Government of Western Australia
Department of Environment Regulation

Works Approval

Environmental Protection Act 1986, Part V

Works Approval Holder: Austral Bricks (WA) Pty Ltd

Works Approval Number: W5925/2015/1

Registered office: 738-780 Wallgrove Road
HORSLEY PARK NSW 2175

ACN: 079 711 603

Premises address: Cardup Brickworks
Lot 101 on Plan 42930; Lot 21 Diagram 49238; Lot 7 Diagram 10840, Lot 51 Diagram 52746; Lot 50 Diagram 52748; Lot 801 and 802 on Plan 302499; Lot 10 Diagram 26892;Lot 12 Diagram 52677;Lot 53 Diagram 4790; Lot 100 Diagram 7854; Lot 50 Diagram 7928
BYFORD WA 6122
as depicted in Schedule 1

Issue date: Thursday, 28 January 2016

Commencement date: Monday, 1 February 2016

Expiry date: Thursday, 31 January 2019

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
41	Clay bricks or ceramic products manufacturing: premises on which refractory products, tiles, pipes or pottery are manufactured.	1000 tonnes or more per year	Not more than 200 000 tonnes per annual period

Conditions
This Works Approval is subject to the conditions set out in the attached pages.

Date signed: 28 January 2016
.....
Jonathan Bailes
Manager Licensing (Process Industries**)**
Officer delegated under section 20
of the *Environmental Protection Act 1986*

Works Approval Conditions

1 General

1.1 Interpretation

1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 In the Works Approval, unless the contrary intention appears:

'Act' means the *Environmental Protection Act 1986;*

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

'CEO' for the purpose of correspondence means:

Chief Executive Officer
The Department Administering the *Environmental Protection Act 1986*
Locked Bag 33
CLOISTERS SQUARE WA 6850
Email: info@der.wa.gov.au;

'kiln' means 'Kiln 3' as indicated on the layout of premises in Schedule 1;

'Commissioning' means the process of operation and testing that verifies the works and all relevant systems, plant, machinery and equipment, including the cascade limestone scrubber, have been installed and are performing in accordance with the design specification set out in the works approval application;

'NATA' means the National Association of Testing Authorities, Australia;

'NATA accredited' means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis;

'Premises'means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

'Sampling period 'means the time over which a monitoring result is obtained;

'Schedule 1' means Schedule 1 of this Works Approval unless otherwise stated;

'Works Approval' means this Works Approval numbered W5925/2015/1 and issued under the Act;

'Works Approval Holder' means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval;

1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.

1.1.4 Any reference to a guideline or code of practice in the Works Approval means the current version of the guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guideline or code of practice made during the term of this Works Approval.

1.2 General conditions

1.2.1 The Works Approval Holder shall construct the works in accordance with the documentation detailed in Table 1.2.1:

Table 1.2.1: Construction Requirements[1]

Document	Parts	Date of Document
Austral Bricks- Cardup Brickworks: Works Approval and Licence Supporting Document, authored by Strategen Environmental Consultants Pty Ltd, dated October 2015	All, including Appendices	October 2015

Note 1: Where the details and commitments of the documents listed in condition 1.2.1 are inconsistent with any other condition of this works approval, the conditions of this works approval shall prevail.

1.2.2 The Works Approval Holder shall commission the brick manufacturing plant and the cascade limestone scrubber for a period not exceeding 6 months.

2 Monitoring

2.1.1 The Works Approval Holder shall ensure that all monitoring equipment used on the Premises to comply with the conditions of this works approval is calibrated in accordance with the manufacturer's specifications.

2.1.2 The Works Approval Holder shall undertake the monitoring specified in Table 2.1.1 during the commissioning period.

Table 2.1.1: Monitoring of point source emissions to air

Emission point reference	Parameter	Units(1)	Method	Sampling period
A1- Cascade limestone scrubber exhaust	Hydrogen fluoride	mg/m^3 g/s	USEPA Method 26 or 26A	Stack test (minimum 60 minutes) (3)
	Hydrogen chloride			
	Oxides of sulphur (as SO_2)		USEPA Method 8	
	Carbon monoxide		USEPA Method 10	
	Particulate Matter		USEPA Method 5 or 17	
	Oxides of nitrogen (as NO_2)		USEPA Method 7D or 7E	
A2- Dryer vent	Hydrogen fluoride		USEPA Method 26 or 26A	Stack test (minimum 60 minutes) (3)
	Hydrogen chloride			
	Oxides of sulphur (as SO_2)		USEPA Method 8	

Note 1 All concentration units are referenced to STP dry and 18% O_2.
Note 2: Monitoring shall be undertaken to reflect normal operating conditions.
Note 3: Non-concurrent duplicate samples to be collected during each sampling event.
Note 4: Sampling at A2 must be undertaken when scrubber is operational.
Note 5: Frequency of testing to be outlined in Commissioning Plan (IR1).

2.1.3 The Works Approval Holder shall ensure that sampling required under Condition 2.1.2 is undertaken at sampling locations in accordance with AS 4323.1.

2.1.4 The Works Approval Holder shall ensure that all non-continuous sampling and analysis is undertaken by a holder of NATA accreditation for the relevant methods of sampling and analysis.

3 Improvements

3.1.1 The Works Approval Holder shall complete the improvements in Table 3.1.1 by the date of completion in Table 3.1.1.

Table 3.1.1: Improvement program

Improvement reference	Improvement	Date of completion
IR1	The Works Approval Holder shall, prior to commencing commissioning, submit a Commissioning Plan to the CEO. The Commissioning Plan shall include, but not be limited to: (a) commissioning stages and expected timeframes; (b) expected emissions and discharges during commissioning; (c) monitoring that will be undertaken during the commissioning period at the cascade limestone scrubber stack and dryer vent, including details on monitoring frequency (refer Table 2.1.1); (d) how emissions to air will be managed during commissioning; (e) how accidents or malfunctions will be managed; (f) start up and shut down procedures; (g) reporting proposals including accidents, malfunctions and reporting against the Commissioning Plan. (h) the extent of the data which will be presented in the Emissions Verification Report (refer C4.1.3).	At least 20 business days prior to commencing commissioning
IR2	The Works Approval Holder shall submit to the CEO a Stormwater Management Plan. The Stormwater Management Plan shall include, but not be limited to: (a) identification of activities on the Premises that could cause stormwater to become contaminated and any potential contaminants; (b) operational measures to prevent contamination of stormwater; (c) measures for containment or treatment of contaminated or potentially contaminated stormwater generated from activities on the Premises; (d) diagram or plan identifying existing stormwater management drains, containment ponds and discharge basins on the premises; (e) information on containment capacity of each stormwater containment basin which demonstrates adequacy to contain stormwater flows and rainfall that may be generated from a design storm event and justification of design criteria chosen; (f) information on maintenance schedule and procedures for existing infrastructure for stormwater conveyance and containment; and (g) where stormwater system is designed to discharge to Cardup Brook via engineered discharge points, a map identifying location of discharge points; (h) where stormwater system is designed to discharge to Cardup Brook via engineered discharge points, a risk assessment identifying potential impacts on surface water quality of the Cardup brook and any downstream	1 August 2016

Table 3.1.1: Improvement program		
Improvement reference	**Improvement**	**Date of completion**
	receptors and proposals for monitoring surface water quality; and (i) identification of improvements required to stormwater management practices or stormwater management infrastructure on the Premises, including requirement of any monitoring regimen, implementation proposal for the improvements identified and timeframe for the same.	

4 Information

4.1 Reporting

4.1.1 The Works Approval Holder shall submit a Compliance Document to the CEO, following the construction of the works and prior to commissioning of the same.

4.1.2 The Compliance Document shall:
(a) certify that the works were constructed in accordance with the conditions of the works approval;
(b) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company.

4.1.3 The Works Approval Holder shall submit to the CEO an Emissions Verification Report within 30 days of completion of monitoring specified in Condition 2.1.2 and in accordance with the Commissioning Plan (IR1).

4.1.4 The Emissions Verification Report shall include but not be limited to:
(a) monitoring results for stack emissions monitoring undertaken for parameters specified in Table 2.1.1 and in accordance to the Commissioning Plan (IR1);
(b) copies of monitoring reports submitted to the Works Approval Holder by a NATA accredited service-provider demonstrating that monitoring was undertaken in accordance with the methods specified in Table 2.1.1;
(c) information demonstrating that commissioning was undertaken in accordance with the Commissioning Plan submitted; and
(d) where they have not been met, measures proposed to meet the design specification of the cascade limestone scrubber and/or works approval conditions, together with timescales for implementing the proposed measures.

4.1.5 The Works Approval Holder shall submit to the CEO a noise emissions assessment report for the Premises within 60 days of completion of commissioning. The report shall be prepared in accordance with Part 3 of the *Environmental Protection (Noise) Regulations 1997 (*Noise Regulations*)* and shall include:
(a) methods used for monitoring noise;
(b) an assessment of whether noise emissions from the Premises comply with the assigned noise level in the Noise Regulations, in particular an assessment of the impact at the nearest sensitive receptors; and
(c) where they are not met, proposed measures to reduce noise emissions to assigned levels together with timescales for implementing the proposed measures.

