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November 2022

Rehabilitation Management Plan for Coorabin Clay Mine ML1196 (Act 1973) PLL1155 (Act 1924)

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Summary Table	
Name of Mine	Coorabin Clay Mine
RMP Commencement Date	July 2022
Mining Authorisations	ML1196 (Act 1973) PLL1155 (Act 1924)
Mining Lease Expiry	23/06/2026 (ML1196) 23/06/2028 (PLL1155)
Name of Authorisation Holder	PGH Bricks & Pavers Pty Ltd
Name of Mine Operator (s)	PGH Bricks & Pavers Pty Ltd
Name and Contact Details of the Mine Manager	Joe Gauci (02) 9826 3964 jgauci@csr.com.au
Name and Contact Details of the Environmental Representative	Melanie Windust 0450 392 709 mwindust@csr.com.au
Name of the Representative of the Authorisation Holder	Joe Gauci
Signature of the Representative of the Authorisation Holder	
Date of Submission	6/12/2022

Revision Table

Date	Version	Author	Reviewed	Approved
6/12/2022	12409_BO_RMP_2022_F0	TO	BK/JG	TO

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1 Introduction to Mining Project

1.1 HISTORY OF OPERATIONS

The Oaklands Clay Mine is Located at Lot 1 DP 831425 off Coorabin Road Oaklands, Parish of Clear Hill, County of Urana (See *Figure Two*).

Development approval was first granted in 1966 for the extraction of Kaolin clay by underground methods on land covered by PLL 1155. DA6/2000 was then granted by the Urana Shire Council to allow for the continued open cut extraction of Kaolin clay to a depth of 23 metres. There is no expiry on the consent and conditions of DA 6/2000 are included in *Appendix A.*

The site has a long history of clay (kaolin) extraction and the DRE have provided records outlining the history of the site as follows.

- PL application 98 was made 17th of September 1945 by Alexander McDonald which may have been refused or did not proceed in about 1950.
- PML6 then granted to Riverina Clays Pty Ltd (application 128) in conjunction with Mr Arthur William Upton (Application 123) on the 24th of June 1966. PML6 was requested to be in the name of Riverina Clays Pty Ltd. These activities were conducted via underground methods to a consented depth of 30.48m and included surface rights.
- PLL 1155 was transferred to R.Fowler Ltd on 15th of May 1979.
- R.Fowler Ltd became Goodlet and Smith Holdings on the 16th of November 1979 and the change of name recorded on the lease on 30th of December 1981.
- Goodlet and Smith Holdings Ltd transferred their interest in PLL 1155 to James Hardie Industries Ltd on 22nd of July 1982.
- On the 27th of January 1988, Mining Lease (ML) 1196 for the Oaklands Clay Mine was granted to James Hardie Industry Limited by the Department of Mineral Resources. The lease allowed for the extraction of clay via open cut methods to occur to a depth of 35 metres for part of the area and the surface and soil thereof to a depth of 6.096 metres for the remainder
- James Hardie Industries Limited transferred PLL 1155 to Riverina Minerals Pty Ltd 11th of April 2000.
- In April 2003, Boral Bricks Pty Ltd, purchased the site from Riverina Minerals with the intention of continuing with the clay extraction operations to supply Boral's Jindera Brickworks. Boral Bricks Pty Ltd was transferred the title on the 4th of September 2003.
- On the 1st of May 2015, CSR Building Products Limited and Boral Bricks Pty Ltd became a joint venture under the name Boral CSR Bricks Pty Ltd now trading as PGH Bricks and Pavers. Both ML 1196 and PLL 1155 and consent now are pending transfer to PGH Bricks and Pavers and operations of extracting clay material from the site continued.
- The title was transferred from Boral Bricks Pty Ltd to PGH Bricks and Pavers Pty Ltd on the 22nd of June 2017.

The site is utilised for extraction activities to provide the raw clay material for brick production within the factory located at Jindera. Costeaning has been the primary exploration technique employed in advance of mining.

Some rehabilitation has been undertaken on the site in the southeast and will continue to follow extraction activities generally in an east to west direction.

1.2 CURRENT DEVELOPMENT CONSENTS, LEASES AND LICENCES

1.2.1 Regional NSW – Mining, Exploration and Geoscience

Table 1. Development Approvals

No.	Date Approved	Expires	Notes
6/2000	27/06/2000	Not Applicable	Continued open cut extraction of clay material to a depth of 23m

Note, the Environmental Impact Statement prepared for this development consent by Brink and Associates Pty Ltd in 1999 has not been found by either PGH Bricks and Pavers Pty Ltd, the previous owner Boral Bricks Pty Ltd, the Regulator or Council. Brink and Associates has since been acquired by another company and efforts to locate records from this company were also undertaken and advice was given that no records could be located. The Mine Operation Plan prepared by R.W. Corkery in May 2003 has been referenced in recent Mine Operation Plans, since the acquisition by PGH Bricks and Pavers Pty Ltd, as it is assumed to be aligned with the intentions of the lost Brink EIS.

1.2.2 Regional NSW- Mining Exploration and Geoscience (MEG)

In 1988, ML 1196 was awarded to James Hardie Industries for open cut extraction of clay on the Oaklands site. On the 4th December 2015, ML 1196 was renewed for a period of 19 years and the old conditions were replaced by new conditions. The PLL and ML conditions are included *Appendix B* and *Appendix C*.

Table 2. Mining Authorisation

No.	Act	Company	Granted	Expires	Area (Ha)	Minerals
PLL 1155	1924	PGH Bricks and Pavers Pty Ltd		23rd June 2028	25.39	Kaolin
ML 1196	1973	PGH Bricks and Pavers Pty Ltd		23rd June 2036	33.17	Kaolin, Structural Clay
ML 1196	1973	PGH Bricks and Pavers Pty Ltd		4th December 2034	33.17	Kaolin, Structural Clay

1.2.2.1 Depth Restrictions and Permitted Activities

1.2.2.1.1 PLL 1155

In correspondence (see *Appendix I*) with the Regulator regarding the depth and surface restrictions on the tenements, it was determined that PLL 1155 has a surface restriction over the area shaded pink in the 1966 Mine Lease Plan (see figure in Mine Lease conditions in *Appendix C* and *Figure One*). As stated in the 2007 Instrument of Renewal for PLL 1155, there is no surface restriction for the remainder of the area, this being the green shaded area. The Regulator has determined that surface activities in accordance with Section 81 of the Mining Act 1992 may be undertaken over the entirety of the PLL and mining and mining purposes in accordance with Section 73 of the Mining Act may be undertaken over the green shaded area.

That is, Section 81 states that for surface activities, in relation to subsurface leases, that the holder of any authority may carry out on the surface of the land any activities that are prescribed by the regulations as reproduced below.

Mining Regulation 2016

Section 27 Surface activities in relation to subsurface leases

(Former clause 26 of 2010 Reg)

For the purposes of section 81 (1) of the Act, the following activities are prescribed:

(a) prospecting operations,

(b) the construction, maintenance and use (in or in connection with mining operations) of any drillhole or shaft for the following:

(i) drainage of gas,

(ii) drainage or conveyance of water,

(iii) ventilation,

(iv) conveyance of electricity,

(v) conveyance of materials,

(vi) communications,

(vii) emergency access to underground workings.

Over the green shaded area the Section 73 activities that may be undertaken are listed below.

Mining Act 1992 No 29

Part 5 Division 4 Section 73

73 Rights under mining lease

(1) The holder of a mining lease granted in respect of a mineral or minerals may, in accordance with the conditions of the lease:

(a) Prospect on the land specified in the lease for, and mine on that land, the mineral or minerals so specified, and

(b) Carry out on that land such primary treatment operations (such as crushing, sizing, grading, washing and leaching) as are necessary to separate the mineral or minerals from the material from which they are recovered, and

(c) Carry out on that land any mining purpose.

(1A) The holder of a mining lease granted in respect of a mining purpose or mining purposes only may, in accordance with the conditions of the lease, carry out the mining purpose or mining purposes specified in the lease.

(2) While a mining lease is in force, the holder of the lease and any person acting as agent or employee of the holder, or delivering goods or providing services to the holder, for the purpose of a requirement of or an activity authorised by the lease may:

(a) for that purpose enter and be on the mining area, and

(b) do anything so authorised or required.

1.2.2.1.2 ML 1196

ML 1196 operates to a depth of 6.1m over the majority of the site with the exception being an area to the west where the depth restriction is 35m. Notwithstanding this, Council consent (DA 6/2000) only allows for extraction to a depth of 23m.

The effect of the 'over and under' tenements is to allow the site to be developed from the surface to the consented depth of 23m. *Figure One* shows the various depth restrictions as they apply over the site.

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Mining Lease Depth Restrictions**	**Location:**	Off Coorabin Road, Oaklands, NSWW	**Source:**	Google Earth Pro - Image Date 2013, Photomapping March 2015 & Landair Survey Flown 8/02/2017	**Plan By:**	JD
Figure:	**ONE**	**Council:**	Urana Shire Council	**Survey:**	Not Applicable	**Project Manager:**	TO
Version/Date:	V0 04/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	Not Applicable	**Office:**	Thornton
Our Ref:	12409_BO_RMP2022_Q001_V0_F1	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	Not Applicable		

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N

0 30 60 90 120 150m

Legend

- Site
- Mining Lease Boundary (ML1196)
- Private Land Lease Boundary (PLL1155)
- 35m Depth — Depth Restriction within ML 1196 Boundary (Surface to 35m & Surface to 6.096m)
- 6.096m Depth — Depth Restriction within PLL 1155 Boundary (6.096m - 30.48m)
- 30.48m Depth — Depth Restriction within PLL 1155 Boundary (Surface to 30.48m)

1.2.3 Environmental Protection Authority (EPA)

Boral CSR Bricks Pty Ltd holds Environmental Protection Licence 11196 over the Oaklands Clay Mine. The site has two monitoring points. Point 1 monitors discharge of water into the local environment while Point 2 (as a number of separate points) monitors the emission of depositional dust into the atmosphere.

A copy of the full EPL 11196 can be found in *Appendix D*. A variation to the EPL licence will be sought in the next 12 months to ensure the scale of the production reflects the tonnages expected to be mined on the site annually. Until then, the site is managed so that the annual tonnages do not exceed the current EPL licence limits.

Table 3. EPL Monitoring

Air

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
2	Monitoring of dust deposition	Monitoring of dust deposition	Points as established

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge from the sedimentation dams	Discharge from the sedimentation dams	Sedimentation dams on the property 'Carberry'

L2.4 Air Concentration Limits

POINT 2

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Particulates - Deposited Matter	grams per square metre per month	2.5			

L2.5 Water and/or Land Concentration Limits

POINT 1

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
TSS	milligrams per litre				50

Total Suspended Solids (TSS) are to be monitored at each overflow event while Particulates- Deposited material is monitored monthly.

1.3 LAND OWNERSHIP AND LAND USE

1.3.1 Land Ownership and Land Use

The land is freehold owned by PGH and is described as Lot 1 DP 831425, Coorabin Road, Oaklands, NSW. *Table 4* lists the cadastral lots involve in the mine operations.

Table 4. Land Ownership and Land Use

Lot	DP	Ownership	Land Description
1	831425	PGH Bricks & Pavers Pty Ltd	Used in mine operations, contains ML1196 and PLL1155

The site is located within the then Urana Shire local government area. On 12th May 2016 the Urana Shire Council was amalgamated with the Corowa Shire Council and is now known as the Federation Council.

The property is within land which is zoned as RU1 Primary Production where extraction is permitted with consent. Land to the north of the site is currently utilised for clay extraction. To the east and west the land is cultivated for cropping and to the south is remnant woodland merging into further cultivated land.

During the preparation of the R.W. Corkery Environmental Impact Statement (1984) for the Open Cut Mining of Kaolin at Coorabin, an archaeological survey of the mine lease area was conducted. No archaeological materials were found within the mine lease nor the immediately surrounding area.

Plan of:	Rehabilitation Management Plan for Oaklands Clay Mine - Site Location	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	Landair Aerial Photo Flown 12/02/2020 & Google Maps via QGIS	**Plan By:**	JD
Figure:	TWO	**Council:**	Urana Shire Council	**Survey:**	CEH surveyed ML Boundary 2016 & based on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only.	**Project Manager:**	TO
Version/ Date:	V0 07/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855		
Our Ref:	12409_BO_RMP2022_Q002_V0_F2	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	Not Applicable		

N

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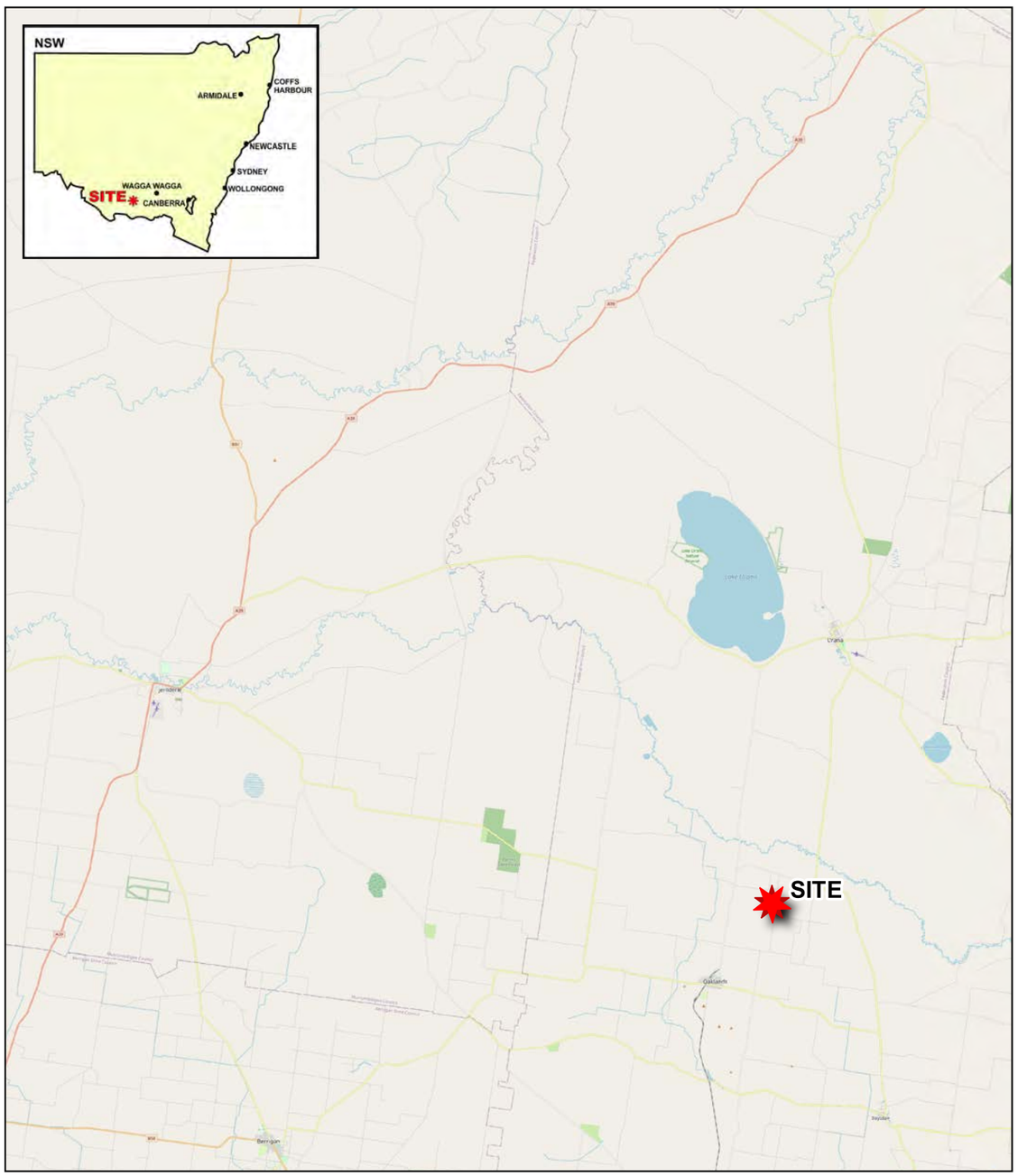

Legend

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML
- Lot Boundary (Cadastral)
- Road Corridor
- Rail Line

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Land Ownership & Land Use**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Google Satellite.	**Plan By:**	TO/JD		
Figure:	THREE	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 05/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855				
Our Ref:	12409_BO_RMP2022_Q003_V0_F3	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

N

0 50 100 m

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This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.

Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Water Management Area
- Lot Boundary
- 1m Contour

Zoning (NSW Zoning WMS Data)

- RU1 - Primary Production

2 Final Land Use

2.1 REGULATORY REQUIREMENTS FOR REHABILITATION

2.1.1 Consent Rehabilitation Requirements

Table 5. Consent Rehabilitation Plan Requirements

Consent Condition	Details	Where Addressed in this Report
DA 6-2000 Condition 1	Development should be carried out generally in accordance with the details provided in the Environmental Impact Statement dated December 1999 prepared by Brick and Associates. *[Note, no copy of the Brink EIS has been recovered.]*	This plan provides the rehabilitation methodology.
DA 6-2000 Condition 12	The applicant shall provide to the Council during every 12-month period of operation a copy of any update to the Mine Operations Plan for ML1196 and Annual Environmental Management Reports including information on the performance of any environmental management systems used on the site.	Section 11.2
DA 6-2000 Condition 13	Operations will be conducted in accordance with the requirements of the Department of Mineral Resources and the Mines Inspections Act, the Mining Act and any Regulation thereunder, and any amending or replacement legislation.	This Rehabilitation Plan has been prepared under the requirements of the Mining Act.
DA 6-2000 Condition 15	Prior to commencement of the operations of this consent, a Mining Operations plan be prepared and submitted to and approved by the Environment Protection Authority, Department of Mineral Resources and the Department of Land and Water Conservation. A copy of the Plan and any approval or licences from statutory authorities are to be submitted to Urana Shire Council. The Mining Plan shall address the following matters; • The prevention and control of erosion. • The conservation, stockpiling and reuse of topsoil. • The control and safe disposal of runoff from all disturbed areas including access roads, tracks and stockpiles. • Staging of the development. • The progressive and final rehabilitation of the site showing final contours. • The collection and control of groundwater where affected by the proposed operations. • The collection of drainage and surface water. • The re-vegetation and rehabilitation of areas following the completion of mining.	The Resources Regulator has approved all Mine Operations Plans (MOPs) under which the site operates. Since the Mining Act reforms commenced in July 2022, the MOP has been replaced by this Report and the requirements of the Form and Way. The EPA, Council and DPIE does not approve documents required under the Mining Act. They are consulted as required on matters contained within the Form and Way. Council has been provided copies of approved MOPs and AEMRs and will be provided future copies of the RMP, Forward Programs and Annual Reviews. Other items are addressed in Section 6.2

Consent Condition	Details	Where Addressed in this Report
DA 6-2000 **Condition 16**	Any destruction or injury to vegetation may require the consent of the Department of land and Water Conservation (DLAWC) under the Native Vegetation Conservation Act. The DLAWC should be contacted prior to the clearing of any vegetation.	Section 6.2.1.1.2 Section 6.2.1.2
DA 6-2000 **Condition 17**	A revegetation program of local native species should be incorporated into the rehabilitation program for the site. The surrounding areas has been extensively cleared and as further clearing is proposed, a compensatory revegetation program should be initiated. Advice can be provided by the DLAWC regarding such a program and full details of the rehabilitation program should be submitted to the Council for approval prior to commencement of operations.	Section 6.2.5 Previous MOPs have been submitted to Council with no response received. This RMP, and updates as undertaken from time to time, will be provided to Council for approval.
DA 6-2000 **Condition 18**	The applicant shall ensure that: • Clean surface water is diverted away from disturbed areas and directed to natural drainage lines in a manner that minimises erosion. • Water that is contaminated with sediments be directed to control structures t allow sediments to settle out prior to reuse or final discharge to the environment. • Contaminated water is directed to control structures for reuse on site.	Section 6.2.1.10

2.1.2 MEG Rehabilitation Requirements

The prescribed standard conditions in the Mining Regulation 2016, Schedule 8A, Part 2 apply in addition to the conditions in Schedule 2 of the Mine Lease. Conditions in the Regulation that relate to rehabilitation in this report are reproduced below.

Table 6. Mine Lease Conditions from the Regulation

Mining Regulation Section	Details	Where Addressed in this Report
Division 1 Protection of the environment and rehabilitation		
4	**Must prevent or minimise harm to environment** (1) The holder of a mining lease must take all reasonable measures to prevent, or if that is not reasonably practicable, to minimise, harm to the environment caused by activities under the mining lease. (2) In this clause— *Harm* to the environment has the same meaning as in the Protection of the Environment Operations Act 1997.	This Report
5	**Rehabilitation to occur as soon as reasonably practicable after disturbance** The holder of a mining lease must rehabilitate land and water in the mining area that is disturbed by activities under the mining lease as soon as reasonably practicable after the disturbance occurs.	Section 4 Section 6
6	**Rehabilitation must achieve final land use** (1) The holder of a mining lease must ensure that rehabilitation of the mining area achieves the final land use for the mining area.	This Report
	(2) The holder of the mining lease must ensure any planning approval has been obtained that is necessary to enable the holder to comply with subclause (1).	Section 1.2
	(3) The holder of the mining lease must identify and record any reasonably foreseeable hazard that presents a risk to the holder's ability to comply with subclause (1). **Note—** Clause 7 requires a rehabilitation risk assessment to be conducted whenever a hazard is identified under this subclause.	Section 3 Section 10

Mining Regulation Section	Details	Where Addressed in this Report
	(4) In this clause— final land use for the mining area means the final landform and land uses to be achieved for the mining area— (a) as set out in the rehabilitation objectives statement and rehabilitation completion criteria statement, and (b) for a large mine—as spatially depicted in the final landform and rehabilitation plan, and (c) if the final land use for the mining area is required by a condition of development consent for activities under the mining lease—as stated in the condition. planning approval means— (a) a development consent within the meaning of the Environmental Planning and Assessment Act 1979, or (b) an approval under that Act, Division 5.1.	Section 2 Section 4 Section 5
Division 2 Risk assessment		
7	**Rehabilitation risk assessment** (1) The holder of a mining lease must conduct a risk assessment (a rehabilitation risk assessment) that— (a) identifies, assesses and evaluates the risks that need to be addressed to achieve the following in relation to the mining lease— (i) the rehabilitation objectives, (ii) the rehabilitation completion criteria, (iii) for large mines—the final land use as spatially depicted in the final landform and rehabilitation plan, and (b) identifies the measures that need to be implemented to eliminate, minimise or mitigate the risks	Section 3
	(2) The holder of the mining lease must implement the measures identified.	This Report and annual reporting.

Mining Regulation Section	Details	Where Addressed in this Report
	(3) The holder of a mining lease must conduct a rehabilitation risk assessment— (a) for a large mine—before preparing a rehabilitation management plan, and (b) for a small mine—before preparing the rehabilitation outcome documents for the mine, and (c) whenever a hazard is identified under clause 6(3)—as soon as reasonably practicable after it is identified, and (d) whenever given a written direction to do so by the Secretary.	Section 3
Division 3 Rehabilitation documents		
10	(1) The holder of a mining lease relating to a large mine must prepare a plan (a rehabilitation management plan) for the mining lease that includes the following—	
	(a) a description of how the holder proposes to manage all aspects of the rehabilitation of the mining area,	This Report
	(b) a description of the steps and actions the holder proposes to take to comply with the conditions of the mining lease that relate to rehabilitation,	This Report
	(c) a summary of rehabilitation risk assessments conducted by the holder,	Section 3
	(d) the risk control measures identified in the rehabilitation risk assessments,	Section 3
	(e) the rehabilitation outcome documents for the mining lease,	Section 4, Section 5
	(f) a statement of the performance outcomes for the matters addressed by the rehabilitation outcome documents and the ways in which those outcomes are to be measured and monitored	

Mining Regulation Section	Details	Where Addressed in this Report
12	**Rehabilitation outcome documents** (1) The holder of a mining lease must prepare the following documents (the rehabilitation outcome documents) for the mining lease and give them to the Secretary for approval— (a) the rehabilitation objectives statement, which sets out the rehabilitation objectives required to achieve the final land use for the mining area, (b) the rehabilitation completion criteria statement, which sets out criteria, the completion of which will demonstrate the achievement of the rehabilitation objectives, (c) for a large mine, the final landform and rehabilitation plan, showing a spatial depiction of the final land use. (2) If the final land use for the mining area is required by a condition of development consent for activities under the mining lease, the holder of the mining lease must ensure the rehabilitation outcome documents are consistent with that condition	Section 4, Section 5

2.2 FINAL LAND USE OPTIONS ASSESSMENT

An assessment of the final land use options has not been undertaken as the conceptual final landform was defined within the approved 2017 MOP, which was based on the .R.W. Corkery MOP (2003) final landform.

2.3 FINAL LAND USE STATEMENT

The conceptual post-mining rehabilitation plan is shown on the FLRP Plan in the Rehabilitation Portal. This landform and landuse is based upon the R.W. Corkery MOP (2003) which in turn, is assumed to be based on the Brink EIS (1999). This landform assumes that the full extent of the mine lease area is extracted. Discussion in the life of mine schedule (see Section 6.1) does not assume the full extent of the mine lease will be extracted over the next 30 years. If extraction works do continue beyond the projected schedule in time and extent, this Plan will be reviewed. The extent of the extraction at the end of the mine life will not impact the general final landform concept described below.

The final landform will consist of a broadly contoured depression. The depression will drain in a south western direction towards a final depression sedimentation dam. If there are any remaining slopes, they will be battered to 3m horizontal to 1m vertical. Once the landform has been established, this site will be spread with topsoil and revegetated with open woodland and grass species.

The final land use may change course throughout the lifetime of the mine depending economic or community factors. However, it is envisaged that the site will be rehabilitated for landuse similar to adjacent properties consisted of agricultural land.

2.4 FINAL LAND USE AND MINING DOMAINS

2.4.1 Final Land Use Domains

Table 7. Post Mining Land Use Domain Codes

Secondary Domains (Post Mining)	Description
Agriculture- Grazing	This Domain comprises the final void area and surrounds as well as infrastructure areas not retained at the completion of extraction activities.
Final Void (including anticipated permanent water body)	This domain is limited to the permanent water body in the final landform.

2.4.2 Mining Domains

Table 8. Operational Domain Codes

Primary Domains (Operational)	Description
Infrastructure Area	This domain includes the haul roads and hardstand areas.
Overburden Emplacement Area	This domain incorporates bunds surrounding the extraction area where overburden has been placed.
Active Mining Area (Open cut void)	This domain incorporates the active extraction area.
Water Management Area	This domain incorporates the existing two water bodies within the mining lease.

3 Rehabilitation Risk Assessment

Identification of hazards and a risk assessment and identification of risk controls has been undertaken and is summarised below.

Table 9. General Rehabilitation Risk Assessment

Hazard	Risks	Risk Controls	Details
Administrative failures.	Insufficient skills and experience of rehabilitation personnel.	Only experienced contractors will be engaged to conduct rehabilitation activities.	
	Lack of clearly defined responsibilities.	Responsibilities and roles for rehabilitation will be defined in the contractual arrangements with contractors and Proponent.	
	Insufficient funding for or prioritisation of rehabilitation activities.	Proponent will ensure that sufficient funds are available to conduct rehabilitation activities. Note, a rehabilitation bond is held over the site and will be reviewed annually for the life of the mine.	
Erosion	Harm to rehabilitation works.	Slopes to be reduced.	Slopes to be reduced to a maximum of 3H:1V within the void.
		Reduce slope lengths.	Slope Lengths shall not exceed 50 metres before being broken by earth banks or similar for batter slopes of 3H:1V.
		Reduce track slopes.	Slopes of major tracks are to be <10 degrees or have cross drains/banks installed. Where unsuitable soils are present, tracks are to be stabilised with crushed bricks, concrete, gravel or similar.
		Roughen exposed surfaces.	Track walk or lightly rip exposed surfaces to encourage infiltration of rainwater.
		Achieve ground coverage factor of at least 0.05 (70%).	Coverage to be achieved via vegetation, mulch or similar within 30 days of completion of works.
		Topsoil stockpile management.	Slopes no greater than 18º (3H:1V). Stockpile height no greater than 2 metres. No stockpiles to be constructed in areas of concentrated flows.
		Overburden stockpile management.	Slopes no greater than 18º (3H:1V). Stockpile height no greater than 3 metres. No stockpiles to be constructed in areas of concentrated flows.

Hazard	Risks	Risk Controls	Details
Sediment Entrainment	Entrained sediment harms downstream environments	Runoff from design storm to be contained in-site.	Sediment dams designed for 90th % 5-day storm event. Drains to be designed for 1 in 10-year design storm. Receiving capacity of sediment dams to be maintained by; • Reuse of water on-site for dust suppression; and • Water to be pumped to pit sump if capacity not sufficient to contain design storm prior to storm events. • Pit maintained to have capacity to contain a volume greater than the design storm.
		Surface water captured on exposed surfaces to be directed to sediment dams.	Sediment dam to be constructed for each catchment in the disturbed area. Drains to be installed to direct dirty surface water to sediment dams.
		Silt fences installed.	Installation of silt fences around disturbed area as appropriate. No silt fences to be constructed in areas of concentrated flows.
		Topsoil stockpile management	Slopes no greater than 18º. Stockpile height no greater than 2 metres. No stockpiles to be constructed in areas of concentrated flows.
		Overburden stockpile management.	Slopes no greater than 18º. Stockpile height no greater than 3 metres. No stockpiles to be constructed in areas of concentrated flows.
Surface Water Quality	Decrease in downstream water quality.	Monitoring.	Surface water monitoring has not been undertaken to date as discharge offsite has not been required. All future monitoring, if undertaken, will be undertaken in accordance with Approved Methods for Sampling and Analysis of Water Pollutants in NSW (DEC 2004) and any EPL requirements.
		Reuse dirty water on site.	Dirty water to be reused for dust suppression.
		Runoff from design storm to be contained in-site.	Sediment dams designed for 90th % 5-day storm event. Drains to be designed for 1 in 10-year design storm. Receiving capacity of sediment dams to be maintained by; • Reuse of water on-site for dust suppression; and • Water to be pumped to pit sump if capacity not sufficient to contain design storm prior to storm events. • Pit maintained to have capacity to contain a volume greater than the design storm.
		Surface water captured on exposed surfaces to be directed to sediment dams.	Sediment dam to be constructed for each catchment in the disturbed area. Drains to be installed to direct dirty surface water to sediment dams.
		Separation of clean water and dirty water.	Upstream clean water to be diverted via diversion drains or bunds as far as possible.

Hazard	Risks	Risk Controls	Details
Geotechnical Stability In-Pit	Failure of In-Pit Slopes	Reduce slopes In-Pit.	Batter slopes with overburden material.
		Batter designs validated by qualified engineer.	
Groundwater Quality and Flows	Decrease in groundwater quality and changes in flows	Groundwater interaction will be minimised.	The R.W. Corkery EIS states that no groundwater was encountered on the site at the lowest level of the underground mining of at least 18m. Extrapolation of the standing water level in the Oaklands area based on local monitoring wells and 12D modelling software by VGT infers that the groundwater level is approximately 52 metres below the surface. This is well below the consented depth of extraction of 23m.
Wind Erosion	Rehabilitation areas impacted by wind erosion.	Air quality monitoring.	Air quality monitoring will be conducted in accordance with Consent Condition 6 and any EPL conditions. Results will be reviewed annually and submitted to the EPA in the annual return and Council.
		Dust suppression.	Water cart to be engaged during mining, hauling and rehabilitation activities. During adverse conditions: • Cease mining or hauling activities in adverse wind conditions: and • Increase water cart frequency.
		Achieve groundcover factor of at least 0.05 (70% coverage) on areas of long-term inactivity.	Coverage to be achieved via vegetation, mulch or similar within 30 days of completion of works.
Heritage	Harm to heritage items	Protection of unexpected heritage items.	In the event that unexpected Aboriginal objects, sites or places are discovered, DPIE will be notified as soon as practicable after they are first identified.
		Protection of human skeletal remains	The immediate vicinity will be secured to protect the find. The police will be notified immediately.
Bushfire	Harm to rehabilitation areas.	Limit access for deliberately lit fires.	Appropriate fencing is to be repaired and maintained. Locked access gate outside of operating hours. Visitors to sign in at the office.
Bushfire	Harm to rehabilitation areas.	Maintain fire breaks.	
Waste	Harm to rehabilitation areas.	Control on-site waste storage and removal	Wastes will be stored in bins with a lid. Wastes will be removed by licenced contractor.

Table 10. Active Mining Phase Rehabilitation Risk Assessment

Hazard	Risks	Risk Controls	Details
Salvage of Biological Resources	Loss of biological resources.	Minimise loss of biological resources through suitable land clearing, salvage and handling practices.	Areas to be land cleared will be clearly marked to ensure only land to be cleared is disturbed. Land clearing is to be supervised by proponent's staff. Felled trees are to be salvaged and reused immediately by placing on rehabilitated land. If no suitable rehabilitation areas are available felled trees will be stored in windrows for reuse in future rehabilitation. Topsoil material to be stripped will be used immediately or stored in stockpiles no greater than 2 metres in height and be revegetated with temporary grass species or otherwise stabilised as described in the erosion risk controls above.
	Limited biological resources available on site.	Importation of topsoil/growth medium material.	If on-site topsoil/growth medium deficit is noted, material may be imported to assist in rehabilitation.
Weather Conditions	Adverse weather conditions during land clearing.	Land clearing activities will not be undertaken during adverse weather conditions.	Land clearing will not be undertaken during periods of prolonged rainfall where damage to soil structure and erosion impacts are greatest.
Geochemical/ Chemical soil conditions	Adverse geochemical/chemical composition of soil/ interburden / overburden materials.	Soil testing of soils / interburden and overburden material will be undertaken.	Materials stockpiled on site will be tested for suitability prior to re-use in rehabilitation. Ameliorants will be applied to the materials as required.

Table 11. Decommissioning Phase Rehabilitation Risk Assessment

Hazard	Risks	Risk Controls	Details
Infrastructure	Retained roads and hardstands are not safe and stable.	All roads and hardstand areas to be retained for the final landuse will be reduced in width/size to that suitable for the final landuse.	Roads not required for final landuse are removed. Hardstand areas reduced to a size required for the final landuse. Slopes of major tracks are to be <10 degrees or have cross drains/banks installed. Where unsuitable soils are present, tracks are to be stabilised with crushed bricks, concrete, gravel or similar.
	Utility services present a safety hazard.	Services not required for final landuse are disconnected.	Relevant services disconnected by qualified contractors
Hazardous Materials	Harm to environment due to hazardous materials.	No hazardous materials remain	All hazardous material removed

Table 12. Landform Establishment Phase Rehabilitation Risk Assessment

Hazard	Risks	Risk Controls	Details
Unstable landform	The final landform is unstable.	Continued monitoring of the landform establishment works by suitably qualified person/s.	Slopes to be reduced until all slopes meet the approved final landform. Suitably qualified geotechnical engineer engaged to assess the instability and provide a range of recommendations to remediate the instability.
Final landform unsuitable for final landuse.	Final landform does not conform to approved final landform.	Landform to be remediated to approved final landform.	Slopes to be reduced until all slopes meet the approved final landform. Survey plan or similar to be prepared to show final slopes meet the approved final landform.
Landform not suitable for target plant species	Target plant species unable to establish.	Soil testing of soils / interburden and overburden material will be undertaken.	Materials stockpiled on site will be tested for suitability prior to re-use in rehabilitation. Ameliorants will be applied to the materials as required.

Table 13. Growth Medium Establishment Phase Rehabilitation Risk Assessment

Hazard	Risks	Risk Controls	Details
Unsuitable physical and structural substrate	Substrate compacted	Substrates to be placed in such a way to maintain soil structure as far as possible.	Minimise vehicle movement over the emplaced substrates. Substrates to be lightly ripped to permit water infiltration and air penetration prior to topsoil placement.
Subsoil and topsoil deficit	Insufficient on-site material available for growth medium.	Available topsoils are stockpiled appropriately and reused on the site.	Records to include amounts of subsoil and topsoils stripped, locations and depths re-spread. If on-site topsoil/growth medium deficit is noted, material may be imported to assist in rehabilitation.
Substrate chemically unsuitable	Substrate inadequate to support revegetation or agricultural land capability.	Soil testing of soils / interburden and overburden material will be undertaken.	Materials stockpiled on site will be tested for suitability prior to re-use in rehabilitation. Ameliorants will be applied to the materials as required. Importation of more suitable materials to be investigated and undertaken if deemed necessary.

Table 14. Ecosystem and Land Use Establishment Phase Rehabilitation Risk Assessment

Hazard	Risks	Risk Controls	Details
Lack of target seed availability and quality	Seeds unable to be sourced for rehabilitation.	Egologist or other suitably qualified persons to be engaged to investigate suitable alternatives.	
Poor seed viability and dormancy	Insufficient germination of seeds to provide groundcover.	Certified seed stock to be utilised as far as possible in rehabilitation.	
Ant and Insect predation	Seed stock depleted by predation.	Protect sown seeds as far as possible.	Seeds to be lightly covered by soil when spread. Apply liquid tackifier if required to bind seeds to the surface. Keep soil moist by mulching or application of water to deter ants.
Damage to seed through revegetation processes	Insufficient germination of seeds to provide groundcover.	Protect seeds from damage during rehabilitation.	Experienced contractors to be employed for rehabilitation works. Rehabilitation areas to be protected from vehicular traffic by fencing or similar barriers. Minimise handling of seeds during storage and use.
Weed Infestation	Weed number overwhelm revegetation.	Regular inspection and spraying for weeds will be undertaken.	Monitoring confirms that after 2 years the non-native/non-target species (weeds) represents less than 20% of projected foliage cover or equivalent to surrounding vegetation not disturbed by mining activities.
Inappropriate rehabilitation techniques	Failure of rehabilitation.	Ensure approved rehabilitation plan is followed.	Experienced contractors to be employed for rehabilitation works. Rehabilitation to be undertaken in accordance with the Rehabilitation Plan approved by DPIE and this plan. Proponent to supervise rehabilitation works to ensure compliance with any approved plans and best practice techniques are utilised.
		Approved plans will be reviewed as required to ensure best practice techniques are employed.	
Adverse weather conditions	Failure of rehabilitation.	Revegetation will not be undertaken during periods of drought.	
		Rehabilitation works will not be undertaken during wet periods where soils and seed planting may be damaged.	
		A water cart may be employed to water rehabilitation areas during dry or windy periods until vegetation is established.	
Inappropriate Seasonal timing of revegetation	Failure of rehabilitation.	Revegetation will preferably be planted during the spring and autumn seasons to avoid hot and dry weather conditions and winter frost.	

Table 15. Ecosystem and Land Use Development Phase Rehabilitation Risk Assessment

Hazard	Risks	Risk Controls	Details
Weather and climatic influences	Failure of rehabilitation.	A water cart may be employed to water rehabilitation areas during dry or windy periods until vegetation is established.	
		Reseeding of failed areas may be undertaken as advised by ecologist or suitably qualified person/s	
Long term water quality and quantity issues	Decrease in downstream water quality.	Mine personnel identify site of erosion and remediate through additional earthworks, soil works including addition of ameliorants, supplementary revegetation or other stabilisation method.	
	Groundwater seepage increases salinity in remaining water bodies.	Engage hydrologist and/or geotechnical engineer to assess impacts and remediation measures if required.	
Damage to rehabilitation	Deliberate vandalism of rehabilitation areas.	Rural fences and gates installed around disturbed area to prevent unauthorised access that may damage rehabilitation.	Monitoring indicates evidence of trespassing and/or damage to rehabilitation areas. Appropriate fencing, signage and bunding is to be repaired and maintained.
	Bushfire damages rehabilitation areas.	Where possible regular slashing/mowing of pasture areas will be undertaken.	
	Weed number overwhelm revegetation.	Regular inspection and spraying for weeds will be undertaken.	Monitoring confirms that after 2 years the non-native/non-target species (weeds) represents less than 20% of projected foliage cover or equivalent to surrounding vegetation not disturbed by mining activities.
	Insect and plant disease overwhelm revegetation.	Regular inspections to be undertaken and spraying undertaken as appropriate.	
Insufficient establishment of target species and limited species diversity	Vegetation community does not become established on final landform affecting final land use and ecosystem.	Suitably qualified ecologist or revegetation expert engaged to assess reasons for divergence of failure of endemic species establishment and recommend actions to ensure that the final vegetation community corresponds as closely as possible to the approved community.	Sowing of additional seed mix for targeted species or additional species endemic to the pre-disturbance community. Use of Tubestock, seed and mulch mix or other application techniques. Soil amelioration works such as addition of fertiliser. Additional weed control activities (mechanical and/or chemical).
Erosion and failure of landform	Vegetation is unable to be established due to erosion.	Mine personnel identify site of erosion and remediate through additional earthworks, soil works including addition of ameliorants, supplementary revegetation or other stabilisation method.	If the above is unsuccessful, a suitably qualified professional in sediment and erosion control will be engaged to prepare and assessment report and recommendations to be implemented.
Erosion and failure of landform	Visual inspection indicates that the final landform is the source of unacceptable levels of sedimentation downstream.	Mine personnel identify site of erosion and remediate through additional earthworks, soil works including addition of ameliorants, supplementary revegetation or other stabilisation method.	If the above is unsuccessful, a suitably qualified professional in sediment and erosion control will be engaged to prepare and assessment report and recommendations to be implemented.

4 Rehabilitation Objectives and Rehabilitation Completion Criteria

4.1 REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

Final Land Use	Mining Domain	Rehabilitation Objective Category	Proposed Rehabilitation Objectives	Indicator	Proposed Completion Criteria	Validation Method, Monitoring or Record
Infrastructure **(A)**	Infrastructure (1)	**Retention of infrastructure**	All infrastructure that is to remain as part of the final land use is safe and does not pose any hazard to the community.	Retention of infrastructure: All infrastructure that is to remain as part of the final land use is safe and does not pose any hazard to the community.	Hazards isolated and secured.	Statement provided by suitably qualified engineer.
				Tracks suitable for private access or pedestrian usage.	Slopes of major tracks <10° or have cross drains/banks installed. Where unsuitable soils are present, tracks to be stabilised with crushed bricks, concrete, gravel or similar	Survey on completion by registered surveyor.
				Where applicable, necessary approvals are in place (e.g. development consent under the Environmental Planning and Assessment Act 1979) where buildings and infrastructure are to be retained as part of final land use.	Permits and approval documents issued.	Copy of any relevant approvals.
				The structural integrity of the infrastructure is suitable and safe for use as part of the intended final land use.	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use.	Engineering report/statement, photos, risk assessment verifying modes of failure are adequately addressed to minimise risks to public safety or the environment.
				Infrastructure is in a condition (e.g. structural, electrical, other hazards) that is suitable for the intended final land use.	Formal acceptance from the subsequent landowner that infrastructure is in a condition that is suitable for the intended final land use in accordance with formal agreement.	Formal acceptance from landowner.
Water Storage **(G)**	**Active Mining Area (Open Cut Void)** **(5)**	**Surface Water**	Runoff water quality from site is similar to, or better than the pre-disturbance runoff water quality.	Water Quality meets the objective of Section 120 of the Protection of the Environment Operations Act 1997. 'Downstream' water quality monitoring will record total suspended solids <50mg/L or within 30% of 'upstream' levels (which is the greater).	Downstream water to be monitored for TSS and comply with required criteria.	Water quality monitoring reports.
		Water Approvals	Structures that take or divert water such as final voids, dams, levees etc. are appropriately licensed (e.g. under the Water Management Act 2000) and where required ensure sufficient licence shares are held in the water source(s) to account for water take.	Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the proposed final landform	Water approvals / licences are granted by relevant NSW Government Agency.	Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted.

