



Hy-Tec Industries Pty Ltd
Development Consent Application Number SSD-6084
Annual Review for the Austen Quarry Extension
1st July 2017 to 30th June 2018

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Environmental
Compliance
Solutions Pty Ltd

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Prepared by:

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Report Authorised by:	Lisa Thomson VGT Environmental Compliance Solutions Pty Ltd Amanda Croker Hy-Tec Industries Pty Ltd
Checked by:	Sinead Kelly

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Title Block

Name of operation	Austen Quarry Extension
Name of operator	Hy-Tec Industries Pty Ltd
Development consent approval number	SSD-6084
Name of holder of development consent approval	Hy-Tec Industries Pty Ltd
Mining Lease Number	Not Applicable
Water Licence Number	WAL 37423, WAL 25616
Name of holder of water licence	WAL 37423: HY-TEC Industries Pty Ltd WAL 25616: AUS-10 RHYOLITE Pty Limited
Rehabilitation Management Plan start date	02/12/2016
Rehabilitation Management Plan end date	30/06/2050
Annual Review start date	01/07/2017
Annual Review end date	30/06/2018
<p>I, Darryl Thiedeke, certify that this audit report is a true and accurate record of the compliance status of Hy-Tec Industries Austen Quarry for the period 01/07/2017 to 30/06/2018 and that I am authorised to make this statement on behalf of Hy-Tec Industries Pty Ltd.</p> <p>Note. a) The Annual Review is an 'environmental audit' for the purposes of section 122B (2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000. b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</p>	
Name of authorised reporting officer	Darryl Thiedeke
Title of authorised reporting officer	National Planning and Development Manager
Signature of authorised reporting officer	
Date	31/10/2018

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Section 1. Statement of Compliance

Table 1. Statement of Compliance at 30/6/2018

Relevant Approval	All Conditions Compliant?
Development Consent SSD-6084	No: 4 Low Risk, 4 Admin
EPL 12323	No: 1 Low Risk
Water Access Licence 37423	No: 1 Admin
Water Access Licence 25616	Yes

A full list of conditions and compliance status is included in *Appendix A*.

Table 2. Compliance Status Key

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> potential for serious environmental consequences, but is unlikely to occur; or potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> potential for moderate environmental consequences, but is unlikely to occur; or potential for low environmental consequences, but is likely to occur
Administrative	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Table 3. Non-Compliances – SSD-6084 at 30/06/2018

Condition #	Condition Description	Compliance Status	Comment	Where addressed in Annual Review
Sched 2 Cond 2	The Applicant shall carry out the development generally in accordance with the: (a) EIS; (b) Statement of Commitments; and (c) conditions of this consent.	Low Risk Non-compliance	Not all conditions compliant	Section 9.2
Sched 3 Cond 10	The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.	Low Risk Non-compliance	PM ₁₀ 24 hr criteria exceeded on 4 occasions. Low risk: annual averages not exceeded.	Section 5.4

Condition #	Condition Description	Compliance Status	Comment	Where addressed in Annual Review
Sched 3 Cond 12	The applicant shall prepare and implement an Air Quality Management Plan for the development to the satisfaction of the Secretary.	Low Risk Non-compliance	Continuous monitoring of PM ₁₀ was not undertaken from 14 October 2017 to 2 January 2018 as required by the Air Quality Management Plan due to a fault and repairs to the monitor.	Section 5.4
Sched 3 Cond 16	The Applicant shall comply with the discharge limits in any EPL, or with section 120 of the POEO Act	Low Risk Non-compliance	pH from Dam 3 was 0.1 too high during discharge on 24/10/17	Section 6.1
Sched 2 Cond 18	By 30 September 2015, unless otherwise agreed with the Secretary, the Applicant shall: (a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction within the development area; and (b) submit a survey plan of these boundaries with applicable GPS coordinates to the Secretary.	Administrative	Historical: survey not completed by 30/9/15	Section 9.2
Sched 2 Cond 20	Within 6 months of the date of this consent, unless otherwise agreed by the Secretary, the Applicant shall enter into a planning agreement with the Council in accordance with Division 6 of Part 4 of the EP&A Act; and the terms specified in Appendix 7. If there is any dispute between the Applicant and Council on the planning agreement, then either party may refer the matter to the Secretary for resolution.	Administrative	Historical: VPA discussions commenced 7/08/15, agreement signed 10/08/16	Section 9.2
Sched 5 Cond 6	The applicant shall immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Applicant shall provide the Secretary any relevant agencies with a detailed report on the incident, and such further reports as may be requested.	Administrative	Three exceedances of the PM ₁₀ 24 hour criterion were recorded and one minor exceedance of pH Criterion at Point 9 and the DPE was not informed immediately.	Section 5.4 and Section 6.1
Sched 5 Cond 8	Within a year of the date of this consent, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit....	Administrative	Audit not commissioned by 15/9/17	Section 9.2

Table 4. Non-Compliances – EPL12323 at 30/6/2108

Condition #	Condition Description	Compliance Status	Comment	Where addressed in Annual Review
L2.4	Water Concentration Limits	Low Risk Non-compliance	pH from EPL Point 9 (Dam 3) was 0.1 too high during discharge on 24/10/17	Section 6.1.1

Table 5. Non-Compliances – WAL 37423 (10WA119180) at 30/6/2108

Condition #	Condition Description	Compliance Status	Comment	Where addressed in Annual Review
DS2431-00001	Monitoring Plan to be submitted and approved within 6 months	Administrative	WMP approved 16/10/17	Section 9.2.4

An Independent Audit was undertaken in October 2017. The Non-Compliances found during this audit are discussed in *Section 9.2*. Where these non-compliances have been rectified, they are counted as compliant as at 30/6/2018.

Section 2. Introduction

2.1. Department of Planning and Environment Review

This Annual Compliance review was submitted to the Department of Planning and Environment (DPE) on the 28th of September 2018. The DPE reviewed the document and provided correspondence to Hy-Tec Industries Pty Ltd stating that it did not consider it to generally satisfy the requirements of the approval/consent in relation to the Annual Review. The table below summarises the DPE comments and where they are addressed in this amendment to the Annual Review.

Table 6. DPE Annual Review Comments and Report Amendments

Comment	Where Addressed in this Document
<p>a) A comparison of 2017/2018 air quality, blasting and noise monitoring results with previous years is to be provided, including the provision of graphs (particularly for air quality monitoring) to demonstrate trends.</p>	<p>Air Quality graphs: section 5.4.2. Blasting and noise cannot be graphed due to number of nil triggers and inaudible results. Summary lines have been included in the appropriate tables in sections 5.2 and 5.3</p>
<p>b) It is noted that a complaint has been recorded on the complaints register available on the website in October 2017, however this has not been discussed in the Annual Review and the November 2017 Complaint identified in the Annual Review is to be recorded in the complaints register.</p>	<p>On investigation it was determined that the website has incorrectly listed a different Hy-tec site complaint register in the Austen website complaint register. The correct register has now been uploaded and does contain the November 2017 complaint.</p>
<p><u>Air Quality Monitoring</u></p> <p>It is noted that the E-Sampler developed a fault on 14 October 2017, was removed for repairs on 24 October, reinstalled in 19 December and recommenced logging on 2 January 2018. This indicates that there was a period of 2 ½ months where PM₁₀ monitoring was not undertaken.</p> <p>Section 8.4.1.2 of the Air Quality Management plan dated November 2016 for the Austen Quarry- Stage 2 Extension Project states that “[Particulate matter] monitoring will occur continuously with data collected and analysed on a monthly basis.”</p> <p>Condition 12 of Schedule 3 of the consent states: “The Applicant must implement the Air Quality Management Plan as approved by the Secretary”.</p> <p>It is requested that a response is provided by 2 November 2018 detailing what actions, if any, were taken by Hy-Tec to ensure compliance with Condition 12 of Schedule 3 of the consent. The failure to undertake continuous monitoring is required to be noted as a non-compliance in the Annual Review.</p>	<p>Table 3, Section 5.4.1</p>

Comment	Where Addressed in this Document
<p><u>Incident Reporting</u></p> <p>It is noted that the following incidents were not reported to the Department in accordance with Condition 6 of Schedule 5 of the consent:</p> <ul style="list-style-type: none"> • Four exceedances of the PM₁₀ 24 hour criterion (on 21 August 2017, 2 September 2017, 24 and 25 April 2018); and • One minor exceedance of the pH criterion at Point 9 on 24 October 2017. <p>Condition 6 of Schedule 5 of the consent (and the definition of an incident) required any exceedances of limits, regardless of whether they were caused by the operation to be reported to the Department immediately. This is a non-compliance with the consent and should be noted in the Annual Review.</p>	<p>Table 3, Section 5.4.1</p> <p>Note that the exceedance of the PM₁₀ 24 hour criterion on 21/8/17 was during bushfires and is therefore not a non-compliance nor an incident.</p>
<p>It is also noted that the 2017 Annual <u>Review</u> has been incorrectly labelled on the website as the 2016-2017 Annual <u>Return</u>. This should be corrected.</p>	<p>The website has been amended to include the correct title for the Annual Review.</p>

2.2. Background

Aus10 Rhyolite Pty Ltd is part of the HY-TEC Group, a wholly owned subsidiary of Adelaide Brighton Limited. The Austen hard rock quarry (the site) is located at Hartley in the NSW Blue Mountains, approximately 100km west of Sydney. Operating since the mid-1990s, a State Significant Development Consent number 6084 (*Appendix B*) was issued on 15th July 2015 for the continued extraction of hard rock material and the extension of the quarry into additional reserve areas.

The quarry extracts and crushes Rhyolite for roadworks, asphalt, rail and landscaping uses. Extraction is undertaken using drill and blast methods, fragmenting the material into smaller manageable pieces. The fragmented material is then loaded into a primary crusher. Crushed material is then passed through a scalping plant and transferred to the processing area via a conveyer system.


Once at the processing area, the material is passed through a secondary crusher and screen to produce a variety of quarry products. The different products are then stockpiled and moved offsite via haul trucks to the regional and Sydney markets.

2.3. Location

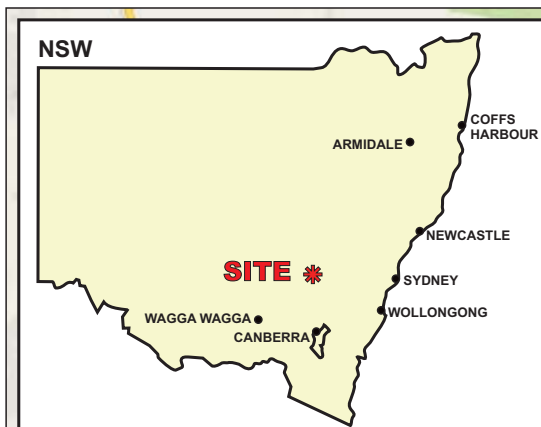
The site is located on freehold land privately owned by Hartley Pastoral Corporation (HPC) and is contained within Lots 1, 2 DP1005511 and Lot 31 DP 1009967. The site is bounded by remnant natural bushland to the south and pastoral land to the north (see *Figure 1*). According to Lithgow City Council Local Environmental Plan, the quarry is situated on land categorised as RU1: Primary Production. Access to the Austen site is via the sealed site access road which intersects Jenolan Caves Road.

Plan of:	Annual Review for the Austen Quarry Extension July 2017 to June 2018 - Site Location	Location:	Off Jenolan Caves Road, Hartley, NSW	Source:	Google Map - Image Date 17/03/2018 & Google Maps 2018	Our Ref:	6124_HY_H_AR17-18_C001_V0_F1.cdr
Figure:	ONE	Council:	Lithgow City Council	Survey:	N/A	Plan By:	JD
Sheet:	1 of 1	Tenure:	N/A	Projection:	N/A	Project Manager:	TO
Version/Date:	V0 03/09/2018	Client:	Hy-Tec Industries Pty Ltd - Adelaide Brighton Limited	Contour Interval:	N/A	Office:	Thornton

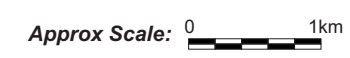
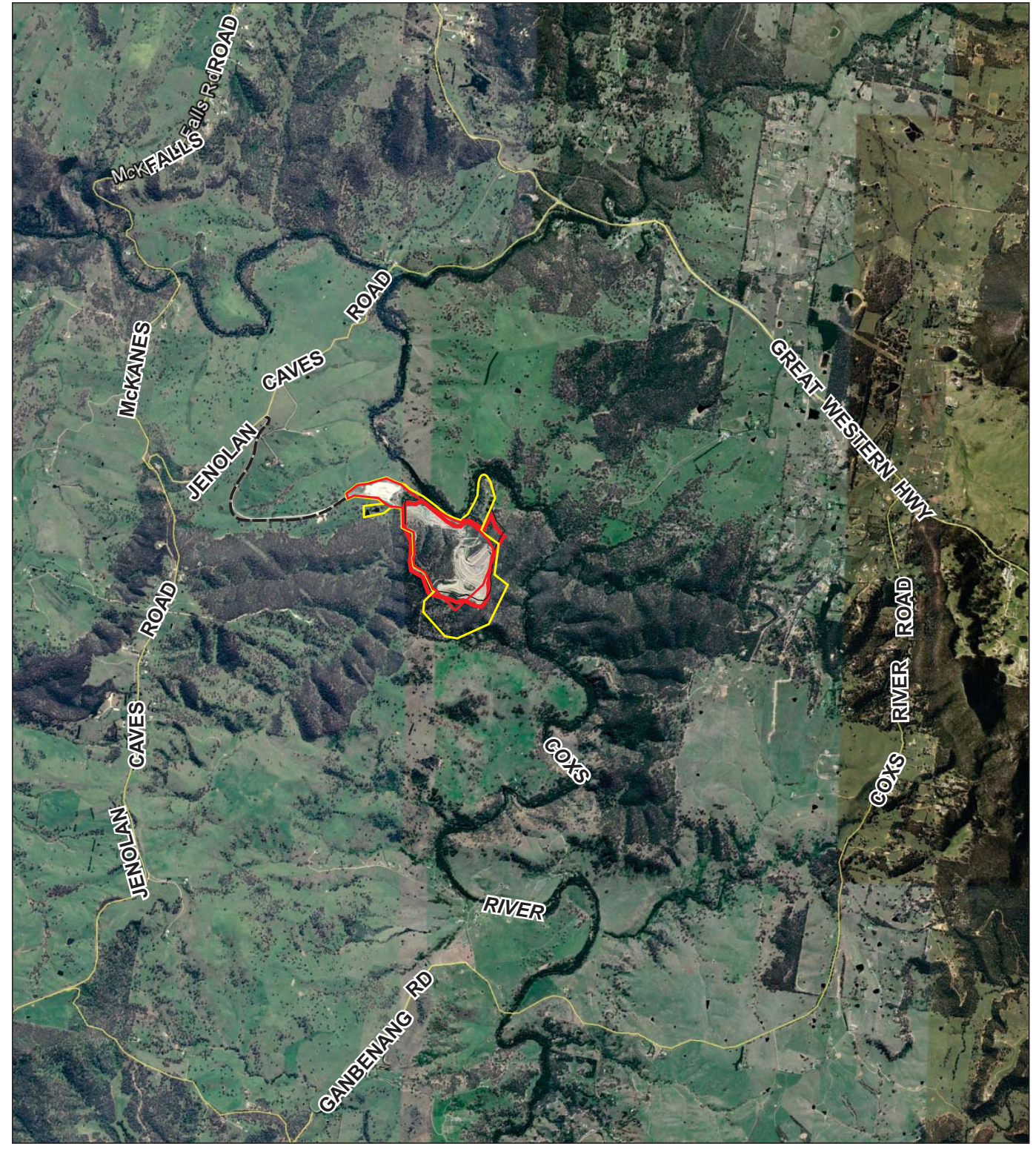
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Environmental Compliance Solutions Pty Ltd




- Legend**
- Stage 1
 - Stage 2
 - Quarry Access Road



Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke

Signed: 
Date: 28/09/2018

Project Manager VGT: Lisa Thomson

Signed: 
Date: 19/09/18

2.4. Scope

This report has been prepared by VGT Environmental Compliance Solutions Pty Ltd (VGT) to satisfy condition 4 in schedule 5 of the Development Consent conditions for application number SSD-6084:

4. By the end of September each year, or other timing as may be agreed by the Secretary, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:

(a) describe the development (including any rehabilitation) that was carried out in the previous financial year, and the development that is proposed to be carried out over the current financial year;

(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, which includes a comparison of these results against the:

- relevant statutory requirements, limits or performance measures/criteria;*
- requirements of any plan or program required under this consent;*
- monitoring results of previous years; and*
- relevant predictions in the EIS;*

(c) identify any non-compliance over the past financial year, and describe what actions were (or are being) taken to ensure compliance;

(d) identify any trends in the monitoring data over the life of the development;

(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and

(f) describe what measures will be implemented over the current financial year to improve the environmental performance of the development.

This Annual Review summarises all site activities, condition compliance, environmental performance and rehabilitation progression during the reporting period 1st July 2017 to 30th June 2018.

2.5. Site Contacts

Table 7. Site Contacts

Contact	Darryl Thiedeke	Rodd Welsh
Title	National Planning and Development Manager	Austen Quarry Production Manager
Address	PO Box 6770, Silverwater NSW, 1811	391 Jenolan Caves Road, Hartley NSW 2790
Mobile	0409 652 022	0418 292 843
Phone	N/A	02 6355 0268
Email	Darryl.Thiedeke@adbri.com.au	rod.welsh@adbri.com.au

Section 3. Approvals

3.1. SSD 6084

On the 15th of July 2015, State Significant Development 6084 was granted to Hy-Tec Industries. The consent allows for the continued extraction of hard rock material and the extension of the quarry. SSD 6084 has been summarised below in *Table 8* and included in *Appendix B*.

Table 8. State Significant Development Summary

Consent Number	Approved	Expiry	Notes
SSD 6084	15/07/15	30/6/2050	Extension of quarrying activities into stage 2 reserves. Quarrying to be completed by 30 th June 2050. Rehabilitation activities may continue.

3.2. Environment Protection Licence

The NSW EPA has issued Environment Protection Licence (EPL) number 12323. The licensee is AUS-10 Rhyolite Pty Limited and the scheduled activity is Land-based extraction 500,000 – 2,000,000 tonnes annual capacity to extract, process or store. A summary is given below, and the conditions included in *Appendix C*.

Table 9. Environment Protection Licence Summary

Licence Number	Anniversary Date	Monitoring Point Number	Type of Monitoring
12323	01-July	1	Discharge to waters: Dam 1
		2	Ambient water monitoring: upstream of processing area
		3	Ambient water monitoring: downstream of processing area
		4	Ambient air monitoring: AQD-1
		5	Ambient air monitoring: AQD-2
		6	Ambient air monitoring: AQD-3
		8	Discharge to waters: Dam 2
		9	Discharge to waters: Dam 3
		10	Discharge to waters: Dam 4
		11	Discharge to waters: Dam 5
		12	Weather Analysis

There are also conditions with limits on noise and blast impacts and operating hours.

3.3. Water Licences

There are two water access licences relevant to the operations. The licences are summarised in *Table 10* and the conditions included in *Appendix D*.

Table 10. Water Licences Summary

Water Licence Number	Work Approval Number	Issued	Expiry	Notes
WAL37423	10WA119180	25/03/2015	24/03/2025	Coxs River Fractured Rock Groundwater Source, Lots 1&2 DP1005511, 20.00 ML
WAL25616	10WA103330	1/07/2011	24/11/2025	Upper Nepean and Upstream Warragamba Water Source, Lot 31 DP1009967, 20.00 ML

Section 4. Operations Summary

4.1. Mining Operations

Table 11. Production Summary

Material	Previous reporting period 1/7/16 – 30/6/17 (actual tonnes)	This reporting period 1/7/17 – 30/6/18 (actual tonnes)
Over 75mm		946 T
Over 30mm to 70mm		2,179 T
5mm to 30mm		706,992 T
Manufactured Sand		244,567 T
Prepared Road Base		55,017 T
Other Unprocessed		16,797 T
Total Site Production	1,058,563 T	1,026,498 T


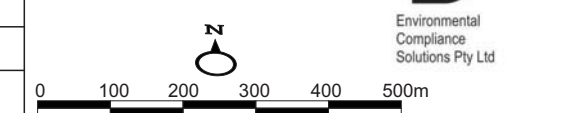
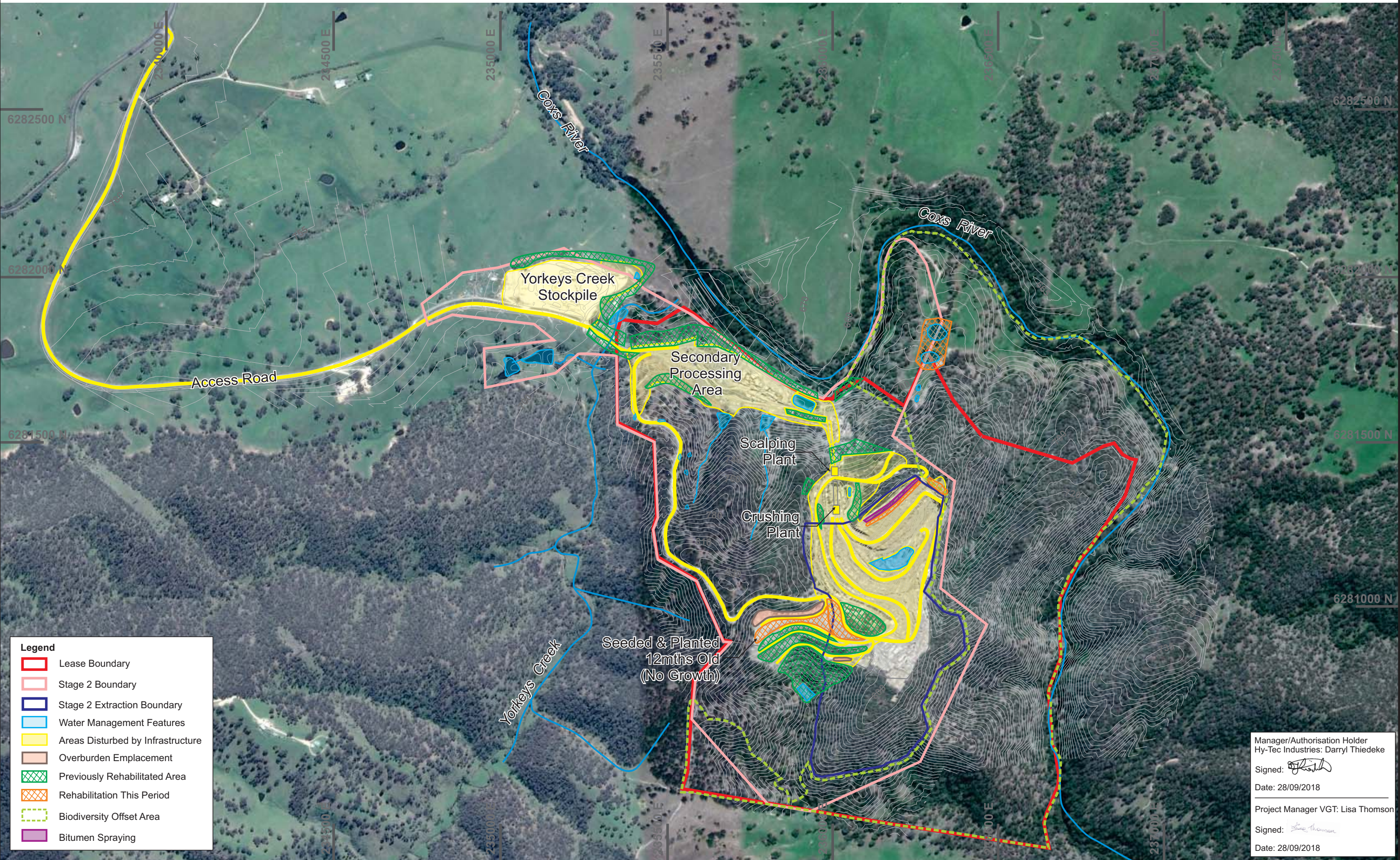
4.1.1. Quarry Progress

During the report period extraction continued deeper within the existing pit floor, and moved south and west into the extension area, as shown on *Figure 2*. The lowest depth within the extracted pit as surveyed in April 2018 is 706.0 m AHD, as shown on *Figure 4*, which is 21 metres above the limit of 685 m AHD.

Two clearing and stripping campaigns were undertaken in August 2017 and May 2018. All topsoil and vegetation cleared during the report period has been re-used in accordance with the LRMP and BOMP. Pre- and post- clearing reports indicate that works were undertaken in accordance with the Flora and Fauna Management Plan and no fauna were injured as a result of the clearing.

