provided for feedback and/or complaints on the company website;
    - Social media is used and monitored wherever appropriate.

8.6.2. Analysing and providing community feedback

AGL Loy Yang evaluates and analyses feedback received from the community particularly through the Environmental Review Committee, where all formal feedback is discussed. As discussed in section 8.4, AGL Loy Yang also commissions annual independent community monitor surveys that assess the success of its community engagement activities. Survey results are recorded in their report and used to identify improvements to AGL Loy Yang's community engagement plan and mine operations.

Evidence of AGL Loy Yang receiving and addressing community feedback is provided in Table 8.6.2.1.

Table 8.6.2.1 Receiving and addressing community feedback

Program	Recent reference	Review period
Planning and implementation	AGL Loy Yang's Community Engagement Plan (2013) Complaints register	Annually On-going
Feedback and response	Independent community monitor surveys (Federation University)(Nov 2014) Feedback forms on AGL web site	Quarterly As required
Evaluation and continuous improvement	Independent community monitor survey	Quarterly

AGL Loy Yang has identified a number of avenues in which to provide feedback to key stakeholders and the wider community about issues or projects which may affect them or impact on them in some way. These are:

- **Annual public engagement forum**: The forum, which is promoted through the local media and via email to key stakeholders, is an effective way to disperse information
- **Site visits**: AGL Loy Yang encourages site visits by key stakeholders and the wider community. It engages with the local media through its Corporate Communications group to provide information of public interest;
- **Environmental Review Committee**: The ERC membership includes regulators and community representatives who have strong links with the local community. Part of this committee's over-arching responsibility is to report to and engage with key stakeholders and the wider community;
- **Other**: Information is available on the Loy Yang page of the AGL website (http://www.agl.com.au/about-agl/how-we-source-energy/thermal-energy/agl-loy-yang), provided through email/letters, social media and also through face-to-face meetings when required.
    - The majority of AGL Loy Yang employees live within the local community and are active in local community organisations and forums. They also provide relevant and regular feedback if mine related issues affecting the community should arise.

8.6.3. Registering and responding to complaints

AGL Loy Yang has a complaints register procedure in place whereby individuals and/or organisations can either ring a designated number (03 5173 2000) between 8am and 4.30pm week days or email at loyyang@agl.com.au. The enquiry is directed to the company's Corporate Communications group which documents the complaint in a Complaints Register then refers it to the responsible officer on site to deal with the complaint. Stringent formal follow-up practices ensure the complaint is dealt with in a timely manner. In the event of a complaint, an AGL Loy Yang employee will make a personal visit to a complainant to confirm the validity of the complaint, assess the perceived or real impact and then institute follow-up action if required.

The EPA may also receive complaints with regards to the environment which are referred to, and acted upon, by AGL Loy Yang.

AGL Loy Yang prepares information about issues it could potentially address through modifying how it operates and identifies ways the community can provide feedback on these issues. For stakeholder issues or complaints that it is unable to address, AGL Loy Yang prepares information that explains how it came to these decisions.

The stakeholder register includes contact details, records of on-going stakeholder consultation and a list of key issues relevant to each stakeholder. These records allow AGL Loy Yang to refer to previous stakeholder interactions so that it can relate to stakeholders consistently. The list of key issues allows AGL Loy Yang to direct specific information to interested stakeholders and to track issue progress over time.

8.6.4. Planning and implementation

Planning is needed to review and implement AGL Loy Yang's community engagement activities (Section 8.5) and to address any new issues likely to be relevant to stakeholders or complaints received by AGL Loy Yang. AGL Loy Yang considers stakeholder register information and selects engagement methods that will encourage positive outcomes for stakeholders.

9. Fire risk

9.1. Purpose

AGL Loy Yang is committed to identifying, controlling and monitoring all fire risks associated with the Loy Yang Mine. AGL Loy Yang has developed and maintains a Fire Risk Assessment and a Fire Risk Management Plan (FRMP).

The main objectives of the AGL Loy Yang Fire Risk Management Plan under the "plan, do, check" cycle are to:

- Protect health and safety, life, property and assets within MIN 5189 from fire.
- Minimise the risks to the integrity of the Loy Yang Mine and its ability to supply coal to its customers.
- Minimise the risks from fires within MIN 5189 on the local community and local infrastructure (including the adjacent Loy Yang B Power Station).

AGL Loy Yang has responsibilities under the legislation shown in Table 9.1.1.

Table 9.1.1 Relevant legislation

Legislation	Requirements
Mining Licence MIN 5189	Prepare a risk assessment and a risk management plan.
Local Government Act (1989)	Obligations and requirements with respect to fire
Electricity Safety Act 1998, Electricity Safety (Bushfire Mitigation) Regulations 2013	Bushfire mitigation plans, inspection of overhead electric lines and supply networks
Country Fire Act 1958	Sets out powers of Chief Officer, officers at fires, and owners. Outlines reporting and fire prevention requirements
Summary Offences Act 1966	Obligations and requirements with respect to fire
Emergency Management Act 1986	Coordination and management of Emergency Management Plan (DISPLAN)
Occupational Health and Safety Act 2004	Fire risk mitigation responsibilities
Occupational Health and Safety (Mine safety regulations) 2007	Performance based regulations based on operational procedures
Dangerous Goods Act 1985 and Regulations 1989	Promote the safety and wellbeing of all persons in and around the operating mine. Planning for emergencies and information for fire authorities.

9.2. Key commitments

AGL Loy Yang's key commitments to minimising fire risk are included in the Fire Risk Management Plan (FRMP). This plan contains details as set out in Table 9.2.1.

Table 9.2.1 Key commitments in the Fire Risk and Management Plan (FRMP)

Issue	Commitment
Emergency Management Plan	Ensure fire response is quick, effective and coordinated. Provide full time coverage for Fire Crew and Incident Controller on site. (Reference HSM0001C)
Mine Fire Design Standards	Comply with AGL Loy Yang's design standards (P000085)
Mine Fire Instructions	Comply with AGL Loy Yang's fire instructions (HSM001M)
Fire Risk Assessments	Maintain a Fire Risk Assessment on a three year basis or earlier if requested by DEDJTR or within three months of a Reportable Event described in Section 41AB of the MRSD Act.
Safe working environment	AGL Loy Yang is committed, so far as is reasonably practicable, to provide and maintain a working environment that is safe.
Elimination of hazards	AGL Loy Yang actively pursues the elimination of all hazards under the control of AGL Loy Yang and works to minimise the number and magnitude of fire risks
Fire risk management plan	Maintain a Fire Risk Management Plan on a three year basis or earlier if requested by DEDJTR or within three months of a Reportable Event described in Section 41AB of the MRSD Act.(PCY000022)

Loy Yang Mine demonstrates this commitment through the programs described below.

9.3. Systems and procedures

AGL Loy Yang maintains and operates a number of fire mitigation systems and procedures:

- Comprehensive water reticulation system.
- The requirements of the Country Fire Authority are adhered to, in particular, the declaration of total fire ban periods. The mine may also declare additional Fire Alert days, based on local conditions.
- A permit system is used for all hot works performed within the mine.
- All vehicles operating on coal surfaces have appropriately modified exhausts and brakes and other vehicles operating on grassed areas surrounding the mine have extinguishers in accordance with AGL Loy Yang's Vehicle Standards Procedure (P000055).
- AGL Loy Yang operates and maintains fire suppression equipment, including tankers, for use within and adjacent to the site.
- Employees and contractors receive basic training on the fire service systems and emergency management as part of the induction process and undertake regular refresher courses where appropriate.
- Fire breaks are established and maintained around the mine and vegetation is managed within the operating buffer.
- Automatic detection systems are used in designated high risk areas, for example, the raw coal bunker.

9.4. Identification and assessment of fire hazards and risks

As part of the Victorian OH&S legislation AGL Loy Yang maintains a Major Mining Hazard bow tie diagram of all identified fire hazards both within the MIN 5189 area and identified fire pathways. The bow tie diagram records risk mitigation processes and responsibilities for implementing mitigations.

AGL Loy Yang documentation regarding the identification and assessment of fire hazards is provided in Table 9.4.1.

Table 9.4.1 Fire hazards and risks

Program	Most recent reference	Review period
Major Mining Hazard Procedure	P000101 (Major Mining Hazard Procedure)	As required or annually

9.5. Communication of significant fire threats or hazards

AGL Loy Yang commits to engagement with its employees and contractors on the MIN 5189 area and the community. All employees and site contractors are informed of high fire danger periods or fire alert days by the Head of Mining.

Evidence of AGL Loy Yang communicating significant fire threats or hazards is provided in Table 9.5.1.

Table 9.5.1 Communication of fire threats or hazards

Program	Most recent reference	Review period
Fire alert notifications	HSP004M (Loy Yang Mine Fire Alert Procedure	As required
Total fire ban day notifications	PRWF045M (Fire Watch) HSP800 (Procedure for Declared Fire Danger Period and Total Fire Ban Days)	As required

9.6. Fire risk management

AGL Loy Yang commits to prepare and maintain all areas within the mine licence area through the activities listed below.

Fire suppression includes all activities involved in extinguishing a fire. AGL Loy Yang is committed to giving priority for the suppression of fires over all other business activities. All operational employees are made available for fire fighting response (as appropriate) on immediate notice.

Evidence of AGL Loy Yang being ready for fire suppression activities is provided in Table 9.6.1.

Table 9.6.1 Fire risk management activities

Program	Most recent reference	Review period
Fire suppression network	P000085 AGL Loy Yang Mine Fire Service Design Guidelines	Annually
Fire fighting equipment	HSM001 Fire Instructions	Annually
Fire service water infrastructure	P000085 AGL Loy Yang Mine Fire Service Design Guidelines	Annually
Fire detection and procedures	HSP0004M Mine Fire Alert Procedure	Annually

Water for fire protection for the Loy Yang Mine is provided from the fire service reservoir and the high level storage dam and distributed to sprays through a pipe reticulation system (AGL Loy Yang Fire Service Plan) (Figure 4b). The fires service system is gravity fed and, in the open cut, is not reliant on the availability of other power sources. It has two booster pumps used to feed the outlet area, rising conveyors, raw coal bunker and above grass level overburden system. Within the open cut the fire service system is

divided into a number of pressure levels that maintain operating pressures below an upper safety limit. The upper pressure system is gravity fed, with the pressure of the lower systems maintained using pressure reduction valves. Protection on plant is via rotary sprays.

As the mine develops (Stages C to E) the fire suppression network will be extended to continue to meet the Fire Services Design Standards (including maximum demand scenarios, storage capacity, the restoration of storage, water pressures, system reliability and system monitoring. System maximum delivery volumes are defined in the maximum demand scenarios. Water storage capacity is estimated to be sufficient for mine expansion to the end of Stage C at which time the internal overburden dump will cover exposed coal in the floor of the pit and allow expansion of the system to continue of the exposed coal in Stage D to F.

Wash down water and rainfall runoff from within the mine and its immediate surrounds is collected in ponds within the mine. The primary settled water is pumped to the fire service reservoir for further settlement of particles. The reservoir provides a gravity fed water supply, boosted by pumps where appropriate, to the mine and overburden dump. The reservoir water level of the fire service reservoir is checked daily and managed to maintain a balanced system. The reservoir has sufficient capacity to meet the requirements of the Fire Service Design Guidelines and hold drainage water from significant storms. In the event the reservoir reaches capacity, excess water is directed to the overburden dump treatment ponds system before discharge to Traralgon Creek.

9.7. AGL Loy Yang Emergency Management Plan

9.8. Evaluation and continuous improvement

The development and maintenance of the Loy Yang Mine Fire Risk Management Plan is coordinated by the Manager Infrastructure, Civil and Environment in consultation with the AGL Loy Yang Head of Mining and Corporate Manager Security and Emergency Management. The plan is reviewed annually. An annual audit is conducted to review compliance with the requirements of the plan. An action plan is developed and implemented in a timely manner.

Evidence of AGL Loy Yang improving its fire planning is provided in Table 9.8.1.

Table 9.8.1 Fire planning improvement

Program	Most recent reference	Review period
Fire Risk Management Plan	PCY000022	Annually or earlier if required
Fire risk management plan audit	Major Mining Hazard	Annually or earlier if required

Figures

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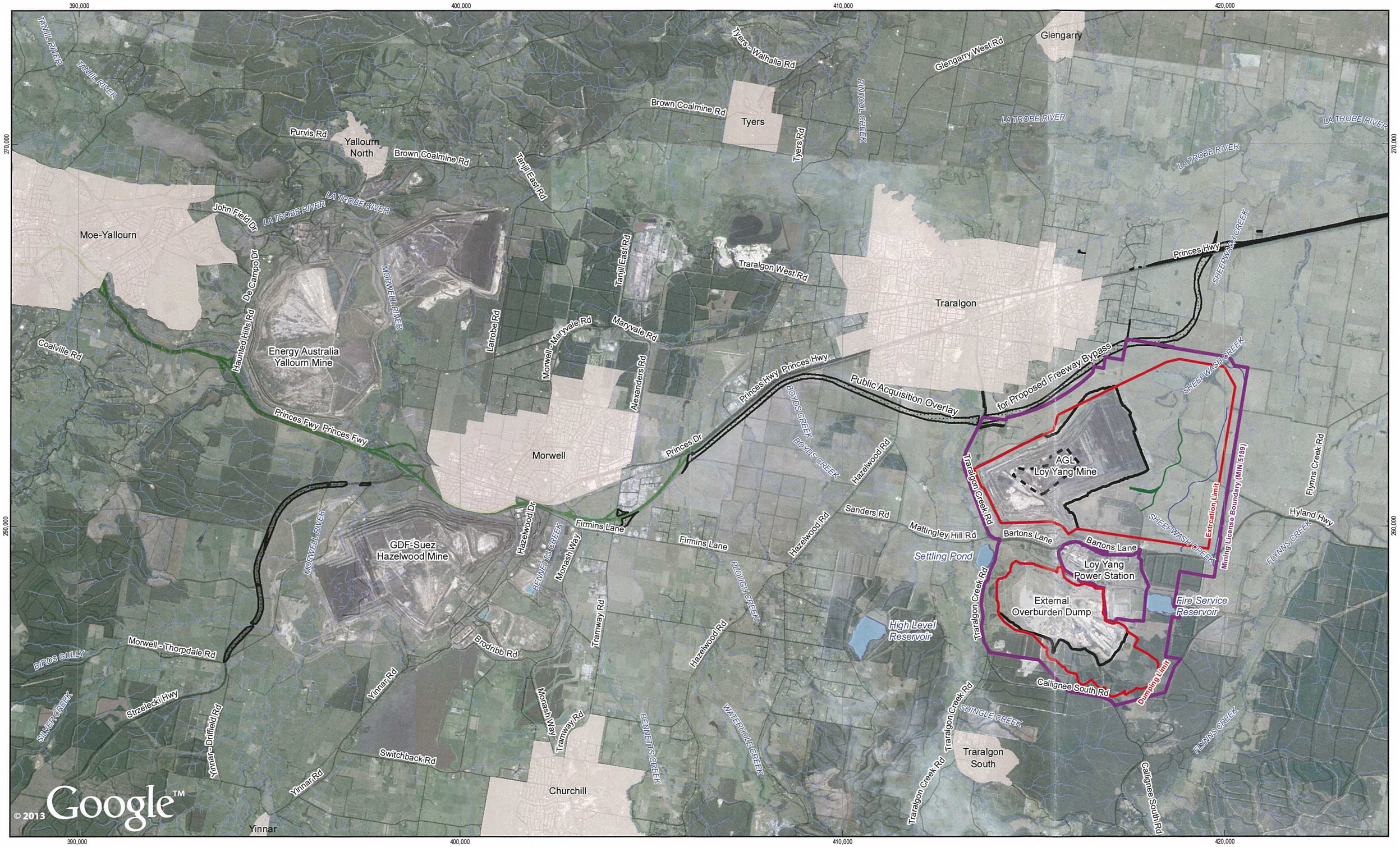

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

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LEGEND

- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Public Acquisition Overlay
- Current Mine Base
- Current Mine Crest and Current Overburden Dump Boundary
- Future Possible Sheepwash Creek Diversion
- Existing Sheepwash Creek Diversion Stage 1
- River
- Waterbodies
- Freeway
- Highway
- Sealed road (arterial & local)
- Unsealed road

Energy in action.