Final Land Use	Mining Domain	Rehabilitation Objective Category	Proposed Rehabilitation Objectives	Indicator	Proposed Completion Criteria	Validation Method, Monitoring or Record
Agriculture-Grazing **(B)**	**Infrastructure** **(1)** **Overburden Emplacement** **(4)** **Active Mining Area (Open cut void)** **(5)**	**Removal of Infrastructure**	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.	Removal of all services (power, water, communications) that have been connected on the site as part of the operation.	All utility infrastructure removed.	Statement provided, utility service disconnection record / notification.
				Removal of all plant, equipment and associated infrastructure including processing facilities, stockpile areas, loading facilities, office complex, portable offices, exploration core samples, camp facilities, storage racks, samples.	Infrastructure removed.	As-constructed final landform plan, photos, decommissioning reports etc
				Removal of all water management infrastructure (including pumps, pipes and power).	Infrastructure removed.	Statement provided and before/after photos.
				Removal of all historical underground mining infrastructure remaining on the surface. Sealing of access to underground workings.	Infrastructure removed. Access to underground working sealed.	Photos, decommissioning reports, mine safety inspection report.
		Land Contamination	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.	Waste material and/or visible contamination areas on site surface.	There are no visible signs of contamination following the removal of plant, equipment and materials. All rubbish/ waste materials removed from site.	Statement provided and before/after photos.
				Soil testing for contaminants of concern as listed by Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999) applicable to land use type.	Contamination will be appropriately remediated so that appropriate guidelines for land use are met, e.g. Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999). Excess sludge/material has been removed from surface water dams.	Contamination Remediation Report prepared by Land Contamination Consultant Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor (where required).

Final Land Use	Mining Domain	Rehabilitation Objective Category	Proposed Rehabilitation Objectives	Indicator	Proposed Completion Criteria	Validation Method, Monitoring or Record
		Landform Stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream/downslope of the site or a safety risk to the public/stock/native fauna. Landform that is commensurate with surrounding natural landform and where appropriate, incorporates geomorphic design principles.	Visual - indicators of erosion and land instability. Visual - indicators that surface water management structure are functioning as designed. Measured - survey of rehabilitated landform to verify final landform construction in accordance with Final Landform and Rehabilitation Plan. Measured – survey/monitoring of rehabilitated landform to specifically monitor settlement (Subsidence) and/or material loss via erosion.	Visual- minimal erosion that would not require moderate to significant ongoing management and maintenance works. Visual – no signs of land instability such as mass movement. Visual - no areas of active gully erosion. Visual - no evidence of tunnel erosion. Visual – no evidence of active scour likely to compromise surface water management structure. Survey verifies final landform complies with final landform construction in accordance with Final Landform and Rehabilitation Plan. Survey verifies that settlement (subsidence) and/or material loss is within predicted limits and will not compromise final landform drainage via differential settlement. Total projected foliage cover is greater than or equal to 70% (Blue Book C -factor equivalent of 0.05)	Before and after photos, rehabilitation monitoring reports, as-constructed surveys, erosion surveys, and independent geotechnical reports (where required) that indicate long-term stability of rehabilitated landform. Stability will continue to be evaluated over 5 years.
					Significant surface water management structures (e.g. spillways, drop structures, major drains and creek diversions) have been constructed in accordance with Managing Urban Stormwater ‘Blue Book’ DECC 2008 requirements.	An engineering assessment undertaken by a suitably qualified person concludes that significant surface water management structures (e.g. spillways, drop structures, and major drains) have been constructed in accordance with Managing Urban Stormwater ‘Blue Book’ DECC 2008 requirements.
					High risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design.	An engineering assessment undertaken by a suitably qualified person concludes that high risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design.
		Surface Water	Runoff water quality from mine site is similar to, or better than the pre-disturbance runoff water quality.	Water Quality meets the objective of Section 120 of the Protection of the Environment Operations Act 1997. In particular, ‘downstream’ water quality monitoring will record total suspended solids <50mg/L or within 30% of ‘upstream’ levels (which is the greater).	Downstream water to be monitored for TSS and meets the proposed criteria.	Water quality monitoring reports.
		Bushfire	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.	Appropriate bushfire hazard controls (where required) have been implemented on the advice from the NSW Rural Fire Service.	Bushfire controls implemented.	Statement provided and before/after photos.

Final Land Use	Mining Domain	Rehabilitation Objective Category	Proposed Rehabilitation Objectives	Indicator	Proposed Completion Criteria	Validation Method, Monitoring or Record
		Agricultural Revegetation	The vegetation composition of the rehabilitation is recognisable as the target vegetation community (agricultural-grazing)	Routine Soil Test (bulked soil samples 0-10 cm) Includes: Total Carbon (TC), Total Nitrogen (TN), Organic Matter, TC/TN Ratio; Bray I and II Phosphorus; Colwell Phosphorus; Available cations (Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulphur); Available Micronutrients (Zinc, Manganese, Iron, Copper, Boron, Silicon); Exchangeable (Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium, Cation Exchange Capacity); pH and EC (1:5 water); Basic Colour, Basic Texture.	Land and Soil Capability classification or Agricultural Land Classification criteria met. The re-established topsoil / subsoil substrate is capable of supporting the targeted pasture / cropping regime on a sustained basis. Pasture establishment is consistent with the range of species utilised within the region. Pasture establishment is in good health and provides adequate cover.	Rehabilitation monitoring reports, independent soil reports, environmental monitoring records, independent agronomist reports. Achievement of criteria to be evaluated over a period of 5 years.
				Resilience demonstrated by the effects of drought and fire on composition, structure and other function attributes of cropping (grassland) lands.	Appropriate and reliable access to water for grassland maintenance. Resilience to drought and fire.	
				No further active weed control required beyond that considered necessary at analogue sites.	Monitoring confirms the non-target species (weeds) represent less than 10% of projected foliage cover or equivalent to surrounding vegetation not disturbed by mining activities.	

4.2 REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA – STAKEHOLDER CONSULTATION

Consultation undertaken to date is summarised below.

Table 1. Stakeholder Consultation

Stakeholder	Consultation Activities	Matters Subject to Consultation	Actions
NSW Resources Regulator	Approved Mine Operations Plans. Annual Rehabilitation Reports.	Nil	Nil
	Risk Assessment/ Principle Hazard Management Plan (PHMP)	Risk assessment of historic mining infrastructure and mine subsidence impacts in 2015.	MOP amended to account for findings of risk assessment and PHMP prepared.
Urana Shire Council	Annual Rehabilitation Reports.	Nil	Nil
EPA	Approval of EPL 11196. Variation of licence in 2020.	Nil	Nil
Residential Neighbours	Nil	Nil	Nil

5 Final Landform and Rehabilitation Plan

5.1 FINAL LANDFORM AND REHABILITATION PLAN – ELECTRONIC COPY

Coorabin Clay Mine ML1196 & PLL1155 FLRP Plan 1. Dated 08/06/2022

Legend

- Final Landform Features
- Final Landuse
  - Agricultural – Cropping
  - Agricultural – Grazing
  - Rehabilitation Biodiversity Offset Ar
  - Final Void
  - Heritage Area
  - Industrial
  - Infrastructure
  - Native Ecosystem
  - Water Management Areas
  - Water Storage (Excluding Final Voi
  - Other
- Project Approval Boundary
- Mine Operations Area
- World Imagery
- Low Resolution 15m Imagery
- High Resolution 60cm Imagery
- High Resolution 30cm Imagery
- Citations

Notes

Portal Submission IDs:
2131: Final Landuse

271.6 0 135.79 271.6 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Coorabin Clay Mine ML1196 & PLL1155 FLRP Plan 2. Dated 08/06/2022

Legend

- Final Landform Contours
- Project Approval Boundary
- Mine Operations Area
- World Imagery
- Low Resolution 15m Imagery
- High Resolution 60cm Imagery
- High Resolution 30cm Imagery
- Citations

Notes

Portal Submission IDs:
2236: Final Landform Contours

271.6 0 135.79 271.6 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

6 Rehabilitation Implementation

6.1 LIFE OF MINE REHABILITATION SCHEDULE

It should be noted that there is no expiration date on the consent conditions however the mine leases will require renewal prior to the end of the life of the mine.

Table 2. Life of Mine Rehabilitation Schedule

Rehabilitation Activity		Timing	Assumptions and Principles (Milestones)
Active mining	Any topsoil generated will be stored in perimeter bunds if final surfaces not available. Any overburden generated will be stored in perimeter bunds or places onto final faces.	Up to 2052 (estimated)	Topsoil stripping is anticipated to be complete prior to 2052, when mining is expected to be completed. Overburden generation is also anticipated to be complete prior to 2052, when mining is expected to be completed.
Removal of product stockpiles	Any remaining material stockpiles will be removed offsite. If stockpile material remains it will be utilised in battering slopes to achieve the final landform.	Up to 2052	Raw material exhausted from extraction area. Mining has ceased.
Water Management	If water is present in pit sump, the volume will be reduced to permit access to pit for mining and then rehabilitation. Water collected in the pit sump will be discharged, if required, when EPL criteria is met, until the final landform has a coverage of at least 70% and is not prone to sediment entrainment. Clean water will be diverted around the disturbed area.	Up to 2052	Water management will continue until mining has ceased and the void has ground coverage of at least 70%.
Removal of Infrastructure	Removal of roads not required in the final landform for rehabilitation and maintenance. Removal of services not required in final landform.	Up to 2052	Mining has ceased. Infrastructure is no longer required for rehabilitation purposes.
Batter in-Pit Slopes	Overburden material will be utilised to assist in battering in pit slopes. Slopes will be lightly ripped where possible to key in overburden material.	Up to 2057	Mining has ceased in target areas. Water levels in the pit are lowered sufficiently to permit access to each final face.

Rehabilitation Activity		Timing	Assumptions and Principles (Milestones)
Topsoil Emplacement	Topsoil material stored in bunds will be tested for suitability and ameliorated if required. Final slopes will be lightly ripped where possible to key in topsoil material. Topsoil bunds will be removed and reused on final surfaces.	2023- Stored topsoil testing. 2022 to 2057	Applicable when final slopes have been achieved. Final slopes have been ripped. Topsoil is suitable for target species.
Establishment of Vegetation	Seeding/planting of pasture species is undertaken on finished surfaces Watering/Irrigation as required to assist establishment of vegetation.	2027 to 2057	Applicable where final slopes have been achieved. Suitable topsoil has been spread on final surfaces available to date. Watering/irrigation to occur after seeding/planting.
Monitoring and Maintenance of Rehabilitation	Monitor progress of rehabilitation areas. Continue weed management and pest management. Repair failed rehabilitation areas.	2022 to 2062	Completion of vegetation establishment.

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Current Rehabilitation 2022**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD	vgt environmental compliance solutions and laboratories	This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.
Figure:	SIX	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855				
Our Ref:	12409_BO_RMP2022_Q006_V0_F6	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

N

0 50 100 m

Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Lot Boundary (Cadastral)
- Road Corridor
- Water Management Area
- 1m Contour

Current Rehabilitation RMP 2022

- Current Rehabiliation Area
- Current Infrastructure
- Current Mining

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Proposed Rehabilitation 2022 to 2027**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD
Figure:	SEVEN	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855		
Our Ref:	12409_BO_RMP2022_Q007_V0_F7	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m		

N

0 50 100 m

vgt environmental compliance solutions and laboratories

This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.

Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Lot Boundary (Cadastral)
- Water Management Area

Rehabilitation Phase

- Landform Establishment
- Ecosystem & Land Use Development
- Active Mining

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Proposed Rehabilitation 2027 to 2032**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD	vgt environmental compliance solutions and laboratories	This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.
Figure:	EIGHT	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855				
Our Ref:	12409_BO_RMP2022_Q008_V0_F8	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

N

0 50 100 m

Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Lot Boundary (Cadastral)
- Road Corridor
- Water Management Area

Rehabilitation Phase

- Landform Establishment
- Ecosystem & Land Use Establishment
- Ecosystem & Land Use Development
- Active Mining

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Proposed Rehabilitation 2032 to 2037**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD		
Figure:	NINE	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855				
Our Ref:	12409_BO_RMP2022_Q0069_V0_F9	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

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0 50 100 m

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Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Lot Boundary (Cadastral)
- Water Management Area

Rehabilitation Phase

- Landform Establishment
- Ecosystem & Land Use Establishment
- Ecosystem & Land Use Development
- Active Mining

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Proposed Rehabilitation 2037 to 2042**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD		
Figure:	TEN	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855	N	0 50 100 m		
Our Ref:	12409_BO_RMP2022_Q010_V0_F10	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

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Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Lot Boundary (Cadastral)
- Water Management Area

Rehabilitation Phase

- Landform Establishment
- Ecosystem & Land Use Establishment
- Ecosystem & Land Use Development
- Active Mining

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Proposed Rehabilitation 2042 to 2047**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD	vgt environmental compliance solutions and laboratories	This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.
Figure:	ELEVEN	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855				
Our Ref:	12409_BO_RMP2022_Q011_V0_F11	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

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Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Lot Boundary (Cadastral)
- Water Management Area

Rehabilitation Phase

- Landform Establishment
- Ecosystem & Land Use Establishment
- Ecosystem & Land Use Development
- Active Mining

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Proposed Rehabilitation 2047 to 2052**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD		
Figure:	TWELVE	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855	N	0 50 100 m		
Our Ref:	12409_BO_RMP2022_Q012_V0_F12	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

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Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Lot Boundary (Cadastral)
- Water Management Area

Rehabilitation Phase

- Landform Establishment
- Ecosystem & Land Use Establishment
- Ecosystem & Land Use Development
- Active Mining

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Proposed Rehabilitation 2052 to 2057**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD		
Figure:	THIRTEEN	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855				
Our Ref:	12409_BO_RMP2022_Q013_V0_F13	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

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Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Lot Boundary (Cadastral)
- Water Management Area

Rehabilitation Phase

- Landform Establishment
- Ecosystem & Land Use Establishment
- Ecosystem & Land Use Development

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Proposed Rehabilitation Completion**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD
Figure:	FOURTEEN	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855		
Our Ref:	12409_BO_RMP2022_Q014_V0_F14	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m		

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Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Water Management Area
- Lot Boundary (Cadastral)

Rehabilitation Phase

- Ecosystem & Land Use Development

6.2 PHASES OF REHABILITATION AND GENERAL METHODOLOGIES

6.2.1 Active Mining Phase

6.2.1.1 Soils and Materials

6.2.1.1.1 Soil and Landscape Description

The landscapes are described as gently undulating rises and low hills on residual and colluvial deposits derived from the Tertiary geologies. Slopes are generally <10% with local relief of 5-30 metres, elevation 130-200 metres.

On crests and upper slopes where hard rock is near the surface Red Kurosols (Red Podzolic Soils) are common. On simple slopes with wind-blown sands or sandy parent materials near the surface, Red Kandosols (Red Earths) occur. Midslopes and lower slopes with gentle gradients, Red Chromosols/Sodosols (Red Podzolic/Red Solodic Soils) are common. Red Dermosols (structured Red Earths) also occur on slopes. In drainage depressions Brown Sodosols/Chromosols (Brown Podzolic Soils/Soloths) dominate.

Soil structural decline and loss of organic matter occurs on cultivated lands. There is evidence of localised sheet erosion of topsoils.

Soil data has been obtained from the eSPADE online database from NSW Office of Environment and Heritage [Ref 2]. The sample site was located approximately 7km south of the site at which the soil was sampled to a depth of 0.8m. The three soil layers recorded were described as slightly acidic, composed of sandy loams to sandy clay with moderate to weak pedality. There was no evidence of fauna activities. It was noted that the soil had been used for use in pasture grazing.

Areas undisturbed by mining to the west of the current pit have topsoil available for the use during rehabilitation. As mining progresses into these areas topsoil will be stored in 1m high stockpiles until rehabilitation areas are shaped and ready for revegetation.

6.2.1.1.2 Topsoil Stripping and Storage

Land is required to be cleared to the west and south west of the existing pit for extraction of material.

Prior to any clearing of trees or vegetation, the designated areas will be sprayed for weeds, if required, to reduce the risk of spreading weeds over the site and particularly introducing them to new topsoil stockpiles. Existing trees will be felled and placed on spread topsoil in rehabilitated areas to provide habitat and shelter prior to revegetation. Where they may not be used immediately they will be stored in windrows along the perimeter of the disturbed area.

Stripping should not occur when in either and excessively dry or wet condition. Grading or pushing soil into windrows with graders or dozers for later collection for loading into rear dump trucks by front-end loaders are examples of preferential less aggressive soil handling systems. This minimises compression effects of the heavy equipment that is often necessary for economical transport of soil material.

Topsoil, which generally consists of poorly structured sandy loam, will be removed to a depth of approximately 0.2m. Where possible, it will be immediately reused in rehabilitation areas, otherwise if will be stored in stockpiles on the perimeter of the site. Topsoil stockpiles will be no greater than 2m in height and will be stabilised within 30 days of construction with vegetation or similar to minimise erosion losses. The underlying subsoils down to approximately 1.2 to 1.7m will be removed and used as a subsoils in the rehabilitation of the former stockpile area. If the subsoils cannot be used immediately they will be stored on the perimeter of the site. Overburden stockpiles are kept less than 3 metres in height. Stockpiles of topsoil and overburden are to be located at least five metres from areas of likely concentrated or high velocity flows, especially drainage lines and access roads. The surface of soil stockpiles should be left in as coarsely structured a condition as possible in order to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming. They will be stabilised with vegetation within 30 days.

Drains and diversion bunds will also be installed around the new stockpile area and the new extraction area at this stage. All drains and water management features will be constructed according to the Blue Book requirements as discussed in *Sections 6.2.1.10*. Barrier fencing will be installed to limit access to rehabilitated areas or the stockpiles. Management practices will be carried out to minimise areas being affected by wind and water erosion.

The actual depth of stripping of each layer will be recorded and a total volume of topsoil and subsoils estimated, and an inventory kept. Each stockpile location will be logged. The inventory of soils management will be and reported in future Annual Reviews.

6.2.1.2 Flora

The Oaklands site is surrounded by and situated on land classified as RU1: Primary Production according to the Urana Shire Councils Local Environmental Plan 2011. The surrounding land has been subject to major land clearing and extraction activities during the past resulting in a highly disturbed landform.

The principle vegetation assemblage in the mine lease is an open woodland comprising of white cypress pine (Callitris columellaris), yellow box (Eucalyptus melliodora) and grey box (Eucalyptus macrocarpa). These are randomly scattered across the site. Occasional samples of bull oak (Allocasurina luehmanii), butterbush (Pittosporum phyllireoides and peppreina tree (Schinus areira) are noted. Native grasses and a range of weeds provide scattered groundcover through the open woodland.

According to the EIS (1984):

"The site has a moderate ecological value principally because of the presence of the open woodland on most of MLA 48 (ML 1196). *It should be noted that similar and more densely vegetated areas are located to the south of the site."*

Condition 16 states that

'Any destruction or injury to vegetation may require the consent of the Department of land and Water Conservation (DLAWC) under the Native Vegetation Conservation Act. The DLAWC should be contacted prior to the clearing of any vegetation.'

There are trees present on planned future extraction areas on the site which will require removal. Thus, the Murray LLS was contacted regarding the removal of the trees within the latest area of land clearing and determined that no further action from them is required. They have asked to be advised of any future land clearing areas.

Weed eradication and control will be undertaken; if noxious weeds are identified a qualified weed contractor will spray these. The Regulator conducts inspections of the site and follow-up reports are sent to PGH if weed treatment is required. A Weed Management Program has been developed by PGH (see *Appendix H)*

Vegetation species that will be established on the site will be consistent with local pasture species. Planting of vegetation is likely to be a combination of direct seeding and planting with tubestock as appropriate. The newly planted vegetation will be watered, if required, in order to assist in establishment. Tree guards may also be employed to protect seedlings from adverse weather and vermin.

6.2.1.3 Fauna

According to the EIS (1984):

"Birds are the principal fauna that frequent MLA 48 (ML 1196). Other animals observed periodically on the site are the Grey Kangaroo rabbits and foxes. Brown Snakes and a range of local lizards have been observed during the summer months"

The mitigation measures to mitigate indirect impacts to the fauna on site will include:

- a speed limit of 40 kilometres per hour (km/h) will apply on the site access road and generally 20 km/h on unsealed internal roads; and
- roads will be regularly maintained by managing vegetation to main visibility to prevent vehicle strike.
- The site is fenced with rural fencing to prevent incursions by livestock. Fencing will be maintained throughout the life of the project and rehabilitation activities.
- If evidence of feral animal impacts on revegetation is noted, control measures such as rabbit proof fencing will be investigated. A baiting program may also be investigated with the appropriate authorities if required.

6.2.1.4 Rock and Overburden Emplacement

Overburden not required for earth mound construction will be used within the site as cover material and to achieve the final landform profile. The cover material will be stockpiled, where it cannot be used immediately, adjacent to the void or on the perimeter of the site. It is not anticipated that there will be any surplus overburden material. Stockpiles will be no greater than 3 metres in height with slopes no greater than 3H:1V. Burden material from previous mining activities has been stored around the pit.

6.2.1.5 Waste Management

6.2.1.5.1 General Waste

The mine will produce only produce minor quantities of waste during continued mine operations:

- general waste, including putrescible waste such as minimal food scraps;
- comingled recycling (from office activities and site employees);
- oily rags, filters and drums.

General domestic waste is collected in rubbish bins and disposed of via a licensed waste disposal facility.

6.2.1.6 Geology and Geochemistry

The Oaklands area is situated in the eastern extent of the Murray Basin which extends across NSW into South Australia. The Murray River transverses the basin draining to the west. The Basin is consisted of Fluvial and alluvial sediments deposited during the Tertiary. At Oaklands, the Murray basin is 50m thick and underlain by the Oaklands Basin a 3800km^2 basin which has previously been subject to multiple hydrocarbon assessments.

The Oaklands Clay Mine is directly underlain by the Shepperton Formation which is consisted of unconsolidated to poorly consolidated mottled variegated clay, silty clay with lenses of polymictic, coarse to fine sand and gravel; partly modified by pedogenesis **Ref 1**.

Drilling conducted by VGT Pty Ltd, determined that the stratum underlying the site is consisted of fine to coarse grained sand, sandy clays with varying quartz percentages and white clay/Kaolin. It is assumed that the Shepperton Formation at the Oaklands site is underlain by the Calivil and Onley formation of the Tertiary Murray Basin.

The soils and subsoils of the area are slightly acidic to neutral (pH approximately 6.0 to 7.3) according to eSpade website data. The risk of acid mine drainage is therefore considered to be low. There is very low risk of spontaneous combustion due to the absence of carbonaceous material at the site.

The geochemistry is not expected to present any particular difficulties with regard to overburden and topsoil management. The soils are somewhat dispersive and will be stored appropriately to minimise erosion if they cannot be immediately utilised.

6.2.1.7 Material Prone to Spontaneous Combustion

There is no material on the site that is prone to spontaneous combustion.

6.2.1.8 Material Prone to Generating Acid Mine Drainage

There is no material on the site that is prone to generating acid mine drainage.

6.2.1.9 Ore Beneficiation Waste Management

There is no ore beneficiation waste produced on the mine lease.

6.2.1.10 Erosion and Sediment Control

The water management of the site has been developed to comply with *Managing Urban Stormwater, Soils and Construction, Volume 2E Mines and Quarries*. Sediment basins are designed for a 90th percentile, 5-day rainfall event assuming a non-sensitive receiving environment.

The water management strategy is to divert as much clean water as possible and capture only dirty water collected from disturbed areas for treatment, if required, then proceed with controlled discharge after testing. Dam water is also utilised in dust suppression over the site.

Discharges from the site are subject to EPL 11196 and there is one licenced discharge point, EPL Point 1, 'Sedimentation Dams on the property '*Carberry*''. The relevant water quality limits are included in *Section 1.2.3.*

6.2.1.10.1 Constraints and Characteristics

Important site physical characteristics are identified in the table below.

Table 3. Constraints and Characteristics

Constraint/Opportunity	Value
IFD:2 year, 6 hour storm	5.42 (from BOM IFD data)
Slope Gradients	2-4% Average (in pit slopes may be higher)
Soil Erodibility	0.050 (Assumed) High (from NSW Soil and Land Information System- Soil technical report)
Calculated Soil Loss	Up to 580 tonnes per ha Per year within the pit Up to 110 tonnes per ha Per year in undisturbed areas.
Soil Loss Class	5 (in pit) 1 (out of pit and undisturbed area)
Soil Hydrological Group	D
Runoff Coefficient (Cv)	0.64

The Soil Hydrological Group for the soil materials is assumed to be D, very high run-off potential. Water moves into and through these soils very slowly when thoroughly wetted. They shed run-off from most rainfall events. Sediment retention basins have been designed using the Type D Soils calculations.

The likely soil loss is calculated with the Revised Universal Soil Loss Equation (RUSLE). The values of the other RUSLE factors are: P of 1.3, and the C is assumed to be 1.0 for bare soil. Slope lengths were assumed for the calculations to be maximum of 300 metres.

6.2.1.10.2 Catchments

The following table summarises the Catchment volumes required by the *Managing Urban Stormwater, Soils and Construction, Volume 2E Mines and Quarries* (see calculations in *Appendix G*).

Table 4. Catchment Volumes Required

Dam Identification/ Catchment	Catchment Area (Ha)	Sediment Basin Storage (soil) volume (m^3)	Sediment Basin Storage (water) volume (m^3)	Dam Volume Required for 90th percentile, 5-day rainfall event (m^3)
Main Pit Catchment (Dam 1)	5.49	216	176	**392**
Dam 2 Catchment	5.71	41	183	**224**
Dam 3 Catchment	2.86	5	92	**97**

The estimated capacity of the dams is shown below.

Table 5. Estimated Sediment Dam Capacities

Dam Identification/ Catchment	Dam Area (m^2)	Estimated Depth (m)	Estimated Volume (m^3)
Main Pit Dam	946	1*	946
Dam 2	639	1	639
Dam 3	486	1	486

*This is a conservative estimate as the pit is able to hold more than 1m of water before overtopping.

As can be seen from the tables above, the volume of water that could be held by the dams and pit sump exceeds the designed storm event and there is minimal risk of uncontrolled water leaving the site. The main pit dam can capture a much greater volume than the design storm and this will be true for the life of the mine. As areas external to the pit may be subject to future disturbance, dirty water will either be directed to the main pit dam or further sediment dams will be constructed to prevent discharge of sediment laden water downstream.

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Water Management**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD	vgt environmental compliance solutions and laboratories	This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.
Figure:	FIFTEEN	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 05/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855				
Our Ref:	12409_BO_RMP2022_Q015_V0_F15	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

N

0 50 100 m

Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Water Management Area

- Lot Boundary
- 1m Contour

Catchment Features

- Catchment 1 (Main Pit)
- Catchment 2 (Dam 2)
- Catchment 3 (Dam 3)

- Clean Water Flow
- Dirty Water Flow
- Diversion Channel With Bank

6.2.1.10.3 Management of Soil and Erosion

Generally, the site has a moderate risk of rilling and mild gully erosion on sloped areas erosion, but this is limited to the exposed worked areas of the mine. Minor eroded soils and sediment are captured within the Main Pit Dam or the two sediment dams located in the south of the site.

Since the mine has a self-contained water management system, specific erosion or sediment controls are not generally required for normal mining operations. The disturbed mine area drains into the mine extraction area, and no dirty runoff passes off site.

The following general measures will be implemented as practicable:

- Soil erosion from the site will be minimised through progressive rehabilitation and the minimisation of disturbed areas.
- Pre-stripping will also be kept to a minimum.
- Vehicles are required to remain on the designated access tracks to prevent damage to the existing vegetation and minimise surface erosion.
- A water cart regularly sprays the roads and quarry floor in order to prevent dust generation and minimise windblown soil loss.
- Vegetation will be established as soon as practicable on stored soil stockpiles as well as rehabilitated areas.
- Slopes on rehabilitated areas will be kept to a minimum to reduce erosion hazards.

6.2.1.10.4 Works Sequence

All works are to be undertaken following the approved Forward Plan in the following sequence:

- Topsoil in new areas will be surveyed, mapped and the texture, thickness and quality described prior to stripping. Topsoil and overburden not for immediate use will be stockpiled in appropriate areas and limited to 2 metres in height and revegetated with temporary ground cover species, mulching or chemical stabilisers or binders if they are to remain in place for more than 30 days. A minimum of 70 percent cover is required for both mulch and vegetative covers;
- Construct earth banks (Stormwater Collection Drains) to divert as much clean water as possible and capture the dirty water in the extraction area;
- Undertake extraction activities in the new area;
- Rehabilitate lands in exhausted areas with topsoil and overburden and revegetate;
- Install barrier fencing to limit access to rehabilitated areas; and
- Ensure management practices are carried out to minimise areas being affected by wind and water erosion.

6.2.1.10.5 Erosion Control Instructions

The soil erosion hazard on the site will be kept as low as practicable by minimising disturbance. Some ways of doing this are outlined in *Table 6.* Extraction will take place within a defined work area. Entry to land not involved directly in the extraction process will be prohibited and will be managed as natural grassland or woodland as appropriate. Vehicular access to the site will be limited to that essential for extraction or rehabilitation.

Table 6. Limitations to Access

Landuse	Access Limitations	Comments
Extraction	Land disturbances beyond five (preferably two) metres from the edge of the operations are prohibited.	All site workers should clearly recognise these areas and they should be clearly marked — suitable materials include barrier mesh, sediment fencing, etc. The project manager will determine their actual location on site. They can vary in position to conserve existing vegetation best while being considerate of the needs of efficient works activities.
Access Roads	Roads and tracks are limited to a width that are the minimum necessary to allow safe operation of heavy equipment	
Remaining Lands	Land disturbances are prohibited except for essential management works.	

Rehabilitation means:

Achieving a C-factor (Revised Universal Soil Loss Equation) of less than 0.1 and setting in motion a program that should ensure it will drop permanently, by reducing the risk of erosion by vegetation, paving, armouring, etc. as soon as practicable after extraction activities cease.

It should be noted that the cover factor, C, is the ratio of soil loss from land under specified crop or mulch conditions to the corresponding loss from continuously tilled, bare soil. A C-factor of 1.0 corresponds to that of bare soil.

While C-factors are likely to rise to 1.0 during the work's program, they should not exceed those given in Table 15 within the specified times.

Table 7. Maximum acceptable C-factors at nominated times during works

Lands	Maximum C-Factor	Remarks
Waterways and other areas subjected to concentrated flows, post construction.	0.05	Applies after ten working days from completion of formation and before they are allowed to carry any concentrated flows. Flows are limited to those indicated in "Blue Book". Foot and vehicular traffic are prohibited in these areas.
Stockpiles, post clearance	0.1	Applies after ten working days from completion of formation.
All lands, including waterways and stockpiles during construction	0.15	Applies after 20 working days of inactivity, even though works might continue later.

Note: *working days* does not include public holidays, weekends or days when work is not possible due to wet weather.

The required C factors can be achieved in the short term (temporary protection for up to six months) with either:

- a suitable soil binder in areas of sheet flow, e.g. topsoil stockpiles; and
- a temporary vegetative cover.

Any soil binders applied should be employed following the manufacturer's instructions.

A suggested listing of suitable plant species is shown in *Table 8.* Before sowing, additional tests should be undertaken to assess the requirements of ameliorants such as lime to help plant growth.

Table 8. Plant Species for Temporary Cover

Sowing Season	Seed Mix
Autumn/Winter	Oats @ 40kg/Ha Japanese Millet @ 10kg/Ha
Spring/Summer	Oats @ 20kg/Ha Japanese Millet @ 20kg/Ha

While ever the C-factor is higher than 0.1, maintain the lands in a condition that resists removal by wind. This can be achieved by keeping the soil moist (not wet) by sprinkling with water and where practicable, leaving the surface in a cloddy state. Notwithstanding the above, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 10 days on slopes steeper than 30 per cent and 20 days on slopes less steep than 30 per cent.

Lands planted recently with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Follow-up seed and fertiliser will be applied as necessary in areas of minor soil erosion and/or inadequate vegetative protection. Where practicable, foot and vehicular traffic will be kept away from all recently stabilised areas.

Topsoil is to be stripped in a moist condition to avoid pulverisation and dust and topsoil stockpiles are not to exceed 2m in height with a minimum crest width of 2m. They should be seeded with a temporary vegetation cover if stockpiles are to remain longer than 30 days. Stockpiles are to be located at least five metres from areas of likely concentrated or high velocity flows, especially drainage lines and access roads. If necessary, earth banks or drains will be constructed to divert localised run-on. Soil materials are to be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils remain on the surface at the completion of works.

Earth batters can have maximum gradients of 2(H):1(V) during the works program but will be laid back to lower grades before the rehabilitation program starts.

All waterways, drains, spillways and outlets will be constructed to be stable in accordance with the "Blue Book" for soils with high erodibilities.

6.2.1.11 Ongoing Management of Biological Resources for Use in Rehabilitation

6.2.1.11.1 Topsoil Management

Topsoil stripping and storage management is discussed in *Section 6.2.1.1*. Topsoil will be analysed prior to respreading to determine if amelioration measures are required such as lime, fertilisers or other nutrients to make the soil suitable for the species to be planted.

Prior to re-spreading stockpiled topsoil onto reshaped overburden, an assessment of weed infestation on stockpiles should be undertaken to determine if individual stockpiles require herbicide application and / or "scalping" of weed species prior to topsoil spreading. If insufficient on-site topsoil material is available, VENM may be imported to meet the shortfall.

6.2.1.11.2 Methods of Propagation

Vegetation will consist of grazing species which will be suitable for groundcover and advice will be sought from a qualified agronomist or similar on the most appropriate species and methods of seeding during the landform establishment phase. It is most likely that seed will be required to be purchased.

6.2.1.12 Mine Subsidence

Clay was obtained by underground methods in the area since at least 1955 according to Corkery EIS 1984. Loftus House Pty Ltd, the then operator, sought to change from underground mining to open cut methods due to quality control problems with kaolin mined from the lower level and unsafe mining conditions in the upper level.

Figure 2.4 (see *Figure Fourteen*) from the 1984 EIS indicates the extent of the underground mining and this is assumed to have informed the 2003 MOP also by Corkery (see *Figure Fifteen*). No consideration was given to the risk of encountering underground workings in the proposed open cut area as it was considered to be outside the underground workings area. Roof collapses were noted within the upper level of workings causing subsidence on the surface in the north east and these were to be remediated with overburden from the open cut operations.

The 2003 MOP states the redundant and disused equipment remaining from the former underground mining operation will be removed for recycling or disposed of at an approved waste disposal site. The surface overhead loading bins, hoisting equipment and structurally sound sheds would be retained during the period of the MOP, with the opening to the shaft being modified to prevent accidental access to the underground workings.

A plan named 'Underground Workings Plan' by Kip Gallender, Bert Brink for R Fowler Ltd (Newbold General Refractories Ltd) for the Riverina Clay Mine at Coorabin "B" Level Workings- Figure G153 dated 20th April 1978 was located within documents provided with the PGH acquisition of the site. It was georeferenced into QGIS and scaled to best fit using fence lines, the shed and the main shaft and is shown in *Figure Sixteen*. The plan is indicative only and cannot be relied upon for surveyed accuracy.

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Figure 2.4 from 1984 EIS**	**Location:**	Off Coorabin Road, Oaklands, NSWW	**Source:**	R W Corkery & Co. Pty Limited Figure 2.4 EIS for Open Cut Mining of Kaolin at Coorabin NSW	**Plan By:**	JD
Figure:	**SIXTEEN**	**Council:**	Urana Shire Council	**Survey:**	Not Applicable	**Project Manager:**	TO
Version/Date:	V0 04/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	Not Applicable	**Office:**	Thornton
Our Ref:	12409_BO_RMP2022_Q016_V0_F16	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	Not Applicable		

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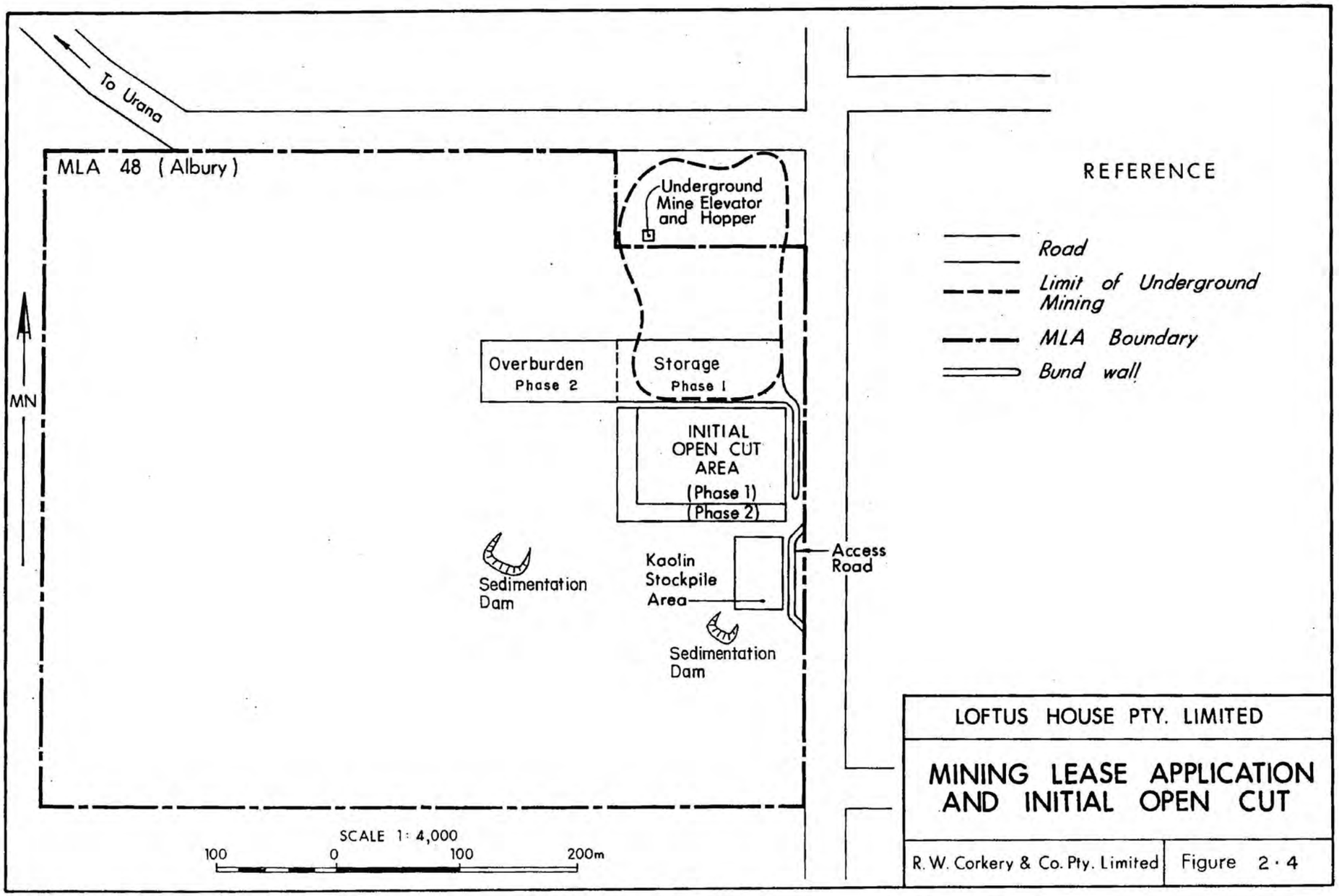

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Plan From 2003 MOP**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	R W Corkery & Co. Pty Limited - Mining Operations Plan, Coorabin Clay Mine, NSW - Plan 1/May 2003	**Plan By:**	TO/JD		
Figure:	SEVENTEEN	**Council:**	Urana Shire Council	**Survey:**	Not Applicable	**Project Manager:**	TO		
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	Not Applicable				
Our Ref:	12409_BO_RMP2022_Q017_V0_F17	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	Not Applicable				

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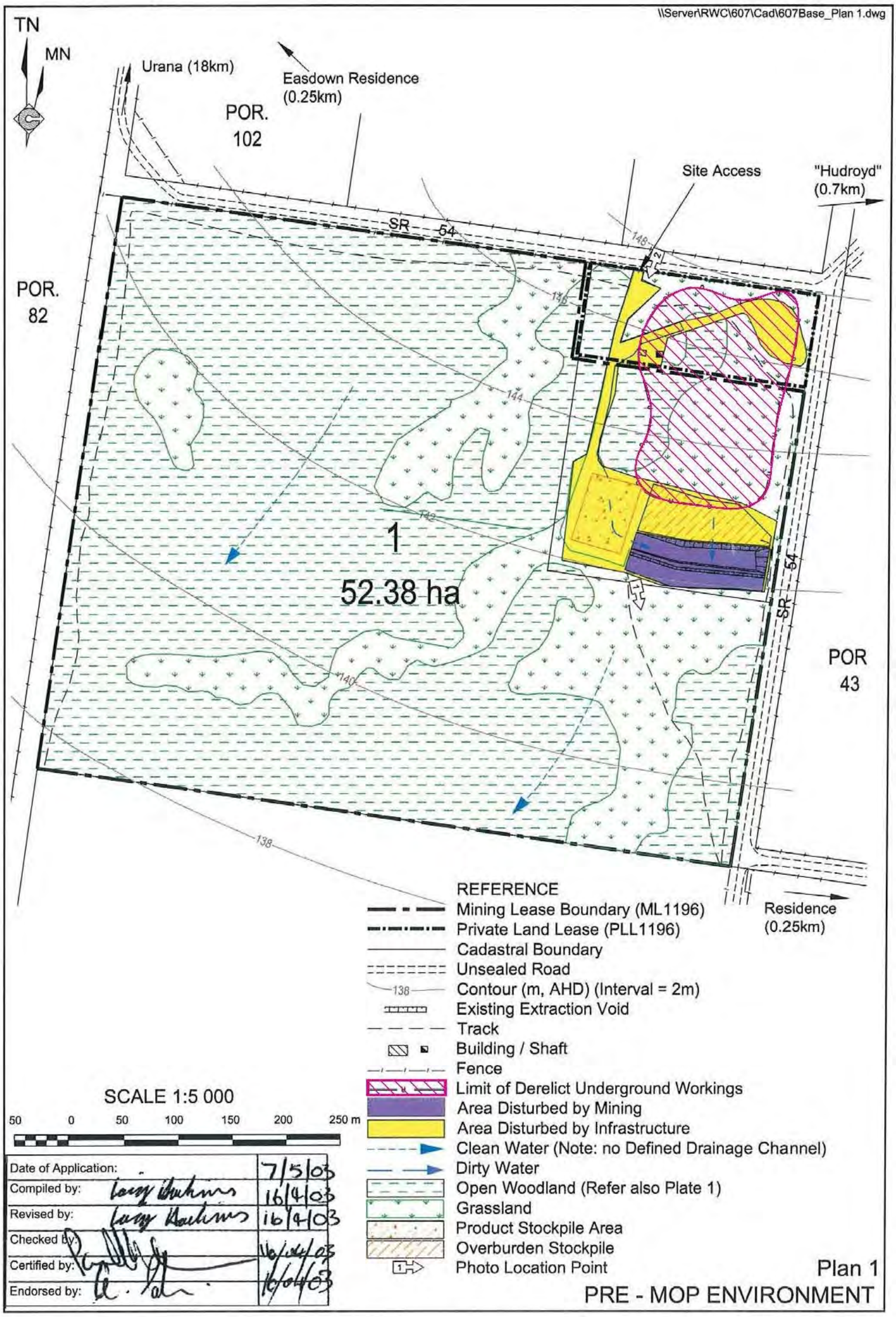
MINING OPERATIONS PLAN - 27 - **BORAL BRICKS PTY LIMITED**

Coorabin Clay Mine
Report No. 607/01



R.W. CORKERY & CO. PTY. LIMITED

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Interpolation of Historical Underground Workings - Plan 'B'**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	Landair Survey Flown 8/2/2017 & Underground Workings Plan Kip Gallender, Bert Brink for R Fowler Ltd Riverina Clay Mine at Coorabin "B" Level Workings Figure G153 20/4/1978.	**Plan By:**	TO/JD
Figure:	EIGHTEEN	**Council:**	Urana Shire Council	**Survey:**	Landair Survey Flown 8/2/2017	**Project Manager:**	TO
Version/ Date:	V0 02/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	MGA		
Our Ref:	12409_BO_RMP2022_Q018_V0_F18	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	Not Applicable		

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0 20 40 60 80 100m

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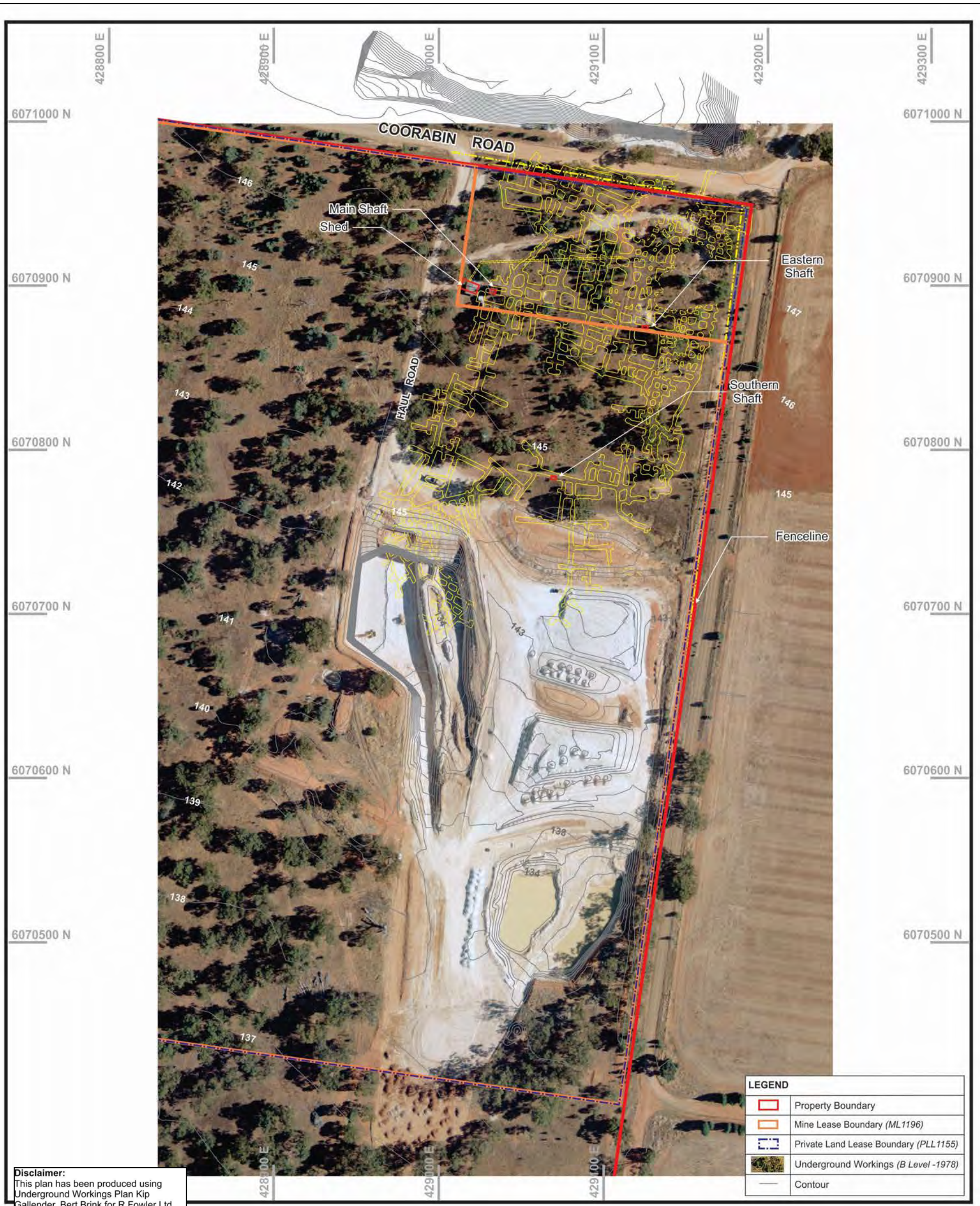
This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.