Plan of:	Annual Review for the Austen Quarry Extension July 2017 to June 2018 - Activities During Reporting Period	Location:	Off Jenolan Caves Road, Hartley, NSW	Source:	Client 2016 & Google Map - Image Date 17/03/2018. Proposed Stage 2 Offset & Conservation Area from Niche Environmental & Heritage Biodiversity Offset Management Plan Figure 4/2916 19/08/2016, not surveyed.	Our Ref:	6124_HY_H_AR17-18_C002_V1_F2.cdr
Figure:	TWO	Council:	Lithgow City Council	Survey:	Client 2016	Plan By:	TO/JD
Sheet:	1 of 1	Tenure:	N/A	Projection:	MGA	Project Manager:	LT
Version/Date:	V1 13/09/2018	Client:	Hy-Tec Industries Pty Ltd - Adelaide Brighton Limited	Contour Interval:	5m	Office:	Thornton

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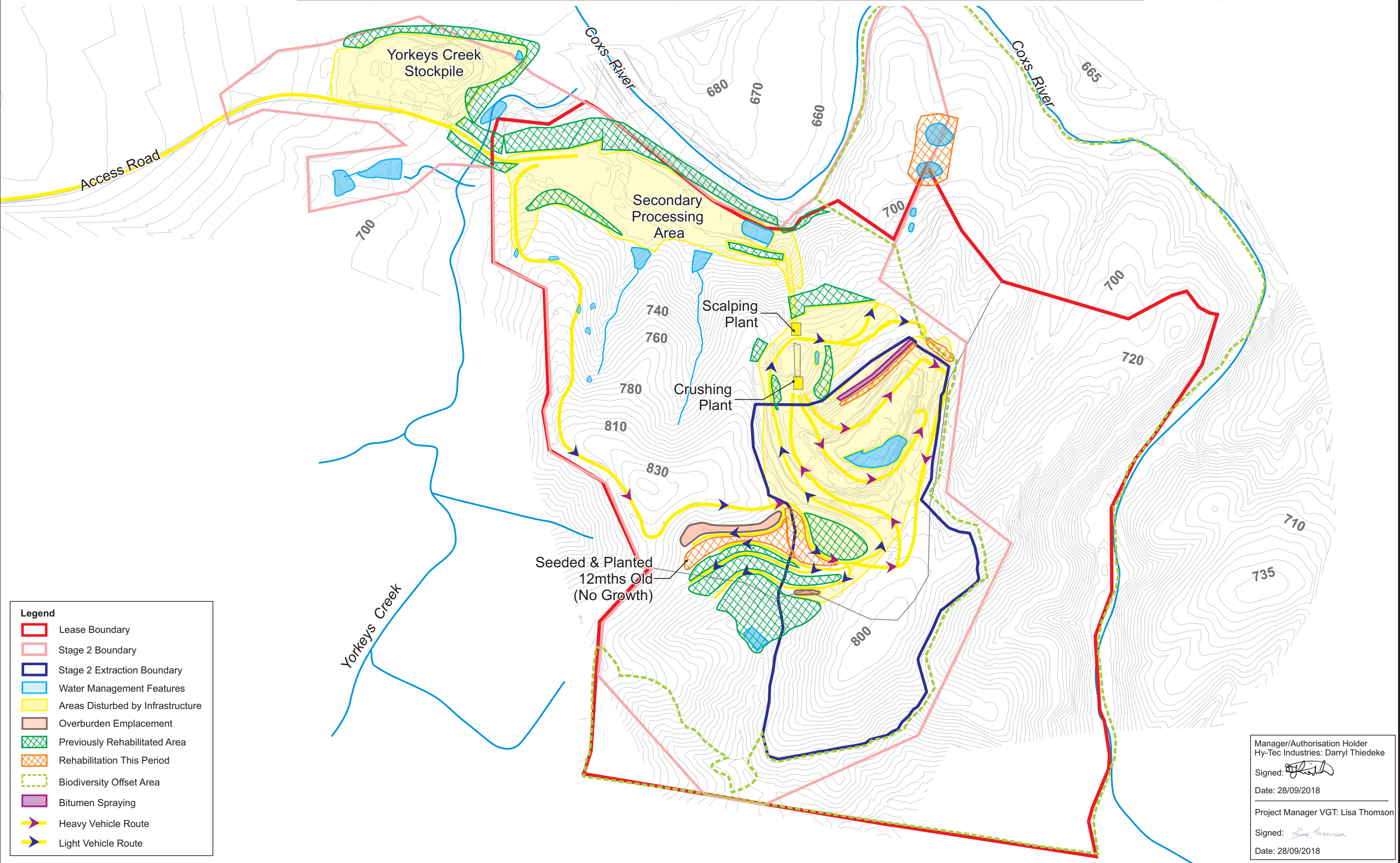
Legend	
	Lease Boundary
	Stage 2 Boundary
	Stage 2 Extraction Boundary
	Water Management Features
	Areas Disturbed by Infrastructure
	Overburden Emplacement
	Previously Rehabilitated Area
	Rehabilitation This Period
	Biodiversity Offset Area
	Bitumen Spraying

Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke
Signed: 
Date: 28/09/2018

Project Manager VGT: Lisa Thomson
Signed: 
Date: 28/09/2018

Plan of:	Annual Review for the Austen Quarry Extension July 2017 to June 2018 - Activities During Reporting Period	Location:	Off Jenolan Caves Road, Hartley, NSW	Source:	Client 2016 & Google Map - Image Date 17/03/2018. Proposed Stage 2 Offset & Conservation Area from Niche Environmental & Heritage Biodiversity Offset Management Plan Figure 4/2916 19/08/2016, not surveyed.	Our Ref:	6124_HY_H_AR17-18_C005_V0_F3.cdr
Figure:	THREE	Council:	Lithgow City Council	Survey:	Client 2016	Plan By:	TO/JD
Sheet:	1 of 1	Tenure:	N/A	Projection:	MGA	Project Manager:	LT
Version/Date:	V0 13/09/2018	Client:	Hy-Tec Industries Pty Ltd - Adelaide Brighton Limited	Contour Interval:	5m	Office:	Thornton

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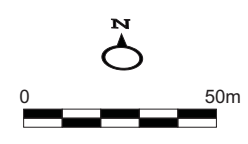


Legend	
	Lease Boundary
	Stage 2 Boundary
	Stage 2 Extraction Boundary
	Water Management Features
	Areas Disturbed by Infrastructure
	Overburden Emplacement
	Previously Rehabilitated Area
	Rehabilitation This Period
	Biodiversity Offset Area
	Bitumen Spraying
	Heavy Vehicle Route
	Light Vehicle Route

Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke
Signed:
Date: 28/09/2018
Project Manager VGT: Lisa Thomson
Signed:
Date: 28/09/2018

Plan of:	Annual Review for the Austen Quarry Extension July 2017 to June 2018 - Spot Survey April 2018
Figure:	FOUR
Sheet:	1 of 1
Version/Date:	V0 13/09/2018

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Location:	Off Jenolan Caves Road, Hartley, NSW	Source:	Client - CEH Survey Drawing No:HQ0418 - Pit Limit & Levels 31/07/2018	Our Ref:	6124_HY_H_AR17-18_C004_V0_F4.cdr
Council:	Lithgow City Council	Survey:	Client - CEH Survey, Consulting Land, Engineering & Mining Surveyors	Plan By:	JD
Tenures:	N/A	Projection:	N/A	Project Manager:	LT
Client:	Hy-Tec Industries Pty Ltd - Adelaide Brighton	Contour Interval:	N/A	Office:	Thornton



DRAWING No: HQ0418 - PIT LIMIT & LEVELS	AUSTEN QUARRY - HARTLEY PIT LIMIT & LEVELS - APRIL 2018	SCALE: 1:2500 DATUM: AHD
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		CEH SURVEY CONSULTING LAND, ENGINEERING AND MINING SURVEYORS <small>"Astrolabe" 1 Rutherford Lane, LITHGOW 2790</small> ABN: 68 056 544 551 Office: (02) 6351 2281 Email: survey@ceh.com.au Website: www.ceh.com.au	<table border="1"> <tr> <td>DATE</td> <td>31-07-2018</td> </tr> <tr> <td>AMENDED</td> <td></td> </tr> <tr> <td>SURVEYOR</td> <td>TH</td> </tr> <tr> <td>DRAWN</td> <td>TH</td> </tr> <tr> <td>CHECKED</td> <td></td> </tr> </table>	DATE	31-07-2018	AMENDED		SURVEYOR	TH	DRAWN	TH	CHECKED	
		DATE	31-07-2018										
AMENDED													
SURVEYOR	TH												
DRAWN	TH												
CHECKED													

Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke
Signed:
Date: 28/09/2018
Project Manager VGT: Lisa Thomson
Signed:
Date: 19/09/2018

Border size = 185mm x 272mm on A4 p

4.1.2. Extractive Material Transportation

4.1.2.1. Performance and Management

The site has implemented the measures described in the approved Traffic Management Plan, and there have been no changes to the approved plan during the report period.

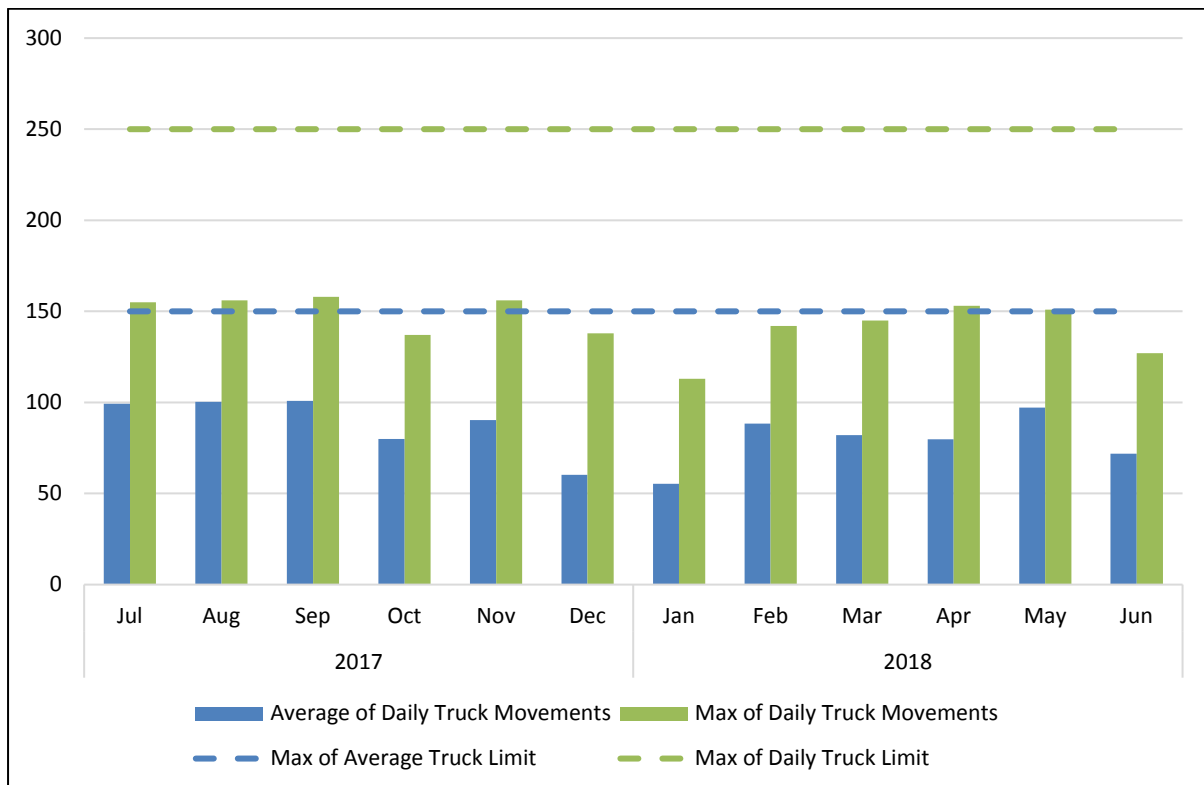
4.1.2.2. Monitoring Data

Truck movements are monitored daily and are reported on the website: <https://www.hytec.com.au/quarry-documentation> and summarised below.

Table 12. Transportation Monitoring

Material	Approved limit	Previous reporting period 1/7/16 – 30/6/17	This reporting period 1/7/17 – 30/6/18	Compliance
Transported off site (T)	1,100,000	1,058,563	1,026,498	Compliant
Total movements during report period		33,318	30,563	
Maximum laden trucks per day	250	203	158	Compliant
Maximum average laden trucks per day in calendar month	150	113	83.7	Compliant

Graph 1. Laden Truck Movements



4.2. Operation of Plant and Equipment

Plant used at the site are summarised in *Table 13*.

Table 13. Plant and Equipment

Plant	Number	Purpose
PC 850 Excavator	1	Loading of haul trucks with extracted material.
HD325 Dump Truck	2	Haul extracted material to crusher and overburden to the emplacement areas.
HD605 Dump Truck	2	Haul extracted material to crusher and overburden to the emplacement areas.
475 Dozer	1	Overburden stripping and emplacement formation, Stockpile management
Volvo A40 Water Truck	1	Dust suppression
WA500 Front End Loader	2	Loading of product into highway haul trucks and used in the creation of product stockpiles
Blast Drill Rig	1	Drilling of blast holes

Maintenance is managed through Gearbox maintenance system with schedules set in accordance with OEM requirements and operated in accordance with ABL SMS (Safety Management System). Plant maintenance records are available on request.

4.3. Operating Hours

The site reports full compliance with the operating hours described in the table below. There were no emergency works, or deliveries or dispatches of materials requested by Police or other authorities.

Table 14. Operating hours

Activity	Permissible Hours (SSD-6084 & EPL12323 L6)
<ul style="list-style-type: none"> Extraction operations Processing Operations Overburden Management Stockpile Management 	<ul style="list-style-type: none"> 6 am to 10 pm Monday to Friday 6 am to 3 pm Saturday At no time on Sundays or Public Holidays
<ul style="list-style-type: none"> Blasting 	<ul style="list-style-type: none"> 10 am to 3 pm Monday to Friday (except Public Holidays)
<ul style="list-style-type: none"> Loading and dispatch 	<ul style="list-style-type: none"> 5 am to 10 pm Monday to Friday 5 am to 3 pm Saturday At no time on Sundays or Public Holidays
<ul style="list-style-type: none"> Maintenance 	<ul style="list-style-type: none"> Anytime

4.4. Other Operations

There were no new buildings or structures, alterations or additions to existing building or demolitions during the report period.

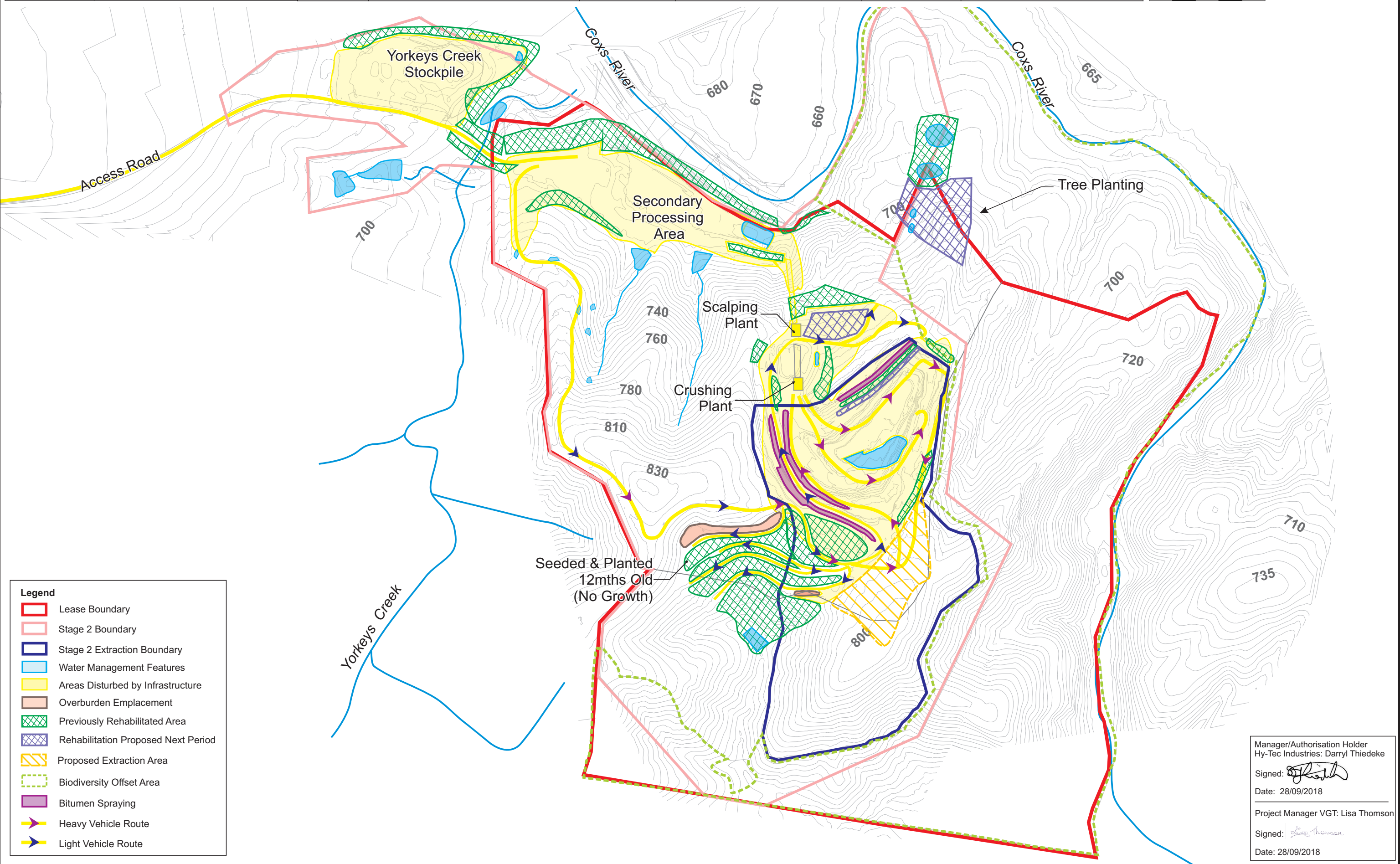
4.5. Next Reporting Period

The proposed works for the next report period are shown on *Figure 5*.

There are no proposed changes to infrastructure or equipment.

Plan of:	Annual Review for the Austen Quarry Extension July 2017 to June 2018 - Proposed Operations Next Report Period	Location:	Off Jenolan Caves Road, Hartley, NSW	Source:	Client 2016 & Google Map - Image Date 17/03/2018. Proposed Stage 2 Offset & Conservation Area from Niche Environmental & Heritage Biodiversity Offset Management Plan Figure 4/29/16 19/08/2016, not surveyed.	Our Ref:	6124_HY_H_AR17-18_C008_V0_F5.cdr
Figure:	FIVE	Council:	Lithgow City Council	Survey:	Client 2016	Plan By:	TO/JD
Sheet:	1 of 1	Tenure:	N/A	Projection:	MGA	Project Manager:	LT
Version/Date:	V0 18/09/2018	Client:	Hy-Tec Industries Pty Ltd - Adelaide Brighton Limited	Contour Interval:	5m	Office:	Thornton

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	
	Lease Boundary
	Stage 2 Boundary
	Stage 2 Extraction Boundary
	Water Management Features
	Areas Disturbed by Infrastructure
	Overburden Emplacement
	Previously Rehabilitated Area
	Rehabilitation Proposed Next Period
	Proposed Extraction Area
	Biodiversity Offset Area
	Bitumen Spraying
	Heavy Vehicle Route
	Light Vehicle Route

Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke
Signed:

Date: 28/09/2018

Project Manager VGT: Lisa Thomson
Signed:


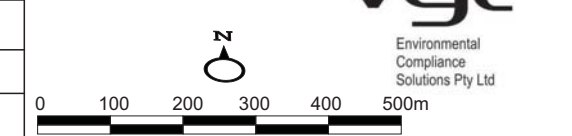
Date: 28/09/2018

Section 5. Environmental Performance

This section summarises the performance in environmental management against the limits, predictions and commitments in the consent and environmental management plans. The monitoring locations are shown on *Figure 6 and Figure 7*. All management plans are available at <https://www.hy-tec.com.au/quarry-documentation>.

Plan of:	Annual Review for the Austen Quarry Extension July 2017 to June 2018 - Environmental Monitoring Locations	Location:	Off Jenolan Caves Road, Hartley, NSW	Source:	Client 2016 & Google Map - Image Date 31/07/2015. Proposed Stage 2 Offset & Conservation Area from Niche Environmental & Heritage Biodiversity Offset Management Plan Figure 4/2916 19/08/2016, not surveyed.	Our Ref:	6124_HY_H_AR17-18_C006_V0_F6.cdr
Figure:	SIX	Council:	Lithgow City Council	Survey:	Client 2016	Plan By:	TO/JD
Sheet:	1 of 1	Tenure:	N/A	Projection:	MGA	Project Manager:	LT
Version/Date:	V0 13/09/2018	Client:	Hy-Tec Industries Pty Ltd - Adelaide Brighton Limited	Contour Interval:	5m	Office:	Thornton

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

- Lease Boundary
- Stage 2 Boundary
- SD6 Storage Dam
- SB6 Sediment Basin
- Water Management Feature
- EPA Licence Monitoring Point
- WS Weather Station
- Groundwater Monitoring Bore
- ▲ Noise Monitoring Location
- Location of E-Sampler (PM10)
- E. pulverulenta Core Population

Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke

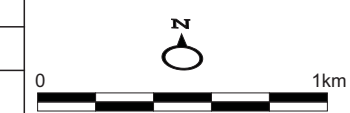

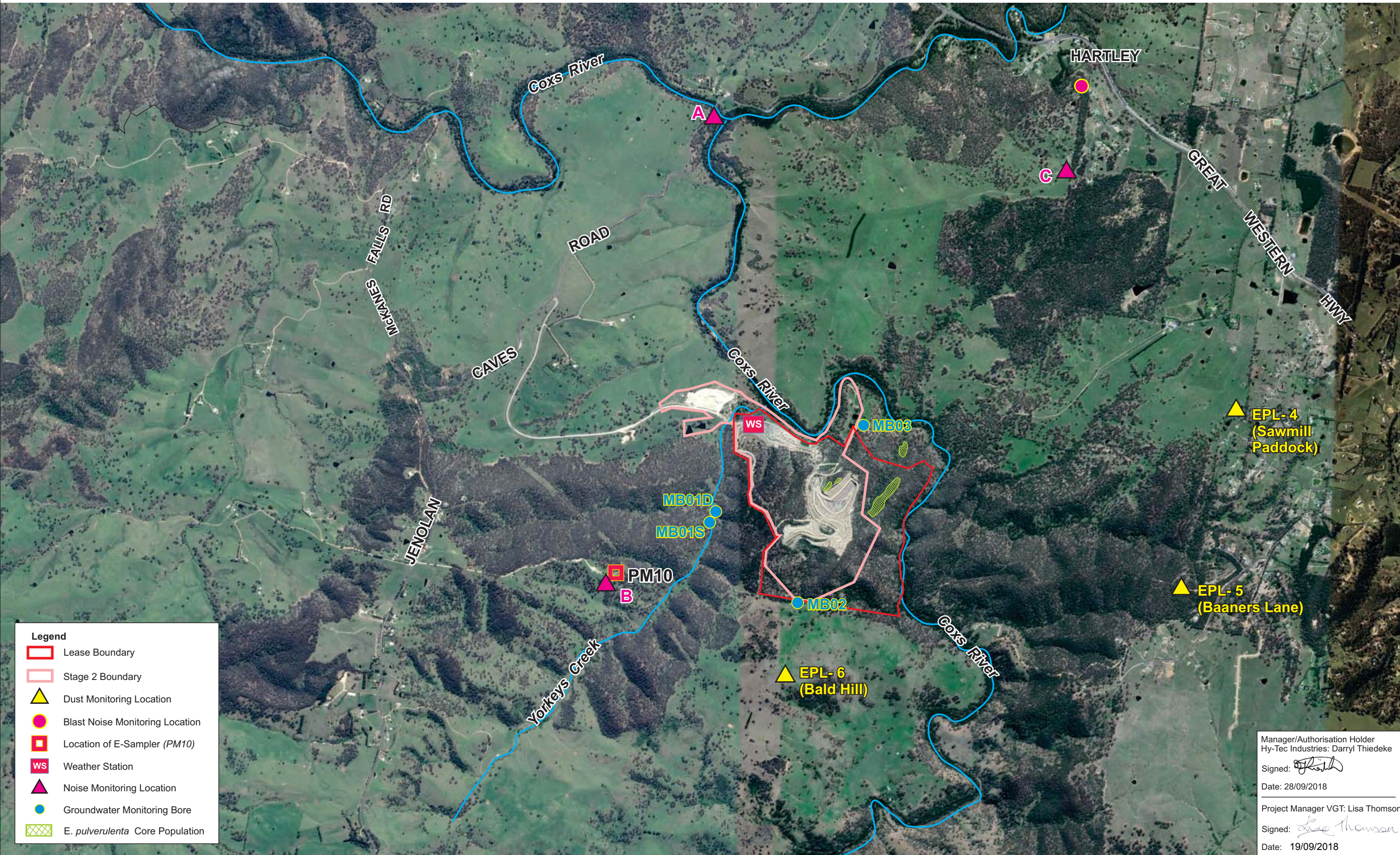
Signed: 
Date: 28/09/2018

Project Manager VGT: Lisa Thomson

Signed: 
Date: 19/09/2018

Plan of:	Annual Review for the Austen Quarry Extension July 2017 to June 2018 - Perimeter Monitoring Locations	Location:	Off Jenolan Caves Road, Hartley, NSW	Source:	Client and Google Map - Image Date 17/03/2018	Our Ref:	6124_HY_H_AR17-18_C007_V0_F7.cdr
Figure:	SEVEN	Council:	Lithgow City Council	Survey:	N/A	Plan By:	TO/JD
Sheet:	1 of 1	Tenure:	N/A	Projection:	N/A	Project Manager:	LT
Version/Date:	V0 13/09/2018	Client:	Hy-Tec Industries Pty Ltd - Adelaide Brighton Limited	Contour Interval:	N/A	Office:	Thornton


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

- Lease Boundary
- Stage 2 Boundary
- ▲ Dust Monitoring Location
- Blast Noise Monitoring Location
- Location of E-Sampler (PM10)
- WS Weather Station
- ▲ Noise Monitoring Location
- Groundwater Monitoring Bore
- E. pulverulenta* Core Population

Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke
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5.1. Climate

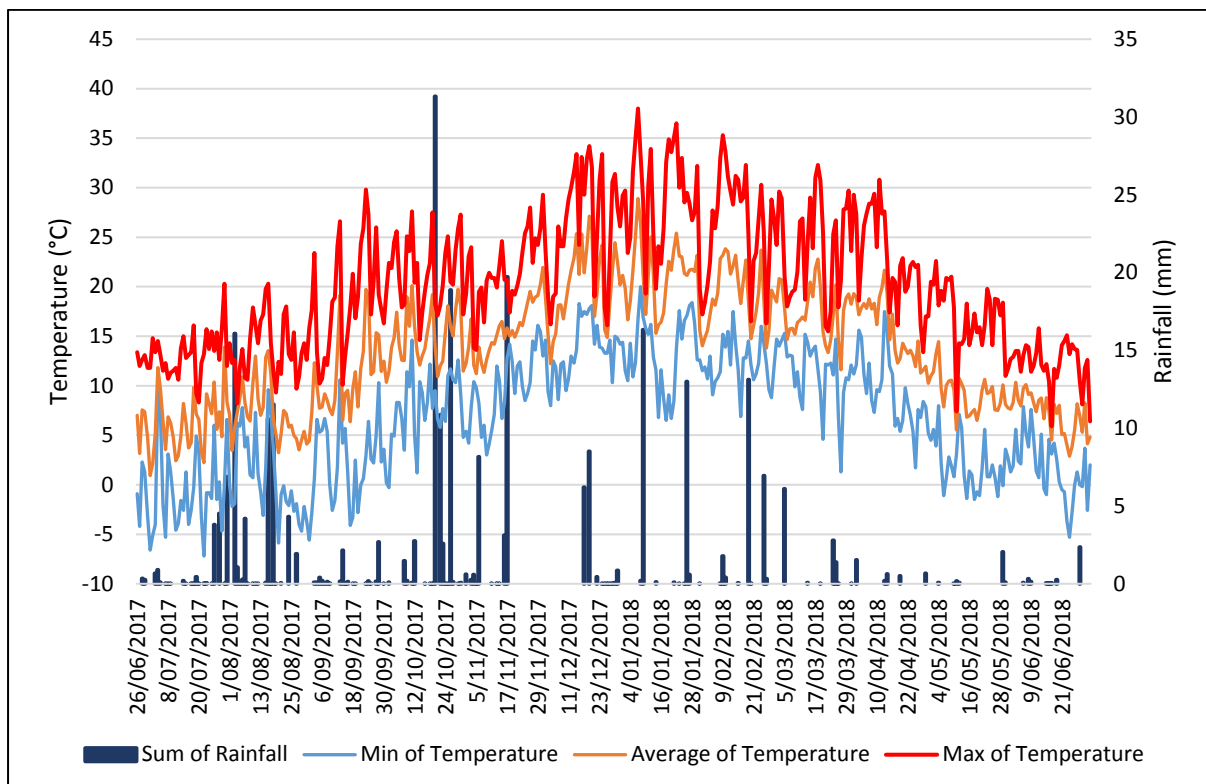
Weather data is measured on the site at 15-minute intervals for temperature, rainfall, wind speed and wind direction, which is in compliance with the parameters and frequency required by EPL 12323 condition M8.1 and schedule 3, condition 13 of SSD-6084. The recorded data is summarised in the following graphs and tables. Historical averages are sourced from the Bureau of Meteorology site at Mt Boyce. The site reports no cessation of activities due to weather conditions.

In summary, the climate during the report period has been very dry particularly in the last quarter, with the site receiving approximately 1/3 of the mean annual rainfall for the area. Minimum temperatures have been lower, and maximum temperatures have been higher than averages. Wind speeds have been slightly lower than averages.