4.2 Notification

4.2.1 The Works Approval Holder shall ensure that the parameters listed in Table 4.2.1 are notified to the CEO and are in accordance with the notification requirements of the table.

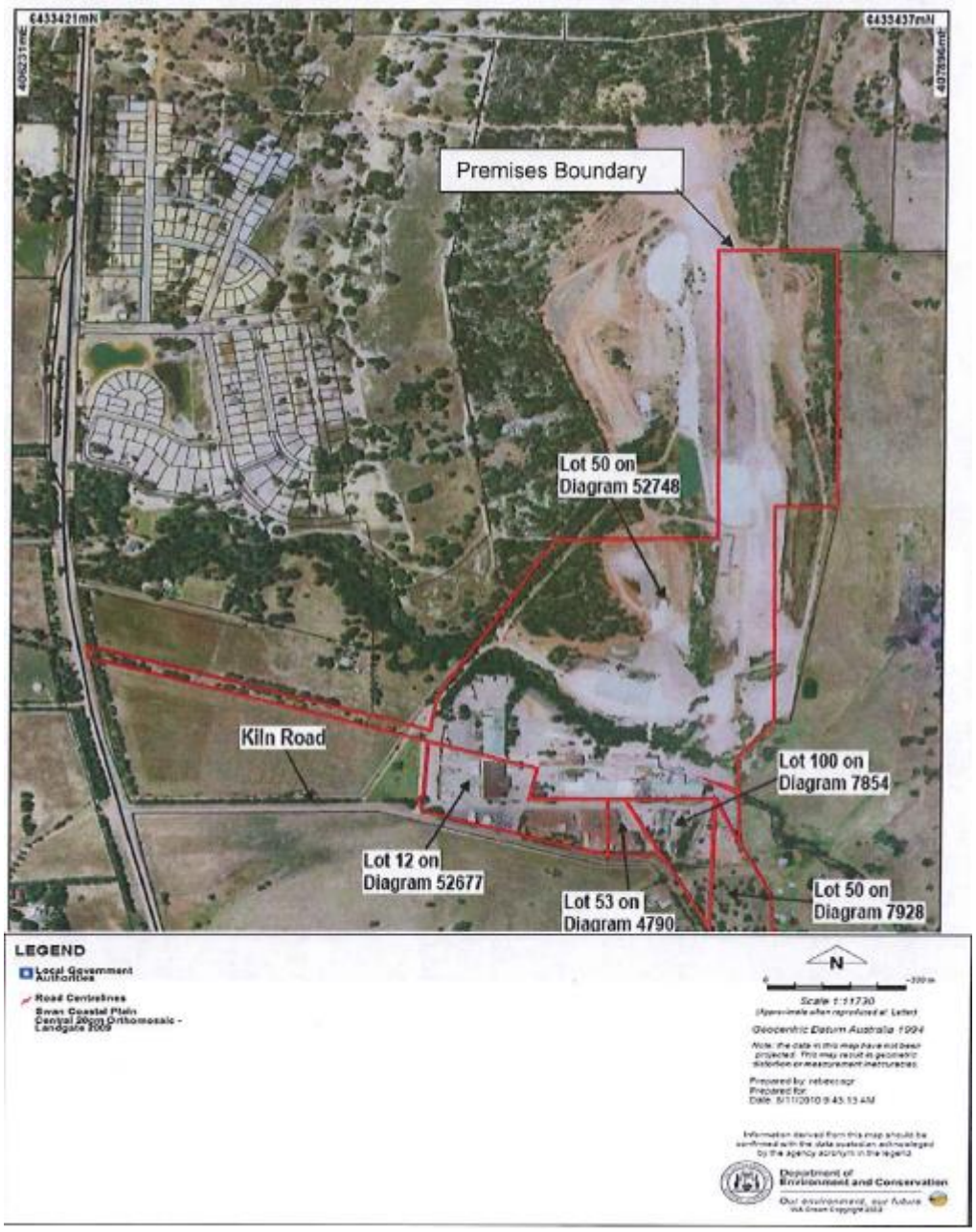
Table 4.2.1: Notification requirements

Condition or table (if relevant)	Parameter	Notification requirement	Format or form
1.2.4	Commencement of commissioning	At least 7 usual business days prior to start	None specified
	Completion of commissioning	Within 7 usual business days after completion	

Schedule 1: Maps

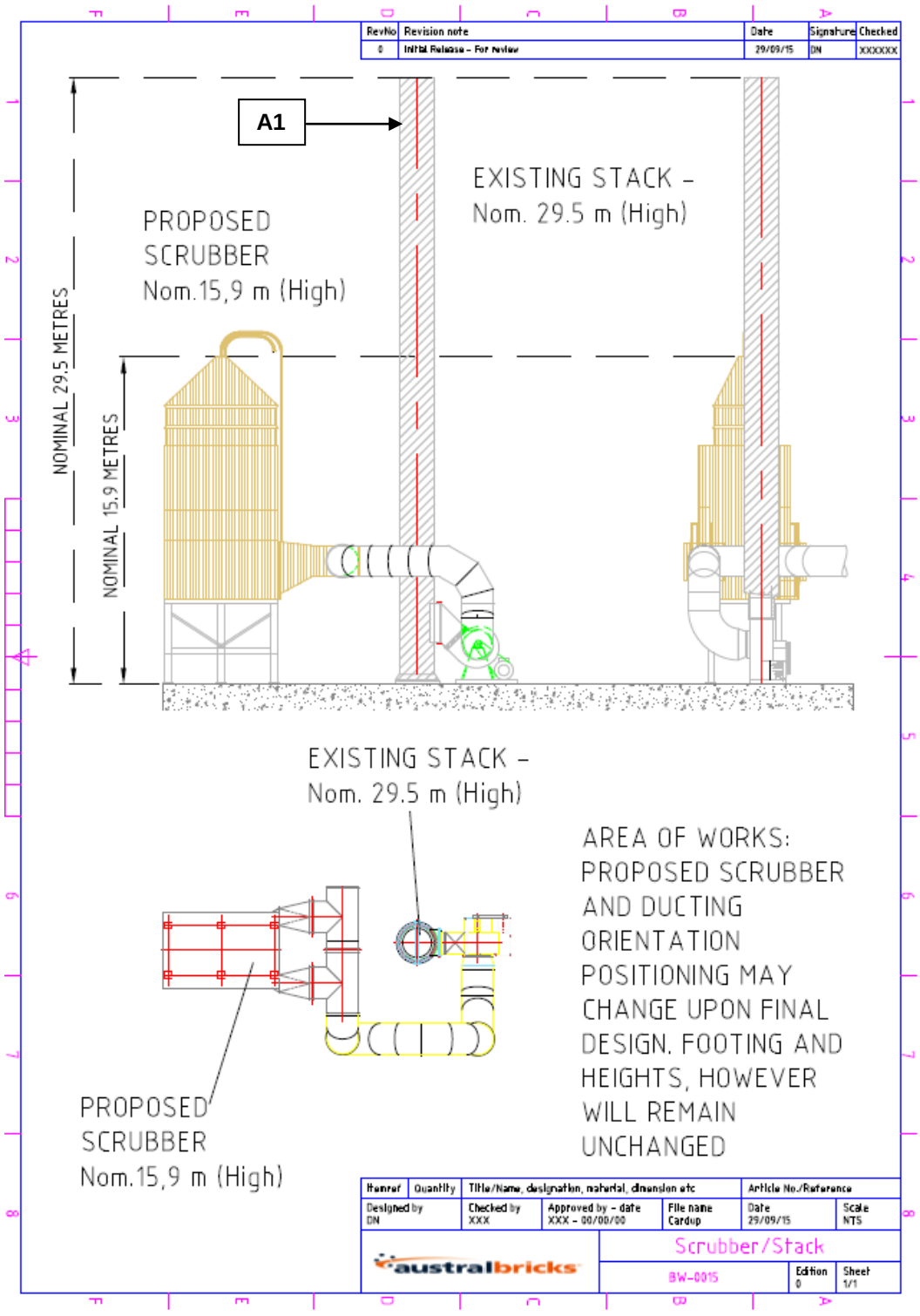
Premises map

The Premises is shown in the map below. The red line depicts the Premises boundary.