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	3
Date	25 Sep 2015

Location Plan

Figure 1

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Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); Google Earth Imagery. Created by:scyphers

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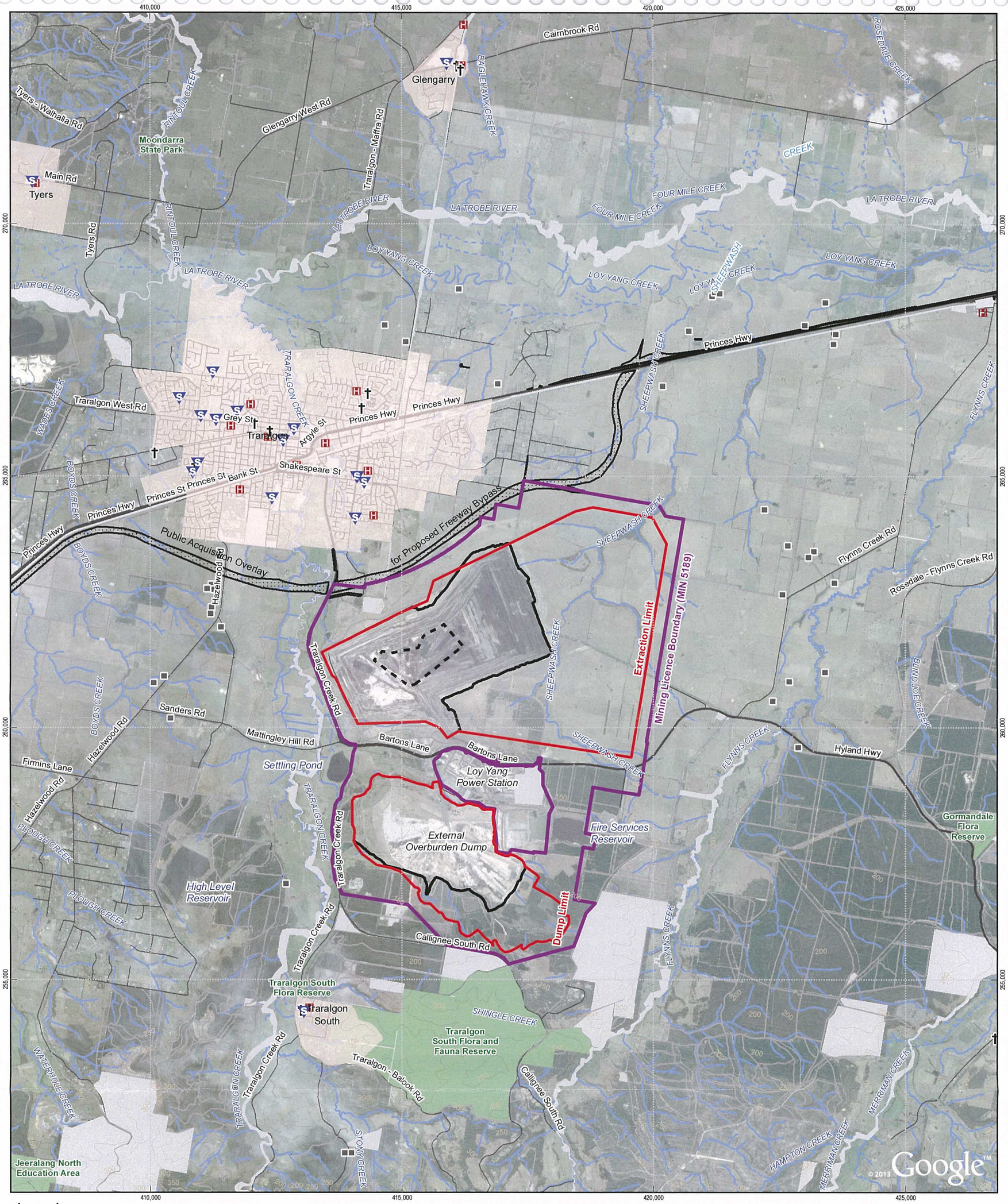

Legend

Community Facilities
- Church
- Hospital
- Hall
- School
- Occupied Houses

- Current Mine Base
- Current Mine Crest and Current Overburden Dump Boundary
- Mining Licence Boundary

- Public Acquisition Overlay
  - Minor
  - Major

- Freeway
- Highway
- Sealed road (arterial & local)
- Unsealed road

- River
- Stream
- Channel / drain
- Parks
- Crown Land

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

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AGL Loy Yang
Mining Licence Work
Plan Variation

Job Number 31-2072315
Revision 5
Date 25 Sep 2015

Regional Plan

Figure 2

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415,000 420,000

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Traralgon

Public Acquisition Overlay for Proposed Freeway Bypass

Extraction Limit

Mining Licence Boundary (MIN 5189)

Dumping Limit

Traralgon Creek Rd

Mattingley Hill Rd

Bartons Lane

Callignee South Rd

Hyland Hwy

SHEEPWASH CREEK

TRARALGON CREEK

ELMAS CREEK

Settling Pond

Loy Yang A Power Station

Loy Yang B Power Station

External Overburden Dump

Ash Pond

Fire Service Reservoir

Legend

- Bund Toe
- Bund Top
- Current Mine Base
- Current Mine Crest and Current Overburden Dump Boundary
- Mining Licence Boundary
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Public Acquisition Overlay
- Land Parcel
- AGL Loy Yang Land Parcels
- Land not owned by AGL Loy Yang within Mining Licence Boundary

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

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AGL Loy Yang

Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 2
Date 25 Sep 2015

AGL Loy Yang Land Ownership Figure 3

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Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

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260,000

Traralgon

SECTION 4

SECTION 19

Public Acquisition Overlay for Proposed Freeway Bypass

CREEK

SECTION B

SHEEPWASH

Traralgon Creek Rd

North-West Treatment Pond

SHEEPWASH CREEK

Extraction Limit

Mining Licence Boundary (MIN 5189)

TRARALGON CREEK

Mattingley Hill Rd

Bartons Lane

Bartons Lane

SECTION OB

Settling Pond

Loy Yang A Power Station

Hyland Hwy

Loy Yang B Power Station

North Retention Pond

Flocc Pond & Overburden Runoff Pond

External Overburden Dump

Ash

Pond

Fire Service Reservoir

South Retentio Pond

Traralgon Creek Rd

Callignee South Rd

Dumping Limit

FLYNNS CREEK

415,000

420,000

Legend

- Water
- Optic
- Sewer
- Gas
- Current Mine Base
- Extraction Limit and Dump Limit
- Current Mine Crest and Current Overburden Dump Boundary
- Mining Licence Boundary
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Public Acquisition Overlay
- Section Locations
- Potential Development Sites

For sections refer to Figure 7

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

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Energy in action.

Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 2
Date 25 Sep 2015

Site Plan - External Services & Potential Development Sites

Figure 4a

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Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

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Traralgon

SECTION 4

SECTION 19

Public Acquisition Overlay for Proposed Freeway Bypass

SECTION B

SECTION OB

CREEK

SHEEPWASH

SHEEPWASH CREEK

Traralgon Creek Rd

North-West Treatment Pond

TRARALGON CREEK

Extraction Limit

Mining Licence Boundary (MIN 5189)

Mattingley Hill Rd

Bartons Lane

Bartons Lane

Settling Pond

Loy Yang A Power Station

Loy Yang B Power Station

Hyland Hwy

North Retention Pond

Flocc Pond & Overburden Runoff Pond

External Overburden Dump

Ash Pond

Fire Service Reservoir

South Retentio Pond

Ash Slimes Disposal Cell

Traralgon Creek Rd

Callignee South Rd

Dumping Limit

FLYNNS CREEK

415,000 420,000

Legend

- Artesian
- Dewatering
- Fire Service
- HQW
- LQW
- SWOP
- Extraction Limit and Dump Limit
- Current Mine Base
- Current Mine Crest and Current Overburden Dump Boundary
- Mining Licence Boundary
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Public Acquisition Overlay
- Section Locations
- Ash Slimes Disposal Cell

For sections refer to Figure 7

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

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Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Site Plan
AGL Infrastructure

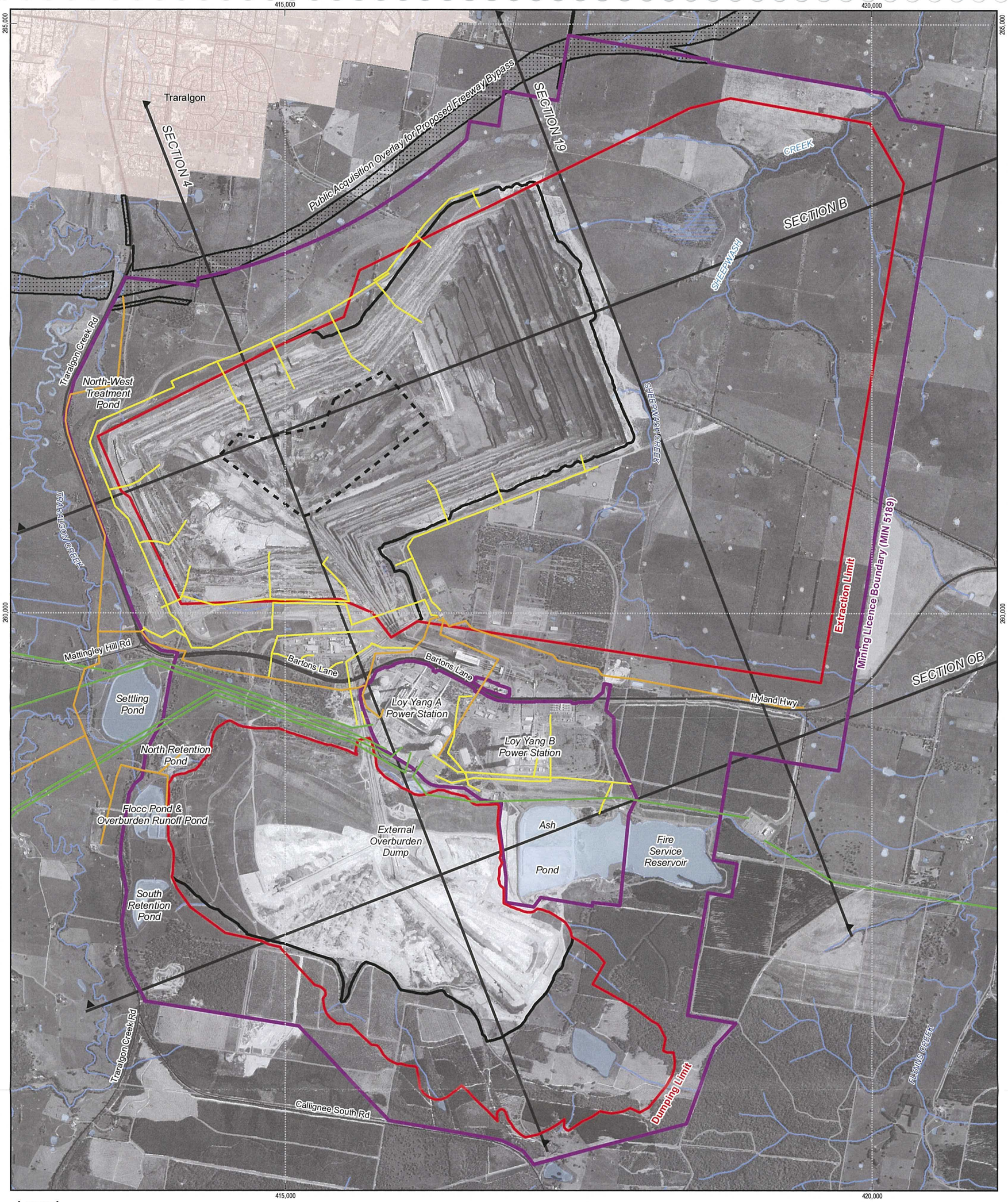
Job Number 31-2072315
Revision 2
Date 25 Sep 2015

Figure 4b

G:\31\2072315\GIS\Maps\Deliverables\312072315_004b_AGLInfrastructure_Rev2.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers



Legend

Electrical Infrastructure
- AGL
- Distribution
- Transmission
- Extraction Limit and Dump Limit
- Mining Licence Boundary

- Current Mine Base
- Current Mine Crest and Current Overburden Dump Boundary
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream

- Public Acquisition Overlay
- Section Locations

For sections refer to Figure 7

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Site Plan
Electrical Infrastructure

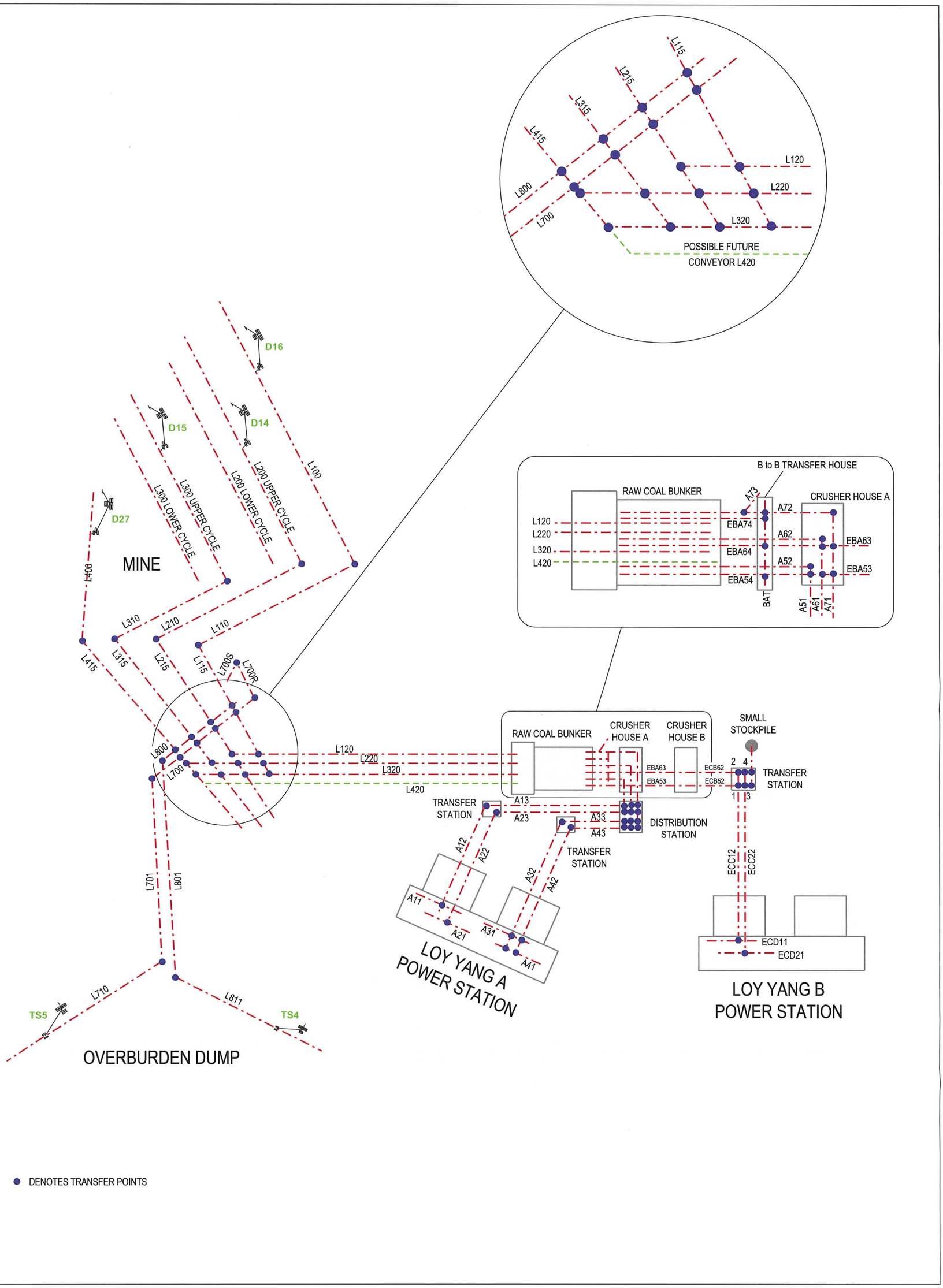
Job Number	31-2072315
Revision	2
Date	25 Sep 2015

Figure 4c

G:\31\2072315\GIS\Maps\Deliverables\312072315_004c_ElectricalInfrastructure_Rev2.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers



Paper Size A3
Not to Scale

N

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	1
Date	04 Mar 2015

Site Plan - Conveyor Layout Schematic Diagram

Figure 4d

G:\2072315\CADD\Drawings\2014 Figures\31-2072315-FIG004d.dgn

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au

413,000 414,000 415,000 416,000 417,000 418,000 419,000 420,000

263,000 262,000 261,000 260,000

Traralgon

Public Acquisition

SHEEPWASH CREEK

Traralgon Creek Rd

JOHN HOLLAND SUMP

to Fireservice Reservoir

Mattingley Hill Rd

TRARALGON CREEK

Traralgon Creek Rd

Traralgon Creek Rd

Bartons Lane

Bartons Lane

Loy Yang A Power Station

Hyland Hwy

Settling

1:20,000 at Paper Size A3

0 500 1,000

Meters

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

LEGEND

Culvert by Consequence Category
- 1
- 2
- 3a
- 3b

- Channel
- Dewatering Pipeline
- Highway
- Sealed road (arterial & local)
- Unsealed road

Energy in action.