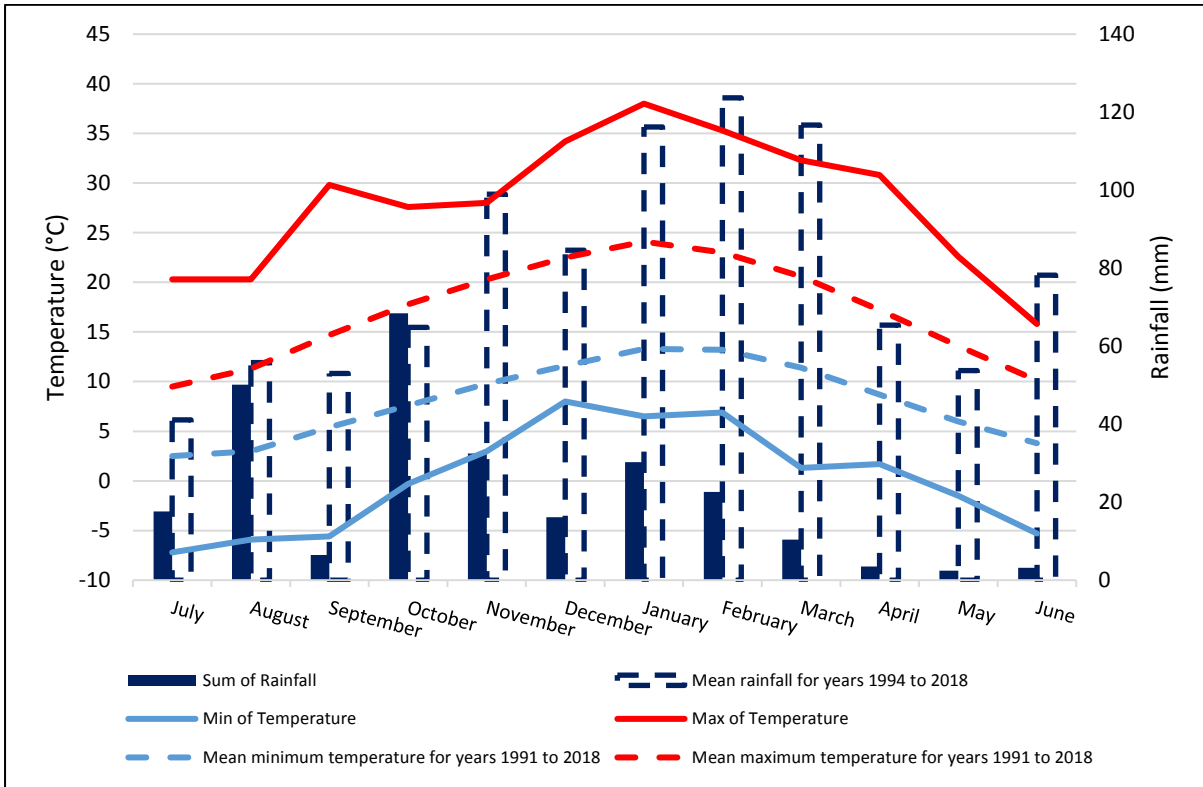
Table 15. Weather Summary versus Historical Averages

Measurement	1/07/17 to 30/06/18	1994 – 2018 Mean (BOM-Mt Boyce)
Annual rainfall (mm)	264.4	972.9
Minimum temperature (°C)	-7.2	-3.6
Maximum temperature (°C)	38.0	37.2
Mean 9am wind speed (m/s)	2.1	4.1
Mean 3pm wind speed (m/s)	3.2	4.8

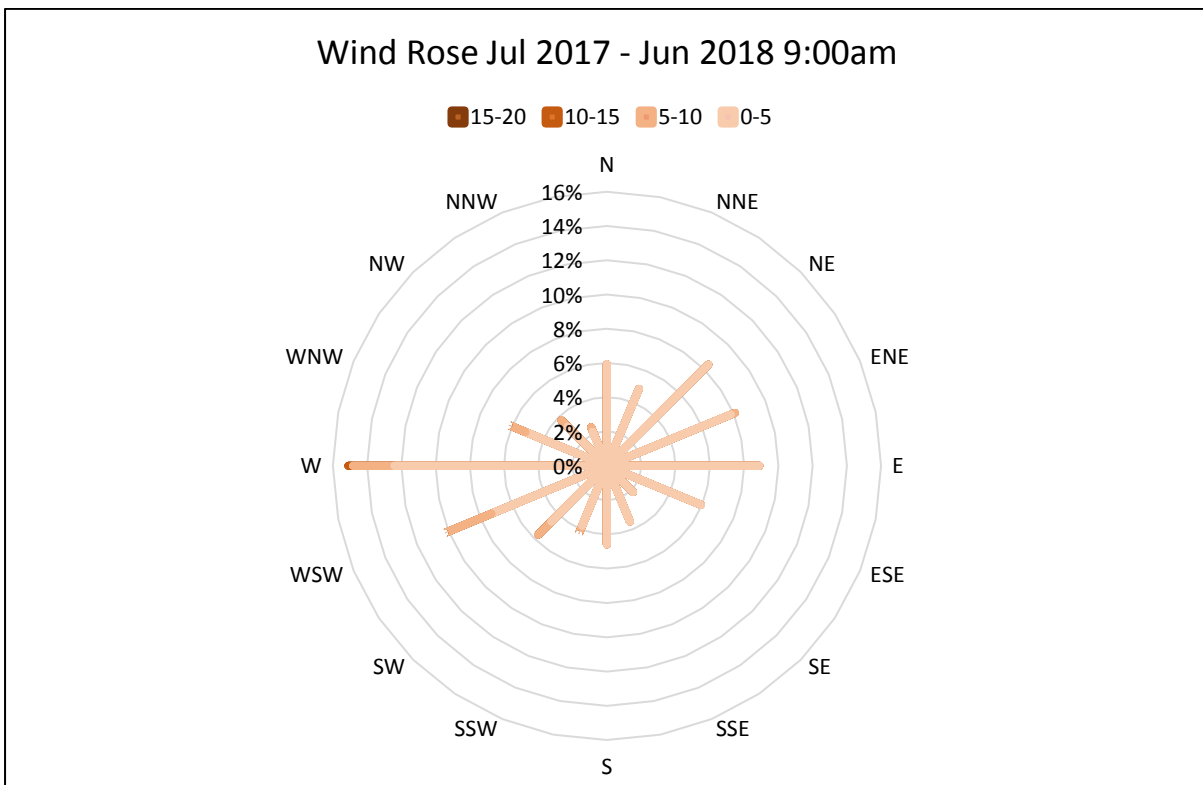
Graph 2. Daily Weather Data



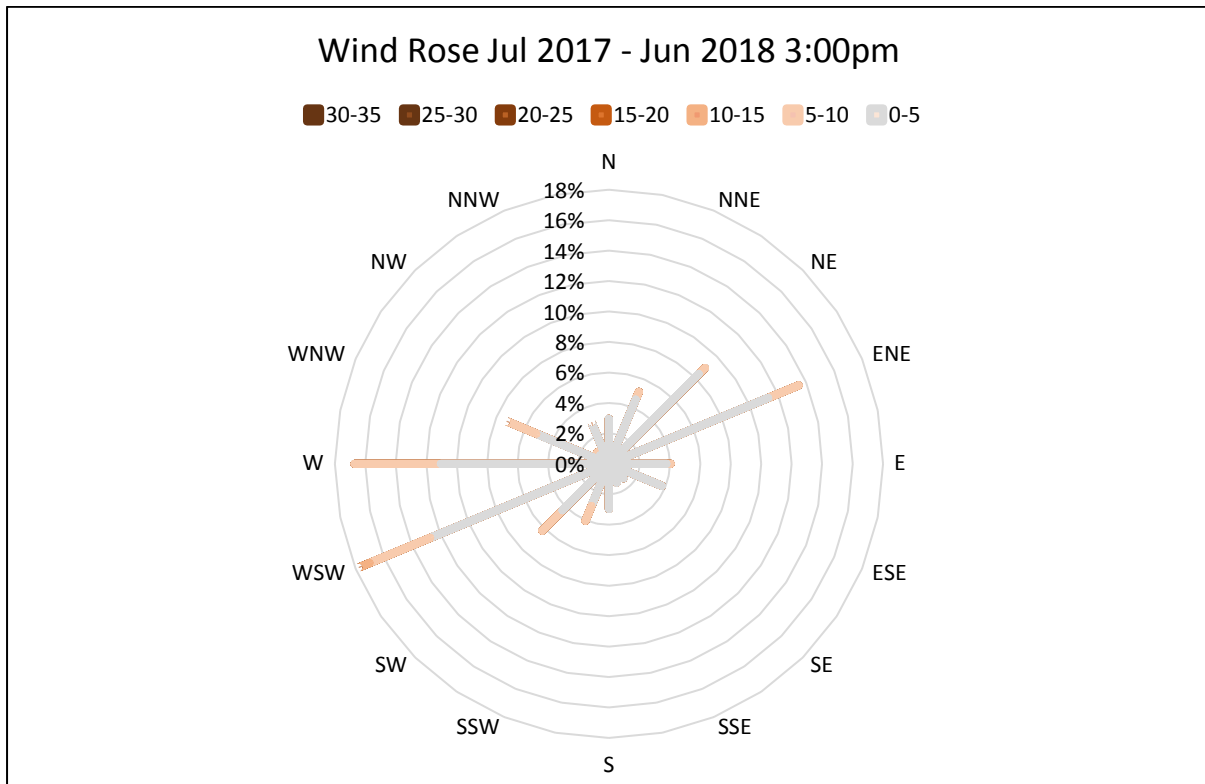
Graph 3. Climate with Historical Averages



Graph 4. Wind Rose at 9am



There was one calm recording at 9am for the report period.

Graph 5. Wind Rose at 3pm

There were no calm recordings at 3pm for the report period.

5.2. Noise

5.2.1. Performance and Management

Activities on the site have been undertaken in accordance with the EIS, statement of commitments and Noise Management Plan (NMP). No new types of equipment have been commissioned on the site in the current report period, and therefore all sound power levels of equipment are unchanged from those measured previously. There have been no exceedances of the transport limitations, and all drivers are required to conform to the site's Code of Conduct.

As highlighted in the Independent Audit, reporting on the noise monitoring required by the NMP is to be received by the Quarry Manager within 7 days. Monitoring undertaken up to 5/10/17 was reported in a Final Version on 6/11/17, which is greater than 7 days after monitoring occurred. The December 2017 and April 2018 monitoring rounds were reported within 7 days. The NMP has not yet been updated to extend this reporting timeframe, however as the 2 regular were reported within 7 days, this condition is considered generally in compliance.

There was one noise-related complaint received during November 2017, regarding a noisy truck travelling on Jenolan Caves road. The complaint was investigated and sourced to a particular vehicle. The muffler system on the vehicle was modified, as subsequently confirmed by Hy-Tec staff. The noise source was identified and rectified without the need for additional noise monitoring.

5.2.2. Monitoring Data

Three noise monitoring assessments were undertaken during the report period to address a short-fall in the previous year. Muller Acoustic Consulting undertook assessments in

accordance with the NSW EPA noise policy, EPL 12323, and the site's Noise Management Plan in October 2017, December 2017 and April 2018, and the results are available at <https://www.hy-tec.com.au/quarry-documentation>, and summarised below. Monitoring locations are shown on *Figure 7*.

Table 16. Noise Monitoring Summary

Location	Round	Quarry Noise Contribution	Noise Criteria
A	Day Oct 2017 Evening Oct 2017 Shoulder Oct 2017	Not Audible Not Audible Not Audible	35
A	Day Dec 2017 Evening Dec 2017 Shoulder Dec 2017	Not Audible Not Audible Not Audible	35
A	Day Apr 2018 Evening Apr 2018 Shoulder Apr 2018	Not Audible Not Audible Not Audible	35
Location A 2018		Compliant	
Location A 2017		Compliant	
B	Day Oct 2017 Evening Oct 2017 Shoulder Oct 2017	34 28 33	35
B	Day Dec 2017 Evening Dec 2017 Shoulder Dec 2017	28 Not Audible 27	35
B	Day Apr 2018 Evening Apr 2018 Shoulder Apr 2018	29 26 33	35
Location B 2018		Compliant	
Location B 2017		Compliant	
C	Day Oct 2017 Evening Oct 2017 Shoulder Oct 2017	32 Not Audible Not Audible	35
C	Day Dec 2017 Evening Dec 2017 Shoulder Dec 2017	Not Audible Not Audible Not Audible	35
C	Day Apr 2018 Evening Apr 2018 Shoulder Apr 2018	Not Audible Not Audible Not Audible	35
Location C 2018		Compliant	
Location C 2017		Compliant	

5.2.3. Interpretation of Results

Operator attended noise surveys were conducted on Wednesday 4/10/17, Thursday 5/10/17, Wednesday 6/12/17, Thursday 7/12/18, Tuesday 3/4/18, and Wednesday 4/4/18. Unattended noise monitoring was undertaken over a two-week period at location B between 19/9/17 and 4/10/17. The frequency and type of monitoring is compliant with the consent, EPL and NMP requirements.

The results of all monitoring concluded that quarry noise contributions were compliant when compared against relevant criteria. The unattended noise monitoring concluded that:

“background noise levels (LA90) remain generally below 35dBA and hence, indicates that the quarry noise contribution at Location B is not significant when validated against attended noise monitoring data.”

The monitoring results show that the site noise management controls and practices are effective.

5.3. Blasting

5.3.1. Performance and Management

To ensure the safety of personnel and the public, measures in the Blast Management Plan (BMP) have been implemented. There were a total of 21 blasts during the reporting period. There were no monitoring exceedances and no instances of more than one blast occurring in the same week.

5.3.2. Monitoring Data

Monitoring occurs at Hartley Village.

Table 17. Blast Monitoring Data

Parameter	Date	Blast No	Criteria	Result	Days apart
Ground Vibration	13/07/17	135	5 mm/s	<0.51	15
Overpressure	13/07/17	135	115 dB	<88	15
Ground Vibration	15/08/17	136	5 mm/s	<0.51	33
Overpressure	15/08/17	136	115 dB	<88	33
Ground Vibration	30/08/17	138	5 mm/s	<0.51	15
Overpressure	30/08/17	138	115 dB	<88	15
Ground Vibration	13/09/17	137	5 mm/s	<0.51	14
Overpressure	13/09/17	137	115 dB	<88	14
Ground Vibration	27/09/17	139	5 mm/s	<0.51	14
Overpressure	27/09/17	139	115 dB	<88	14
Ground Vibration	11/10/17	140	5 mm/s	<0.51	14
Overpressure	11/10/17	140	115 dB	<88	14
Ground Vibration	25/10/17	141	5 mm/s	<0.51	14
Overpressure	25/10/17	141	115 dB	<88	14
Ground Vibration	9/11/17	142	5 mm/s	<0.51	15
Overpressure	9/11/17	142	115 dB	<88	15
Ground Vibration	22/11/17	143	5 mm/s	<0.51	13
Overpressure	22/11/17	143	115 dB	<88	13
Ground Vibration	6/12/17	144	5 mm/s	<0.51	14
Overpressure	6/12/17	144	115 dB	<88	14
Ground Vibration	20/12/17	145	5 mm/s	<0.51	14
Overpressure	20/12/17	145	115 dB	<88	14
Ground Vibration	31/01/18	146	5 mm/s	<0.51	42
Overpressure	31/01/18	146	115 dB	<88	42
Ground Vibration	14/02/18	147	5 mm/s	<0.51	14
Overpressure	14/02/18	147	115 dB	<88	14
Ground Vibration	7/03/18	149	5 mm/s	<0.51	21
Overpressure	7/03/18	149	115 dB	<88	21
Ground Vibration	14/03/18	148	5 mm/s	<0.51	7
Overpressure	14/03/18	148	115 dB	<88	7
Ground Vibration	28/03/18	150	5 mm/s	<0.51	14
Overpressure	28/03/18	150	115 dB	<88	14
Ground Vibration	11/04/18	151	5 mm/s	<0.51	14

Parameter	Date	Blast No	Criteria	Result	Days apart
Overpressure	11/04/18	151	115 dB	<88	14
Ground Vibration	26/04/18	152	5 mm/s	<0.51	15
Overpressure	26/04/18	152	115 dB	<88	15
Ground Vibration	22/05/18	153	5 mm/s	<0.51	26
Overpressure	22/05/18	153	115 dB	<88	26
Ground Vibration	6/06/18	154	5 mm/s	<0.51	15
Overpressure	6/06/18	154	115 dB	<88	15
Ground Vibration	20/06/18	155	5 mm/s	<0.51	14
Overpressure	20/06/18	155	115 dB	<88	14
Ground Vibration 2018				No Triggers	
Overpressure 2018				No Triggers	
Ground Vibration 2017				Max 0.62 mm/s	
Overpressure 2017				No Triggers	
Ground Vibration 2016				Max 1.36 mm/s	
Overpressure 2016				Max 95.9	

Table 18. Blast Monitoring Summary

Approval criteria / EIS Predictions	Performance during the period	Trend	Implemented / proposed actions
Blasting on the site does not exceed an Airblast overpressure (dB(L in Peak) of 120 at 0% allowable exceedance at any residence on privately owned land.	Compliant	No exceedances recorded – Blast Management practices are considered effective	Continue in accordance with EMP
Blasting on the site does not exceed an Airblast overpressure (dB (L in Peak) of 115 at 5% of the total number of blasts over a period of 12 months at any residence on privately owned land.	Compliant		
Blasting on the site does not exceed a Ground vibration (mm/s) of 10 at 0% allowable exceedance at any residence on privately owned land.	Compliant		
Blasting on the site does not exceed an Ground vibration (mm/s) of 5 at 5% of the total number of blasts over a period of 12 months at any residence on privately owned land	Compliant		

5.4. Air Quality

5.4.1. Performance and Management

Activities on the site have been undertaken in accordance with the EIS, statement of commitments and Air Quality Management Plan (AQMP). Management activities and controls are unchanged from the 2016 AQMP.

Dust deposition is collected at three sites in accordance with the EPL and consent conditions. The parameters and frequency are in compliance with requirements. Annual averages are all below the 4 g/m²/month criteria. The trends for this monitoring are steady and compliant.

Particulate Matter less than 10 micron (PM₁₀) is measured at the nearest residence using a continuous real time monitor (E-Sampler). Monitoring commenced on 14th March 2017, therefore trends against last year are not available for this parameter. Total Suspended Particulates (TSP) is calculated from the PM₁₀ fraction in accordance with the following statement from Todoroski Air Sciences:

“In accordance with the approved Air Quality Management Plan, compliance with criteria for total suspended particulates (TSP) is to be considered through monitored PM₁₀, recognising that PM₁₀ constitutes approximately 40% of TSP. Thus the TSP levels can be reasonably calculated to be 2.5 times the measured PM₁₀ level.”

There were 4 recorded instances of the PM₁₀ 24 hour average exceeding the criteria of 50 µg/m³. On Monday 21/08/2017 the average recorded for 24 hours was 57 µg/m³. Site management were informed of the result following the monthly download of the monitoring data. On investigation, it was noted that there were bushfires in the vicinity of the site on this date and no further action was undertaken. This is not recorded as a non-compliance in accordance with Note “d” of “Table 4: Air Quality Criteria” which states:

“[Air quality criteria] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary”

On Saturday 2/09/2017 132 µg/m³ was recorded. Site management were informed of the result following the monthly download of the monitoring data. On investigation, the operation of the monitor was questioned given the low level of production on site.

On 14th October 2017, the E-Sampler was inspected and found to be faulty. It was removed for repairs on 24th October, reinstalled on 19/12/2017 and re-commenced logging on 2/01/2018 (see Appendix F). Therefore no data is available for this period. The failure of continuous monitoring has been recorded as a non-compliance of Condition 12 of Schedule 3 of the consent in this report. Given the low level of operations on Saturday 2/09/2017 and the level of exceedance, site management incorrectly related this occurrence to the monitor fault and the exceedance was not reported. This represents a non-conformance against Schedule 5 Condition 6 which requires notification of incidents.

On Tuesday 24th and Wednesday 25th April (Anzac Day public holiday) 2018, 118 and 94 µg/m³ were recorded, respectively. Site management were advised of the result on the 26th April 2018 and conducted an investigation. On these days there were little or no operations on the site and investigations showed that the results were unlikely to be due to the quarry activities. Smoke haze was also present in the area over these days. The PM₁₀ monitor is located at a residence as shown on Figure 7. It is noted that the residence has a long, unsealed driveway and conducts a civil contracting business. It was also noted that there was an increase transport movements at that residence due to project works at this time. The driveway was sealed around May 2018 and results have stayed below 20 µg/m³ 24 hour averages since mid-May. The exceedances occurred during weather conditions with winds from the S – SSW which would see the monitor highly influenced from off site activities. No further actions were considered relevant at this stage and site management incorrectly assumed that the occurrence was not required to be reported as it was not the result of site

activities. This represents a non-conformance against Schedule 5 Condition 6, the requirement to notify the department of incidents.

The Air Quality Management Plan (AQMP) states that trigger alarms will be programmed into the real time particulate matter monitor to give feedback for when dust levels are approaching or likely to approach criteria levels. It appears that the trigger alarms were not implemented at the time of the exceedances. Hy-tec has since liaised with the supplier of the E-samplers to ensure the automatic trigger alarms are active. The alarms inform the monitor supplier of exceedances, or if dust levels are higher than existing trends or equipment failures, who will then immediately inform key staff Hy-tec via email. The key staff may include National Planning and Development Manager, National Planning and Development Manager Project Manager, Austen Quarry Production Manager and Quarry Supervisor. In addition, Hy-Tec staff will monitor the online data at least weekly to ensure any exceedances or equipment failures are captured and actioned.

Hy-tec staff have been re-trained to ensure that, if triggers are activated, that an internal investigation of climatic, operational and other contributing conditions is undertaken according to the AQMP- Response and Corrective Actions. Training also included the requirement to report the exceedance to the DPE and EPA.

Should the investigation reveal an equipment failure such as that detailed in *Appendix F*, a determination will be made regarding the length of time the equipment will take to repair, re-install and recalibrate. This information will be included in the incident notification report along with proposed replacement options if the equipment is unavailable for an extended period. Advice and approval will be sought from the Department prior to installation of any alternate monitoring equipment.

The average of the PM₁₀ measurements for the report period was 11.2 µg/m³ which is compliant with the annual average requirement of less than 30 µg/m³. Therefore the 24-hour exceedances are considered low impact non-compliances, and the air quality practices and controls are considered effective.

5.4.2. Monitoring Data

Air quality results are available at <https://www.hy-tec.com.au/quarry-documentation> and are summarised below. The monitoring sites are shown on *Figure 7*.

Table 19. EPL Point 4 Depositional Dust Monitoring

Month	Insoluble Solids g/m ² .month	Combustible Matter g/m ² .month	Ash g/m ² .month
Jul-17	0.2	0.1	0.1
Aug-17	0.6	0.4	0.2
Sep-17	0.2	0.2	<0.1
Oct-17	0.9	0.4	0.5
Nov-17	1.9	1.4	0.5
Dec-17	2.3	0.9	1.4
Jan-18	2.4	1.6	0.8
Feb-18	1.4	0.7	0.7
Mar-18	11.1	7.2	3.9
Apr-18	1.2	0.4	0.8
May-18	0.3	<0.1	0.3
Jun-18	0.1	0.2	<0.1
Annual Average 2018	1.9 Compliant	1.1	0.8
Annual Average 2017	0.8	0.5	0.4
Annual Average 2016	0.5	0.3	0.2
Limit (annual average)	4	N/A	N/A

Graph 6. EPL Point 4 – Sawmill Paddock Dust Deposition

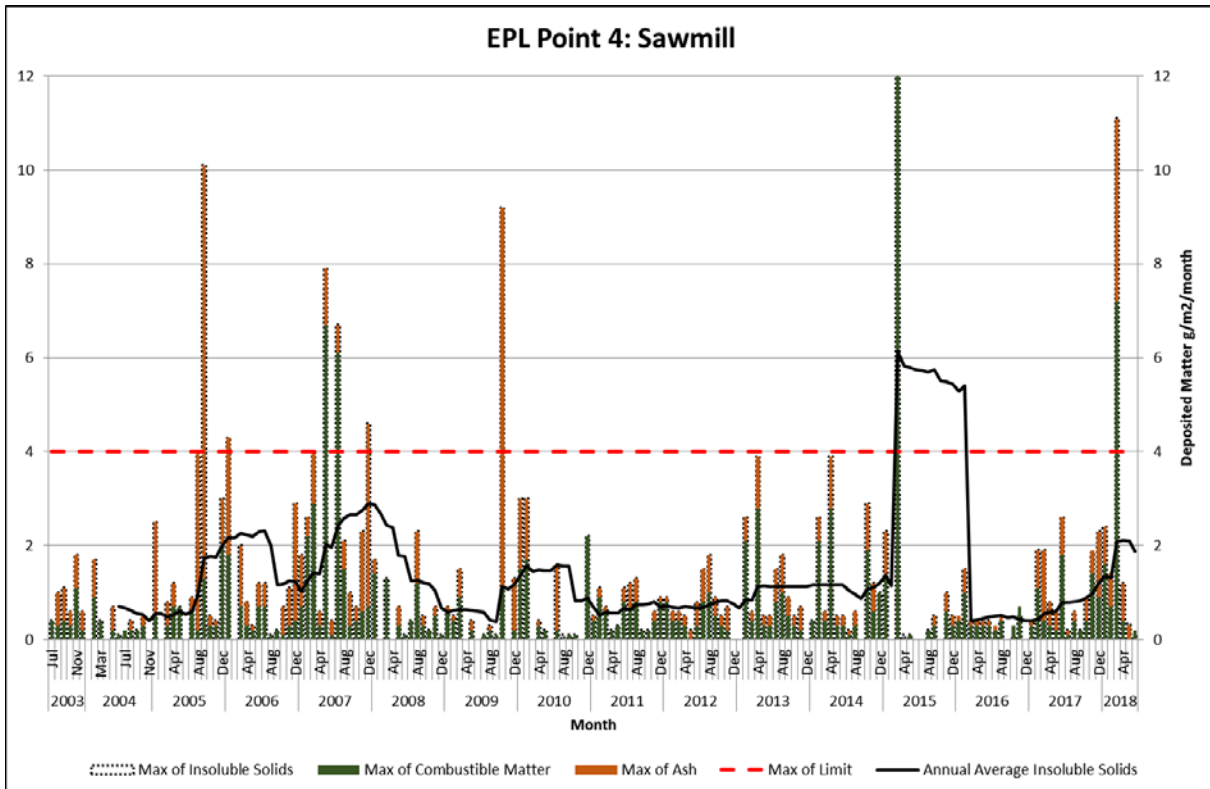


Table 20. EPL Point 5 Depositional Dust Monitoring

Month	Insoluble Solids g/m ² .month	Combustible Matter g/m ² .month	Ash g/m ² .month
Jul-17	0.3	0.2	0.1
Aug-17	0.6	0.3	0.3
Sep-17	0.3	0.1	0.2
Oct-17	0.5	0.2	0.3
Nov-17	0.35	0.3	0.1
Dec-17	0.7	0.4	0.3
Jan-18	0.3	0.2	0.1
Feb-18	0.8	0.4	0.4
Mar-18	0.5	0	0.5
Apr-18	0.9	0.3	0.6
May-18	0.3	0.1	0.2
Jun-18	0.2	0.2	0
Annual Average 2018	0.5 Compliant	0.2	0.2
Annual Average 2017	0.6	0.4	0.3
Annual Average 2016	0.6	0.4	0.2
Limit (annual average)	4	N/A	N/A

Graph 7. EPL Point 5 – Baners Lane Dust Deposition

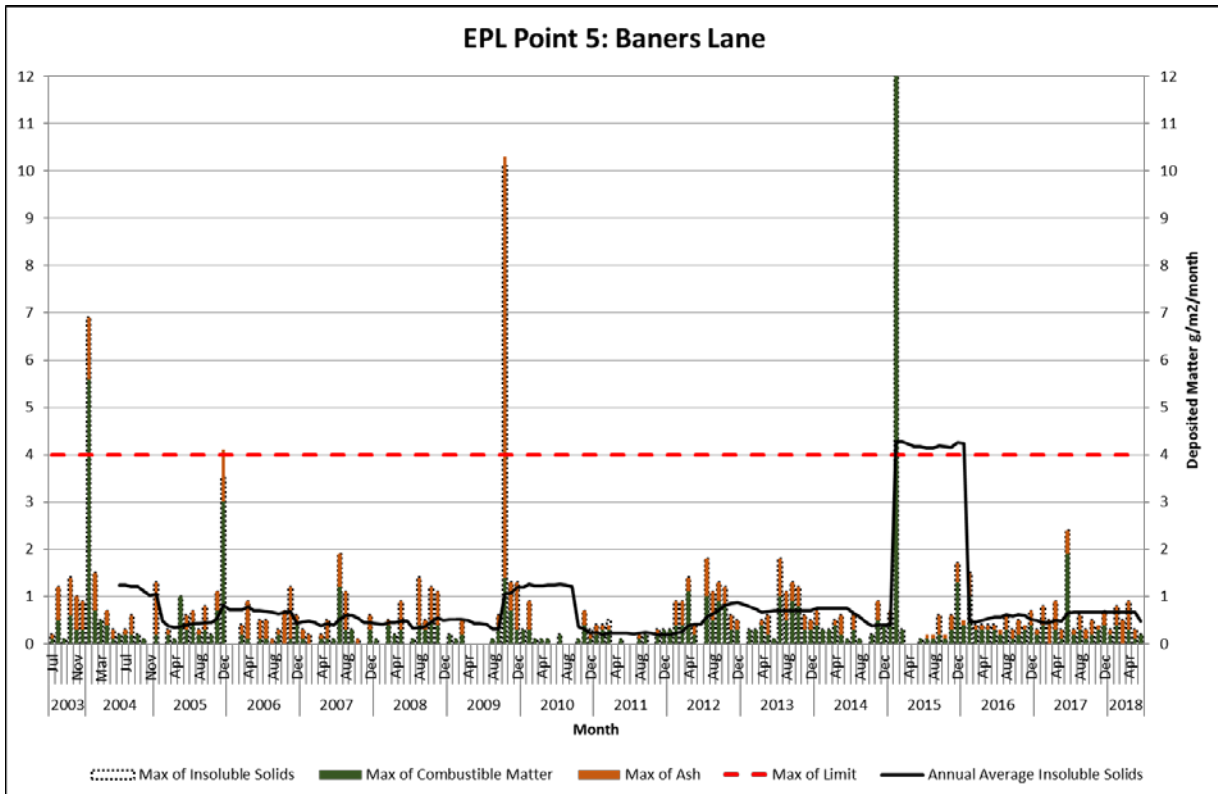


Table 21. EPL Point 6 Depositional Dust Monitoring

Period	Insoluble Solids (g/m ² .month)	Combustible Matter g/m ² .month	Ash (g/m ² .month)
Jul-17	0.5	0.4	0.1
Aug-17	1.1	0.9	0.2
Sep-17	No Sample*	No Sample*	No Sample*
Oct-17	0.3	0.1	0.2
Nov-17	0.9	0.4	0.5
Dec-17	0.3	0.2	0.1
Jan-18	0.7	0.3	0.4
Feb-18	1.4	0.8	0.6
Mar-18	0.4	0.1	0.3
Apr-18	<0.1	<0.1	<0.1
May-18	0.09	0.1	<0.1
Jun-18	0.3	0.2	0.1
Annual Average 2018	0.5 Compliant	0.3	0.2
Annual Average 2017	0.7	0.5	0.2
Annual Average 2016	0.6	0.4	0.2
Limit (annual average)	4	N/A	N/A

*No sample recorded in September 2017 due to dry conditions, no water was left in bottle to enable collection of sample