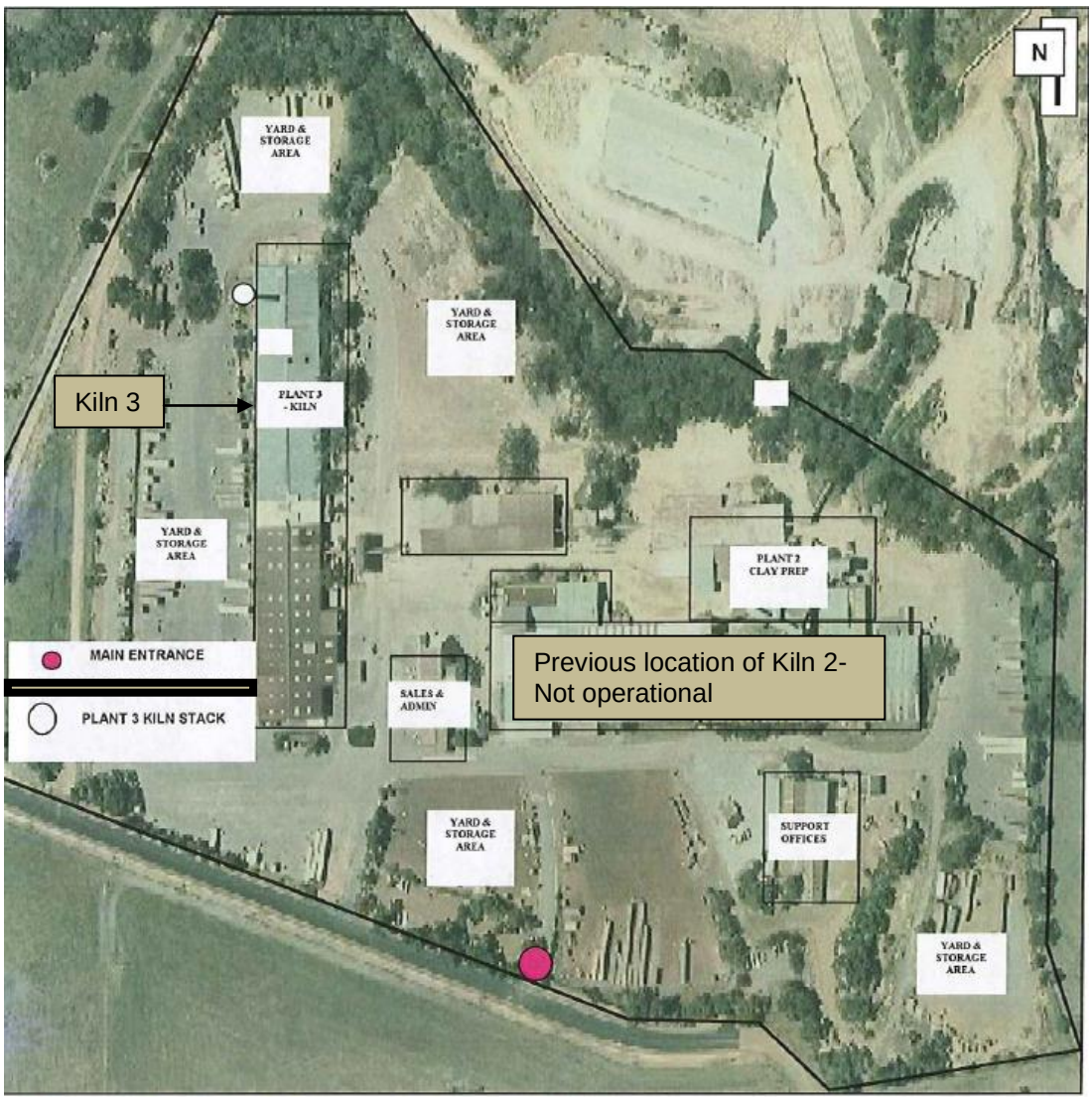
Map of emission points

The location of emission point A1 specified in Table 2.1.1 is shown below.



Layout of premises

The location of Kiln 3 proposed to be commissioned through this works approval defined in Section 1 is shown below.



Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Proponent: Austral Bricks (WA) Pty Ltd

Works Approval: W5925/2015/1

Registered office:	738-780 Wallgrove Road HORSLEY PARK NSW 2175
ACN:	079711603
Premises address:	Cardup Brickworks Lot 101 on Plan 42930; Lot 21 Diagram 49238; Lot 7 Diagram 10840, Lot 51 Diagram 52746; Lot 50 Diagram 52748; Lot 801 and 802 on Plan 302499; Lot 10 Diagram 26892;Lot 12 Diagram 52677;Lot 53 Diagram 4790; Lot 100 Diagram 7854; Lot 50 Diagram 7928 BYFORD WA 6122
Issue date:	Thursday, 28 January 2016
Commencement date:	Monday, 1 February 2016
Expiry date:	Thursday, 31 January 2019

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER) has decided to issue a works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations.

Decision Document prepared by:	Gargi Joshi Licensing Officer
Decision Document authorised by:	Jonathan Bailes Delegated Officer

Contents

1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986.* Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

2 Administrative summary

Administrative details		
Application type	Works Approval ☒ New Licence ☐ Licence amendment ☐ Works Approval amendment ☐	
Activities that cause the premises to become prescribed premises	**Category number(s)** 41	**Assessed design capacity** Not more than 200,000 tonnes per annual period
Application verified Application fee paid	Date: 30 October 2015 Date: 11 November 2015	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☐ No☒	
Commercial-in-confidence claim outcome		
Is the proposal a Major Resource Project?	Yes☐ No☒	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☐ No☒	Referral decision No: Managed under Part V☐ Assessed under Part IV ☐
Is the proposal subject to Ministerial Conditions?	Yes☐ No☒	Ministerial statement No: EPA Report No:
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)?	Yes☒ No☐ Department of Water consulted Yes ☒ No ☐ The Premises is located within Serpentine Groundwater Area. Cardup Brook, a tributary of Serpentine River, flows through the premises. Fugitive emissions of suspended solids and discharge into the brook from sediment ponds on site are possible. DoW has been consulted.	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☐ No☒		
Is the Premises subject to any EPP requirements? Yes☐ No☒		

3 Executive summary of proposal and assessment

Austral Bricks (WA) Pty Ltd (Austral) manufacture clay bricks, pavers, terracotta floor tiles and roof tiles. Cardup Brickworks were previously licensed (L6407/1967/9) under the EP Act. The licence has ceased to have effect and the premises has been under care and maintenance since May 2012. Austral intends to re-start the brick manufacturing process at the site.

The premises is located adjacent to Bush Forever Site No. 271- Cardup Brook Bushland, Cardup/Peel Estate, which is 35.8 hectares in size. Cardup Brook, a minor perennial watercourse which is a tributary of the Serpentine River, runs through the premises (Lot 50 on Diagram 52748) in a north-westerly direction. Several wetlands of varying conservation status are located in the vicinity of the premises. A multiple use category wetland is located adjacent to the activity area and within the premises boundary. A conservation category wetland, associated with a section of the Cardup Brook, is located approximately 410 m to the north-west. The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary.

Key stages in brick manufacturing process involve:

- Clay preparation: raw material (clay) storage, crushing, grinding, blending, addition of water and additives (such as sugar, colour, calcium, textures);
- Extrusion (shaping); and
- Product drying and firing.

Product drying typically uses hot air recovered from the kiln and will be carried out at a maximum temperature of approximately 210^{o}C. Dryer emissions will be vented to atmosphere without treatment through the scrubber. The maximum kiln firing temperature is approximately 1180^{o}C.

This works approval application is for construction and commissioning of a cascade limestone scrubber and commissioning of an existing kiln (Kiln 3) and associated plant equipment on the premises.

Austral is proposing to 'pre-commission' the kiln on natural gas for approximately three months to assist the identification of any issues of concern. Repairs or replacement of worn/faulty/damaged elements in the kiln will be carried out. Once the kiln is brought online and the scrubber installed, the process of full commissioning will commence. At this stage, the operation of the kiln and scrubber will be assessed to ensure optimisation. The commissioning process is expected to take approximately six months. Austral intends to subsequently operate Kiln 3 for 20 years at an expected throughput of 200,000 tonnes of clay products per year.

Key emissions during construction may include noise and dust emissions. Key emissions during commissioning and operation will include emissions to air (hydrogen fluoride, hydrogen chloride, sulphur oxides and other elements naturally present in clay), fugitive emissions to stormwater from raw material (clay) storage areas, emissions to surface water, dust emissions, noise emissions, and potential odour emissions due to shale or organic matter associated with clay that is used in the process.