Disclaimer:
This plan has been produced using Underground Workings Plan Kip Gallender, Bert Brink for R Fowler Ltd (Newbold General Refractories Ltd) Riverina Clay Mine at Coorabin "B" Level Workings *Figure G153 20/4/1978* (known as the scanned underground plan). This scanned underground plan was imported into Corel then traced by VGT. Using the key features of the northern & eastern fenceline, the shed & the main shaft, VGT has scaled these from the scanned underground plan to best fit the underground workings onto the latest aerial photography.

This plan is indicative only & cannot be relied on for surveyed accuracy.

Due to the presence of historical underground workings there is the possibility that subsidence areas may appear on the surface of the site. According to the current information available, it is expected that the area at most risk of subsidence is located to the north east of the site. Subsidence has been experienced in this area in the past and has been remediated by backfilling with overburden. Investigations undertaken by PGH are outlined below.

6.2.1.12.1 2015 Investigations

From the 2015 AEMR, where PGH became involved in the site, there were no actions from the previous annual review required. However a Regulator site inspection on the 12th of August 2015 noted the following in a letter dated 14th of August 2015 (ref OUT15/21447) (see Appendix E)

- Subsidence and associated impacts from historic underground clay mining operations- Plans must be adopted which outline the remediation of areas impacted by subsidence and where historic clay piles are still present. The plans may be forwarded to the Department at any time but must be included in the Mining Operations Plan to be submitted and approved before April 2017.
- Historic mining infrastructure. Plans must also be adopted which outline the decommissioning and cleaning up of historic mining infrastructure. The plans may be forwarded to the Department at any time but must be included in the Mining Operations Plan to be submitted and approved before April 2017. The Department reminds the titleholder that the heritage status of underground headframe and shaft should) be reviewed prior to any decommission being undertaken.

On the 13th of November 2015, in email correspondence with The Regulator (see *Appendix E*) after the above site inspection site, PGH proposed a safety risk assessment on the historical mining infrastructure and if acceptable to mitigate risk a fenced type compound be erected around the perimeter. The infrastructure would then be removed at the end of quarry life and the MOP amended to reflect this. The Regulator agreed that in principle this was acceptable if the MOP was amended. Inquiries with the Urana Shire Council indicated that there was no historical significance of the structures on the site and that demolition could proceed. The Regulator was also informed that there were no items of historical significance on the site.

A risk assessment undertaken by PGH in December 2015 (see *Appendix G*) which concluded that serious injury could result if individuals were to access the infrastructure. Fencing the area was considered an acceptable method of managing the risk. At this stage the underground workings were considered by both the Regulator and PGH to be confined within the area shown in the 1984 EIS and 2003 MOP.

6.2.1.12.2 2016 Investigations

In April 2016 an amended MOP was submitted to the Regulator which included amendments to include the retention of the derelict mining infrastructure until the closure of the mine. The MOP included a copy of the risk assessment undertaken by PGH in December 2015 which concluded that serious injury could result if individuals were to access the infrastructure. As stated above, fencing the area was considered an acceptable method of managing the risk. The amended MOP was approved by the Regulator in April 2016.

Mining commenced in April to May 2016 and in the course of extraction activities, underground workings were uncovered at an approximate depth of 11m below the surface.

Photoplate 1. Exposed Underground Workings 2016

Photoplate 2. Exposed Underground Workings 2017

A mining engineer specialising in explosives was engaged to assess the workings as it was suggested by staff that had worked in the underground operation that surplus gelignite explosives may have been left in the underground workings. The technical report (see *Appendix F*) concluded that it was unlikely that explosives would be left on site and suggested a safe method for visually determining the presence of explosives in the workings as the excavation progresses. This was formalised into an operating procedures for the site but the essential elements involved.

- Conducting a toolbox meeting to talk with employees who may be operating digging equipment or working in and around the area so that they are aware of what to look for if any explosives items area uncovered.
- In the existing exposed tunnels a small backhoe excavator may be used to gradually drag off small layers of pit material that has tumbled into the cavity.
- After clearing the entrances to the tunnels a flashlight could be used to inspect for several metres in to the tunnel to confirm that no explosive boxes or materials are present. After each examination, excavation of the sides of the pit can proceed several metres and then the examination process repeated.
- An experienced and qualified explosives handler will be engaged to safely remove and store and such items.

The presence of explosives in the shaft area has been investigated (see *Appendix F*). PGH have notified the Mines Department, Safework NSW and the local police office in Albury of the possibility of explosives on the site.

Notice N23-2016/03516 was issued by the DRE (Mines Safety) on the 6/10/2016 and required that:

- The underground re-entry procedure used in the tool box meeting needs to be reviewed and updated to reflect all hazards, risks and controls associated with re-entering into old workings.

- A regular documented inspection regime needs to be implemented in and around monitoring unauthorised access and entry into the underground workings.

The information requested was suppled to Mines Safety via email in November 2016 and additional information requested via phone call supplied via email on the 16/1/2017 (see *Appendix E*).

6.2.1.12.3 2017 Investigations

Notice N191-2017/00043 (see *Appendix E*) was issued on the 20th of February 2017 by Mines Safety as they had not been supplied any prepared documents in relation to the Principle Mining Hazard Plan for Ground or Strata failure control. PGH was required to comply with the notice by 5th of May 2017.

Notice N23-2017/00069 (see *Appendix E)* was also issued on the 20th February 2017 by DPI requiring the following from PGH:

- *A Principle Hazard Management Plan for Ground or Strata Failure has not been developed by the Mine Operator as required by legislation. S191 Notice issued.*
- *Mining characteristics at the mine have changed significantly (depth of clay level) with no triggers in place to identify additional risks and appropriate controls to manage increased risk of ground or strata failure.*
- *No current mine plan was identified that included geotechnical advice and design on how to control ground and strata failure.*
- *SWMS developed for mining on site made no reference to ground or strata control and safety systems did not allow for change management situations which occurred on site with the increased depth of the new pit.*
- *Managers and employees lacked training/competency in identifying ground and strata issues on site.*

A Principle Hazard Management Plan has been developed for the site and was submitted to the Regulator- Mines Safety on the 5th of May 2017 (see *Appendix H*). The plan has been accepted by Regulator –Mines Safety in email correspondence dated 8th of May 2017 (see *Appendix E*).

As part of the MOP renewal process and to address the requirement to develop a safe mining plan, PGH has attempted to acquire plans for the historical underground workings. A plan from 1978 showing underground workings at approximately 12m depth was located by the mining contractor in April 2017. This was overlaid on current plans as accurately as possible (see *Figure Sixteen*) and it infers that the underground workings did in fact extend to the current pit area. The plan refers to these workings as 'Level B' and indicates the presence of further workings at approximately 20m below the surface, 'Level C' workings. The presence of 'Level C' workings is corroborated by the 1984 EIS by R.W. Corkery in *Section 1.6*. It is likely that the workings uncovered are the 'Level B' workings due to the map and depth correlations.

The Regulator was contacted to determine if any other plans were available to indicate where underground workings may have been undertaken, specifically the 'Level C' workings. PGH was suppled a number of plans in April 2017 including one designated the '20 metre level' for the area. Unfortunately, the map lacks the detail required to determine the actual location of these workings in relation to the surface features. It is however suspected that the map may be of the Haines quarry to the north of the PGH site.

At this stage no other plans can be located and it is likely that all avenues of inquiry have been exhausted. On the basis of the current information and the reference to underground workings on the site at a lower level (20 metres), this MOP will assume that the likelihood of encountering historic workings is high and the extraction methods will reflect this added risk.

6.2.1.12.4 Mining Techniques

Benching Plan

Methods of extraction on the site will vary according to the risk of encountering historical underground workings. It has been determined the most likely area of encountering underground workings is to the north east of the site. Workings uncovered within the current pit appear to generally confirm the depth and extent of the upper level underground workings however, the depth and extent of the lower level of workings are unknown. The benching plan has been developed using the geotechnical advice provided by EP Risk (see *Appendix I*).

North East Area

Therefore, in areas to the north and east of the current and extended pit, after removal of the topsoil and subsoil, the clay material will be removed using a dozer to approximately 5 metres below the original surface and a bench will be formed at this level. An excavator would then be utilised to selectively pull down on the face of the bench where underground workings are likely to be encountered. It will also allow for a safe distance between potential roof collapses and the operator. Extraction will continue another to a total of 12 metres below the surface where the next bench will be formed.

The next bench will be developed as above a further 5 metres down at an approximate depth from the surface of 17 to 18 metres. It is PGH's understanding that it is likely that this depth corresponds to the top of the lower level of the underground workings. Selective mining with the excavator will proceed as described above. If workings are encountered, operations will cease whilst investigations are undertaken. The bench will then be developed to approximately 19 metres below the surface.

The floor of the pit will be developed as required at approximately 3 metres depth from the previous bench as described above to the limit of extraction depth (23 metres below the surface). It is envisaged that the initial bench to 5 metres below the surface will have side batters of 3:H:1V. Further benches (7 metre and 3 metre depths respectively) will have side batter of up to 75 degrees (see *Figure Seventeen*). The steep batter design, for this portion of the site, is to allow the excavator to pull the clay down the face so equipment does not operate over underground working with less than 5 metres of cover as designed by EP Risk. All benches will be approximately 10 metres in width.

The pit has been extracted to a depth of 21 metres in the north east and has not yet encountered the 'C' level workings, believed to lie some 22-25m below the surface. Mining of this area to the consented depth of 23 meters removes a portion of the underground workings and reduces the risk of future subsidence in the final landform.

South and Western Area

Excavation works to the west and south are not expected to encounter underground workings. As such a dozer will extract down to RL136m to form a 10-metre bench (see *Figure Eighteen).* The wall will be battered at an angle of 3H:1V. The excavation will then extend to RL131m where another bench will be formed. The batter wall will be at an angle of 75º with the bench extending 10 metres. The excavation will then extend to the floor of the pit at RL126m with wall angles of 75º.

Photoplate 3. Benching Works Around Underground Workings

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Benching Plan North Eastern Through Underground Workings**	**Location:**	Off Coorabin Road, Oaklands, NSWW	**Source:**	Batter Designs by EP Risk Consulting	**Plan By:**	JD
Figure:	**NINETEEN**	**Council:**	Urana Shire Council	**Survey:**	Not Applicable	**Project Manager:**	TO
Version/Date:	V0 04/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	Not Applicable	**Office:**	Thornton
Our Ref:	12409_BO_RMP2022_Q019_V0_F19	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	Not Applicable		

Not To Scale

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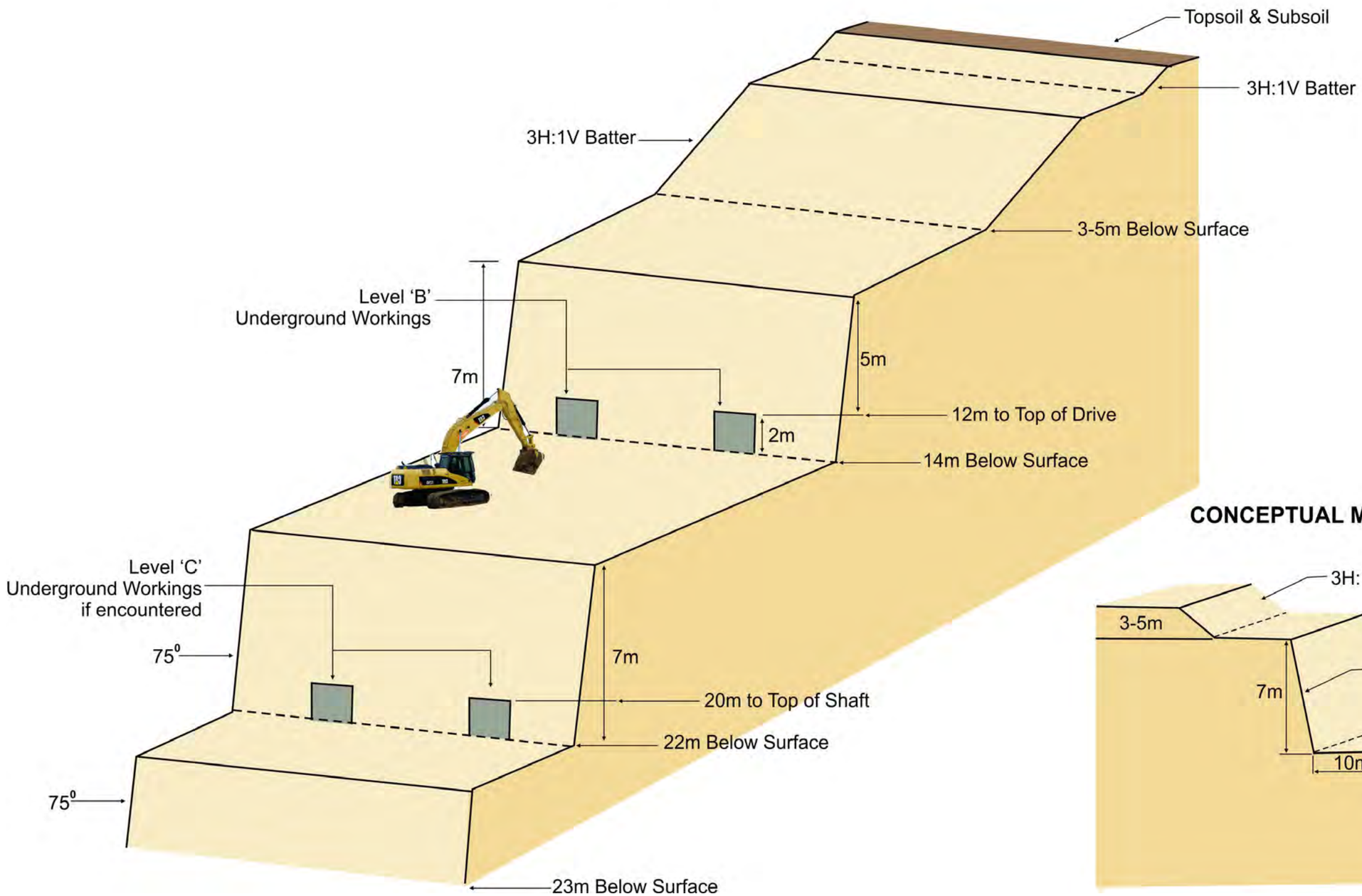
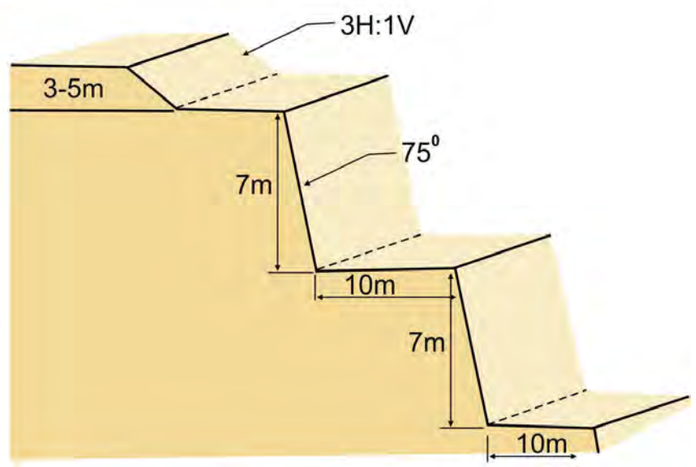
OAKLANDS - NORTH EASTERN THROUGH UNDERGROUND WORKINGS



CONCEPTUAL MINING DESIGN



Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Benching Plan West Development**	**Location:**	Off Coorabin Road, Oaklands, NSWW	**Source:**	Batter Designs by EP Risk Consulting	**Plan By:**	JD
Figure:	**TWENTY**	**Council:**	Urana Shire Council	**Survey:**	Not Applicable	**Project Manager:**	TO
Version/Date:	V0 04/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	Not Applicable	**Office:**	Thornton
Our Ref:	12409_BO_RMP2022_Q020_V0_F20	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	Not Applicable		

Not To Scale

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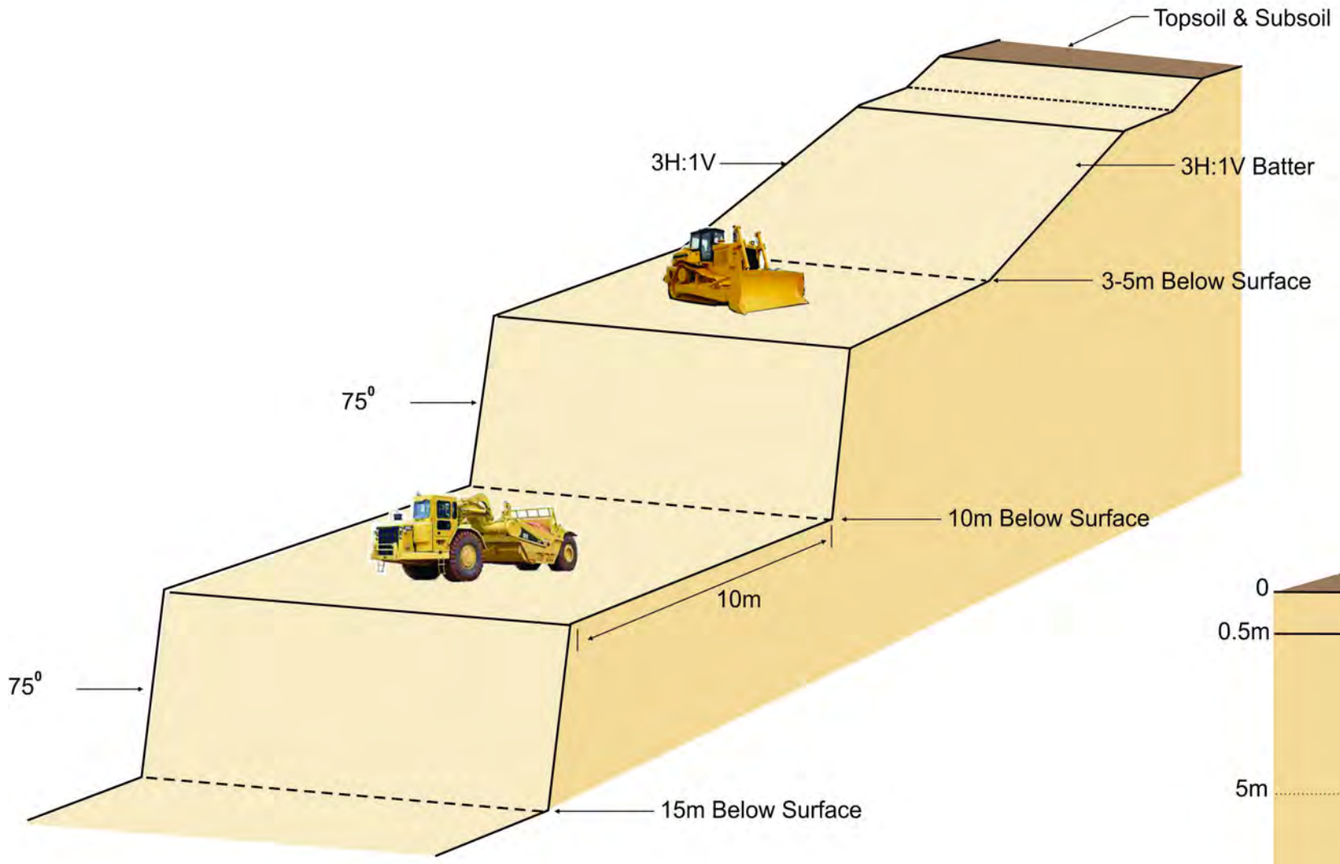
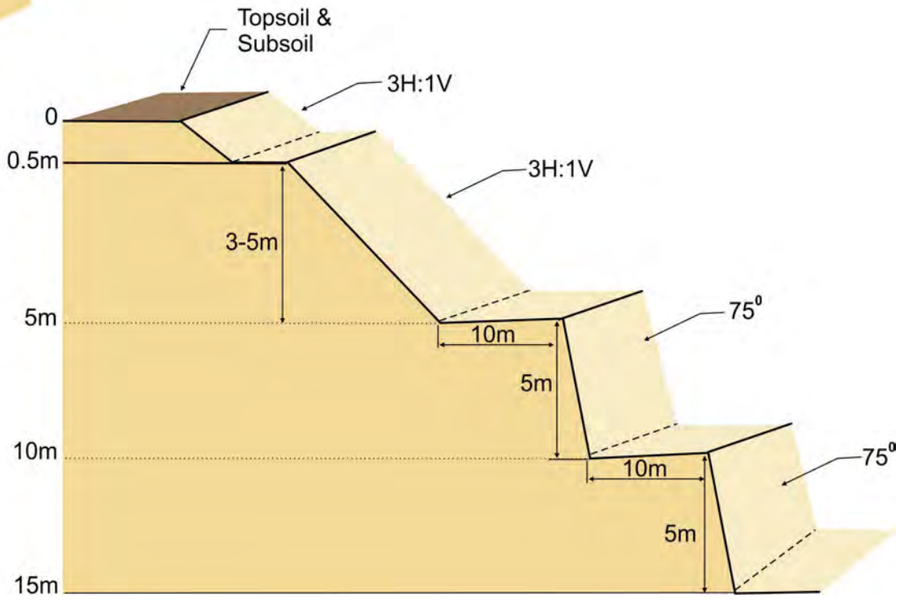
OAKLANDS - WESTERN DEVELOPMENT



CONCEPTUAL MINING DESIGN



6.2.1.13 Management of Potential Cultural and Heritage Issues

The following mitigation measures will be applied:

- The work will proceed with caution and the following actions will be taken in accordance with the Aboriginal Heritage Due Diligence recommendations:
    - In the event that unexpected Aboriginal objects, sites or places are discovered, DPIE will be notified as soon as practicable after they are first identified.
    - In the event that known or suspected human skeletal remains are encountered, the following procedure will be followed:
        - the immediate vicinity will be secured to protect the find and the find will be immediately reported to the work supervisor who will immediately advise the site supervisor or other nominated senior staff member;
        - the environmental manager or other nominated senior staff member will notify the police and the state coroner on the same day of the find (as required for all human remains discoveries);
        - the environmental manager or other nominated senior staff member will contact DPIE for advice on identification of the skeletal material as Aboriginal and if so, management of the material;
        - if it is determined that the skeletal material is ancestral Aboriginal remains, the Aboriginal community will be contacted, and consultative arrangements will be made to discuss ongoing care of the remains;
        - the site will be recorded in accordance with the NPW Act and DPIE guidelines; and
        - if the remains are historical and not of Aboriginal origin, the Heritage Division of DPIE will be notified for further instruction.

6.2.1.14 Exploration Activities

Exploration activities that may be undertaken are likely to be core drilling in future extraction areas to assess the quality of clay materials. Drill hole are likely to be limited in number in advance of extraction. Previous exploration drilling by PGH, since the acquisition of the site number some 10 holes drilled to a maximum depth of 30 metres to the north and the west of the main pit area in November 2016 (see *Figure Seventeen*). No further drilling has been undertaken since that time.

Some costeaning may be undertaken within existing the mining footprint. There will be no rehabilitation of exploration activities in these areas as they will be subject to extraction activities prior to final site rehabilitation.

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Drill Hole Locations**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	CEH surveyed ML Boundary base on original ML Plan (1983). PLL Boundary interpolated by VGT, use as guide only. Landair contours 08/02/2017 & Landair aerial flown 19/08/2021.	**Plan By:**	TO/JD	vgt environmental compliance solutions and laboratories	This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.
Figure:	TWENTY ONE	**Council:**	Urana Shire Council	**Survey:**	CEH survey 2016 & Landair contours 08/02/2017.	**Project Manager:**	TO		
Version/ Date:	V0 05/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855				
Our Ref:	12409_BO_RMP2022_Q021_V0_F21	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m				

N

0 50 100 m

Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Lot Boundary (Cadastral)
- Water Management Area
- Drill Hole Locations (November 2016)
- 1m Contour

6.2.2 Decommissioning

6.2.2.1 Site Security

In the interest of public safety, fences are maintained around the perimeter of the mine sites. Prominent signage has also been erected to discourage trespassers. The site entrance gate is locked when operations are not being conducted. The Header has been fenced securely to prevent access.

Due to the rural and remote setting of the quarry, trespassers are not common.

Visitors onto the site must report to the site supervisor during site activities. All visitors must be always accompanied by PGH personnel.

Photoplate 4. Locked Access Gate

6.2.2.2 Infrastructure to be Removed or Demolished

The temporary office building will be removed at the end of mining and active rehabilitation activities. The historic mine header and associated infrastructure will be removed and the remining shaft sealed. All waste materials (metal, bricks etc) from the removal will be disposed of in a licenced waste facility.

Photoplate 5. Fenced Historic Underground Header

6.2.2.3 Buildings, Structures and Fixed Plant to be Retained

There are no buildings, structures or fixed plan to remain on the mine lease at the end of the mine life.

6.2.2.4 Management of Carbonaceous/Contaminated Material

There is no carbonaceous or contaminated material remaining on site.

6.2.2.5 Hazardous Materials Management

There are no hazardous materials stored on the mine lease. During mining, hauling and rehabilitation activities, contractors may bring fuel or oils onto the site via mobile equipment. Mobile vehicles are required to carry spill kits and a spill kit is located at the site office.

6.2.2.6 Underground Infrastructure

Although there are underground workings on site, it is understood there is no underground infrastructure on the mining lease that required removal. No evidence of infrastructure has been noted in underground workings uncovered to date.

6.2.3 Landform Establishment

6.2.3.1 Water Management Infrastructure

The final void has been envisaged to remain and capture water in the form of a dam. A Water Access Licence will be sought for the remaining water body, if required, in the final landform closer to completion of mining.

If any sediment dams are constructed outside of the void these will be designed to Best Practice according to the 'Blue Book' Criteria for a 5 day 90th percentile storm event. Any drains required will be designed for the 1 in 10 years design storm event and all spillways will be designed for the 1 in 100-year design storm event and do not re-entrain sediment.

6.2.3.2 Final Landform Construction: General Requirements

The final landform will consist of a broadly contoured depression. The depression will drain in a south western direction towards a final depression sedimentation dam. If there are any remaining slopes, they will be battered to 3m horizontal to 1m vertical. Slopes greater than 50 metres will be broken by catch drains to convey the surface water to the sediment dam to reduce erosion effects.

Slopes of major tracks are to be graded to less than 10° or have cross drains/banks installed. Where unsuitable soils are present, tracks to be stabilised with crushed bricks, concrete, gravel or similar.

6.2.3.3 Final Landform Construction: Reject Emplacement Areas and Tailings Dams

There are no reject emplacement areas or tailing dams on the site.

6.2.3.4 Final Landform Construction: Final Voids, Highwalls and Low Walls

Slopes will be kept to the minimum possible to reduce erosion impacts and sediment entrainment. Drainage will be established to direct surface water into the final water body. Surface water outside the void catchment will be diverted to neighbouring properties as currently occurs. Exposed surfaces may be roughened to minimise erosion and maximise rainfall infiltration.

Battering of the north and eastern highwall and the southern stockpile area is expected to commence from 2022 to 2037. As mining progresses to the north and west, land forming will follow.

Overburden won from the extension of the active mining areas will be utilised to assist in the battering of the highwalls.

6.2.3.5 Construction of Creek/ River Diversion Works

There are no creek or river diversion on the site.

6.2.4 Growth Medium Development

Once final rehabilitation faces become available, they will be ripped using a dozer and the overburden material will be keyed into the surface. This will increase water retention and reduce erosion and slumping of the emplaced overburden. Where topsoil resources allow, topsoil should be spread to a nominal depth of 50-100 mm (unless studies indicate an alternative depth) on all re-graded subsoils. Subsoils will be emplaced first over the battered overburden material used to create the final landform. The depth of subsoils should aim to replicate that of the original soil profile.

The existing topsoil and overburden are suitable for rehabilitation but may require some amelioration, depending on the vegetation species selected. Soil testing would be undertaken prior to permanent revegetation and advice from a suitably qualified specialist would be sought. Soil ameliorants would be added if recommended by soil testing results to provide a suitable soil medium for the growth of the targeted species and ecosystems. Topsoil should be spread,

treated with fertiliser and seeded in one consecutive operation, to reduce the potential for topsoil loss to wind and water erosion.

Thorough seedbed preparation should be undertaken to ensure optimum establishment and growth of vegetation. All topsoiled areas should be lightly contour ripped (after topsoil spreading) to create a "key" between the soil and the overburden. Ripping should be undertaken on the contour. Best results will be obtained by ripping when soil is moist and when undertaken immediately prior to sowing. The respread topsoil surface should be scarified prior to, or during seeding, to reduce run-off and increase infiltration. This can be undertaken by contour tilling with a fine-tyned plough or disc harrow.

Establishment of the growth medium is preferable in late winter early spring to enable planting to occur during spring to give the vegetation the optimum growing conditions. Weed control measure will continue to be undertaken as required.

6.2.5 Ecosystem and Land Use Establishment

Sowing methods may be via hand casting, if the area is sufficiently small or direct drilling. Seedlings will be directly planted. Consideration will be given to short lived sterile grasses to establish ground cover and stabilising of soil whilst the target cropping species establish. There is no description of the types of species and planting densities within the Corkery EIS (1984) and DA6/2000. The R.W. Corkery MOP (2003), assumed to align with the Brink EIS (1999) describes the establishment of native tree lots 15m by 15m in area, with each lot in each alternative extraction cell. This equates to approximately 5-8 trees per lot. Regardless, advice from an agronomist and Murray LLS will be sought to determine the most suitable species.

Plant guards may be considered if necessary to ensure the establishment of some tubestock and will be erected at the time of planting. These will be regularly inspected to ensure that they are providing sufficient protection for the juvenile plants and replaced when necessary

Watering of the rehabilitated areas may be undertaken via the use of a water cart if required i.e. prolonged dry periods. Once established the grassland species should not require continued watering. Regular monitoring and control for weeds will continue and should be of a similar frequency requirement to neighbouring pastures.

Plan of:	**Rehabilitation Management Plan for Oaklands Clay Mine - Final Landform with Indicative Tree Lots**	**Location:**	Off Coorabin Road, Oaklands, NSW	**Source:**	R W Corkery & Co. Pty Limited 2003 MOP Report.	**Plan By:**	TO/JD
Figure:	TWENTY TWO	**Council:**	Urana Shire Council	**Survey:**	R W Corkery & Co. Pty Limited 2003 MOP Report.	**Project Manager:**	TO
Version/ Date:	V0 07/09/2022	**Tenure:**	ML 1196 & PLL 1155 (Act 1992)	**Projection:**	GDA2020/MGA Zone 55 EPSG:7855		
Our Ref:	12409_BO_RMP2022_Q022_V0_F22	**Client:**	PGH Bricks & Pavers Pty Ltd	**Contour Interval:**	1m		

N

0 50 100 m

vgt environmental compliance solutions and laboratories

This figure may be based on third party data which has not been verified by vgt and may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and vgt does not warrant its accuracy.

Legend

Mine Lease Features

- Authority Boundary (ML1196) - Lease from CEH Survey
- Private Land Lease (PLL1155) - Edited from Minview to match ML

Site Features

- Road Corridor
- Lot Boundary (Cadastral)
- Water Management Area
- Final Water Body RMP 2022
- Tree Lots (15m x 15m)
- Final Landform Features
- 1m Contour

6.2.6 Ecosystem and Land Use Development

- Weed monitoring will continue and will confirm that after 2 years the non-target species (weeds) represents less than 20%of projected foliage cover or equivalent to surrounding vegetation (Box Gum Open Forest) not disturbed by mining activities;
- Inspection of dams, drains and other water management structures will be undertaken monthly for the first six months then six monthly until completion criteria are achieved. Repairs will be undertaken as required;
- Inspections to identify any land instability such as mass movement to be undertaken and if identified, advice from geotechnical experts to be sought and repairs effected;
- Vegetation will be monitored and areas where establishment has failed will be identified and assessed by an agronomist or similar. Remediation will be undertaken as advised. Remediation may include application of ameliorants, reseeding, mulching etc;
- Assessment of land capability will be undertaken to ensure the land meets the requirements of the final land use;
- Monitoring of soil parameters to determine continued suitability for developing ecosystem. Application of ameliorants to be undertaken, including fertilisation if required. Routine Soil Test (bulked soil sample 0-10 cm) includes but no limited to;
    - Total Carbon (TC), Total Nitrogen (TN), Organic Matter, TC/TN Ratio; Bray I and II Phosphorus; Colwell Phosphorus; Available cations (Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulphur); Available Micronutrients (Zinc, Manganese, Iron, Copper, Boron, Silicon); Exchangeable (Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium, Cation Exchange Capacity); pH and EC (1:5 water); Basic Colour, Basic Texture;
- Inspection and repair of fencing as appropriate;
- Inspection and repair of access tracks as appropriate;
- Wildlife deterrents to be inspected and repaired/replaced as required; and
- Bushfire controls are to continue and monitored for effectiveness.

6.3 REHABILITATION OF AREAS AFFECTED BY SUBSIDENCE

The areas likely to be affected by subsidence are located in the north east of the site. The extraction of clay material from a portion of this area will remove the level ‘B’ underground workings and will reduce the risk of subsidence. There will still be some remaining risk of the subsidence from the ‘C’ level underground workings that have not yet been encountered. Previous subsidence areas noted on the surface of the site were rehabilitated by backfilling with overburden and revegetated with grass species.

The area in the north east subject to subsidence will be monitored throughout the life of the mine for subsidence impacts and remediation. The Regulator will be contacted if subsidence is observed, and advice sought. Any subsidence will not impact any buildings, residences, or other major infrastructure.

7 Rehabilitation Quality Assurance Process

Table 9. Rehabilitation Quality Assurance Process

Key Actions	Responsibilities	Records	Review
Active Mining (Land Clearing)			
Topsoil Stockpile Management • Slopes no greater than 3H:1V. • Topsoil stockpile height no greater than 2 metres. • No stockpiles to be constructed in areas of concentrated flows. • Record volumes and locations of topsoil stockpiles. • Volume of material, topsoil and subsoil required for application to current and future disturbance areas • Chronology of treatments (e.g. weed control, application of cover crop) undertaken on the stockpile. • Achieve groundcover factor of at least 0.05 (70% coverage) on stockpiles with long term inactivity. • Estimate of the volume of suitable alternative material required to be imported onto site to supplement potential material, topsoil and subsoil deficits.	Mine Manager Surveyor	Survey data of topsoil stockpiles. GIS data and plans. Soil inventory. Reports from weed contractors. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Overburden Stockpile Management • Slopes no greater than 3H:1V. • Stockpile height no greater than 3 metres. • No stockpiles to be constructed in areas of concentrated flows. • Record volumes and locations of overburden stockpiles. • Volume of material, overburden required for application to current and future disturbance areas • Chronology of treatments (e.g. weed control, application of cover crop) undertaken on the stockpile. • Achieve groundcover factor of at least 0.05 (70% coverage) on stockpiles with long term inactivity. • Estimate of the volume of suitable alternative material required to be imported onto site to supplement potential material deficits.	Mine Manager Surveyor	Survey data of overburden stockpiles. GIS data and plans. Soil inventory. Reports from weed contractors. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Flora and Fauna • Trees are tapped with the bucket to alert fauna and then laid down with an ecologist on site to assist any injured wild life.	Mine Manager	Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Waste • Wastes will be stored in bins with a lid. • Wastes will be removed by licenced contractor.	Mine Manager	Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11

Key Actions	Responsibilities	Records	Review
Erosion • Slopes to be reduced to a maximum of 3H:1V in pit areas. • Slopes of 3H:1V shall not be greater than 50 metres or they will be broken by catch drains to convey the surface water to the sediment dam to reduce erosion effects. • Slopes of major tracks are to be <10 degrees or have cross drains/banks installed. • Where unsuitable soils are present, tracks are to be stabilised with crushed bricks, concrete, gravel or similar. • Track walk or lightly rip exposed surfaces to encourage infiltration of rainwater. • Achieve ground coverage factor of at least 0.05 (70%) via vegetation, mulch or similar within 30 days of completion of works.	Mine Manager	Survey data. GIS data and plans. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Sediment • Sediment dams designed for 90th % 5-day storm event. • Capacity of sediment dams to be monitored for available capacity. • Drains to be designed for 1 in 10-year design storm. • Spillways to be designed for 1 in 100-year design storm. • Receiving capacity of sediment dams to be maintained by; o Reuse of water on-site for dust suppression; and o Water to be pumped to pit sump if capacity not sufficient to contain design storm prior to storm events. • Pit maintained to have capacity to contain a volume greater than the design storm. • Drains to be installed to direct dirty surface water to sediment dams. • Installation of silt fences around disturbed area as appropriate. • No silt fences to be constructed in areas of concentrated flows. • Upstream clean water to be diverted via diversion drains or bunds as far as possible.	Mine Manager	Survey data. GIS data and plans. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Wind Erosion • Water cart to be engaged during mining, hauling and rehabilitation activities. During adverse conditions: • Cease mining or hauling activities in adverse wind conditions: and • Increase water cart frequency.	Mine Manager	Weather data. Watercart usage/pumping volumes. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Water Quality • Water quality discharged meets the objective of Section 120 of the Protection of the Environment Operations Act 1997. In particular, 'downstream' water quality monitoring will record total suspended solids <50mg/L or within 10% of 'upstream' levels (whichever is the greater), in accordance with the EPL conditions.	Mine manager NATA Accredited laboratory	Water testing reports	Annual Rehabilitation Report Section 8.3 See Section 11

Key Actions	Responsibilities	Records	Review
Active Mining (Production)			
Topsoil Stockpile Management • Slopes no greater than 3H:1V. • Topsoil stockpile height no greater than 2 metres. • No stockpiles to be constructed in areas of concentrated flows. • Record volumes and locations of topsoil stockpiles. • Volume of material, topsoil and subsoil required for application to current and future disturbance areas • Chronology of treatments (e.g. weed control, application of cover crop) undertaken on the stockpile. • Achieve groundcover factor of at least 0.05 (70% coverage) on stockpiles with long term inactivity. • Estimate of the volume of suitable alternative material required to be imported onto site to supplement potential material, topsoil and subsoil deficits.	Mine Manager Surveyor	Survey data of topsoil stockpiles. GIS data and plans. Soil inventory. Reports from weed contractors. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Overburden Stockpile Management • Slopes no greater than 3H:1V. • Stockpile height no greater than 3 metres. • No stockpiles to be constructed in areas of concentrated flows. • Record volumes and locations of overburden stockpiles. • Volume of material, overburden required for application to current and future disturbance areas • Chronology of treatments (e.g. weed control, application of cover crop) undertaken on the stockpile. • Achieve groundcover factor of at least 0.05 (70% coverage) on stockpiles with long term inactivity. • Estimate of the volume of suitable alternative material required to be imported onto site to supplement potential material deficits.	Mine Manager Surveyor	Survey data of overburden stockpiles. GIS data and plans. Soil inventory. Reports from weed contractors. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Waste • Wastes will be stored in bins with a lid. • Wastes will be removed by licenced contractor.	Mine Manager	Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Erosion • Slopes to be reduced to a maximum of 3H:1V in pit areas. • Slopes of 3H:1V shall not be greater than 50 metres and will be broken by catch drains to convey the surface water to the sediment dam to reduce erosion effects. • Slopes of major tracks are to be <10 degrees or have cross drains/banks installed. • Where unsuitable soils are present, tracks are to be stabilised with crushed bricks, concrete, gravel or similar. • Track walk or lightly rip exposed surfaces to encourage infiltration of rainwater. • Achieve ground coverage factor of at least 0.05 (70%) via vegetation, mulch or similar within 30 days of completion of works.	Mine Manager	Survey data. GIS data and plans. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11

Key Actions	Responsibilities	Records	Review
Sediment • Sediment dams designed for 90th % 5-day storm event. • Capacity of sediment dams to be monitored for available capacity. • Drains to be designed for 1 in 10-year design storm. • Spillways to be designed for 1 in 100-year design storm. • Receiving capacity of sediment dams to be maintained by; o Reuse of water on-site for dust suppression; and o Water to be pumped to pit sump if capacity not sufficient to contain design storm prior to storm events. • Pit maintained to have capacity to contain a volume greater than the design storm. • Drains to be installed to direct dirty surface water to sediment dams. • Installation of silt fences around disturbed area as appropriate. • No silt fences to be constructed in areas of concentrated flows. • Upstream clean water to be diverted via diversion drains or bunds as far as possible.	Mine Manager	Survey data. GIS data and plans. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Wind Erosion • Water cart to be engaged during mining, hauling and rehabilitation activities. During adverse conditions: • Cease mining or hauling activities in adverse wind conditions: and • Increase water cart frequency	Mine Manager	Weather data. Watercart usage/pumping volumes. Photography and site inspections reports.	Annual Rehabilitation Report Section 8.3 See Section 11
Water Quality • Water quality discharged meets the objective of Section 120 of the Protection of the Environment Operations Act 1997. In particular, 'downstream' water quality monitoring will record total suspended solids <50mg/L or within 10% of 'upstream' levels (whichever is the greater), in accordance with the EPL conditions.	Mine manager NATA Accredited laboratory	Water testing reports	Annual Rehabilitation Report Section 8.3 See Section 11