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	1
Date	25 Sep 2015

Site Plan
Surface Water Drainage

Figure 4e

G:\31\2072315\GIS\Maps\Deliverables\312072315_004E_DrainageSitePlan_Rev1.mxd

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94). Created by:scyphers

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

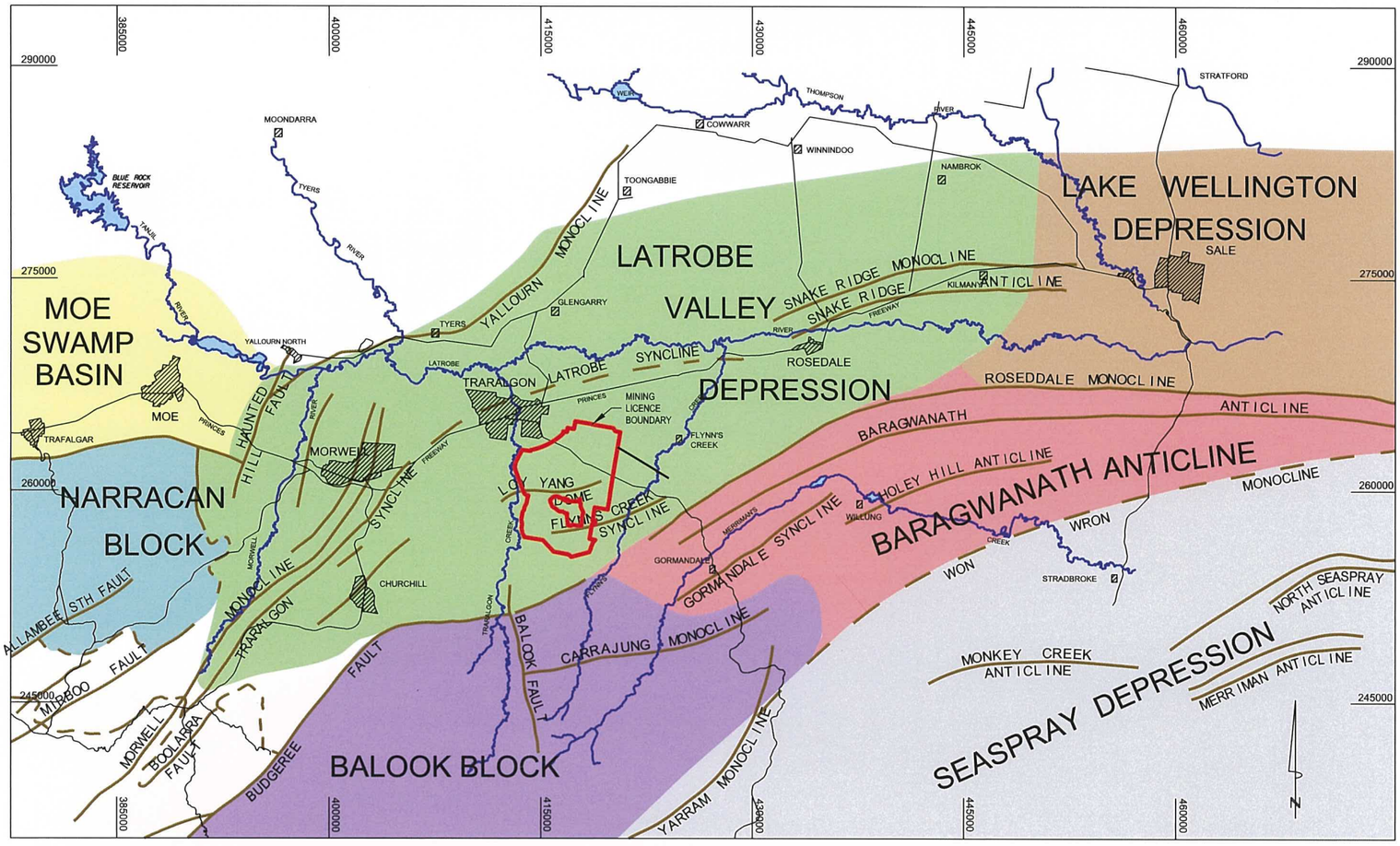


Figure 5(b) Major Structural Elements - Latrobe Valley Depression

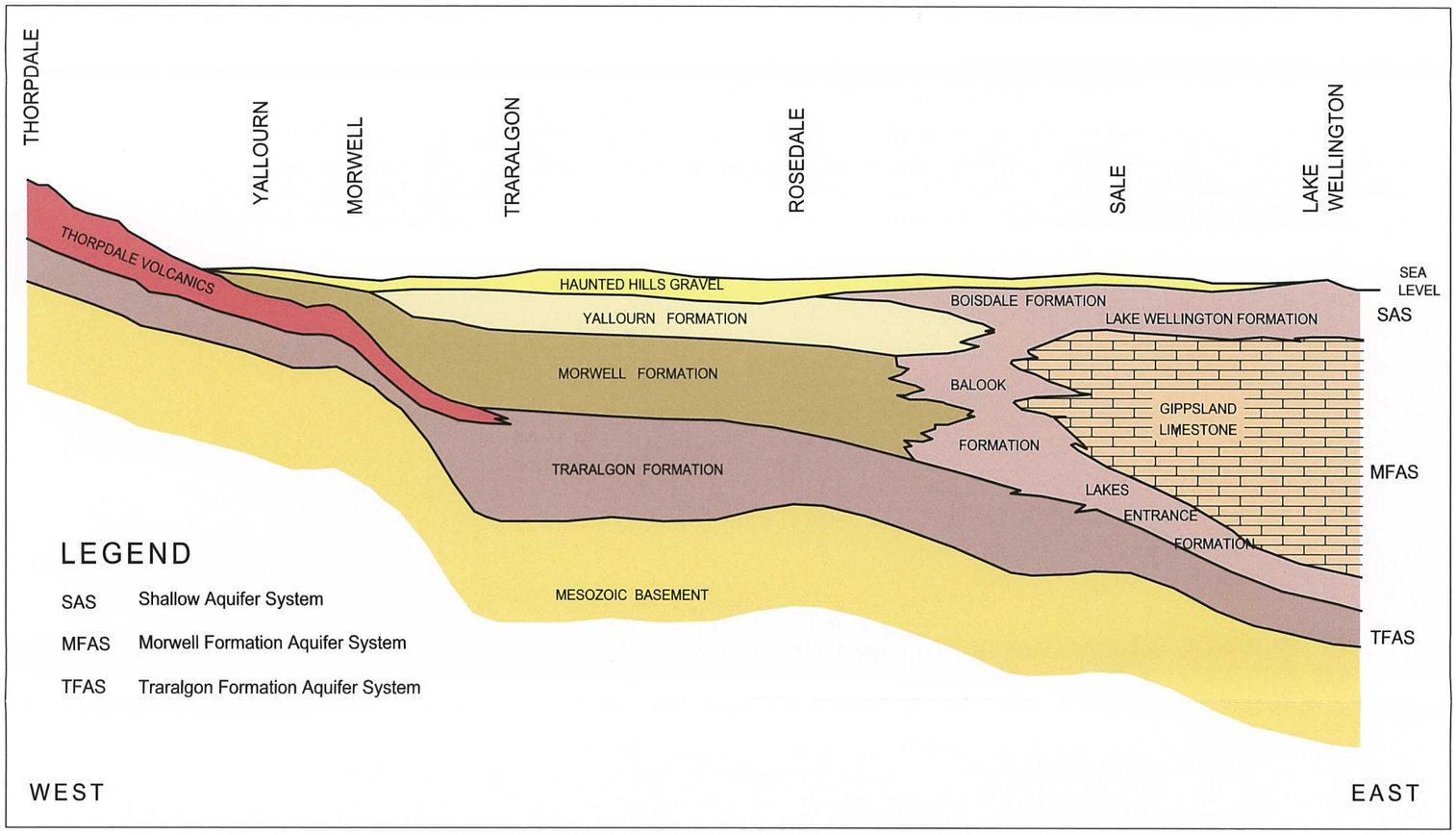


Figure 5(a) Schematic Geological Section - Latrobe Valley Depression

Paper Size A3
Not to Scale

AGL Loy Yang
Mining Licence
Work Plan Variation

Geological Information

Job Number 31-2072315
Revision 1
Date 04 Mar 2015

Figure 5

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

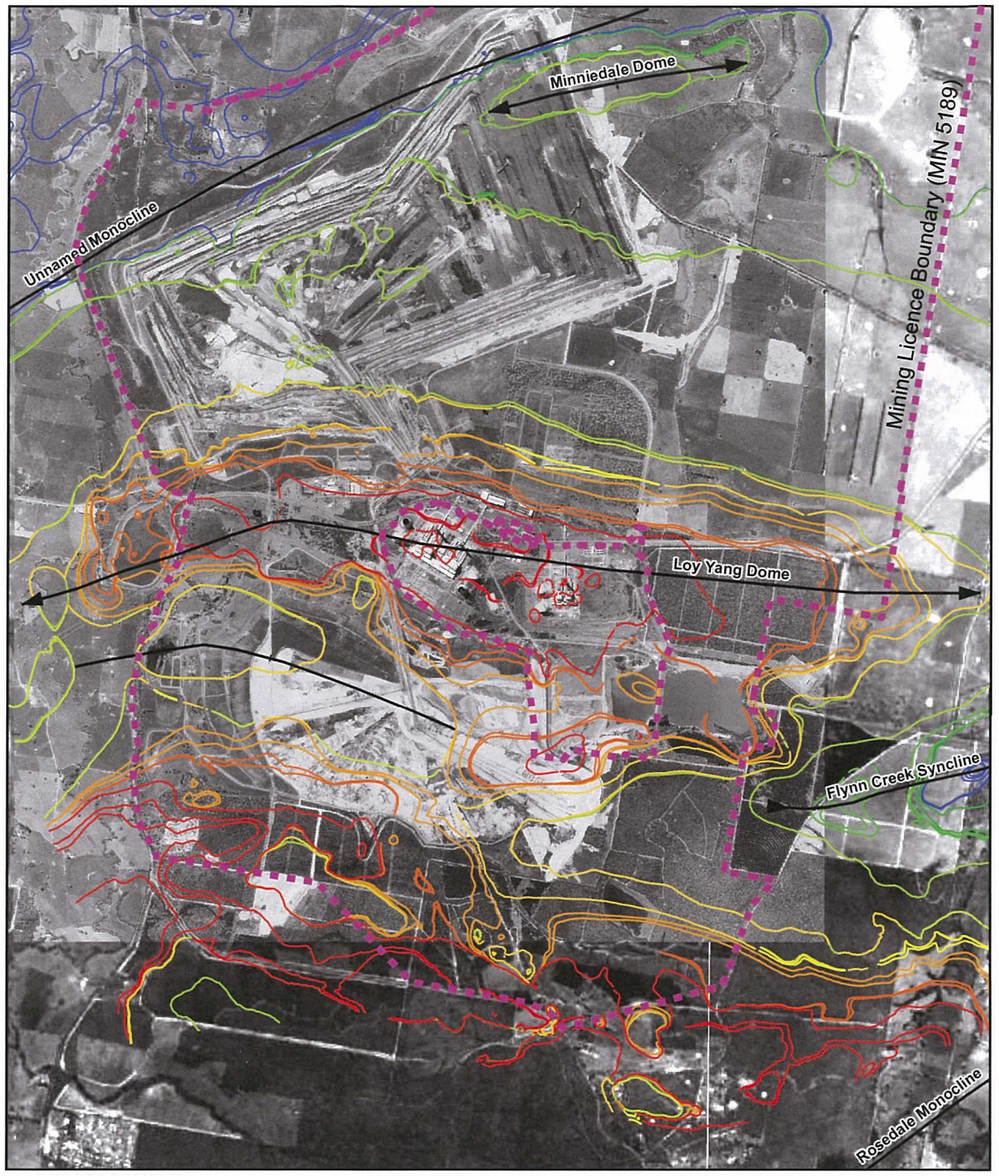
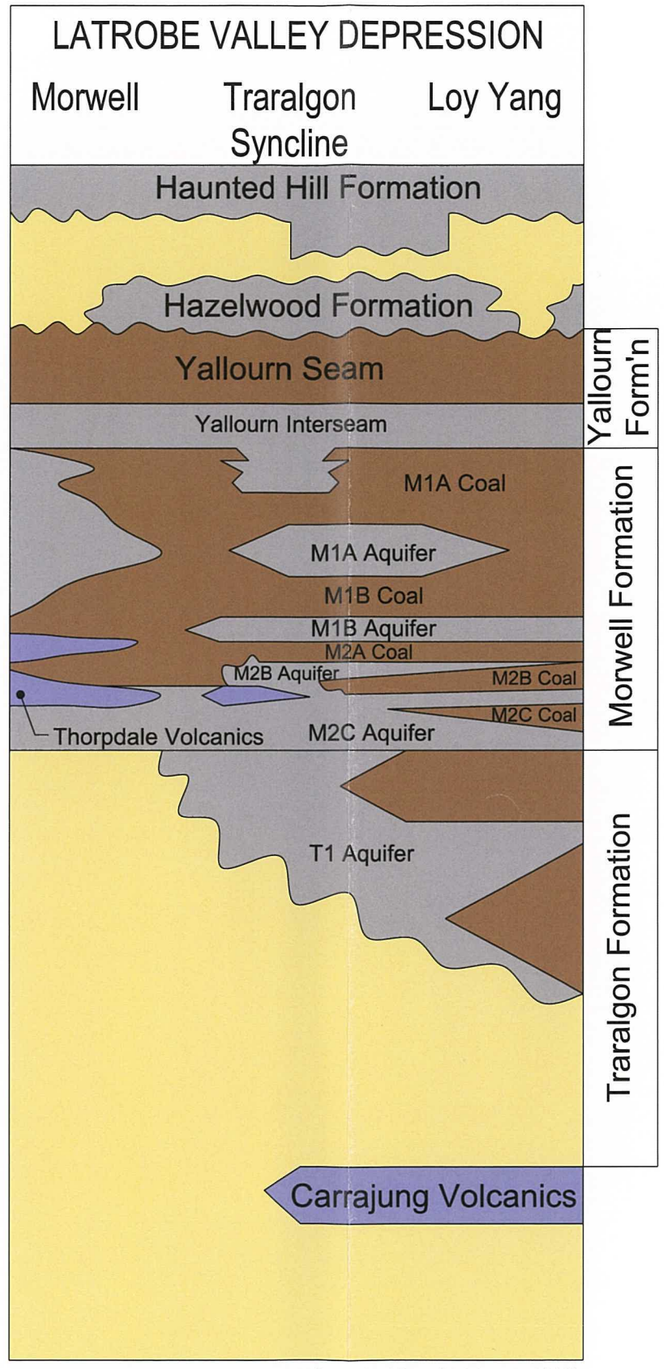


Figure 6(a) - Structural Features of Loy Yang Region



(modified from Holdgate, 2003)

Figure 6(b) - Stratigraphic Column

Paper Size A3
Not to Scale

N

AGL Loy Yang
Mining Licence
Work Plan Variation

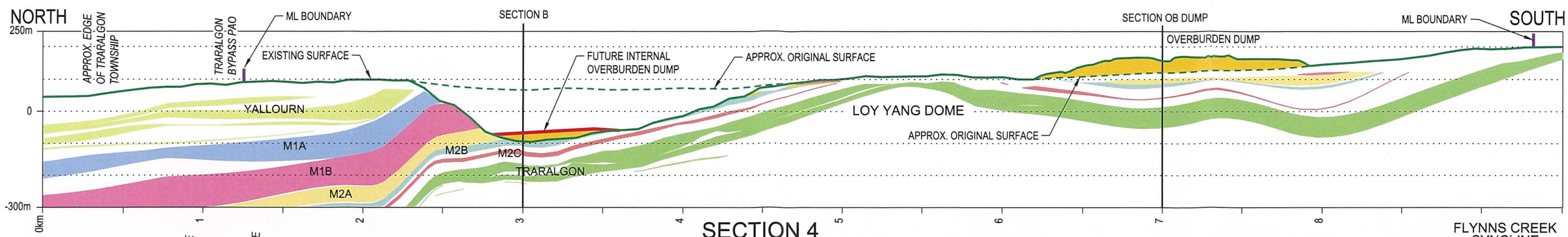
Job Number	31-2072315
Revision	1
Date	04 Mar 2015