The works approval includes conditions to manage potential emissions and discharges during construction and commissioning. Austral will be required to submit a compliance document subsequent to completion of construction works and prior to commissioning. Conditions regarding undertaking verification monitoring, noise monitoring and submission of a stormwater management plan have also been included in the works approval.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act1986*, the *Environmental Protection Regulations 1987*and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
General conditions	W1.2.1 Licence	**Construction** DER has assessed the risk of emissions and discharges from the premises based on the information provided in the works approval application document submitted by the proponent and stipulated regulatory controls accordingly. In order to ensure that the proponent undertakes works only as authorised under the works approval, condition 1.2.1 has been added. See Appendix A- Emissions to stormwater for details of DER's risk assessment and decision making.	Austral Bricks-Cardup Brickworks: Works Approval and Licence Supporting Document, authored by Strategen Environmental Consultants Pty Ltd, dated October 2015
Premises operation	-	**Construction, Commissioning and Operation** No premises specific conditions relating to construction, commissioning or operation have been recommended.	
Emissions general	Licence	Descriptive limits may be set through the licence, and therefore, conditions regarding recording and investigation of exceedances of limits may be included. See *Appendix A- Point source emissions to air* for details of DER's risk assessment and decision making.	N/A
Point source emissions to air including monitoring	-	**Construction** No significant point source emissions to air are expected during construction. No conditions relating to point source emissions to air during construction are specified in the works approval.	Ambient Air Assessment Criteria, National

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
	W 2.1.1 – W2.1.4	**Commissioning and Operation** See *Appendix A- Point source emissions to air* for details of DER's risk assessment and decision making.	Environmental Protection Measure (Ambient Air Quality) Department of Health internal document (*Acid Gas Criteria*, *Internal document, Toxicology WA Department of Health*, Shenton Park, WA)
Point source emissions to surface water including monitoring	-	**Construction** No point source emissions to surface water have been proposed during construction. **Commissioning and Operation** Information available on file indicates that stormwater retention basins may discharge to Cardup Brook during periods of heavy rainfall. *See Appendix A – Emissions to surface water* for details of DER's risk assessment and decision making.	-
Point source emissions to groundwater including monitoring	-	**Construction, Commissioning and Operation** No point source emissions to groundwater have been proposed during construction, commissioning or operation.	-

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
Emissions to land including monitoring	-	**Construction, Commissioning and Operation** No point source emissions to land have been proposed during construction, commissioning or operation.	-
Fugitive emissions		**Construction** Emissions Description *Emission:* Fugitive dust emissions associated with construction activities such as earthworks and civil works on site. Construction will involve the installation of the cascade limestone scrubber equipment and repairs or replacement of worn/faulty/damaged elements in the existing kiln on the premises. *Impact:* The nearest residential receptor (a property owned by Austral) is located 234m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary. There is potential for limited impact due to dust emissions during construction. *Control:* No specific controls to manage potential fugitive dust emissions during construction have been proposed. Risk Assessment *Consequence:* Insignificant *Likelihood*: Unlikely *Risk Rating:* Low Regulatory controls General provisions of the EP Act are considered appropriate to manage fugitive emissions during construction. No further works approval conditions are considered necessary. Residual Risk *Consequence:* Insignificant *Likelihood*: Unlikely *Risk Rating:* Low	-

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Commissioning and Operation See *Appendix A- Fugitive dust emissions* for details of DER's risk assessment and decision making.	
Odour	-	**Construction** Proposed construction work will involve installation of the cascade limestone scrubber equipment, repairs or replacement of worn/faulty/damaged elements in the existing kiln on the premises. Odour emissions associated with construction activities are not likely. **Commissioning and Operation** <u>Emissions Description</u> *Emission:* Odour emissions during brick manufacturing associated with the use of odour generating raw materials. *Impact:* The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary. Previous Environmental Assessment Report (for licence L6407/1967/8) for the premises noted receipt of odour complaints when molasses was used in the firing processes. There is potential for limited impact during commissioning and operation. *Control:* Austral has committed to substituting molasses with sugars which have a lower odour generation potential. Austral has committed not to store or process any material that has the potential to generate unreasonable odours. <u>Risk Assessment</u> *Consequence:* Minor *Likelihood*: Possible *Risk Rating:* Moderate	Environmental Assessment Report for previous licence L6407/1967/8 for Cardup brickworks, dated 2009

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Regulatory controls General provisions of the EP Act are considered appropriate to manage odour emissions. Residual Risk *Consequence:* Minor *Likelihood*: Unlikely *Risk Rating:* Moderate	
Noise	-	**Construction** Emissions Description *Emission:* Noise emissions associated with construction activities such as earthworks and civil works on site. Construction will involve the installation of the cascade limestone scrubber equipment, repairs or replacement of worn/faulty/damaged elements in the existing kiln on the premises. *Impact:* The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary. There is potential for limited impact due to noise emissions during construction. *Control:* No specific controls to manage potential noise emissions during construction have been proposed. Risk Assessment *Consequence:* Insignificant *Likelihood*: Unlikely *Risk Rating:* Low	*Environmental Protection (Noise) Regulations 1997*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
	4.1.5	Regulatory controls The *Environmental Protection (Noise) Regulations 1997* are considered appropriate to manage noise emissions during construction. No further works approval conditions are considered necessary. Residual Risk *Consequence:* Insignificant *Likelihood*: Unlikely *Risk Rating:* Low **Commissioning and Operation** See *Appendix A- Noise emissions* for details of DER's risk assessment and decision making.	
Monitoring general	W2.1.1- 2.1.4 Licence	**Construction and Commissioning** See *Appendix A-Point Source Emissions to Air including Monitoring* for details of DER's risk assessment and decision making. **Operation** This Decision Document recommends inclusion of point source air emission limits on a licence should Austral seek a licence for ongoing operations. General monitoring conditions may be included in the licence requiring investigation of any limit exceedance. See *Appendix A- Emissions to Air* for details of DER's risk assessment and decision making.	-
Monitoring of inputs and outputs	-	**Construction, Commissioning and Operation** No conditions relating to monitoring of inputs and outputs have been specified in the works approval or are recommended to be added to the licence.	-

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
Process monitoring	-	**Construction, Commissioning and Operation** See *Appendix A- Emissions to air (abnormal operations)* for proposed regulatory controls for management of scrubber bypass events.	-
Ambient quality monitoring	-	**Construction, Commissioning and Operation** No conditions relating to ambient monitoring have been specified in the works approval or are recommended to be added to the licence.	-
Meteorological monitoring	-	**Construction, Commissioning and Operation** No conditions relating to meteorological monitoring have been specified in the works approval or are recommended to be added to the licence.	-
Improvements	IR1 IR2	Austral is proposing to commission Kiln 3 and the cascade limestone scrubber. IR1 requires submission of commissioning plan. See Appendix A- Emissions to air for details. *See Appendix A- Emissions to stormwater and Emissions to Surface water* for details.	-
Information	W4.1.1-4.1.2 W4.1.3-4.1.5	**Construction** Condition W4.1.1 has been added requiring submission of a compliance document following construction and prior to commissioning. Condition W4.1.2 specifies information and authorisation requirements for a compliance document to be submitted. **Commissioning** Condition 4.1.3 requires submission of an Emissions Verification Report. Condition 4.1.4 details information requirements for the Emissions Verification Report. Condition 4.1.5 requires submission of Noise Emissions Assessment Report. See Noise emissions section of this document for details of DER's risk assessment and decision making.	
Works approval Duration	-	The works approval has been granted for three years duration.	

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
23/11/2015	Application advertised in West Australian (or other relevant newspaper)	No comments received.	Not applicable.
23/11/2015	Application referred to Shire of Serpentine Jarrahdale	No comments received.	Not applicable.
27/11/2015	Application referred to Department of Water (DoW)	DoW's advice recommends that a Stormwater Management Plan should be prepared and implemented with advice from DoW. DOW's advice notes that the Plan should show how runoff within and from the site will be managed to ensure that turbidity and pollutants are appropriately managed prior to stormwater discharging to Cardup Brook. • Runoff from disturbed areas should pass through settling pits designed and maintained to provide storage for a minimum of 2 hours runoff resulting from a 10 years average return interval (ARI) storm event; • Bunding used to control potential spills around facilities such as fuel storage should be designed and maintained to provide storage for a 20 year 72 hours ARI storm event plus 110% of tank contents; • Runoff upto the 10 year 2 hour ARI storm event from disturbed areas should be managed to prevent mobilisation of sediments; • Runoff from undisturbed areas should be diverted away from disturbed areas.	A Stormwater Management Plan is required through conditions of works approval. DER will consult with DoW once the proponent submits the stormwater management plan. Austral Bricks should consider DoW recommendations.
7/01/ 2016	Proponent sent a copy of draft instrument	Comments received on 14/1/16 regarding duration of commissioning, monitoring regimen during commissioning, and emission limits during commissioning.	Comments considered and updated draft was sent to proponent on 20/01/16. Proponent confirmed acceptance of proposed condition on 21/01/16.

6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

Appendix A

Emissions to surface water

Construction

Emission Description

Emission: Stormwater runoff from manufacturing area containing elevated concentrations of suspended solids, entering Cardup Brook. The Proponent has indicated that clay stocks will be replenished during the cartage season to ensure a sufficient supply for commissioning and impending operation of the site.

Impact: Cardup Brook, a tributary of Serpentine River, flows through the premises. Stormwater flows in the direction of the brook. The release of contaminated or potentially contaminated stormwater, including higher suspended solids and hydrocarbons, into the Brook may impact surface water quality and potentially affect aquatic ecosystem health. There is potential for short-term localised impact.

Control: Construction activities will include installation of the cascade limestone scrubber and repair and maintenance of the existing Kiln 3 on the premises.

The Proponent has committed to developing a Stormwater Management Plan and Hydrocarbon Management Plan.

Risk Assessment
Consequence: Minor
Likelihood: Possible
Risk: Moderate

Regulatory controls
Potential emissions to stormwater during construction can be managed under general provisions of the *Environmental Protection Act 1986* (EP Act) and *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

Residual Risk
Consequence: Minor
Likelihood: Possible
Risk: Moderate

Commissioning and Operation

Emission Description

Emission: Discharge of stormwater runoff with elevated suspended solids or hydrocarbon concentration to Cardup Brook. Raw material (clay) stockpile areas, by-product/ waste stockpile areas, and unsealed trafficable areas can contaminate stormwater runoff with suspended solids.