Graph 8. EPL Point 6 – Bald Hill Dust Deposition

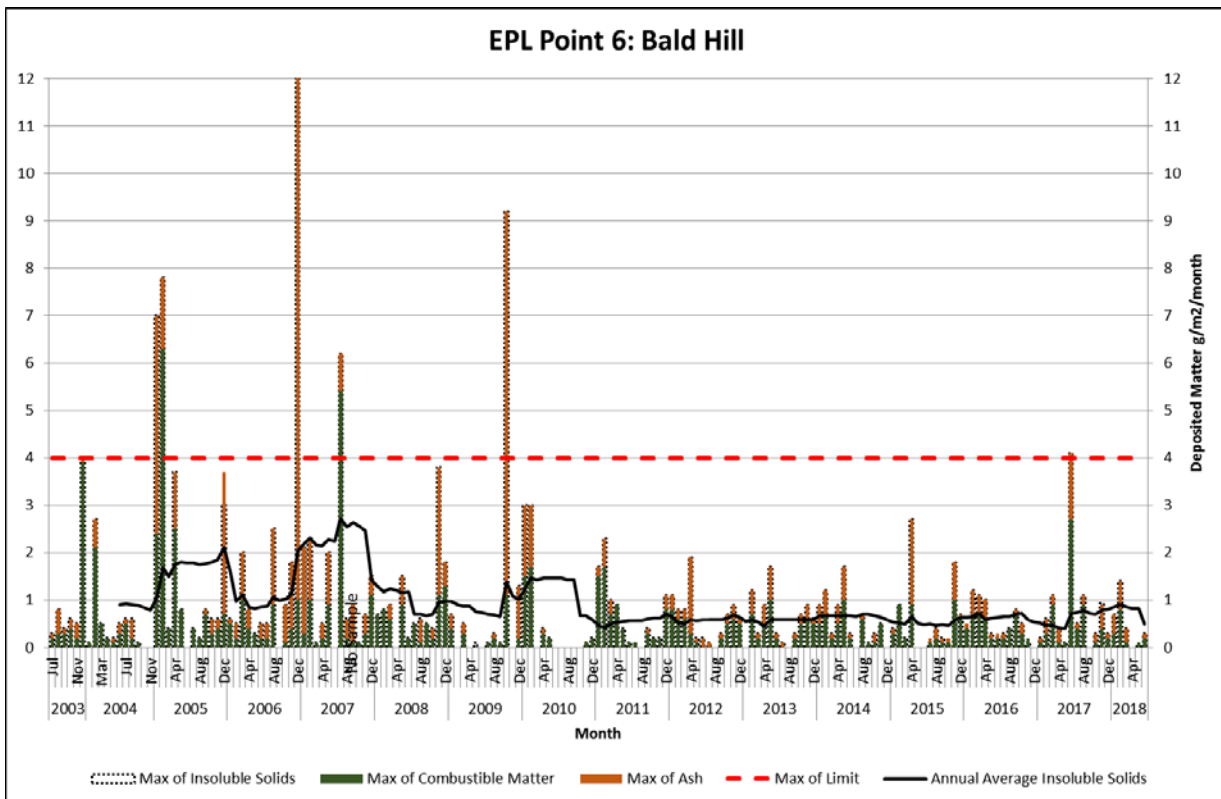


Table 22. Particulate Matter Annual Averages

Annual Averages	PM ₁₀ µg/m ³	Calculated TSP µg/m ³
1/07/17 – 30/06/18	11.2*	28
Compliant with DA	Yes	Yes
Limit	30	90

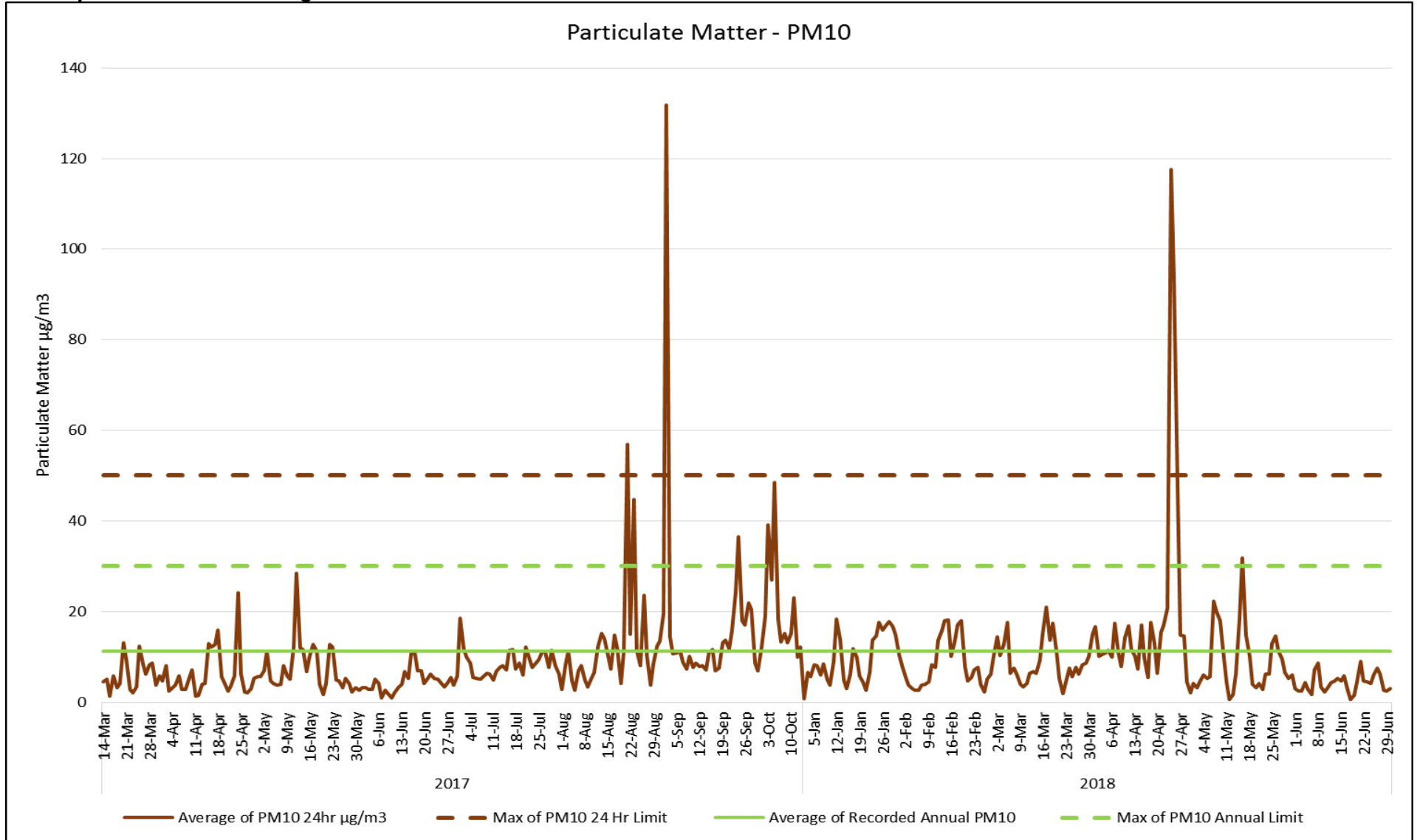
*Note that data was not available for the whole year, and commenced in March 2017.

Table 23. 24 Hour Maximum Particulate Exceedances

Date of Exceedance	PM ₁₀ µg/m ³	Calculated TSP µg/m ³
21/08/2017	57	142.5
2/09/2017	132	330
24/04/2018	118	295
25/04/2018	94	235
Compliant with DA	No	
Limit	50	N/A

N/A = Not applicable

Graph 9. PM₁₀ Monitoring Results



5.5. Heritage

The Austen Quarry is situated within the tribal boundaries of the Wiradjuri people. The Wiradjuri were more dependent on terrestrial and freshwater food sources than aboriginal tribes situated within the Sydney basin. With the site proximity to the Cocks River, it is assumed that the area surrounding the Austen Quarry was of high importance to the local aboriginal people.

The Indigenous Heritage Assessment conducted by Niche Environmental and Heritage Pty Ltd (2014) concluded that due to no discoveries of aboriginal artefacts within the stage 2 development area, the development is unlikely to impact aboriginal cultural heritage values. Activities on the site have continued in accordance with the Indigenous Heritage Assessment.

During the reporting period, there were no items of Aboriginal heritage significance discovered during quarrying activities.

If items of Aboriginal heritage significance are discovered, the management measures listed in the Indigenous Heritage Assessment will be implemented.

5.6. Visual

5.6.1. Performance and Management

The site is visible from a number of local viewpoints including Jenolan Caves Road, the Great Western Highway, Hassan Walls Lookout to the north of the site and Mt York Lookout. Visual impact monitoring has been included in the AQ Environmental Inspection Checklist (*Appendix G*).

Lighting impacts are managed by directly light sources inwards, and are monitored visually on a monthly basis.

Yorkeys Creek stockpile and the secondary processing area retain their vegetation screening. The visual screen on the northern ridge has been augmented by additional tree plantings, see *section 7.1*. The western quarry face has been previously sprayed with bitumen to reduce visual impacts, and portions of the northern quarry face have been sprayed this report period. It is proposed to re-spray some weathered faces next report period.

5.6.2. Monitoring Data

Plate 1. View from Hassans Wall (50mm Focal Point) – taken 15 July 2018



Plate 2. View from Hassans Wall (42mm Focal Point) – taken 15 July 2018



Plate 3. View from Hassans Wall (27mm Focal Point) – taken 15 July 2018



5.7. Waste, Liquid Storage and Dangerous Goods

5.7.1. Performance and Management

Principally wastes produced at the Austen Quarry consist of domestic wastes, scrap steel, trackable wastes (batteries, oils, tyres etc.) and domestic wastewaters.

Hy-Tec has implemented the following environmental performance measures to mitigate the potential impacts of Wastes, Liquid Storage and Dangerous Goods:

- Appropriate waste water management systems to be maintained,
- The storage, handling and transport of dangerous goods is conducted in accordance with the relevant Australian standards,
- Sewage produced onsite is removed by Williams Liquid Waste Services for transport to the Lithgow Sewage Treatment plant,
- Waste skip bins to be emptied when required to prevent overtopping,
- Waste skip bins lids to be closed when not in use,
- Wastes that are not disposed of in skip bins, to be stored in a neat and orderly manner and clearly marked as wastes.
- Wastes segregated on site into categories (general, scrap metal, oily recyclables etc.) accordingly,
- Wastes to be removed by licenced contractors and;
- Liquid wastes are banded appropriately with bands exceeding 110% of the storage tanks capacity.

During the report period all wastes have been stored, transported offsite and disposed of appropriately during the reporting period. There have been no complaints regarding waste and dangerous goods.

5.8. Bushfire

5.8.1. Performance and Management

The site is equipped with fire extinguishers and a fire suppression system covers the Electrical Control room. Vehicles are fitted with fire suppression equipment and the water cart has a cannon suitable for use in fire-fighting. Access to dams is maintained for fire-fighting purposes, and a 20m buffer is maintained around quarry operations to manage fuel loads.

The Quarry Manager regularly attends Rural Fire Service meetings. Staff are trained in evacuation procedures, and plans, contact details and equipment are available and updated as required.

Refuelling is undertaken within designated fuel bays equipped with fire extinguishers.

Training on bushfires and emergency management plans has been implemented during the report period. Prior to the next bushfire season a meeting will be held with Rural Fire Service and NSW Fire and Rescue to obtain input into the site's bushfire emergency plan.

5.8.2. Monitoring Data

No assistance was required for the RFS or the local community from the quarry operations during the report period.

The first controlled burn as a part of the stage 2 development will be conducted within the first 5 years of development (before 2021). Timing of the controlled burn is yet to be determined.

5.9. Biodiversity Offset

5.9.1. Performance and Management

The Biodiversity Offset Area (BOA) is situated to the north, west and south of the stage 2 limit of disturbance (see *Figure 2*). Management of the offset area consists specifically of the conservation of native vegetation, fauna habitat and silver leaved mountain gum populations to offset the impacts of the Austen Quarry Stage 2 extension. Hy-Tec have implemented the environmental measures as described in the Biodiversity Offset Management Plan (available <https://www.hy-tec.com.au/quarry-documentation>).

Securing the BOA under a Nature Conservation Trust agreement, or similar is underway. This will be reported on in the next Annual Review.

Maintenance of the existing fencing around the BOA has been included in the AQ Environmental Inspection Checklist, (*Appendix G*). All topsoil and vegetation cleared during the report period has been re-used in accordance with the LRMP and BOMP.

An additional 630 *Eucalyptus pulverulenta* were installed across the Offset Site during Autumn 2018, see details provided in the Austen Quarry Revegetation Report by Land Works (*Appendix L*).

5.9.2. Weed Management Activities

A weed identification manual and training package has been developed to assist with weed management on the site. Key personnel have been trained and quarterly weed inspections have been included in the AQ Environmental Inspection Checklist (*Appendix G*). The dominant weeds identified on the site are Blackberry, African Love Grass, Thistles, Wild Canola, Blue Heliotrope, Serated Tussock and Patterson's Curse. Spraying is conducted by sub-contractors over about 20 days per year, predominantly for Love Grass, Blackberries and Serrated Tussock.

The Upper Macquarie County Council cancelled the autumn and spring aerial spraying programs this report period due to the prolonged dry weather. The Council was of the opinion

that the aerial herbicide would affect non-target species already stressed by the drought conditions.

5.9.3. Pest Management Activities

Feral goats present a risk to rehabilitation activities on the site. The operators are working with the landowner to reduce the population in the surrounding properties. An estimated 80-100 goats have been shot during the report period on the quarry site and surrounding properties, however, due to their nomadic nature, this has proved insufficient to control populations. A program of mustering and removal is proposed for the next report period.

Pigs have been trapped and baited, as well as shot when seen, on the property in conjunction with local Land Services. During the report period it is estimated that 50-60 animals have been removed from the area.

Baiting and shooting of foxes and wild dogs is undertaken by the Hampton Wild Dog Action Group, of which the quarry staff are members. Baiting programs are co-ordinated with surrounding properties several times per year. The operators have also worked with neighbours to control dog and fox numbers by shooting and reporting sightings.

5.9.4. Monitoring Data

During the reporting period, Onsite Environmental conducted flora and fauna surveys over a 3-day, 2-night period at the end of November 2017, see *Appendix H*. This is discussed in more detail in *Section 5.10*. The monitoring suggests no significant changes to the flora communities.

5.10. Terrestrial Ecology

5.10.1. Performance and Management

Activities on the site have been undertaken in accordance with the Landscape and Rehabilitation Management Plan (LRMP), Biodiversity Offset Management Plan (BOMP) and the Silver Leaved Mountain Gum Management Plan (SLMGMP). No changes to these plans have been made during the report period.

5.10.2. Monitoring Data

During November 2017, Onsite Environmental Management on behalf of Hy-Tec conducted terrestrial ecological monitoring program. The monitoring program was conducted over a three day and 2-night period within the BOA, Riparian zone and rehabilitation area using the following survey techniques:

Diurnal fauna survey

- 20-minute bird census periods at discrete points along flora transects,
- 20-minute reptile searched beneath logs and rocks at bird census points,
- Bird call taping at dusk and dawn for 1-hour periods at impact and control locations and;
- Opportunistic survey along flora transects.

Nocturnal fauna survey

- Spotlight transects in all vegetation communities over one night,
- Call playback and listening for threatened fauna species from elevated positions at dusk,
- Amphibian call recording for 2 hours at dusk and spotlight searches where calls were detected,
- Echo-location call recording for 2 x 2hour periods at impact and control sites and;

- Infrared camera bait station recording at two locations.

In conjunction with fauna surveys, flora surveys were conducted using 2 x 50m transects within each vegetation community survey location. Transects were set up and the presence of vegetation, bare areas, rock and leaf litter was recorded at 1m intervals along the transect to provide 100 survey points. In addition to this, all plant species present were recorded using two 20 x 20m plots located at each end of the transects.

The monitoring program determined that the ridge surrounding the site continues to show low levels of weed species establishment in both impact and control sites. A decrease of weeds species was recorded at Ridge 1 site.

The riparian zone continues to show a trend of weed concentrations exceeding the native concentrations with little native groundcover existing in these areas. There was no indication of quarrying activities impacting these areas.

Monitoring of rehabilitated areas (1, 2 and 3) continued during this period adjacent to the quarry pit operations as described in Section 4 of the Onsite Ecological Monitoring Report November 2017 (*Appendix H*).

Rehabilitation Site 1 was established in 2010 and is currently consisted of native canopy species 5-6 metres tall. Weeds and native ground cover species are present ground layers. Native species are believed to be establishing via self-recruitment from adjacent bushland. Topsoil development is ongoing.

Rehabilitation Area 2, revegetated in 2012, is progressing well with most plants observed to be healthy. Couch crop dominated the ground cover restricting the natural germination and recruitment of native groundcover species.

Rehabilitation Area 3 has previously been treated with topsoil and crop cover treatment. Weed and grass growth has previously been heavy however the 2017 data shows that natives now exceed weeds species throughout the transect, with the area now considered to be stable and planted species growing well.

Most fauna groups were recorded during the reporting period in similar numbers to the previous year's results with more mammals being identified across the site and no new bird species.

Table 24. Terrestrial Ecological Monitoring Summary

Approval criteria / EIS Predictions	Performance during the period	Trend / key management implications	Implemented / proposed actions
Monitor in accordance with the SLMGMP, LRMP, and BOMP	Compliant	Terrestrial ecological monitoring indicates management practices are effective	Continue in accordance with EMP.

5.11. Aquatic Ecology

5.11.1. Performance and Management

Mitigation of impacts on Coxs River and Yorkeys Creek is achieved by operating in accordance with the approved Water Management Plan, Water Licences and EPL 12323.

5.11.2. Monitoring Data

Aquatic Ecology monitoring was undertaken in Spring 2017 as reported in *Appendix I* by Niche Environment and Heritage. The monitoring did not indicate any substantial differences between this and previous monitoring, and showed no discernible trends. The report concluded:

“In general, variability irrespective of quarry operations, has been shown throughout the entire monitoring program since 2011. For all the ecological variables examined it appears that very little of the variability detected is as a direct result of quarry operations, while the sites exhibit good water quality and support macroinvertebrate assemblages that are reflective of reference conditions for the region. Furthermore, macroinvertebrate assemblages indicate that at present the ecological health of the river within the vicinity of Austen Quarry is no different, and sometimes better, than other areas of the river not influenced by quarry operations. It is likely that any impacts that are occurring are short-term in nature and confined to small spatial scales close to the discharge point. Thus, environmental management practices used at the quarry appear to be providing suitable protection to the aquatic environment of the Coxs River.”

Table 25. Aquatic Ecological Monitoring Summary

Approval criteria / EIS Predictions	Performance during the period	Trend / key management implications	Implemented / proposed actions
Monitor the aquatic ecology from the sites identified in Figure 4.41 of the EIS using the AUSRIVAS methodology as stated in Section 4.8.6 of the EIS	Compliant	Aquatic ecological monitoring indicates management practices are effective	Continue in accordance with EMP.

Section 6. Water Management

6.1. Performance and Management

The Water Management Plan (WMP) was developed in consultation with the NSW Department of Planning and Environment, NSW DPI-Water and Water NSW, and version 9 was approved in October 2017. The plan is available on the Hy-Tec website.

Surface water management and monitoring has continued in accordance with the EPL 12323. The controls and procedures undertaken to mitigate impacts on surface water at the site are considered effective. Monitoring results and trends are given in the following section.

Groundwater monitoring bores were established as required by the new WMP in December 2017 and monitored for baseline parameters in January and June 2018. Locations are given on *Figure 6*. Depth is measured by continuous loggers installed in January 2018. Four rounds of groundwater monitoring are proposed to establish baseline groundwater quality against which to compare future potential impacts. Baseline data will therefore be presented in the next Annual Review, and trends against this base reported in subsequent reports.

6.1.1. Surface Water Monitoring Data

Water quality results are available at <https://www.hy-tec.com.au/quarry-documentation> and summarised below. Monitoring point locations are shown on *Figure 6* and *Figure 7*. Sampling is to be conducted at EPL Points 1, 8, 9, 10, and 11 daily during discharges. At EPL points 2 and 3, the sampling frequency is monthly and daily during discharge from Point 1.

There were two discharges during the reporting period from Dam 3 (EPL Point 9) on the 24/10/17 and 6/4/18. The dam was sampled prior to discharge and tested within required criteria on both occasions. On the 24th October however the pH had drifted higher (8.6) overnight. Oil & Grease was not recorded. This is considered a low impact non-compliance, as the pH measured downstream (at EPL Point 3) showed no impact from the discharge. The discharge on 6th April was fully compliant. This was recorded as a non-compliance in the 2017 / 2018 submitted EPL annual return. **This represents a non-conformance against Schedule 5 Condition 6 which requires notification of incidents.**

Table 26. EPL Point 2 Water Monitoring Summary
Coxs River, Upstream of Processing Area

Date	pH	Turbidity (NTU)	TSS (mg/L)	Oil and Grease (mg/L)	Volume Discharge (KL)
Jul-17	8.1	1.8	<5	<5	0
Aug-17	7.0	1.7	<5	<5	0
Sep-17	8.3	2.2	<5	<5	0
Oct-17	8.0	1.9	<5	<5	0
Nov-17	8.3	3.3	8	<5	0
Dec-17	7.5	1.4	<5	<5	0
Jan-18	8.0	2.5	8	<5	0
Feb-18	6.3	2.2	<5	<5	0
Mar-18	8.2	1.3	<5	<5	0
Apr-18	8.3	1.4	<5	<5	0
May-18	7.0	0.1	<5	<5	0
Jun-18	7.9	1.2	<5	<5	0
<i>Min</i>	6.3	0.1	0	0	0
<i>Ave</i>	7.74	1.75	1.33	0.00	0.00
<i>Max</i>	8.3	3.3	8	0	0
<i>Count</i>	12	12	12	12	12
EPL Limit	N/L	N/L	N/L	N/L	

N/L = No limit

Table 27. EPL Point 3 Water Monitoring Summary
Coxs River, Downstream of Processing Area

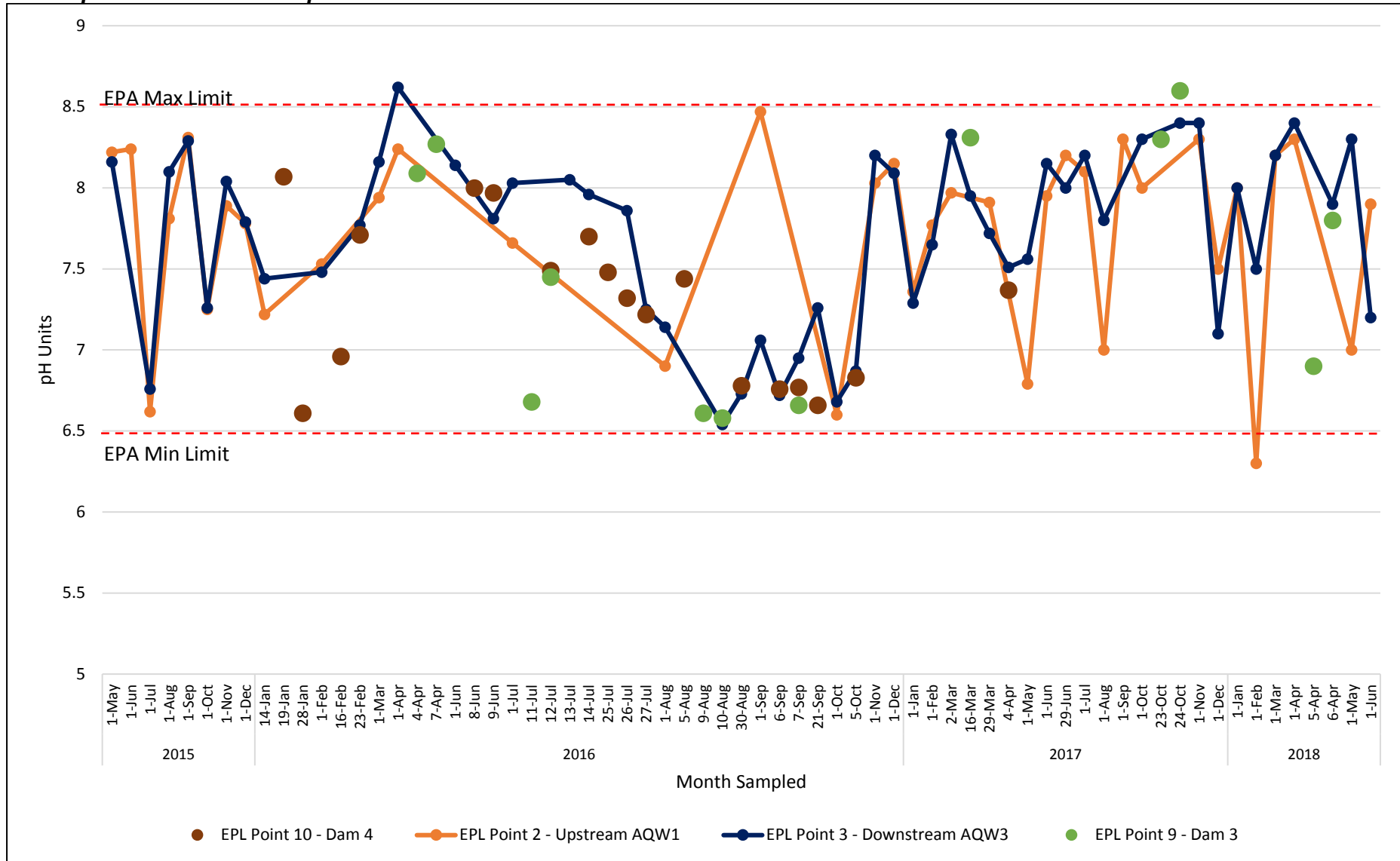
Date	pH	Turbidity (NTU)	TSS (mg/L)	Oil and Grease (mg/L)	Volume Discharge (KL)
Jul-17	8.2	1.2	<5	<5	0
Aug-17	7.8	1.5	<5	<5	0
Sep-17		2.8	<5	<5	0
24/10/17	8.4	3.1	<10		1,000
Oct-17	8.3	2.0	<5	<5	0
Nov-17	8.4	1.8	<5	<5	0
Dec-17	7.1	1.5	<5	<5	0
Jan-18	8.0	7.6	<5	<5	0
Feb-18	7.5	2.2	<5	<5	0
Mar-18	8.2	1.2	<5	<5	0
6/04/2018	7.9	1.0	<5		1,000
Apr-18	8.4	0.9	<5	<5	0
May-18	8.3	0.9	<5	<5	0
Jun-18	7.2	0.9	<5	<5	0
<i>Min</i>	7.1	0.9	0	0	
<i>Ave</i>	7.98	2.04	0.00	0.00	
<i>Max</i>	8.4	7.6	0	0	1000
<i>Count</i>	13	14	14	12	
EPL Limit	N/L	N/L	N/L	N/L	N/L

N/L = No limit

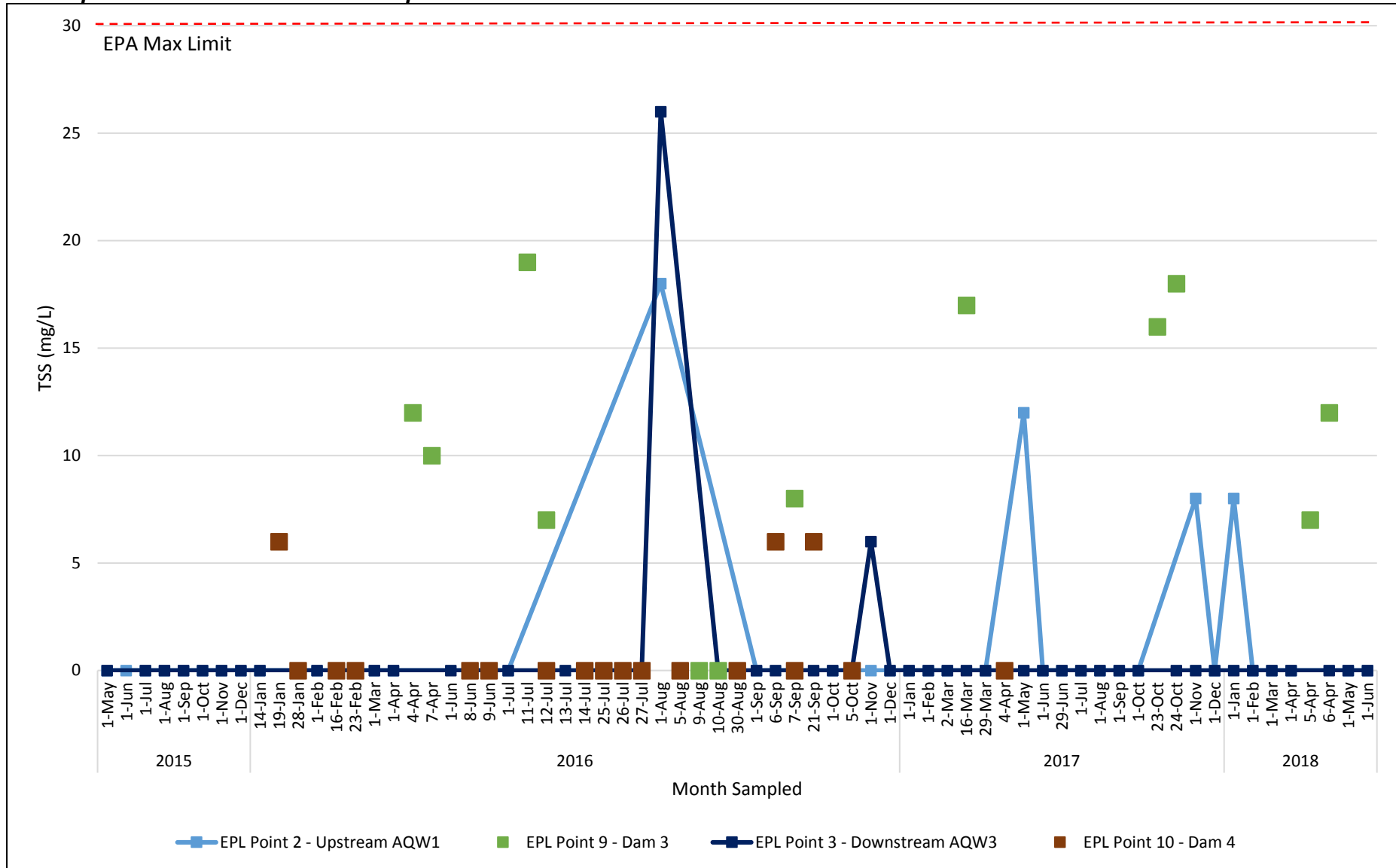
Table 28. EPL Point 9 Water Monitoring Summary
Dam 3

Date	pH	Turbidity (NTU)	TSS (mg/L)	Oil and Grease (mg/L)	Volume Discharge (KL)
23/10/2017	8.3	19	16		0
24/10/2017	8.6	22	18		1,000
5/04/2018	6.9	18	7	<5	0
6/04/2018	7.8	11	12	<5	1000
<i>Min</i>	6.9	11	7	<5	0
<i>Ave</i>	7.90	17.50	13.25	0	500.00
<i>Max</i>	8.6	22	18	0	1000
<i>Count</i>	4	4	4	2	
EPL Limit	6.5 - 8.5	25	30	10	NL

Graph 10. Surface Water pH Trends



Graph 11. Surface Water Total Suspended Solids Trends



6.1.2. Interpretation of Surface Water Results

The pH in Coss River is variable and differs by more than 0.5 of a pH unit between upstream and downstream locations. However the difference in pH cannot be attributed to discharges from the quarry and is more likely impacts from the low rainfall during the report period. The discharge of Dam 3 at pH 8.6 had no impact on the downstream pH measurement. The Total Suspended Solids results are consistently low and show no impact from quarry discharges. Oil and Grease was not plotted as results are mostly not detectable, and Turbidity results follow the Total Suspended Solids trends.