Key Actions	Responsibilities	Records	Review
Decommissioning			
Infrastructure (Retained) • Damage to access tracks has been repaired and stabilised. • Slopes of major tracks <10° or have cross drains/banks installed. Where unsuitable soils are present, tracks to be stabilised with crushed bricks, concrete, gravel or similar. • Roads reduced in width to that suitable for final land use. • Where applicable, necessary approvals are in place (e.g. development consent under the Environmental Planning and Assessment Act 1979) where buildings and infrastructure are to be retained as part of final land use. • The structural integrity of the infrastructure is suitable and safe for use as part of the intended final land use.	Mine Manager Structural Engineer Surveyor	Survey data. Structural reports Photography and site inspections reports.	Annual Rehabilitation Report Decommissioning Report See Section 11 Section 8.3
Infrastructure (Removed) • Removal of all services (power, water, communications) that have been connected on the site as part of the operation. • Removal of all plant, equipment and associated infrastructure including processing facilities, stockpile areas, and loading facilities, office complex, portable offices, exploration core samples, camp facilities, storage racks, samples. • Removal of all water management infrastructure (including pumps, pipes and power).	Mine Manager	Utility service disconnection record / notification. Photography and site inspections reports.	Annual Rehabilitation Report Decommissioning Report See Section 11 Section 8.3
Overburden and Stockpile Areas • All overburden stockpiles are removed and or incorporated into the final landform.	Mine Manager	Survey data. Photography and site inspections reports.	Annual Rehabilitation Report Decommissioning Report See Section 11 Section 8.3
Waste • All rubbish/ waste materials removed from site. • Contamination will be appropriately remediated so that appropriate guidelines for land use are met, e.g. Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999). • Excess sludge/material has been removed from surface water dams.	Mine Manager Land Contamination Consultant EPA Accredited Auditor	Contamination Remediation Report Site Contamination Audit Report Site Audit Statement (where required) Photography and site inspections reports.	Annual Rehabilitation Report Decommissioning Report See Section 11 Section 8.3

Key Actions	Responsibilities	Records	Review
Landform Establishment			
• Slopes outside the final void are no greater than 3 horizontal to 1 vertical and slope lengths shall not exceed 50 metres before being broken by earth banks or similar. • Sediment dams designed for 90th % 5-day storm event. • Capacity of sediment dams to be monitored for available capacity. • Drains to be designed for 1 in 10-year design storm. • Spillways to be designed for 1 in 100-year design storm. • Drains to be installed to direct dirty surface water to sediment dams prior to vegetation establishment. • Installation of silt fences around disturbed area as appropriate. • No silt fences to be constructed in areas of concentrated flows. • High risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design. • Final landform conforms to the approved final landform. • Overburden material stored on site has been utilised to achieve the final landform. • Water quality discharged meets the objective of Section 120 of the Protection of the Environment Operations Act 1997. In particular, 'downstream' water quality monitoring will record total suspended solids <50mg/L or within 10% of 'upstream' levels (whichever is the greater), in accordance with the EPL conditions.	Mine Manager Earth moving contractor CPESC Surveyor NATA Accredited laboratory	Engineering drawings Survey data. Photography and site inspections reports. Topsoil and overburden material inventory Water testing results	Annual Rehabilitation Report Decommissioning Report See Section 11 Section 8.3

Key Actions	Responsibilities	Records	Review
Growth Medium Development			
• The re-established topsoil / subsoil substrate is capable of supporting the targeted cropping/grassland regime on a sustained basis. Analysis to determine suitability includes: o Total Carbon (TC), Total Nitrogen (TN), Organic Matter, TC/TN Ratio; Bray I and II Phosphorus; Colwell Phosphorus; Available cations (Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulphur); Available Micronutrients (Zinc, Manganese, Iron, Copper, Boron, Silicon); Exchangeable (Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium, Cation Exchange Capacity); pH and EC (1:5 water); Basic Colour, Basic Texture. • Ameliorants to be applied to topsoil material if required as identified by testing. • A topsoil established of at least 50-100 millimetres thick and comprising clean soils, which can include compost to help with vegetation establishment and growth. • Imported topsoil (if required) conforms to consent conditions and is certified in accordance with EPA requirements. • Track walk or lightly rip exposed surfaces to encourage infiltration of rainwater.	Mine Manager Earth moving contractor NATA Accredited laboratory Agronomist or similar	Photography and site inspections reports. Topsoil and overburden material inventory Soil testing results	Annual Rehabilitation Report Decommissioning Report See Section 11 Section 8.3
Ecosystem and Landuse Establishment			
• Advice from an agronomist will be sought to determine the most suitable species. • Seeds for use in rehabilitation will be certified where possible. • Reseeding of the final landform with suitable grassland species will be undertaken by direct seeding where terrain permits, spray emulsion or hand casting in smaller areas. • Watering of the rehabilitated areas may be undertaken via the use of a water cart if required i.e. prolonged dry periods. • Regular monitoring and control for weeds will continue and should be of a similar frequency requirement to neighbouring pastures.	Mine Manager Agronomist or similar Weed/pest control contractor	Photography and site inspections reports. Water testing results Seed viability certificates Water cart volumes and frequency Weather data	Annual Rehabilitation Report Decommissioning Report See Section 11 Section 8.3
Ecosystem and Landuse Development			
• Total foliage cover is greater than or equal to 70%. • Monitoring confirms that after 2 years the non-target species (weeds) represents less than 20%of projected foliage cover or equivalent to surrounding vegetation not disturbed by mining activities. • Rural fences and gates installed around disturbed area to protect rehabilitation areas. • Feral animal controls will be implemented if required. • Minimal erosion or land instability evident that would not require moderate to significant ongoing management and maintenance works. • Surface water management structures are functioning as designed. • Water quality discharged meets the objective of Section 120 of the Protection of the Environment Operations Act 1997. In particular, 'downstream' water quality monitoring will record total suspended solids <50mg/L or within 10% of 'upstream' levels (whichever is the greater), in accordance with the EPL conditions. .	Mine Manager NATA Accredited laboratory Agronomist or similar Weed/pest control contractor	Photography and site inspections reports. Water testing results	Annual Rehabilitation Report Decommissioning Report See Section 11 Section 8.3

8 Rehabilitation Monitoring Program

8.1 ANALOGUE SITE BASELINE MONITORING

Control analogue sites will be identified in consultation with a MEG representative and person(s) suitably qualified in flora and landform assessment. It is expected that these sites will be used as a comparison to assist in determining whether the objectives relating to slope stability and vegetation coverage have been achieved. Progress towards identifying these sites will be reported in the annual review.

8.2 REHABILITATION ESTABLISHMENT MONITORING

This section summarises monitoring to be undertaken during the commencement of Ecosystem and Landuse Establishment phase of rehabilitation.

Table 10. Rehabilitation Establishment Inspection Regime

Monitoring	Frequency	Records
Topsoil/Subsoil suitability testing for key parameters.	6 monthly for the first 12 months. Yearly for the next 2 years.	NATA laboratory results.
Topsoil/Subsoil depth measurements to ensure sufficient depth emplaced and maintained.	6 monthly for the first 12 months. Yearly for the next 2 years.	Photography and/or inspection checklist. Soil sampling reports.
Purchased seed viability certification.	Prior to purchase.	Seed viability certificate or similar.
Seed coverage on rehabilitated areas.	Post spreading on topsoil.	Photography and/or inspection report.
Soil moisture.	Weekly for the first month after seeds are spread. Monthly for the next 12 months whilst vegetation establishes. 3 monthly for the next 2 years.	Photography and/or inspection report.
Weed numbers.	6 monthly.	Photography and/or inspection checklist. Weed control contractor reports if spraying undertaken.
Access restrictions/fencing of rehabilitation areas.	6 monthly.	Photography and/or inspection checklist.
Evidence of Erosion.	Monthly for the first 12 months whilst vegetation establishes. 3 monthly for the next 2 years.	Photography and/or inspection checklist.
Surface water management structures.	Monthly for the first 12 months. 3 monthly for the next 2 years.	Photography and/or inspection checklist.

Monitoring	Frequency	Records
Surface water quality.	Monthly for the first 12 months. 3 monthly for the next 2 years.	NATA laboratory results. Trend data/graphs
Vegetation coverage	Monthly for the first 12 months whilst vegetation establishes. 3 monthly for the next 2 years.	Photography and/or inspection checklist.

8.3 MEASURING PERFORMANCE AGAINST REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

The performance of the site rehabilitation will be measured against the rehabilitation objectives and completion criteria outlined in *Section 4.*

Table 11. Rehabilitation Objectives and Completion Criteria Inspection Regime

Performance Indices	Monitoring	Frequency	Records	Assessment of Trends	Trigger Thresholds to Identify Emerging Risks to Achieving Final Land Use
Decommissioning Phase					
All infrastructure that is to remain as part of the final land use is safe and does not pose any hazard to the community.	Inspection/s by suitably qualified engineer or similar.	At completion of decommissioning phase.	Site decommissioning inspection report. Statement provided by suitably qualified engineer or similar. Photography.	Not applicable.	Inspection indicates that not all hazards are isolated and secured.
Tracks suitable for private access or pedestrian usage.	Inspection/s by suitably qualified engineer or similar for grade of <10º, and suitable width of access track, cross drains /banks installed. Inspect for presence of erosion gullies or rills. Inspect for installation of suitable all-weather material on access tracks.	At completion of decommissioning phase.	Site decommissioning inspection report. Statement provided by suitably qualified engineer or similar. Photography. Survey by registered surveyor.	Not applicable.	Inspection reveals that the access tracks are not suitable for light vehicle access or pedestrians
The structural integrity of the infrastructure is suitable and safe for use as part of the intended final land use.	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use.	At completion of decommissioning phase.	Site decommissioning inspection report. Statement provided by suitably qualified engineer or similar. Photography. Survey by registered surveyor.	Not applicable.	Inspection by engineer finds the structural integrity of remaining infrastructure is not safe and suitable for the intended final land use.
Infrastructure is in a condition (e.g. structural, electrical, other hazards) that is suitable for the intended final land use.	Obtain evidence of acceptance from landowner that infrastructure is in a condition that is suitable for the intended final land use in accordance with formal agreement.	At completion of decommissioning phase	Site decommissioning inspection report. Formal acceptance from landowner.	Not applicable.	No acceptance of landowner obtained.
Removal of all services (power, water, communications) that have been connected on the site as part of the operation.	Inspection of site to confirm removal of all services (power, water, communications) that have been connected on the site as part of the operation.	At completion of decommissioning phase	Site decommissioning inspection report. Statement provided, utility service disconnection record / notification.	Not applicable.	Services to be removed are still connected.

Performance Indices	Monitoring	Frequency	Records	Assessment of Trends	Trigger Thresholds to Identify Emerging Risks to Achieving Final Land Use
Removal of all plant, equipment and associated infrastructure including processing facilities, stockpile areas, rail infrastructure and loading facilities, underground hydrocarbon storage tanks, office complex, portable offices, exploration core samples, camp facilities, storage racks, samples.	Inspection of the site to confirm all plant, equipment and associated infrastructure including, stockpile areas, loading facilities, office complex, portable offices, exploration core samples, camp facilities, storage racks, samples have been removed.	At completion of decommissioning phase	Site decommissioning inspection report. Statement provided by suitably qualified engineer or similar. Photography. Survey by registered surveyor.	Not applicable.	Infrastructure not removed from the site.
Removal of all water management infrastructure (including pumps, pipes and power) not required for site rehabilitation works or retained in final landform.	Inspection of site confirms that water management infrastructure not required for site rehabilitation works or in the final landform is removed.	At completion of decommissioning phase	Site decommissioning inspection report. Photography.	Not applicable.	Water management infrastructure not removed from the site.
No waste material and/or visible contamination areas on site surface.	There are no visible signs of contamination following the removal of plant, equipment and materials. All rubbish/ waste materials removed from site.	At completion of decommissioning phase	Site decommissioning inspection report. Photography.	Not applicable.	Waste or potential contamination present on site.
Soil testing for contaminants of concern as listed by Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999) applicable to land use type.	Site inspection and risk assessment of site to determine potential contamination issues. If potential risks identified in risk assessment, then a contamination assessment is to be undertaken by suitably qualified person/s. Remediation measures, if required, to be assessed by Land Contamination Consultant or EPA Accredited Auditor.	At commencement of decommissioning phase.	Contamination Remediation Report prepared by Land Contamination Consultant Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor (where required).	Not applicable.	Soil testing indicates that sites does not meet Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999) applicable to land use type.

Performance Indices	Monitoring	Frequency	Records	Assessment of Trends	Trigger Thresholds to Identify Emerging Risks to Achieving Final Land Use
Landform Establishment Phase					
Measured survey of rehabilitated landform to verify final landform construction in accordance with Final Landform and Rehabilitation Plan.	Survey verifies final landform complies with final landform construction in accordance with Final Landform and Rehabilitation Plan.	On construction completion.	Survey data and plans. Photography.	Not applicable.	Slopes outside the final void are greater than 3 horizontal to 1 vertical Slope lengths exceed 50 metres before being broken by earth banks or similar.
	Verify high risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design.	On construction completion.	Survey data and plans	Not applicable.	High risk landforms (such as steep slopes, high walls) have not been constructed in accordance with geotechnical design.
	Verify overburden material stored on site has been utilised to achieve the final landform.	On construction completion.	Survey data and plans. Photography.	Not applicable.	Overburden stockpiles identified as remaining on the site.
	Verify material stockpiles have been removed from the site or utilised to achieve the final landform.	On construction completion.	Survey data and plans. Photography.	Not applicable.	Material stockpiles identified as remaining on the site.
Measured survey/monitoring of rehabilitated landform to specifically monitor settlement and/or material loss via erosion.	Survey verifies that settlement and/or material loss is within predicted limits and will not compromise final landform drainage via differential settlement.	12 months after completion of construction.	Survey data and plans	Not applicable.	Settlement or material loss results in pooling of water, changes in surface water flow directions and velocities and function of water management structures.
Water Quality meets the objective of Section 120 of the Protection of the Environment Operations Act 1997. In particular, 'downstream' water quality monitoring will record total suspended solids <50mg/L or within 10% of 'upstream' levels (whichever is the greater).	Downstream water to be monitored for TSS and complies with required criteria. Verify sediment dams are designed for 90th % 5-day storm event. Monitor available capacity of sediment dams. Verify drains are designed for 1 in 10-year design storm. Verify spillways are designed for 1 in 100-year design storm. Verify drains installed to direct dirty surface water to sediment dams. Verify installation of silt fences around disturbed areas as appropriate.	On construction completion.	Assessment Report undertaken by a suitably qualified person. Survey	Not applicable.	Sediment dams not designed for 90th % 5-day storm event. Drains not designed for 1 in 10-year design storm. Spillways not designed for 1 in 100-year design storm.

Performance Indices	Monitoring	Frequency	Records	Assessment of Trends	Trigger Thresholds to Identify Emerging Risks to Achieving Final Land Use
Growth Medium Development Phase					
Track walk or lightly rip/scarify exposed surfaces to encourage infiltration of rainwater	Visual inspection to confirm the surface to which topsoil is to be applied is roughened.	Prior to topsoil application	Photography. Site inspection reports/checklists.	No applicable.	Surface is noted to be compacted.
Growth medium/topsoil testing (bulked soil samples 0-10 cm) meets suitable criteria as determined by final landuse.	Routine Soil Test (bulked soil sample 0-10 cm). Includes but no limited to: Total Carbon (TC), Total Nitrogen (TN), Organic Matter, TC/TN Ratio; Bray I and II Phosphorus; Colwell Phosphorus; Available cations (Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulphur); Available Micronutrients (Zinc, Manganese, Iron, Copper, Boron, Silicon); Exchangeable (Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium, Cation Exchange Capacity); pH and EC (1:5 water); Basic Colour, Basic Texture.	Topsoil to be tested prior to spreading.	Soil testing reports.	Not applicable.	Soil testing indicates soil not within recommended criteria as advised by Soil Specialist/Agronomist.
Ameliorants applied to topsoil material if required as identified by testing.	Visual observation of ameliorant application, including photography, to ensure even application at specified rate.	Post topsoil spreading	Photography. Site inspection reports/checklists. Contractor invoices.	Not applicable.	Ameliorants not applied or applied evenly or applied at below the specified rate.
Topsoil established of at least 50-100 millimetres thick and comprising clean soils, which can include compost to assist with vegetation establishment and growth.	Test pits dug to confirm depth of topsoil application. Verify even application of topsoil and that no bare surfaces remain.	Post topsoil spreading	Photography. Site inspection reports/checklists	Not applicable.	Average depth of topsoil less than 50mm. Bare patches evident.
Imported topsoil or mulch (if required) conforms to consent conditions and is certified in accordance with EPA requirements.	Topsoil/mulch material is certified in accordance with any EPA waste exemption requirements.	Prior to receipt of topsoil/mulch	Topsoil/mulch certificate Haulage records/tonnage received.	Not applicable	No topsoil/mulch certificate provided by supplier

Performance Indices	Monitoring	Frequency	Records	Assessment of Trends	Trigger Thresholds to Identify Emerging Risks to Achieving Final Land Use
Ecosystem and Land Use Establishment Phase					
Visual indicators of erosion and land instability.	Visual inspections for identification of erosion that would require moderate to significant ongoing management and maintenance works. Visual inspection for signs of land instability such as mass movement. Visual inspection for areas of active gully erosion. Visual inspection for evidence of tunnel erosion.	Weekly for the first month after landform establishment and then monthly for the next five years.	Photography. Erosion surveys- measurements of depths and numbers of rills, gullies, mass movements, tunnel erosion if present. Site inspection reports/checklists. Independent geotechnical reports (where required) Surveys	Compare photography and measurements to identify if erosion impacts are increasing.	Rills/gullies greater than 10cm in depth. Rills/gullies are showing an increasing trend in size for a period of at least 6 months. Any evidence of mass movement/slumping. Any evidence of tunnel erosion.
	Ground cover within plotted test quadrants. Vegetation size, survival rates and variety of species within plotted quadrants.	Monthly for the year after ecosystem and landform establishment and then 6 monthly for the next five years.	Photography. Reports on the estimates of ground coverage, vegetation size, survival rates and variety of species. Site inspection reports/checklists.	Compare photography and measurements of groundcover to determine if it is trending towards or away from a coverage factor of 70% (Blue Book C -factor equivalent of 0.05). Compare measurements of vegetation size, survival rates and variety of species to determine if on an increasing or decreasing trend and maturation rate.	Average loss of more than 20% of species within test quadrants. Ground coverage remains the same or is decreasing with regards to the final target of 70% over any 6-month period.
	Validate seeds for use in rehabilitation are certified where possible.	Prior to purchase	Certificates and purchase records.	Not applicable	No seed certification available.
	Visual observation of soil moisture of the rehabilitated areas to determine if watering is required i.e. prolonged dry periods.	Weekly for the first month after seeding and then monthly for the next 12 months.	Site inspection reports/checklists. Weather data	Review weather data and long-term outlooks for rainfall to determine if more frequent watering is required.	Failure of vegetation due to prolonged dry conditions.
	Visual – no evidence of active scour likely to compromise surface water management structures such as drains, spillways etc.	Monthly for the first 6 months after landform establishment and then 6 monthly for the next five years.	Photography. Site inspection reports/checklists.	Compare photography and site inspection reports to determine if scouring is occurring and increasing in impact.	Surface water management structures are the source of sediment entrainment.

Performance Indices	Monitoring	Frequency	Records	Assessment of Trends	Trigger Thresholds to Identify Emerging Risks to Achieving Final Land Use
Soil testing (bulked soil samples 0-10 cm) meets suitable criteria as determined by final landuse.	Routine Soil Test (bulked soil samples 0-10 cm). Includes but no limited to: Total Carbon (TC), Total Nitrogen (TN), Organic Matter, TC/TN Ratio; Bray I and II Phosphorus; Colwell Phosphorus; Available cations (Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulphur); Available Micronutrients (Zinc, Manganese, Iron, Copper, Boron, Silicon); Exchangeable (Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium, Cation Exchange Capacity); pH and EC (1:5 water); Basic Colour, Basic Texture.	6 monthly after initial emplacement.	Soil testing reports.	Compare soil parameters to identify if soil fertility is decreasing or increasing.	Soil testing indicates soil fertility is decreasing according to criteria as advised by Soil Specialist/Agronomist.
Ecosystem and Land Use Development Phase					
Resilience demonstrated by the effects of drought and fire on composition, structure and other function attributes of pasture lands.	Ground cover within plotted test quadrants. Vegetation size, survival rates and variety of species within plotted quadrants.	6 monthly	Photography. Reports on the estimates of ground coverage, vegetation size, survival rates and variety of species. Site inspection reports/checklists.	Compare photography and measurements of groundcover to determine if it is trending towards or away from a coverage factor of 70% (Blue Book C -factor equivalent of 0.05). Compare measurements of vegetation size, survival rates and variety of species to determine if on an increasing or decreasing trend and maturation rate.	Average loss of more than 20% of species within test quadrants. Ground coverage remains the same or is decreasing with regards to the final target of 70% over any 6-month period.
All Phases					
No further active weed control required beyond that considered necessary at analogue sites.	Monitoring confirms the non-target species (weeds) represent less than 10% of projected foliage cover or equivalent to surrounding vegetation not disturbed by mining activities.	6 monthly	Site inspection reports/checklists Weed contractor reports/invoices	Comparison of weed inspection reports overtime to determine if weed numbers are increasing.	Non-target species (weeds) represent greater than 10% of foliage cover.
Soil inventory to be maintained to assess requirements to achieve the final landform.	Topsoil and overburden inventory to be maintained, included volumes stripped, stored in stockpiles and spread over rehabilitation areas.	Annually	Annual report to RR.	Identify possible deficits in future rehabilitation requirements	Projected topsoil volumes available for rehabilitation indicate less than 100mm depth over the entire rehabilitation area can be achieved.
Appropriate bushfire hazard controls (where required) have been implemented on the advice from the NSW Rural Fire Service.	Bushfire controls implemented.	12 monthly	Slashing records. Liaison with NSW RFS. Photography.	Not applicable	Vegetation during periods of high fire danger at risk of bushfire.

9 Rehabilitation Research, Modelling and Trials

9.1 CURRENT REHABILITATION RESEARCH, MODELLING AND TRIALS

There are no current rehabilitation trials being undertaken. Assessment of topsoil volume requirements and available topsoil quality for rehabilitation will be quantified in the next 12 months.

9.2 FUTURE REHABILITATION RESEARCH, MODELLING AND TRIALS

Future rehabilitation research will likely involve selection of suitable species and when final surfaces become available, trials may be undertaken to determine the best approach to establishing revegetation. The results of any trial will be used to address any knowledge gaps in relation to:

- the control or management of risks identified in the rehabilitation risk assessment
- the development and further refinement of rehabilitation completion criteria and
- the achievement of rehabilitation objectives and rehabilitation completion criteria.

This report will be updated as the development of research, modelling and trials are investigated.

10 Intervention and Adaptive Management

Table 12. Trigger Action Response Plan

Rehabilitation Threat	Trigger levels	Actions to be implemented	Evidence / Reference
Infrastructure that is to remain as part of the final land use is not safe and poses a hazard to the community.	Inspection indicates that not all hazards are isolated and secured.	Suitably qualified professional or utilities provider to be engaged to isolate/remove hazards and render safe.	Site decommissioning inspection report. Statement provided by suitably qualified engineer or similar.
	Inspection reveals that access track repairs have not been undertaken or have been ineffective.	Track repairs to be undertaken.	Photography. Survey by registered surveyor.
	Inspection reveals that the access tracks are not suitable for light vehicle access or pedestrians	Tracks to be rendered suitable for light vehicle access or pedestrians.	Statement provided, utility service disconnection record / notification. Formal acceptance from landowner.
	Inspection by engineer finds the structural integrity of remaining infrastructure is not safe and suitable for the intended final land use.	Suitably qualified engineer or similar to be engaged to assess remaining infrastructure and advise on rectifying structural integrity.	
	Infrastructure not removed from the site.	Infrastructure to be removed from the site.	
	Water management infrastructure not removed from the site.	Water management infrastructure to be removed from the site.	
Harm to rehabilitation areas due to presence of contaminants of concern.	Soil testing indicates that sites does not meet Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999) applicable to land use type.	Engage a contamination professional to assess the site and advise on remediation measures.	Contamination Remediation Report prepared by Land Contamination Consultant. Site Contamination Audit Report Site Audit Statement prepared by EPA Accredited Auditor (where required).
Waste material visible on-site surface.	Waste present on site.	Waste to be removed from the site.	Site decommissioning inspection report. Photography.
Harm to rehabilitation works due to erosion impacts.	Slopes within the final void are greater than 3 horizontal to 1 vertical Slopes of 3H:1V greater than 50 metres before being broken by earth banks or similar.	Suitably qualified professional to assess the landform to determine if erosion impacts evident and advise on mitigation measures, if required. Mitigation may include reshaping the landform or installing additional erosion controls.	Managing Urban Stormwater ‘Blue Book’ DECC 2008. Survey data and plans. Photography. Assessment Report undertaken by a suitably qualified person i.e. CPESC.

Rehabilitation Threat	Trigger levels	Actions to be implemented	Evidence / Reference
Harm to rehabilitation works due to erosion impacts. **Limited biological resources available on site for rehabilitation.**	Overburden stockpiles identified as remaining on the site.	Overburden material is to be removed from the site or incorporated into the rehabilitation of the final landform.	Managing Urban Stormwater 'Blue Book' DECC 2008. Survey data and plans. Photography. Assessment Report undertaken by a suitably qualified person i.e. CPESC. Survey data and plans. Photography. Soil Inventory reported in AR.
	Material stockpiles identified as remaining on the site.	Stockpile material is to be removed from the site or incorporated into the rehabilitation of the final landform.	
	Sediment dams not designed for 90th % 5-day storm event. Drains not designed for 1 in 10-year design storm. Spillways not designed for 1 in 100-year design storm.	A suitably qualified professional in sediment and erosion control will be engaged to prepare and assessment report and recommendations to be implemented.	
	Settlement or material loss results in pooling of water, changes in surface water flow directions and velocities and function of water management structures.	A suitably qualified professional in sediment and erosion control will be engaged to prepare and assessment report and recommendations to be implemented.	
	Rills/gullies greater than 10cm in depth. Rills/gullies are showing an increasing trend in size for a period of at least 6 months. Any evidence of mass movement/slumping. Any evidence of tunnel erosion.	A suitably qualified professional in sediment and erosion control will be engaged to prepare and assessment report and recommendations to be implemented. Mitigation may include reshaping the landform or installing additional erosion controls.	
	Ground coverage remains the same or is decreasing with regards to the final target of 70% over any 6-month period.	A suitably qualified professional in sediment and erosion control and/or ecologist will be engaged to prepare and assessment report and recommendations to be implemented. Mitigation may include reseeding exposed areas, applying mulch, applying soil binder, watering and fertilising etc	
	Evidence of erosion or bare patches in rehabilitated areas due to stock or feral animals.	Fencing to be inspected and repaired as required. Removal of stock from rehabilitation areas. Engagement of animal control professional to remove pests.	
	Evidence of rehabilitation areas impacted by wind erosion.	A suitably qualified professional in sediment and erosion control will be engaged to prepare and assessment report and recommendations to be implemented. Mitigation may include installing additional erosion controls.	
	On-site topsoil/growth medium deficit projected in achieving desired coverage (50-100mm) on the final landform is noted in annual reporting.	Investigate the use of overburden material, if sufficient volumes available, to replace the topsoil deficit. This may include soil analysis and application of ameliorants to manufacture suitable topsoil material. Investigate the importation of suitable topsoil material.	
Domain landform is not safe, stable and fit for the purpose of the intended final land use.	High risk landforms (such as steep slopes, high walls) have not been constructed in accordance with geotechnical design.	Suitably qualified geotechnical engineer to assess the landform to determine if the landform is stable or requires modification other structural repairs are required.	Survey data and plans. Photography. Geotechnical reports

Rehabilitation Threat	Trigger levels	Actions to be implemented	Evidence / Reference
Domain landform is not safe, stable and fit for the purpose of the intended final land use. **Failure to establish soil/growing medium suitable for establishment of vegetation community.**	Slopes required by the final landform are not obtained due to material deficits.	Suitably qualified geotechnical engineer to assess the landform to determine if the landform is stable or requires modification other structural repairs are required.	Survey data and plans. Photography. Geotechnical reports Photography. Site inspection reports/checklists. Contractor invoices. Soil testing reports.
	Surface is noted to be compacted.	Surface to be ripped to promote surface water and air infiltration and reseeding undertaken if required.	
Failure to establish soil/growing medium suitable for establishment of vegetation community. **Vegetation community establishment unsuccessful.**	Soil testing indicates soil not within recommended criteria as advised by Soil Specialist/Agronomist.	Ameliorants to be applied as advised by soil specialist/agronomist.	Photography. Site inspection reports/checklists. Contractor invoices. Soil testing reports. Reports on the estimates of ground coverage, vegetation size, survival rates and variety of species. Site inspection reports/checklists. Photography. Seed certificates and purchase records. Weather data Soil testing reports.
	Ameliorants not applied or applied evenly or applied at below the specified rate.	Advice to be sought from soil specialist/agronomist to determine whether reapplication required or other methods to be employed to ensure the growth medium is suitable.	
	Average depth of topsoil less than 50mm. Bare patches evident.	Advice to be sought from soil specialist/agronomist to determine whether reapplication required or if the topsoil depth is suitable for target species. This may include evidence from rehabilitation trials.	
	Average loss of more than 20% of species within vegetation test quadrants. Ground coverage remains the same or is decreasing with regards to the final target of 70% over any 6-month period.	Advice to be sought from agronomist/ecologist to determine the causes of the vegetation losses and possible remediation measures. Remediation measures may include reseeding, application of mulch, application of fertiliser or other ameliorants, watering etc.	
Vegetation community establishment unsuccessful. **Decrease in downstream water quality.**	No seed certification available.	Alternative seed supplier to be sought. If no other supplier available for target species, advice to be sought from agronomist/ecologist to determine suitability of the available seed or determine alternative species.	Reports on the estimates of ground coverage, vegetation size, survival rates and variety of species. Site inspection reports/checklists. Photography. Seed certificates and purchase records. Weather data Soil testing reports. Water Testing Reports. ANZECC Guidelines. EPL.
	Failure of vegetation due to prolonged dry conditions.	Review weather data and long-term outlooks for rainfall to determine if more frequent watering is required. Investigate installing/upgrading irrigation systems. If additional watering is not feasible, investigate alternative means of stabilising the soil i.e. binders until conditions improve. Reseed bare areas once dry conditions have been alleviated.	
	Soil testing indicates soil fertility is decreasing according to criteria as advised by Soil Specialist/Agronomist.	Advice to be sought from agronomist/ecologist to determine why fertility is decreasing and determine remediation measures.	

Rehabilitation Threat	Trigger levels	Actions to be implemented	Evidence / Reference
	Non-target species (weeds) represent greater than 10% of foliage cover.	Weed control contractor to be engaged to spray or mechanically remove weeds. Selective herbicides should be used where possible to protect target species.	
	Continued exceedance of trigger values, over a 6-month period, for water quality, as defined in Section 120 of the Protection of the Environment Operations Act 1997. In particular, 'downstream' water quality monitoring will record total suspended solids <50mg/L or within 10% of 'upstream' levels (whichever is the greater).	Source of the pollution to be investigated and remediated if the source of the pollution is on-site. This may include erosion and sediment controls in the case of elevated total suspended solids, spills and leaks of hydrocarbons to be investigated if detected etc. Management procedures to be reviewed and amended as required in accordance with the results of any investigations. Reports to be prepared and provided to EPA or DPIE as required in any consent or licence conditions.	
Harm to rehabilitation areas due to bushfire.	Excessive vegetation height during periods of high to extreme fire danger.	Fire breaks, where they exist, to be maintained by slashing. Reduce fuel loads in vegetated areas by slashing or grazing where vegetation is sufficiently established to support such activities.	Site inspection reports/checklists. Photography. Weather data.

11 Review, Revision and Implementation

11.1 REVIEW OF THE PLAN

Table 13. Triggers for Review of the Rehabilitation Management Plan

Triggers	Process	Timing	Responsibility	Implementation/ Records
Mining Regulation- Clause 11 of Schedule 8A The holder of a mining lease must amend the rehabilitation management plan for the mining lease as follows—				
(a) to substitute the proposed version of a rehabilitation outcome document with the version approved by the Secretary—within 30 days after the document is approved,	The approved rehabilitation outcome document i.e. Rehabilitation Objective Statement, Rehabilitation Completion Criteria Statement or the Final Landform and Rehabilitation Plan (spatial data) will replace any proposed (and unapproved) documents. The Rehabilitation Management Plan (RMP) will be reviewed and amended to ensure it is consistent with the approved rehabilitation outcome document.	Within 30 days after the document is approved.	Mine Manager/ Environmental Manager	The amended RMP will be include a record of document versions, dates amended and a brief summary of the amendments.
(b) as a consequence of an amendment made under clause 14 to a rehabilitation outcome document—within 30 days after the amendment is made,	The RMP will be reviewed and amended within 30 days if a rehabilitation outcome document is amended to ensure it is consistent with the approved rehabilitation outcome document.	Within 30 days after the amendment is made.	Mine Manager/ Environmental Manager	The amended RMP will be include a record of document versions, dates amended and a brief summary of the amendments.
(c) to reflect any changes to the risk control measures in the prepared plan that are identified in a rehabilitation risk assessment—as soon as practicable after the rehabilitation risk assessment is conducted,	The RMP will be reviewed and amended as soon as practicable if a rehabilitation risk assessment determines that risk control measures must be changed.	As soon as practicable	Mine Manager/ Environmental Manager	The amended RMP will be include a record of document versions, dates amended and a brief summary of the amendments.

Triggers	Process	Timing	Responsibility	Implementation/ Records
(d) whenever given a written direction to do so by the Secretary—in accordance with the direction.	The RMP will be reviewed and amended as soon as practicable if directed by the Secretary.	As soon as practicable	Mine Manager/ Environmental Manager	The amended RMP will be include a record of document versions, dates amended and a brief summary of the amendments.
Mining Regulation- Clause 13 of Schedule 8A- **Forward Program and Annual Reporting**	The RMP will be reviewed and amended as soon as practicable if the Annual Review identifies changes to the processes, risks, mining progress etc that are inconsistent with the current RMP.	As soon as practicable	Mine Manager/ Environmental Manager	The amended RMP will be include a record of document versions, dates amended and a brief summary of the amendments.
Modification to Development Consent DA No. 08-0326	The RMP will be reviewed and amended as soon as practicable after the approval of any modification to the development consent and be consistent with and requirements under the amended consent.	As soon as practicable	Mine Manager/ Environmental Manager	The amended RMP will be include a record of document versions, dates amended and a brief summary of the amendments.
Amendment to the Rehabilitation Management Plan	The amended RMP will be provided to staff and relevant contractors and acknowledgement of the changes from staff will be recorded.	As soon as practicable after document is amended.	Environmental Manager/ Site staff and contractors.	The amended RMP will be include a record of document versions, dates amended and a brief summary of the amendments. Records of staff training and inductions are to be updated to include the amended RMP.

11.2 REHABILITATION REPORTING

PGH submits an Annual Rehabilitation Review to the Regulator each year. The Annual Review, as well as a summary of the environmental management performance, will be forwarded to Council during every 12-month period in accordance with condition 12 of the consent.

12 References

Ref 1 Department of Industries: Division of Resources and Energy,- (2015) Interpreting the Oaklands Basin: morphology, stratigraphy and petroleum potential

Ref 2 NSW Office of Environment & Heritage (Accessed 2017) NSW eSPADE Soil and Land Information Website

Ref 3 DECC (2008) *Managing Urban Stormwater Soils and Construction V1*

Ref 4 DECC (2009) *Managing Urban Stormwater Soils and Construction V2E Mines and Quarries*

Ref 5 NSW DPE (2022) *Land Zoning WMS*

Ref 6 NSW Resource Regulator (2021) *Form and Way: Rehabilitation Management Plan for Large Mines*

Ref 7 NSW Resource Regulator (2021) *Guideline: Rehabilitation Risk Assessment*

Ref 8 R.W. Corkery (1984) Environmental Impact Statement for the Open Cut Mining of Kaolin at Coorabin, NSW

Appendix A
DA No. 6/2000

COUNCIL OF THE SHIRE OF URANA
P. O. Box 55, URANA 2645 Telephone: 0269 208205, Fax 0269 208060

Form 5

Determination of development application
(designated development)
Notice to people who made submissions (including objections) under section 79(5) of the Act
issued under the *Environmental Planning and Assessment Act 1979* section 81(1)(b)

Submission made by

Name: HEATHER LANE
Address: "Hudroyd"
OAKLANDS NSW 2646

development application

number: 6/2000
applicant name: RIVERINA MINERALS PTY LTD
Land to be developed: address: Lot 1 DP 831425 Oaklands

proposed development: Open Cut Extraction of kaolin

has a Commission of Inquiry been held?

☐ yes ☑ no

determination

☐ consent granted unconditionally
☑ consent granted subject to conditions described below
☐ application refused

rights of appeal

applicants right of appeal

If the applicant is dissatisfied with this decision, section 97 of the *Environmental Planning and Assessment Act 1979* gives him or her the right to appeal to the Land and Environment Court within 12 months after the date on which he or she received the 'Notice of determination' under section 81(1)(a) of the *Environmental Planning and Assessment Act 1979* (copy attached).

your right to be informed

If the applicant appeals, section 97 of the *Environmental Planning and Assessment Act 1979* gives you the right to be given notice of the appeal, and to be heard at the hearing of the appeal (you need to apply to the court within 28 days of the notice of the appeal).

your right of appeal

If you are an objector to designated development, and are dissatisfied with a decision to grant consent (either unconditionally or subject to conditions), section 98 of the *Environmental Planning and Assessment Act 1979* gives you the right to appeal to the Land and Environment Court within 28 days of the date of this notice.
Your appeal may be made by lodging an application to the Court in accordance with the Rules of Court. You do not have right of appeal where a Commission of Inquiry has been held (see section 80 (8) and section 89A (2) of the *Environmental Planning and*

Assessment Act 1979).

signed on behalf of the consent authority

signature C Nevins
name CHRIS NEVINS
date 27/6/2000

DEVELOPMENT APPLICATION 6/2000 BY RIVERINA MINERALS PTY LTD

CONDITIONS

1. Development to be carried out generally in accordance with the details provided in the Environmental Impact Statement dated December 1999 prepared by Brink and Associates.

2. The approved use shall only be carried out between the hours indicated in Table 2.6 of the EIS.

3. Sound attenuation measures shall be taken to ensure that noise emissions comply with the requirements of the Environment Protection Authority and any relevant Australian Standard.

4. Noise emissions from the operation of the mine must:-

   a) Not exceed an LA10 (15 minutes) noise emission criteria of 45 dBA during the day (7 am to 10 pm) at the nearest or most affected residence not associated with the mine; and

   b) Not exceed in LA10 (15 minutes) noise emission criteria of 35 dBA during the night (10 pm to 7 am) at the nearest or most affected residence not associated with the mine.

5. The applicants shall provide evidence to Urana Shire Council that it has obtained the approval of the Department of Mineral Resources for the proposed use.

6. Dust emissions from the use shall be kept to a minimum and shall comply with the requirements of the Environment Protection Authority and any relevant Australian Standard.

7. Detailed plans and specifications of all buildings shall be provided to and approved by Urana Shire Council prior to commencement of construction. All buildings shall be finished in non-reflective cladding to the satisfaction of Council.

8. Adequate toilet facilities shall be provided on site.

9. Movement of vehicles and machinery is to be confined to the nominated development areas and disturbance to surrounding vegetation is to be minimised.

10. In the event of any aboriginal archaeological material being discovered during earthmoving works, all work in that area shall cease immediately and the National Parks & Wildlife Service and the Dubbo Local Aboriginal Land Council shall be notified of the discovery. Appropriate actions will then be negotiated between the National Parks & Wildlife Service, the Dubbo Local Aboriginal Land Council and the applicant prior to recommencement of work.

11. Prior to the commencement of work at the site, the applicants shall obtain any further approvals or licences necessary from any other Government agencies including the Environment Protection Authority.

12. The applicant shall provide to the Council during every 12 month period of operation a copy of any update to the Mining Operation Plans for ML 1196 and Annual Environmental Management Reports including information on the performances of any environmental management systems used on the site.

13. Operations shall be conducted in accordance with requirements of the Department of Mineral Resources and the Mines Inspections Act, the Mining Act and any Regulations thereunder, and any amending or replacement legislation.

14. The mining operation shall be restricted to a depth of 23 metres below natural surface, except with the approval of Council.

15. Prior to commencement of the operations under this consent, a Mining Operations Plan be prepared and submitted to an approved by the Environment Protection Authority, Department of Mineral Resources and the Department of Land and Water Conservation. A copy of the Plan and any approvals or licences from statutory authorities are to be submitted to Urana Shire Council. The Mining Plan shall address the following matters:

    - The prevention and control of erosion.
    - The conservation, stockpiling and reuse of top soil.
    - The control and safe disposal of run-off from all disturbed areas including access roads, tracks and stockpiles.
    - Staging of the development.
    - The progressive and final rehabilitation of the site showing final contours.
    - The collection and control of ground water where affected by the proposed operations.
    - The collection of drainage and surface water.
    - The re-vegetation and rehabilitation of areas following the completion of mining.

16. Any destruction or injury to vegetation may require the consent of the Department of Land & Water Conservation (DLAWC) under the Native Vegetation Conservation Act. The DLAWC should be contacted prior to the clearing of any vegetation.

17. A revegetation program of local native species should be incorporated into the rehabilitation program for the site. The surrounding area has been extensively cleared and as further clearing is proposed, a compensatory revegetation program should be initiated. Advice can be provided by the DLAWC regarding such a program and full details of the rehabilitation program should be submitted to the Council for approval prior to commencement of operations.

18. The applicant shall ensure that:

- Clean surface water is diverted away from disturbed areas and directed to natural drainage lines in a manner which minimises erosion.
- Water that is contaminated with sediments be directed to control structures to allow sediments to settle out prior to reuse or final discharge to the environment
- Contaminated water is directed to control structures for reuse on site.
- No offensive odours are emitted from the premises.
- Trucks entering and leaving the premises that are carrying loads must be covered at all times, except during loading and unloading.

19. The applicant enter into a legal agreement with the Council for the ongoing payment of Section 94 contributions to be applied by the Council for the upgrading and maintenance of access roads between the entrance to the site and the Shire Boundary in accordance with Council's adopted Section 94 Plan.

The contributions shall be determined using the following formula:

$C = TC \times (NL/\{EL + NL\})/NL + RM$

Where:

C is the total Section 94 levy for this development in $

TC is the total cost of the work, minus any subsidies received and community benefit in $

NL is the total new traffic generated by the development in number

EL is the existing traffic in number

RM is the total cost of additional road maintenance attributable to the total new traffic generated by the development in $

The road network to which the Section 94 contribution would relate shall be from the site gate to the Shire boundary following the proposed haul routes. The Section 94 contributions shall be based on an annual estimate prepared by the Director of Engineering Services based on traffic volume statistics gathered by the Council from the RTA and its own traffic counts and by Statutory Declarations submitted by the applicant.

The Statutory Declarations provided by the applicant shall set out the total truck movements passing the gate and indicate the total weight being transported. The method of payment shall be on an annual basis with quarterly instalments in advance.

The costs associated with the preparation and execution of the agreements shall be borne by the applicant.