Impact: Cardup Brook, a tributary of Serpentine River, flows through the premises. The previous assessment noted that the screening, crushing and clay storage area is located within 100 metres to the north of the Brook. There is also clay storage to the south of the brook. The premises has had a history of incidents where activities onsite have led to sediment discharge into the Cardup Brook during wet weather periods. The release of contaminated or potentially contaminated stormwater, including elevated levels of suspended solids and hydrocarbons, into the Brook may impact surface water quality and potentially affect aquatic ecosystem health.

Past records indicate that the Department of Environment Conservation had consulted with the proponent for improving stormwater management practices at the premises.

Review of the report titled *'Stormwater Discharge Assessment Report, Austral Bricks- Cardup Main pit'*, numbered *AUBCAR01-Rev 0, March 2011, authored by Coterra Environment* (referred to as the *Coterra Report* hereafter) identifies that the manufacturing area could be the major source of the TSS loading to Cardup Brook.

The *Coterra Report* reviewed stormwater management practices in the excavation area (not a prescribed activity) and the manufacturing area. The *Coterra Report* noted the following with regards to stormwater containment infrastructure in the manufacturing area:

- The manufacturing area discharges via four points to Cardup Brook. Catchment 6, 7 and 8 discharge via drainage channels D5 and 6, while catchment 10 discharges via V-notch weirs V1 and V2.
- Stormwater from drain D5, which collects from the western side of the manufacturing area, was discharging fairly regularly during the winter months. This contributed towards 2-5% of the Cardup flow and on certain occasions accounted for higher TSS concentrations at the exit location of Cardup Brook;
- Drainage channels within these catchments act mainly as a conveyance system. Further filtration and treatment could be achieved in these drains by planting the channels with appropriate vegetation prior to discharge.
- Settlement Basin B8 is largely undefined and does not currently offer much retention capacity;
- Catchment 9 currently drains offsite via a small drainage channel;
- V-notch weirs V1 and V2 that discharge into Cardup Brook were not performing as effectively as designed.

The *Coterra Report* had recommended a number of improvement options including vegetation of conveyance drains, re-contouring and definition of stormwater detention basins, and improving sediment retention efficiency using techniques including the use of flocculants. As part of the works approval application, the proponent has not demonstrated that deficiencies in stormwater infrastructure at the premises as identified in the *Coterra Report* have been addressed.

There is potential for alteration of the environment and localised impact if stormwater discharge from the premises is not appropriately managed.

Control:

The proponent has indicated that existing stormwater collection infrastructure at the premises includes three smaller interconnected ponds, located south of the clay store shed, a drainage channel connected to two sediment pond located to the west of the yard and storage area and three ponds located west of the clay store shed.

The *Coterra Report* had identified deficiencies in retention capacity of existing stormwater basins on the premises and recommended improvements.
As part of the works approval application, the proponent has not demonstrated that deficiencies in stormwater infrastructure at the premises as identified in the *Coterra Report* have been addressed. See Appendix B for a map of stormwater infrastructure as included in the *Coterra Report.*

The proponent has committed that:

- A stormwater management plan will be prepared;

- the capacity of each of the ponds will be monitored each day rain is forecast and maintained to ensure sufficient capacity. Weather conditions will be monitored daily using on-line weather forecasts;
- portable pumps will be used to pump water into the large pond or water tanks;
- uncontaminated stormwater from rooftops and sealed discharged into Cardup Brook will flow through series of v-notch weirs to reduce the risk of erosion and turbid water discharges;
- All waste intended for offsite disposal will be stored in an appropriate receptacle such as skip bins, bulk bags, wheelie bins and three-sided bins;
- Waste management contractors will be employed to deliver solid waste that is not suitable for onsite re-use to the applicable waste-disposal facility; and
- Reject bricks known as “grog” will be stored in stockpiles, free of contaminants such as plastic straps. The grog will be used in the brick making process.

No specific controls regarding the frequency of discharge into Cardup Brook or to monitor or minimise suspended solids load that may be discharged to the brook have been proposed.

Risk Assessment
Consequence: Moderate
Likelihood: Possible
Risk: Moderate

Regulatory controls

Review of *Coterra Report* for Cardup Brickworks has identified deficiencies in existing stormwater containment infrastructure at the site. This may be significant during operation stage.

The proponent has not demonstrated the adequacy of existing stormwater collection and drainage infrastructure on the premises. Information including design capacity of existing ponds on the premises to accommodate expected storm events (10 year ARI), design freeboard that will be maintained during normal operations, proposed monitoring regimen or methodology to determine potential impact of premises operations and discharges from the premises on surface water quality of the Cardup Brook has not been provided.

IR2 has been included in the works approval requiring the proponent to submit a Stormwater Management Plan, which reviews stormwater management measures on the premises, containment capacity of stormwater infrastructure and identifies potential impacts on surface water quality where discharge to Cardup Brook is proposed.

DER will review the Stormwater Management Plan and consider whether regulatory controls are required to manage potential impacts during operations.

Hydrocarbon Storage on the premises, at current storage volumes, is not a prescribed activity. Potential unauthorised emissions from hydrocarbon storage can be managed under general provisions of the EP Act.

Residual Risk
Consequence: Moderate
Likelihood: Possible
Risk: Moderate

Point source emissions to air including monitoring

Key emissions associated with brick manufacturing include hydrogen fluoride (HF), hydrogen chloride (HCl), sulphur dioxide (SO_2), nitrogen oxide (NOx), carbon monoxide (CO) and particulates (PM).

Austral is proposing to install a cascade limestone scrubber to reduce potential air emissions from the kiln stack. Austral have undertaken air emissions modelling for key parameters listed above using emission rates data from Cardup's previous operations and the expected reduction from the scrubber proposed to be installed through this works approval.

The predicted Ground Level Concentrations (GLCs) for these emission rates and other parameters of
interest are shown in Table 1. The modelling study has assumed background concentrations of these pollutants not to be significantly contributing to the air shed at Cardup given the paucity of industry in the area.

Table 1: Modelled ground level concentrations for key air emission parameters

Parameter	Guideline (µg/m^3 and averaging time)[a]	Highest concentration on the modelling grid (µg/m^3 and averaging time)	Percentage of guideline
HF with scrubber	100, 1 hour	7.5, 1 hour	7.5%
HF scrubber in bypass	*100, 1 hour*	*41.5, 1 hour*	*41.5%*
HCl	100, 1 hour	66, 1 hour	66%
NO_2	246, 1 hour	7, 1 hour	2.8%
	61.6, annual	0.06, annual	0.01%
SO_2	571.8, 1 hour	8.8, 1 hour	1.5%
	228.7, 24 hour	1.3, 24 hour	0.6%
	57.2, annual	0.07, annual	0.1%
CO	11 249, 8 hour	10, 8 hour	0.1%
PM_{10}	50, 24 hour	0.3, 24 hour	0.6%
$PM_{2.5}$	25, 24 hour	5.2, 24 hour	21%
	8, annual	0.3, annual	3.8%

a. all standards from the NEPM (NEPC 2003) except HF and HCl which are the WA health guidelines for acid gases (DoH 2007)

The WA Health Guideline (2007) concentrations referenced by Austral are based on a Department of Health internal document (*Acid Gas Criteria*, *Internal document, Toxicology WA Department of Health*, Shenton Park, WA) which has been previously referenced in other air quality assessments submitted to DER. The air emissions modelling data submitted by Austral has been reviewed by DER's air quality technical experts and modelled results deemed acceptable.

The contribution of other smaller emission points, such as dryer vents, to emissions to air, has not been included in the air emissions modelling assessment. These emissions are not treated through the scrubber. During normal operations, emissions from dryer vents are not expected to be significant. A condition has been added to the works approval requiring dryer vent monitoring during commissioning to validate this assumption.

Commissioning and normal operation

Emission Description – Nitrogen oxide (NOx) and Carbon monoxide (CO)
Commissioning will be undertaken in two stages. Pre-commissioning the kiln using natural gas for approximately three months and full commissioning of the kiln for approximately three months once scrubber installation is complete.

Emission: Emissions to air during pre-commissioning will include natural gas combustion products (NOx, CO).

Impact: Key environmental impacts associated with NO_2 emissions arise due to their potential photochemical activity. Nitrogen oxides and sulphur dioxide are also known irritant gases. CO above recommended criteria can be toxic.

Air emissions modelling assessment shows that NO_2 emissions are not likely to exceed 2.8% of the NEPM (1 hour) guideline and CO emissions are not likely to exceed 0.1% of the NEPM (8 hour) guideline during normal operations. Air emissions modelling data indicates that NOx and CO emissions during normal operations are not likely to cause significant localised impact during operations.

No estimation of potential NOx and CO stack concentrations during commissioning has been provided. However, given the short duration of commissioning and based on the fact that no significant concerns relating to NOx or CO emissions have been based on previous operations on the site, potential impact during commissioning are not expected to be significant.