Geological Information

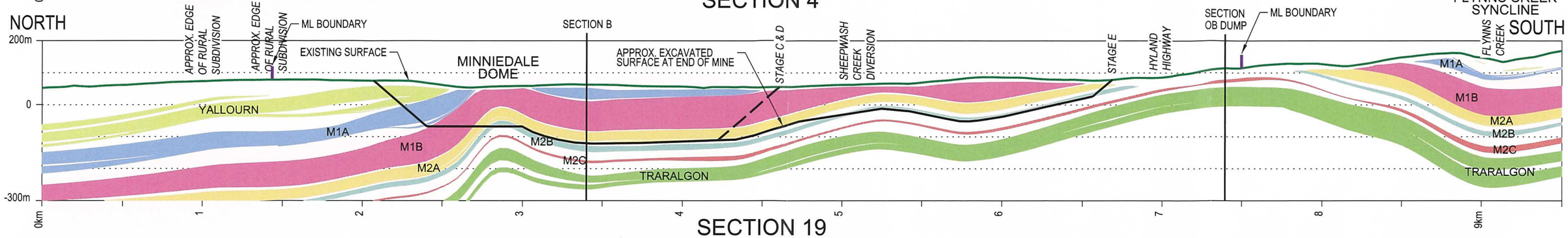
Figure 6

G:\2072315\CADD\Drawings\2014 Figures\31-2072315-FIG006.dgn

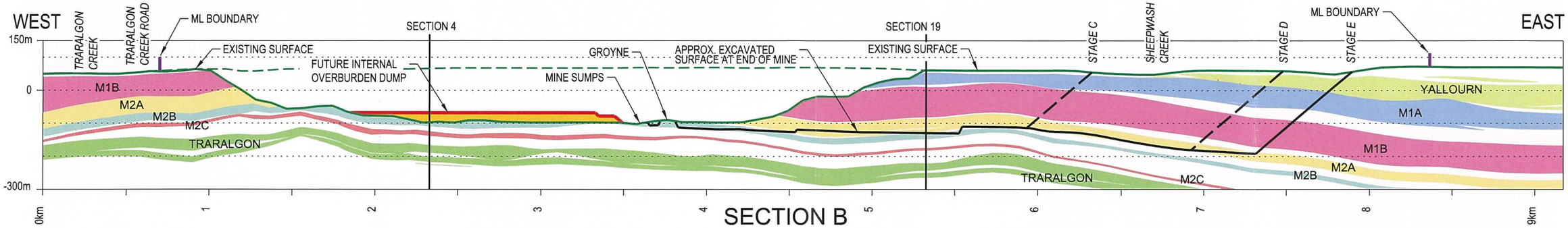
Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au



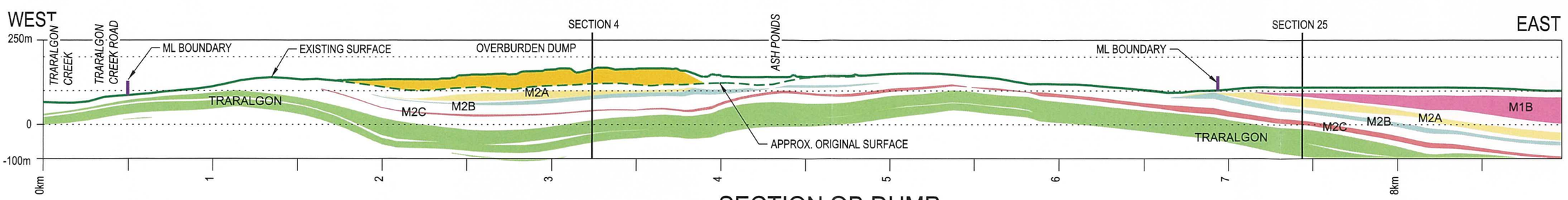
SECTION 4



SECTION 19



SECTION B



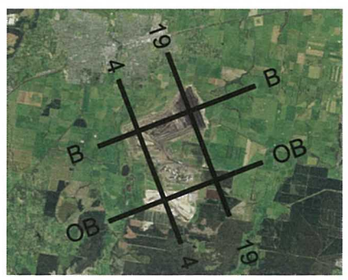
SECTION OB DUMP

VERTICAL 1:12500
AT ORIGINAL SIZE

HORIZONTAL 1:25000
AT ORIGINAL SIZE

0 100 500m

0 0.2 1.0km



Paper Size A3
Exaggerated Scale

N

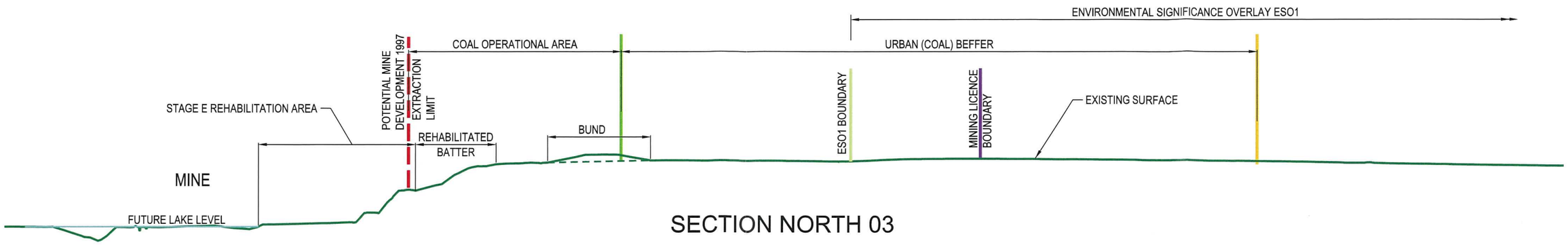
AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	1
Date	04 Mar 2015

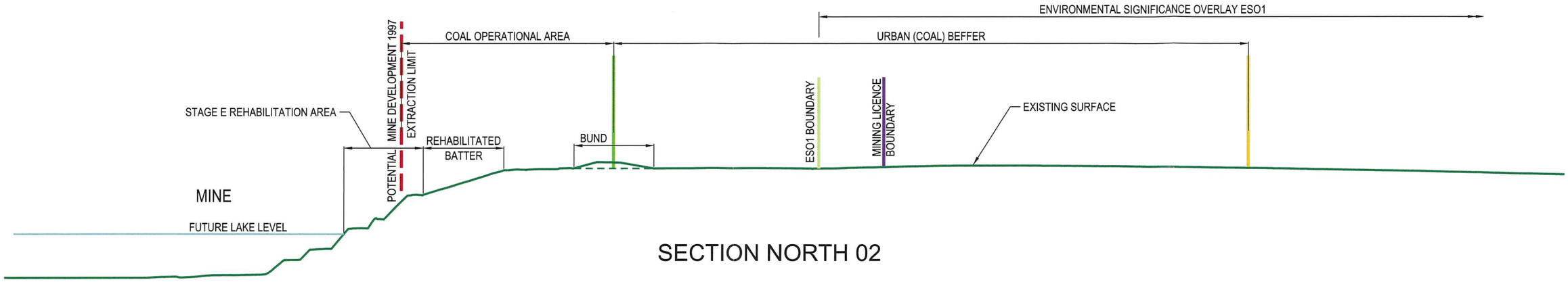
Geological Cross Sections

Figure 7

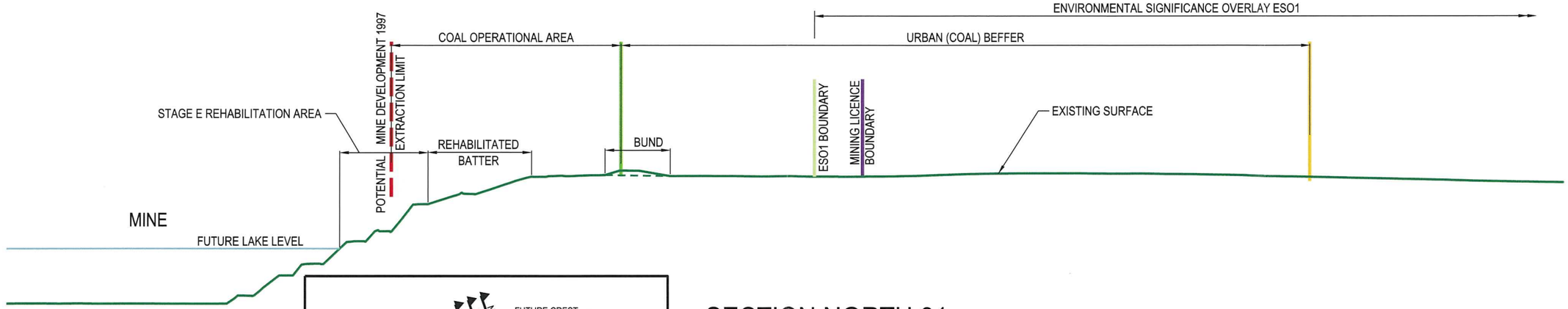
Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au



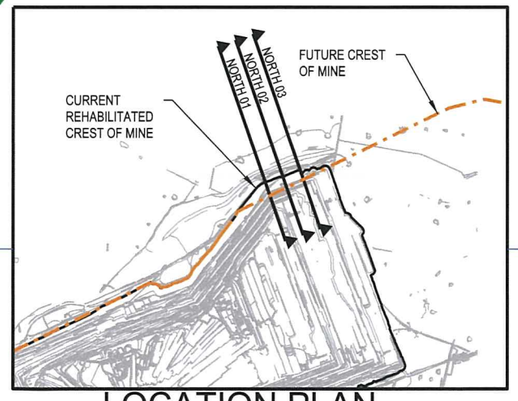
SECTION NORTH 03



SECTION NORTH 02



SECTION NORTH 01



LOCATION PLAN

Paper Size A3

0 50 100 150 200 250m

SCALE 1:500 AT ORIGINAL SIZE

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	1
Date	30 Sept 2015

Northern Batters
Cross Sections

Figure 7a

G:\2072315\CADD\Drawings\2014 Figures\31-2072315-FIG007a.dgn

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au

415,000 420,000

265,000 260,000

Traralgon

Public Acquisition Overlay for Proposed Freeway Bypass

Traralgon Creek Rd

TRARALGON CREEK

SHEEPWASH CREEK

Extraction Limit

Mining Licence Boundary (MIN 5189)

Mattingley Hill Rd

Bartons Lane

Bartons Lane

Loy Yang A Power Station

Loy Yang B Power Station

Hyland Hwy

Traralgon Creek Rd

Callignee South Rd

Dumping Limit

FLYNNS CREEK

Legend

- Boreholes without Moisture & Ash Results
- Boreholes with Moisture & Ash Results
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Current Mine Crest and Current Overburden Dump Boundary
- Current Mine Base
- Mining Licence Boundary
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Public Acquisition Overlay

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 3
Date 25 Sep 2015

Boreholes in AGL Loy Yang Licence Area

Figure 8

G:\31\2072315\GIS\Maps\Deliverables\312072315_008_Boreholes_Rev3.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

415,000 420,000

265,000 260,000

Traralgon

Public Acquisition Overlay for Proposed Freeway Bypass

N1 N2 N3 N4 N5 N6 N7 N8 N9 N10 N11 N12 N13 N14 N15

W1 W2 W3

ST1 ST2 ST3 ST4 ST5 ST6 ST7 ST8 ST9 ST10 ST11

S1 S2 S3

Traralgon Creek Rd

TRARALGON CREEK

SHEEPWASH CREEK

Extraction Limit

Mining Licence Boundary (MIN 5189)

Mattingley Hill Rd

Bartons Lane

Bartons Lane

Loy Yang A Power Station

Loy Yang B Power Station

Hyland Hwy

Traralgon Creek Rd

Callignee South Rd

Dumping Limit

FLYNNS CREEK

415,000 420,000

Legend

- Survey Pins
- Bund Toe
- Bund Top
- Current Mine Crest and Current Overburden Dump Boundary
- Current Mine Base
- Mining Licence Boundary
- Stability Line
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Public Acquisition Overlay

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 3
Date 25 Sep 2015

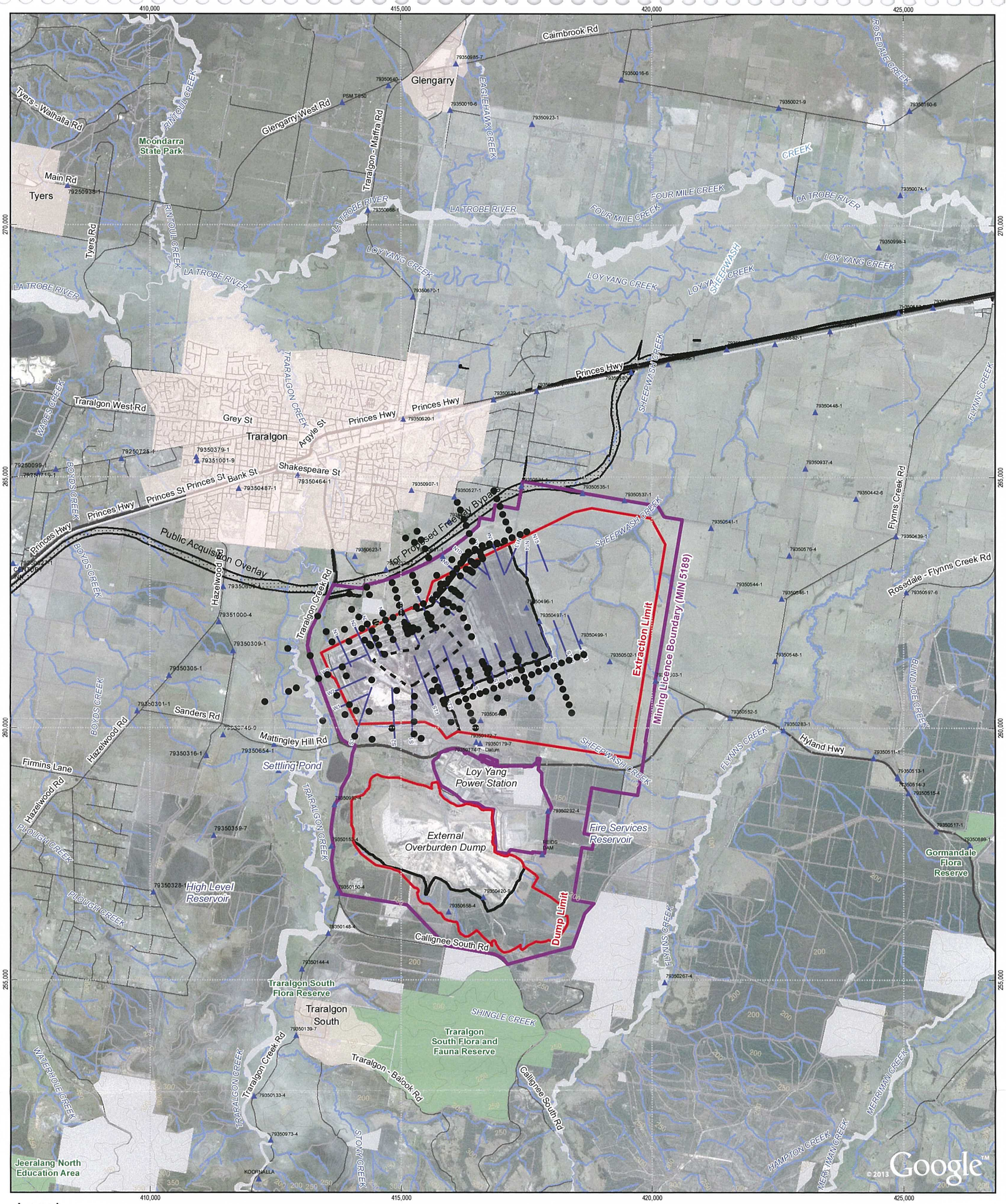
Stability Lines and Survey Pins Loy Yang Mine Area

Figure 8a

G:\31\2072315\GIS\Maps\Working\20150903\312072315_008a_Boreholes_Rev3.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers



Legend

- Regional Survey Pins
- Survey Pins
- Stability Line
- Current Mine Base
- Extraction Limit and Dump Limit
- Current Mine Crest and Current Overburden Dump Boundary
- Mining Licence Boundary
- Public Acquisition Overlay
  - Minor
  - Major
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Channel / drain
- Parks
- Crown Land