The site's surface water management practices are considered effective. The operator has purchased a pH meter and now conducts tests on-site to determine whether treatment of collected water is required prior to testing and discharge. Pollutant levels inside the required criteria will be targeted to ensure a margin for drifting and differences between in-situ testing and laboratory measurements.

6.1.3. Groundwater Monitoring

Groundwater quality will be monitored at 6 monthly intervals for a period of two years after the bores were installed (December 2017). A sample from each bore and the pit sump will be tested for the following parameters:

- pH, Electrical Conductivity, Oxidation Reduction Potential, Temperature
- Total Dissolved Solids
- Cations and anions
- Dissolved heavy metals
- Ammonia, Nitrate, Nitrite
- Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethyl Benzene, Xylenes (BTEX), Polyaromatic Hydrocarbons (PAHs) – pit sump only.

Two rounds of background monitoring have been achieved this report period and the reports are included in *Appendix J*. MB03 was dry on both occasions.

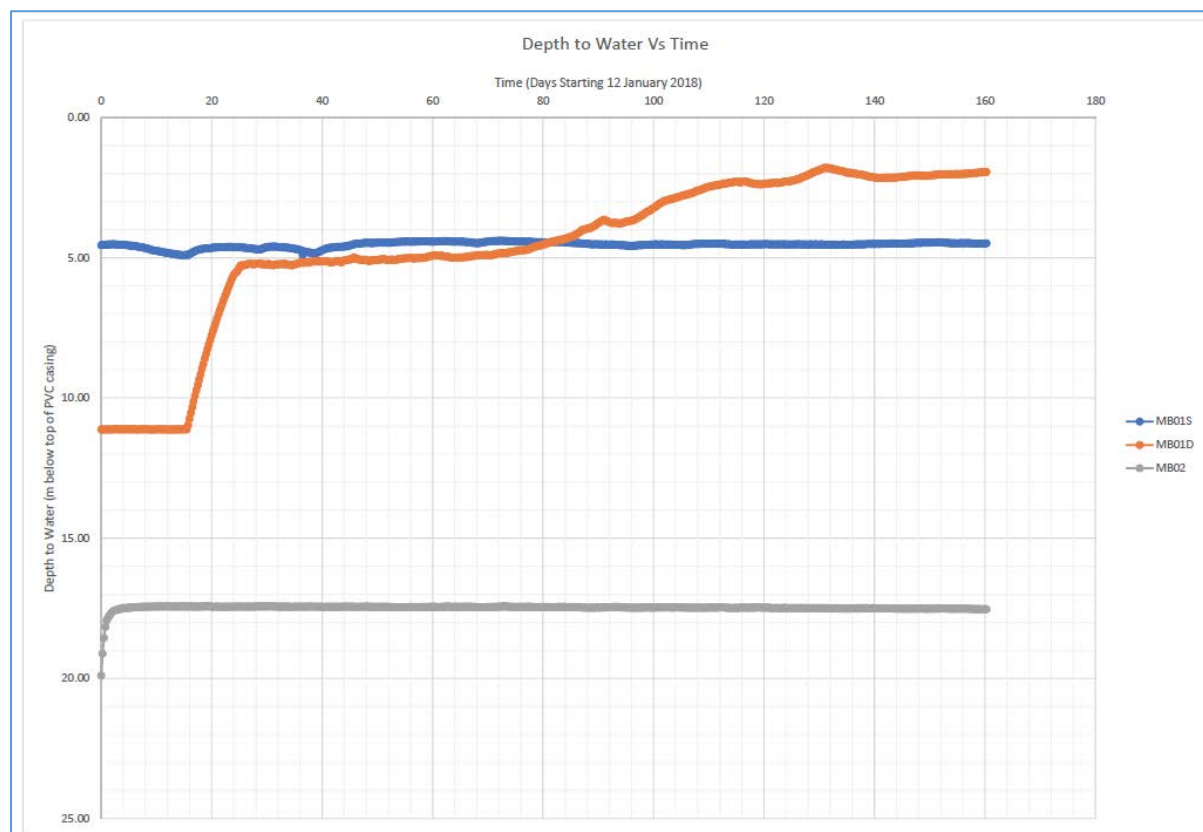
Table 29. Groundwater Quality Parameters

	Units	MB01S		MB01D		MB02		Pit	
		10/01/18	22/06/18	10/01/18	22/06/18	10/01/18	22/06/18	10/01/18	22/06/18
Field Parameters									
Depth to Water	M	4.63	4.48	5.49	1.94	17.43	17.54	-	-
Temperature	°C	15.9	16.5	16.7	14.7	16.4	12.9	21.9	7.6
Diss Oxygen	mg/L	6.08	5.41	2.64	1.56	3.73	5.08	4.30	6.97
Conductivity	µS/cm	575	343	1170	779	1210	927	820	357
pH		6.27	7.41	7.02	7.44	7.03	7.32	7.00	7.01
ORP	mV	-11.6	94	-22	85	-5	130	8	119
Cations and Anions									
Calcium	mg/L	66	74	144	150	52	71	71	49
Magnesium	mg/L	14	13	16	15	24	31	45	26
Sodium	mg/L	23	22	95	59	200	190	26	25
Potassium	mg/L	1	1	3	1	2	2	4	3
Sulphate	mg/L	22	23	259	248	120	127	183	98
Chloride	mg/L	43	44	58	23	68	78	9	10
Hydroxide as CaCO ₃	mg/L	<1	<1	<1	<1	<1	<1	<1	<1
Carbonate as CaCO ₃	mg/L	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate as CaCO ₃	mg/L	216	232	307	335	476	520	181	201
Dissolved Heavy Metals									
Aluminium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic	mg/L	0.003	0.001	0.005	0.005	0.004	0.004	<0.001	<0.001
Boron	mg/L	<0.05	<0.05	0.33	0.32	0.32	0.27	<0.05	<0.05
Barium	mg/L	0.015	0.013	0.08	0.055	0.065	0.085	0.032	0.029

	Units	MB01S		MB01D		MB02		Pit	
		10/01/18	22/06/18	10/01/18	22/06/18	10/01/18	22/06/18	10/01/18	22/06/18
Beryllium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0088	0.0019
Chromium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	mg/L	<0.001	<0.001	0.002	0.003	<0.001	<0.001	0.003	<0.001
Copper	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.123	0.153	0.353	0.53	0.038	0.046	2	0.188
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	0.002	<0.001	0.03	0.004	0.009	0.002	0.004	<0.001
Nickel	mg/L	0.001	<0.001	0.018	0.003	0.003	0.002	0.008	0.001
Selenium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silicon	mg/L	9.15	10.1	24.4	31.6	9.6	11.3	15.2	19.4
Silver	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	mg/L	0.208	0.245	0.897	0.897	2.36	3.01	0.298	0.231
Titanium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.03	<0.005	<0.005	0.006	<0.005	<0.005	0.443	0.16
Nutrients									
Nitrate*	mg/L	0.05	<0.01	0.08	<0.01	<0.01	<0.01	4.45	0.48
Nitrite	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Ammonia	mg/L	0.03	0.05	0.03	0.02	<0.01	0.08	0.4	0.05
Hydrocarbons									
TRH	ug/L	-	-	-	-	-	-	<PQL	<PQL
Benzene	ug/L	-	-	-	-	-	-	<1	<1
Toluene	ug/L	-	-	-	-	-	-	<2	<2
Ethylbenzene	ug/L	-	-	-	-	-	-	<2	<2
Xylene	ug/L	-	-	-	-	-	-	<2	<2
Naphthalene	ug/L	-	-	-	-	-	-	<5	<5
Benzo(a)pyrene	ug/L	-	-	-	-	-	-	<0.5	<0.5

Data compilation supplied by Ground Doctor Pty Ltd

Graph 12. Standing Water Levels



6.2. Water Take

Water take in the pit is monitored according to the WMP and in accordance with WAL 37423. Ground Doctor measured the inflow between 9am 21st and 9am 22nd June 2018, then used this to calculate the annual groundwater in flow. Active pumping is undertaken in accordance with WAL 25616 and is calculated from the log book kept on site.

Table 30. Water Take

Water Licence #	Plan / Source / Management Zone	Entitlement	Passive take / inflows	Active Pumping	Total
37423	Coxs River Fractured Rock Groundwater Source	20.00 ML	7.6 ML	-	7.6 ML
25616	Upper Nepean and Upstream Warragamba Water Source, Dharabuladh Management Zone	20.00 ML		16.812 ML	16.812 ML

Section 7. Rehabilitation

7.1. Rehabilitation Activities Undertaken during Report Period

Skillset Environment Land Works were engaged to install 1340 plants during the autumn 2018 planting season. Areas planted included:

- Casurina plantings at Glenroy Cottages and Campground,
- Visual screening of mixed trees across the northern ridge,
- Seeds and tubestock within and adjacent to the previous rehabilitation areas in the south, west of the Stage 2 extraction area,
- Eucalypts and acacias on the northern and western quarry highwalls, and
- 630 Silver Leaved Mountain Gums across the Biodiversity Area.

Details and methodologies are provided in the Revegetation Report in *Appendix L* and locations shown on *Figure 2* and *Figure 3*.

7.2. Summary of Rehabilitation Performance

Compliance with the Landscape and Rehabilitation Management Plan (LRMP) has been summarised in *Table 31*.

Table 31. Rehabilitation Monitoring Summary

Approval criteria / EIS Predictions	Performance during the period	Trend / key management implications	Implemented / proposed actions
Infrastructure not required for future landuse removed	Not Triggered	N/A	N/A
Contamination is identified and removed	Not Triggered	N/A	N/A
Final Landform equivalent to [EIS] <i>Figure 4</i>	Not Triggered	N/A	N/A
Soil is stockpiled in accordance with the management measures described in Section 8.4.1.5 (LRMP)	Compliant	Soil management procedures effective	N/A

During the reporting period, Onsite Environmental Management conducted an ecological monitoring program as a part of the ongoing ecological monitoring program (see *Appendix H*). The three day, two night monitoring program consisted of Diurnal and Nocturnal fauna surveys as well as flora transects. These surveys/transects were conducted in the following locations:

- Biological Offset Areas (BOA) to the north east and south of the quarry operations (transects 1 and 3);
- Rehabilitation Area and;
- New quarry operation areas.

Table 32. Rehabilitation Status

Mine Area Type	Previous Reporting Period (Actual) ha	Current Reporting Period (Actual) ha	Next Reporting Period (Estimate) ha
A. Total Mine Footprint	128	128	128
B. Total Active Disturbance	45.9	45.9	45.9
C. Land being prepared for rehabilitation	0.5	1.0	1.1
D. Land under active rehabilitation	1.4	3.0	3.0
E. Completed Rehabilitation	7.0	7.0	7.0

Note: temporary rehabilitation undertaken for the purposes of dust or erosion control and not for the purpose of establishing the intended post mining land use must be accounted for as part of the "Total active disturbance" area (B) rather than the rehabilitation figures for areas C, D and E.

7.2.1. Progression of Previous Rehabilitation

Plate 4. Yorkeys Creek Stockpile Rehabilitation Area



Plate 5. Secondary Processing Area



7.3. Rehabilitation of Buildings

No buildings or infrastructure have been removed or rehabilitated during the report period.

7.4. Rehabilitation Activities Proposed for Next Report Period

Skillset Environment Land Works propose to return in spring 2018 to monitor the health of the vegetation planted in autumn and to replace any individuals that did not survive. During this time additional planting in accordance with the LRMP, BOMP and SLMGMP will be undertaken in the areas highlighted on *Figure 5*.

Plate 6. 15 year old Rehabilitation Area to be Re-seeded



Section 8. Community

Austen Quarry community participation includes ongoing funding of voluntary planning agreements.

It is advised, during the last reporting period a number of informal catch up meetings were held with members of the Hartley District Progress association and other local community members, along with meetings with Lithgow City Council staff. Regular meetings with representatives from NSW state departments have been undertaken on the topics of road, vehicle and transport, fire and explosion, and environmental monitoring points.

The Quarry continues to play an active support role with other local organisations such as Hartley Historic Site Advisory Committee, Rhodo Festival Blackheath etc.

There was one noise-related complaints from the local community regarding a heavy vehicle travelling on Jenolan Caves Rd. . Complaints are recorded on a complaints register, a copy of which may be found on the website: <https://www.hy-tec.com.au/quarry-documentation>.

Table 33. Complaints Summary

Review Period	Details	Action	Where Addressed in Report
2015-2016	No complaints	N/A	-
2016-2017	No complaints	N/A	-
2017-2018	1 complaint: noisy truck	Mufflers upgraded	Section 5.2

Section 9. Incidents and Non-Compliances

9.1. Incidents

There have been no reportable incidents in the reporting period.

9.2. Non-Compliances

9.2.1. Schedule 2, Condition 2

"The Applicant shall carry out the development generally in accordance with the:

- (a) EIS;*
- (b) Statement of Commitments; and*
- (c) conditions of this consent."*

As discussed further in this section, there are non-compliances against some of the conditions of the consent.

9.2.2. Schedule 3, Condition 10

"The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM ₁₀)	Annual	a,d 30 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	24 hour	b 50 µg/m ³
Total suspended particulates (TSP)	Annual	a,d 90 µg/m ³
^c Deposited dust	Annual	b 2 g/m ² /month a,d 4 g/m ² /month

There were 4 recorded instances of the PM₁₀ 24 hour average exceeding the criteria of 50 µg/m³. On Monday 21/08/2017 the average recorded for 24 hours was 57 µg/m³. There were bushfires in the vicinity of the site on this date and no further investigation was undertaken.

On Saturday 2/09/2017 132 µg/m³ was recorded. On Tuesday 24th and Wednesday 25th April (Anzac Day public holiday) 2018 118 and 94 µg/m³ were recorded, respectively. On these days there were little or no operations on the site and investigations showed that the results were unlikely to be due to the quarry activities. The PM₁₀ monitor is located at a residence as shown on *Figure 7*. It is noted that the residence has a long, unsealed driveway which was sealed around May 2018. Results have stayed below 20 µg/m³ 24 hour averages since mid-May. The exceedances occurred during weather conditions with winds from the S – SSW which would see the monitor highly influenced from the un-sealed driveway. No further actions were considered relevant at this stage.

The average of the PM₁₀ measurements for the report period was 11.2 µg/m³ which is compliant with the annual average requirement of less than 30 µg/m³. Therefore the 24-hour exceedances are considered low impact non-compliances, and the air quality practices and controls are considered effective.

9.2.2.1. Actions taken to improve performance

The site will continue to be monitored in accordance with current management plans. Investigations are currently being undertaken in regard to system monitoring alerts being reported directly to local management, supported by wind directional information.

9.2.3. Schedule 3, Condition 16 and EPL 12323 Condition L2.4

"The Applicant shall comply with the discharge limits in any EPL, or with section 120 of the POEO Act"

"L2.4 Water and/or Land Concentration Limits

POINT 11,8,9,10,1

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	milligrams per litre				10
pH	pH				6.5 - 8.5
Total suspended solids	milligrams per litre				30

There were two discharges during the reporting period from Dam 3 (EPL Point 9) on the 24/10/17 and 6/4/18. The dam was sampled prior to discharge and tested within required criteria on both occasions. On the 24th October however, the pH had drifted higher (8.6) overnight. Oil & Grease was not recorded. This is considered a low impact non-compliance, as the pH measured downstream (at EPL Point 3) showed no impact from the discharge. The discharge on 6th April was fully compliant.

9.2.3.1. Actions taken to improve performance

The operator has purchased a pH meter and now conducts tests on-site to determine whether treatment of collected water is required prior to testing and discharge. Pollutant levels inside the required criteria will be targeted to ensure a margin for drifting and differences between in-situ testing and laboratory measurements.

9.2.4. Administrative Non-Compliances

Schedule 5, Condition 8

"Within a year of the date of this consent, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must: be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;"

The approval of the auditor, and hence commissioning of the Independent Environmental Audit had not been completed by 15/09/17. Hy-Tec disagree with this assessment from the DPE and considered the auditor commissioned prior to receiving endorsement from the DPE.

Water Access Licence 37423, DS2431- 00001

"Within 6 months of granting this approval (15/7/15), a monitoring plan to measure the water table, groundwater and surface water quality must be submitted to, and approved by, the relevant licensor, Parramatta Office"

While a Water Monitoring Program has been developed and approved for the site, the Water Monitoring Plan had not been submitted to and approved by NOW within 6 months of granting

of the licence. The plan has since been submitted and approved, but not within 6 months. No further actions are required.

9.2.4.1. Actions taken to improve performance

When the next audit is due, Hy-Tec will endeavour to appoint an auditor and receive endorsement from the DPE within the required time-frame, ie before 15/9/2020.

9.2.5. Historical Administrative Non-Compliances

The following conditions relate to administrative activities that did not meet a prescribed timeframe. These conditions have been discussed in previous Annual Reviews, and have been resolved to satisfaction of the Secretary. No further actions are required.

Schedule 2, Condition 18

"By 30 September 2015, unless otherwise agreed with the Secretary, the Applicant shall:

(a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction within the development area; and

(b) submit a survey plan of these boundaries with applicable GPS coordinates to the Secretary."

Schedule 2, Condition 20

"Within 6 months of the date of this consent, unless otherwise agreed by the Secretary, the Applicant shall enter into a planning agreement with the Council in accordance with Division 6 of Part 4 of the EP&A Act; and the terms specified in Appendix 7. If there is any dispute between the Applicant and Council on the planning agreement, then either party may refer the matter to the Secretary for resolution."

9.3. Actions Required from Previous Annual Reviews

Table 34. Actions Required from the previous Annual Review

Action required	Requested by	Action taken by Operator	Where discussed in Annual Review
Actions Proposed in previous Annual Review			
Ongoing extraction of material from the Stage One extraction area	Annual Review	Ongoing	Section 4.1.1
Commencement of extraction within the Stage Two resource area	Annual Review	Ongoing	Section 4.1.1
Rehabilitation activities around the current overburden emplacement, replanting of trees around SD1,SD2 and other areas around the site	Annual Review	Skillset Environmental engaged to undertake planting program	Section 7
Planting of 2,000 Silver Leaved Gums, and 1,000 mixed native tree species (Stringy Bark/Yellow Box etc)	Annual Review	Skillset Environmental engaged to undertake planting program	Section 7
Installation of piezometers in accordance with the Water Management Plan	Annual Review	Ground Doctor engaged to install piezometers in Dec 2017	Section 6
Actions required from DPE following previous Annual Review			
A plan showing the location of offset areas	DPE	Done	Figure 2 and Figure 3
A plan showing the status of mining and rehabilitation at the end of the reporting period.	DPE	Done	Figure 2, Figure 3 and Figure 5
Surface water monitoring data for all Environmental Protection Licence (EPL) points in accordance with Condition 4b) of Schedule 5.	DPE	Done	Section 6.1.1
A year on year comparison of complaints received at the project.	DPE	Done	Table 33
It is requested that a table is provided in future Annual Reviews that lists the improvement opportunities proposed in the previous Annual Review for the current reporting period and the action taken to progress them, as well as listing any comments from the regulatory agencies on the previous Annual Review, and where they have been addressed in the current Annual Review.	DPE	Done	Table 34

Action required	Requested by	Action taken by Operator	Where discussed in Annual Review
In accordance with Condition 26 of Schedule 3, please provide evidence that suitable arrangements were made by 15 th July 2017 to provide appropriate long-term security for the land within the Biodiversity Offset Strategy to the satisfaction of the Secretary	DPE	It is noted that Condition 26 has been deleted in the modification approval of 15 August 2018. As per the updated approval – Condition 25 - Within 12 months of the approval of Modification 1, or other timeframe agreed by the Secretary, the Applicant must retire the biodiversity credits specified in Table 4A below.	
In accordance with Condition 30 of Schedule 3, please provide evidence that the Conservation and Rehabilitation Bond was lodged with the Department by 2 June 2017.	DPE	A copy of the bond was included in Appendix L of the previous review. No action required.	
A review of the website did not identify any monitoring data under the heading 'Monitoring Data'. It is noted in the Annual Review that EPL monitoring data was published on the Hy-Tec website. Please confirm that the data is available and how Hy-tec has complied with condition 10a) dot point 4 and Condition 10b) of Schedule 5.	DPE	https://www.hy-tec.com.au/quarry-documentation	

9.4. Independent Audit

Table 35. Actions Required from Independent Audit

Issue No	Risk Rating	Condition	Requirement	Issue Sighted	Action Taken / Date and Compliance at 30/6/2018
N-01	Low	Environmental Management Strategy 3.3	<p>A training package detailing the importance of observing all environmental safeguards and outlining the potential environmental impacts will be implemented for all personnel working on-site. This may be done at the following stages:</p> <p><input type="checkbox"/> At the commencement of employment as part of the employee's site induction and safety procedures briefing.</p> <p><input type="checkbox"/> At least every 24 months thereafter.</p> <p><input type="checkbox"/> At any stage, should there be a change in operational procedures</p>	A definitive training package had not been prepared and implemented.	Induction module updated to include environmental management issues Feb 2018. Appendix G
N-02	Low	Environmental Management Strategy 3.4	Visual inspections of stormwater, sediment and erosion control prior to, and following wet season and/or major rainfall events (>25mm in 24hours)	Records do not demonstrate inspections of sediment and erosion control had been conducted prior to high rainfall events.	Heavy Rainfall Inspection Worksheet developed Feb 2018. No heavy rainfall received since that date. Appendix G
N-03	Low	Environmental Management Strategy 3.4	<p>Prevent the spread of weeds through site by:</p> <p><input type="checkbox"/> Visual weed inspections of machinery entering site; and</p> <p><input type="checkbox"/> Quarterly weed inspections of the site.</p>	Inspections required to be conducted for the management of weeds had not been completed. No records were available for inspection of machinery entering site. Quarterly weed inspections had not been conducted.	AQ Weed Identification Manual developed. Appendix G
N-04	Low	Environmental Management Strategy 6.10.5	Employees should be able to recognise existing and potential weeds present on-site and within the surrounding area to ensure they are not inadvertently brought in via items contaminated by seed	No records to demonstrate that workers had been trained in the identification of weeds on site.	Training Records Appendix G

Issue No	Risk Rating	Condition	Requirement	Issue Sighted	Action Taken / Date and Compliance at 30/6/2018
N-05	Low	Environmental Management Strategy 6.11.5	Have markers, fencing or flagging been provided around vegetation to be protected or areas undergoing rehabilitation?	Markers, fencing or flagging had not been provided around vegetation to be protected or areas undergoing rehabilitation.	Areas within the Biodiversity Offset Area have been fenced; directive to use access tracks only included in induction Appendix G
N-06	Low	Water Access Licence 25616 MW0017-00023	From 1 July 2011, water must not be taken from the Dharabuladh Management Zone of the Upper Nepean and Upstream Warragamba Water Source when flows are in the Very Low Flow Class, which means that the flow at Coxs River at the Island Hill gauge [No. 212045] is: A. equal to or less than 17 ML/day on a rising river, or B. equal to or less than 15 ML/day on a falling river. This restriction does not apply if water is to be taken from a runoff harvesting dam or an in-river dam pool.	Visual observation of water flow in the river was recorded at the commencement of pumping. The flow at the Island Hill gauge was not verified prior to pumping.	Pumping record sheet amended Appendix K
A-01	Admin	Administrative Controls 18	By 30 September 2015, unless otherwise agreed with the Secretary, the Applicant shall: (a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction within the development area; and (b) submit a survey plan of these boundaries with applicable GPS coordinates to the Secretary.	Survey not completed by 30 September 2015. This was raised as an administrative non-compliance by DPE in an audit in November 2015.	This issue has been addressed previously to the satisfaction of the Secretary of DPE
A-02	Admin	Administrative Controls 20	Within 6 months of the date of this consent, unless otherwise agreed by the Secretary, the Applicant shall enter into a planning agreement with the Council in accordance with division <input type="checkbox"/> Division 6 of Part 4 of the EP&A Act; and <input type="checkbox"/> the terms specified in Appendix 7.	While discussions on the VPA had commenced with Council on 7/08/15, the voluntary planning agreement had not been entered into with Council within 6 months of the date of the consent.	The VPA has since been finalised and implemented by both parties

Issue No	Risk Rating	Condition	Requirement	Issue Sighted	Action Taken / Date and Compliance at 30/6/2018
A-03	Admin	Schedule 3 - Environmental Performance Conditions 4 Schedule 5- Environmental Management, Reporting and Auditing 10 Noise Management Plan 8.4.3	<p>The Applicant shall:</p> <p>(a) implement best practice management to minimise the operational and road transportation noise of the development;</p> <p>(b) minimise the noise impacts of the development during meteorological conditions when the noise criteria in this consent do not apply (see Appendix 5);</p> <p>(c) carry out noise monitoring (at least every 6 months, unless otherwise approved by the Secretary) to determine whether the development is complying with the relevant conditions of this consent; and</p> <p>(d) regularly assess noise monitoring data and modify and/or stop operations on site to ensure compliance with the relevant conditions of this consent, to the satisfaction of the Secretary.</p>	Noise monitoring had not been conducted on a six monthly basis. Noise monitoring conducted September 2016 and September 2017.	Three noise monitoring campaigns undertaken this report period

Issue No	Risk Rating	Condition	Requirement	Issue Sighted	Action Taken / Date and Compliance at 30/6/2018
A-04	Admin	Schedule 5- Environmental Management, Reporting and Auditing 8	<p>Within a year of the date of this consent, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:</p> <p>(a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;</p> <p>(b) include consultation with the relevant agencies;</p> <p>(c) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent and any relevant EPL or necessary water licences for the development (including any assessment, strategy, plan or program required under these approvals);</p> <p>(d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; and</p> <p>(e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, strategy, plan or program required under the abovementioned approvals.</p>	The approval of the auditor, and hence commissioning of the Independent Environmental Audit had not been completed by 15/09/17.	Hy-tec considered they had commissioned the auditor prior to receiving endorsement from the DPE
A-05	Admin	Landscape and Rehabilitation Management Plan 8.3.1.1	Signs will be placed on selected survey markers to highlight the ecological sensitivity of the BOA to contractors and staff.	Signs have not been installed at this stage. Noted that while a biodiversity offset area had been identified, the biodiversity offset strategy had not been finalised at the time of audit.	Biodiversity Offset Area and management issues included in Induction Appendix G

Issue No	Risk Rating	Condition	Requirement	Issue Sighted	Action Taken / Date and Compliance at 30/6/2018
A-06	Admin	Landscape and Rehabilitation Management Plan 8.3.2 Biodiversity Offset Management Plan 3.3	Monthly boundary inspections and any breaches rectified within 4 weeks.	Reported to have been completed however no records available	Included in Environmental Checklist Appendix G
A-07	Admin	Landscape and Rehabilitation Management Plan 8.3.2	Implement an access track management strategy.	Development of the access track management strategy had not commenced at time of audit.	Included in the site induction Appendix G
A-08	Admin	Landscape and Rehabilitation Management Plan 8.4.1.4 8.4.1.5	Vegetation will be cleared in a way that maximises the opportunity for recycling Operators will be instructed to handle soil as little as possible.	No evidence of communication of requirements for vegetation clearing and soil stripping to operators	<i>AQ Vegetation, Topsoil and Overburden Stripping Procedures</i> developed
A-09	Admin	Landscape and Rehabilitation Management Plan 8.4.1.5	To ensure the value of the soils to be disturbed is maximised, the following management measures will be implemented for topsoil stripping, stockpile management and soil resreading.	Evidence that the requirements for the management of disturbed soils had been communicated to workers involved in the activities was not available.	<i>AQ Vegetation, Topsoil and Overburden Stripping Procedures</i> developed
A-10	Admin	Noise Management Plan 8.4.3	Attended noise monitoring will be undertaken using a hand-held noise meter. The maximum (L_{Amax}), and the energy equivalent (L_{Aeq}) intrusive noise level over a 15 minute measurement period will be recorded. If necessary, other descriptors such as LA_{10} , LA_{50} , LA_{90} , LA_{99} and L_{Amin} could also be recorded. Wherever possible, the LA_{90} noise level (i.e. without contributions from Quarry activities) will be recorded to identify the prevailing a background noise level.	Attended monitoring conducted on an annual basis. Conducted September 2016 and September 2017. $L_{Aeq15min}$ reported. L_{Amax} not reported in September 2016 Noise report.	Attended monitoring occurred in Oct 17, Dec 17 and Apr 18 in accordance with this condition. L_{Amax} reported each time.