Control: No specific end of pipe controls has been proposed. A complaints register will be implemented.

Risk Assessment
Consequence: Insignificant
Likelihood: Likely
Risk: Moderate

Regulatory controls

Condition 1.2.2 and 1.2.3 limit duration for which commissioning can be undertaken. Condition 2.1.2 requires point source air emissions monitoring. Condition 2.1.3 requires that sampling is undertaken in accordance with AS 4323.1. Condition 2.1.4 requires that point source emissions sampling and analysis is undertaken using NATA accredited laboratory and in accordance with the test methods specified.

Improvement requirement IR1 has been added requiring submission of commissioning plan. Upon completion of commissioning, Austral will be required to submit to the CEO an Emissions Verification Report that would include analysis results and copies of monitoring reports. DER will review the results presented in the Emissions Verification Report. Should Austral seek a licence to operate, the following conditions may be specified in the licence to manage point source emissions to air:

- Conditions requiring ongoing monitoring for NO_x and CO;
- Recordkeeping and reporting requirements for submission of Annual Environmental Report and Annual Audit Compliance Report;
- Notification requirements for scrubber bypass events;
- Recordkeeping requirements for bypass start and end time, and investigation into root cause and preventative measures.

Risk Assessment
Consequence: Insignificant
Likelihood: Likely
Risk: Moderate

Commissioning

Emission Description – Acid gases

Emissions: Emissions to air during commissioning will include acid gas emissions (HF, HCl and SO_2) from the kiln stack.

Impact: Key environmental impacts associated with acid gas emissions include the potential for leaf burn to vegetation and irritation to humans. HF can impact on vegetation health at low concentrations.

Australian and New Zealand Environment Council's report on National Goals for fluoride in ambient air and forage, March 1990 notes that investigations on native species under experimental conditions have identified that a three-month average exposure of 0.5µg/m^3 would result in little significant visible injury. The report, however, identifies that Australian native plant species including *Acacia saligna, Eucalyptus citriodora, Eucalyptus tessellaris and Xanthorrhoea preissii* may be impacted at ambient HF concentrations of 0.6 µg/m^3 and above.

The premises is located adjacent to Bush Forever Site No. 271- Cardup Brook Bushland, Cardup/Peel Estate, which is 35.8 hectares in size. Several wetlands of varying conservation status are located in the vicinity of the Brickworks. A multiple use category wetland is located adjacent to the activity area and within the premises boundary. A conservation category wetland, associated with a section of the Cardup Brook, is located approximately 410 m to the north-west.

The report titled *'Vegetation health Survey at Cardup, WA, 12 January 2005, Austral Bricks Limited'*, *authored by D.Doley dated February 2005* notes that visible injury attributable to fluoride emissions from Cardup brickworks appeared to be contained within the Austral Bricks property. The extent and patterns of distribution of visible injury to plant species is consistent with prevailing wind directions during summer growing season. The Report notes evidence of visible injury to vegetation north-east of the brickworks. The report notes that structural elements of vegetation on the north-west of the premises do not appear to be at risk and that south-east portion of the Bush Forever reserve appeared to be in a reasonable condition, however, recommended that long-term management plan is in place to ensure the Reserve continues to meet its objectives.

Acid gases can interact in the atmosphere to form fine sulphate and nitrate particles that can be transported by the wind and have the potential to impact human health when inhaled. The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary.

Air emissions modelling information submitted by Austral indicates that during operations, HCl emissions are likely to be 66% of the DoH-2007 (1 hour) ambient air quality criteria referenced by the proponent, SO_2 emissions are likely to be 1.5% of the NEPM (1 hour) criteria and HF emissions are likely to be 41.5% of the DoH-2007 criteria during worst case scenario. Once the stable scrubber performance is achieved, HF emissions are likely to be 7.5% of the DoH criteria. Given the short duration of commissioning, potential impacts are likely to be localised.

Control: A cascade limestone scrubber will be installed and operational during commissioning. The scrubber may not operate at its design specifications for the whole duration of commissioning. HCl and SO_2 removal efficiency of the cascade limestone scrubber, during normal operations, is minimal. Accordingly, during commissioning, the HCl and SO_2 emissions profile is not expected to be

significantly different to those from normal operations. HF emissions may be higher until stable scrubber performance is achieved.

Austral has committed to undertake air quality monitoring during commissioning. Preliminary vegetation monitoring will be undertaken to establish the baseline. A complaints register will be implemented.

Risk Assessment
Consequence: Minor
Likelihood: Likely
Risk: Moderate

Regulatory controls

Condition 2.1.2 requires point source air emissions monitoring. Condition 2.1.3 requires that sampling is undertaken in accordance with AS 4323.1. Condition 2.1.4 requires that point source emissions sampling and analysis is undertaken using NATA accredited laboratory and in accordance with the test methods specified.

Condition 1.2 limits duration for which commissioning can be undertaken.

Improvement requirement IR1 has been added requiring submission of commissioning plan. Upon completion of commissioning, Austral will be required to submit to the CEO a commissioning report that would include analysis results and copies of monitoring reports. The point source emissions monitoring results will also be used to verify modelling assumptions and will be considered in assessing potential impacts of operations.

Residual Risk
Consequence: Minor
Likelihood: Likely
Risk: Moderate

Normal Operation – Considered to be when cascade limestone scrubber is operational

Emission Description

Emission: Acid gas emissions (HF, HCl and SO_2) from kiln stack.

Impact: Key environmental impacts associated with acid gas emissions include potential for potential for leaf burn and irritation to humans. HF even at low concentrations can impact on vegetation health. Acid gases can interact in the atmosphere to form fine sulphate and nitrate particles that can be transported by the wind and have the potential to impact human health when inhaled.

The premises is located adjacent to Bush Forever Site No. 271- Cardup Brook Bushland, Cardup/Peel Estate, which is 35.8 hectares in size. Several wetlands of varying conservation status are located in the vicinity of the Brickworks. A multiple use category wetland is located adjacent to the activity area and within the premises boundary. A conservation category wetland, associated with a section of the Cardup Brook, is located approximately 410 m to the north-west.

The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary.

Modelling contours included in the air emissions modelling assessment show that the highest concentrations can be expected to the east of the kiln. This area

contains farmland and some remnant bushland, leading to the potential for vegetation to be affected by emissions, particularly HF emissions.

Air emissions modelling information submitted by Austral indicates that during normal operations, HCl emissions are likely to be 66% of the DoH-2007 (1 hour) ambient air quality criteria, SO_2 emissions are likely to be 1.5% of the NEPM (1 hour) criteria and HF emissions are likely to be 7.5% of DoH-2007 criteria.

There is potential for localised impact on vegetation health and potential for alteration of the environment.

Control: The cascade limestone scrubber to be installed is estimated to achieve 82% reduction in HF, 12% reduction in HCl and 20% reduction in SO_2 concentrations.

Austral has indicated that acid gas emission rates as below can be achieved during normal operations of the scrubber.

- HF 1 g/s (or 130 mg/m^3 at 18% O_2);
- HCl 200 mg/m^3 at 18% O_2; and
- SO_2 200 mg/m^3 at 18% O_2.

The proposed scrubber technology is similar to the one used at Austral's Armadale operations. Austral Bricks proposes to monitor its acid gas emissions quarterly, consistent with all the other brick manufacturing premises in Western Australia.

During the first year of operation, monthly monitoring of surrounding vegetation within the potential impact zone will be undertaken. Austral has indicated that this check would include searching for signs of vegetation degradation (such as marginal necrosis) as outlined in the Australian and New Zealand Environment Council (ANZECC) guideline, National Goals for Fluoride in Ambient Air and Forage (ANZECC 1990).

Austral has indicated that it has not identified evidence of offsite vegetation degradation in the area that could be attributed to previous brickmaking operations at Cardup.

Risk Assessment
Consequence: Minor
Likelihood: Likely
Risk: Moderate

Regulatory controls

Scrubber efficiency can be dependent on a number of parameters including the availability of appropriate quantities of limestone, operating temperature, etc. Considering the proximity of receptors and given the potential ground level concentrations of acid gas emissions (based on air emissions modelling data provided) ongoing stack emissions monitoring for acid gases is considered appropriate.

Should Austral seek a licence to operate, the following conditions may be specified in the licence to manage point source emissions to air:

- Emission limits for HF, HCl and sulphur oxides;
- Conditions requiring quarterly monitoring for acid gases;
- Recordkeeping and reporting requirements for submission of Annual Environmental Report and Annual Audit Compliance Report;
- Notification requirements for scrubber bypass events;
- Recordkeeping requirements for bypass start and end time, investigation into root cause and preventative measures

The contribution of other smaller emission points, such as dryer vents, to emissions to air, has not been included in the air emissions modelling assessment. These emissions are not treated through the scrubber. During normal operations, emissions from dryer vents are not expected to be significant. The condition has been added to the works approval requiring dryer vent monitoring during commissioning to verify this assumption.