1:70,000 at Paper Size A3

0 500 1,000 2,000 3,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence Work
Plan Variation

Job Number 31-2072315
Revision 4
Date 25 Sep 2015

Stability Lines and Survey Pins Regional Plan

Figure 8b

G:\31\2072315\GIS\Maps\Deliverables\312072315_008b_RegionalPlan_Rev4.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); Google Earth Imagery. Created by:scyphers

415,000 420,000

265,000 260,000

Traralgon

Public Acquisition Overlay for Proposed Freeway Bypass

3

Stage B Rehabilitated Crest Position

Stage C Crest Position

Stage D Crest Position

Stage E Crest Position

CREEK

SHEEPWASH

SHEEPWASH CREEK

Traralgon Creek Rd

2

TRARALGON CREEK

Extraction Limit

Mining Licence Boundary (MIN 5189)

1

Mattingley Hill Rd

Bartons Lane

Bartons Lane

Settling Pond

Loy Yang A Power Station

Loy Yang B Power Station

Hyland Hwy

External Overburden Dump

Ash Pond

Fire Service Reservoir

Traralgon Creek Rd

Callignee South Rd

Dumping Limit

FLYNNS CREEK

415,000 420,000

Legend

- Future mine crest
- Block Boundaries from previous workplan (1997) application
- Current Mine Base
- Current Mine & Overburden Dump Crests
- Mine Crest 1997
- Potential Loy Yang Mine Development (1997)
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Public Acquisition Overlay
- 1 Potential mine boundary revision
- 2 Potential mine boundary revision
- 3 Northern permanent batter boundary revision
- Future OB Crest

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 5
Date 25 Sep 2015

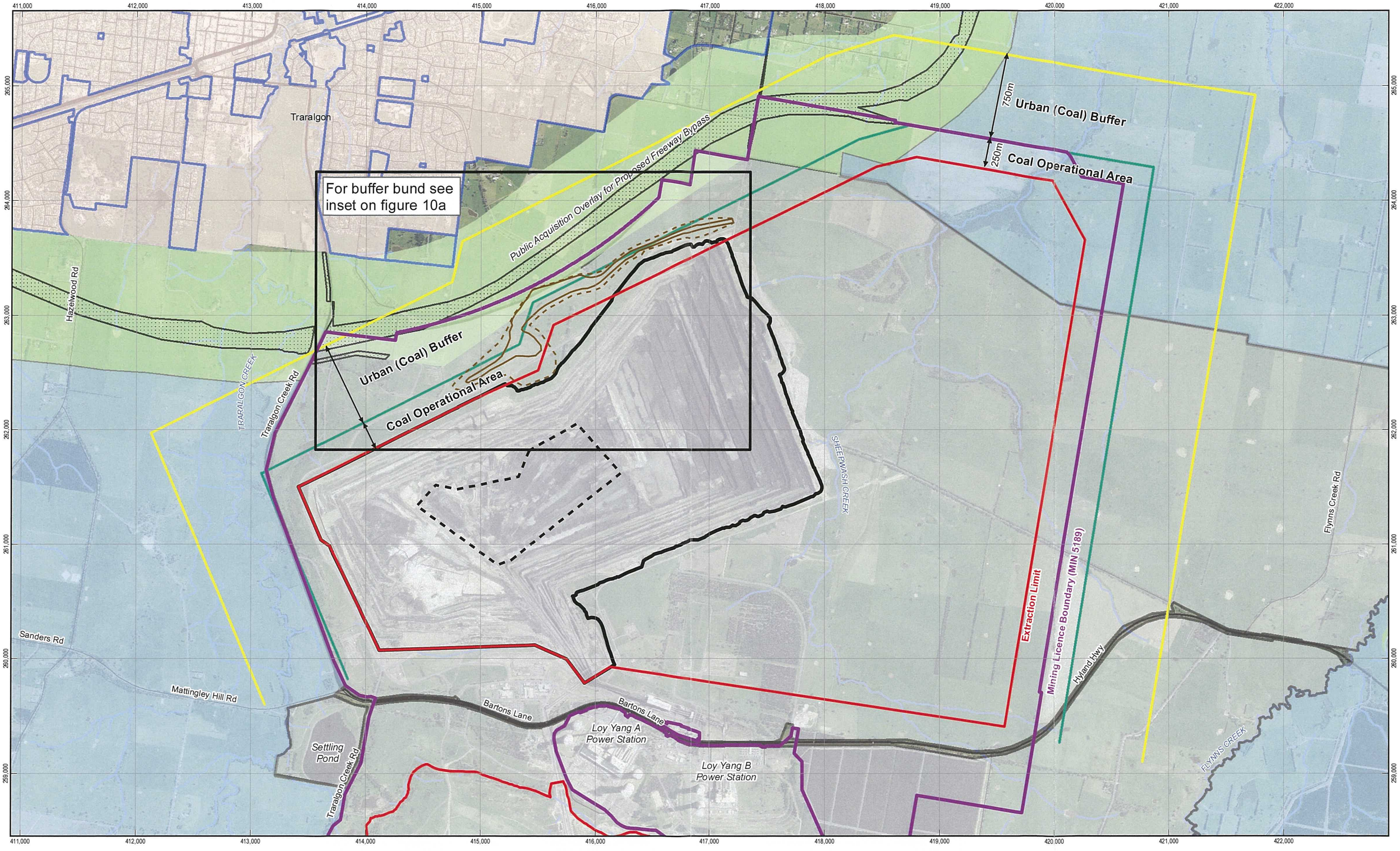
Mine Development Areas

Figure 9

G:\31\2072315\GIS\Maps\Deliverables\312072315_009_ProposedMineDevelopments_Rev5.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers



1:30,000 at Paper Size A3

0 0.25 0.5 0.75 1

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

LEGEND

- Coal Operational Area
- Urban (Coal) Buffer
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Current Mine Crest
- Current Mine Base
- Mining Licence Boundary
- Special Use Zone
- Environmental Significance Overlay
- Public Acquisition Overlay
- State Resource Overlay
- Rural Living and General Residential Areas
- Highway
- Sealed road (arterial & local)
- Unsealed road

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	2
Date	25 Sep 2015

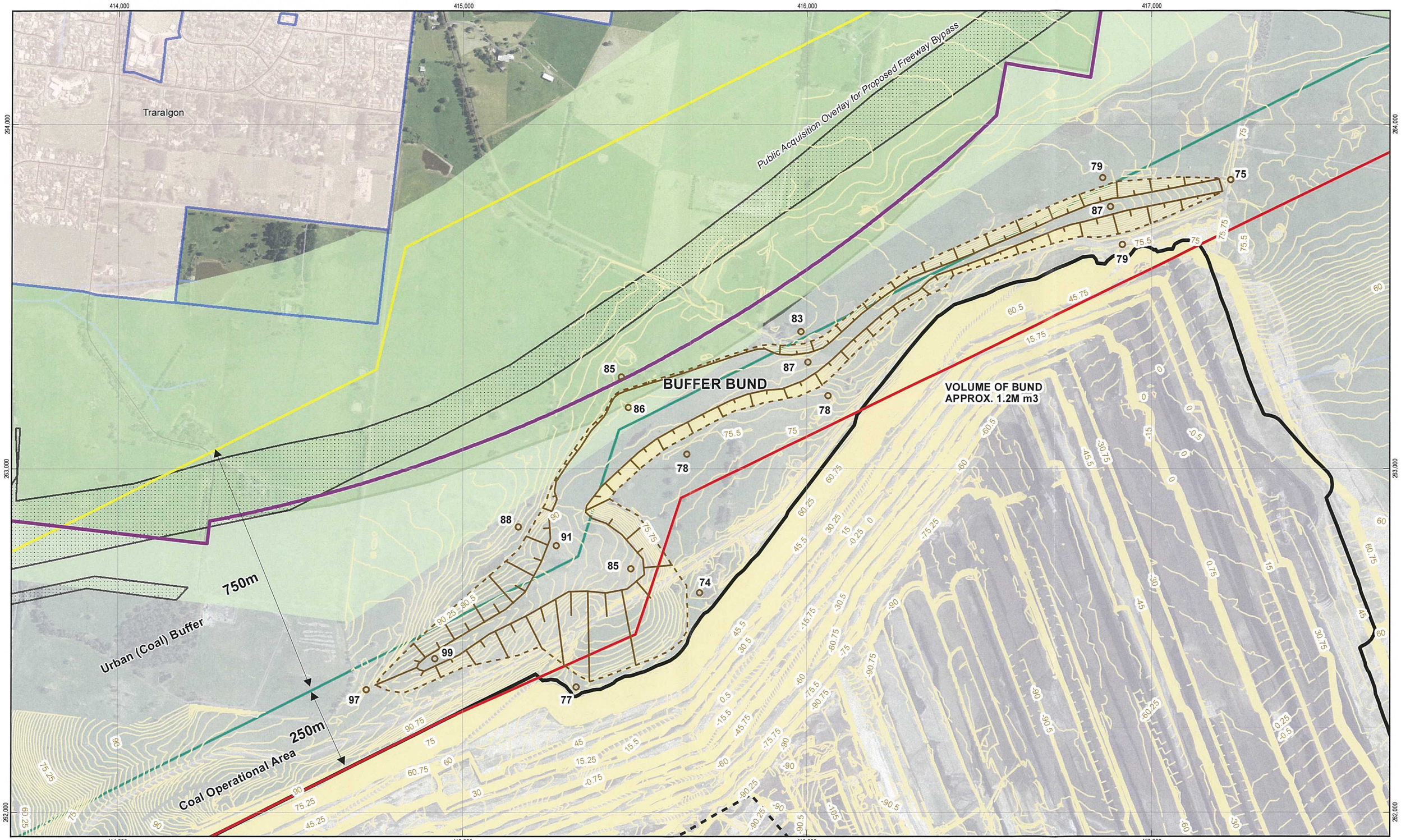
Buffer Zones

Figure 10

G:\31\2072315\GIS\Maps\Deliverables\312072315_010_BufferZones_Rev2.mxd

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94). Created by:scyphers

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au



1:10,000 at Paper Size A3

0 0.08 0.16 0.24 0.32

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

LEGEND

- Bund Toe
- Bund Top
- Coal Operational Area
- Urban (Coal) Buffer
- Extraction Limit and Dump Limit
- Contour
- Current Mine Crest
- Current Mine Base
- Mining Licence Boundary
- Special Use Zone
- Environmental Significance Overlay
- Public Acquisition Overlay
- Rural Living and General Residential Areas
- Highway
- Sealed road (arterial & local)
- Unsealed road
- 85 Bund Levels (mAHD)

Energy in action:

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	1
Date	25 Sep 2015

Buffer Bund

Figure 10a

G:\31\2072315\GIS\Maps\Deliverables\312072315_010a_BufferZonesInset1_Rev1.mxd

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94). Created by:scyphers

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

415,000 420,000 265,000 260,000

Traralgon

Public Acquisition Overlay for Proposed Freeway Bypass

CREEK

SHEEPWASH

SHEEPWASH CREEK

Traralgon Creek Rd

TRARALGON CREEK

82 93 54 1:3.1 -54 1:10.3 76 1:4.4 -33 50 1:5.3 82 63 71

Extraction Limit

Mining Licence Boundary (MIN 5189)

Mattingley Hill Rd

Bartons Lane

Bartons Lane

Settling Pond

87

Loy Yang A Power Station

Loy Yang B Power Station

Hyland Hwy

External Overburden Dump

108 105 134

Ash Pond

Fire Service Reservoir

111 73 99 145 134 140 138

Traralgon Creek Rd

Callignee South Rd

Dumping Limit

FLYNNS CREEK

415,000 420,000

Legend

- Current Mine Base
- Current Mine Crest
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Contours (10m)
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Connector
- Public Acquisition Overlay
- Urban Settlement Boundary
- 1:3 Overall Batter Grades (V:H) Crest to Mine Floor

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Development Stage A - at 1997

Job Number 31-2072315
Revision 2
Date 25 Sep 2015

Figure 11

G:\31\2072315\GIS\Maps\Deliverables\312072315_011_DevelopmentStageA_Rev2.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

Legend

- Curent Base of Mine and Dump
- Curent Crest of Mine and Dump
- Internal Waterbodies
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Existing Sheepwash Creek Diversion Stage 1
- Contours (10m)
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Connector
- Public Acquisition Overlay
- Urban Settlement Boundary
- 1:3 Overal Batter Grades (V:H) Crest to Mine Floor

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Development Stage B - at 2014

Job Number 31-2072315
Revision 2
Date 25 Sep 2015

Figure 12

G:\31\2072315\GIS\Maps\Deliverables\312072315_012_DevelopmentStageB_Rev2.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

Legend

Development Stage C (Crest) with Levels (mAHD)	Extraction Limit and Dump Limit	Stream	1:3 Overall Batter Grades (V:H) Crest to Mine Floor
Development Stage C (Base) with Levels (mAHD)	Mining Licence Boundary	Connector	
Internal OB Dump	Contours (10m)	Public Acquisition Overlay	
Internal Waterbodies	Highway	Stacker Route	
Bund Toe	Sealed road (arterial & local)	Stage 2 Sheepwash Creek Diversion	
Bund Top	Unsealed road		

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

Energy in action.

AGL Since 1837

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	4
Date	25 Sep 2015

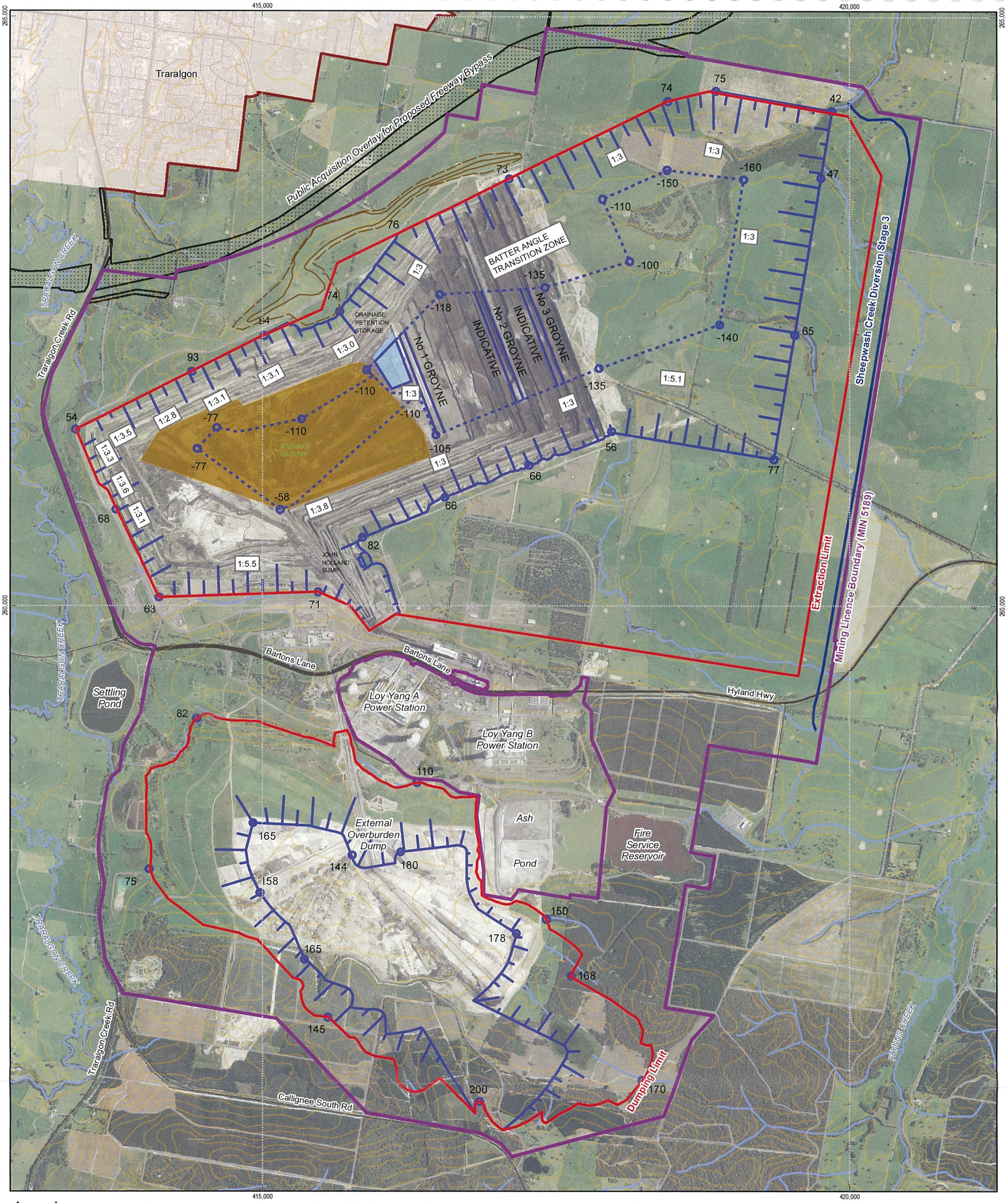
Development Stage C

Figure 13

G:\31\2072315\GIS\Maps\Deliverables\312072315_013_DevelopmentStageC_Rev4.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers



Legend

- Internal OB Dump
- Internal Waterbodies
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Contours (10m)
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Connector
- Public Acquisition Overlay
- Urban Settlement Boundary
- Stage 3 Sheepwash Creek Diversion
- Development Stage D (Crest) with Approx. Levels (mAHD)
- Development Stage D (Base) with Approx. Levels (mAHD)
- 1:3 Overall Batter Grades (V:H) Crest to Mine Floor

1:30,000 at Paper Size A3

0 250 500 1,000 1,500 Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 4
Date 25 Sep 2015

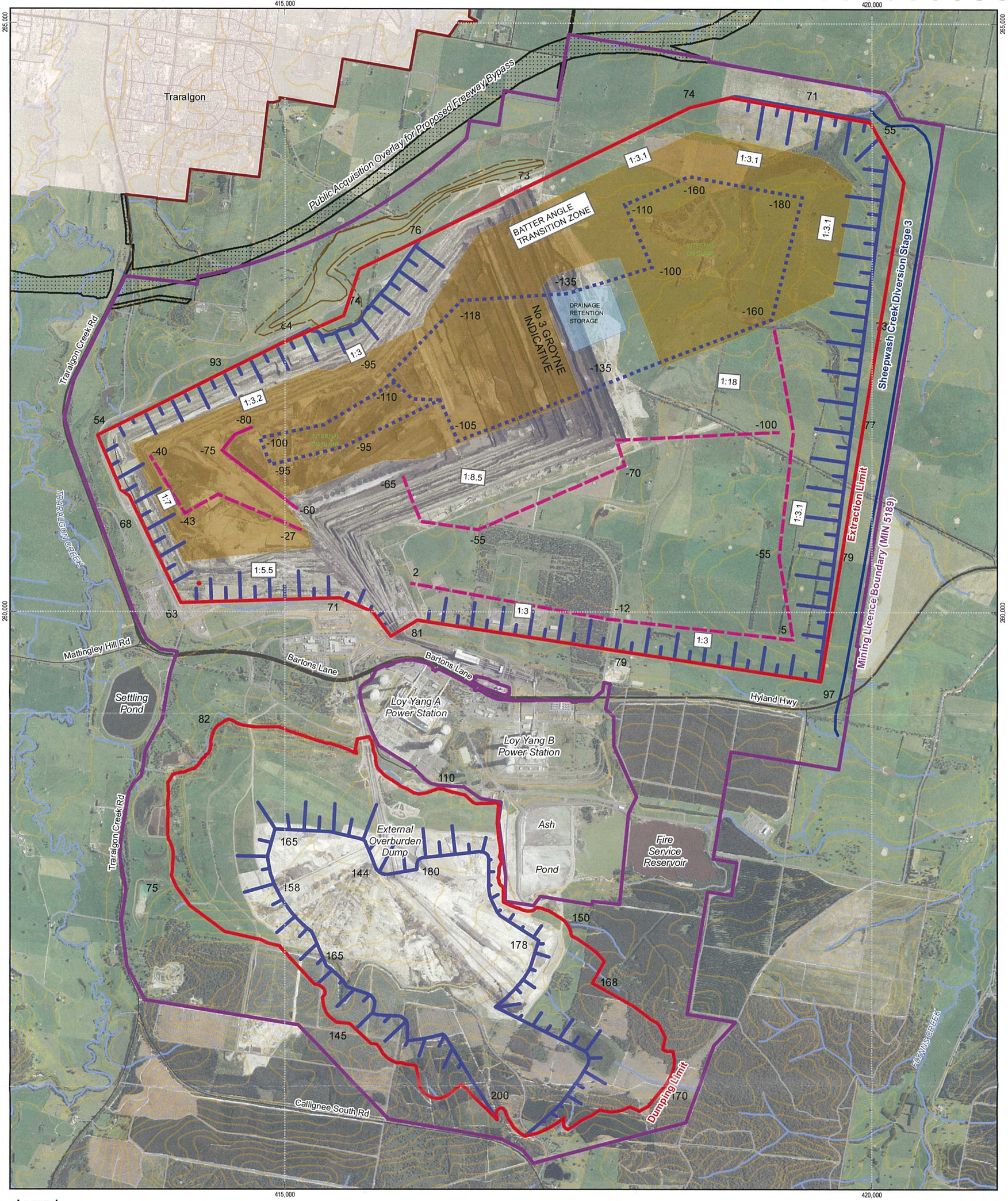
Development Stage D at approximately 2030

Figure 14

G:\31\2072315\GIS\Maps\Deliverables\312072315_014_DevelopmentStageD_Rev4.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers



Legend

- Development Stage E (Crest) with Approx. Levels (mAHD)
- Development Stage E (Base) with Approx. Levels (mAHD)
- Development Stage E (Intermediate Toes)
- Internal OB Dump
- Internal Waterbodies
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Stage 3 Sheepwash Creek Diversion
- Contours (10m)
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Connector
- Public Acquisition Overlay
- Urban Settlement Boundary
- 1:3 Overall Batter Grades (V:H) Crest to Mine Floor

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 3
Date 25 Sep 2015

Development Stage E Mine Closure

Figure 15

G:\31\2072315\GIS\Maps\Deliverables\312072315_015_DevelopmentStageF_Rev3.mxd

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Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

415,000 420,000

265,000 260,000

Traralgon

Public Acquisition Overlay for Proposed Freeway Bypass

Traralgon Creek Rd

DRAINAGE RETENTION STORAGE

WILLIAMS SUMP

NW RETARDING BASIN

JOHN HOLLAND SUMP

TRARALGON CREEK

SHEEPWASH CREEK

SHEEPWASH CREEK

Extraction Limit

Mining Licence Boundary (MIN 5189)

to Fireservice Reservoir

Mattingley Hill Rd

Bartons Lane

Bartons Lane

Settling Pond

Loy Yang A Power Station

Loy Yang B Power Station

Hyland Hwy

External Overburden Dump

Ash Pond

Fire Service Reservoir

Traralgon Creek Rd

Callignee South Rd

Dumping Limit

FLYNNS CREEK

415,000 420,000

Legend

- Development Stage B (Base)
- Development Stage B (Crest)
- Internal Waterbodies
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Contours (10m)
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Connector
- Public Acquisition Overlay
- Urban Settlement Boundary
- Existing Rehabilitated Area

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 3
Date 25 Sep 2015

Rehabilitation Stage Plan at Development Stage B - 2014 Figure 16

G:\31\2072315\GIS\Maps\Working\312072315_016_RehabilitationStagePlans_Current_Rev2.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

415,000 420,000

265,000 260,000

Traralgon

Public Acquisition Overlay for Proposed Freeway Bypass

Traralgon Creek Rd

TRARALGON CREEK

SHEEPWASH CREEK

SHEEPWASH CREEK

Extraction Limit

Mining Licence Boundary (MIN 5189)

Mattingley Hill Rd

Bartons Lane

Bartons Lane

Settling Pond

Loy Yang A Power Station

Loy Yang B Power Station

Hyland Hwy

External Overburden Dump

Ash Pond

Fire Service Reservoir

Traralgon Creek Rd

Callignee South Rd

Dumping Limit

FLYNNS CREEK

415,000 420,000

Legend

- Development Stage C (Crest)
- Development Stage C (Base)
- Internal OB Dump
- Internal Waterbodies
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Contours (10m)
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Connector
- Public Acquisition Overlay
- Urban Settlement Boundary
- Previously Rehabilitated Areas
- New Rehabilitated Areas
- Area Reserved for Rehabilitation Trials

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

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Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 4
Date 25 Sep 2015

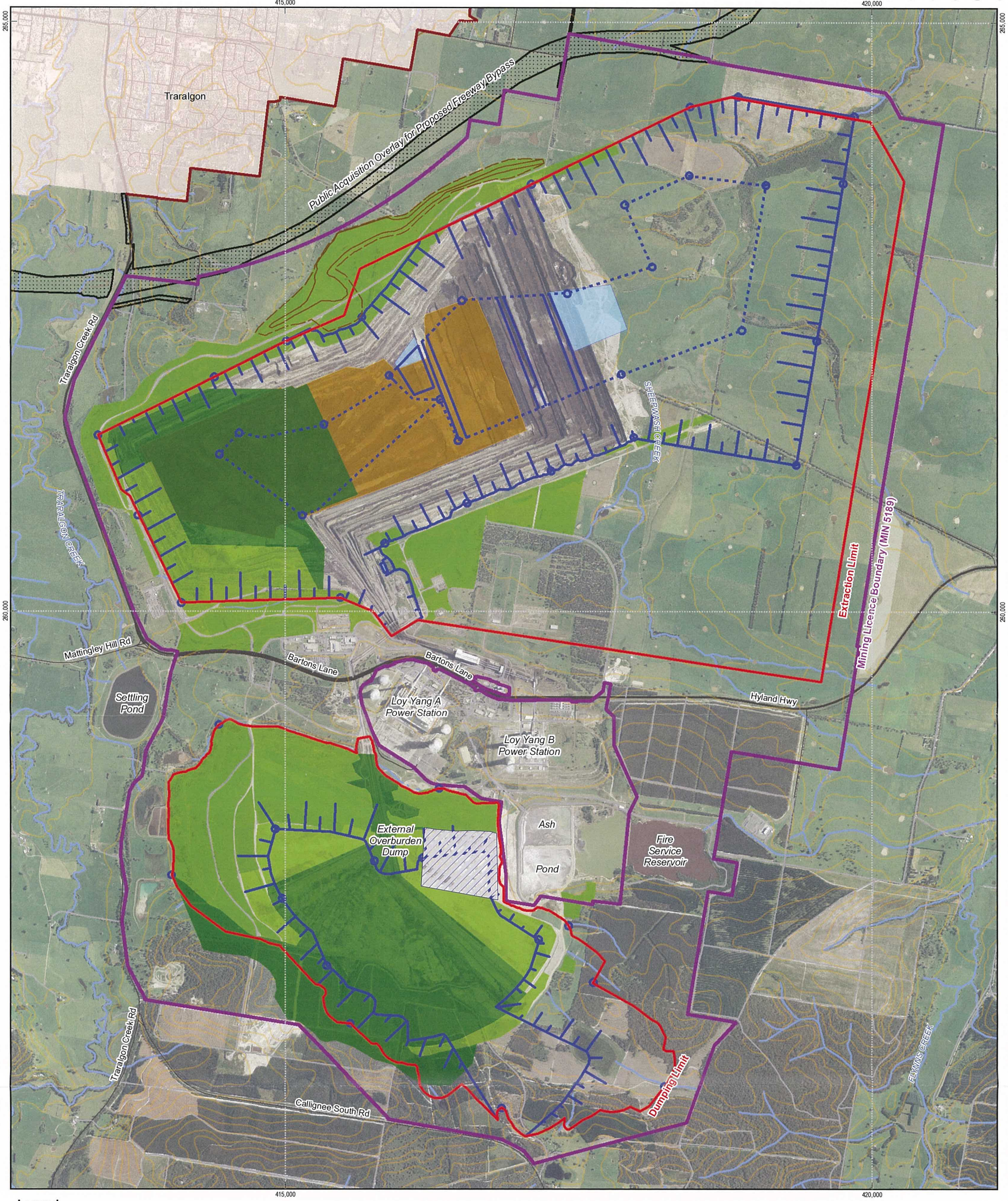
Rehabilitation Stage Plan at Development Stage C

Figure 17

G:\31\2072315\GIS\Maps\Deliverables\312072315_017_RehabilitationStagePlansC2030_Current_Rev4.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers



Legend

- Development Stage D (Base)
- Development Stage D (Crest)
- Internal OB Dump
- Internal Waterbodies
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Contours (10m)
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Connector
- Public Acquisition Overlay
- Urban Settlement Boundary
- Previously Rehabiliated Areas
- New Rehabiliated Areas
- Possible Ash Dumping

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

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Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 4
Date 25 Sep 2015

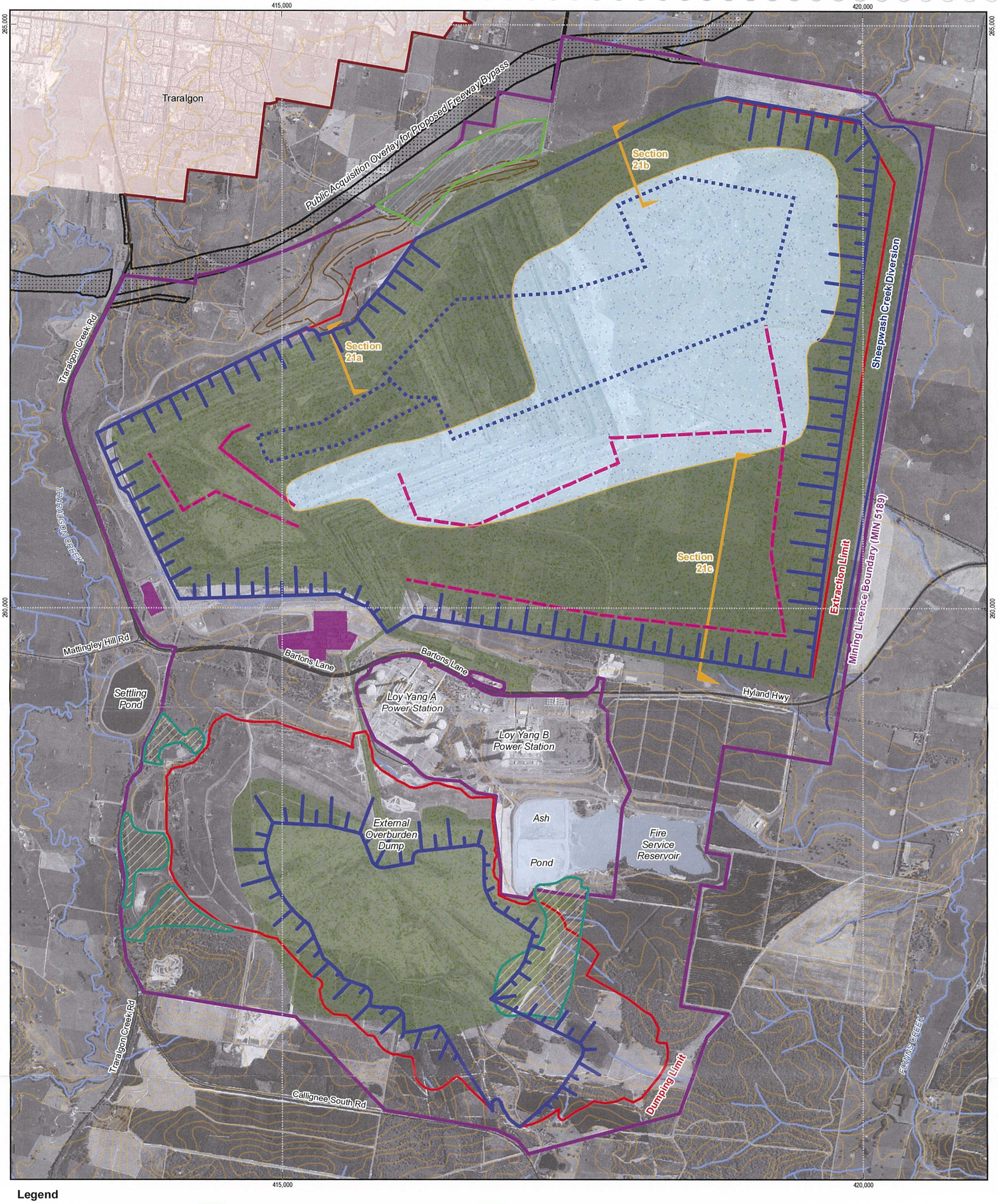
Rehabilitation Stage Plan at Development Stage D

Figure 18

G:\31\2072315\GIS\Maps\Deliverables\312072315_018_RehabilitationStagePlans_StageD_Rev4.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers



Legend

- Development Stage E (Crest)
- Development Stage E (Base)
- Development Stage E (Intermediate Toes)
- New Water Level
- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Mining Licence Boundary
- Sheepwash Creek Diversion
- Contours (10m)
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Connector
- Public Acquisition Overlay
- Urban Settlement Boundary
- Potential Offset Plantings
- Potential Revegetation Plantings
- Section Lines (Refer to figure 21)
- Lake
- Cover for fire, dust and water shedding
- Industry/Commerce

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 3
Date 25 Sep 2015

Rehabilitation Stage Plan At Mine Closure

Figure 19

G:\31\2072315\GIS\Maps\Deliverables\312072315_019_RehabilitationStagePlans_Stage1_Rev3.mxd

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Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

415,000
420,000
265,000
260,000
Traralgon
Public Acquisition Overlay for Proposed Freeway Bypass
L226
L225
L229
D7
D5
D1
SHEEPWASH CREEK
L160
Traralgon Creek Rd
Final Mine Footprint
Extraction Limit
Mining Licence Boundary (MIN 5189)
Sheepwash Creek Diversion Stage 3
TRARALGON CREEK
D4
Dredger Erection Site
Fueling Area
Raw Coal Bunker
Coal Handling Area
Mattingley Hill Rd
Bartons Lane
Loy Yang A Power Station
Bartons Lane
Hyland Hwy
Valley Power Gas Turbine
SHEEPWASH CREEK
L171
Retention Ponds
Switchyard
Loy Yang B Power Station
L170
S3
External Dump Treatment & Retention Ponds
S2
Fire Service Reservoir
Basslink Converter Station
Ash Pond
Traralgon Creek Rd
Moto-X Track
Latrobe City Landfill
Callignee South Rd
Dumping Limit
D6
FLYNNS CREEK

Legend

- Bund Toe
- Bund Top
- Extraction Limit and Dump Limit
- Coal Operational Area
- Current Mine Base
- Current Mine Crest and Current Overburden Dump Boundary
- Mining Licence Boundary
- Sheepwash Creek Diversion
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Stream
- Public Acquisition Overlay
- Plantations
- Remnant
- Dust Monitoring Sites
- WaterQualitySites EPA
- Mine Offices and Workshops
- Final Mine and OB Footprint
- Revegetation Plantings
- Offset Plantings

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action.