20. The applicant enter into a legal agreement with the Council, such agreement shall provide for the construction, draining and sealing of the access roads from the entrance to the site to the arterial road known as the Urana-Oaklands Road together with associated intersection improvement works all in accordance with plans and specifications to be approved by the Council. The upgrading may be staged over 2 years or such other period as agreed to in writing by the Council. The costs associated with the preparation and execution of the agreements shall be borne by the applicant.

URANA SHIRE COUNCIL

Telephone: (02) 6920 8205
(02) 6920 8003
Facsimile: (02) 6920 8060
Email: URANA1@bigpond.com

All Communications to be addressed to the General Manager PO Box 55 URANA NSW 2645

Ref: ..... 6/2000 ~~DAH:GR~~

RECEIVED 2 JAN 2002

20 December 2001

Mr Tom Stacy
Stacy & Nyman
Solicitors
P O Box 27
TUMUT NSW 2720

Dear Sir

RE: RIVERINA MINERALS – DEVELOPMENT APPLICATION NO 6/2000

I refer to your letter of 2 November 2001 and enclose copy of executed Agreement in respect of the above Development Application. Council has retained a copy for its records.

Yours faithfully

D A HOVENDEN
GENERAL MANAGER

GOING FORWARD WITH PRIDE

(c) The Developer shall be responsible for one half of the cost of constructing Local Road 54 to formation width 10m, pavement width 9m and seal width 7.5m;

(d) The Responsible authority shall be responsible for road and intersection design and any negotiations required with NSW Rail for alterations to the rail crossing on Local Road 54;

(e) The Developer shall complete all road improvement works or lodge surety in the form of cash deposit or bank guarantee for the estimated cost of all incomplete works within two years of commencement of receiving waste to the site;

(f) The estimated cost of works shall be prepared by the Responsible Authority following completion of construction drawings;

(g) The Developer shall have the right to have the stimated cost reviewed by an independent engineer selected by mutual agreement of the two parties;

(h) If the Developer exercises its right under (g), the estimated cost determined by the independent engineer shall be accepted by both parties.

3. Any notice hereunder may be served on the Developer by delivering the same to the Developer at their address as specified in this Agreement by posting the same in a pre-paid certified envelope addressed to the Developer and any notice posted shall be conclusively deemed to have been served at the expiration of twenty-four (24) hours from the time of posting but if the day of posting shall be the Friday at the expiration of twenty-four (24) hours after the next business day.

4. In the event of the Developer failing to comply with the provisions hereof the General Manager of the Urana Shire Council may cause to be served on the Developer a notice in writing specifying the works, matters and things (hereinafter called "the works") in respect of which the Developer is in default and should such default continue for thirty (30) days after the service of such notice the Responsible Authority may by its officers, employees, agents and contractors enter upon the land and cause such works to be carried out. Any notice or demand served on the Developers pursuant to this Clause may set out the costs as estimated by the Director of Engineering Services and stated in such notice if carrying out such works to remedy the default. In the event of the Development not complying with such notice within the said period of thirty (30) days the Responsible Authority may cause to be served on the Developer a demand in writing for the amount of the costs estimated as aforesaid and the amount thereof shall forthwith be paid by the Developer to the Responsible Authority. As soon as may be practical after completion of such works, the Responsible Authority shall certify the actual costs thereof and the difference between such actual costs and the estimated costs paid to the Responsible Authority pursuant to this Clause shall be paid by the Developer to the Responsible Authority or by the Responsible Authority to the Developer as the cause may be.

RIVERINA MINERALS PTY LTD

SCHEDULE "A"

CALCULATIONS SECTION 94 CHARGES – RIVERINA MINERALS PTY LTD

Average loads per day	Road Improvement Contribution Per load	Road Maintenance Contribution Per load	Estimated Quarterly Total Contribution	Estimates Yearly Total Contribution
1	$6.69	$3.60	$ 668.85	$ 2675.40
2	$6.63	$3.60	$1329.90	$ 5319.60
3	$6.58	$3.60	$1985.10	$ 7940.40
4	$6.52	$3.60	$2631.20	$10524.80
5	$6.45	$3.60	$3269.50	$13078.00
6	$6.41	$3.60	$3903.90	$15615.60
7	$6.35	$3.60	$4527.25	$18109.00
8	$6.30	$3.60	$5148.00	$20592.00
9	$6.25	$3.60	$5762.25	$23049.00
10	$6.20	$3.60	$6370.00	$25480.00
25	$5.42	$3.60	$14657.50	$58630.00
50	4.67	$3.60	$26877.50	$107510.00

NOTES:

1. FIGURES ASSUME 5 DAYS/WEEK OPERATION

2. FORMULA – C = TCX (NL/{EL = NL})
C = ANNUAL COST
TC = (MAINTENANCE COST/KM = IMPROVEMENT COST/KM) X KM OF ROAD TRAVERSED
EL = EXISTING HEAVY VEHICLE COUNT/YEAR
NL = HEAVY VEHICLE TRAFFIC GENERATED BY DEVELOPMENT

3. IMPROVEMENT COST NOT APPLIED TO LR54 & LR 2a DUE TO DEVELOPER HAVING TO PAY FOR INITIAL IMPROVEMENTS.

RIVERINA MINERALS PTY LTD.

Assessment Act 1979).

signed on behalf of the consent authority

signature C Newns
name CHRIS NEWNS
date 27/6/2000

HEALTH FORMS NSW DEPT OF MINERAL RESOURCES

11. Prior to the commencement of work at the site, the applicants shall obtain any further approvals or licences necessary from any other Government agencies including the Environment Protection Authority.

12. The applicant shall provide to the Council during every 12 month period of operation a copy of any update to the Mining Operation Plans for ML 1196 and Annual Environmental Management Reports including information on the performances of any environmental management systems used on the site.

13. Operations shall be conducted in accordance with requirements of the Department of Mineral Resources and the Mines Inspections Act, the Mining Act and any Regulations thereunder, and any amending or replacement legislation.

14. The mining operation shall be restricted to a depth of 23 metres below natural surface, except with the approval of Council.

15. Prior to commencement of the operations under this consent, a Mining Operations Plan be prepared and submitted to an approved by the Environment Protection Authority, Department of Mineral Resources and the Department of Land and Water Conservation. A copy of the Plan and any approvals or licences from statutory authorities are to be submitted to Urana Shire Council. The Mining Plan shall address the following matters:

- The prevention and control of erosion.
- The conservation, stockpiling and reuse of top soil.
- The control and safe disposal of run-off from all disturbed areas including access roads, tracks and stockpiles.
- Staging of the development.
- The progressive and final rehabilitation of the site showing final contours.
- The collection and control of ground water where affected by the proposed operations.
- The collection of drainage and surface water.
- The re-vegetation and rehabilitation of areas following the completion of mining.

16. Any destruction or injury to vegetation may require the consent of the Department of Land & Water Conservation (DLAWC) under the Native Vegetation Conservation Act. The DLAWC should be contacted prior to the clearing of any vegetation.

17. A revegetation program of local native species should be incorporated into the rehabilitation program for the site. The surrounding area has been extensively cleared and as further clearing is proposed, a compensatory revegetation program should be initiated. Advice can be provided by the DLAWC regarding such a program and full details of the rehabilitation program should be submitted to the Council for approval prior to commencement of operations.

The Statutory Declarations provided by the applicant shall set out the total truck movements passing the gate and indicate the total weight being transported. The method of payment shall be on an annual basis with quarterly instalments in advance.

The costs associated with the preparation and execution of the agreements shall be borne by the applicant.

20. The applicant enter into a legal agreement with the Council, such agreement shall provide for the construction, draining and sealing of the access roads from the entrance to the site to the arterial road known as the Urana-Oaklands Road together with associated intersection improvement works all in accordance with plans and specifications to be approved by the Council. The upgrading may be staged over 2 years or such other period as agreed to in writing by the Council. The costs associated with the preparation and execution of the agreements shall be borne by the applicant.

Appendix B
ML1196 Conditions

Instrument of Variation

Mining Lease 1196 (1973)

I, **JAMIE TRIPODI, Executive Director Assessments & Systems**, Mining Exploration and Geoscience in the Department of Regional NSW, with the delegated authority of the Minister under section 261B and clause 12 of Schedule 1B of the *Mining Act 1992* (the Act), **vary** the conditions of mining lease **ML 1196 (1973)** as described in Schedule A.

The conditions of **ML 1196 (1973)**, as varied, are set out in Schedule B.

The variation takes effect on 17 October 2022.

JAMIE TRIPODI
Executive Director Assessments & Systems
As delegate for the Minister administering the *Mining Act 1992*
Delegation date: 14 May 2018

Dated: 14 August 2022

Schedule A

Condition		Variation	New Condition
	Definitions	Definitions of 'Department', 'Environment' 'Environmental incident notifications and reports' and 'Harm to the environment' omitted as no longer used.	N/A
1	Notice to Landholders	Wording amended to modernise the condition	1. Notice to Landholders – see Schedule B
2	Rehabilitation	Condition omitted	N/A
3	Mining Operations Plan and Annual Rehabilitation Report	Condition omitted	N/A
4	Non-Compliance Reporting	Condition omitted	N/A
5	Environmental Incident Report	Condition omitted	N/A
6	Resource Recovery	Condition omitted	N/A
7	Group Security	Condition amended to modernise the wording. Condition has been re-numbered due to omission of other conditions.	2. Group Security– see Schedule B
8	Cooperation Agreement	Condition amended to modernise the wording. Condition has been re-numbered due to omission of other conditions.	3. Cooperation Agreement – see Schedule B
N/A		New condition attached	4. Assessable Prospecting Operations– see Schedule B
SPECIAL CONDITIONS			
Nil			

Schedule B

Mining Lease Conditions

(Version as at February 2022)

Definitions

Words used in this mining lease have the same meaning as defined in the *Mining Act 1992* except where otherwise defined below:

Term	Definition
Act	means the *Mining Act 1992.*
Landholder	for the purposes of these conditions: • does not include a secondary landholder • includes, in the case of exempted areas, the controlling body for the exempted area.
Minister	means the Minister administering the Act.

Note:

1. The rights and duties of the Lease Holder(s) are those prescribed by the *Mining Act 1992* and the Mining Regulation 2016, subject to the terms and conditions of this mining lease.
2. This mining lease does not override any obligation on the lease holder(s) to comply with the requirements of other legislation and regulatory instruments which may apply (including all relevant development approvals) unless specifically provided under the *Mining Act 1992* or other legislation or regulatory instruments.

MINING LEASE CONDITIONS

Standard conditions

See Mining Regulation 2016, Schedule 8A, Part 2.

NOTE TO HOLDERS: The prescribed standard conditions in the Mining Regulation 2016, Schedule 8A, Part 2 apply in addition to the conditions in this Schedule 2 (but have not been replicated in this mining lease). The conditions imposed by the Mining Regulation 2016 prevail to the extent of any inconsistency with the conditions in this Schedule 2.

General conditions

1. Notice to Landholders

(a) Within 90 days from the date of grant or renewal of this mining lease, the lease holder must give each landholder notice in writing:

(i) that this mining lease has been granted or renewed; and

(ii) whether the lease includes the surface.

The notice must include a plan identifying the lease area and each landholder and individual land parcel within the lease area.

(b) If there are ten or more landholders to which notice must be given, the lease holder will be taken to have complied with condition 1(a) if a notice complying with condition 1(a) is published in a newspaper circulating in the region where the lease area is situated.

2. Group Security

The security deposit to be provided and maintained for this mining lease is part of a group security deposit.

The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations under the mining leases covered by the group security deposit, including obligations under each mining lease that may arise in the future.

The amount of the security deposit to be provided as a group security deposit has been assessed at **$381,000**.

The leases covered by the group security include this **ML 1196 (1973)** and:

Lease type	Lease Number	Act Year
PLL	**1155**	**1924**

3. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate its attempts to the satisfaction of the Secretary, to enter into a cooperation agreement with the holder(s) of any overlapping authorisations issued under the *Mining Act 1992* and petroleum titles issued under the *Petroleum (Onshore) Act 1991*. The cooperation agreement should address but not be limited to:

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts; and
- rehabilitation issues.

4. Assessable Prospecting Operations

(a) The lease holder must not carry out any assessable prospecting operation on land over which this lease has been granted unless:

(i) it is carried out in accordance with any necessary development consent; or

(ii) if development consent is not required, the prior written approval of the Minister has been obtained.

(b) The Minister may require the lease holder to provide such information as required to assist the Minister to consider an application for approval.

(c) An approval granted by the Minister under this condition may be granted subject to terms.

(d) The lease holder must comply with the approval granted to the holder under this condition.

Special conditions

Nil

Exploration Reporting

Note: *Exploration Reports (Geological and Geophysical)*

The lease holder must lodge reports in accordance with the requirements in section 163C of the Mining Act 1992 and clauses 59, 60 and 61 of the Mining Regulation 2016 as well as any further requirements issued by the Secretary under clause 62 of the Mining Regulation.

Guidelines for the structure, content and data format requirements for reports are set out in the Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales.

Appendix C
PLL1155 Conditions

Instrument of Variation

Private Lands Lease 1155 (1924)

I, **JAMIE TRIPODI, Executive Director Assessments & Systems**, Mining Exploration and Geoscience in the Department of Regional NSW, with the delegated authority of the Minister under section 261B and clause 12 of Schedule 1B of the *Mining Act 1992* (the Act), **vary** the conditions of private lands lease **PLL 1155 (1924)** as described in Schedule A.

The conditions of **PLL 1155 (1924)**, as varied, are set out in Schedule B.

The variation takes effect on 17 October 2022.

JAMIE TRIPODI
Executive Director Assessments & Systems
As delegate for the Minister administering the *Mining Act 1992*
Delegation date: 14 May 2018

Dated: 14 August 2022

Schedule A

Condition		Variation	New Condition
	Definitions	Definitions of 'Department', 'Environment' 'Environmental incident notifications and reports' and 'Harm to the environment' omitted as no longer used.	N/A
1	Notice to Landholders	Wording amended to modernise the condition	1. Notice to Landholders – see Schedule B
2	Rehabilitation	Condition omitted	N/A
3	Mining Operations Plan and Annual Rehabilitation Report	Condition omitted	N/A
4	Non-Compliance Reporting	Condition omitted	N/A
5	Environmental Incident Report	Condition omitted	N/A
6	Resource Recovery	Condition omitted	N/A
7	Group Security	Condition amended to modernise the wording. Condition has been re-numbered due to omission of other conditions.	2. Group Security– see Schedule B
8	Cooperation Agreement	Condition amended to modernise the wording. Condition has been re-numbered due to omission of other conditions.	3. Cooperation Agreement – see Schedule B
N/A		New condition attached	4. Assessable Prospecting Operations– see Schedule B
SPECIAL CONDITIONS			
Nil			

Schedule B

Mining Lease Conditions

(Version as at February 2022)

Definitions

Words used in this mining lease have the same meaning as defined in the *Mining Act 1992* except where otherwise defined below:

Term	Definition
Act	means the *Mining Act 1992.*
Landholder	for the purposes of these conditions: • does not include a secondary landholder • includes, in the case of exempted areas, the controlling body for the exempted area.
Minister	means the Minister administering the Act.

Note:

1. The rights and duties of the Lease Holder(s) are those prescribed by the *Mining Act 1992* and the Mining Regulation 2016, subject to the terms and conditions of this mining lease.
2. This mining lease does not override any obligation on the lease holder(s) to comply with the requirements of other legislation and regulatory instruments which may apply (including all relevant development approvals) unless specifically provided under the *Mining Act 1992* or other legislation or regulatory instruments.

MINING LEASE CONDITIONS

Standard conditions

See Mining Regulation 2016, Schedule 8A, Part 2.

NOTE TO HOLDERS: The prescribed standard conditions in the Mining Regulation 2016, Schedule 8A, Part 2 apply in addition to the conditions in this Schedule 2 (but have not been replicated in this mining lease). The conditions imposed by the Mining Regulation 2016 prevail to the extent of any inconsistency with the conditions in this Schedule 2.

General conditions

1. Notice to Landholders

(a) Within 90 days from the date of grant or renewal of this mining lease, the lease holder must give each landholder notice in writing:

(i) that this mining lease has been granted or renewed; and

(ii) whether the lease includes the surface.

The notice must include a plan identifying the lease area and each landholder and individual land parcel within the lease area.

(b) If there are ten or more landholders to which notice must be given, the lease holder will be taken to have complied with condition 1(a) if a notice complying with condition 1(a) is published in a newspaper circulating in the region where the lease area is situated.

2. Group Security

The security deposit to be provided and maintained for this mining lease is part of a group security deposit.

The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations under the mining leases covered by the group security deposit, including obligations under each mining lease that may arise in the future.

The amount of the security deposit to be provided as a group security deposit has been assessed at **$381,000**.

The leases covered by the group security include this **PLL 1155 (1924)** and:

Lease type	Lease Number	Act Year
ML	**1196**	**1973**

3. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate its attempts to the satisfaction of the Secretary, to enter into a cooperation agreement with the holder(s) of any overlapping authorisations issued under the *Mining Act 1992* and petroleum titles issued under the *Petroleum (Onshore) Act 1991*. The cooperation agreement should address but not be limited to:

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts; and
- rehabilitation issues.

4. Assessable Prospecting Operations

(a) The lease holder must not carry out any assessable prospecting operation on land over which this lease has been granted unless:

(i) it is carried out in accordance with any necessary development consent; or

(ii) if development consent is not required, the prior written approval of the Minister has been obtained.

(b) The Minister may require the lease holder to provide such information as required to assist the Minister to consider an application for approval.

(c) An approval granted by the Minister under this condition may be granted subject to terms.

(d) The lease holder must comply with the approval granted to the holder under this condition.

Special conditions

Nil

Exploration Reporting

Note: *Exploration Reports (Geological and Geophysical)*

The lease holder must lodge reports in accordance with the requirements in section 163C of the Mining Act 1992 and clauses 59, 60 and 61 of the Mining Regulation 2016 as well as any further requirements issued by the Secretary under clause 62 of the Mining Regulation.

Guidelines for the structure, content and data format requirements for reports are set out in the Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales.

Appendix D
EPA Licence

Environment Protection Licence

Licence - 11196

Licence Details	
Number:	11196
Anniversary Date:	01-September

Licensee

BORAL CSR BRICKS PTY LIMITED

LOCKED BAG 1345

NORTH RYDE NSW 1670

Premises

"OAKLANDS PML 4"

"CARBERRY"

URANA NSW 2645

Scheduled Activity

Mining for Minerals

Fee Based Activity	Scale
Mining for minerals	0-30000 T produced

Region

South West - Albury

2nd Floor, Government Offices, 512 Dean Street
ALBURY NSW 2640

Phone: (02) 6022 0600

Fax: (02) 6022 0610

PO BOX 544 ALBURY DC

NSW 2640

Environment Protection Licence

Licence - 11196

Environment Protection Licence

Licence - 11196

Environment Protection Licence

Licence - 11196

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

Licence - 11196

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

BORAL CSR BRICKS PTY LIMITED
LOCKED BAG 1345
NORTH RYDE NSW 1670

subject to the conditions which follow.

Environment Protection Licence

Licence - 11196

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Mining for Minerals	Mining for minerals	0 - 30000 T produced

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
"OAKLANDS PML 4"
"CARBERRY"
URANA
NSW 2645
LOT 1 DP 831425

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of

monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
2	Monitoring of dust deposition	Monitoring of dust deposition	Points as established

P1.2 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.3 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge from the sedimentation dams	Discharge from the sedimentation dams	Sedimentation dams on the property 'Carberry'

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Air Concentration Limits

POINT 2

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period

Environment Protection Licence

Licence - 11196

Particulates - Deposited Matter	grams per square metre per month	2.5

L2.5 Water and/or Land Concentration Limits

POINT 1

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
TSS	milligrams per litre				50

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must

be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Quarterly	Australian Standard 3580.10.1-1991

M2.3 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
TSS	milligrams per litre	Each overflow event	Grab sample

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or

b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2010* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

Environment Protection Licence

Licence - 11196

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
a) a Statement of Compliance; and
b) a Monitoring and Complaints Summary.
At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in

accordance with the requirements of Part 5.7 of the Act.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Environment Protection Licence

Licence - 11196

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 11196

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

Licence - 11196

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Mr Robert Monteith

Environment Protection Authority

(By Delegation)

Date of this edition: 01-September-2000

End Notes

1	Licence transferred through application 142271, approved on 27-Oct-2003, which came into effect on 31-Jul-2003.
2	Licence varied by notice 1034143, issued on 23-Jan-2004, which came into effect on 17-Feb-2004.
3	Licence varied by correction to EPA data record, issued on 15-Aug-2005, which came into effect on 15-Aug-2005.
4	Licence varied by notice 1071617, issued on 08-May-2007, which came into effect on 08-May-2007.
5	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
6	Licence varied by notice 1518392 issued on 29-Jan-2014
7	Licence transferred through application 1530227 approved on 04-May-2015 , which came into effect on 04-May-2015

Appendix E
Mine Safety Correspondence

Triniti 3, 39 Delhi Road, North Ryde, NSW 2113
Locked Bag 1345, North Ryde, BC 1670
T 61 2 9235 8000
F 61 2 8362 9005
ABN 68 168 794 821

5 May 2017

Attention:
Ronald Dillon | Senior Mine Safety Officer
NSW Department of Industry | Resource Regulator
161 Kite Street ORANGE NSW 2800

Dear Mr Dillion

RE: NOTICE No. N191-2017/00043

We refer to your correspondence dated 20 February 2017 in which PGH Bricks and Pavers Pty Ltd (the Company) was issued Improvement Notice N191-2017/00043 for contravention of the Work Health & Safety (Mines & Petroleum Sites) Regulation 2014 - Clause 24 Preparation of Principle Hazard Management Plan (1) (2) (3) (4) & (5), Schedule 1 (1) Ground or Strata failure.

The Company can confirm that it has prepared a Principle Hazard Management Plan for ground and strata control in accordance with the recommendations detailed in the Notice.

Attached to this document are the following annexures:

A. N191-2017_00043_Oaklands_Improvement Notice
B. Oakland's Ground Strata Instability Principal Hazard Management Plan
C. Oakland Ground Strata Instability Risk Assessment 3.05.17
D. PGH-SMS-FRM 002 Oakland's Mine Strata Check Sheet

If you have any questions regarding the content of the information provided or require any further information, please contact the undersigned on 0401 893 413.

Yours Sincerely
Debbie Cook
National WHSE Manager, PGH Bricks and Pavers.

From: Ron Dillon
To: Cook, Debbie
Cc: Gauci, Joe; King, Ben; Saunders, Bruce; Mihai Leonte
Subject: Re: Improvement Notice N191-2017/00043
Date: Monday, 8 May 2017 9:46:28 AM

Again, thanks Debbie and team for the information provided.

In reviewing my Notices I think the only outstanding issues is now,

3. No current mine plan, which you are working on and

5. Managers and employees lacked training/competency in identifying ground and strata issues on site.

Any issues please give me a ring

Regards

Ronald Dillon
Senior Mine Safety Officer
Division of Energy, Water, Regulation and Portfolio Strategy
161 Kite Street ORANGE NSW 2800 | Locked Bag 21 ORANGE NSW 2800
T: 02 63 605 332 | F: 02 63 605363 | M: 0429 917 890 | E: ron.dillon@industry.nsw.gov.au


Subscribe to our newsletter

On Fri, May 5, 2017 at 10:20 PM, Cook, Debbie <DECOOK@pghbricks.com.au> wrote:

> Good Afternoon Ron
>
> Firstly, thank you for your time today the team and I appreciate your input and support.
>
> I have attached correspondence relating to PGH Bricks and Pavers Oakland's Quarry

Improvement Notice N191-201700119.

Could you please forward a copy to Mehai as I do not have his email address.

If you have any questions regarding the contents of this letter or require any further information please do not hesitate to give me a call.

Yours Sincerely

Debbie Cook
National WHSE Manager

39 Delhi Rd
Locked Bag 1345, North Ryde BC NSW 1670
ABN 68 168 794 821

T: 401893413 | M: 401893413 |
E: decook@pghbricks.com.au | PGH Bricks and Pavers

From: Eddie Love
To: Tara O"Brien
Subject: Re: Oaklands PLL1155
Date: Thursday, 11 May 2017 3:58:20 PM
Attachments: image001.jpg
image001.jpg

Tara - Further to the previous email and our telephone conversation this is to confirm our interpretation that PLL 1155 has a surface restriction over the area shaded pink in the 1966 plan as stated in the 2007 Instrument of Renewal and thus there is no surface restriction for the remainder of the area, this being the green shaded area. This means that surface activities in accordance with section 81 of the Mining Act 1992 may be undertaken over the entirety of the PLL and mining and mining purposes in accordance with section 73 of the Mining Act may be undertaken over the green shaded area.

Regards

Eddie Love

Team Leader Service Development
Division of Resources and Geoscience
516 High Street | Maitland NSW 2320 | PO Box 344 Hunter Regional Mail Centre NSW 2310
T 02 4931 6541 M 0419 419 180

On 11 May 2017 at 08:35, Eddie Love <eddie.love@industry.nsw.gov.au> wrote:

> Tara - Further to your email this is to confirm that:
>
> a. surface rights to 100 feet (30.48m) do exist and are current.
> b. mining purposes are covered by section 6 of the Mining Act 1992 and Clause 7 of the Mining Regulation 2016. The legislation allows any mining purpose listed in Clause 7 to be undertaken without it being subject to a Mining Act authorisation but each activity must be in accordance with Part 4 of the Environmental Planning & Assessment Act 1979 (ie have development consent or be exempt development or be development that does not require consent). Any mining purpose listed under section 6 must be the subject of a Mining Act authorisation but an exemption currently exists for these under section 6(2) but this exemption ceases in November 2017. There is proposed legislation to enable section 6 mining purposes (to be known as ancillary mining activities (AMA)) to be added to an existing authorisation by way of a condition. This legislation is due to be considered by Parliament this month.
>
> I hope this satisfies your enquiry.
>
> Regards
>
> **Eddie Love**
>
> Team Leader Service Development
> Division of Resources and Geoscience
> 516 High Street | Maitland NSW 2320 | PO Box 344 Hunter Regional Mail Centre NSW 2310
> T 02 4931 6541 M 0419 419 180

From: Tara O'Brien [mailto:Tara@vgt.com.au]
Sent: Monday, 8 May 2017 11:11 AM
To: eliza.wibberley@industry.nsw.gov.au
Cc: titles.services@industry.nsw.gov.au; Greg Thomson
Subject: Oaklands PLL1155

Hi Eliza,

As briefly discussed this morning, I have a question about surface activities at the Oaklands Mine (ML1196 and PLL1155). There is overlap with the above and underground mining on the site.

The area I am concerned with is the north eastern portion of the site. This area contains historical mining shafts and surface equipment. It is not covered by ML1196 for the surface 'works'.

PLL1155 covers the underground workings but does not appear to cover the surface area where the old shafts are. The old 1966 PML6 (attached) which became PLL1155 does seem to have some recognition of surface activities to cover the shaft infrastructure and other surface works.

Could you clarify if the 'surface right' 3a shown in green on the old 1966 map is still current and does that allow for mining purposes over the green area on the surface, such as roads and stockpiles?

Regards,

Tara O'Brien

Environmental Consultant

Department of Industry
Resources & Energy

OUT15/21447
MCV15/565

Joe Gauci
Distribution Manager
Boral CSR Bricks Pty Ltd
59-67 Cecil Road,
Cecil Park NSW 2178

Dear Joe,

Inspection of Mining Lease No. 1196 and Private Land Lease No. 1155 – Coorabin Clay Mine

Thank you for meeting with Inspectors and facilitating the site inspection of the Coorabin Clay Mine (ML1196 and PLL1155) on 12th August 2015.

During the site inspection, a number of issues were identified and discussed. The issues were:

1. Topsoil management. A stockpile of topsoil was observed in the area of active mining operations and lacked erosion control. Please ensure that an area is dedicated for the storage of topsoil salvaged during operations. Erosion control should also be present. An inventory of topsoil stockpiles must be included in future Mining Operations Plans for ML1196 and PLL1155;
2. Subsidence and associated impacts from historic underground clay mining operations. Plans must be adopted which outline the remediation of areas impacted by subsidence and where historic clay stockpiles are still present. The plans may be forwarded to the Department at any time, but must be included in the Mining Operations Plan to be submitted and approved before April 2017;
3. Historic mining infrastructure. Plans must also be adopted which outline the decommissioning and cleaning up of historic mining infrastructure. The plans may be forwarded to the Department at any time, but must be included in the Mining Operations Plan to be submitted and approved before April 2017. The Department reminds the titleholder that the heritage status of underground headframe and shaft should be reviewed prior to any decommissioning being undertaken.

If you require any clarification on the above, please do not hesitate to contact me.

Yours sincerely,

Daniel Adams
Inspector Environment
14th August, 2015

Resources & Energy – Environmental Sustainability Unit
Locked Bag 21 ORANGE NSW 2800
Tel: 02 6360 5333 **Fax:** 02 6360 5363 **Web:** www.resourcesandenergy.nsw.gov.au
ABN 72 189 919 072

Department of Industry
Resources & Energy
Mine Safety

FORM: WHSMPSA23AN -N08

Notifying Mine Operator of Concerns

Issued under section 23 of the
Work Health and Safety (Mines and Petroleum Sites) Act 2013

NOTICE No. N23-2017/00069

Part A: Notice issued to the following person

Name of Mine Operator: Boral Shared Business Services P/L (ACN (none))

Part B: Mine site details

Mine Name: Oaklands
Address: Corribin Rd via OAKLANDS NSW 2646 Australia
Workplace (location to which the notice relates): PGH Oaklands Clay Mine

Part C: Matter(s)/area(s) inspected

Mine was undertaking a new mining cell with mining down to 15m where they have just intersected the clay level which is between 5 -6m in depth

Part D: Person(s) accompanying government official

Mihai Leonte, Senior Mine Safety Officer

Joe Gauci, PGH Bricks and Pavers

Cameron Robinson, PGH Bricks and Pavers

Debbie Cook, PGH Bricks and Pavers

Mick Fuge, Contractor

Part E: Government official's concerns

I am a government official (other than an investigator) under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013.*

In the course of exercising my functions at the mine I have become aware of the following matters that I consider to be relevant to the continued safe operation of the mine and/or the health and safety of workers at the mine:

1. A Principle Hazard Management Plan for Ground or Strata Failure has not been developed by the Mine Operator as required by legislation. S191 Notice issued

2. Mining characteristics at the mine have changed significantly (depth of clay level) with no triggers in place to identify additional risks and appropriate controls to manage increased risk of ground or strata failure.

3. No current mine plan was identified that included geotechnical advice and design on how to control ground and strata failure.

4. SWMS developed for mining on site made no reference to ground or strata control and safety systems did not allow for change management situations which occurred on site with the increased depth of the new pit.

5. Managers and employees lacked training/competency in identifying ground and strata issues on site

Part F: Issue details

Issued by government official: Ronald Francis Dillon on 20/02/2017 09:57:00

Emailed to Boral Shared Business Services P/L at cameron.robinson@boral.com.au

Other copies provided by email to: Joe Gauci, Debbie Cook, Mihai Leonte, Cameron Robinson

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Contact details for NSW Department of Industry Mine Safety offices

Maitland
516 High Street, Maitland NSW 2320
PO Box 344, HRMC NSW 2310
Ph: 02 4931 6666 Fax: 02 4931 6790

Orange
161 Kite Street, Orange 2800
Locked Bag 21, Orange NSW 2800
Ph: 02 6360 5333 Fax: 02 6360 5363

Wollongong
84 Crown Street, Wollongong NSW 2500
PO Box 674, Wollongong NSW 2520
Phone: 02 4222 8333 Fax: 02 4226 3851

For a full list of offices see http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/safety-and-health/about-us/mine-safety-offices

Department of Industry
Resources & Energy
Mine Safety

FORM: WHSA191IN -N08

Improvement Notice

Issued under section 191 of the *Work Health and Safety Act 2011*

This notice requires the person (which includes a body corporate or other entity) to whom it is issued to remedy a contravention, or take action to prevent a likely contravention, of WHS laws as defined under section 5 of the *Work Health and Safety (Mines) Act 2013* (WHS(M) Act). Section 49 of the WHS(M) Act can extend the circumstances of this notice.

Under section 210 of the *Work Health and Safety Act 2011* (WHS Act) the person to whom an Improvement Notice is issued must as soon as possible display a copy of the notice in a prominent place at or near the workplace, or part of the workplace, at which work is being carried out that is affected by the notice. Maximum penalty of $5,000 for an individual or $25,000 for a body corporate. A person must not intentionally remove, destroy, damage or deface a notice displayed while the notice is in force. Maximum penalty of $5,000 for an individual or $25,000 for a body corporate.

The person to whom an Improvement Notice is issued must comply with the notice for the period specified. Maximum penalty of $50,000 for an individual or $250,000 for a body corporate.

NOTICE No. N191-2017/00043

Part A: Notice issued to the following person

Name: Boral Shared Business Services P/L (ACN: (none))

This notice is given to you as a person who has control over the activity that is the subject of this notice.

Part B: Workplace details

Mine Name: Oaklands
Address: Corribin Rd via OAKLANDS NSW 2646 Australia
Workplace (location to which the notice relates): PGH Oakland Clay Mine

Part C: Ground for issuing

I am an inspector under the WHS Act and I issue this notice because I believe that you are likely to contravene the following provision(s) of the WHS laws:
Work Health & Safety (Mines & Petroleum Sites) Regulation 2014 - Clause 24 Preparation of Principle Hazard Management Plan (1) (2) (3) (4) & (5), Schedule 1 (1) Ground or Strata failure

Part D: Description

Brief description of how the provision(s) is/are likely to be contravened.

1. The Mine Operator was unable to supply any prepared documents in relation to the Principle Mining Hazard Plan for Ground or Strata failure control.

Part E: Directions/recommendations

Directions (if any) on the measures to be taken to remedy the contravention or prevent the likely contravention, or the matters or activities causing the contravention or likely contravention, to which the notice relates.
(It is mandatory to comply with these directions)

Prepare a Principle Hazard Management Plan for ground and strata control

Recommendations (if any). *(It is not an offence to fail to comply with recommendations in a notice)*

Geotechnical advice is sought in the preparation of a ground and strata control plan and includes an up to date mine plan, an updated SWMS, include training for managers and employees and inspection check lists specific to the hazard.

Part F: Compliance

You are required to remedy the contravention or likely contravention or comply with this notice by: 05/05/2017

Note: An inspector may, by written notice given to the person, extend the compliance period for the improvement notice, however the inspector may extend the compliance period only if the period has not ended.

Part G: Issue details

Issued by inspector: Ronald Francis Dillon on 20/02/2017 09:30:31

Emailed to Boral Shared Business Services
P/L at cameron.robinson@boral.com.au / Cameron.Robinson@boral.com.au

This information forms part of the Improvement Notice under section 191 of the *Work Health and Safety Act 2011*

If you have any queries about this notice please contact the issuing inspector in the first instance.

In relation to matters or the exercise of a power or function concerning a mining workplace or a coal workplace, the Regulator is the Secretary of the Department of Industry, Skills and Regional Development (NSW Department of Industry).

Internal review of this decision

As the person to whom this Improvement Notice has been issued, you (or eligible persons under section 223 of the WHS Act) can apply for an internal review of this decision to the Regulator. If you wish to apply for an internal review of the notice, an application must be made before the period specified on the notice for compliance has expired or within 14 days of the Improvement Notice being issued.

The operation of the Improvement Notice is stayed (i.e. suspended) once the application for review of decision is lodged. The stay remains in effect until a decision is made and whichever of the following is earlier - an external review is applied for or 14 days have elapsed since the person became aware of the decision of the Regulator.

How does a person apply for a review of a decision?

An application must:

- be in writing
- attach a copy of the notice for which any review is being sought
- set out clearly the reasons why the review is sought
- be sent to

  Regulator, Department of Industry, Skills and Regional Development,
  c/- Director, Mine Safety Operations and Director, Mine Safety Performance
  PO Box 344
  Hunter Region Mail Centre NSW 2310

- include your name, address and telephone number

What happens next?

Your application for internal review will be reviewed as soon as reasonably practicable and within 14 days of the application being received, unless additional information is required. You will receive written confirmation of the result of the internal review including the reasons for the decision.

External review

An eligible person may apply to the Industrial Relations Commission (Commission) for an external review of the decision made on an internal review or for a review of an Improvement Notice issued by the Regulator. An external review application must be made within 14 days of the decision first coming to the applicant's notice or, if the Regulator is required by the Commission to give the person a statement of reasons, within 14 days after the day on which the statement is provided.

Privacy

This information is collected by NSW Department of Industry for the purposes of the WHS laws. NSW Department of Industry will use this information for the purposes of law enforcement. This information may also be made available to other government agencies including WorkCover NSW.

Contact Details for NSW Department of Industry Mine Safety Offices

Maitland
516 High Street, Maitland NSW 2320
PO Box 344, HRMC NSW 2310
Ph: 02 4931 6666 Fax: 02 4931 6790

Orange
161 Kite Street, Orange 2800
Locked Bag 21, Orange NSW 2800
Ph: 02 6360 5333 Fax: 02 6360 5363

Wollongong
84 Crown Street, Wollongong NSW 2500
PO Box 674, Wollongong NSW 2520
Phone: 02 4222 8333 Fax: 02 4226 3851

For a full list of offices see http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/safety-and-health/about-us/mine-safety-offices

From: Gauci, Joe
To: Tara O"Brien; Sinead Kelly; Greg Thomson
Subject: FW: Oaklands Quarry PLL 1155
Date: Thursday, 19 November 2015 10:48:31 AM
Attachments: image001.jpg
image002.png

All,
See correspondence with Dan Adams re the removal of the old underground mining equipment.

When we get a chance can we start to look at modifying the MOP as per the instructions below regarding this. So basically what we will do is undertake a risk assessment that looks at erecting a compound around this equipment, which then we will also have to do a revised RCE as also indicted in their email.

Any queries please let me know.

Regards

Joe Gauci
Raw Materials Manager (NSW, VIC, SA)

59-67 Cecil Road, Cecil Park, NSW 2178, Australia

ABN 68 468 794 821

T: 02 9826 3964 | E: jgauci@pghbricks.com.au |
www.pghbricks.com.au

BORAL CSR BRICKS PTY LTD

From: Gauci, Joe
Sent: Monday, 16 November 2015 9:09 PM
To: 'Dan Adams'
Cc: Michael Young (michael.young@trade.nsw.gov.au)
Subject: RE: Oaklands Quarry PLL 1155

Hi Dan,
Thanks for the reply back re this matter.

On the first point we have already made inquiries re the historical status and find that that there is nothing of significance or requirements to leave in tact so therefore it can be removed.

What we will do then is re submit the MOP with the amended sections to cover off the items as you have mentioned below.

Regards

Joe Gauci
Raw Materials Manager (NSW, VIC, SA)

59-67 Cecil Road, Cecil Park, NSW 2178, Australia

ABN 68 468 794 821

T: 02 9826 3964 | E: jgauci@pghbricks.com.au |
www.pghbricks.com.au

BORAL CSR BRICKS PTY LTD

From: Dan Adams [mailto:dan.adams@industry.nsw.gov.au]
Sent: Friday, 13 November 2015 2:28 PM
To: Gauci, Joe
Cc: Michael Young (michael.young@trade.nsw.gov.au)
Subject: Re: Oaklands Quarry PLL 1155

Hi Joe,

In the currently approved MOP for ML1196 and PLL1155 - Coorabin (attached) it mentions that demolition works will be completed in the 'calendar year' (2011). During the site inspection we did however note that the historical status of the infrastructure should be confirmed prior to demolition.

The Department may endorse the plans outlined above, but will require;

- An amended MOP outlining the changes proposed with a commitment stating plans will be developed during the MOP term (heritage status, fencing etc) with a commitment also stating decommissioning will be undertaken in later MOP periods / closure. As the currently approved MOP is in the EDG11 - Small Mine Version MOP Template (which is now superseded), submission of the amended MOP in this template is permissible;
- With the submission of a MOP amendmenet, a review of security is triggered. As such, an updated Rehabilitation Cost Estimate (RCE) will also be required. I note that the security at Coorabin is currently being reviewed; however, inclusions will be required for the demolition and decommisioning of the infrastructure.

Thanks Joe.

On 13 November 2015 at 11:40, Gauci, Joe <JGauci@csr.com.au> wrote:
Dear Michael & Dan,
Recently on the visit plus confirmation in the attached AEMR letter, it was noted re the de commissioning (removal) of the historic mining infrastructure that sits on PLL 1155 .

I would like to put to put a proposal that I seek comment on in regards to this matter.

What we would like to propose, is if we undertake a safety risk assessment on this equipment and found that say a fenced type compound be placed around the perimeter of this if that would be acceptable. We would also look in our next AEMR and MOP to modify and state that this equipment be removed at the end of life of the quarry i.e. in our closure plan.

Could you please let me know if this may be an acceptable plan to this matter.

Regards

Joe Gauci
Raw Materials Manager (NSW, VIC, SA)

59-67 Cecil Road, Cecil Park, NSW 2178, Australia

ABN 68 468 794 821

T: 02 9826 3964 | E: jgauci@pghbricks.com.au |
www.pghbricks.com.au

BORAL CSR BRICKS PTY LTD

--

Regards,

Daniel Adams | Inspector Environment

NSW Department of Industry | Division of Resources & Energy
Locked Bag 21, ORANGE NSW 2800
T: 02 6360 5352 | F: 02 6360 5363 | M: 0428 279 830
E: dan.adams@industry.nsw.gov.au
W: www.resourcesandenergy.nsw.gov.au | www.industry.nsw.gov.au

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From: Gauci, Joe
To: Greg Thomson; Tara O"Brien
Subject: FW: Oaklands Inspection
Date: Thursday, 19 January 2017 10:32:47 AM

FYI, re Oaklands

Regards, Joe

From: Ron Dillon [mailto:ron.dillon@industry.nsw.gov.au]
Sent: Monday, 16 January 2017 4:54 PM
To: Gauci, Joe
Subject: Re: Oaklands Inspection

Thanks Joe

Ronald Dillon
Senior Mine Safety Officer |
NSW Department of Industry| Mine Safety | Locked Bag 21 ORANGE NSW 2800
T: 02 63 605 332 | F: 02 63 605363 | M: 0429 917 890 |
E: ron.dillon@industry.nsw.gov.au
W: www.industry.nsw.gov.au

On 16 Jan. 2017, at 4:15 pm, Gauci, Joe <JGauci@pghbricks.com.au> wrote:

> Hi Ron,
> Thanks for the call this afternoon.
>
> As discussed no one is allowed to enter the underground tunnels with any of the appropriate breathing apparatus.
>
> Any tunnels that are exposed will have the entrance's filled in to block any access from any outside trespasses.
>
> Machines that are to be used, as per the Orica procedure, will adequately be equipped fit for purpose i.e. mesh placed/ fixed to the front of the operators windscreen.
>
> If you require any other additional information please contact me.
>
> Regards
>
> **Joe Gauci** <image004.jpg>
> **National Raw Materials Manager**
>
> 59-67 Cecil Road, Cecil Park, NSW, 2178
>
> ABN 68 168 794 821
>
> **T: 02 9826 3964 | M: 0417 683 526 | E: jgauci@pghbricks.com.au |**
> **www.pghbricks.com.au**

From: Gauci, Joe
Sent: Monday, 16 January 2017 3:20 PM
To: 'Ron Dillon'; Cook, Debbie
Subject: RE: FW: Oaklands Inspection

Hi Ron,
I am not sure if you received this or not back in September of last year when I sent to you. This is the procedure that Orica recommended we use when uncovering these tunnels.

If you need anything else please let us know.

Regards

Joe Gauci <image001.jpg>

National Raw Materials Manager

59-67 Cecil Road, Cecil Park, NSW, 2178

ABN 68 168 794 821

T: 02 9826 3964 | M: 0417 683 526 | E: jgauci@pghbricks.com.au | www.pghbricks.com.au

From: Ron Dillon [mailto:ron.dillon@industry.nsw.gov.au]
Sent: Monday, 16 January 2017 2:40 PM
To: Cook, Debbie
Cc: Gauci, Joe
Subject: Re: FW: Oaklands Inspection

Debbie/Joe, I have just come back off leave after 2 months and i am looking to close this event.