DER will re-assess potential risks during operation once monitoring results from commissioning are available. Reporting mechanisms such as National Pollutant Inventory could be considered to review reported emissions from dryer vents.

Residual Risk
Consequence: Minor
Likelihood: Likely
Risk: Moderate

Emission Description – Abnormal Operation (Scrubber failure/ Bypass)

Apart from the unexpected failure of abatement, the scrubber may need to be bypassed for plant maintenance, operational or safety reasons. Scrubber will be bypassed during start-up events.

Emission: HF, HCl and SO_2 emissions from kiln stack.

Impact: Key environmental impacts associated with acid gas emissions include potential for potential for leaf burn and irritation to humans. HF even at low concentrations can impact on vegetation health.

The premises is located adjacent to Bush Forever Site No. 271- Cardup Brook Bushland, Cardup/Peel Estate, which is 35.8 hectares in size. Several wetlands of varying conservation status are located in the vicinity of the Brickworks. A multiple use category wetland is located adjacent to the activity area and within the premises boundary. A conservation category wetland, associated with a section of the Cardup Brook, is located approximately 410 m to the north-west.

The report titled *'Vegetation health Survey at Cardup, WA, 12 January 2005, Austral Bricks Limited'*, *authored by D.Doley dated and February 2005* notes that visible injury attributable to fluoride emissions from Cardup brickworks appeared to be contained within the Austral Bricks property. The extent and patterns of distribution of visible injury to plant species is consistent with prevailing wind directions during summer growing season. The Report notes evidence of visible injury to vegetation north-east of the brickworks. The report notes that structural elements of vegetation on the north-west of the premises do not appear to be at risk and that south-east portion of the Bush Forever reserve appeared to be in a reasonable condition, however, recommended that long-term management plan is in place to ensure the Reserve continues to meet its objectives.

The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary.

Air emissions modelling information submitted by Austral indicates that during normal operations, HCl emissions are likely to be 66% of the NEPM (1 hour) ambient air quality criteria, SO_2 emissions are likely to be 1.5% of the NEPM (1 hour) criteria and HF emissions (with no end of pipe control) are likely to be 41.5% of the HF criteria.

HCl and SO_2 removal efficiency of the cascade limestone scrubber, during normal operations, is minimal. Accordingly, during scrubber bypass events, HCl and SO_2

emissions profile is not expected to be significantly different to those from normal operations.

Modelling contours included in the air emissions modelling assessment show that the highest HF concentrations can be expected to the east of the kiln. This area contains farmland and some remnant bushland, leading to the potential for vegetation to be affected by emissions, particularly HF emissions.

There is potential for localised impact on vegetation health and potential for alteration of the environment.

Control: Bypass events will be managed by reducing the push rate (amount of cars containing bricks fired in the kiln). Austral has indicated that the push rate can be slowed within approximately 30 minutes of the bypass occurring. Austral has indicated that stopping the production is not feasible due to the potential for damage to kiln structure and burners.

Austral has indicated that the push rate calculation derived from the *National Pollution Inventory (NPI) Emission Estimation Technique Manual for Bricks, Ceramics, and Clay Product Manufacturing,* (NPI 1998) will be used.

Risk Assessment
Consequence: Minor
Likelihood: Likely
Risk: Moderate

Regulatory controls

Should Austral seek a licence to operate, following conditions may be added to manage potential emissions during abnormal operations:

- The requirement that Austral takes relevant measures to ensure HF limits on the licence are not exceeded. This may include reducing the push rate during bypass events;
- Notification requirement when a scrubber bypass event occurs for 30 minutes or more;
- Requirement to investigate scrubber bypass events and report details through Annual Environmental Report including information on date, time, duration, reason for by-pass, action taken, estimation of quantity of each contaminant that may have been emitted (concentration and mass flow rate); and
- Notification requirement for potential breach of licence limit.

Austral has indicated that the cascade limestone scrubber has been chosen due to its reliability and as such bypass events are expected to be rare.

Once the premises is in operation, scrubber bypass events frequency and duration will be monitored and implications considered in determining the appropriateness of regulatory controls.

Residual Risk
Consequence: Minor
Likelihood: Likely
Risk: Moderate

Emission Description – Normal Operation

Emission: Particulate emissions (PM_{10} and $PM_{2.5}$) from kiln stack when scrubber is operational. The application document states that particulate emissions from the cascade limestone scrubber are not likely to be significant. However, the performance data submitted by Austral indicates that particulate emission concentrations from the existing scrubber stack are higher than the inlet concentrations. PM emissions exiting the cascade limestone scrubber are likely to be lime particles.

Table 2: Cascade limestone scrubber inlet and outlet concentrations data submitted by Austral

Atmospheric Contaminant	Concentration (mg/Nm³)		Mass Rate (g/min)		Removal Efficiency (%)
	Inlet	Outlet	Inlet	Outlet	
Carbon monoxide	419	419	622	622	NA
Total nitrogen oxides (as NO_2)	52	52	77	77	NA
Fluorine compounds (as HF)	170	30	252	45	82
Total sulphur oxides (as SO_2)	44	35	65	52	20
Chlorine compounds (as HCl)	239	210	355	312	12
Total solid particulate matter	4	50	6	74	NA

Note: NA - Not applicable

Impact: Lime is known to be corrosive and an irritant to eyes and when inhaled. The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary.

Air emissions modelling assessment shows that during normal operations, ground level concentrations of PM_{10} concentrations are likely to be 0.6% of the NEPM (8 hour) Guidelines and $PM_{2.5}$ emissions are likely to be 21% of the NEPM (8 hour) Guidelines. There is potential for localised impact, minor reversible health effects and potential local complaints.

Control: No specific controls for PM emissions have been proposed. Reliance on the cascade limestone scrubber operating in accordance with the design specifications is the only control.

Risk Assessment
Consequence: Insignificant
Likelihood: Likely
Risk: Moderate

Regulatory controls
Should Austral seek a licence to operate, following conditions may be specified in the licence to manage point source emissions to air:

- Quarterly monitoring of particulates;
- Conditions specifying that sampling and analysis are undertaken by a NATA accredited laboratory;
- Recordkeeping and reporting requirements; and
- The requirement to implement a complaints management system.

Residual Risk
Consequence: Insignificant
Likelihood: Likely
Risk: Moderate

Fugitive Dust Emissions

Fugitive dust emissions are expected from raw material handling, storage activities on the premises. The activity of clay extraction is not a prescribed activity and is not included within the premises boundary.

Commissioning and Operation

Emission Description

Emission: Fugitive dust (particulate) emissions from clay stockpiles and truck movements on haul roads. Dust emissions from clay stockpiles, trafficable areas, machinery and conveyors.

Impact: Potential for dust deposition on vegetation. Fugitive dust emissions have the potential to cause respiratory issues. The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary

Austral has undertaken dust emissions modelling using a conservative estimation of truck movements (5 trucks per hour, 10 hours per day which is the largest expected material movement in a month). The results indicate that PM_{10} concentrations at receptors, in worst case scenario, are likely to be 53.4% of the NEPM Guideline (50µg/m3, 24-hour average). There is potential for localised impact and local concern if fugitive dust emissions are not appropriately managed.

Control: Dust management measures to be employed at the site will include:

- watering stockpiles using water carts;
- all conveyors will be covered;
- all transfer points will be enclosed;
- a roll crusher will be used as the primary crushing unit, low dust generating technology;
- grinding/clay preparation sheds will be enclosed with shade cloth walls
- crushing screens will include curtains and will be enclosed;
- a mechanical sweeper will regularly be used for sweeping the plant;
- all kiln cars will be swept or vacuumed;
- areas associated with brick manufacturing that are not under cover will be watered using water carts and swept regularly. Exposed areas will be covered with crushed aggregate;
- a wet-type street sweeper and water cart would be used on site to reduce potential dust impacts on Kiln Road.

Risk Assessment
Consequence: Minor
Likelihood: Unlikely
Risk: Moderate

Regulatory Controls
Unauthorised dust emissions from the premises during construction, commissioning and operation can be managed under general provisions of the EP Act. Should Austral seek a licence to operate, conditions requiring implementation of dust management procedures, stockpile management and implementation of complaint register may be specified.

Risk Assessment
Consequence: Minor
Likelihood: Unlikely
Risk: Moderate

Noise emissions

Commissioning and Operation

Emission: Noise emissions associated with the operation of the plant and machinery.

Impact: Noise emissions can cause nuisance and potential health impacts if not appropriately managed.

The nearest residential receptor (a property owned by Austral) is located 234 m from the premises boundary. Another residential receptor (a privately owned property) is located 400m from the premises boundary. A search of DER's complaints management system did not identify noise complaints associated with previous operations of Cardup brickworks.

The application document does not include data to ascertain potential noise emissions during commissioning and operation. Austral has indicated that predictive modelling is not considered appropriate for the site as standard power levels might not be representative of the machinery on site, given the age of the plant.

Considering the proximity of receptors, localised impact and potential breach of legal requirements may occur during commissioning and operation if noise emissions from the premises are not appropriately managed.