Since 1837 AGL

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Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 3
Date 25 Sep 2015

Environmental

Figure 20

G:\31\2072315\GIS\Maps\Deliverables\312072315_020_Environmental_Rev3.mxd

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

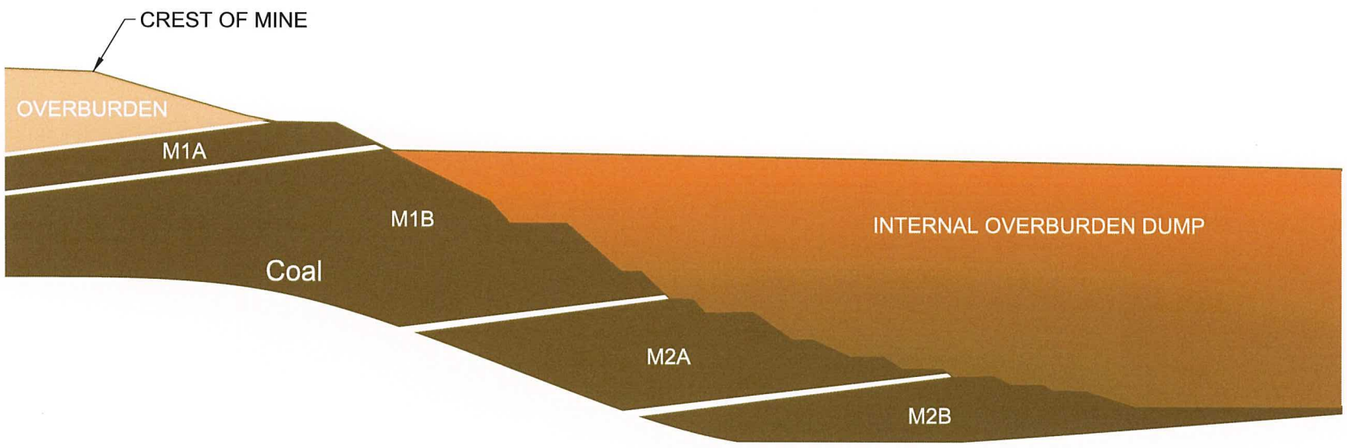

Figure 21(a) Northern Batters and Internal Dump

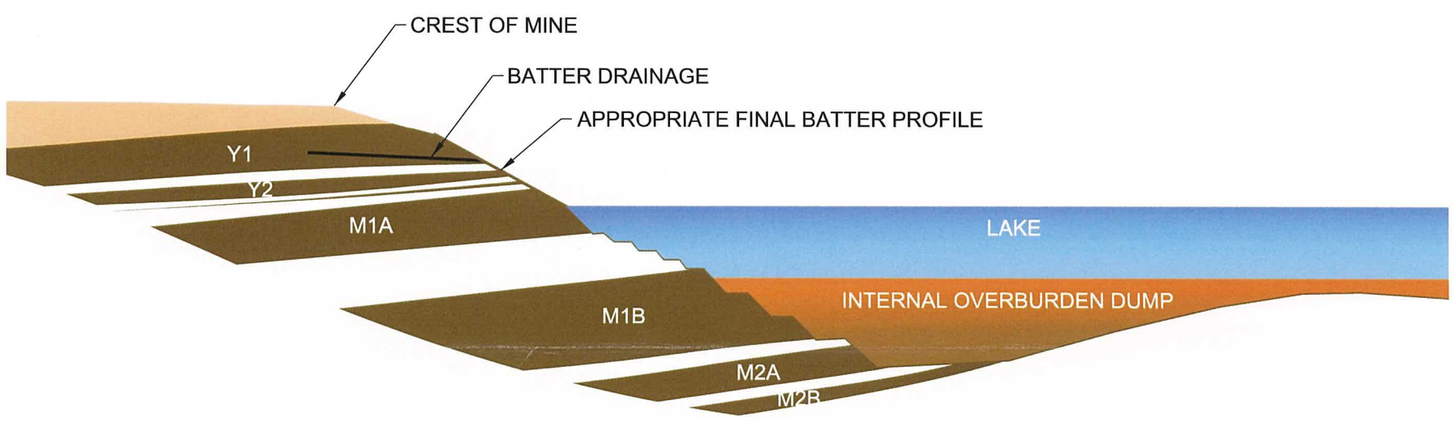

Figure 21(b) Northern Batters at Lake

Figure 21(c) Southern Batters

Refer to Figure 19 for Section locations

Paper Size A3
Not to Scale

N

Energy in action. Since 1837 AGL

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Work Plan Variation

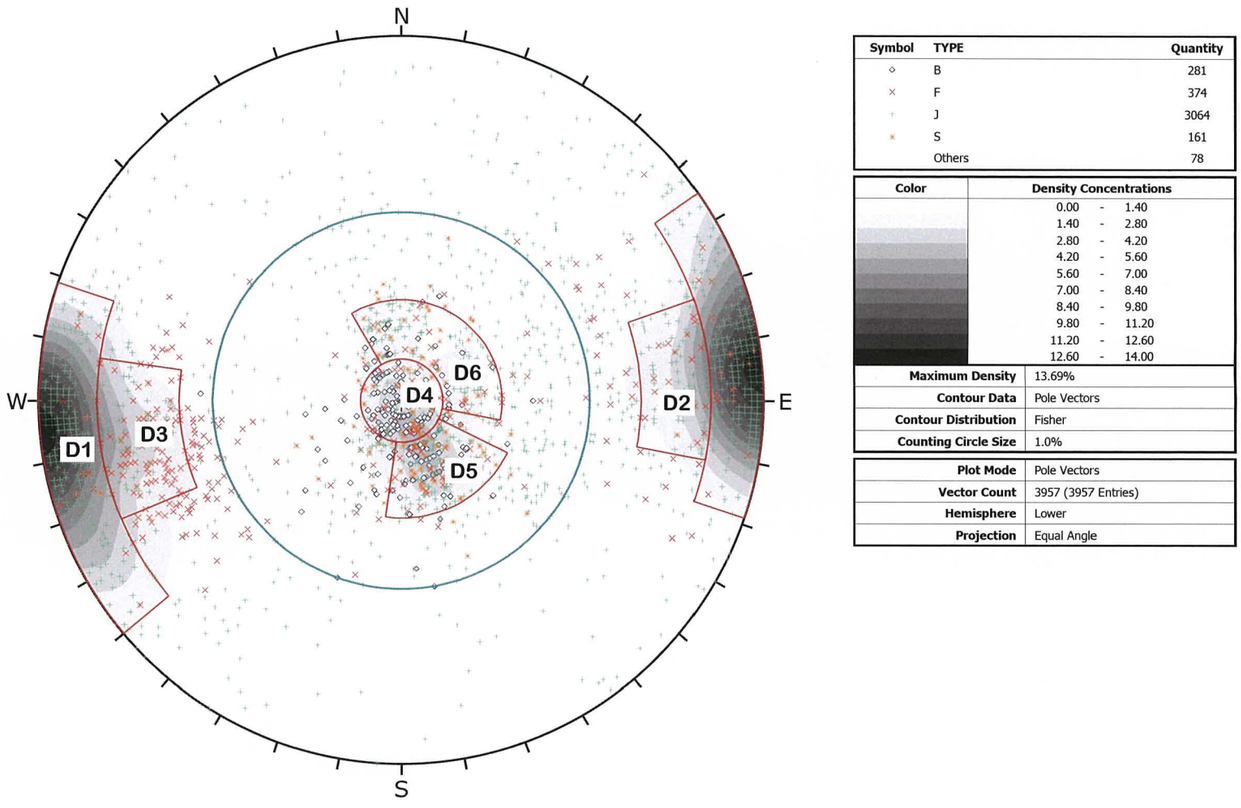
INDICATIVE MINE REHABILITATION SECTIONS

Job Number	31-2072315
Revision	3
Date	03 Sept 2015

Figure 21

G:\2072315\CADD\Drawings\2014 Figures\31-2072315-FIG021.dgn

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au



Symbol	TYPE	Quantity
◇	B	281
×	F	374
·	J	3064
×	S	161
	Others	78

Color	Density Concentrations
	0.00 - 1.40
	1.40 - 2.80
	2.80 - 4.20
	4.20 - 5.60
	5.60 - 7.00
	7.00 - 8.40
	8.40 - 9.80
	9.80 - 11.20
	11.20 - 12.60
	12.60 - 14.00

Maximum Density	13.69%
Contour Data	Pole Vectors
Contour Distribution	Fisher
Counting Circle Size	1.0%

Plot Mode	Pole Vectors
Vector Count	3957 (3957 Entries)
Hemisphere	Lower
Projection	Equal Angle

Figure 22(a) Pole Plot of Mapped Defects Including Defect Sets D1 - D6 (1996 to 2013)

Defect Set	Mean Dip/ Dip Direction (SECV grid)	Description
D1	89°/082°	Sub vertical major joint and minor fault set
D2	76°/266°	Major joint and fault set
D3	72°/082°	Major joint and fault set
D4	2°/003°	Bedding and shear set
D5	23°/333°	Bedding, Joints, faults and shear set
D6	18°/211°	Bedding, Joints, faults and shear set

Figure 22(b) Defect Sets Description Table

Paper Size A3
Not to Scale

N

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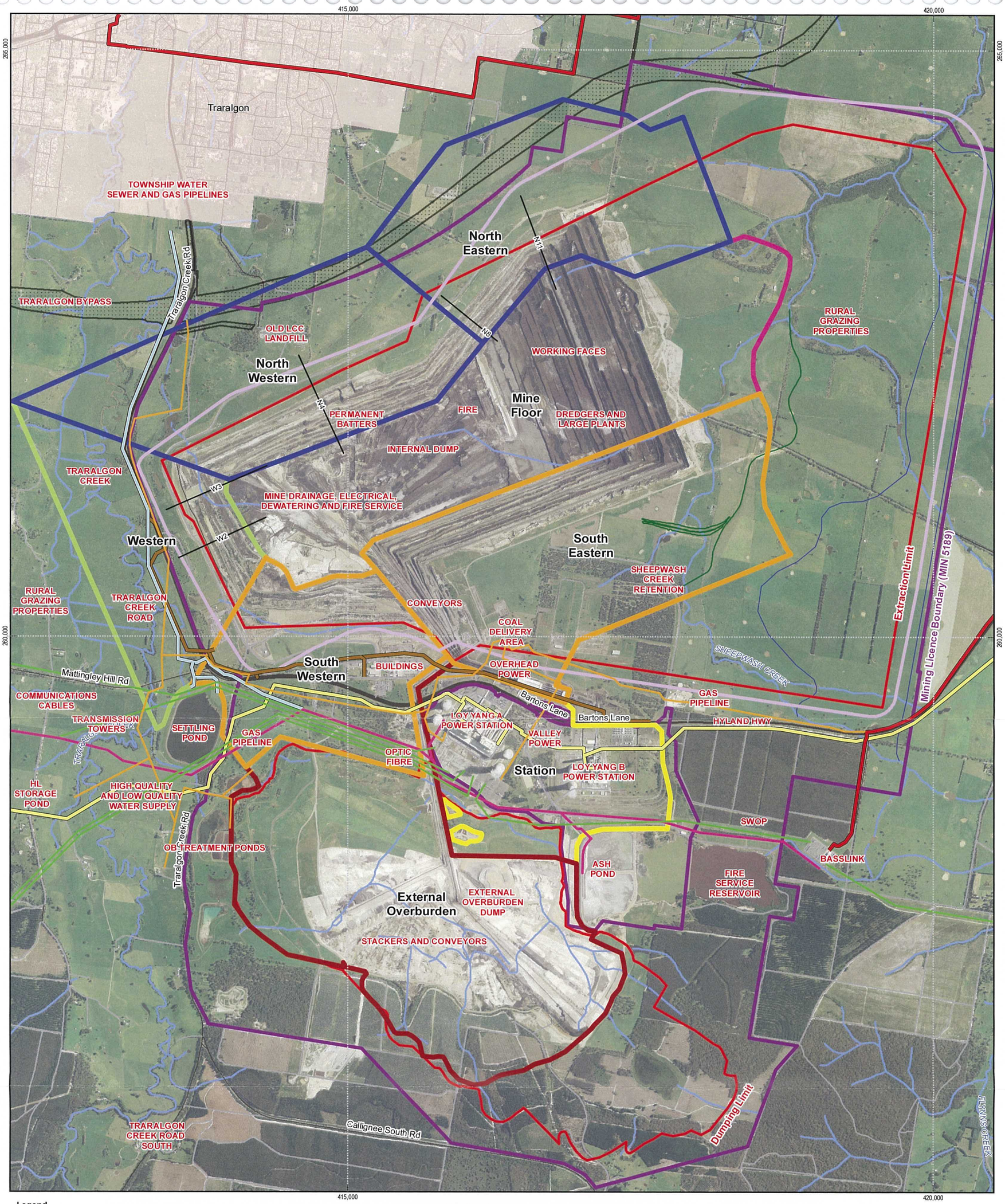
Mining Licence
Work Plan Variation

DEFECTS SET SUMMARY 2013

Job Number	31-2072315
Revision	1
Date	04 Mar 2015

Figure 22

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au



Legend

Domain
- Northern Batters
- Southern Batters
- Western Batters
- Mine Floor / Face
- External Overburden
- Station
- Existing Sheepwash Creek Diversion Stage 1
- Future Possible Sheepwash Creek Diversion
- Stability Lines
- Extraction Limit and Dump Limit
- Public Acquisition Overlay
- Mining Licence Boundary
- Highway
- Sealed road (arterial & local)
- Unsealed road
- GRZ Boundary

Identified Assets
- Distribution
- Gas
- Transmission
- SWOP
- Water
- Optic
- Sewer