Thank you for the information but my records show that you were going to give me some further information on tunnel re-entry. This would include ensuring air quality is acceptable and the roof and side walls safe for entry.

Can you please provide this information so i can close the event.

If you would like to discuss this matter further please do not hesitate to contact me on my mobile.

Regards

Ronald Dillon | Senior Mine Safety Officer
NSW Department of Industry | Resource Regulator
161 Kite Street ORANGE NSW 2800 | Locked Bag 21 ORANGE NSW 2800
T: 02 63 605 332 | F: 02 63 605363 | M: 0429 917 890 | E: ron.dillon@industry.nsw.gov.au
W: www.resourcesandenergy.nsw.gov.au/safety

On Mon, Nov 7, 2016 at 11:19 AM, Cook, Debbie <DECOOK@csr.com.au> wrote:

Good Afternoon Ron

Please find attached tool box correspondence as requested.

Joe

Can you please provide copies of completed inspections.

Much appreciated.

Regards

Debbie Cook
National WHSE Manager

<image001.jpg>

Triniti 3, 39 Delhi Road North Ryde NSW 2113, Australia
Locked Bag 1345, North Ryde BC NSW 1670
ABN 68 168 794 821

| M: 0401 893 413 | E: decook@pghbricks.com.au |
www.pghbricks.com.au

<image002.png>

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From: Ron Dillon [mailto:ron.dillon@industry.nsw.gov.au]
Sent: Monday, 7 November 2016 7:05 AM
To: Gauci, Joe
Cc: Cook, Debbie
Subject: Re: FW: Oaklands Inspection

Debbie/Joe, Could you please provide the following information as requested in Notice N23 - Oaklands - SAss-2016/03516 issued on 6/10/2016

1. The underground re-entry procedure used in the tool box meeting needs to be reviewed and updated to reflect all hazards, risks and controls associated with re-entering into old workings.

2. A regular documented inspection regime needs to be implemented in and around monitoring unauthorized access and entry into the underground workings.

Thanking You

Regards

Ronald Dillon | Senior Mine Safety Officer
NSW Department of Industry | Resource Regulator
161 Kite Street ORANGE NSW 2800 | Locked Bag 21 ORANGE NSW 2800
T: 02 63 605 332 | F: 02 63 605363 | M: 0429 917 890 | E: ron.dillon@industry.nsw.gov.au
W: www.resourcesandenergy.nsw.gov.au/safety

On Mon, Sep 26, 2016 at 4:14 PM, Gauci, Joe <JGauci@pghbricks.com.au> wrote:

Hi Ron,

Find attached report from Orica for our Oaklands Quarry.

By the way we have already toll boxed and documented this with our contractor and Cameron Robinson back in July of this year.

Regards

Joe Gauci
National Raw Materials Manager

59-67 Cecil Road, Cecil Park, NSW, 2178

ABN 68 168 794 821

T: 02 9826 3964 | M: 0417 683 526 | E: jgauci@pghbricks.com.au | www.pghbricks.com.au

BORAL CSR BRICKS PTY LTD

From: Cook, Debbie
Sent: Monday, 26 September 2016 3:33 PM
To: Gauci, Joe
Subject: Fwd: Oaklands Inspection

Good Afternoon Joe

Can you please forward a copy of the Orica SOP to Rob Dillion.
Much appreciated.

Sent from my iPhone

Begin forwarded message:

> **From:** Ron Dillon <ron.dillon@industry.nsw.gov.au>
> **Date:** 23 September 2016 9:07:05 am AEST
> **To:** <decook@pghbricks.com.au>, Cameron Robinson <Cameron.Robinson@boral.com.au>
> **Subject: Oaklands Inspection**
>
> Debbie, during our inspections you had a number of documents that you were going to send me in relation into the investigation from Orica into the reported stored explosives underground at Oakland.
>
> As discussed could you please provide me a copy of the documentation to enable me to close out the reported event.
>
> If you would like to discuss this matter further please do not hesitate to contact me on my mobile.
>
> Regards

Ronald Dillon | Senior Mine Safety Officer
NSW Department of Industry | Resource Regulator
161 Kite Street ORANGE NSW 2800 | Locked Bag 21 ORANGE NSW 2800
T: 02 63 605 332 | F: 02 63 605363 | M: 0429 917 890 | E: ron.dillon@industry.nsw.gov.au
W: www.resourcesandenergy.nsw.gov.au/safety

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OUT17/15249

Joe Gauci
PGH Bricks and Pavers Pty Ltd
59-67 Cecil Road
Cecil Park NSW 2178

Dear Joe,

MINING LEASES 1196 (Act 1973) and PLL1155 (Act 1924) – OAKLANDS CLAY PIT – MINING OPERATIONS PLAN - APPROVAL FOR EXTENSION TO DUE DATE

NOTICE OF APPROVAL FOR EXTENSION TO MINING OPERATIONS PLAN DUE DATE

Pursuant to the Conditions of ML1196 (1973) and PLL1155 (1924), the request for extension to the MOP due date submitted to the Department on 12/04/2017 (DRAG Reference: INW17/20858) is approved. The due date for submission is now the 18/06/2017.

The MOP should be submitted to the Environmental Sustainability Unit via email at minres.environment@industry.nsw.gov.au

Please note that late reports or non-reporting are offences under the Mining Act and may be the subject of enforcement action by the Resources Regulator.

DEFINITIONS

In this letter, words have the meaning given to those terms in the *Mining Act 1992*, unless otherwise specified below.

Department means NSW Department of Planning and Environment.

Authorisation Holder means the holder of the relevant authorisations.

Mining Operations Plan means the report referred to in the Conditions of ML1196 and PLL1155.

If you have any questions about this letter, please contact Michael Young directly on 02 6360 5346.

Michael Young
Manager and Principal Inspector
Division of Resources and Geoscience
12/04/2017
Signed under delegation

Environmental Sustainability Unit
PO Box 344 Hunter Region Mail Centre NSW 2310
516 High St MAITLAND NSW 2320
Email: minres.environment@industry.nsw.gov.au
Tel: 02 4931 6605 **Fax:** 02 4931 6790 **Web:** www.resourcesandenergy.nsw.gov.au
ABN 72189919072

Appendix F. Orica Report

Technical Report C

provided for

Orica Mining Services

and PGH Bricks

Consider the likelihood of the presence of abandoned explosives, and outline procedures to respond to any risk

I am a mining engineer who has specialised in explosives technology and commercial blasting applications for my 45 year career. As outlined in my CV (Appendix) I work in most areas of civil and mining blasting including Opencut and Construction blasting. A major portion of my work in the past 20 years has been in managing Risk Assessments, blasting project evaluation, designing for sensitive construction blasting, auditing blasting performances and training engineers and shotfirers in safe & efficient blasting.

Nick Elith B.E. Mining
MAusIMM, Member ISEE
Principal Blasting Consultant
techNick Consulting P/L
Consulting Explosives Engineers

21 June 2016

Contents

1. Scope

a. Visit site and view opencut pit, shaft and tunnels
b. Get information on prior underground blasting practices
c. Consider the likelihood of the presence of abandoned explosives and if they were left there consider where they may have been left
d. State the sensitivities of nitroglycerine and gelignite and expected condition of gelignite, with age or deterioration
e. Generate operational responses to work around the possibility of encountering gelignite whilst Opencut Mining

2. Introduction and context

Underground mining has been conducted on a separate lease in this area for many years. Some years ago underground mining ceased operation and the shaft head was sealed off with steel mesh, but the shaft remained intact.

In recent years Opencut Mining commenced at an adjacent site with most of the mineral material dug and scraped out using excavators. There was no blasting associated with the Opencut mine.

Recently during excavations, three nearly horizontal tunnels were exposed in the sidewalls of the cutting (see illustration locations '**E**' in the Appendix). Technically, the location of these tunnels lay outside the older underground mining lease. The dimensions of the tunnels are not large and in general excavation can continue safely with only a few standard operating procedures in place.

A passing comment by an operator who previously worked in the underground mine hinted that surplus gelignite explosives may have been left in the underground workings when the site was abandoned. Whilst there is no evidence that this event occurred, it raised sufficient uncertainty and concern that the Opencut mine operators decided to have an official investigation with a view to establishing any presence of gelignite, and in the absence of such a discovery, to outline safe working procedures to continue mining whilst informing operators what to look for in case explosives were encountered.

3. Discussion

a) Visit site and view shaft and tunnels

The visit to the site showed that the arrangements are quite basic. The shaft appears to be in very good condition with a competent headframe arrangement and good ladderways down the shaft. The depth appears to be greater than 30 m. A couple of side adits can be seen in the walls of the shaft.

It is my opinion that a person trained and equipped to work in an enclosed space environment could descend a shaft and conduct a simple visual check for the presence of explosives at the bottom of the shaft or within a torchlight view of the side adits.

b) Get information on prior underground blasting practices

The previous employee at the underground mine indicated that occasionally the minors would bore a single hole about 100 mm diameter and 1 to 2 m deep and place a few sticks of gelignite in the bottom, stem the hole and fire it. This would loosen up the material and tumble it out to make hand digging easy. Such blasting was infrequent and clearly very basic. Explosives quantities used would probably be less than 1 kg and therefore a stock reserve of explosives at the site would mostly only amount to one or two cases.

c) Consider the likelihood of the presence of abandoned explosives and if they were left there consider where they may have been left

Such blasting practices would generally require a small quantity of explosives to be stored conveniently very close to the shaft, but not actually in the shaft bottom (**A** in the attached site illustration) where they may be subject to falling materials. That would mean the most likely place to store reserve explosives would not be too far into the entrance of a side adit at locations **B** or **C**. If blasting was required the shotfirer would simply take a few sticks of explosive from the store and carry them out to the end of the operating workings and consume all the explosives in a single shot.

There is little reason why a person would leave explosives out near the digging face, and therefore I believe it is unlikely that any explosives would remain at locations **D** or **E** in the site illustration.

The other place that explosives could be stored would be in the locked surface shed (**F**)

d) State the sensitivities of nitroglycerine and gelignite and expected condition of gelignite, with age or deterioration

- After a period of years, even gelignite explosives generally become less sensitive although there is the possibility that nitroglycerine can seep free and present an impact or friction hazard.
- If gelignite remains within its original packing it is not highly sensitive to moderate handling, lifting or dragging. The greatest risk of detonation with nitroglycerine based explosives is when they are crushed or grinded between hard surfaces or when they are impacted by high velocity implements. The very soft nature of the geology in this pit means that gentle, controlled digging presents a low risk of any explosion.

e) Generate operational responses to work around the possibility of encountering gelignite whilst Opencut Mining

Principle potential hazards

- Explosives dropped or left at the base of the shaft
- Explosives are left along one of the side tunnels from the shaft
- Explosives were left at the ends of the tunnels in the vicinity of the Opencut workings
- Damaged explosives boxes, split or spread cartridges
- Explosives amongst the rubble
- Explosives buried or partly buried
- Explosives affected by rain and weather

Solutions - Shaft area

i. Go down shaft to look for explosives

ii. If explosives are identified, an expert will be called to recover

iii. It is my professional opinion that remnants, if they exist but cannot be safely removed due to their condition or that they are partially buried, can be safely covered by a few metres of fill material. Such cover would give assurance that no heat, sparks, impact or friction could result in a detonation.

iv. ACTION in this case: Dump at least 3m of soft fill into the bottom of the shaft and confirm with measurements. With 3m of fill on top of gelignite, apart from excavation through the fill, there is no likelihood of any person or event causing detonation in subsequent years. After confirming the depth of fill material, the shaft would then be effectively sealed off to prevent any unauthorized access. Over a period of years any nitroglycerine would be likely to migrate downwards and disperse. In this state it is unlikely that any significant quantity could detonate even if it were heavily impacted.

v. Gazette the presence of explosives so that no future activities shall be conducted down the shaft.

Solutions - Open pit area

i. The project management have been advised to conduct a toolbox talk with employees who may be operating digging equipment or working in and around the area so that they are aware of what to look for if any explosives items are uncovered.

ii. In the existing exposed tunnels a small backhoe excavator may be used to gradually drag off small layers of pit material that has tumbled into the cavity. This will be easy to do without much force as the material is quite soft and a very loose.

iii. After clearing the entrances to the tunnels it should be a simple matter to inspect for several meters into the tunnel using a flashlight, and to confirm that no explosives boxes or materials are present. After each examination excavation of the sides of the pit can proceed several metres and then the examination process repeated

iv. It should be noted that any dispersed explosives fragments are hazardous and must be gathered by an experienced and qualified explosives handler and stored in a secure container. Orica should be called to deal with any such items found.

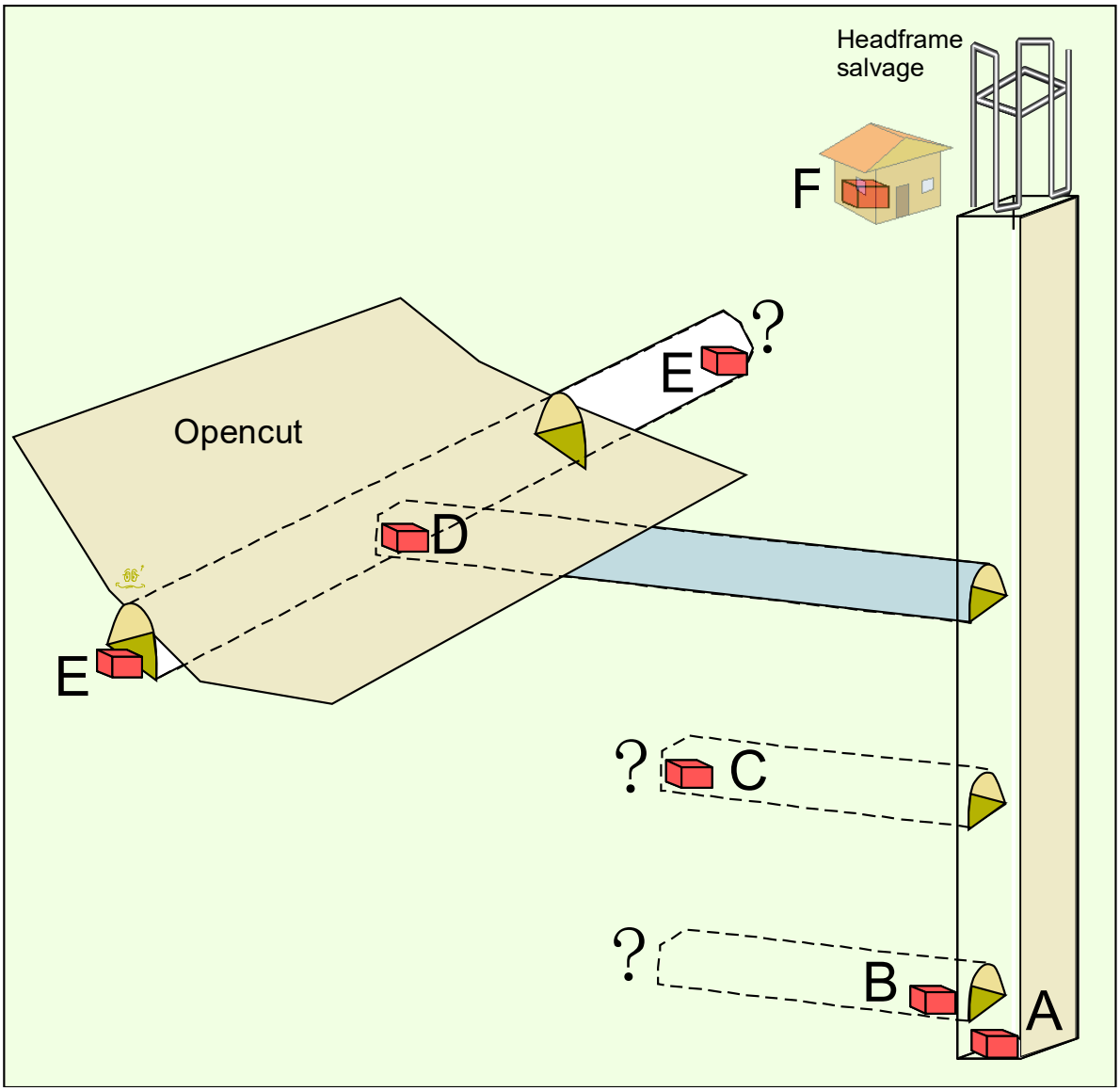
4. Conclusions

1. It seems unlikely that any explosives, if they were left on the site at all, might have been left underground at a location other than **B** in the diagram.
2. A simple investigation conducted by a person qualified to identify explosives going down the shaft, should be able to establish whether explosives do remain at the most probable locations. If discovered they can be easily removed by a shotfirer or qualified explosives handler.
3. The procedures as outlined in the solutions section above will make it safe for earthworks operations to proceed.

Yours faithfully

Nick Elith B.Eng. Mining
Blasting Consultant

5. APPENDIX - Site illustration



6. APPENDIX - Nick Elith - Qualifications and Experience

NAME NICK ELITH
Bachelor of Engineering (Mining)
University of Sydney 1971

POSITION Principal Blasting Consultant
TechNick Consulting P/L. - Consulting Mining Engineers

DATE OF BIRTH 1948

AFFILIATIONS Member; Australasian Institute of Mining & Metallurgy
Member; International Society of Explosives Engineers

EXPERIENCE Over 44 years involvement with explosives and blasting practices.

1977 - Present:

Principle Blasting Consultant : technick Consulting Pty. Ltd.
Consulting to the mining, quarrying and construction industries in :

- ✓ Blasting principles and Blasting Physics applications
- ✓ Safety and Cost Efficiency in blasting; Opencut and Underground
- ✓ Blast Design and implementation - Opencut and Underground
- ✓ Conducting On-site drilling & blasting Operational Audits
- ✓ Initiation Systems application and design
- ✓ Field evaluation of new explosives and Initiation Systems technologies
- ✓ Technical writing: Blasting manuals, Operational Procedures
- ✓ Training resources, graphics, Safety / promotional materials
- ✓ Competency-based Shotfirer training
- ✓ Author of Opencut and Underground blasting manuals
- ✓ Demolitions: Structures, Buildings, Machinery (steel, concrete etc.)
- ✓ Submarine / Underwater blasting and demolitions
- ✓ Environmentally sensitive blast design, analysis and supervision
- ✓ Investigation of explosives accidents and Incidents
- ✓ Legal "Expert Witness" representation

1971 - 1976 Explosives Engineer with ICI Australia (Australia's largest explosives supplier) working as a blasting engineer throughout Australia in:

- *Opencut and Quarry Blast Design and improvement*
- *Civil engineering, Construction, Roadworks and Excavations*
- *Initiation Systems design and development*
- *Underground blast design, Tunneling, Shaft sinking, Stoping*
- *Safety and skills Training*
- *Submarine blasting, Harbour deepening, Offshore Oil-well operations*
- *New explosives development and field testing*

Advanced blast engineering and design

- *Opencut and Quarry Blast Design and improvement*
- *Civil engineering, Construction, Roadworks and Excavations*
- *Initiation Systems design and development*
- *Underground blast design, Tunnelling, Shaft sinking, Stoping*
- *Underground Coal Mine Shotfiring, Training, Risk Assess, Design*
- *Accredited Safety and Blasting skills Training*
- *Submarine blasting, Harbour deepening, Offshore Oil-well operations*
- *Advise, design, execute unusual / sensitive construction / demolition projects:*
- *Control vibrations, air blast, flying fragments, underwater concussion*
- *Buildings, foundations, underwater, mechanical equipment,*
- *Recovery of jammed drill rods, pipes, liners, slag, operating equipment*
- *Calculate, predict environmental effects of blasting in critical areas*
- *Feasibility studies for controlled explosives applications*
- *Legal investigations, reporting and representation*

Mining & Quarry Blasting

Current: All Aspects of Opencut blasting

- ✓ Tender Assistance, Safety, Risk management,
- ✓ Establish Blast Management Plans
- ✓ Designs, Cost Estimations, Product Recommendations,
- ✓ Auditing of Mine Drill & Blast Safety, Procedures and Optimisation
- ✓ Problem Solving, Incident and Misfire Response Management
- ✓ Special Methods, Wall Control, Fragmentation
- ✓ Productivity, Optimisation, Mine-to-Mill Studies

ONGOING: optimisation design and controls – critical environments

1971 – current: Design Blasting methods, Initiation, Optimisation

1971 – current: Advanced technical support to Mining / Quarry industries Aust-wide

1971 – current: Quarry blast designs NSW, VIC, WA, SA, NT, Tas, ACT, QLD

Civil Engineering, Construction Blasting & Tunnelling

Current: All Aspects of Civil Works incl. Tunnelling

- ✓ Tunnelling Designs, Cost Estimations, Environmentals
- ✓ Foundations, Abutments, Spillways D&B Excavations
- ✓ Tender Assistance, Safety, Risk management,
- ✓ Designs, Cost Estimations, Product Recommendations,
- ✓ Auditing of Drill & Blast Safety, Management Plans, SWPs and Optimisation
- ✓ Problem Solving, Incident and Misfire Response Management
- ✓ Special Methods, Wall Control, Fragmentation
- ✓ Blasting Vs Mechanical Productivity, Optimisation Studies

Current - Advanced technical support to Civil Construction industries Aust-Asia

2014 explosives opencut blast implications for real estate development & approval - VIC
2013 Site Audit UG Mine Drill & Blast Safety, Procedures and Optimisation - Mongolia
2012 - 2013 Rail widening close-proximity, sensitive blasting – Regional Rail VIC
2011 - 2013 Gas plant construction proximity blasting, wall control, Gorgon NWWA
2011 Sub-station proximity blasting, environmental specifications – ACT
2011 Underwater proximity blast design, Risk definition, costings - Qld
2011 Pipeline construction -proximity blasting, blast design – Water Authority NSW
2011 Water pipeline proximity blasting, Audit blast designs – Murrumbidgee NSW
2011 Dam construction Proximity blasting, Audit blast designs - Cotter ACT
2010 Pipeline Risk Assessment, Procedures, blast designs – Moomba Gas pipe QLD
2010 Dam Procedures, Expert Reviews, Audit blast designs Keepit Dam NSW
2010 Dam construction Procedures, Reviews, Audit blast designs - Cotter ACT
2010 Dam Procedures, Expert Reviews, Audit blast designs Googong Dam NSW
2010 Rail extension project - Procedures, Reviews, Audit designs - VIC
2010 Pipeline trench blasting adjacent to old existing pipelines – Specifications QLD
2010 Satellite dish foundations Procedures, Reviews, blast designs - ACT
2009 Pipeline excavation blasting onshore to offshore Design, Risk Assess - NWWA
2009 Water pipeline relocation near major Communications facilities - Townsville
2008 -10 Protection of Ancient Rock-Art - Procedures, Reviews, Audit blasts - NWWA
2008 Highway Roadworks expansion, Cuttings - Design, Risk Assess - S NSW
2008 Ocean outfall / Desalination pipeline feasibility- Design, Risk Assess - SA
2007 Pipeline excavation blasting onshore / offshore Design, Risk Assess - SWWA
2007 Foundations Industrial Estate D&B Procedures, Reviews, blast designs - ACT
2006 Industrial Estate foundations D&B Procedures, Reviews, blast designs - ACT
2006 Foundations Industrial Estate D&B Procedures, blast designs, Misfires - VIC
2006 Road widening, Cutting project - Procedures, Reviews, Designs NWWA
2000 to 06 Jammed auger near city hospital – blast free Melbourne - VIC
2000 to 06 Hydro dam tunnel blast designs NSW
2000 to 06 Underground shaft risk assess, design approvals – City Melbourne - VIC

Environmental Blasting and Controls

Current: Regular assessment and prediction of blasting effects & impacts

Environmental calculations & design near houses, optics, cables, pipes, shafts, liquid tanks, bridges, 'green' concrete and sensitive sites

2012 - 2013 Rail widening close-proximity, sensitive blasting – Regional Rail VIC

2012 - 2013 Environmental implications blasting for new mines - NZ

2011 - 2013 Gas plant construction proximity blasting, wall control, Gorgon NWWA

2011 Proximity blast design, Risk definition, underwater near jetties - Qld

2011 Sub-station proximity blasting, environmental specifications – ACT

2011 Pipeline nearby Review, Risk Assess blast design – ACT dam construction - ACT

2011 Gas plant construction proximity blasting, wall damage, specifications – Gorgon NWWA

2011 Underwater proximity blast design, Risk definition, costings - Qld

2010 Pipeline Risk Assessment, Procedures, blast designs – Moomba Gas pipe QLD

2010 Pipeline nearby Review, Risk Assess blast design – QLD

2010 Foundations near Satellite dish Procedures, Reviews, blast designs - ACT

2010 Review / Approve blast design damage Risk – Cotter Dam - ACT

2010 Bridge nearby, Review blast design damage Risk – Mackay QLD

2010 Review / Approve blast design damage Risk – Keepit Dam - NSW

2009 - 10 Review blast damage Risk – Googong Dam refurbishment - NSW

2009 Blasting near ventilation services –Tunnel development Narrabri NSW

2009 Blasting near critical services – UG Coal mine - NZ

2009 Environmental impacts of blasting underwater near marine habitats (SA, WA)

2009 Blasting near critical underground pipes – Tunnel development coal mine - NSW

2009 Blast design & Risk Assessments – Dam construction near infrastructure ACT

2008 Blast design & Risk Assess – construction near infrastructure WA, NSW

2006 - 2010 Risk manage / Design / Audit proximity blast proc - Heritage sites Karratha WA,

2005 Design & environment calcs for blasting near Melb city hospital - VIC

2002 /06 Various mine extension EIS supporting reports: Drilling & Blasting effects

2001 Mine extension environmental effects, blast designs NZ

2000 /06 Guest lecturer – Melbourne University "Environmental Risk" - VIC

2000 /04 Conduct Risk Assessment studies for sensitive blasting near dams, electronic switchgear, sensitive facilities, overhead / underground services - various

2001 Blast mine Portal Tasmania, 5m from pipelines, 30m from workshops - TAS

1998 Close proximity blasting 3 metres from highway; Wollongong NSW

1998 Blasting consultant to Botany underground LPG tanks study - NSW

1998 Controlled blasting amongst major LPG tanks - Woodside Petroleum; WA

1996 Investigation / Clearances at Canberra Hospital Implosion - ACT

1993, 94 Blast design, vibration, air blast monitoring of tunnelling works - homes, school, temples, within tens of metres in - Taiwan

1971 – 2008 Design blasting to optimise productivity and minimise disruption to locality - various

Appendix G
Risk Assessment for Underground Workings

RA Number:		Assessed by:	Paul Lambert / James Young
Inspection Area:	Oaklands Quarry		
Plant/Equipment:	Ground & Strata Instability	Review Date	4 May 2017
Initial assessment date:	3 May 2017	Reviewed By	James Young

POTENTIAL CONSQUENCE -C (select first)			**LIKELIHOOD -L** (select after the consequence rank)				
			E Very Rare or Very Unlikely	**D** Rare or Unlikely	**C** Infrequent or Possible	**B** Occasional or Probable	**A** Frequent or Almost Certain
	Safety & Health	**Environment**	The risk event may occur only in exceptional circumstances (has not occurred and probably never will)	The risk event could occur at some time (three yearly basis, but less than annually)	The risk event should occur at some time (annually but less than four times per annum)	The risk event will probably occur in most circumstances (three monthly but less than weekly)	The risk event is expected to occur in most circumstances (weekly or more frequently)
1 Minor	An event resulting in a no injury or a minor injury or illness such as a First Aid Injury.	Onsite release, containable with minimal damage.	**1 LOW**	**2 LOW**	**4 LOW**	**7 MODERATE**	**11 MODERATE**
2 Significant	An event resulting in an Injury requiring less than one week away from normal duties.	Major onsite release with some damage, no offsite damage. Remediation in terms of days.	**3 LOW**	**5 LOW**	**8 MODERATE**	**12 MODERATE**	**16 MODERATE**
3 Serious	An event resulting in an Injury requiring more than one week away from normal duties.	Offsite release, with short term detrimental effect, no significant environmental damage. Remediation in terms of weeks.	**6 LOW**	**9 MODERATE**	**13 MODERATE**	**17 MODERATE**	**20 HIGH**
4 Critical	An event resulting in a disabling injury or permanent disability	Major offsite release, short to medium term environmental damage. Remediation in terms of months.	**10 MODERATE**	**14 MODERATE**	**18 MODERATE**	**21 HIGH**	**23 VERY HIGH**
5 Catastrophic	An event that results in fatality or multiple fatalities.	Major offsite release, long term environmental damage. Remediation in terms of years.	**15 MODERATE**	**19 MODERATE**	**22 HIGH**	**24 VERY HIGH**	**25 VERY HIGH**

Order of Preference	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Method	**Elimination**	**Substitution**	**Engineering Controls** design modification; guarding; permanently fixed physical barrier physical barrier; interlocked physical barrier	**Isolation**	**Administrative Controls**	**Personal Protective Equipment**	Other - Advise Client

Step #	Hazard	Description	Outcome	Current Controls	Current Rank			Proposed Additional Controls	Revised Rank			Comments
					C	L	R		C	L	R	
1.0	Highwall Failure	Soil slump from top of wall (estimated volume 20m3-50m3)	Engulfment (workers/machinery in pit). Collapse/fall into pit (workers/machinery at crest of pit)	ROPS/FOPS on machinery. 2H:1V slope in clay soil over upper 2m of wall, fencing, bunding and signage around crest of wall	4	D	M	2H:1V slope in clay to full depth (some areas up to 4m), fencing/signage or bunding minimum 5m from crest of wall around full pit perimeter (includes abandoned pit). Avoid working in pit during heavy rainfall, redirect any surface flow channels during rainfall away from pit edge	4	E	M	
1.1	Highwall Failure	Large scale wall failure encompassing wall from crest to bench on top of claystone unit. Caused by toppling or block slide on combination of jointing and bedding	Engulfment (workers/machinery in pit). Collapse/fall into pit (workers/machinery at crest of pit)	ROPS/FOPS on machinery. Fencing and signage around part of crest of wall. Wall cut near vertical and is not undercut. Bench on top of claystone unit at base of pit to prevent undercutting at this level.	5	E	M	No adversely oriented geological defects observed that could result in overall wall collapse. Ensure wall is not undercut during excavation.	5	E	M	
1.2	Highwall Failure	Collapse of face in claystone unit below bench caused by toppling on joint sets/water ingress from water ponding on bench and/or undercutting of slope	Partial engulfment (assumes 4m high face, current face)	ROPS/FOPS on machinery. Face is cut near vertical and not undercut	4	D	M	Grade bench to prevent water ponding, No persons allowed on bench or within 10m of base of claystone wall.	2	E	L	

Step #	Hazard	Description	Outcome	Current Controls	Current Rank			Proposed Additional Controls	Revised Rank			Comments
					C	L	R		C	L	R	
1.3	Highwall Failure	Collapse of face in claystone unit below bench caused by toppling on joint sets/water ingress from water ponding on bench and/or undercutting of slope	Full engulfment (assumes face higher than 4m and current pit floor is deepened).	ROPS/FOPS on machinery. Face is cut near vertical and not undercut	5	C	H	Grade bench to prevent water ponding, No persons allowed on bench or within 10m of base of claystone wall.	3	D	M	
1.4	Highwall Failure	Small rock fall from highwall above bench (<100mm size), loose material on wall from excavation or has become loosened due to weathering	Personnel/machinery struck while working in pit	ROPS and FOPS on machinery	4	D	M	No workers standing within 10m from toe of wall. Hard hats to be worn when outside of machinery when it pit.	2	E	L	
2	Failure/collapse of dumped materials in nearby abandoned pit	Soil slump failure	Engulfment or fall/collapse into pit void containing water	None	5	C	H	No workers or machinery allowed within 5m of crest of any dump face. Remove ponded water from crest of dump face into void. Product stockpiles a minimum 5m from crest of any dump face into void. Remove water from void prior to dumping/pushing material into void. Dump face height kept at less than 2m.	3	E	L	
3	Failure/collapse of ground above underground workings	Sudden sink hole development above working	Worker/machinery fall into sink hole on site	None	5	C	H	No machinery allowed over roof of working where depth of cover is less than 5m. Progressively excavate/collapse workings using machinery standing to side of opening (>5m horizontal distance from edge of working) or at floor of working	4	D	M	

Step #	Hazard	Description	Outcome	Current Controls	Current Rank			Proposed Additional Controls	Revised Rank			Comments
					C	L	R		C	L	R	
3.1	Failure/collapse of ground above underground workings	Sudden sink hole development above working	Vehicle/pedestrian fall into sink hole off site	Security guard watching existing sink hole near roadway	5	E	M	Confirm location of workings using survey and matching workings currently exposed to record tracings. Where workings extend off site, either excavate and replace with compacted fill or infill void with concrete//sand cement or similar	1	E	L	
3.2	Failure/collapse of ground above underground workings	Sudden sink hole development above working	Vehicle/pedestrian fall into sink hole off site	Fence of areas prior to backfilling	5	D	M	Confirm location of workings using survey and matching workings currently exposed to record tracings. Where workings extend off site, either excavate and replace with compacted fill or infill void with concrete//sand cement or similar	1	E	L	
4	Product stockpile failure	Slump failure	Engulfment, person on ground or person in machinery	Stockpiles less than 4m-5m high	5	D	M	No persons allowed on ground within 10m distance of any undercut stockpile slope (i.e. slope that has been cut steeper than angle of repose >37˚). Limit stockpile height to maximum 5m. Machinery to load from stable near horizontal floor at base of stockpile. Prevent water ponding against stockpiles	2	E	L	

Comments

Signatures: Name James Young_____ Signature _____ Date 4/05/2017

Name Paul Lambert_____ Signature _____ Date 4/05/2017

Appendix H
Principle Hazard Management Plan

GROUND/STRATA INSTABILITY
PRINCIPAL HAZARD MANAGEMENT PLAN
OAKLANDS QUARRY-OAKLANDS

DOCUMENT HISTORY

Revision No.	Description of Revision	Date
1	Initial Draft – GSIMP (legislation compliance)	11/04/2017
2	Modified specifically for Oaklands Mine	15/04/2017
3	Edited and revised and issued as Draft	20/04/2017
4	Revised and issued as Final Draft	4/05/2017
5	Revised and reissued following comment Final	4/05/2017

CONSULTATION

Revision No.	Personnel	Date
3	Debbie Cook-PGH	30/04/17
4	Debbie Cook-PGH	04/05/17

TABLE OF CONTENTS;

Attachments

Risk Assessment Review Form PGH-SMH-FRM – 001.0
Oaklands Mine Strata -check Sheet PGH-SMH-FRM – 002.0

1.0 PURPOSE

The Oaklands Clay Quarry (Oaklands) is operated by PGH Brick & Pavers (PGH). The Oaklands Ground or Strata Failure Principal Hazard Management Plan (PHMP) shall be implemented as part of the Oaklands Safety Management System (SMS). Oaklands have obligations to manage the risk of ground or strata failure and subsidence in accordance with:

- NSW Work Health and Safety Act and Regulations 2011;
- NSW Work Health & Safety (Mines and Petroleum Sites) Act 2013; and
- NSW Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 - Clause 24, Schedule 1 (1).

PGH recognise that geotechnical conditions exist at the Oaklands Quarry that influence the stability of excavated walls, spoil slopes and natural ground surfaces through subsidence and possibly sink hole development. The geotechnical conditions are controlled by geology, groundwater and surface hydrology. The design and construction details for excavated walls and underground workings combined with the geotechnical conditions determine the level of ground or strata failure risk.

The purpose of the PHMP is to identify all hazards related to ground or strata failure including subsidence that have the potential to result in a serious consequence (i.e. fatality or injury) and to outline the processes used to manage these risks.

2.0 SCOPE

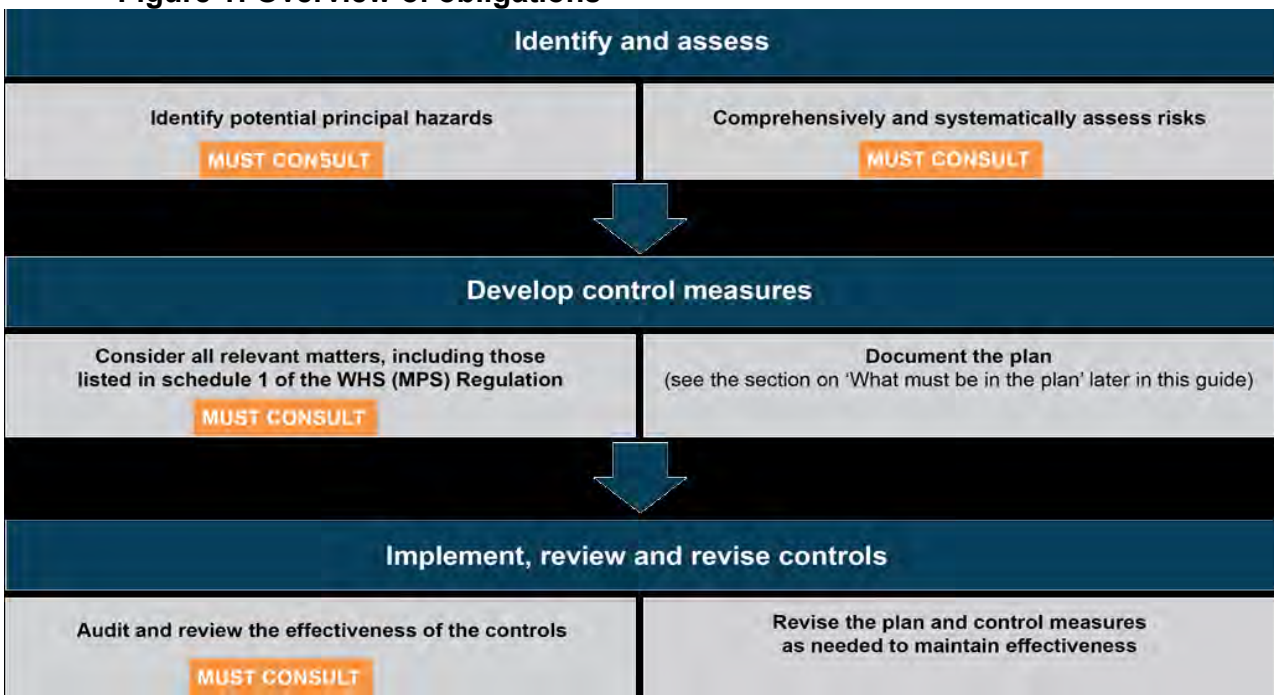
PGH shall engage a suitably qualified geotechnical consultant to undertake the following:

- Identification of potential principal hazards related to a ground and strata instability including subsidence;
- Comprehensively and systematically assess the risk associated with the identified principal hazards; and
- Management of risk appropriately in accordance with figure 1 - overview of obligations in the principal hazard management plan guide by NSW Department of Industry, Resources Regulator, Mine Safety | v1.0 December 2016.

A site risk assessment shall be undertaken to determine the current risks associated with ground and strata instability, identify current controls and management processes and developing additional controls, for any gaps identified through the risk assessment process.

The risk assessment process shall incorporate a selection of operators, management and personnel with appropriate geological, geotechnical and operational expertise, ensuring all actions and activities undertaken at the mine are assessed and appropriate controls put into place to provide the ongoing health and safety objectives of this plan.

Figure 1: Overview of obligations



A consultative approach shall be used for managing risk, with worker and other relevant stake holder in accordance with the following:

- NSW code of practice: Work Health and Safety Consultation, Co-operation and Co-ordination published by SafeWork NSW;
- Contractors and other businesses at mines and petroleum sites guide;
- CSR consultation procedure; and
- Consulting workers fact sheet.

Figure 2 Overview of PHMP content.

The PMHP shall include the following:

(a) describe the nature of the principal hazard to which the plan relates;
(b) describe how the principal hazard relates to other hazards associated with mining operations at the mine site;
(c) describe the analysis methods used in identifying the principal hazard to which the plan relates;
(d) include a record of the most recent risk assessment conducted in relation to the principal hazard;
(e) describe the investigation and analysis methods used in determining the control measures to be implemented;
(f) describe all control measures to be implemented to manage risks to health and safety associated with the principal hazard;
(g) describe the arrangements in place for providing the information, training and instruction required by clause 39 of the WHS Regulations in relation to the principal hazard,
(h) refer to any design principals, engineering standards and technical standards relied on for control measures for the principal hazard; and
(i) set out the reasons for adopting or rejecting each control measures considered

3.0 INDENTIFICATION AND ASSESSMENT OF PRINCIPAL HAZARDS AND GEOTECHNICAL RISKS

The objective of the risk assessment is to identify and assess geotechnical hazards which are potential Principal Hazards and how they relate to other identified hazards associated with operations at Oaklands. Identify control measures and/or monitoring to reduce risk associated with ground or strata instability including subsidence at the mine. Factors taken into account in the risk assessment include:

- The local geological structure;
- The local hydrogeological environment, including surface and ground water movement; and the effect on rock stability over time;
- The geotechnical characteristics of the rocks and soil, including the effects of weathering and water on strata support and stability;
- The design, installation and quality of rock support and reinforcement, if required;
- The collection, analysis and interpretation of relevant geotechnical data, including the monitoring of openings and excavations;
- The location and loadings from existing or proposed mine infrastructure such as stockpile waste dumps, haul roads and mine facilities;
- Any previously excavated or abandoned workings;
- The proposed and existing mining operations, including the nature and number of excavations, the number and size of permanent or temporary voids or openings,

backfilling of quarried areas and stopes, abutments, periodic weighting and windblast or air-blast;

- The design, layout, operation, construction and maintenance of any dump, stockpile or emplacement area at the mine;
- The filling requirements for mined areas and the material to be used as fill;
- The stability of any slopes;
- the use of appropriate equipment and procedures for scaling;

3.1 Hazard Identification and assessment methodology

Geotechnical Hazards identified following risk assessment will be assessed by the methodology including but not limited to:

- Desktop review of historical data including underground mine tracings;
- Detailed geological mapping of Oaklands site and pit faces;
- Risk Assessment
- Geotechnical drilling and logging;
- Laboratory assessment of strata;
- Development of geological models; and
- OCE Inspections

Identification of Principal Hazards and assessing the associated risk shall be conducted in general accordance with Work Health and Safety (Mines and Petroleum Sites) Regulation 23 Identification of principal hazards and conduct of risk assessments (cl 627 model WHS Regs) using. With the investigation and analysis methodology utilised in assessing the risk being appropriate to each hazard identified as well as collectively with other hazards.

Risk assessment shall be undertaken using **Hazard Identification, Risk Analysis, Control Identification & Review Form PGH-SMH-FRM 001**

The current Risk Assessment was undertaken on: (3/04/2017)

4.0 MANAGEMENT OF GEOTECHNICAL RISKS

The process for managing geotechnical risk at Oaklands will be developed following identification of the geotechnical hazards identified by the processes outlined in Section 3 above and their relationship to other identified mining hazards. These will include:

- Scheduled geotechnical inspections;
- Pit Design utilising the geological model and geotechnical inputs from Section 3.1;
- Development of control plan specific for the hazard identified,

- Training of Oaklands personnel in identification of potential and actual geotechnical hazards;
- Development of Trigger Action Response Plans (TARP's); and
- Development of a routine inspection and monitoring program, including inspection checklists.

4.1 Site Assessment and Engineering

Site assessment of the geotechnical / geological structure and hydrogeological environment shall be undertaken to determine the ground and strata considerations for mining activities to be undertaken at Oaklands Mine. The following methodology, construction and assessment shall be inclusive of the operation over the operations life cycle.

4.2 Geotechnical /Geological Structure and Materials

The methods which will identify and control geotechnical hazards will be determined following identification and assessment of the hazard and how it interacts on the operation of the mine and other potential hazards.

Following consideration of the above points listed in Sections 2 and 3, along with any other factors posing potential or actual risk, an assessment will be made as to:

Oaklands being assessed as either (suitable / unsuitable) for continued operation. (NB Where continued operation is found to pose unacceptable and unmanageable risk with existing controls. Operation must cease until suitable controls to manage risk are established).