Issue No	Risk Rating	Condition	Requirement	Issue Sighted	Action Taken / Date and Compliance at 30/6/2018
A11	Admin	Noise Management Plan 8.6	A noise monitoring report will be prepared by the person or company responsible for the monitoring within 7 days of each attended noise monitoring event.	Noise monitoring reports had not been provided within 7 days of each noise monitoring event	Monitoring up to 5/10/17 reported 6/11/17. Dec 17 and Apr 18 monitoring reported within 7 days. NMP not yet updated to extend this reporting timeframe
A12	Admin	Biodiversity Offset Management Plan 3.3	Clearly delineated conservation exclusion zones within and around the existing Quarry and Stage 2 Extension will be implemented following approval of the BOMP to exclude movement of vehicles, plant and staff within rehabilitation areas and the BOA.	Markers, fencing or flagging had not been provided around vegetation to be protected or areas undergoing rehabilitation.	See A05
A13	Admin	Silver Leaved Mountain Gum Management Plan 4.6	Are the requirements of Section 4.6 of the SLMGMP for the replanting of rehabilitation areas communicated to workers?	While Section 4.6 of the SLMGMP provides requirements for the replanting and rehabilitation of disturbed areas, a rehabilitation procedure for was not available, and evidence that the requirements of Section 4.6 had been communicated to workers involved in rehabilitation was not available.	AQ Revegetation Monitoring Record developed. Replanting works undertaken in April – June 2018. Appendix G
A-14	Admin	Environmental Management Strategy 3.4	Update Material Safety Data Sheet Register – Event based or annually.	While a hazardous chemicals register including safety data sheets was available, some SDS provided were greater than 5 years old.	SDS database updated
A-15	Admin	Environmental Management Strategy 3.4	Confirm sufficient spill response equipment is supplied and properly maintained - Quarterly or following use of a spill kit.	While Spill kits had been provided, no records of inspection of the spill kits available.	Included in Environmental Checklist Appendix G

Issue No	Risk Rating	Condition	Requirement	Issue Sighted	Action Taken / Date and Compliance at 30/6/2018
A-16	Admin	Environmental Management Strategy 3.4	Stormwater captured within any bunding is to be removed as soon as practicable after a rain event and disposed of as contaminated water. Spills within bunded areas must be cleaned up as soon as practicable	Small volume of diesel in sump under diesel tank. Bunded area had not been maintained to ensure spills within the bund are quickly cleaned up and removed.	While all spills are cleaned up immediately, spills captured in purpose built sumps shall be cleaned out when practical or required
A-17	Admin	Environmental Management Strategy 6.9.6	Bi-annual weed inspection and herbicide treatment program shall be undertaken or as required.	While an annual inspect had been conducted by Onsite Environmental, weed inspections were not conducted on a bi-annual basis.	See N-03
A-18	Admin	Environmental Management Strategy 6.12.6	The Quarry Manager to undertake a visual assessment annually to assess adequacy of the bushfire control measures implemented.	No records to show that a specific annual visual assessment has been conducted to assess the adequacy of bushfire control measures.	Included in Environmental Checklist Appendix G
A-19	Admin	Water Access Licence 25616 MW2337-00001	The following information must be recorded in the logbook for each period of time that water is taken: A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time, and B. the access licence number under which the water is taken, and C. the approval number under which the water is taken, and D. the volume of water taken for domestic consumption and/or stock watering.	Water access licence was included in the logbook. While a logbook was maintained which included meter reading, river flow and time recorded at the commencement of pumping, the start and end time was not always recorded.	See N06

Issue No	Risk Rating	Condition	Requirement	Issue Sighted	Action Taken / Date and Compliance at 30/6/2018
A-20	Admin	Water Access Licence 37423 DS2431-00001	Within 6 months of granting this approval (15/7/15), a monitoring plan to measure the water table, groundwater and surface water quality must be submitted to, and approved by, the relevant licensor, Parramatta Office.	While a Water monitoring program has been developed and approved for the site, the Water Monitoring Plan had not been submitted to and approved by NOW within 6 months of granting of the licence.	The Water Management Plan (including a monitoring program) was approved on 16 October 2017 (not within 6 months)

Section 10. Actions Planned for Next Report Period

The following activities are likely to occur during the next reporting period:

- Securing the BOA under a Nature Conservation Trust agreement, or similar is underway, any updates will be reported in the next Annual Review;
- A program of goat mustering and removal is proposed for the next report period;
- Ongoing collection of baseline groundwater quality monitoring; and
- Continued monitoring of the water pH levels using onsite pH meter to determine whether treatment of collected water is required prior to testing and discharge
- Update and review of site environmental management system tools.
- Update of relevant plans following approval of Modification request to various conditions as approved 15 August 2018.

Appendix A: Conditions Compliance

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

DA Conditions: SSD 6084

Compliant

Non Compliant: High Risk Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence

Non Compliant: Medium Risk Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur

Non Compliant: Low Risk Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur □

Non Compliant: Administrative Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Schedule	Condition	Condition Text	Details of compliance status at 30/6/2018	Where addressed in Annual Review
Compliance Summary		Number of Conditions Non-compliant		
Non Compliant: High Risk		Nil	See Table Below	See Table Below
Non Compliant: Medium Risk		Nil		
Non Compliant: Low Risk	Sched 2: 2, Sched 3: 10, 16	3		
Non Compliant: Administrative	Sched 2: 18, 20, Sched 5: 8	3		
General				
2	1	In addition to meeting the specific performance criteria established under this consent, the Applicant shall implement all reasonable and feasible measures to prevent and/or minimise any material harm to the environment that may result from the construction, operation, or rehabilitation of the development.	Compliant	
	2	The Applicant shall carry out the development generally in accordance with the: (a) EIS; (b) Statement of Commitments; and (c) conditions of this consent.	Non-compliant - not all conditions are compliant	Section 9.2
	3	If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this consent shall prevail to the extent of any inconsistency.	Compliant	
	4	The Applicant shall comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of: (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this consent; (b) any reviews, reports or audits undertaken or commissioned by the Department regarding compliance with this consent; or (c) the implementation of any actions or measures contained in these documents.	Compliant	
	5	If the development has not been physically commenced within 5 years of the date of this consent, then this development consent shall lapse	Compliant: DA 103/94 was surrendered on the 15th September 2016	
	6	The Applicant shall not extract extractive materials below a level of 685 m AHD.	Compliant: Depth of extraction 706.0m AHD April 2018	See Figure 4
	7	The Applicant may carry out quarrying operations on the site until 30 June 2050.	Compliant	
	8 a)	The Applicant shall not: a) transport more than 1.1 million tonnes of quarry products from the site during any financial year;	Compliant - saleable product 1,026,498T for report period	Section 4.1.2, Table 13
	8 b)	dispatch more than 250 laden trucks from the site on any one day and;	Compliant: max laden trucks 158	Section 4.1.2, Table 13
	8 c)	dispatch more than 150 laden trucks from the site per day, averaged over the total number of dispatch days in any calendar month.	Compliant: average laden trucks 83.7	Section 4.1.2, Table 13
	9	Within 12 months of the date of this consent, or as otherwise agreed by the Secretary, the Applicant shall surrender the development consent (DA 103/94) for the existing operations on the site in accordance with Section 104A of the EP&A Act.	Compliant - DA 103/94 surrendered 15/09/2016	
	10	Prior to the surrender of development consent DA 103/94, the conditions of this consent shall prevail to the extent of any inconsistency with the conditions of development consent DA 103/94.	Compliant	
	11	The Applicant shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.	Compliant: no new structures this report period	
	12	The Applicant shall ensure that all demolition work is carried out in accordance with Australian Standard AS 2601-2001: The Demolition of Structures, or its latest version	Compliant: no demolition this report period	
	13	The Applicant shall: a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development; and b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development	Compliant: Not required	
	14	The Applicant shall ensure that all the plant and equipment used at the site is: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.	Compliant	Section 4.2
	15	To ensure that strategies, plans and programs required under this consent are updated on a regular basis, and that they incorporate any appropriate additional measures to improve the environmental performance of the development, the Applicant may at any time submit revised strategies, plans or programs for the approval of the Secretary. With the agreement of the Secretary, the Applicant may also submit any strategy, plan or program required by this consent on a staged basis. With the agreement of the Secretary, the Applicant may prepare a revision of or a stage of a strategy, plan or program without undertaking consultation with all parties nominated under the applicable condition in this consent.	Compliant	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

DA Conditions: SSD 6084

Compliant

Non Compliant: High Risk

Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence

Non Compliant: Medium Risk

Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur

Non Compliant: Low Risk

Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur □

Non Compliant: Administrative

Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Schedule	Condition	Condition Text	Details of compliance status at 30/6/2018	Where addressed in Annual Review											
	16	Until they are replaced by an equivalent strategy, plan or program approved under this consent, the Applicant shall implement the existing strategies, plans or programs for the site that have been approved under DA 103/94	Compliant												
	17 a)	provide annual quarry production data to DRE using the standard form for that purpose;	Compliant	Appendix E											
	17 b)	Include a copy of this data in the Annual Review (see condition 4 of Schedule 5).	Compliant	Appendix E											
	18	By 30 September 2015, unless otherwise agreed with the Secretary, the Applicant shall: (a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction within the development area; and (b) submit a survey plan of these boundaries with applicable GPS coordinates to the Secretary.	Administrative Non-compliance - Stage 2 extraction boundary marked out and pegged with steel posts. Survey completed 27/11/15, updated 15/09/16	See Figure 2, Section 9.2											
	19	While quarrying operations are being carried out, the Applicant shall ensure that these boundaries are clearly marked at all times in a manner that allows operating staff to clearly identify the approved limits of extraction	Compliant - Stage 2 extraction boundary marked out and pegged with steel posts	See Figure 2											
	20	Within 6 months of the date of this consent, unless otherwise agreed by the Secretary, the Applicant shall enter into a planning agreement with the Council in accordance with Division 6 of Part 4 of the EP&A Act; and the terms specified in Appendix 7. If there is any dispute between the Applicant and Council on the planning agreement, then either party may refer the matter to the Secretary for resolution.	Administrative Non-compliance: VPA discussions commenced 7/08/15, agreement signed 10/08/16	Discussed in previous Annual Reviews to the satisfaction of the Secretary. Section 9.2											
3	1	The Applicant shall comply with the operating hours set out in Table 1. <i>Table 1: Operating Hours</i> <table border="1"> <thead> <tr> <th>Activity</th> <th>Permissible Hours</th> </tr> </thead> <tbody> <tr> <td>• Extraction operations • Processing operations • Overburden Management • Stockpile Management</td> <td>• 6 am to 10 pm Monday to Friday; • 6 am to 3 pm Saturday; and • At no time on Sundays or public holidays.</td> </tr> <tr> <td>• Blasting</td> <td>• 10 am to 3 pm Monday to Friday (except public holidays).</td> </tr> <tr> <td>• Loading and dispatch</td> <td>• 5 am to 10 pm Monday to Friday; • 5 am to 3 pm Saturdays; and • At no time on Sundays or public holidays.</td> </tr> <tr> <td>• Maintenance</td> <td>• Anytime.</td> </tr> </tbody> </table>	Activity	Permissible Hours	• Extraction operations • Processing operations • Overburden Management • Stockpile Management	• 6 am to 10 pm Monday to Friday; • 6 am to 3 pm Saturday; and • At no time on Sundays or public holidays.	• Blasting	• 10 am to 3 pm Monday to Friday (except public holidays).	• Loading and dispatch	• 5 am to 10 pm Monday to Friday; • 5 am to 3 pm Saturdays; and • At no time on Sundays or public holidays.	• Maintenance	• Anytime.	Compliant	Section 4.3	
Activity	Permissible Hours														
• Extraction operations • Processing operations • Overburden Management • Stockpile Management	• 6 am to 10 pm Monday to Friday; • 6 am to 3 pm Saturday; and • At no time on Sundays or public holidays.														
• Blasting	• 10 am to 3 pm Monday to Friday (except public holidays).														
• Loading and dispatch	• 5 am to 10 pm Monday to Friday; • 5 am to 3 pm Saturdays; and • At no time on Sundays or public holidays.														
• Maintenance	• Anytime.														
	2 a)	The following activities may be carried out on the site outside the hours specified in condition 1: delivery or dispatch of materials as requested by Police or other authorities; and	Compliant	N/A											
	2 b)	emergency work to avoid the loss of lives, property and/or to prevent environmental harm.	Compliant	N/A											
	3	The Applicant shall ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land <i>Table 2: Noise criteria dB(A)</i> <table border="1"> <thead> <tr> <th>Receiver</th> <th>Day dB(A)_{L_{Aeq}(15 min)}</th> <th>Evening dB(A)_{L_{Aeq}(15 min)}</th> <th>Morning Shoulder dB(A)_{L_{Aeq}(15 min)}</th> </tr> </thead> <tbody> <tr> <td>All privately-owned residences</td> <td>35</td> <td>35</td> <td>35</td> </tr> </tbody> </table>	Receiver	Day dB(A) _{L_{Aeq}(15 min)}	Evening dB(A) _{L_{Aeq}(15 min)}	Morning Shoulder dB(A) _{L_{Aeq}(15 min)}	All privately-owned residences	35	35	35	Compliant	Section 5.2			
Receiver	Day dB(A) _{L_{Aeq}(15 min)}	Evening dB(A) _{L_{Aeq}(15 min)}	Morning Shoulder dB(A) _{L_{Aeq}(15 min)}												
All privately-owned residences	35	35	35												
	4 a)	The Applicant shall: implement best practice management to minimise the operational and road transportation noise of the development;	Compliant												
	4 b)	minimise the noise impacts of the development during meteorological conditions when the noise criteria in this consent do not apply (see Appendix 5)	Compliant	No cessation of operations due to any weather condition											
	4 c)	carry out noise monitoring (at least every 6 months) to determine whether the development is complying with the relevant conditions of this consent; and	Compliant	Additional monitoring undertaken to make up shortfall from last year.											
	4 d)	regularly assess noise monitoring data and modify and/or stop operations on site to ensure compliance with the relevant conditions of this consent.	Compliant	Section 5.2											
	5 a)	The Applicant shall prepare and implement a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must be prepared in consultation with EPA;	Compliant: NMP 11/10/16 approved 2/12/16												
	5 b)	be submitted to the Secretary at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary	Compliant: V1 submitted 15/06/16												
	5 c)	describe the measures that would be implemented to ensure: <input type="checkbox"/> compliance with the noise criteria in this consent; <input type="checkbox"/> best practice management is being employed; and <input type="checkbox"/> the noise impacts of the development are minimised during meteorological conditions under which the noise criteria in this consent do not apply (see Appendix 5);	Compliant												
	5 d)	describe the proposed noise management system; and	Compliant												
	5 e)	include a monitoring program to be implemented to measure noise from the development against the noise criteria in Table 2, and which evaluates and reports on the effectiveness of the noise management system on site.	Compliant												
	6	The Applicant shall ensure that blasting on site does not cause any exceedance of the criteria in Table 3. <i>Table 3: Blasting Criteria</i> <table border="1"> <thead> <tr> <th>Receiver</th> <th>Airblast overpressure (dB(Lin Peak))</th> <th>Ground vibration (mm/s)</th> <th>Allowable exceedance</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Any residence on privately-owned land</td> <td>120</td> <td>10</td> <td>0%</td> </tr> <tr> <td>115</td> <td>5</td> <td>5% of the total number of blasts over a period of 12 months</td> </tr> </tbody> </table>	Receiver	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance	Any residence on privately-owned land	120	10	0%	115	5	5% of the total number of blasts over a period of 12 months	Compliant - nil exceedances	Section 5.3
Receiver	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance												
Any residence on privately-owned land	120	10	0%												
	115	5	5% of the total number of blasts over a period of 12 months												

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

DA Conditions: SSD 6084

Compliant

Non Compliant: High Risk

Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence

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Schedule	Condition	Condition Text	Details of compliance status at 30/6/2018	Where addressed in Annual Review															
	7	The Applicant may carry out a maximum of 1 blast per calendar week, unless an additional blast is required following a blast misfire. This condition does not apply to blasts required to ensure the safety of the quarry or workers on site.	Compliant	See section 5.3: Total of 21 blasts, none in same week															
	8 a)	During blasting operations, the Applicant shall: implement best practice management to: <input type="checkbox"/> protect the safety of people and livestock in the areas surrounding blasting operations; <input type="checkbox"/> protect public or private infrastructure/property in the surrounding area from damage from blasting operations and <input type="checkbox"/> minimise the dust and fume emissions of blasting;	Compliant																
	8 b)	operate a suitable system to enable the local community to get up-to-date information on the proposed blasting schedule on site; and	Compliant	Letter drop at least one week prior to blast															
	8 c)	carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent, to the satisfaction of the Secretary	Compliant	Every blast monitored															
	9 a)	The Applicant shall prepare and implement a Blast Management Plan for the development to the satisfaction of the Secretary. This plan must: be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary;	Compliant: BMP V1 submitted 15/06/16. V2 11/10/16 approved 2/12/16																
	9 b)	describe the measures that would be implemented to ensure compliance with the blast criteria and operating conditions of this consent;	Compliant																
	9 c)	include a monitoring program for evaluating and reporting on compliance with the blasting criteria in this consent;	Compliant																
	9 d)	include community notification procedures for the blasting schedule; and	Compliant																
	9 e)	include a protocol for investigating and responding to Complaints	Compliant																
	10	The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land. <table border="1"> <caption>Table 4: Air quality criteria</caption> <thead> <tr> <th>Pollutant</th> <th>Averaging Period</th> <th>Criterion</th> </tr> </thead> <tbody> <tr> <td>Particulate matter < 10 µm (PM₁₀)</td> <td>Annual</td> <td>^{a,d} 30 µg/m³</td> </tr> <tr> <td>Particulate matter < 10 µm (PM₁₀)</td> <td>24 hour</td> <td>^b 50 µg/m³</td> </tr> <tr> <td>Total suspended particulates (TSP)</td> <td>Annual</td> <td>^{a,d} 90 µg/m³</td> </tr> <tr> <td>^c Deposited dust</td> <td>Annual</td> <td>^b 2 g/m²/month ^{a,d} 4 g/m²/month</td> </tr> </tbody> </table>	Pollutant	Averaging Period	Criterion	Particulate matter < 10 µm (PM ₁₀)	Annual	^{a,d} 30 µg/m ³	Particulate matter < 10 µm (PM ₁₀)	24 hour	^b 50 µg/m ³	Total suspended particulates (TSP)	Annual	^{a,d} 90 µg/m ³	^c Deposited dust	Annual	^b 2 g/m ² /month ^{a,d} 4 g/m ² /month	Non-Compliant: PM10 exceeded 24 hr limit on 3 occasions	Section 5.4. Low risk: annual averages not exceeded.
Pollutant	Averaging Period	Criterion																	
Particulate matter < 10 µm (PM ₁₀)	Annual	^{a,d} 30 µg/m ³																	
Particulate matter < 10 µm (PM ₁₀)	24 hour	^b 50 µg/m ³																	
Total suspended particulates (TSP)	Annual	^{a,d} 90 µg/m ³																	
^c Deposited dust	Annual	^b 2 g/m ² /month ^{a,d} 4 g/m ² /month																	
	11 a)	The Applicant shall: implement best practice management to minimise the dust emissions of the development;	Compliant	AQMP															
	11 b)	regularly assess meteorological and air quality monitoring data and relocate, modify and/or stop operations on site to ensure compliance with the air quality criteria in this consent;	Compliant	Section 5.1 (Climate) and 5.4 (Air Quality)															
	11 c)	minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note under Table 4);	Compliant	At no times did weather conditions cease works															
	11 d)	monitor and report on compliance with the relevant air quality conditions in this consent; and	Compliant	Section 5.4															
	11 e)	minimise the area of surface disturbance and undertake progressive rehabilitation of the site, to the satisfaction of the Secretary.	Compliant	See Figures															
	12 a)	The Applicant shall prepare and implement an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must: be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agree by the Secretary	Compliant: AQMP submitted 15/6/16. V2 24/11/16 approved 2/12/16																
	12 b)	describe the measures that would be implemented to ensure: • compliance with the relevant conditions of this consent; • best practice management is being employed; and • the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events;	Compliant																
	12 c)	describe the proposed air quality management system;	Compliant																
	12 d)	include an air quality monitoring program that: • is capable of evaluating the performance of the development; • includes a protocol for determining any exceedances of the relevant conditions of consent; • effectively supports the air quality management system; and • evaluates and reports on the adequacy of the air quality management system	Non - Compliant	Section 5.4: PM10 monitoring not continuous for 12 months.															
	13	For the life of the development, the Applicant shall ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline.	Compliant - Operational meteorological weather station on site	Section 5.1															
	14	The Applicant shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site.	Compliant	Measures included in AQMP															
	15	The Applicant shall ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of operations under the consent to match its available water supply, to the satisfaction of the Secretary.	Compliant	Water Balance in WMP															

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

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Schedule	Condition	Condition Text	Details of compliance status at 30/6/2018	Where addressed in Annual Review
	16	The Applicant shall comply with the discharge limits in any EPL, or with section 120 of the POEO Act	Non-Compliant	Section 6.1: pH from Dam 3 was 0.1 too high during discharge on 24/10/17
	17 a)	Within three months of the date of this consent, the Applicant shall commission independent surface water expert/s, approved by the Secretary, to undertake an audit of current and proposed surface water management practices and infrastructure on the site. The audit shall: be undertaken in consultation with EPA and WaterNSW	Compliant: Audit conducted by Groundwork Plus accepted 14/7/16	
	17 b)	fully describe and audit existing site water management practices and consider the EIS's proposed water management practices;	Compliant	
	17 c)	identify all reasonable and feasible measures to improve surface water management on the site, with particular reference to opportunities to divert clean water away from the site; and	Compliant	
	17 d)	recommend design parameters for proposed water management systems on the site	Compliant	
	18	Unless otherwise agreed with the Secretary, the Applicant shall submit the Surface Water Audit report to the Secretary within six months of commissioning the audit. The report must be accompanied by a Water Management Improvement Program, based on the report's recommendations, to improve surface water management practices on the site, including a program of proposed timeframes for implementation.	Compliant: Audit 15/6/16 with WMIP included	
	19	The Applicant must implement the Water Management Improvement Program to the satisfaction of the Secretary.	Compliant	
	20 a)	The Applicant shall prepare and implement a Water Management Plan for the development to the satisfaction of the Secretary. This plan must: be prepared by suitably qualified person/s approved by the Secretary;	Compliant: WMP first submitted 15/6/16. V9 approved 16/10/17	Section 6
	20 b)	be prepared in consultation with the EPA, NOW and Water NSW;		
	20 c)	be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary;		
	20 d)	include a: (i) Site Water Balance ; (ii) Surface Water Management Plan, (iii) Groundwater Management Plan, (iv) Surface and Ground Water Contingency Strategy.		
	21	The Applicant shall keep accurate records of all laden truck movements to and from the site (hourly, daily, weekly, monthly and annually) and publish a summary of records on its website every 6 months.	Compliant	Section 4.1.2 and https://www.hy-tec.com.au/quarry-documentation
	22 a)	The Applicant shall ensure that: all reasonable measures are taken such that laden trucks have appropriate signage, including a contact phone number, so they can be easily identified by road users;	Compliant	
	22 b)	all laden trucks entering or exiting the site have their loads covered;	Compliant	
	22 c)	all laden trucks exiting the site are cleaned of material that may fall on the road, before leaving the site; and	Compliant	
	22 d)	no trucks queue at the entrance to the quarry access road before 5 am.	Compliant	
	23 a)	The Applicant shall prepare and implement a Transport Management Plan for the development to the satisfaction of the Secretary. This plan must:be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary;	Compliant: Transport Management Plan v1 submitted 15/6/18. V3 approved Nov 2016	Section 4.1.2
	23 b)	describe the measures that would be undertaken to monitor the level of service at the Jenolan Caves Road and Great Western Highway intersection and maintain an acceptable level of service at this intersection;	Compliant	
	23 c)	include a Drivers' Code of Conduct to minimise the impacts of development-related trucks on local residences and road users including measures to minimise use of local roads; and	Compliant	
	23 d)	describe the measures that would be put in place to ensure compliance with the Drivers' Code of Conduct.	Compliant	
	24 a)	If any item or object of Aboriginal heritage significance is identified on site, the Applicant shall ensure that: all work in the immediate vicinity of the suspected Aboriginal item or object ceases immediately;	Compliant	Section 5.5
	24 b)	a 10 m buffer area around the suspected item or object is cordoned off; and	Compliant	
	24 c)	the OEH is contacted immediately.	Compliant	
	25	The Applicant shall implement the Biodiversity Offset Strategy, described in the EIS and including Conservation Area H, shown conceptually in Appendix 6, to the satisfaction of the Secretary.	The Biodiversity Offset Strategy is still under negotiation and the revised date (from the DPE) for securing the BOA's is the 15/9/2018.	
	26	Within 2 years of this consent, unless otherwise agreed with the Secretary, the Applicant shall make suitable arrangements to provide appropriate long-term security for the Biodiversity Offset Strategy, to the satisfaction of the Secretary.	Compliant: due 15/9/18	