1:30,000 at Paper Size A3

0 250 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: SECV Latrobe Valley

N

Energy in action. Since 1837 AGL

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 4
Date 25 Sep 2015

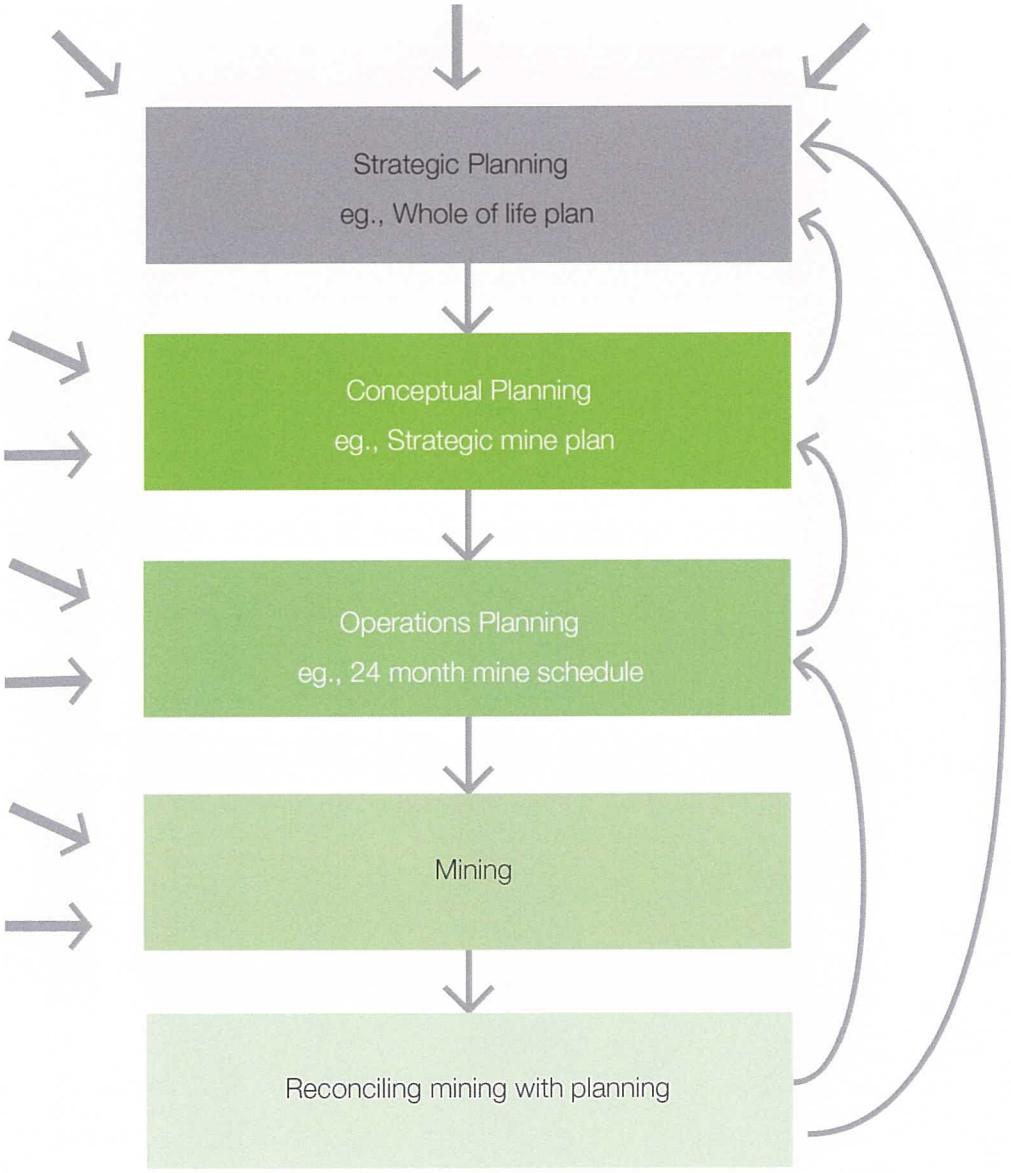
Risk Management Domains and Identified Assets

Figure 23

G:\31\2072315\GIS\Maps\Deliverables\312072315_023_Domains_Rev4.mxd

Data source: Vicmap(parcel, roads, zone, overlay,dtm20,); DEPI(min_geo_94); GHD(wol_3D_sectionlines) Created by:scyphers

Barton Lane Traralgon VIC 3844 Australia T 61 3 5173 3700 F 61 3 5173 3298 W www.agl.com.au



Paper Size A4

Energy in action. Since 1837 AGL

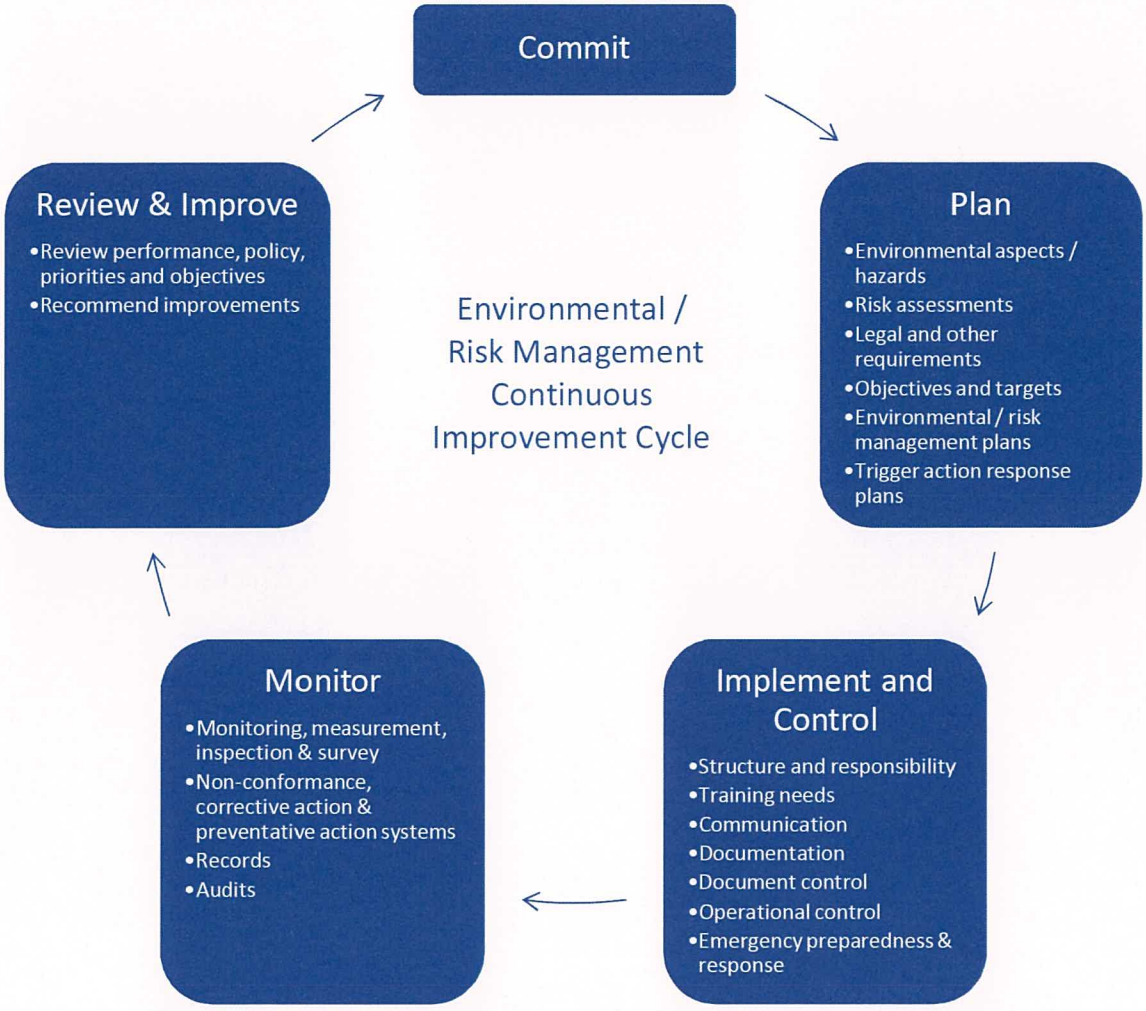
AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	1
Date	04 Mar 2015

Mining Design Process

Figure 24

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au



Paper Size A4

Energy in action. Since 1837 AGL

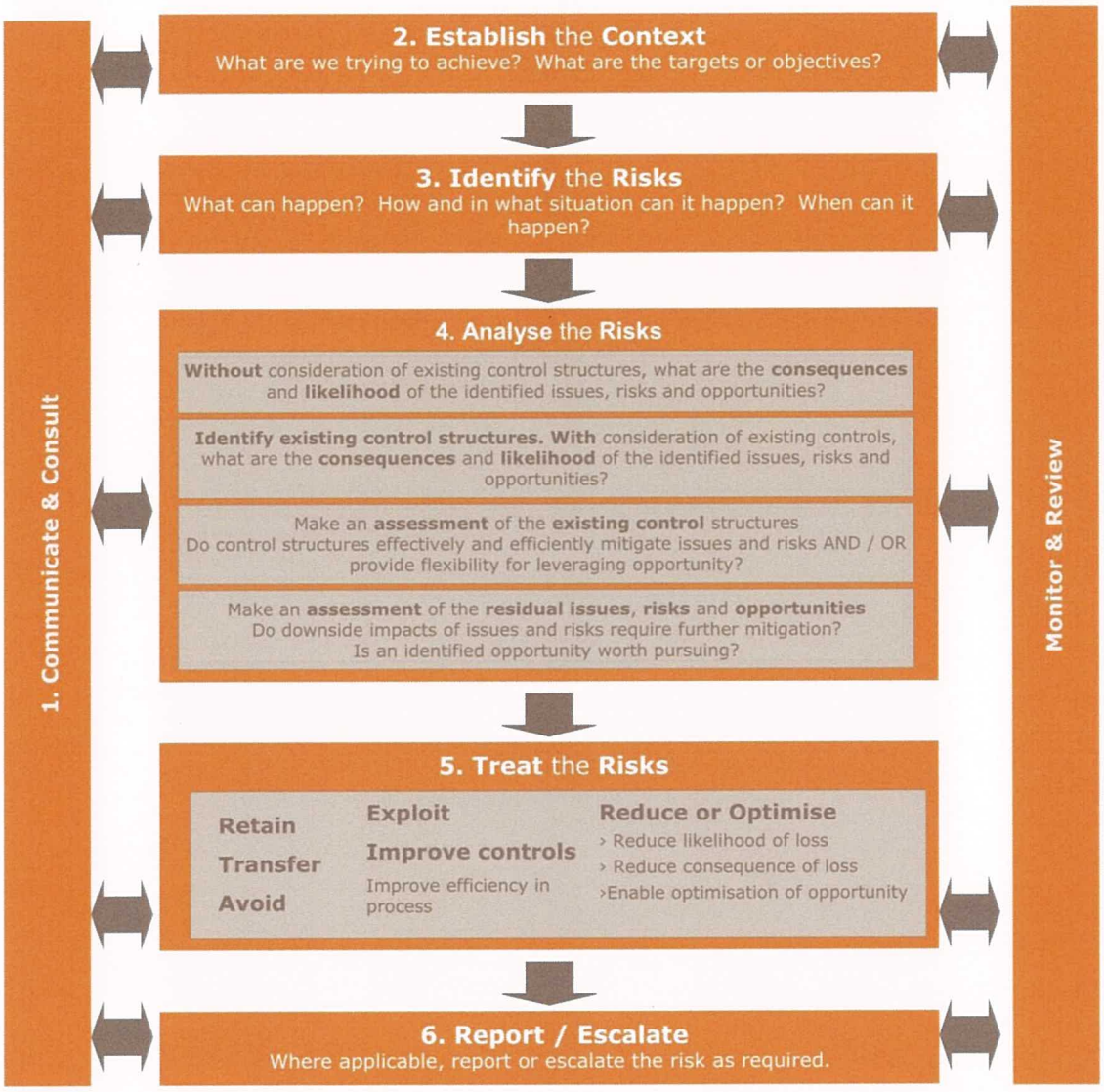
AGL Loy Yang
Mining Licence
Work Plan Variation

Environmental and Risk Management Approach

Job Number	31-2072315
Revision	1
Date	04 Mar 2015

Figure 25

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au



Paper Size A4

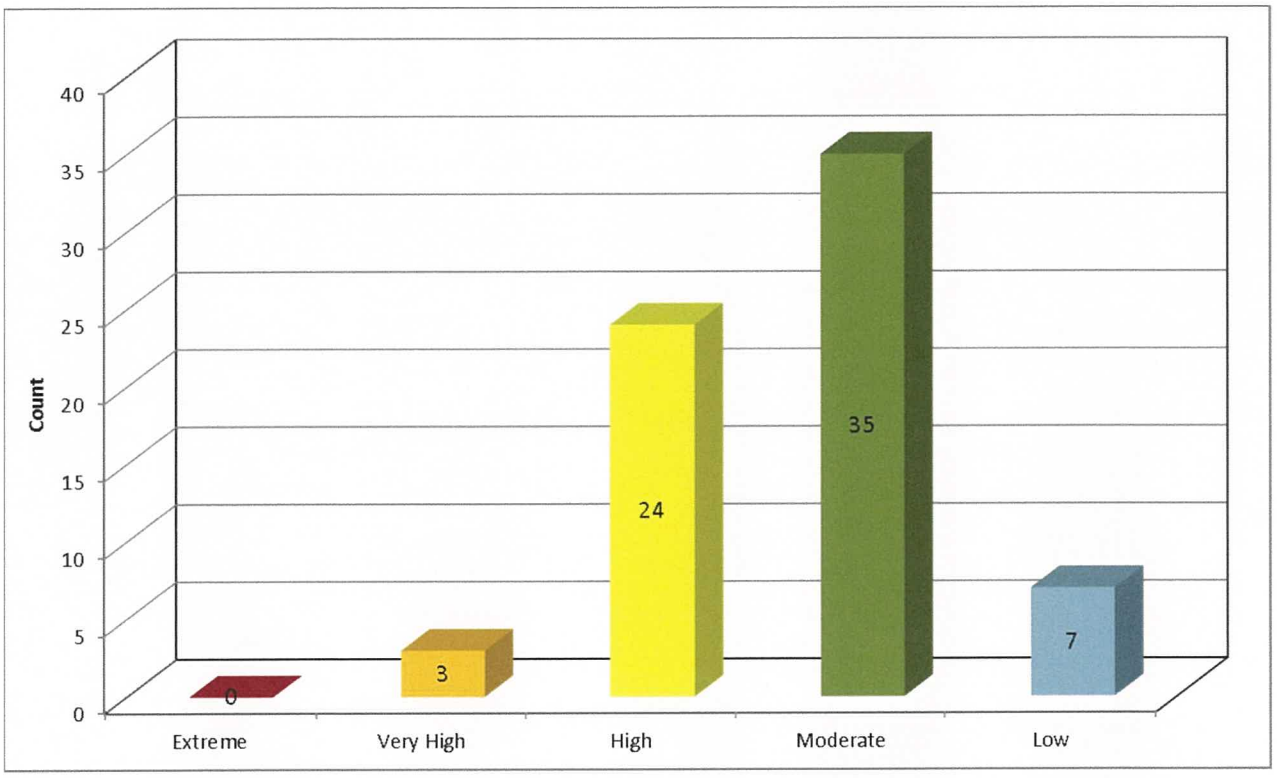
AGL Loy Yang
Mining Licence
Work Plan Variation

Risk Management Methodology

Job Number	31-2072315
Revision	1
Date	04 Mar 2015

Figure 26

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au



Paper Size A4

AGL Loy Yang
Mining Licence
Work Plan Variation

Job Number 31-2072315
Revision 1
Date 04 Mar 2015

Site Risk Profile

Figure 27

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au

Paper Size A4

Energy in action. Since 1837 AGL

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Mining Licence
Work Plan Variation

Job Number	31-2072315
Revision	1
Date	04 Mar 2015

GCMP General Overview

Figure 28

G:\2072315\CADD\Drawings\2014 Figures\31-2072315-FIG028.dgn

Barton Lane Traralgon VIC 3844 Australia **T** 61 3 5173 3700 **F** 61 3 5173 3298 **W** www.agl.com.au

Plates

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Plate 1 – Rehabilitated final landform - level 1 and 2 of the western section of Level 2 and 3 of external overburden dump, looking SE

Plate 2 - Rehabilitated final landform – western section of Level 2 and 3 of external overburden dump, looking SE

Plate 3 - Final rehabilitated landform – External overburden dump from Level 3. looking North

Plate 4 - Final rehabilitated landform - mine western batters –Viewing Mound

Plate 5 - Sheepwash Creek Diversion – retention areas, looking South

Plate 6 - Sheepwash Creek Diversion – retention area, looking West

Plate 7 – Progressive rehabilitated landform – down slope drainage

Plate 8 - Progressive rehabilitation landform – with topsoil and grassed and preliminary shaping.

Report Authors

This work plan variation has been compiled from AGL Loy Yang reports by Coffey International Pty Ltd with significant contributions from the following:

Name	Company	Title

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