Material Stability is noted as either (stable/unstable), with continued weathering of exposed areas producing (little/minor/significant) concern to the stability of the ground and strata within and around the pit and stockpiles.

Based on the above findings, ground and strata stability will be maintained throughout the operations life cycle, by operating within the Mine Operating Plan (MOP) and following design criteria itemised below.

4.3 Pit Design

Pit was initially undertaken shallow mining utilising, scrapper small dozer and front end load to an envisaged depth of 6m below ground surface level (bgsl). The 2003 MOP comprised a single bench a permanent batter slopes of 1 in 3 (vertical: horizontal). Mining depth has since been revised to 23m bgsl as indicated in the Conditions Compliance Report July 16 (allowable to 35m bgsl as per Schedule 1 of the Mining lease and 23m as per Urana Shire Council consent condition 14). Mining has now progressed beyond 15m bgsl. The new MOP due in 2017 will incorporate specific design for the revised mining plan. The new MOP will incorporate the following details within the MOP and in accordance with the design criteria to be determined following geotechnical evaluation and risk assessment currently in progress:

Maximum Wall Height: To top of claystone (kaolin) ≈ 15-20m
Maximum Slope Angle: Vertical while operational
Bench Width: 5m
Haul Road Width: To allow safe passing of two vehicles

Inclusive within the pit design shall be the influence of abandoned underground workings along

with the rehabilitation processes, including determination of fill material, material depths, weathering effects, contours and ground vegetation requirements.

4.4 Stockpile Design

Stock pile Area: as per MOP
Maximum face 5m
Batter slopes: Stable slope while working, 1V:3H permanent
Surrounding Area: as per 2017 MOP

4.5 Roadways

The roadways at Oaklands shall be constructed with consideration to all weather operation in accordance with the 2017 MOP including:

- Drainage;
- Surfacing;
- Gradient and cross-fall;
- Dust;
- Risk or subsidence;
- Appropriate bunding adjacent excavations; and
- Risk of strata collapse.

4.6 Drainage

Drainage throughout the site will be managed through the site water management plan (WMP). This plan outlines the requirements for management of surface and ground water, including storm events. Drainage for the site will take into consideration those effects that will impact on ground and strata stability and manage through design, maintenance and continued monitoring, a stable mining environment.

Design shall take into consideration:

- Water ponding behind the pit face;
- Water Flow over the pit face;
- Water Flow into the pit via infiltration / piping;
- Water Flow Out of the pit face;
- Effects on stockpiles;
- Effects on roadways; and
- Effects on buildings and structures.

4.7 Mobile Equipment Selection

Mobile equipment selection will be undertaken in line with the requirements of the MOP, with reference to Guideline for Mobile and Transportable Equipment for Use in Mines (MDG 15) and this PMHMP, ensuring that equipment selection is appropriate for mining activities and based on the above design criteria.

Selection criteria shall include:

- Suitable equipment to safely undertake face scaling; and
- Safe operation of machinery in proximity to the face.

4.8 Ground Subsidence

An inspection and monitoring program shall be implemented to manage risk due to subsidence. The planning of mining should take into consideration the risk of subsidence and potential consequences to life and property. Alteration to the MOP shall be undertaken were the risk of subsidence cannot be managed appropriately. The suitability of the methodology be employed for backfilling of sinkholes is being assessed by the Department of Industry – Resources & Energy (DRE) during inspections, as per Item 2 of the Notice of Satisfactory AEMR 13 October 2016.

Measures to eliminate / manage risk may include:

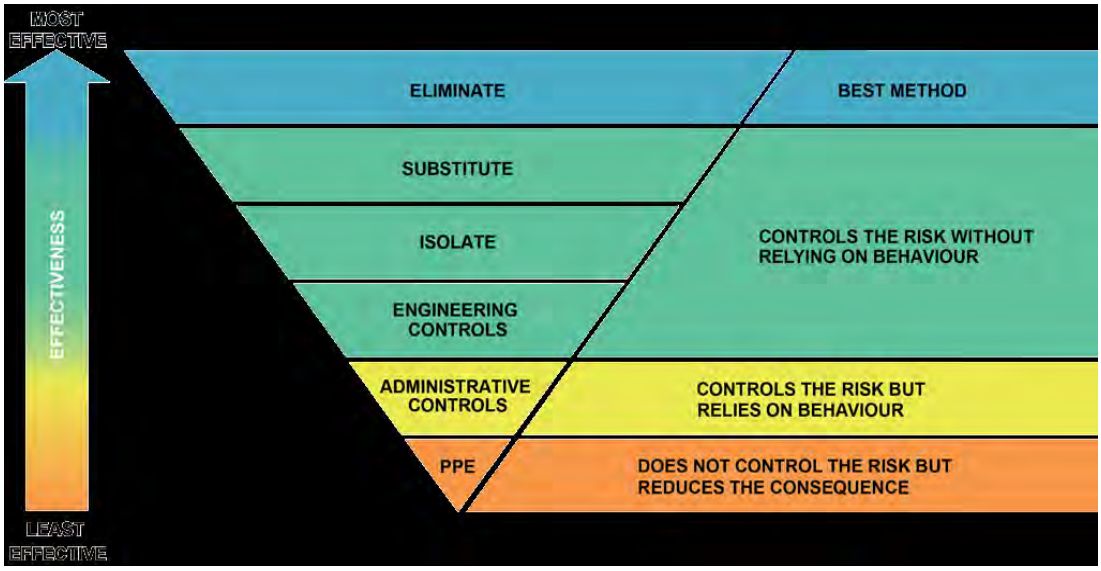
- Mining of abandoned areas; and
- Rerouting haul roads and mining to avoid underground workings.

5.0 HAZARD MANAGEMENT CONTROL PLANS

The main control plan for hazard management will be the revised 2017 MOP in which the PHMP will also be incorporated as part of the Oaklands Safety Management Plan. Individual control plans will be undertaken where warranted following Risk Assesment.

The hierarchy of control shown below in figure 3 shall be used with the focus on elimination adopted as best practice where practical.

Fig 3 The hierarchy of control showing the highest to lowest level of protection



The following actions and activities are designed to ensure that all persons entering the mine are not exposed to undue risk from potential threats relating to ground and strata instability.

Design, assessment criteria and determination of mining activities has been undertaken and is outlined within the site Annual Environmental Management Report (AERM), July 2016 and Conditions Compliance Report (CCR) July 2016. This AEMR and CCR shall cover the following

areas associated with the management of ground and strata instability and shall be undertaken in the following manner.

5.1 Geological / Geotechnical Structure

The geotechnical assessment provides for a maximum wall height of 15-20m to the top of the claystone (Kaolin), with a 5m bench provided at this level with mining activities utilising a 5% back slope on the face (a vertical face is tolerable during short periods of extraction prior to backfilling)

Bench widths are to be determined (as outlined within the site risk assessment) and MOP updated following assessment. It is noted that no benching has taken place at this stage within the mining operation.

Daily inspections using the **Oaklands Mine Strata Check Sheet** when in operational mode shall be undertaken by trained and competent designated person during their normal job activities. These inspections shall be recorded on the site **Oaklands Mine Strata Check Sheet**, along with any actions required. Where actions are required, the operator shall advise the Mine Supervisor who shall manage activities and record details.

Daily inspections during and prior to operation shall include bunding, wall faces, slopes, roadways and stockpiles.

5.2 Hydrogeological Structure

A draft water management plan (WMP) November 2016, has been developed to manage water use, drainage and storage for the site. Through the assessment of surface and ground water it has been determined that there is little risk of strata instability during mining operations, from normal adverse weather events, or long term material weathering when mining and rehabilitation is undertaken in accordance with the MOP.

It is therefore considered that the current and proposed water management strategy as per the draft WMP is sufficient to manage and alleviate any potential influence on strata instability along with any specific control put in place due to geotechnical and risk assessment. Monitoring and assessment reviews will be undertaken daily when in operational mode and following each adverse weather event to ensure continued safe operation. The results of the review will be recorded on the **Oaklands Mine Strata Check Sheet**.

5.3 Stockpiles

Stockpile floor and wall stability shall be continually monitored by operations personnel during their daily activities. Any adverse conditions noticed shall be brought to the attention of the Mine Supervisor.

Inspections of stockpile areas shall be recorded on the **Oaklands Mine Strata Check Sheet**.

5.4 Rehabilitation

Rehabilitation activities have been outlined in the MOP, and shall be followed when areas have been completed. Fill material, material depths and contours shall be consistent with those outlined within the MOP, and an ongoing assessment of the rehabilitation areas shall be included within the yearly external audit process, until the auditor assesses that further assessment is no longer required.

5.5 External Auditing

Yearly auditing of all areas shall be undertaken by suitably qualified and experienced personnel ensuring that ground and strata conditions are being managed in accordance with this plan. The audit report shall capture:

- The current ground and strata conditions in the pit area;
- Assessment of the geotechnical structure present to that within the design criteria;
- Assessment of the current hydrogeological conditions (including surface & ground water/drainage);
- Any unstable materials;
- Effects of weathering on the current operation;
- Effects of any faults, cavities, intrusions, bedding or jointing;
- Assessment of any rehabilitation areas within the site;
- Recommendations for modifications to the operation, if any; and
- Any additional hazards identified during the audit process.

The AEMR or CCR will be used for reporting compliance.

6.0 TRAINING

Induction and training of mine operations personnel and appropriate contractors shall be undertaken, to ensure personnel are competent in the assessment and evaluation of ground and strata instability conditions.

7.0 REVIEW

This PMHMP, engineering design and the ongoing control and monitoring of Ground and Strata processes shall be reviewed:

- 12 months after being implemented;
- In the event of an incident/accident this plan has been designed to manage;
- Where a major change is made to the mine that effects the design parameters associated with Ground and Strata;
- In the event that the materials/strata being mined are inconsistent with the original engineering reports and design; and
- 3 yearly, following the original 12-month review.

8.0 RESPONSIBILITIES

8.1 Mine Manager (Mine Operator)

- Prepare and manage this Principal Mining Hazard Management Plan based on the risk of persons, plant and equipment being exposed;
- Develop tools/forms to allow monitoring and reporting of all inspections;
- Implement and control an inspection regime, whereby site inspections are carried out, to detect the potential of instability within roads, walls, batters, bench or stockpiles;
- Take action if conditions or potential threats are not stabilised within a timely manner; and
- Monitor the risk associated with the withdrawal condition to allow the early prediction of an emergency situation arising;

8.2 Mine Supervisor

- Manage this Principal Mining Hazard Management Plan based on the risk of persons, plant and equipment being exposed;
- Supervise the inspection regime, whereby site inspections are carried out within the mining operations area and across the site, to detect the potential of instability within walls, roadways, batters, benches or stockpiles;
- Monitor strata ground instability following weather, or natural seismic events;
- Ensure trained competent personnel are utilised to carry out inspections;
- Take action if conditions or potential threats are not stabilised within a timely manner.
- Train operators in the requirements for inspections and reporting; and
- Monitor the risk associated with the withdrawal condition to allow the early prediction of an emergency situation arising.

8.3 Plant Operators and Site Personnel

- Follow the instructions from the Mine Manger/Supervisor in the event that deteriorating conditions pose a threat to wall, roadways, stockpile stability;
- Undertake training for inspection of mining areas;
- Maintain drainage and storm water ways;
- Isolate and barricade off areas of concern, where found during inspection; and
- Immediately report any newly found conditions (cracks or deteriorating walls) to the Mine Manger/Supervisor.

Appendix I
EP Risk Report

30 May 2017
Ref: EP0484.002_LR1

PGH Bricks and Pavers
Locked Bag 1345
North Ryde BC NSW 1670

Attention: Debbie Cook

Geotechnical Site Inspection and Stability Analysis Results
PGH Quarry, Oaklands, NSW

Introduction

EP Risk Management Pty Ltd ('EP Risk') were engaged by PGH Bricks and Pavers (PGH) to undertake a geotechnical inspection and summary of stability analysis results of quarry walls ('the Assessment') at the PGH Quarry, Oaklands, NSW ('the Site').

The assessment, and modelling of the pit was undertaken by Paul Lambert a principal engineering geologist with over 20 years' experience in geotechnical engineering in Australia and Asia. Paul has particular expertise in rock and soil slope stability assessments (including slope risk assessments) and slope retention design for mining, road/rail and residential developments. Paul's CV is attached.

Observations

The Site is located about 7.5 km north-east of Oaklands in NSW and is bounded by Coorabin Road along the northern boundary and an unknown (unsealed) road along the eastern boundary. To the north of Coorabin Road is a larger disused pit which is owned and was mined by others and is not part of the site.

Reference to the Jerilderie 1:250,000 Geological Map shows the site is underlain by residual and colluvial soils overlying Tertiary pebbly sandstones, mudstones and claystones.

Topographically, the Site is located in near flat lying terrain with no obvious drainage lines within the near vicinity of the site. A large meandering creek is located about 3 km north of the Site.

The pit mines a white claystone material (kaolin) which is used for brick making at the PGH facility at Hueske Road, Jindera. At the time of inspection, no mining was current occurring at the site. Observations are provided below.

The pit contains a ramp at the south end leading down into a square shaped excavation with near vertical (~75˚) walls. Benching has occurred on the walls at various intervals and the upper 2 m-3 m of the wall has been laid back at around 2H:1V (estimate).

Melbourne
22/1 Ricketts Road
Mount Waverley, Vic, 3149
T 03 8540 7300

Sydney
G11/283 Alfred Street
North Sydney, NSW, 2060
T 02 8324 7508

Newcastle
3/19 Bolton Street
Newcastle, NSW, 2300
T 02 4913 5650

W www.eprisk.com.au **ABN** 81 147 147 591

Materials in the pit are won using a combination of excavation methods employing ripping and free digging with scrappers, dozers and excavators and no blasting is required at the site. The pit walls are trimmed/ scaled using an excavator bucket to form reasonably smooth walls.

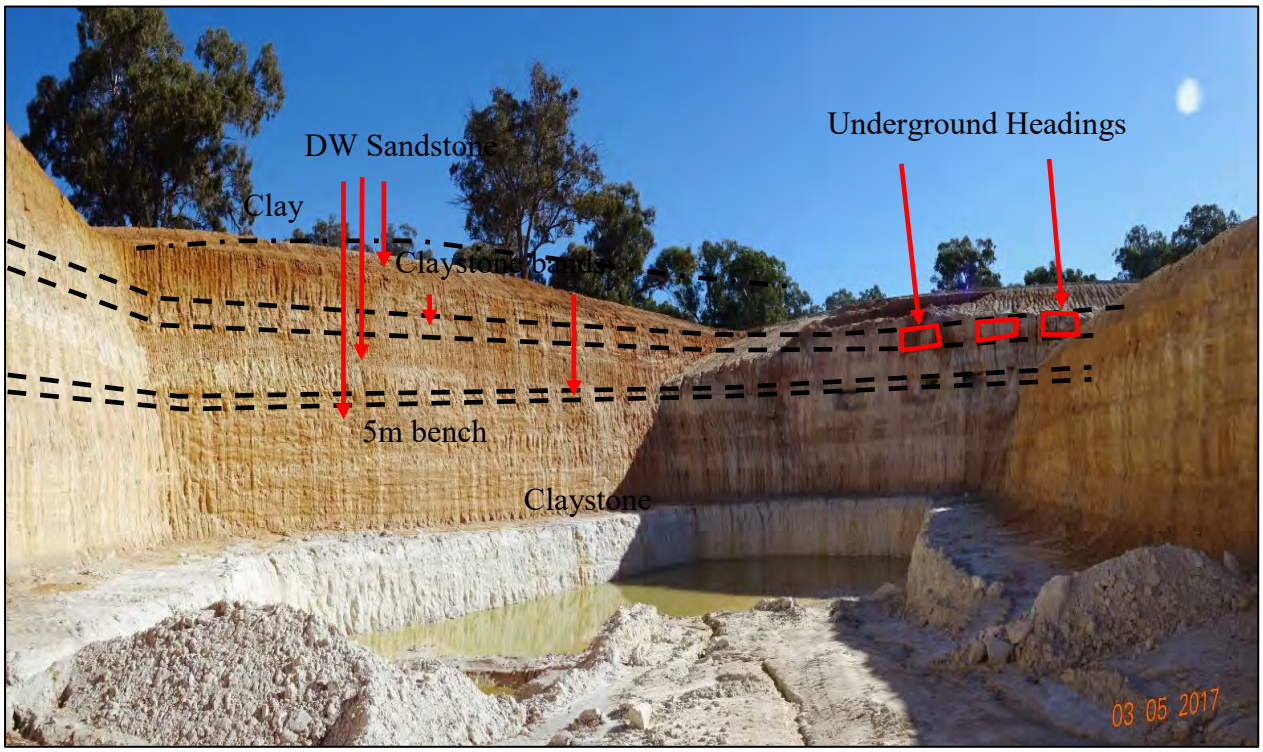
Geology exposed on the walls comprised residual clay soils about 2 m-3 m thick overlying sandstone which was estimated to be low-medium strength and distinctly weathered. The sandstone was generally coarse grained and cross bedded with no obvious jointing or faulting observed. Two approximate 1 m-2 m thick claystone bands sub-horizontally bedded were noted within the sandstone unit with a thicker claystone unit (>3 m thickness) at the current pit floor level. Underground mining has occurred in the upper claystone band in the past with abandoned square shaped headings noted in the northern wall about 7 metres below ground level ('mBGL').

A 5m wide bench was observed at the boundary between the sandstone and thicker claystone unit at the base of the pit. The claystone unit at the base of the pit contained jointing near vertical and striking north-east/south-west and north-west/south-east.

No instability was noted in the walls apart from a narrow crack in the 5 m wide bench on top of the claystone unit. The cracking followed a joint set observed in the underlying claystone. The crack is possibly due to a combination of toppling and saturation of the claystone due to ponding water at the base of the pit. Only minor small rock fall was noted on the 5m wide bench on top of the claystone unit. No other sign of instability on the pit walls was observed.

No seepage was observed on the walls. Water was ponding in the base of the pit at time of inspection, though it is not known what proportion of the ponded water was rainfall. Reference to rainfall data showed about 44 m of rainfall in Urana (about 25 km north of the site) on 26 April 2017, about 1.5 weeks prior to the Site inspection. Therefore, a large proportion of the ponded water was most likely derived from rainfall.

Photograph 1 Ramp into Pit



Photograph 2 Pit walls

Photograph 3 From base of pit showing pit walls in good conditi

Photograph 4 Crack in claystone bench follows north-east/south-west joint

Photograph 5 Face above headings in northern wall, no sign of instability/cracking etc.

A nearby abandoned pit exists in which mining to a shallow depth has occurred in the past. Waste material (sandstone) is dumped into this pit. At the time of inspection this pit contained water.

Photograph 6 Abandoned pit used for dumping waste (sandstone) material

Photograph 7 Fill slope rilling into abandoned pit with water at base-note product stockpiles (white claystone) about 5m from crest of fill slope

Proposed New Wall Design

A new pit wall design has been developed by others (VGT) and is attached to this report. The design criterion for the new pit wall design includes:

- 3H: 1V (~18˚) walls from surface to RL136 m (~5 m-9 m height).
- 1H: 1V (45˚) walls by 5 m high below RL136 m to final pit floor at RL126 m.
- 10 m wide benches at RL136 m and RL131 m.

Stability Analysis

Stability analyses have been completed using SLIDE software from Rocscience adopting the GLE Morgenstern Price Method. The purpose of the stability modelling was to calculate Factors of Safety of the pit wall in its current condition and adopting the slope profile from the proposed new mine design. The existing wall geometry was gained from a visual estimate during the site inspection.

Material parameters used in the stability modelling and are shown in **Table 1**. The parameters were assumed based on experience and viewing pit wall materials. Groundwater was assumed to daylight at the current pit wall toe with a shallow rise to a maximum 5 m above pit floor.

Table 1 – Summary of Material Parameters

Material	Parameters
Upper XW Rock and Soil	γ =21kN/m^3, c'=10kPa, Ø'=30˚
Distinctly weathered rock (sandstone)	γ =24kN/m^3, c'=100kPa, Ø'=35˚
Distinctly weathered rock (claystone)	γ =22kN/m^3, c'=50kPa, Ø'=25˚
Distinctly weathered rock (claystone) underground mined	γ =22kN/m^3, c'=37.5kPa, Ø'=25˚
Weak Bands (sandstone/claystone interface)	γ =20kN/m^3, c'=0kPa, Ø'=15˚

γ= Unit Weight, c'=Drained cohesion, Ø' = Drained Friction Angle

The assumed failure mechanism that was considered in the modelling involved block sliding along the claystone/sandstone interface to simulate an overall wall collapse mechanism. Viewing the claystone bands in the wall it appears that bedding is near flat lying (horizontally bedded), therefore the failure plane was assumed to be flat/horizontal. No other wall instability mechanisms were identified during the site visit apart from the possibility of shallow slumping in soil near the wall crest and slumping/toppling collapse of the claystone at the base of the pit caused by water saturation and softening of the claystone material.

The stability analysis results are appended to this report and show the pit walls in their current condition have a Minimum Factor of Safety of 1.58. The model assumed the slope profile on the western wall which was the steepest wall observed in the pit. The northern and eastern walls which contain wide benches in the upper wall profile are likely to have higher Factors of Safety. The pit wall profile adopted for the proposed new slope design, has a Minimum Factor of Safety of 2.66.

A risk assessment has also been completed to assess risk levels associated with the current pit wall design. According to this risk assessment and considering the hazards associated with highwall failure only, the current pit wall slopes have a Moderate to High risk rating which can be reduced to Low to Moderate with recommended controls.

The proposed new pit wall design is significantly flatter than the current wall and provides a Factor of Safety that is well in excess of that generally required for mining operations. A risk assessment assuming this wall design indicated the risk level would be Moderate and could be reduced to Low to Moderate with recommended controls.

Bunding and Drainage

Drainage and bunding should be constructed and maintained to prevent water ponding along the crest of the pit wall. The bund height shall be as the mining operation plan (MOP) and modified where appropriate for new mining techniques or equipment are employed.

Ponded water was noted during a visit on 27 March 2017, but was absence during a second visit on 3 May 2017. Channel should be formed to direct storm water away from the bunding and pit crest.

Photograph 8 Showing ponded water at the crest on 27 May 2017

Subsidence

Subsidence is in the form of sink hole development has occurred in the north-eastern portion of the site and recently outside the site boundary adjacent Coorabin Road. Subsidence has also reoccurred in the areas where sinkholes have been backfilled. The reoccurrence appears to be related to pipping failure due to ponding of water and saturation of unconsolidated backfill due to recent heavy rainfall. Area should be backfilled and graded to divert water away from areas and prevent ponding. Tension cracking was also noted on around the edge of backfilled suggestive of consolidation with saturation or possible migration of fines, but likely the former.

The sinkhole outside the site boundary is judges to be at the end of a drive and is likely associated reduced cover and concentration of underground working in that area. This sink hole should be backfilled with stabilised sand or suitable grout to form a moisture insensitive plug or excavated and backfilled as per the recommendation of the recent risk assessment (RA).

It is understood that the revision of the MOP due, shows mining of the NE portion of the site where considered economic by excavation from the base of the abandoned underground workings within the current pit utilising and excavator to progressively excavate and collapse the workings moving in a north and easterly direction.

It is also understood that modification to current haul routes are being undertaken to redirect all traffic to the western and southern sides of the existing pit to avoid trafficking the underground workings.

Photograph 8 Reoccurrence of sink hole in remediated area

30 May 2017
Ref: EP0484.002_LR1

Summary

Based on a pit inspection and stability analyses presented in this report, the current pit wall design appears appropriate for the conditions exposed. The analyses and risk assessment do not indicate a re-design is required, however a slight reduction in risk is suggested for the proposed new pit wall design where remediation of the pit by backfilling as proposed in the current is delayed for an extended time..

It should be noted that flatter batter slopes have a greater propensity to erosion in the form of scour and pipping particularly in residual soils, claystones and weaker rock units exposed permanently or for extended period. It should also be noted that 45^0 slopes have longer boulder trajectory runout and steeper slopes have shorter runout trajectories. Scour and fine migration due to pipping are two of the primary failure mechanisms than can be observed in the abandoned pit north of Coorabin Road. Drainage works are required to divert storm water away from the crest of the pit and prevent the ponding of water behind bunding along the crest of pit walls.

Subsidence in the form of sinkhole development in backfilled areas and new areas in the NE portion of the site area are occurring. Subsidence is expected to be an ongoing issue and backfilling, regrading should be undertaken to minimize saturation of backfill and prevent ponding of water. The sinkhole outside the side boundary should be either backfilled with stabilised sand or other suitable grout mix to prevent migration of fines. Alternately excavation and backfill in a controlled manner is recommended.

Further investigation of the extent, location and stability analysis of abandoned underground working outside the site is recommended.

for and on behalf of
EP Risk Management Pty Ltd

Reviewd By:

Paul Lambert
Principal Engineering Geologist

James Young
Principal Geotechnical Scientist

Attachments:

Oaklands Stability Analysis
Oaklands Risk Assessment 4 May 2017
Paul Lambert CV

LIMITATIONS

This Geotechnical Site Inspection and Stability Analysis Results was conducted on the behalf of for the purpose/s stated in Section 1.

EP Risk has prepared this document in good faith, but is unable to provide certification outside of areas over which EP Risk had some control or were reasonably able to check. The report also relies upon information provided by third parties. EP Risk has undertaken all practical steps to confirm the reliability of the information provided by third parties and do not accept any liability for false or misleading information provided by these parties.

It is not possible in a Geotechnical Site Inspection and Stability Analysis Results to present all data, which could be of interest to all readers of this report. Readers are referred to any referenced investigation reports for further data.

Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

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QUALITY CONTROL

Version	Author	Date	Reviewer	Date	Quality Review	Date
v1	P Lambert	26/05/2017	J Young	30/05/2017	S Lord	30/05/2017

Plan of:	Site Specific Field Sheet - Oaklands Clay Mine - Proposed Mine Plan
Figure:	SSFS2
Sheet:	1 of 1
Version/Date:	V0 22/05/2017

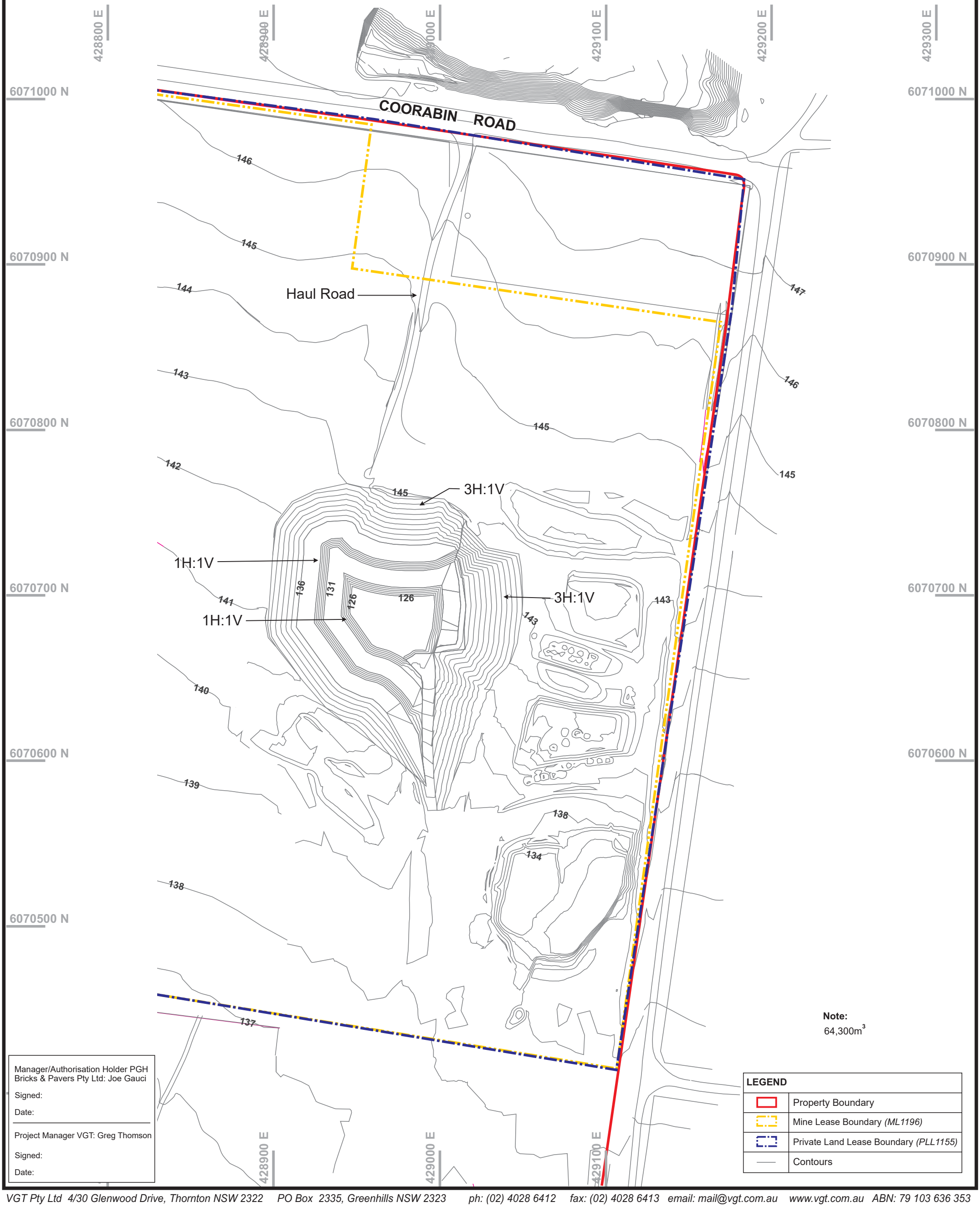
This figure is used as a working site plan and is not Quality Assured.

N

0 20 40 60 80 100m

vgt Environmental Compliance Solutions

Location:	Off Coorabin Road, Oaklands, NSW	***Source:***	Landair Survey Flown 08/02/2017	***Our Ref:***	3384_BO_MOP2017_SSFS002_V0_SSFS2 .cdr
Council:	Urana Shire Council	***Survey:***	Landair Survey Flown 08/02/2017	***Plan By:***	TO/JD
Tenure:	ML 1196 & PLL 1155 (Act 1992)	***Projection:***	MGA	***Project Manager:***	TO
Client:	PGH Bricks & Pavers Pty Ltd	***Contour Interval:***	1m	***Office:***	Thornton



Note:
64,300m^3

Manager/Authorisation Holder PGH Bricks & Pavers Pty Ltd: Joe Gauci

Signed:

Date:

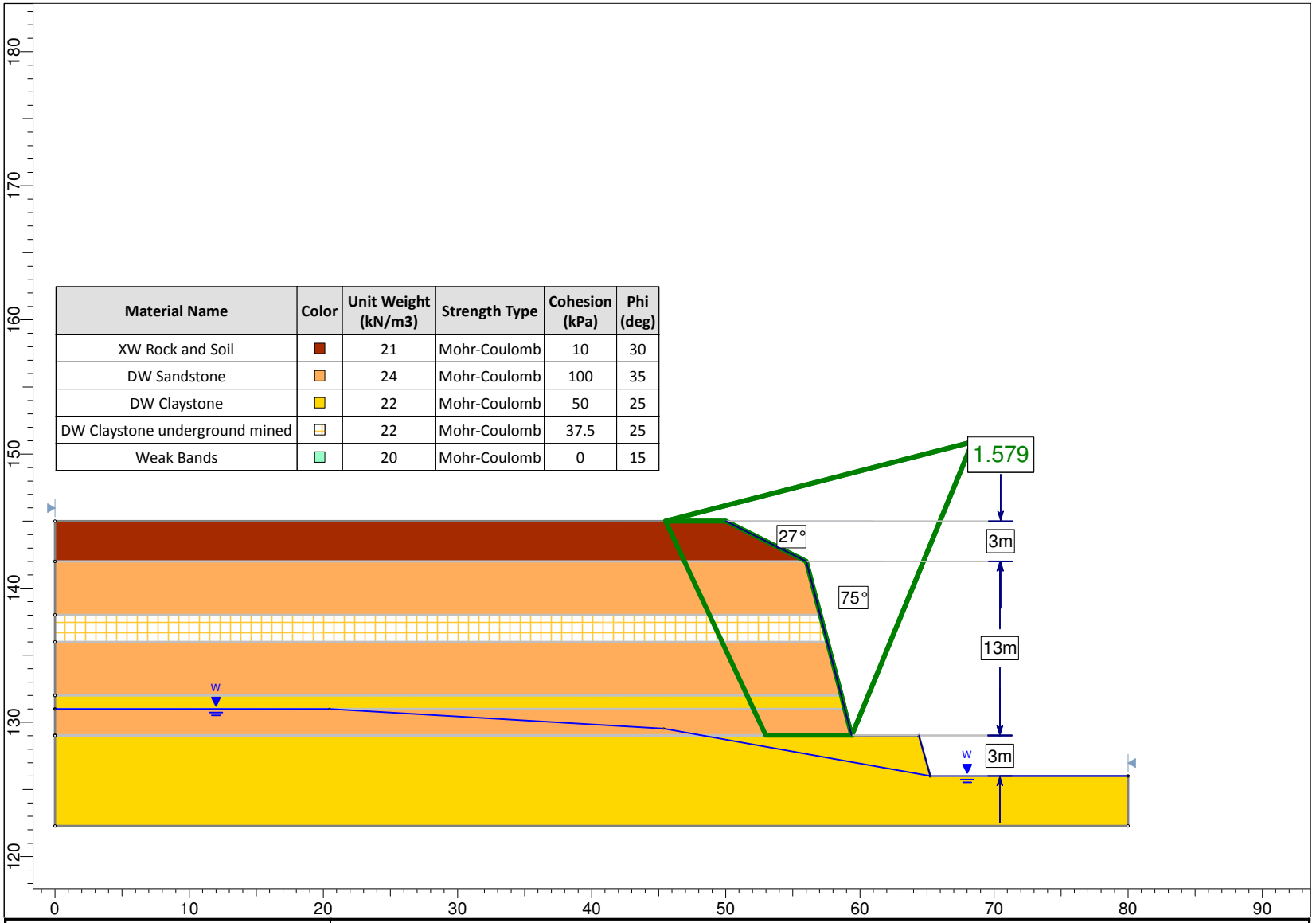
Project Manager VGT: Greg Thomson

Signed:

Date:

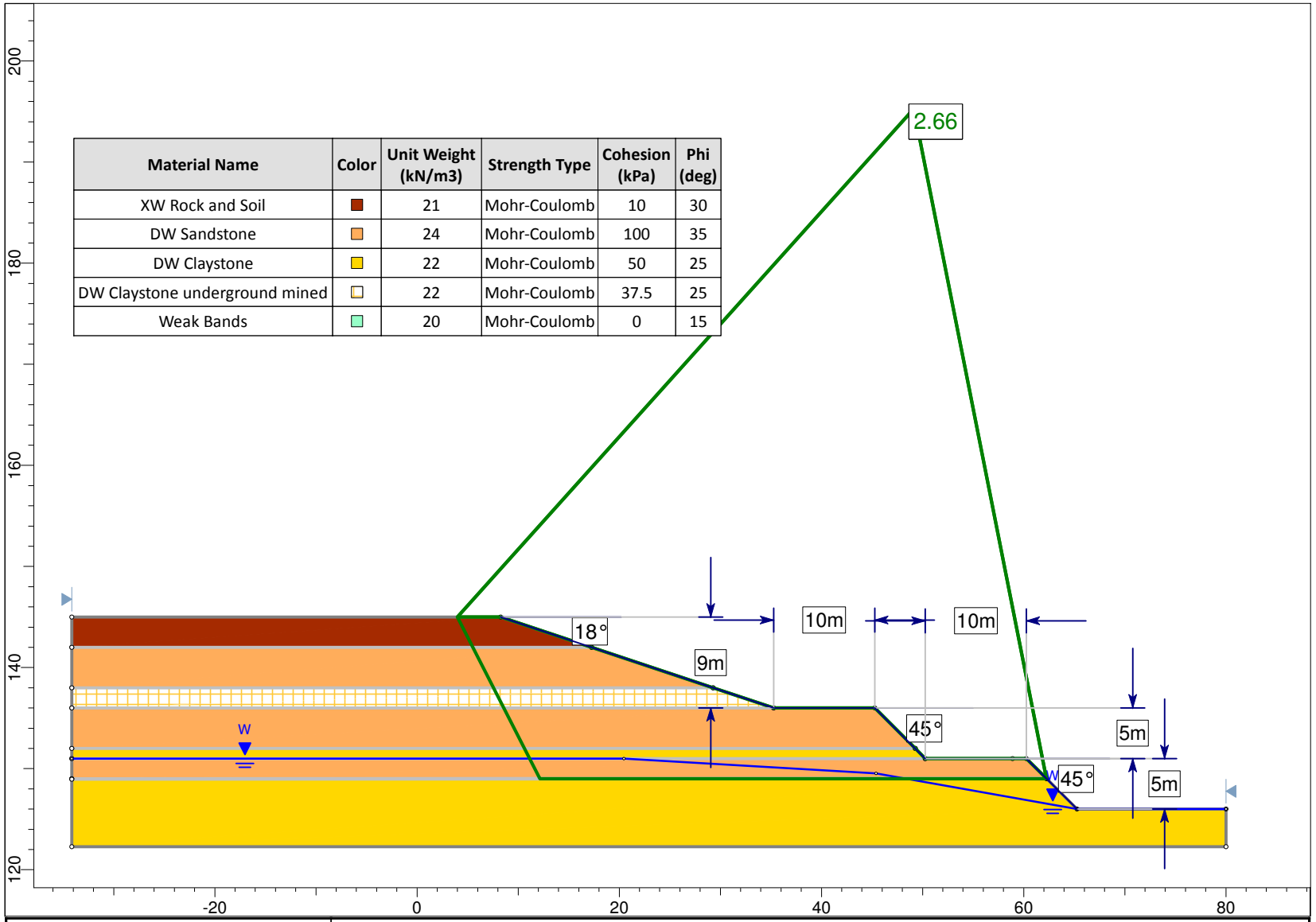
LEGEND	
	Property Boundary
	Mine Lease Boundary *(ML1196)*
	Private Land Lease Boundary *(PLL1155)*
	Contours

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
XW Rock and Soil		21	Mohr-Coulomb	10	30
DW Sandstone		24	Mohr-Coulomb	100	35
DW Claystone		22	Mohr-Coulomb	50	25
DW Claystone underground mined		22	Mohr-Coulomb	37.5	25
Weak Bands		20	Mohr-Coulomb	0	15



	Project	Oaklands Clay Mine			
	Analysis Description	Current Pit Slope Profile			
	Drawn By	PL	*Scale*	1:449	*Company* Lambert Geotech
SLIDEINTERPRET 6.039	*Date*	19/12/2012, 9:29:03 AM			*File Name* Section.slim

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
XW Rock and Soil		21	Mohr-Coulomb	10	30
DW Sandstone		24	Mohr-Coulomb	100	35
DW Claystone		22	Mohr-Coulomb	50	25
DW Claystone underground mined		22	Mohr-Coulomb	37.5	25
Weak Bands		20	Mohr-Coulomb	0	15



rocscience	Project	Oaklands Clay Mine		
	Analysis Description	Proposed Pit Slope Profile		
	Drawn By	PL	Scale 1:595	Company Lambert Geotech
	Date	19/12/2012, 9:29:03 AM		File Name Sectionproposed new slope.slim

SLIDEINTERPRET 6.039

RA Number:		Assessed by:	Paul Lambert / James Young
Inspection Area:	Oaklands Quarry		
Plant/Equipment:	Ground & Strata Instability	Review Date	30 May 2017
Initial assessment date:	3 May 2017	Reviewed By	James Young

POTENTIAL CONSQUENCE -C (select first)			**LIKELIHOOD -L** (select after the consequence rank)				
			E Very Rare or Very Unlikely	**D** Rare or Unlikely	**C** Infrequent or Possible	**B** Occasional or Probable	**A** Frequent or Almost Certain
	Safety & Health	**Environment**	The risk event may occur only in exceptional circumstances (has not occurred and probably never will)	The risk event could occur at some time (three yearly basis, but less than annually)	The risk event should occur at some time (annually but less than four times per annum)	The risk event will probably occur in most circumstances (three monthly but less than weekly)	The risk event is expected to occur in most circumstances (weekly or more frequently)
1 Minor	An event resulting in a no injury or a minor injury or illness such as a First Aid Injury.	Onsite release, containable with minimal damage.	**1 LOW**	**2 LOW**	**4 LOW**	**7 MODERATE**	**11 MODERATE**
2 Significant	An event resulting in an Injury requiring less than one week away from normal duties.	Major onsite release with some damage, no offsite damage. Remediation in terms of days.	**3 LOW**	**5 LOW**	**8 MODERATE**	**12 MODERATE**	**16 MODERATE**
3 Serious	An event resulting in an Injury requiring more than one week away from normal duties.	Offsite release, with short term detrimental effect, no significant environmental damage. Remediation in terms of weeks.	**6 LOW**	**9 MODERATE**	**13 MODERATE**	**17 MODERATE**	**20 HIGH**
4 Critical	An event resulting in a disabling injury or permanent disability	Major offsite release, short to medium term environmental damage. Remediation in terms of months.	**10 MODERATE**	**14 MODERATE**	**18 MODERATE**	**21 HIGH**	**23 VERY HIGH**
5 Catastrophic	An event that results in fatality or multiple fatalities.	Major offsite release, long term environmental damage. Remediation in terms of years.	**15 MODERATE**	**19 MODERATE**	**22 HIGH**	**24 VERY HIGH**	**25 VERY HIGH**

Order of Preference	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Method	**Elimination**	**Substitution**	**Engineering Controls** design modification; guarding; permanently fixed physical barrier physical barrier; interlocked physical barrier	**Isolation**	**Administrative Controls**	**Personal Protective Equipment**	Other - Advise Client

item #	Hazard	Description	Outcome	Current Controls	Current Rank			Proposed Additional Controls	Revised Rank			Hierarchy of Control				
					C	L	R		C	L	R	Elimination	Substitution	Engineering	Admin	PPE
1.0	Highwall Failure	Soil slump from top of wall (estimated volume 20m3-50m3)	Engulfment (workers/machinery in pit). Collapse/fall into pit (workers/machinery at crest of pit)	ROPS/FOPS on machinery. 2H:1V slope in clay soil over upper 2m of wall, fencing, bunding and signage around crest of wall	4	D	M	2H:1V slope in clay to full depth (some areas up to 4m), fencing/signage or bunding minimum 5m from crest of wall around full pit perimeter (includes abandoned pit). Avoid working in pit during heavy rainfall, redirect any surface flow channels during rainfall away from pit edge. Current Mine Plan utilises 1H:1V & 3H:1V batter slopes within the pit.	4	E	M			Yes		
1.1	Highwall Failure	Large scale wall failure encompassing wall from crest to bench on top of claystone unit. Caused by toppling or block slide on combination of jointing and bedding	Engulfment (workers/machinery in pit). Collapse/fall into pit (workers/machinery at crest of pit)	ROPS/FOPS on machinery. Fencing and signage around part of crest of wall. Wall cut near vertical (75º) and is not undercut. Bench on top of claystone unit at base of pit to prevent undercutting at this level.	5	E	M	No adversely oriented geological defects observed that could result in overall wall collapse. Ensure wall is not undercut during excavation. Current Mine Plan utilises 1H:1V & 3H:1V batter slopes within the pit.	5	E	M			Yes		
1.2	Highwall Failure	Collapse of face in claystone unit below bench caused by toppling on joint sets/water ingress from water ponding on bench and/or undercutting of slope	Partial engulfment (assumes 4m high face, current face)	ROPS/FOPS on machinery. Face is cut near vertical and not undercut	4	D	M	Grade bench to prevent water ponding, No persons allowed on bench or within 5m of base of claystone wall. Current Mine Plan utilises 1H:1V & 3H:1V batter slopes within the pit.	2	E	L			Yes		

item #	Hazard	Description	Outcome	Current Controls	Current Rank			Proposed Additional Controls	Revised Rank			Hierarchy of Control				
					C	L	R		C	L	R	Elimination	Substitution	Engineering	Admin	PPE
1.3	Highwall Failure	Collapse of face in claystone unit below bench caused by toppling on joint sets/water ingress from water ponding on bench and/or undercutting of slope	Full engulfment (assumes face higher than 4m and current pit floor is deepened).	ROPS/FOPS on machinery. Face is cut near vertical and not undercut	5	C	H	Grade bench to prevent water ponding, No persons allowed on bench or within 5m of base of claystone wall. Current Mine Plan utilises 1H:1V & 3H:1V batter slopes within the pit. Implementation of routine inspection and monitoring.	3	D	M			Yes		
1.4	Highwall Failure	Small rock fall from highwall above bench (<100mm size), loose material on wall from excavation or has become loosened due to weathering	Personnel/machinery struck while working in pit	ROPS and FOPS on machinery	4	D	M	No workers standing within 10m from toe of wall. Hard hats to be worn when outside of machinery when it pit. Current Mine Plan utilises 1H:1V & 3H:1V batter slopes within the pit. Implementation of routine inspection and monitoring.	2	E	L			Yes		
1.5	Highwall Failure during scaling operations	Failure mechanisms noted in issues 1.0-1.3	Outcomes noted in 1.0-1.3	ROPS and FOPS on machinery	5	D	M	Appropriate selection of scaling machinery. New mine plan shows bench heights of 5-7m	5	E	L			Yes		
1.6	Highwall Failure during excavation of overburden/mining adjacent crest	Failure mechanisms noted in issues 1.0-1.3	Outcomes noted in 1.0-1.3	Controls as per 1.0 -1.3	5	D	M	No scrapper work within 10m of crest. Mining by excavator within 10m of crest New mine plan shows bench heights of 5-7m	5	E	L			Yes		

item #	Hazard	Description	Outcome	Current Controls	Current Rank			Proposed Additional Controls	Revised Rank			Hierarchy of Control				
					C	L	R		C	L	R	Elimination	Substitution	Engineering	Admin	PPE
2	Failure/collapse of dumped materials in nearby abandoned pit	Soil slump failure	Engulfment or fall/collapse into pit void containing water	None	5	C	H	No workers or machinery allowed within 5m of crest of any dump face. Remove ponded water from crest of dump face into void. Product stockpiles a minimum 5m from crest of any dump face into void. Remove water from void prior to dumping/pushing material into void. Dump face height kept at less than 2m. Implementation of routine inspection and monitoring.	3	E	L			Yes		
3	Failure/collapse of ground above underground workings	Sudden sink hole development above working	Worker/machinery fall into sink hole on site	None	5	C	H	No machinery allowed over roof of working where depth of cover is less than 5m. Progressively excavate/collapse workings using machinery standing to side of opening (>5m horizontal distance from edge of working) or at floor of working. Implementation of routine inspection and monitoring. Revised MOP addresses proposed mining of underground workings	4	D	M	Yes		Yes		

item #	Hazard	Description	Outcome	Current Controls	Current Rank			Proposed Additional Controls	Revised Rank			Hierarchy of Control				
					C	L	R		C	L	R	Elimination	Substitution	Engineering	Admin	PPE
3.1	Failure/collapse of ground above underground workings	Sudden sink hole development above working	Vehicle/pedestrian fall into sink hole off site	Security guard watching existing sink hole near roadway. Barricading or fencing.	5	E	M	Confirm location of workings using survey and matching workings currently exposed to record tracings. Where workings extend off site, either excavate and replace with compacted fill or infill void with concrete//sand cement or similar. Implementation of routine inspection and monitoring. Revised MOP addresses proposed mining of underground workings	1	E	L	Yes		Yes		
3.2	Failure/collapse of ground above underground workings	Sudden sink hole development above working	Vehicle/pedestrian fall into sink hole on site	Fence of areas prior to backfilling	5	D	M	Confirm location of workings using survey and matching workings currently exposed to record tracings. Where workings extend off site, either excavate and replace with compacted fill or infill void with concrete//sand cement or similar Implementation of routine inspection and monitoring. Revised MOP addresses proposed mining of underground workings Also plans to relocate haul routes away from underground workings	1	E	L	Yes		Yes		

item #	Hazard	Description	Outcome	Current Controls	Current Rank			Proposed Additional Controls	Revised Rank			Hierarchy of Control				
					C	L	R		C	L	R	Elimination	Substitution	Engineering	Admin	PPE
4	Product stockpile failure	Slump failure	Engulfment, person on ground or person in machinery	Stockpiles less than 4m-5m high	5	D	M	No persons allowed on ground within 5m distance of any undercut stockpile slope (i.e. slope that has been cut steeper than angle of repose >37˚). Limit stockpile height to maximum 5m. Machinery to load from stable near horizontal floor at base of stockpile. Prevent water ponding against stockpiles. Implementation of routine inspection and monitoring.	2	E	L			Yes		

Comments

Signatures: Name James Young (EP Risk) Signature _____ Date 4/05/2017

Name Paul Lambert (EP Risk) Signature _____ Date 4/05/2017

Name Tim Fuge (PGH) Signature _____ Date

PAUL LAMBERT

Current Position
Principal Engineering Geologist

Year's Experience
20+

Profession
Engineering Geology

Qualifications
Bachelor of Science (Geology with Geophysics) Macquarie University, 1990

Master of Applied Sciences (Engineering Geology) University of New South Wales, 1995

Summary of Experience

Over 20 years experience in geotechnical engineering in Australia and Asia with particular expertise in rock and soil slope stability assessments (including slope risk assessments) and slope retention design for mining, road/rail and residential developments

.