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Schedule	Condition	Condition Text	Details of compliance status at 30/6/2018	Where addressed in Annual Review												
	27	<p>The Applicant shall rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the rehabilitation strategy in the EIS and the conceptual final landform in Appendix 4 and must comply with the objectives in Table 5.</p> <table border="1"> <caption>Table 5: Rehabilitation Objectives</caption> <thead> <tr> <th>Feature</th> <th>Objective</th> </tr> </thead> <tbody> <tr> <td>Site (as a whole)</td> <td> <ul style="list-style-type: none"> Safe, stable and non-polluting Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land </td> </tr> <tr> <td>Surface Infrastructure</td> <td> <ul style="list-style-type: none"> Decommissioned and removed, unless DRE agrees otherwise </td> </tr> <tr> <td>Quarry Benches</td> <td> <ul style="list-style-type: none"> Landscaped and vegetated using native tree and understorey species </td> </tr> <tr> <td>Quarry Pit Floor</td> <td> <ul style="list-style-type: none"> Landscaped and revegetated using native tree and understorey species </td> </tr> <tr> <td>Final Void</td> <td> <ul style="list-style-type: none"> Minimise the size, depth and slope of the batters of the final void Minimise the drainage catchment of the final void </td> </tr> </tbody> </table>	Feature	Objective	Site (as a whole)	<ul style="list-style-type: none"> Safe, stable and non-polluting Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land 	Surface Infrastructure	<ul style="list-style-type: none"> Decommissioned and removed, unless DRE agrees otherwise 	Quarry Benches	<ul style="list-style-type: none"> Landscaped and vegetated using native tree and understorey species 	Quarry Pit Floor	<ul style="list-style-type: none"> Landscaped and revegetated using native tree and understorey species 	Final Void	<ul style="list-style-type: none"> Minimise the size, depth and slope of the batters of the final void Minimise the drainage catchment of the final void 	Compliant	Section 7
Feature	Objective															
Site (as a whole)	<ul style="list-style-type: none"> Safe, stable and non-polluting Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land 															
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Final Void	<ul style="list-style-type: none"> Minimise the size, depth and slope of the batters of the final void Minimise the drainage catchment of the final void 															
	28	The Applicant shall rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation.	Compliant	Section 6												
	29 a)	The Applicant shall prepare and implement a Landscape and Rehabilitation Management Plan for the development to the satisfaction of the Secretary. This plan must: be prepared in consultation with OEH and be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless the Secretary agrees otherwise;	Compliant: LRMP v1 submitted 15/06/16, V2 24/11/16 approved 2/12/16													
	29 b)	provide details of the conceptual final landform and associated land uses for the site;	Compliant													
	29 c)	describe how the implementation of the Biodiversity Offset Strategy would be integrated with the overall rehabilitation of the site;	Compliant													
	29 d)	include detailed performance and completion criteria for evaluating the performance of the Biodiversity Offset Strategy and rehabilitation of the site, including triggers for any necessary remedial action;	Compliant													
	29 e)	describe the short, medium and long term measures that would be implemented to: <ul style="list-style-type: none"> <input type="checkbox"/> manage remnant vegetation and habitat on site, including within the Biodiversity Offset Strategy area; and NSW Government Department of Planning and Environment 13 <input type="checkbox"/> ensure compliance with the rehabilitation objectives and progressive rehabilitation obligations in this consent; 	Compliant													
	29 f)	include a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3 year period following initial approval of the plan) including the procedures to be implemented for: <ul style="list-style-type: none"> <input type="checkbox"/> maximising the salvage of environmental resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse in the enhancement of the offset area or site rehabilitation; <input type="checkbox"/> restoring and enhancing the quality of native vegetation and fauna habitat in the biodiversity and rehabilitation areas through assisted natural regeneration, targeted vegetation establishment and the introduction of fauna habitat features; <input type="checkbox"/> protect, conserve, propagate, plant and/or regenerate Silver-leafed Mountain Gum (<i>Eucalyptus pulverulenta</i>) (including the propagation and planting of at least 1,000 individuals of this species); <input type="checkbox"/> protecting vegetation and fauna habitat outside the approved disturbance area on-site; <input type="checkbox"/> minimising the impacts on native fauna, including undertaking pre-clearance surveys; <input type="checkbox"/> establishing vegetation screening to minimise the visual impacts of the site on surrounding receivers; <input type="checkbox"/> ensuring minimal environmental consequences for threatened species, populations and habitats; <input type="checkbox"/> collecting and propagating seed; <input type="checkbox"/> controlling weeds and feral pests; <input type="checkbox"/> controlling erosion; <input type="checkbox"/> controlling access; and <input type="checkbox"/> managing bushfire risk; 	Compliant													
	29 g)	include a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;	Compliant													
	29 h)	identify the potential risks to the successful implementation of the Biodiversity Offset Strategy, and include a description of the contingency measures that would be implemented to mitigate these risks; and	Compliant													
	29 i)	include details of who would be responsible for monitoring, reviewing, and implementing the plan.	Compliant													

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Schedule	Condition	Condition Text	Details of compliance status at 30/6/2018	Where addressed in Annual Review
	30 a)	Within 6 months of the approval of the Landscape Management Plan, the Applicant shall lodge a Conservation and Rehabilitation Bond with the Department to ensure that the Biodiversity Offset Strategy and rehabilitation of the site are implemented in accordance with the performance and completion criteria set out in the plan and relevant conditions of this consent. The sum of the bond shall be determined by: calculating the cost of implementing the Biodiversity Offset Strategy over the next 3 years;	Compliant: bond calculated 25/7/17, lodged 17/8/17, acknowledged by DPE 23/8/17	
	30 b)	calculating the cost of rehabilitating the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and	Compliant	
	30 c)	employing a suitably qualified quantity surveyor or other expert to verify the calculated costs, to the satisfaction of the Secretary.	Compliant	
	31 a)	Within 3 months of each Independent Environmental Audit (see condition 8 of Schedule 5), the Applicant shall review, and if necessary revise, the sum of the Conservation and Rehabilitation Bond to the satisfaction of the Secretary. This review must consider the: effects of inflation;	Compliant	Not yet required: due following next Independent Audit
	31 b)	likely cost of implementing the Biodiversity Offset Strategy and rehabilitating the site (taking into account the likely surface disturbance over the next 3 years of the development); and	Compliant	
	31 c)	performance of the implementation of the Biodiversity Offset Strategy and rehabilitation of the site to date.	Compliant	
	32	The Applicant shall implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the development to the satisfaction of the Secretary.	Compliant	Section 5.6
	33 a)	The Applicant shall:manage on-site sewage treatment and disposal in accordance with the requirements of its EPL, and to the satisfaction of the EPA and Council;	Compliant	Section 5.7
	33 b)	minimise the waste generated by the development;	Compliant	
	33 c)	ensure that the waste generated by the development is appropriately stored, handled, and disposed of; and	Compliant	
	33 d)	report on waste management and minimisation in the Annual Review, to the satisfaction of the Secretary	Compliant	Section 5.7
	34	Except as expressly permitted in an EPL, the Applicant must not receive waste at the site for storage, treatment, processing, reprocessing or disposal.	Compliant: none received	
	35	The Applicant shall ensure that all tanks and similar facilities for storage of liquids (other than for water) are protected by appropriate bunding, which must exceed 110% of the stored volume of the liquid.	Compliant	
	36	The Applicant shall ensure that the storage, handling, and transport of dangerous goods is done in accordance with the relevant Australian Standards, particularly AS1940 and AS1596, and the Dangerous Goods Code.	Compliant	
	37 a)	The Applicant shall: ensure that the development is suitably equipped to respond to any fires on site; and	Compliant	
	37 b)	assist the Rural Fire Service and emergency services as much as possible if there is a fire in the vicinity of the site.	Compliant	
4	1 a)	As soon as practicable after obtaining monitoring results showing: an exceedance of any relevant criteria in Schedule 3, the Applicant shall notify the affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the development is again complying with the relevant criteria; and	Compliant	
	1b)	an exceedance of any relevant air quality criteria in Schedule 3, the Applicant shall send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and current tenants of the land (including the tenants of land which is not privately-owned).	Compliant	
	2 a)	If an owner of privately-owned land considers the development to be exceeding the relevant criteria in 2.Schedule 3, then he/she may ask the Secretary in writing for an independent review of the impacts of the development on his/her land. the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision, the Applicant shall: (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to: <input type="checkbox"/> consult with the landowner to determine his/her concerns; <input type="checkbox"/> conduct monitoring to determine whether the development is complying with the relevant criteria in Schedule 3; and <input type="checkbox"/> if the development is not complying with these criteria, then identify measures that could be implemented to ensure compliance with the relevant criteria; and	Compliant: no requests	
	2 b)	give the Secretary and landowner a copy of the independent review.	Compliant	
	1 a)	The Applicant shall prepare and implement an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must: be submitted to the Secretary for approval within 6 months of the date of this consent;	Compliant: approved 6/6/16	
5	1 b)	(b) provide the strategic framework for environmental management of the development;	Compliant	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

DA Conditions: SSD 6084

Compliant

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Schedule	Condition	Condition Text	Details of compliance status at 30/6/2018	Where addressed in Annual Review
	1 c)	(c) identify the statutory approvals that apply to the development;	Compliant	
	1 d)	(d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;	Compliant	
	1 e)	(e) describe the procedures that would be implemented to: <input type="checkbox"/> keep the local community and relevant agencies informed about the operation and environmental performance of the development; <input type="checkbox"/> receive, record, handle and respond to Complaints; <input type="checkbox"/> resolve any disputes that may arise during the course of the development; <input type="checkbox"/> respond to any non-compliance; <input type="checkbox"/> respond to emergencies; and	Compliant	
	1 f)	(f) include: <input type="checkbox"/> copies of any strategies, plans and programs approved under the conditions of this consent; and <input type="checkbox"/> a clear plan depicting all the monitoring to be carried out under the conditions of this consent.	Compliant	
	2 a)	The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include: detailed baseline data;	Compliant	
	2 b)	a description of: <input type="checkbox"/> the relevant statutory requirements (including any relevant approval, licence or lease conditions); <input type="checkbox"/> any relevant limits or performance measures/criteria; and <input type="checkbox"/> the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	Compliant	
	2 c)	a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Compliant	
	2 d)	a program to monitor and report on the: <input type="checkbox"/> impacts and environmental performance of the development; and <input type="checkbox"/> effectiveness of any management measures (see (c) above);	Compliant	
	2 e)	contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Compliant	
	2 f)	a program to investigate and implement ways to improve the environmental performance of the development over time;	Compliant	
	2 g)	a protocol for managing and reporting any: <input type="checkbox"/> incidents; <input type="checkbox"/> Complaints; <input type="checkbox"/> non-compliances with statutory requirements; and <input type="checkbox"/> exceedances of the impact assessment criteria and/or performance criteria; and	Compliant	
	2 h)	a protocol for periodic review of the plan	Compliant	
	3 a)	The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedule 3. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation. Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must, at the earliest opportunity: take all reasonable and feasible steps to ensure that the exceedance ceases and does not reoccur;	Compliant	
	3 b)	consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and	Compliant	
	3 c)	implement remediation measures as directed by the Secretary;	Compliant	
	4 a)	By the end of September each year, or other timing as may be agreed by the Secretary, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:	Compliant: 2017 Review submitted (extended) 13/10/17, approved 27/11/17	
	4 b)	include a comprehensive review of the monitoring results and Complaints records of the development over the previous financial year, which includes a comparison of these results against the: <input type="checkbox"/> relevant statutory requirements, limits or performance measures/criteria; <input type="checkbox"/> requirements of any plan or program required under this consent; <input type="checkbox"/> monitoring results of previous years; and <input type="checkbox"/> relevant predictions in the EIS;	Compliant	
	4 c)	identify any non-compliance over the past financial year, and describe what actions were (or are being) taken to ensure compliance;	Compliant	
	4 d)	identify any trends in the monitoring data over the life of the development;	Compliant	
	4 e)	identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and	Compliant	

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Schedule	Condition	Condition Text	Details of compliance status at 30/6/2018	Where addressed in Annual Review
	4 f)	describe what measures will be implemented over the current financial year to improve the environmental performance of the development.	Compliant	
	5 a)	Within 3 months of the submission of an: annual review under condition 4 above;	Compliant	
	5 b)	incident report under condition 6 below;	Compliant	
	5 c)	audit report under condition 8 below; and	Compliant	
	5 d)	any modifications to this consent, the Applicant shall review the strategies, plans and programs required under this consent, to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted for the approval of the Secretary.	Compliant	
	6	The Applicant shall immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Applicant shall provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.	Non-compliant: incidents not reported immediately	Section 5.4 and Section 6.1: Three exceedances of the PM10 24 hour criterion were recorded and one minor exceedance of pH criterion at Point 9 and the DPE was not informed immediately
	7	The Applicant shall provide regular reporting on the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.	Compliant	https://www.hy-tec.com.au/quarry-documentation
	8 a)	The site's surface water management practices are considered effective. The operator has purchased a pH meter and now conducts tests on-site to determine whether treatment of collected water is required prior to testing and discharge.	Non-compliant: audit not commissioned by 15/9/17, audit conducted 17/10/17	Section 9.2
	8 b)	include consultation with the relevant agencies;	Compliant	
	8 c)	assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent and any relevant EPL or necessary water licences for the development (including any assessment, strategy, plan or program required under these approvals);	Compliant	
	8 d)	review the adequacy of strategies, plans or programs required under the abovementioned approvals; and	Compliant	
	8 e)	recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, strategy, plan or program required under the abovementioned approvals	Compliant	
	9	Within 6 weeks of completion of this audit, or as otherwise agreed by the Secretary, the Applicant shall submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report.	Compliant: Audit resubmission and response approved 8/3/18	
	10 a)	Within 6 months of the date of this consent, the Applicant shall: (a) make the following information publicly available on its website: <input type="checkbox"/> the documents listed in condition 2 of Schedule 2; <input type="checkbox"/> current statutory approvals for the development; <input type="checkbox"/> all approved strategies, plans and programs required under the conditions of this consent; <input type="checkbox"/> a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs; <input type="checkbox"/> a Complaints register, updated monthly; <input type="checkbox"/> the annual reviews of the development; <input type="checkbox"/> any independent environmental audit, and the Applicant's response to the recommendations in any audit; and <input type="checkbox"/> any other matter required by the Secretary; and	Compliant	https://www.hy-tec.com.au/quarry-documentation
	10 b)	keep this information up-to-date, to the satisfaction of the Secretary	Compliant	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

EPL12323

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Schedule	Condition	Condition Text	Details of compliance status	Where addressed in Annual Review
Compliance Summary		Number of Conditions Non-compliant		
Non Compliant: High Risk		Nil	See Table Below	See Table Below
Non Compliant: Medium Risk		Nil		
Non Compliant: Low Risk	L2.4	1		
Non Compliant: Administrative		Nil		

General

A	1.1	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 > 500000 - 2000000 T annual capacity to extract, process or store	Compliant																									
	2.1	The licence applies to the following premises: Premises Details AUS-10 QUARRY 391 JENOLAN CAVES ROAD HARTLEY NSW 2790 LOT 1 DP 1005511, LOT 2 DP 1005511, LOT 31 DP 1009967	Compliant																									
	3	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.	Compliant																									
P	1.1	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.	Compliant																									
		<table border="1"> <thead> <tr> <th colspan="4">AIR</th> </tr> <tr> <th>EPA identification no.</th> <th>Type of Monitoring Point</th> <th>Type of Discharge Point</th> <th>Location Description</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>Ambient air monitoring</td> <td></td> <td>Dust monitoring location identified as "AQD-1" on Figure 1 Environment Protection Licence Monitoring Points - provided to EPA on 19/09/11 (DOC11/40371).</td> </tr> <tr> <td>5</td> <td>Ambient air monitoring</td> <td></td> <td>Dust monitoring location identified as "AQD-2" on "Figure 1 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.</td> </tr> <tr> <td>6</td> <td>Ambient air monitoring</td> <td></td> <td>Dust monitoring location identified as "AQD-3" on "Figure 1 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.</td> </tr> <tr> <td>12</td> <td>Weather Analysis</td> <td></td> <td>Weather monitoring location as identified on "Figure 2 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.</td> </tr> </tbody> </table>	AIR				EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description	4	Ambient air monitoring		Dust monitoring location identified as "AQD-1" on Figure 1 Environment Protection Licence Monitoring Points - provided to EPA on 19/09/11 (DOC11/40371).	5	Ambient air monitoring		Dust monitoring location identified as "AQD-2" on "Figure 1 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.	6	Ambient air monitoring		Dust monitoring location identified as "AQD-3" on "Figure 1 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.	12	Weather Analysis		Weather monitoring location as identified on "Figure 2 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.	Compliant	
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1.3	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.	Compliant																										
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Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

EPL12323

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L	1.1	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.	Compliant																									
	2.1	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.	Compliant																									
	2.2	Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.	Compliant																									
	2.3	To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table/s.	Compliant																									
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		<p>POINT 11,8,9,10,1</p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Units of Measure</th> <th>50 percentile concentration limit</th> <th>90 percentile concentration limit</th> <th>3DGM concentration limit</th> <th>100 percentile concentration limit</th> </tr> </thead> <tbody> <tr> <td>Oil and Grease</td> <td>milligrams per litre</td> <td></td> <td></td> <td></td> <td>10</td> </tr> <tr> <td>pH</td> <td>pH</td> <td></td> <td></td> <td></td> <td>6.5 - 8.5</td> </tr> <tr> <td>Total suspended solids</td> <td>milligrams per litre</td> <td></td> <td></td> <td></td> <td>30</td> </tr> </tbody> </table>	Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit	Oil and Grease	milligrams per litre				10	pH	pH				6.5 - 8.5	Total suspended solids	milligrams per litre				30	Non-compliant	Section 6.1: pH from EPL Point 9 (Dam 3) was 0.1 too high during discharge on 24/10/17
	Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit																						
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	Total suspended solids	milligrams per litre				30																						
3.1	The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below. Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below. Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below. This condition does not limit any other conditions in this licence.	Compliant																										
	<table border="1"> <thead> <tr> <th>Code</th> <th>Waste</th> <th>Description</th> <th>Activity</th> <th>Other Limits</th> </tr> </thead> <tbody> <tr> <td>NA</td> <td>Cured concrete waste from a batch plant</td> <td>Recycled concrete aggregate sourced from Hy-Tec Industries Pty Limited's concrete batching plants</td> <td>Resource recovery Waste processing (non-thermal treatment) Waste storage</td> <td>5,000 tonnes per year</td> </tr> <tr> <td>NA</td> <td>General or Specific exempted waste</td> <td>Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2005</td> <td>As specified in each particular resource recovery exemption</td> <td>NA</td> </tr> </tbody> </table>	Code	Waste	Description	Activity	Other Limits	NA	Cured concrete waste from a batch plant	Recycled concrete aggregate sourced from Hy-Tec Industries Pty Limited's concrete batching plants	Resource recovery Waste processing (non-thermal treatment) Waste storage	5,000 tonnes per year	NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2005	As specified in each particular resource recovery exemption	NA	Compliant											
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4.1	Noise from the premises must not exceed 35 dB(A)LAeq (15 minute) at any time. Where LAeq means the equivalent continuous noise level - the level of noise equivalent to the energy-average of noise levels occurring over a measurement period	Compliant																										
4.2	To determine compliance with condition(s) L4.1 noise must be measured at, or computed for, any affected noise sensitive locations (such as a residence, school or hospital). A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".	Compliant																										
4.3	The noise emission limits identified in this licence apply under all meteorological conditions except: a) during rain and wind speeds (at 10m height) greater than 3m/s; and b) under "non-significant weather conditions".	Compliant																										
5.1	Blasting in or on the premises must only be carried out between 1000 hours and 1500 hours Monday to Friday. Blasting in or on the premises must not take place on Saturdays, Sundays or Public Holidays without the prior approval of the EPA.	Compliant																										

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

EPL12323

Compliant

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Non Compliant: Medium Risk

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Non Compliant: Administrative

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	5.2	The airblast overpressure level from blasting operations in or on the premises must not exceed: a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and b) 120 dB (Lin Peak) at any time. At the most affected noise-sensitive location not under the ownership or control of the licensee .	Compliant																																	
	5.3	The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed: a) 5mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period; and b) 10 mm/s at any time. At the most affected sensitive location not under the ownership or control of the licensee .	Compliant																																	
	5.4	The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed 2 mm/s at the most sensitive location within Hartley Village.	Compliant																																	
	6.1	Activities covered by this licence must only be carried out between the hours of 0600 hours and 1800 hours Monday to Friday, and 0700 hours and 1500 hours Saturday, and at no time on Sundays and Public Holidays.	Compliant																																	
	6.2	The loading and unloading of trucks at the Premises and transport to and from the Premises is permitted between 0500 hours and 2000 hours Monday to Friday and between 0500 hours and 1500 hours on Saturdays only.	Compliant																																	
O	1.1	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.	Compliant																																	
	2.1	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.	Compliant																																	
	3.1	The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.	Compliant																																	
M	1.1	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.	Compliant																																	
	1.2	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.	Compliant																																	
	1.3	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.	Compliant																																	
	2.1	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:	Compliant																																	
	2.2	POINT 4,5,6 <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Units of measure</th> <th>Frequency</th> <th>Sampling Method</th> </tr> </thead> <tbody> <tr> <td>Particulates - Deposited Matter</td> <td>grams per square metre per month</td> <td>Continuous</td> <td>AM-19</td> </tr> </tbody> </table>	Pollutant	Units of measure	Frequency	Sampling Method	Particulates - Deposited Matter	grams per square metre per month	Continuous	AM-19	Compliant																									
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	2.4	For the purposes of the table(s) above Special Frequency 1 means the collection of samples monthly, with the exception of when a discharge is occurring from Point 1, where samples must be collected daily.	Compliant																																	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

EPL12323

Compliant

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3.1	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.	Compliant																															
3.2	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	Compliant																															
4.1	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.	Compliant																															
4.2	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.	Compliant																															
4.3	The record of a complaint must be kept for at least 4 years after the complaint was made.	Compliant																															
4.4	The record must be produced to any authorised officer of the EPA who asks to see them.	Compliant																															
5.1	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.	Compliant																															
5.2	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.	Compliant																															
5.3	The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.	Compliant																															
6.1	For each discharge point or utilisation area specified below, the licensee must monitor: a) the volume of liquids discharged to water or applied to the area; b) the mass of solids applied to the area; c) the mass of pollutants emitted to the air;	Compliant																															
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7.1	To determine compliance with condition(s) L5.2, L5.3 and L5.4 a) Airblast overpressure and ground vibration must be measured and electronically recorded at the nearest residence or sensitive receiver or as otherwise directed by an authorised officer of the EPA for all blasts carried out in or on the premises; and b) Instrumentation used to measure the airblast overpressure and ground vibration must meet the requirements of Australian Standard AS 2187.2-2006.	Compliant																															
8.1	Requirement to Monitor Weather The applicant must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1. The applicant must use the sampling method, units of measure, averaging period and sample at the frequency specified opposite in the other columns unless otherwise approved by the EPA:	Compliant																															
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Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

EPL12323

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R	1.1	The licensee must complete and supply to the EPA an Annual Return in the approved form comprising: 1. a Statement of Compliance, 2. a Monitoring and Complaints Summary, 3. a Statement of Compliance - Licence Conditions, 4. a Statement of Compliance - Load based Fee, 5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan, 6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and 7. a Statement of Compliance - Environmental Management Systems and Practices.	Compliant	
	1.2	An Annual Return must be prepared in respect of each reporting period, except as provided below.	Compliant	
	1.3	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.	Compliant	
	1.4	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	Compliant	
	1.5	The Annual Return for the reporting period must be supplied to the EPA via eConnect EPA or 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').	Compliant	
	1.6	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.	Compliant	
	1.7	Within the Annual Return, the Statements 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.	Compliant	
	1.8	The results of the blast monitoring required by condition M7.1 must be submitted to the EPA at the end of each reporting period	Compliant	
	2.1	Notifications must be made by telephoning the Environment Line service on 131 555.	Compliant	
	2.2	The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.	Compliant	
	3.1	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.	Compliant	
	3.2	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.	Compliant	
	3.3	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.	Compliant	

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		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.	Compliant	
G	1.1	A copy of this licence must be kept at the premises to which the licence applies.	Compliant	
	1.2	The licence must be produced to any authorised officer of the EPA who asks to see it.	Compliant	
	1.3	The licence must be available for inspection by any employee or agent of the licensee working at the premises.	Compliant	
	2.1	The licensee must operate 24-hour telephone contact lines for the purpose of enabling the EPA to directly contact one or more representatives of the licensee who can: a) respond at all times to incidents relating to the premises; and b) contact the licensee's senior employees or agents authorised at all times to: i) speak on behalf of the licensee; and ii) provide any information or document required under this licence.	Compliant	
	2.2	The licensee is to inform the EPA of the representative or representatives and their telephone number within 3 months of the date of the issue of this licence. The EPA must be notified of the telephone number on commencement of its operation.	Compliant	
	2.3	The licensee is to inform the EPA in writing of the appointment of any subsequent contact persons, or changes to the person's contact details as soon as practicable and in any event within fourteen days of the appointment or change.	Compliant	
	3.1	The location of EPA point number(s) 1 to 7 inclusive must be clearly marked by signs that indicate the point identification number used in this licence and be located as close as practical to the point.	Compliant	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

WAL Conditions

Compliant	
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WAL 37423

Schedule	Condition	Condition Text	Details of compliance status	Where addressed in Annual Review
Compliance Summary		Number of Conditions Non-compliant		
Non Compliant: High Risk		Nil	See Table Below	See Table Below
Non Compliant: Medium Risk		Nil		
Non Compliant: Low Risk		Nil		
Non Compliant: Administrative		Nil		

General

	MW0929-001	From 1 July 2018, if the water supply work nominated on this access licence is located at or less than 40 m from the top of the high bank of a river then: A. water must not be taken in this groundwater source when flows are in the Very Low Flow Class for an unregulated river access licence in that river. B. This restriction will only apply when the system that confirms when water can be taken is available on DPI Water website. C. DPI Water will inform the licence holder in writing of the applicable restrictions and how to access the information on its website when this system becomes operative	Compliant - not relevant	
	MW0605-00001	Water must be taken in compliance with the conditions of the approval for the nominated work on this access licence through which water is to be taken	Compliant	
	MW0919-00001	A maximum water allocation of 0.1 ML/unit share may be carried over in the account for this access licence from one water year to the next water year if a water meter is installed on each water supply work nominated on this licence and each meter is maintained in working order.	Compliant	
	MW0547-00001	The total volume of water taken under this licence in any water year must not exceed a volume equal to: A. the sum of water in the account from the available water determination for the current year, plus B. the water carried over in the account from the previous water year, plus C. the net amount of water assigned to or from the account under a water allocation assignment, plus D. any water re-credited by the Minister to the account.	Compliant	
	MW2338-00001	The completed logbook must be retained for five (5) years from the last date recorded in the logbook.	Compliant	
	MW2336-00001	The purpose or purposes for which water is taken, as well as details of the type of crop, area cropped, and dates of planting and harvesting, must be recorded in the logbook each time water is taken.	Compliant	N/A - not taken for irrigation
	MW2337-00001	The following information must be recorded in the logbook for each period of time that water is taken: A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time, and B. the access licence number under which the water is taken, and C. the approval number under which the water is taken, and D. the volume of water taken for domestic consumption and/or stock watering	Compliant	Sections 6.2
	MW2339-00001	A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by DPI Water.	Compliant	
	MW0051 00002	Once the licence holder becomes aware of a breach of any condition on this access licence, the licence holder must notify the Minister as soon as practicable. The Minister must be notified by: A. email: water.enquiries@dpi.nsw.gov.au, or B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call	Compliant	

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WAL Conditions

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10WA103330

Schedule	Condition	Condition Text	Details of compliance status	Where addressed in Annual Review
Compliance Summary		Number of Conditions Non-compliant		
Non Compliant: High Risk		Nil	See Table Below	See Table Below
Non Compliant: Medium Risk		Nil		
Non Compliant: Low Risk		Nil		
Non Compliant: Administrative	DS2431-00001	1		
	MW0655-00001	Any water supply work authorised by this approval must take water in compliance with the conditions of the access licence under which water is being taken.	Compliant	
	MW0097-00001	If contaminated water is found above the production aquifer during the construction of the water supply work authorised by this approval, the licensed driller must: A. notify the relevant licensor in writing within 48 hours of becoming aware of the contaminated water, and B. adhere to the Minimum Construction Requirements for Water Bores in Australia (2012), as amended or replaced from time to time.	Compliant - not triggered	
	MW0487-00001	The water supply work authorised by this approval must be constructed within three (3) years from the date this approval is granted.	Compliant	
	MW0044-00001	A. When a water supply work authorised by this approval is to be abandoned or replaced, the approval holder must contact the relevant licensor in writing to verify whether the work must be decommissioned. B. The work is to be decommissioned, unless the approval holder receives notice from the Minister not to do so. C. When decommissioning the work the approval holder must: i. comply with the minimum requirements for decommissioning bores prescribed in the Minimum Construction Requirements for Water Bores in Australia (2012), as amended or replaced from time to time, and ii. notify the relevant licensor in writing within sixty (60) days of decommissioning that the work has been decommissioned.	Compliant - not triggered	
	MW0484-00001	Before water is taken through the water supply work authorised by this approval, confirmation must be recorded in the logbook that cease to take conditions do not apply and water may be taken. The method of confirming that water may be taken, such as visual inspection, internet search, must also be recorded in the logbook. If water may be taken, the: A. date, and B. time of the confirmation, and C. flow rate or water level at the reference point in the water source must be recorded in the logbook.	Compliant	
	MW2338-00001	The completed logbook must be retained for five (5) years from the last date recorded in the logbook.	Compliant	
	MW2336-00001	The purpose or purposes for which water is taken, as well as details of the type of crop, area cropped, and dates of planting and harvesting, must be recorded in the logbook each time water is taken.	Compliant - not for irrigation	
	MW2337-00001	The following information must be recorded in the logbook for each period of time that water is taken: A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time, and B. the access licence number under which the water is taken, and C. the approval number under which the water is taken, and D. the volume of water taken for domestic consumption and/or stock watering.	Compliant	
	MW0482-00001	Where a water meter is installed on a water supply work authorised by this approval, the meter reading must be recorded in the logbook before taking water. This reading must be recorded every time water is to be taken.	Compliant	
	MW2339-00001	A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by the relevant licensor.	Compliant	
	MW0051-00001	Once the approval holder becomes aware of a breach of any condition on this approval, the approval holder must notify the Minister as soon as practicable. The Minister must be notified by: A. email: water.enquiries@dpi.nsw.gov.au, or B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.	Compliant	
	MK0485-00001	Within sixty (60) days of completing construction of the water supply work authorised by this approval, the approval holder must provide a completed Form A for that work to the relevant licensor.	Compliant	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