Control: Noise monitoring will be undertaken during commissioning to ascertain noise emission levels at receptors.

Austral has committed that noise mitigation strategies will be investigated should noise monitoring identify any issues or noise equipment/ plant components. Any vehicle fitted with reversing beepers that have the potential to exceed noise regulation limits will be retrofitted with broadband or visual alarms. All machinery will be kept in good working order.

Risk Assessment
Consequence: Minor
Likelihood: Possible
Risk: Moderate

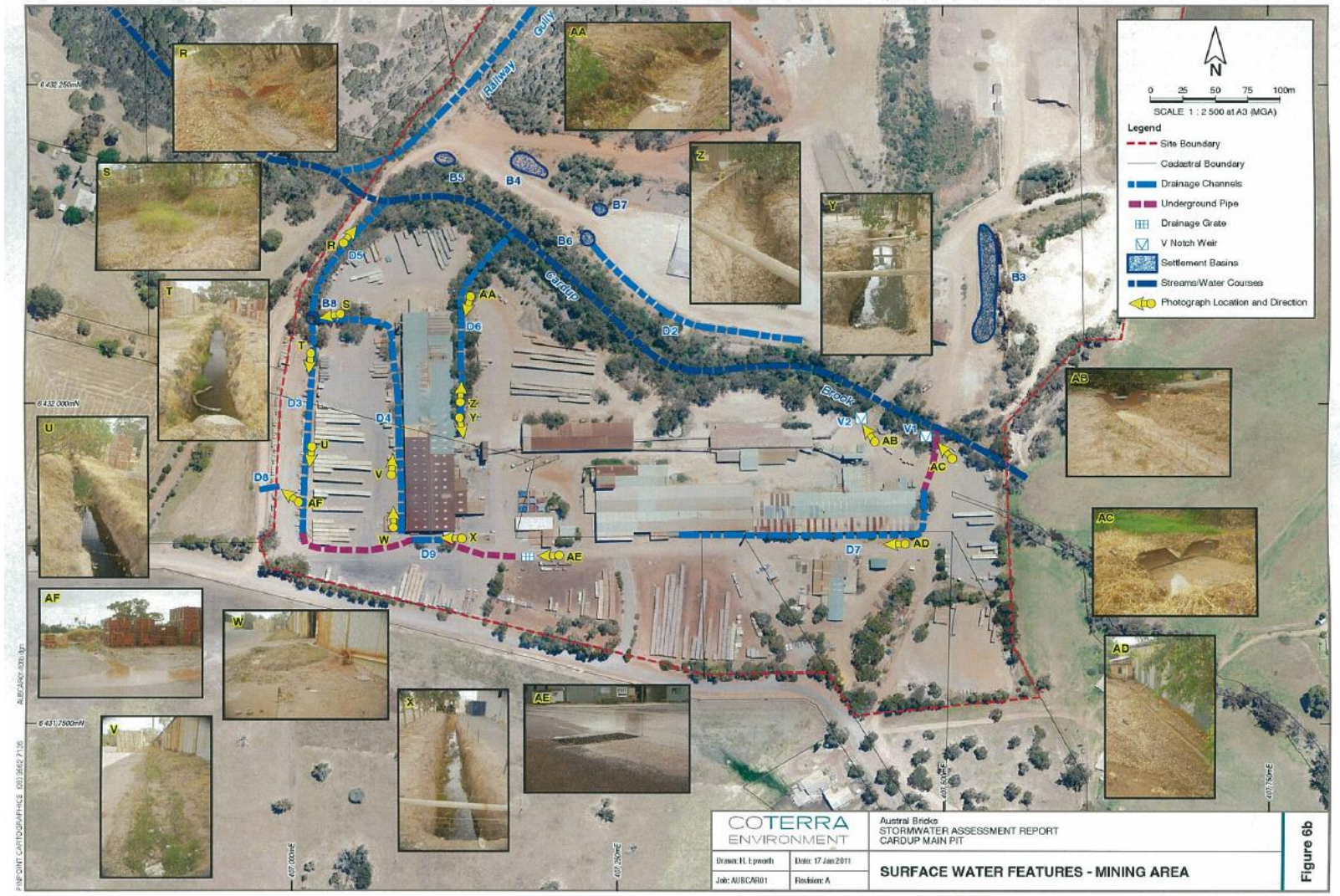
Regulatory Controls

Condition 4.1.5 has been added to the works approval requiring Austral to submit a noise emissions assessment report demonstrating compliance with *Environmental Protection (Noise) Regulations 1997*, identifying any improvements required and timeframes for completion of any improvements identified.

DER will consider the outcome of the noise emissions assessment in future licensing decisions to determine whether any improvements are warranted at the premises. The Premises will be required to comply with the EP (Noise) Regulations 1997. Should Austral seek a licence to operate, a condition requiring Austral to implement a complaints management system may be included.

Residual Risk
Consequence: Minor
Likelihood: Possible
Risk: Moderate

Appendix B – Map of stormwater infrastructure at Cardup brickworks



Appendix B- Location of Bush forever site- 271 within premises boundary- Cardup brickworks

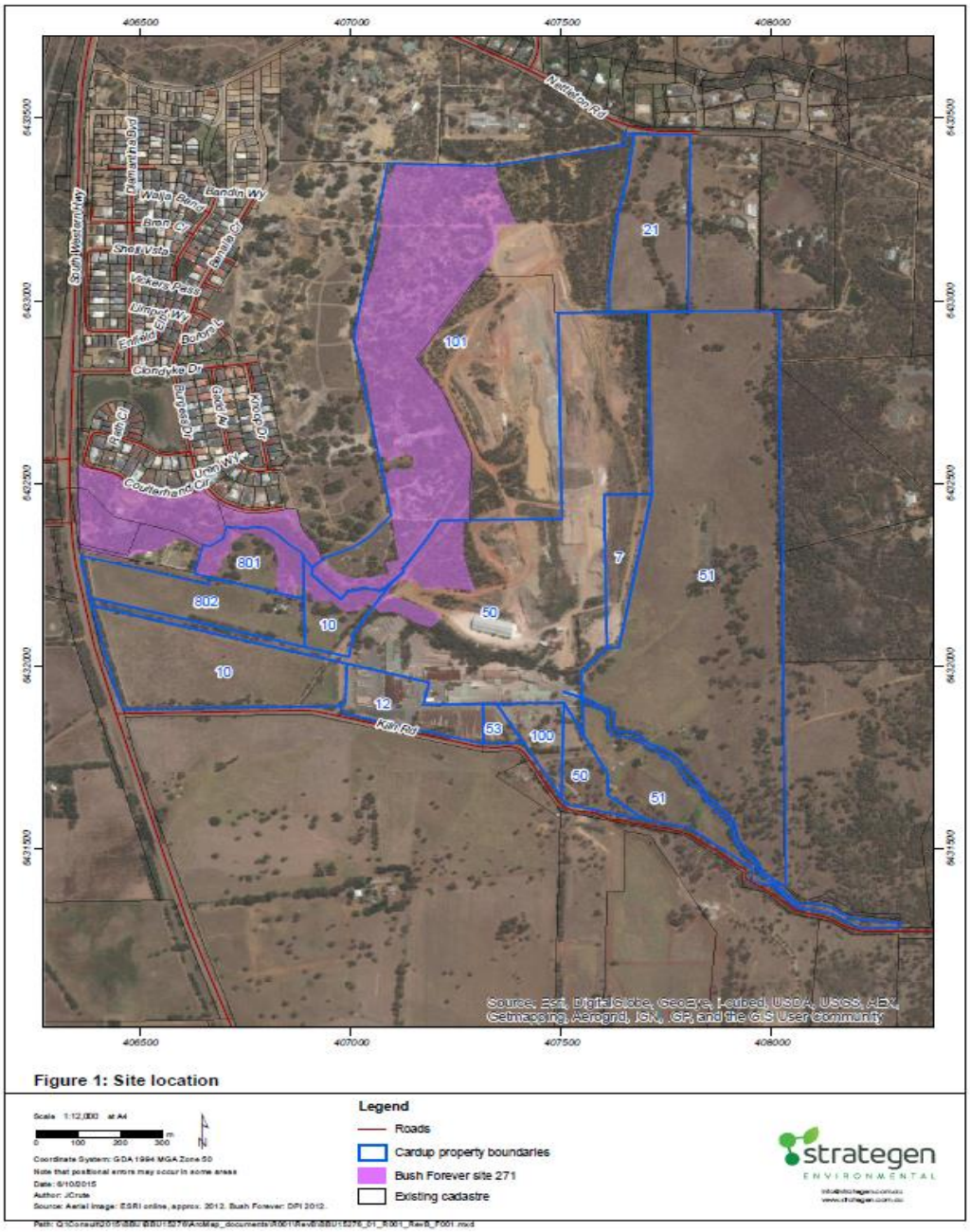


Figure 1: Site location

Legend
- Roads
- Cardup property boundaries
- Bush Forever site 271
- Existing cadastre

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 6/10/2015
Author: JCrute
Source: Aerial Image: ESRI online, approx. 2012, Bush Forever: DPI 2012.

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