Experience with geotechnical site investigations and recommendations for design of building and bridge footings, retaining walls, earthworks and pavements. Open cut coal mine experience including highwall and low-wall stability assessments and surveillance inspections for tailings dams. Geophysical experience in Australia and Indonesia.

KEY PROJECTS

Mining/Quarry Slope Stability

- Ongoing geotechnical inspections, advice and design verification for open cut coal operations including highwall, low-wall slopes and spoil dumps at the following mines:
  - Bulga Coal Mine, Glencore (2006-present)
  - Ravensworth Open Cut, Glencore (2012-present)
  - Liddell Coal Mine, Glencore (2003-present)
  - Mangoola Coal, Glencore (2008-present)
  - Duralie and Stratford, Yancoal (2012-present)
  - Ashton, Yancoal (2010-present)
  - Werris Creek Mine, Whitehaven Coal Limited (2013-present)
  - Rocglen Coal, Whitehaven Coal Limited (2013-present)
  - Integra Coal Operations P/L, Vale (2009-2015)
  - Muswellbrook Coal, Muswellbrook Coal Company Limited (2012-present)

Additional projects include:

- Prefeasibility and feasibility geotechnical assessment for the Bulga Optimisation Project.
- Prefeasibility geotechnical assessment for Mangoola North.
- Preliminary Pit Stability Assessment, Proposed Cobbora Mine, Cobbora Holding Company Pty Ltd.
- Highwall stability assessment, Invincible Colliery, Coalpac P/L.
- Highwall stability assessment, Blackhill Quarry, Woodburys Haulage and Earthmoving P/L. Finite element modelling of highwall failure assessing stresses on coal pillars at base of wall.
- Stability Assessment of Natural Slopes Overlying Proposed Longwall Extraction Area, Ashton Coal Mine, NSW, Ashton Coal Operations Pty Ltd. Assess risk of longwall subsidence movements inducing instability of natural slopes adjacent Glennies Creek and Hunter River.
- Highwall stability assessment proposed open cut Ulan Coal Mine, NSW, Roche Mining Pty Ltd. Assessment of impact of underground workings on highwall stability and recommend mining methods to retrieve coal resource in voided ground.
- Mesh and Bolt Design over Portals, Ashton Coal Mine, Ashton NSW, Ashton Coal Operations Ltd. Highwall inspection and develop suitable mesh and bolt design for 20m high face over 3 portal entries.
- Preliminary Stability Assessment and Mine Design, Bickham Coal Mine, Murrurundi, NSW, Bickham Coal Company Pty Ltd. Stability assessment and preliminary mine design for proposed 300m deep coal mine.

- Stability Assessment, South Antienne Void Rehabilitation, Liddell Coal Mine, NSW, Liddell Coal Operations Pty Ltd. Stability Assessment for placement of coarse rejects capping over tailings in the South Antienne Void. Stability assessment required to assess affect of capping on stability of retaining embankments.
- Stability Assessment, Proposed Boxcuts, Mt Owen Coal Mine, NSW, Hunter Valley Coal Corporation. Assessment of highwall and low wall stability for two proposed boxcuts located adjacent to a rail loop. Review included potential affects on stability due to the introduction of tailings to the boxcuts, and affect on stability of the nearby East Ravensworth Highwall.
- Stability Assessment, Proposed Rehabilitation of Mountain Block, Liddell Coal Mine, NSW, Liddell Coal Operations Pty Ltd. Stability assessment for regrading of 100m highwall that had mined up to 'The Hebden and Hunter Trusts', resulting in some instability during operations. Project involved geotechnical investigation, stability analyses and design for remediation of slope instabilities.
- Stability Risk Assessment, Proposed Auger Mining of Liddell Seam D-ply at Liddell Coal Mine, NSW, Liddell Coal Operations Pty Ltd. Stability assessment assessed the risk of collapse of auger holes when mining the D-ply which was overlain by an approximate 0.8m intact coal roof (C-ply) then partially collapsed underground workings.
- Rehabilitation of Hornsby Quarry, Hornsby NSW, Hornsby Shire Council. Detailed geological mapping and slope stability assessment for rehabilitation of a 100 metre deep hard rock quarry.
- Highwall Stability Assessment, Beltana Coal Mine, NSW, Beltana Highwall Mining. Stability assessment of highwall face over portal entries into underground workings. Involved review and design check of meshing and rock bolt layout over portals.
- Low-wall Stability Assessment, Warkworth Coal Mine, NSW, Rio Tinto Coal Australia. Analysis of low-wall slump and recommendations to reduce risk of recurrence in future mine strips.
- Stability Assessments, Prospect Quarry NSW, Boral Construction Materials. Peer review, stability analyses, site mapping and recommendations for design batters for final end of life quarry plan.
- Stabilisation of Cut Faces, Wallsend Brickworks NSW, Newcastle City Council. Recommend remedial works options for cut faces within the disused quarry. Cut slopes up to about 20m high in highly weathered materials had been formed up to adjoining site boundaries containing buildings and roadways adjacent to the crest.
- Open Cut Slope Stability Assessment, Mt McClure Gold Mine, WA. Slope design recommendations and back analysis of previous slope failures for a thesis project.
- Audit of Geotechnical Group, Kaltim Prima Coal, Indonesia. Audit of geotechnical group comprising approximately 10 engineers.

- Geotechnical finite element modelling for conveyor line constructed over old pit infilled with mud, Kaltim Prima Coal, Indonesia.
- Kelian River Diversion Project, East Kalimantan, Indonesia, PT CRA Engineering Indonesia. Full time on site geotechnical advisor for a 1.2km long river diversion over 18 month period. Responsibilities included detailed geological mapping of interim cut slopes, preparation of final cut slope designs (for slopes up to 110m high in high rainfall environment) and monitor construction of three, 15m high zoned earth/rockfill dams.
- Oriented Core Drilling Program, Mount Muro Gold Mine, East Kalimantan, Indonesia, Aurora Gold. Completion of oriented core drilling program, detailed mapping of existing cut faces and analysis of data for open cut slope design.

Slope Stability (General)

- Stability assessment Wamberal Headland, NSW, National Parks and Wildlife Service. Stability assessment an slope risk analysis of headland above wave platform.
- Rock Face Remediation, Saraburi Concrete Plant, Thailand, Sherwood Geotechnical and Research Services. Detailed geological mapping of cut faces adjacent concrete plant infrastructure and design of rock face remediation including catch fences, gravity walls, mesh and rock bolts to protect infrastructure.
- Bondi Icebergs Upgrade, Bondi, NSW, Southern Cross Constructions Pty Ltd. Project involved design of extensive rock anchor and shotcrete protection for excavation face exposing extremely low to very low strength rock materials and multiple daylighting joints adjacent to roadway.
- Mapping and rock face stabilisation design, Paynes Crossing Road widening, Wollombi, Cessnock City Council.
- Stability Assessment of Road Cutting on Elizabeth Street, Tighes Hill, Newcastle City Council. Project involved providing recommendations for stabilising the cutting including rock bolts, shotcrete and rock fall mesh.
- Stability Assessment Proposed Residential Development, Speers Point NSW, Stevens Group. Stability assessment of a known landslide risk area at Speers Point and recommendations for stabilisation of land to allow residential development.
- Slope Risk Assessment, The Ranges, Moonbi, NSW, Egan Murphy Solicitors. Assessment of risk to life for road users on track along steep hillside at Moonbi as part of a legal case.
- Stability Assessment of Viewing Platforms, North Head, NSW, NSW Parks and Wildlife Service. Viewing platforms located at the crest of a 70m high cliff face. Recommendations involved closure of part of the viewing platform areas due to assessed stability risk.

- Geotechnical Investigation Proposed Residential Development, Castle Hill, NSW. Proposed development was in known landslide area. Project involved detailed mapping of test pit excavations and recommendations on the location of suitable areas on the site for residential development and recommendations for remedial measures to reduce the risk of instability.
- Monitor Installation of Deep Subsoil Drains, West Pennant Hills, NSW. Subsoil drains were designed to reduce ground movements in landslide area.
- Stability Assessment, existing excavation, Katoomba, NSW. A 15m high sub-vertical cut face was located below a 2 storey hotel building located at crest. Project involved design of rock bolt and shotcrete support, including overseeing implementation of support measures. Project was completed with tight time constraints as the hotel was evacuated until permanent support had been provided to the cutting.
- Stability Assessments, basement excavation Military Rd, Neutral Bay. Monitored construction of 10 to 15m deep basement excavation with 10 storey building at crest. Project involved design of rock bolts to support unstable rock wedge that was supporting additional load from a contiguous retaining wall and footing loads from an adjoining multi storey building located at the crest of the excavation.
- Stability Assessment, basement excavation, North Sydney, NSW. Monitored construction of a 20m deep basement excavation with multi storey buildings at crest. Provided recommendations for rock bolt support to isolated rock wedges.
- Proposed Residential Development, Seaforth, NSW for property owner. Monitor excavation and development on steep property. Project involved recommendations for support of large boulders near the excavation boundary that were supporting adjoining residences, rock bolt design for unstable cliff face, placement of footings to support proposed house and swimming pool.
- Proposed Excavation Queen St, Vaucluse NSW for property owner. Stability assessment for proposed excavation at the toe of a cliff face that supported a suspended concrete carpark at the crest. Project involved ongoing monitoring during excavation and recommendations for remedial support measures including underpinning overhanging cliff faces and rock bolting.
- Proposed Excavation, Bellevue Hill, NSW for property owner. Geotechnical investigation and stability assessment for proposed 15m deep excavation at the toe of a 10m high cliff face.
- Stability Assessment of Rock Face, Brougham Street, Potts Point, NSW for South Sydney Council. Stability assessment for 15 metre high rock face and retaining wall with a multi-storey building located at crest of rock face and heavily trafficked roadway at base. Project involved supervising remedial works including installation of rock bolts, weep holes and construction of a new retaining wall at the crest of the slope.

Mine Infrastructure

- Bored pier inspections Bengalla Washery Upgrade, Walz Constructions.
- Railway Embankment Stability Assessment, Yandicoogina, WA for BHP. Geotechnical investigation and design of remedial works for cracked railway embankments. Railway used to transport iron ore from Yandicoogina mine to Port Headland. Project involved remedial works design including borrow searches for materials to be used as spoil buttresses to support the embankments.
- Geotechnical investigation for 30m light towers, Ashton Coal Mine.
- Geotechnical investigation for rigid pavement design to support mine trucks and dozers, Mt Thorley, Komatsu.
- Geotechnical investigation for Coal Preparation Plant Upgrade, Liddell Coal Mine, NSW, Liddell Coal Operations. Investigation comprised cored boreholes and footing design recommendations for rejects bin, thickeners, conveyors and transfer towers.
- Geotechnical Investigation for Coal Preparation Plant Upgrade, Mt Owen Mine, NSW, Hunter Valley Coal Corporation. Investigation comprised cored boreholes and footing design recommendations for reclaim stacker, rejects bin, dump hopper, conveyors, reclaim tunnel.
- Geotechnical Investigation Proposed Coal Mine Development, Wilpinjong NSW, Thiess Pty Ltd. Geotechnical investigation and footing and earthworks recommendations for coal mine infrastructure including 1.5km rail loop, CHPP, ROM pad, site compound, tailings and mine water dams.
- Bored Pier Inspections Proposed Conveyors and Rejects Bins at Mt Thorley and Warkworth Mines, NSW, Rio Tinto Coal Australia.
- Rehabilitation of Spoil Pile, Pikes Gully, NSW, Rio Tinto Coal Australia. Geotechnical investigation and preparation of design drawings and technical specification for rehabilitation of spoil pile containing potentially combustible coal waste and tailings.
- Bored Pier Inspections, Bridge Over Putty Road, NSW, Rio Tinto Coal Australia. Inspection of bored piers for a proposed haul road over Putty Road connecting Warkworth and Mt Thorley Coal Mines. Project involved re-design of socket lengths of piers based on variable ground conditions.
- Geotechnical investigation, Proposed Silos Bayswater Power Station, NSW, Rocla Quarry Products. Geotechnical investigation and footing design recommendations for proposed silos, included pier inspections during construction.
- Geotechnical Investigation Proposed Coal Handling Facility and Industrial Area, Ashton Coal Mine, NSW, Roberts and Schaefer Australia Pty Ltd. Completed geotechnical investigation and prepared report providing footing design recommendations and earthworks details for proposed development.
- Reinforced Earth Retaining Wall Footing Design, Proposed ROM Pad, Ashton Coal Mine, NSW, Roberts and Schaefer Australia Pty Ltd. Project involved

global stability assessment of RE wall and design of rock bolt and shotcrete support for rock face below base of RE wall.

- Geotechnical Investigation, Proposed Spray Poles, Mt Arthur North Coal Mine, NSW. Involved recommendations for footing design of proposed spray poles in deep mine spoil.
- Geotechnical Investigation Proposed Contiguous Retaining Wall, Mt Arthur North Coal Mine, NSW, Daracon. Involved geotechnical investigation, footing design recommendations and supervision of bored pier installation.
- Geotechnical Investigation Drive Unit and Weight Tower, Cumnock No. 1 Colliery, NSW. Involved recommendations for support of infrastructure located over old mine workings. Support alternatives comprised installation of deep piles or infilling old workings with grout/flyash mixture.
- Geotechnical Investigation Proposed Conveyor and Drive Units, Beltana Coal Mine, NSW, Beltana Highwall Mining, NSW. Involved design recommendations for footings with substantial lateral loads.
- Geotechnical Investigation Proposed Anchored Retaining Wall, Bridge over Broke Road, Bulga Coal Mine, NSW. Provided recommendations for design of rock anchors to support wingwalls adjacent to the bridge.
- Feasibility Assessment Proposed Nickel/Laterite Mine, Kalgoorlie, WA. Responsibilities included location of borrow sources for haul roads and footing design recommendations for proposed infrastructure.

Railways

- Geotechnical advisor for Rhomberg Rail Australia. Geotechnical advice and construction supervision during full track reconstructions, various sites in Sydney, Hunter Valley and Central Coast.
- Geotechnical advisor to ARTC for East Maitland Drainage Project. Project involved construction of subsoil, surface drains, shotcrete support to cut batters and track reconstruction.
- Stability assessment of cracked embankment at Boggabri, NSW, ARTC
- Detailed stability assessments and remediation design for cuttings at Antienne, Grasstree and Ardglen, Main Northern Rail Line and Sandy Hollow and Kerrabee Ulan Line, ARTC
- Independent verifier, Hunter 8 Third Track Duplication, Stages 2 and 3, Hunt8R Alliance.
- Bored pier inspections, underbridge replacement, Parkville, NSW, ARTC
- Slope stability risk reviews, North Coast Line between Newcastle and NSW/QLD border, Australian Rail Track Corporation (ARTC), 2008, 2009, 2013.
- Slope stability risk reviews, Main South Line, Picton to Melbourne, Moss Vale-Unanderra and Joppa Junction to Queanbeyan, 2006, 2007, 2008, 2010 and 2011, 2012 ARTC.

- Slope stability risk reviews, Main South Line, Botany to Melbourne and Moss Vale-Unanderra, 2014 ARTC.
- Slope stability risk reviews, Western Lines, NSW between Lithgow and Parkes, ARTC, January 2010.
- Slope stability risk reviews, Singleton-Muswellbrook and Sandy Hollow-Wollar, ARTC, March and June 2007 and 2009.
- Slope stability risk reviews, Adelaide-Broken Hill and Adelaide to Tailem Bend, ARTC, 2010.
- Mapping and design for rail cutting widening including rock bolt and shotcrete design, Junction Street Telarah, ARTC
- Mapping and design of remedial design options for steep rail cutting adjacent tunnel portal, Queenbeyan, ARTC
- Mapping and design of remedial design options for rail cuttings at Pyrenees, Victoria and Demondrille, NSW, ARTC.
- Investigation and design of remedial works for unstable rail embankment at Allandale, Hunter Valley network, Australian Rail Track Corporation. Project involved 24 hour supervision during construction of rockfill toe buttress to support unstable embankment. Construction was carried out during train operations requiring constant visual assessment of embankment stability.
- Geotechnical investigation of numerous sites within Hunter rail network for proposed track reconstructions, Australian Rail Track Corporation. Projects involve investigation of existing conditions, assessment of cause of poor track performance and design of remedial works. Projects also require on-site supervision and advice during track reconstruction.
- Geotechnical Investigation of existing formation Neath, GHD. Investigation of existing formation and comment on suitability for construction of new rail line.
- Geotechnical Investigation of rail embankment, Wiangaree, North Coast Line, ARTC. Investigate cause of poor track performance across embankment and recommendations to improve stability of embankment and remedial works to improve formation.
- Stability Assessment Hanbury Dive, Waratah, Newcastle, NSW, ARTC. Project involved desk study of previous slope instability and remedial works at the site and recommendations on additional remedial works/monitoring requirements for the site.
- Stability Assessment Bethungra Spiral, Main South Line, Cootamundra, NSW, ARTC. Project involved detailed desk review of previous remedial works and detailed mapping to assess stability of 3 deep cuttings and provide remedial design solutions to improve stability including rock bolts, rock fall mesh, rock catch fences and rock fall detection fences.
- Geotechnical investigation and assessment of embankment stability, North Coast Line, Weismantels, ARTC. Project involved test pits and surface observations to assess piping risk in 5m high rail embankment and design of remedial works to reduce risk.

- Geotechnical Investigation and Assessment of Embankment, Main West Line, Eulomogo, ARTC. Project comprised assessing cause of undulations (loss of top) in 5m high rail embankment over 200m length and recommendation for remedial works which included lime stabilisation.
- Geotechnical Investigation, Sandy Creek Bridge Replacement, Nevertire to Warren Line, ARTC. Project involved drilling to assess subsurface conditions and design of footings to support proposed bridge replacement.
- Geotechnical Investigations for proposed underbridge replacements along Werris Creek to Merrygoen Line (4 sites) and Joppa Junction to Queenbeyan Line (1 site), Australian Rail Track Corporation. Geotechnical investigations comprised cored boreholes and electronic friction cone penetrometer tests.
- Geotechnical Assessment of 15 proposed crossing loop sites on the north coast line between Maitland, NSW and Brisbane, QLD, Australian Rail Track Corporation. Assessment included a desk study of previous geotechnical reports, aerial photographic interpretation and walkover survey of each site. Reports discussed geotechnical issues at each site and proposed investigation required for detailed design.
- Stability Assessment of Rail Cuttings at Kerrabee and Branxton, NSW, Australian Rail Track Corporation. Geotechnical mapping of cuttings, stability assessment and design of remedial works including soil nail walls, shotcrete, meshing and regrading.
- Geotechnical Investigation, Proposed Rail Loop, Mt Owen Coal Mine, NSW, Hunter Valley Coal Corporation. Assessment of borrow sources for capping, structural zone and general fill. Recommendations for cuttings excavatability and batter slopes, embankment foundations and earthworks.
- Geotechnical Investigation for proposed underbore beneath the Great Northern Rail Line, Ashton Coal Mine, NSW White Mining Ltd. Assessment of excavatability, stability of underbore and potential settlement affect on rail line.
- Sewer Underbore, Singleton, NSW Singleton Shire Council. Geotechnical Investigation and design of pipeline beneath Great Northern Rail Line. Assessment of excavatability, stability of underbore and potential settlement affect on rail line.
- Proposed Rail Loop, Wilpinjong Coal Development Project, NSW, Thiess Pty Ltd. Geotechnical investigation for proposed rail loop including recommendations on cut slopes, embankment foundation conditions, borrow materials for embankment, structural zone and capping.

Roads

- Geotechnical Route Options Assessment, Bolivia Hill Upgrade, New England Highway, December 2012, RMS
- Bored pier inspections, Thornton Road Bridge, RTA.
- On site geotechnical advice during construction of Pacific Highway upgrade Karuah-Bulahdelah Stages 2 and 3, AbiGroup. Advice required on foundation

preparation for fill and cut floors and cut batter slopes.

- Slope Risk Assessment of Numerous Bridge Abutments, Cut and Fill Sites, Sydney region, RTA. The assessments were carried out in accordance with the RTA "Guide to Slope Risk Assessment", Version 3.1, November 2001.
- Soil Nail Wall Design, Putty Rd, RTA. Soil nail design for 16m long 2m high retaining wall along Putty Rd, NSW.
- Slope Risk Assessment of Numerous Road Cuts and Fills along Browns Mountain, Snowy Mountains Highway, NSW, RTA. The assessments were carried out in accordance with the RTA "Guide to Slope Risk Assessment", Version 3.1, November 2001.
- Slope Risk Assessment of Road Cuttings along Rouchel Rd, Aberdeen, NSW, Upper Hunter Shire Council. The assessments were carried out in accordance with the RTA "Guide to Slope Risk Assessment", Version 3.1, November 2001.
- Slope Risk Assessment of Numerous Road Cuts and Fills along F3 freeway between Wahroonga and Hawkesbury River bridge, NSW, RTA. The assessments were carried out in accordance with the RTA "Guide to Slope Risk Assessment", Version 3.1, November 2001.
- Slope Risk Assessment of Numerous Road Cuts and Fills along Illawarra Highway (SH25), NSW, RTA. The assessments were carried out in accordance with the RTA "Guide to Slope Risk Assessment", Version 3.1, November 2001.
- Stability Assessment of Numerous Road Cuttings in Muswellbrook Shire, NSW, Muswellbrook Council. Project involved provision of maintenance and remedial works recommendations.
- Geotechnical Investigation, Bonville Deviation, NSW, RTA. Prepare geotechnical investigation report for RTA summarising 6 years of geotechnical investigations and providing recommendation on cut stability, road formation materials, embankment settlements, excavation conditions in cuttings etc.
- Stability Assessment and Remedial Works Recommendations for Existing Road Cuttings, Rosemount Road and Peberdy's Road, Denman NSW, Muswellbrook Shire Council.
- Geotechnical Investigation Bulahdelah Bypass, NSW, RTA. Detailed geological mapping for design of cut slopes at northern interchange.
- Landslide Risk Assessment Proposed Cutting Bulahdelah Bypass, NSW, RTA. Assessment completed in accordance with Geomechanics 2000 guidelines. Proposed cutting was through deep colluvium near base of Bulahdelah Mountain.
- Pacific Highway Upgrade, Yelgun to Chinderah, NSW. Slope design and support recommendations for proposed road cuttings as part of Maunsell McIntyre/Walter Construction tender design.

Residential/Commercial Developments

- Geotechnical investigations and recommendations for footing design, retaining wall design, excavation conditions, pavement design, site classifications to AS2870-2011 and general earthworks at numerous sites in the Sydney, Newcastle, Hunter Valley and Tamworth regions. Also included geotechnical investigations for cracked buildings and recommendations for remedial works and landslide risk assessments based on Australian Geomechanics, 2000 Guidelines.

Dams

- Geotechnical stability assessments and advice for dumping mine spoil into water and over co-disposed tailings, and advice on safe offset distances for machinery and personnel on tailings beach. Old Main Pit, Stratford.
- Geotechnical Advice on Capping Options North East Tailings Dam, Wambo Coal Mine, NSW, Roche Mining Pty Ltd. Project required assessment of numerous capping options over tailings with thin crust of very low shear strength due to high clay smectite content.
- Risk Assessment Existing Sediment Dam, Bengalla Coal Mine, NSW, Bengalla Mining Company Pty Ltd. Report assessing the risks involved with collapse or overtopping of existing sediment dam.
- Geotechnical Assessment Sediment Dams, Muswellbrook Coal Mine, Muswellbrook Coal Company Pty Ltd. Report addressing remedial options for existing slope instability within sediment dams.
- Type 2 surveillance inspection report North East Tailings Dam, Wambo Coal Mine, NSW, Wambo Mining Corporation. Inspection report prepared in accordance with NSW Dam Safety Committee requirements.
- Monthly inspections of active and disused tailings dams at Warkworth Coal Mine, NSW, Rio Tinto Coal Australia over 2-3 year period. Involved preparation of regular surveillance reports as requested by NSW Dams Safety Committee.
- Risk Assessment of Existing Dams, Various Mine Sites in Hunter and Western Coalfields NSW, Xstrata Coal. Sites inspected included Cumnock, United, Baal Bone, Bulga, South Bulga and Beltana.
- Geotechnical Investigation and Stability Assessment for Swan Lake Dam, Bulga Coal Mine, NSW, Bulga Coal Management Pty Ltd.
- Monitor Piezometer Installation at North East Tailings Dam, Wambo Coal Mine, NSW, Wambo Mining Corporation.
- Preparation of Dam Safety Emergency Plan for Tailings Dam No. 2 at Warkworth Coal Mine, NSW, Rio Tinto Coal Australia.
- Preparation of Operation & Maintenance Manual for Stage 2 Tailings Dam, Mount Owen Mine, NSW, Hunter Valley Coal Corporation..

Tunneling

- Cracked Escape Tunnel, Coal Mine in Hunter Valley (Mine name and client held in confidentiality). Geotechnical assessment of cause of cracking and distortion in 2.55m diameter reinforce concrete escape tunnel beneath ROM coal stockpile.
- Auger Mining, Liddell Coal Mine, Liddell Coal Operations Pty Ltd. Prepared numerous reports for proposed auger mining below highwalls at Liddell Coal mine.
- Proposed Railway Tunnel, Marsden Point Rail Link, New Zealand, Beca Carter Engineers. Involved preparation of geological model and rockmass characterization in terms of the Rock Tunneling Quality Index – (Q)
- Soil Nail Wall Design, Lane Cove Tunnel, NSW. Soil nail support design for retaining wall associated with Lane Cove Tunnel Project.
- Proposed Vaucluse/Diamond Bay Sewerage Diversion Scheme, NSW for Sydney Water. Prepared geological and geotechnical model along proposed alignment options and commented on development constraints relating to construction options including directional drilled boreholes and conventional tunneling.
- Parramatta to Chatswood Rail Link, NSW. Logging of deep cored boreholes and packer permeability testing for proposed rail tunnels.
- Proposed Hydropower Scheme, Mindanao, Philippines. Logging of deep cored boreholes and packer permeability testing for proposed tunnel.

Power

- Geotechnical investigations for proposed substations, switching station upgrades and transmission line routes, numerous sites in NSW, TransGrid. Geotechnical investigations to assess founding conditions/footing recommendations for infrastructure.
- Proposed 330kV Transmission Line, Wollar to Wellington, NSW, TransGrid. Geotechnical mapping and investigation along proposed 120km transmission line route. Report addressed footing conditions and design parameters for suspension and tension towers.
- Proposed Transmission Line Deviation, Hunter Valley Operations, NSW, TransGrid. Geotechnical investigation for proposed 4km deviation. Report addressed footing conditions and design parameters for suspension and tension towers. Proposed alignment crossed an area of deep mine spoil, requiring consideration of anticipated settlements.

Geophysical Investigations

- Electrical, electromagnetic, gravity and seismic surveys in areas such as West Coast Tasmania, Sandy Desert, WA, Northwest Queensland, East Kalimantan and North Sumatra, Indonesia for CRA and Pasminco.

EMPLOYMENT HISTORY	
2012-Present	Lambert Geotech Pty Ltd, Newcastle Principal Engineering Geologist and Director
2011 – 2012	Cardno Geotech Solutions Pty Ltd, Newcastle Principal Engineering Geologist
2006-2011	RCA Australia Pty Ltd, Newcastle Principal Engineering Geologist and Director
2002-2006	Parsons Brinckerhoff Australia, Singleton Senior Engineering Geologist
1998-2002	Jeffery & Katauskas Pty Ltd, Sydney Senior Engineering Geologist
1995-1998	Coffey Partners International, Perth, Indonesia, Brisbane, Sydney Engineering Geologist
1992-1994	Scintrex Pty Ltd, Perth Geophysical Operator (Crew Leader)
1990-1991	D J Douglas & Partners, Sydney Engineering Geologist
1985-1987	Jeffery & Katauskas Pty Ltd, Sydney Geotechnician
Paper/Presentations	'Geotechnical Issues Associated with Slope Design for the Kelian River Diversion, East Kalimantan, Indonesia', P Lambert, not published, presented at 1998 Young Geotechnical Engineers Conference, Melbourne Overview of Open Cut Coal Mining, Hunter Coalfield a Geotechnical Perspective', P Lambert and D Nelmes, Australian Geomechanics Journal, Volume 40 No 1 March 2005 'Management of Slope Instability Risk, Open Cut Coal Mines, Hunter Coalfield', P Lambert, Regional Convention of Engineers Australia, Newcastle Division, 23-25 March 2007

Appendix J
Blue Book Calculations

1. Erosion Hazard and Sediment Basins

Site Name: Oaklands

Site Location: Clay Mine

Precinct/Stage: Existing

Other Details:

Site area	Sub-catchment or Name of Structure						Notes
	Tot Pit	Dam 2	Dam 3	Pit only	UndistP		
Total catchment area (ha)	5.49	5.71	2.86	2.55	2.94		
Disturbed catchment area (ha)	2.55	3.01	0.5	2.55	2.94		

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D	D	D	D		From Appendix C (if known)
% sand (fraction 0.02 to 2.00 mm)							Enter the percentage of each soil fraction. E.g. enter 10 for 10%
% silt (fraction 0.002 to 0.02 mm)							
% clay (fraction finer than 0.002 mm)							
Dispersion percentage							E.g. enter 10 for dispersion of 10%
% of whole soil dispersible							See Section 6.3.3(e). Auto-calculated
Soil Texture Group	D	D	D	D	D		Automatic calculation from above

Rainfall data

Design rainfall depth (no of days)	35.2	35.2	35.2	35.2	35.2		See Section 6.3.4 and, particularly, Table 6.3 on pages 6-24 and 6-25.
Design rainfall depth (percentile)	90	90	90	90	90		
x-day, y-percentile rainfall event (mm)	5	5	5	5	5		
Rainfall R-factor (if known)							Only need to enter one or the other here
IFD: 2-year, 6-hour storm (if known)	5.42	5.42	5.42	5.42	5.42		

RUSLE Factors

Rainfall erosivity (*R* -factor)	890	890	890	890	890		Auto-filled from above
Soil erodibility (*K* -factor)	0.05	0.05	0.05	0.05	0.05		RUSLE LS factor calculated for a high rill/interrill ratio.
Slope length (m)	120	300	300	120	300		
Slope gradient (%)	20	4	3	20	3		
Length/gradient (*LS* -factor)	9.97	1.84	1.22	9.97	1.22		
Erosion control practice (*P* -factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (*C* -factor)	1	1	1	1	1	1	

Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Type C basins)

Storage (soil) zone design (no of months)	2	2	2	2	2		Minimum is generally 2 months
Cv (Volumetric runoff coefficient)	0.64	0.64	0.64	0.64	0.64		See Table F2, page F-4 in Appendix F

Calculations and Type D/F Sediment Basin Volumes

Soil loss (t/ha/yr)	577	107	70	577	70		
Soil Loss Class	5	1	1	5	1		See Table 4.2, page 4-13
Soil loss (m^3/ha/yr)	444	82	54	444	54		Conversion to cubic metres
Sediment basin storage (soil) volume (m^3)	189	41	5	189	27		See Sections 6.3.4(i) for calculations
Sediment basin settling (water) volume (m^3)	176	183	92	82	94		See Sections 6.3.4(i) for calculations
Sediment basin total volume (m^3)	365	224	97	271	121		

NB for sizing of Type C (coarse) sediment basins, see Worksheet 3 (if required).

Appendix K
Weed Management Plan

Environmental Management Plan – Weed & Pest Management

PURPOSE

This is a management plan for the control of weeds and pests at the PGH Albury operations. The site is a quarry as well as a brick processing facility.

This management plan identifies the weed and pest issues associated with the site and provides a planned program of control where necessary.

The most effective way to manage the weeds at the site is to undertake primary control, followed up with ongoing control in subsequent years or seasons to deplete the plant's ability to reproduce. In some cases, weed seeds can be viable in the soil for long periods of time, well beyond a decade in same cases. In order to break the weed cycle ongoing timely annual or seasonal control is necessary.

Controlling pests on site is more reactive and only requires attention if large numbers are seen or suspected on the premises. A comprehensive list of pests is attached however the more common pests to the Thomastown site are kangaroos, goats, rabbits and hares which generally originate from the grasslands to the north and east.

This plan takes into consideration all these factors and provides a holistic approach to management of weeds and pests on the site.

SCOPE

This management plan covers the PGH Albury brick site. Via a site inspection with Ben King (NSW Raw Materials Supervisor) and Richard Mason (PGH Environmental Manager) the following weeds have been identified as the most common found on site:

1 - Pattersons Curse (Echium plantagineum) 	***2 - Artichoke Thistle (Cynara cardunculus)*** 
3 - Spear Thistle (Cirsium vulgare) 	***4 - Horehound (Marrubium vulgare)*** 
5 - Prickly Pear (Opuntia) 	***6 - Sweet Briar (Rosa rubiginosa)*** 

7 - Boxthorn (Lycium ferocissimum)	8 - Blackberry (Rubus fruticosus)
	

KEY STAKEHOLDERS

DPIE – NSW government
Greater Hume Council – Responsible for the local weed management
Local Residents – Any significant increase in vermin levels could impact the local residents
Employees – All employees have responsibilities for preventing the introduction of weeds on site
Contractors – All contractors have responsibilities for preventing the introduction of weeds on site and the transfer of weeds on/off site through transportation of plant and equipment

PROCEDURE

Management

This section of the plan outlines the program for primary and follow up management at the site ongoing until a change is required for any reason. The schedule has been developed based on the types of weeds on the site and the best time of the year to poison the weeds for the best result. For best results weed management at any site should be ongoing. Sustained management which keeps weeds under control will also reduce the financial burden over the long term.

Timing – The correct timing of weeding measures is important to ensure the best possible result. Some species have quite restricted times for control due to their growth patterns and habits, whereas others have broader timeframes for treatment. In many cases different control methods are applied to suit the timing of control.
The weeding program is performed twice per annum. Once in Autumn (March/April) when the weeds are sprouting from seeds, spraying at this time will kill the weed in its infancy. The second spraying will be performed in late spring or early summer (November/December) when the weeds are in full growth but have not yet flowered so cannot spread their seeds.

Method – There are many methods used for weeding. The methods recommended below are based on varying factors. These include the weed type, location, level of infestation and control options, efficiency and effectiveness.

The primary methods of control to be employed in this management program include:

High Volume spraying – is generally a vehicle mounted spray unit with a large tank (400- 600L) with hose reels. This technique is generally used to treat large weed populations which can be foliar sprayed. It is used in situations where the UAV can't access or is not economical to use. It is also suited to more scattered weed populations.
Basal Bark spraying – This technique is generally used on particular woody stemmed weeds to chemically ring bark them. This method is best suited to specific species and application on isolated plants or plants that can't be foliar sprayed with herbicide.
Direct Application (Cut and Paint, Stem injection) – This involves cutting woody weeds down at the base or drilling into or scraping the stem at the base and then applying high concentration herbicide. This technique may be used where the risk is too high or when foliar application may not be effective. This technique may be used in similar circumstances to basal bark spraying.
Mechanical – involves the use of machinery such as slashers, scrub mulchers, dozers and the like, to remove the above ground biomass of the plant, and in some cases the roots as well. This is best used where there is a large monoculture of one species, such as African olive, to remove large sections of biomass as well as to create access through these areas for other weeding works.

As the Thomastown site does not have large areas of infestation the main method of spraying will be high volume spraying in localised areas of weed growth.

Action Plan 2020-2022:

Due to the low risk and low quantity of weeds on the premises, an annual weeding program to address all areas of the site has been adopted. A weeding contractor is to be engaged to spray all areas and all species of weeds twice per year to prevent spread and re-growth of weeds.

Requirements

All landowners have legal obligations regarding the management of declared noxious weeds and pest animals on their land. Specifically, landowners must take all reasonable steps to eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds, and prevent the spread of - and as far as possible eradicate - established pest animals on their land.
Any plants brought onto site must be in a healthy condition and free from disease

All machinery, their implements or any other equipment must be thoroughly cleaned (ie. removing soil, organic matter and/or weed seeds or growing parts) prior to coming onto the site and must be similarly cleaned before moving to new locations.

All quarry machinery must be washed/cleaned down before moving on or off site.

MONITORING & REPORTING

Internal reporting is to be completed at the end of each weed management activity. This reporting is to include the following details:

- Date/s of works;
- Weeds treated and method. Daily pesticide application records to be included;
- Area (Management Unit) where works have been undertaken;
- Notes and comments on the weeding activities;
- Details of the next stage of works to be undertaken.

Monitoring is essential for the ongoing effective management of the weeds on site. Monitoring will determine the effectiveness of works completed, as well as inform that which is to come, including primary and follow up works. This procedure and action plan is to be reviewed every 3 years.

FACTORY PROCESSES

- All mobile plant transferred on and off site is be washed thoroughly before transported to remove all dirt which could contain seeds or weeds and spread weeds to another site
- No weed products to be brought onto site for disposal via waste bins by employees or contractors
- Review of the weeding plan annually to assess progress of weed eradication
- Observations during inspections are made to assess if pests are present on the property. If seen in numbers a pest control specialist is called to eradicate the pests

DEFINITIONS

Noxious weed	noxious weed means— (a) a State prohibited weed; or (b) a regionally prohibited weed; or (c) a regionally controlled weed; or (d) a restricted weed;
Land	land includes soil, water, vegetation and fauna on land but excludes a mineral within the meaning of the Mineral Resources (Sustainable Development) Act 1990
Land Owner	land owner means— (a) the registered proprietor of an estate in fee simple in land under the Transfer of Land Act 1958

REFERENCES

Compliance Guide SHE-071-CG Ecosystem Protection, Biodiversity and Biosecurity
Compliance Guide SHE-075-CG Environmental Aspects and Impacts

DOCUMENTATION

- Workplace Inspection Roster – Schedules housekeeping inspections
- Environmental Inspection Checklist – Inspections of all environmental related items
- Site Improvement Plan
- Spray records
- Pest eradication records

ROLES AND RESPONSIBILITIES

1. The Operations Manager is responsible for ensuring the weed management plan is updated and implemented.
2. All employees are responsible for reporting pests observed on the property.

REVIEW AND EVALUATION

This procedure, including records and associated attachments will be reviewed through the audit process to ensure relevance and compliance to WHSE system requirements.

Relevant WHSE system documentation shall be reviewed if they are associated with an incident, change in legislation, standards, codes of practice and the like or when the revision date is reached.

This procedure will be reviewed annually, or earlier if required.

APPENDICES

vgt environmental compliance solutions and laboratories

Beyond Compliance

VGT Environmental Compliance Solutions Pty Ltd
ABN 26 621 943 888

Unit 4, 30 Glenwood Drive Thornton NSW 2322
PO Box 2335, Greenhills NSW 2323

Ph: (02) 4028 6412
E: mail@vgt.com.au

www.vgt.com.au