WAL Conditions

Compliant

Non Compliant: High Risk

Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence

Non Compliant: Medium Risk

Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur

Non Compliant: Low Risk

Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur

Non Compliant: Administrative

Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

10WA103330

Schedule	Condition	Condition Text	Details of compliance status	Where addressed in Annual Review
	DS2431-00001	<p>A. Within 6 months of granting this approval, a monitoring plan to measure the water table, groundwater and surface water quality must be submitted to, and approved by, the relevant licensor, Parramatta Office.</p> <p>B. Then, the water table, groundwater and surface water quality must be measured according to the approved plan.</p> <p>C. All monitoring records must be kept for 10 years and provided to the relevant licensor when requested.</p>	<p>Non-compliant - WMP approved 16/10/17</p>	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

WAL Conditions

Compliant	
Non Compliant: High Risk	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Non Compliant: Medium Risk	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Non Compliant: Low Risk	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur □
Non Compliant: Administrative	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

WAL 25616

Schedule	Condition	Condition Text	Details of compliance status	Where addressed in Annual Review
Compliance Summary		Number of Conditions Non-compliant		
Non Compliant: High Risk		Nil	See Table Below	See Table Below
Non Compliant: Medium Risk		Nil		
Non Compliant: Low Risk		Nil		
Non Compliant: Administrative		Nil		
General				
	MW0112-0001	The maximum water allocation that may be carried over in the account for this access licence from one water year to the next water year is: A. a volume equal to 100 % of the share component of the licence, or B. 1 ML/unit share of the share component of the licence.	Compliant	
	MW0017-0023	From 1 July 2011, water must not be taken from the Dharabuladh Management Zone of the Upper Nepean and Upstream Warragamba Water Source when flows are in the Very Low Flow Class, which means that the flow at Coxs River at the Island Hill gauge [No. 212045] is: A. equal to or less than 17 ML/day on a rising river, or B. equal to or less than 15 ML/day on a falling river. This restriction does not apply if water is to be taken from a runoff harvesting dam or an in-river dam pool.	Compliant	Sections 6.2 and 9.4
	MW0036-0002	The volume of water taken in any three (3) consecutive water years from 1 July 2012 must be recorded in the logbook at the end of those three water years. The maximum volume of water permitted to be taken in those years must also be recorded in the logbook.	Compliant	
	MW0605-0001	Water must be taken in compliance with the conditions of the approval for the nominated work on this access licence through which water is to be taken.	Compliant	
	MW0670-0001	Water must only be taken if there is visible flow in the water source at the location where water is to be taken. This restriction does not apply if water is to be taken: A. from an off-river pool, an in-river pool, a runoff harvesting dam or an in-river dam pool, or B. from the following Weirs: Maldon, Douglas Park, Menangle, Camden, Sharpes, Cobbity, Mount Hunter Rivulet, Brownlow Hill, Theresa Park and Wallacia.	Compliant	
	MW0004-0002	From 1 July 2012, the total volume of water taken in any three (3) consecutive water years under this access licence must not exceed a volume which is equal to the lesser of either: A. the sum of: i. water in the account from the available water determinations in those 3 consecutive water years, plus ii. water in the account carried over from the water year prior to those 3 consecutive water years, plus iii. any net amount of water assigned to or from this account under a water allocation assignment in those 3 consecutive water years, plus iv. any water re-credited by the Minister to the account in those 3 consecutive water years, or B. the sum of: i. the share component of this licence at the beginning of the first year in those 3 consecutive water years, plus ii. the share component of this licence at the beginning of the second year in those 3 consecutive water years, plus iii. the share component of this licence at the beginning of the third year in those 3 consecutive water years, plus iv. any net amount of water assigned to or from this account under a water allocation assignment in those 3 consecutive water years, plus v. any water re-credited by the Minister to the account in those 3 consecutive water years.	Compliant	
	MW2337-0001	The following information must be recorded in the logbook for each period of time that water is taken: A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time, and B. the access licence number under which the water is taken, and C. the approval number under which the water is taken, and D. the volume of water taken for domestic consumption and/or stock watering.	Compliant	
	MW2339-0001	A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by the relevant licensor.	Compliant	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

WAL Conditions

Compliant

Non Compliant: High Risk

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Non Compliant: Low Risk

Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur □

Non Compliant: Administrative

Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

WAL 25616

Schedule	Condition	Condition Text	Details of compliance status	Where addressed in Annual Review
	MW0051-0002	Once the licence holder becomes aware of a breach of any condition on this access licence, the licence holder must notify the Minister as soon as practicable. The Minister must be notified by: A. email: water.enquiries@dpi.nsw.gov.au, or B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call	Compliant	

Hy-Tec Industries Austen (Hartley) Quarry Conditions Compliance Summary 1st July 2017 - 30th June 2018

WAL Conditions

Compliant

Non Compliant: High Risk

Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence

Non Compliant: Medium Risk

Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur

Non Compliant: Low Risk

Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur □

Non Compliant: Administrative

Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

10WA103330

Schedule	Condition	Condition Text	Details of compliance status	Where addressed in Annual Review
Compliance Summary		Number of Conditions Non-compliant		
Non Compliant: High Risk		Nil	See Table Below	See Table Below
Non Compliant: Medium Risk		Nil		
Non Compliant: Low Risk		Nil		
Non Compliant: Administrative		Nil		

General

	MW0655-00001	Any water supply work authorised by this approval must take water in compliance with the conditions of the access licence under which water is being taken.	Compliant	
	MW0491-00001	When a water supply work authorised by this approval is to be abandoned or replaced, the approval holder must contact the relevant licensor in writing to verify whether the work must be decommissioned. The work is to be decommissioned, unless the approval holder receives notice from the Minister not to do so. Within sixty (60) days of decommissioning, the approval holder must notify the relevant licensor in writing that the work has been decommissioned.	Compliant - not triggered	
	MW0481-00001	A logbook must be kept and maintained at the authorised work site or on the property for each water supply work authorised by this approval, unless the work is metered and fitted with a data logger.	Compliant	
	MW2338-00001	The completed logbook must be retained for five (5) years from the last date recorded in the logbook.	Compliant	
	MW0482-00001	Where a water meter is installed on a water supply work authorised by this approval, the meter reading must be recorded in the logbook before taking water. This reading must be recorded every time water is to be taken.	Compliant	
	MW0051-00001	Once the approval holder becomes aware of a breach of any condition on this approval, the approval holder must notify the Minister as soon as practicable. The Minister must be notified by: A. email: water.enquiries@dpi.nsw.gov.au, or B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.	Compliant - not triggered	
	DK0888-00001	Any water supply work authorised by this approval used for the purpose of conveying, diverting or storing water must be constructed or installed to allow free passage of floodwaters flowing into or from a river or lake.	Compliant	
	DK0878-00001	A. The construction, installation or use of the water supply work authorised by this approval must not cause or increase erosion to the channel or bank of the watercourse. B. If erosion is observed, the area must be stabilised with grass cover, stone pitching or any other material that will prevent any further occurrence of erosion.	Compliant	

Appendix B: Consolidated Consent

Development Consent

Section 89E of the *Environmental Planning and Assessment Act 1979*

As delegate of the Minister for Planning, I approve the development application referred to in Schedule 1, subject to the conditions in Schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the development.



Oliver Holm
Executive Director
Resource Assessments and Compliance

Sydney

15 / 7 /

2015

SCHEDULE 1

Application Number	SSD-6084
Applicant	Hy-Tec Industries Pty Ltd
Consent Authority:	Minister for Planning
Land:	Lots 1 and 2 DP 1000511 Lot 31 DP 1009967 Lot 4 DP 876394
Development	Austen Quarry Extension

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DEFINITIONS

Annual Review	The review required by condition 4 of Schedule 5
Applicant	Hy-Tec Industries Pty Ltd, or any other person/s who rely on this consent to carry out the development that is subject to this consent
BCA	Building Code of Australia
Conditions of consent	Conditions contained in Schedules 2 to 5 inclusive
Conservation Area H	The 2.2 ha conservation area shown as 'easement for conservation maintenance work' in Appendix 6 and established in accordance with condition 7b of DA 103/94
Construction	The demolition of buildings or works, carrying out of works and erection of buildings covered by this consent
Council	Lithgow City Council
Day	The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
Department	Department of Planning and Environment
Development	The development as described in the documents listed in condition 2 of Schedule 2
DRE	Division of Resources and Energy (within the Department of Trade and Investment, Regional Infrastructure and Services)
EIS	Environmental Impact Statement titled <i>Environmental Impact Statement for the Austen Quarry Stage 2 Extension Project</i> , dated October 2014, as modified by the Response to Submissions titled, <i>Austen Quarry Stage 2 Extension Project Response to Submissions</i> dated January 2015
EPA	NSW Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPL	Environment Protection Licence under the POEO Act
Evening	The period from 6pm to 10pm
Feasible	Feasible relates to engineering considerations and what is practical to build
GPS	Global Positioning System
Incident	A set of circumstances that: <ul style="list-style-type: none"> • causes or threatens to cause material harm to the environment; and/or • breaches or exceeds the limits or performance measures/criteria in this consent
Land	As defined in the EP&A Act, except where the term is used in the noise and air quality conditions in Schedules 3 and 4 of this consent, where it is defined as the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this consent
Laden trucks	Trucks transporting quarry products from the site
Material harm to the environment	Actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
Minister	Minister for Planning, or delegate
Mitigation	Activities associated with reducing the impacts of the development
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
NOW	NSW Office of Water
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
Privately-owned land	Land that is not owned by a public agency or the Applicant (or its subsidiary)
Public infrastructure	Linear and other infrastructure that provides services to the general public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc.
Quarrying operations	The extraction, processing and transportation of extractive materials on the site and the associated removal of vegetation, topsoil and overburden
Quarry products	Includes all saleable quarry products, but excludes tailings and other wastes
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Rehabilitation	The restoration of land disturbed by the development to a good condition and for the purpose of establishing a safe, stable and non-polluting environment
RMS	Roads and Maritime Services
Secretary	Secretary of the Department, or nominee
Site	The land described in Schedule 1
Stage 2 Extraction Area	The area shown in Appendix 2 as the "Proposed Stage 2 Extraction Boundary" excluding the area shown as the "Stage 1 Extraction Boundary"
Statement of commitments	The Applicant's commitments in Appendix 3

SCHEDULE 2 ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance criteria established under this consent, the Applicant shall implement all reasonable and feasible measures to prevent and/or minimise any material harm to the environment that may result from the construction, operation, or rehabilitation of the development.

TERMS OF CONSENT

2. The Applicant shall carry out the development generally in accordance with the:
 - (a) EIS;
 - (b) Statement of Commitments; and
 - (c) conditions of this consent.

Note: The statement of commitments is reproduced in Appendix 3.

3. If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this consent shall prevail to the extent of any inconsistency.
4. The Applicant shall comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:
 - (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this consent;
 - (b) any reviews, reports or audits undertaken or commissioned by the Department regarding compliance with this consent; or
 - (c) the implementation of any actions or measures contained in these documents.

LAPSING OF CONSENT

5. If the development has not been physically commenced within 5 years of the date of this consent, then this development consent shall lapse.

LIMITS ON CONSENT

Quarrying Operations

6. The Applicant shall not extract extractive materials below a level of 685 m AHD.
7. The Applicant may carry out quarrying operations on the site until 30 June 2050.

Note: Under this consent, the Applicant is required to rehabilitate the site and carry out additional undertakings to the satisfaction of the Secretary. Consequently, this consent will continue to apply in all other respects other than the right to conduct quarrying operations until the rehabilitation of the site and those undertakings have been carried out to a satisfactory standard.

Extractive Material Transport

8. The Applicant shall not:
 - (a) transport more than 1.1 million tonnes of quarry products from the site during any financial year;
 - (b) dispatch more than 250 laden trucks from the site on any one day; and
 - (c) dispatch more than 150 laden trucks from the site per day, averaged over the total number of dispatch days in any calendar month.

SURRENDER OF EXISTING DEVELOPMENT CONSENTS

9. Within 12 months of the date of this consent, or as otherwise agreed by the Secretary, the Applicant shall surrender the development consent (DA 103/94) for the existing operations on the site in accordance with Section 104A of the EP&A Act.

Note: This requirement does not extend to the surrender of construction and occupation certificates for existing and proposed building works under Part 4A of the EP&A Act. Surrendering of consent should not be understood as implying that works legally constructed under a valid consent can no longer be legally maintained or used.

10. Prior to the surrender of development consent DA 103/94, the conditions of this consent shall prevail to the extent of any inconsistency with the conditions of development consent DA 103/94.

STRUCTURAL ADEQUACY

11. The Applicant shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

Notes:

- Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works; and
- Part 8 of the EP&A Regulation sets out the requirements for the certification of the development or project.

DEMOLITION

12. The Applicant shall ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

PROTECTION OF PUBLIC INFRASTRUCTURE

13. The Applicant shall:
- (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development; and
 - (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

Note: This condition does not apply to damage to roads caused as a result of general road usage.

OPERATION OF PLANT AND EQUIPMENT

14. The Applicant shall ensure that all the plant and equipment used at the site is:
- (a) maintained in a proper and efficient condition; and
 - (b) operated in a proper and efficient manner.

UPDATING AND STAGING OF STRATEGIES, PLANS OR PROGRAMS

15. To ensure that strategies, plans and programs required under this consent are updated on a regular basis, and that they incorporate any appropriate additional measures to improve the environmental performance of the development, the Applicant may at any time submit revised strategies, plans or programs for the approval of the Secretary. With the agreement of the Secretary, the Applicant may also submit any strategy, plan or program required by this consent on a staged basis.

With the agreement of the Secretary, the Applicant may prepare a revision of or a stage of a strategy, plan or program without undertaking consultation with all parties nominated under the applicable condition in this consent.

Notes:

- While any strategy, plan or program may be submitted on a staged basis, the Applicant will need to ensure that the existing operations on site are covered by suitable strategies, plans or programs at all times.
- If the submission of any strategy, plan or program is to be staged; then the relevant strategy, plan or program must clearly describe the specific stage/s of the development to which the strategy, plan or program applies; the relationship of this stage/s to any future stages; and the trigger for updating the strategy, plan or program.

16. Until they are replaced by an equivalent strategy, plan or program approved under this consent, the Applicant shall implement the existing strategies, plans or programs for the site that have been approved under DA 103/94.

PRODUCTION DATA

17. The Applicant shall:
- (a) provide annual quarry production data to DRE using the standard form for that purpose; and
 - (b) include a copy of this data in the Annual Review (see condition 4 of Schedule 5).

IDENTIFICATION OF APPROVED EXTRACTION LIMITS

18. By 30 September 2015, unless otherwise agreed with the Secretary, the Applicant shall:
- (a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction within the development area; and
 - (b) submit a survey plan of these boundaries with applicable GPS coordinates to the Secretary.

19. While quarrying operations are being carried out, the Applicant shall ensure that these boundaries are clearly marked at all times in a manner that allows operating staff to clearly identify the approved limits of extraction.

COMMUNITY ENHANCEMENT

20. Within 6 months of the date of this consent, unless otherwise agreed by the Secretary, the Applicant shall enter into a planning agreement with the Council in accordance with division
- Division 6 of Part 4 of the EP&A Act; and
 - the terms specified in Appendix 7.

If there is any dispute between the Applicant and Council on the planning agreement, then either party may refer the matter to the Secretary for resolution.

**SCHEDULE 3
ENVIRONMENTAL PERFORMANCE CONDITIONS**

NOISE

Hours of Operation

1. The Applicant shall comply with the operating hours set out in Table 1.

Table 1: Operating Hours

Activity	Permissible Hours
<ul style="list-style-type: none"> • Extraction operations • Processing operations • Overburden Management • Stockpile Management 	<ul style="list-style-type: none"> • 6 am to 10 pm Monday to Friday; • 6 am to 3 pm Saturday; and • At no time on Sundays or public holidays.
<ul style="list-style-type: none"> • Blasting 	<ul style="list-style-type: none"> • 10 am to 3 pm Monday to Friday (except public holidays).
<ul style="list-style-type: none"> • Loading and dispatch 	<ul style="list-style-type: none"> • 5 am to 10 pm Monday to Friday; • 5 am to 3 pm Saturdays; and • At no time on Sundays or public holidays.
<ul style="list-style-type: none"> • Maintenance 	<ul style="list-style-type: none"> • Anytime.

2. The following activities may be carried out on the site outside the hours specified in condition 1:
- (a) delivery or dispatch of materials as requested by Police or other authorities; and
 - (b) emergency work to avoid the loss of lives, property and/or to prevent environmental harm.

In such circumstances, the Applicant shall notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

Noise Impact Assessment Criteria

3. The Applicant shall ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land

Table 2: Noise criteria dB(A)

Receiver	Day dB(A)_{L_{Aeq}(15 min)}	Evening dB(A)_{L_{Aeq}(15 min)}	Morning Shoulder dB(A)_{L_{Aeq}(15 min)}
All privately-owned residences	35	35	35

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the *NSW Industrial Noise Policy*. Appendix 5 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

4. The Applicant shall:
- (a) implement best practice management to minimise the operational and road transportation noise of the development;
 - (b) minimise the noise impacts of the development during meteorological conditions when the noise criteria in this consent do not apply (see Appendix 5);
 - (c) carry out noise monitoring (at least every 6 months) to determine whether the development is complying with the relevant conditions of this consent; and
 - (d) regularly assess noise monitoring data and modify and/or stop operations on site to ensure compliance with the relevant conditions of this consent, to the satisfaction of the Secretary.

Note: Required frequency of noise monitoring may be reduced if approved by the Secretary.

Noise Management Plan

5. The Applicant shall prepare and implement a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
- be prepared in consultation with EPA;
 - be submitted to the Secretary at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary;
 - describe the measures that would be implemented to ensure:
 - compliance with the noise criteria in this consent;
 - best practice management is being employed; and
 - the noise impacts of the development are minimised during meteorological conditions under which the noise criteria in this consent do not apply (see Appendix 5);
 - describe the proposed noise management system; and
 - include a monitoring program to be implemented to measure noise from the development against the noise criteria in Table 2, and which evaluates and reports on the effectiveness of the noise management system on site.

BLASTING

Blasting Impact Assessment Criteria

6. The Applicant shall ensure that blasting on site does not cause any exceedance of the criteria in Table 3.

Table 3: Blasting Criteria

Receiver	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Any residence on privately-owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months

However, these criteria do not apply if the Applicant has a written agreement with the relevant owner to exceed the limits in Table 3, and the Applicant has advised the Department in writing of the terms of this agreement.

Blasting Frequency

7. The Applicant may carry out a maximum of 1 blast per calendar week, unless an additional blast is required following a blast misfire. This condition does not apply to blasts required to ensure the safety of the quarry or workers on site.

Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a discrete area of the mine.

Operating Conditions

8. During blasting operations, the Applicant shall:
- implement best practice management to:
 - protect the safety of people and livestock in the areas surrounding blasting operations;
 - protect public or private infrastructure/property in the surrounding area from damage from blasting operations and
 - minimise the dust and fume emissions of blasting;
 - operate a suitable system to enable the local community to get up-to-date information on the proposed blasting schedule on site; and
 - carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent, to the satisfaction of the Secretary.

Blast Management Plan

9. The Applicant shall prepare and implement a Blast Management Plan for the development to the satisfaction of the Secretary. This plan must:
- be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary;
 - describe the measures that would be implemented to ensure compliance with the blast criteria and operating conditions of this consent;

- (c) include a monitoring program for evaluating and reporting on compliance with the blasting criteria in this consent;
- (d) include community notification procedures for the blasting schedule; and
- (e) include a protocol for investigating and responding to complaints.

AIR QUALITY

Air Quality Impact Assessment Criteria

10. The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria

Pollutant	Averaging Period	Criterion	
Particulate matter < 10 µm (PM ₁₀)	Annual	a,d 30 µg/m ³	
Particulate matter < 10 µm (PM ₁₀)	24 hour	b 50 µg/m ³	
Total suspended particulates (TSP)	Annual	a,d 90 µg/m ³	
^c Deposited dust	Annual	b 2 g/m ² /month	a,d 4 g/m ² /month

Notes to Table 4:

a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development).

c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.

e "Reasonable and feasible avoidance measures" includes, but is not limited to, the operational requirements in conditions 11 and 12 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.

Operating Conditions

11. The Applicant shall:
- (a) implement best practice management to minimise the dust emissions of the development;
 - (b) regularly assess meteorological and air quality monitoring data and relocate, modify and/or stop operations on site to ensure compliance with the air quality criteria in this consent;
 - (c) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d under Table 4);
 - (d) monitor and report on compliance with the relevant air quality conditions in this consent; and
 - (e) minimise the area of surface disturbance and undertake progressive rehabilitation of the site, to the satisfaction of the Secretary.

Air Quality Management Plan

12. The Applicant shall prepare and implement an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary;
 - (b) describe the measures that would be implemented to ensure:
 - compliance with the relevant conditions of this consent;
 - best practice management is being employed; and
 - the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events;
 - (c) describe the proposed air quality management system;
 - (d) include an air quality monitoring program that:
 - is capable of evaluating the performance of the development;
 - includes a protocol for determining any exceedances of the relevant conditions of consent;

- effectively supports the air quality management system; and
- evaluates and reports on the adequacy of the air quality management system.

Meteorological Monitoring

13. For the life of the development, the Applicant shall ensure that there is a suitable meteorological station operating in the vicinity of the site that complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline.

Greenhouse Gas Emissions

14. The Applicant shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site.

SOIL AND WATER

Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development, including in respect of the extraction and/or interception of groundwater.

Water Supply

15. The Applicant shall ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of operations under the consent to match its available water supply, to the satisfaction of the Secretary.

Water Discharges

16. The Applicant shall comply with the discharge limits in any EPL, or with section 120 of the POEO Act.

Surface Water Audit and Water Management Improvement Program

17. Within three months of the date of this consent, the Applicant shall commission independent surface water expert/s, approved by the Secretary, to undertake an audit of current and proposed surface water management practices and infrastructure on the site. The audit shall:
- be undertaken in consultation with EPA and WaterNSW;
 - fully describe and audit existing site water management practices and consider the EIS's proposed water management practices;
 - identify all reasonable and feasible measures to improve surface water management on the site, with particular reference to opportunities to divert clean water away from the site; and
 - recommend design parameters for proposed water management systems on the site.
18. Unless otherwise agreed with the Secretary, the Applicant shall submit the Surface Water Audit report to the Secretary within six months of commissioning the audit. The report must be accompanied by a Water Management Improvement Program, based on the report's recommendations, to improve surface water management practices on the site, including a program of proposed timeframes for implementation.
19. The Applicant must implement the Water Management Improvement Program to the satisfaction of the Secretary.

Water Management Plan

20. The Applicant shall prepare and implement a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:
- be prepared by suitably qualified person/s approved by the Secretary;
 - be prepared in consultation with the EPA, NOW and WaterNSW;
 - be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary;
 - include a:
 - Site Water Balance that includes:
 - details of:
 - sources and security of water supply;
 - water use and management on site;
 - any off-site water transfers; and
 - reporting procedures.
 - measures that would be implemented to minimise clean water use on site;
 - Surface Water Management Plan, that includes:

- detailed baseline data on surface water flows and quality in water bodies that could potentially be affected by the development;
 - a detailed description of the surface water management system on site including the:
 - clean water diversion system;
 - erosion and sediment controls;
 - dirty water management system; and
 - water storages; and
 - a program to monitor and report on:
 - any surface water discharges;
 - the effectiveness of the water management system; and
 - surface water flows and quality in local watercourses;
- (iii) Groundwater Management Plan, that includes:
- baseline data on groundwater levels, yield and quality in local aquifers and privately-owned groundwater bores that could be potentially affected by the development;
 - a program to monitor and report on groundwater inflows to the quarry pit and the impacts of the development on surrounding aquifers and privately-owned groundwater bores; and
 - an analysis of these monitoring results to predict long-term water levels within the quarry void; and
- (iv) Surface and Ground Water Contingency Strategy, that includes:
- a protocol for the investigation, notification and mitigation of identified impacts on surface water flows and quality in water bodies and/or groundwater levels, yield and quality in local aquifers and privately-owned groundwater bores that could be potentially affected by the development; and
 - the procedures that would be followed if any unforeseen impacts are detected during the development.

TRANSPORT

Monitoring of Product Transport

21. The Applicant shall keep accurate records of all laden truck movements to and from the site (hourly, daily, weekly, monthly and annually) and publish a summary of records on its website every 6 months.

Operating Conditions

22. The Applicant shall ensure that:
- (a) all reasonable measures are taken such that laden trucks have appropriate signage, including a contact phone number, so they can be easily identified by road users;
 - (b) all laden trucks entering or exiting the site have their loads covered;
 - (c) all laden trucks exiting the site are cleaned of material that may fall on the road, before leaving the site; and
 - (d) no trucks queue at the entrance to the quarry access road before 5 am.

Transport Management Plan

23. The Applicant shall prepare and implement a Transport Management Plan for the development to the satisfaction of the Secretary. This plan must:
- (a) be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless otherwise agreed by the Secretary;
 - (b) describe the measures that would be undertaken to monitor the level of service at the Jenolan Caves Road and Great Western Highway intersection and maintain an acceptable level of service at this intersection;
 - (c) include a Drivers' Code of Conduct to minimise the impacts of development-related trucks on local residences and road users including measures to minimise use of local roads; and
 - (d) describe the measures that would be put in place to ensure compliance with the Drivers' Code of Conduct.

ABORIGINAL HERITAGE

24. If any item or object of Aboriginal heritage significance is identified on site, the Applicant shall ensure that:
- (a) all work in the immediate vicinity of the suspected Aboriginal item or object ceases immediately;
 - (b) a 10 m buffer area around the suspected item or object is cordoned off; and
 - (c) the OEH is contacted immediately.
- Work in the vicinity of the Aboriginal item or object may only recommence in accordance with the provisions of Part 6 of the *National Parks and Wildlife Act 1974*.

LANDSCAPE AND REHABILITATION

Biodiversity Offset Strategy

25. The Applicant shall implement the Biodiversity Offset Strategy, described in the EIS and including Conservation Area H, shown conceptually in Appendix 6, to the satisfaction of the Secretary.

Security of Offsets

26. Within 2 years of this consent, unless otherwise agreed with the Secretary, the Applicant shall make suitable arrangements to provide appropriate long-term security for the Biodiversity Offset Strategy, to the satisfaction of the Secretary.

Note: Mechanisms to provide appropriate long term security to the land within the Biodiversity Offset Strategy in accordance with the NSW Biodiversity Offset Policy for Major Projects 2014, including a Biobanking Agreement, Voluntary Conservation Agreement or an alternative mechanism that provides for a similar conservation outcome. Any mechanism must remain in force in perpetuity.

Rehabilitation Objectives

27. The Applicant shall rehabilitate the site to the satisfaction of the Secretary. This rehabilitation must be generally consistent with the rehabilitation strategy in the EIS and the conceptual final landform in Appendix 4 and must comply with the objectives in Table 5.

Table 5: Rehabilitation Objectives

Feature	Objective
Site (as a whole)	<ul style="list-style-type: none">• Safe, stable and non-polluting• Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land
Surface Infrastructure	<ul style="list-style-type: none">• Decommissioned and removed, unless DRE agrees otherwise
Quarry Benches	<ul style="list-style-type: none">• Landscaped and vegetated using native tree and understorey species
Quarry Pit Floor	<ul style="list-style-type: none">• Landscaped and revegetated using native tree and understorey species
Final Void	<ul style="list-style-type: none">• Minimise the size, depth and slope of the batters of the final void• Minimise the drainage catchment of the final void

Progressive Rehabilitation

28. The Applicant shall rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation.

Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to further disturbance in future.

Landscape and Rehabilitation Management Plan

29. The Applicant shall prepare and implement a Landscape and Rehabilitation Management Plan for the development to the satisfaction of the Secretary. This plan must:
- be prepared in consultation with OEH and be submitted to the Secretary for approval at least 3 months prior to the commencement of quarrying operations under this consent, unless the Secretary agrees otherwise;
 - provide details of the conceptual final landform and associated land uses for the site;
 - describe how the implementation of the Biodiversity Offset Strategy would be integrated with the overall rehabilitation of the site;
 - include detailed performance and completion criteria for evaluating the performance of the Biodiversity Offset Strategy and rehabilitation of the site, including triggers for any necessary remedial action;
 - describe the short, medium and long term measures that would be implemented to:
 - manage remnant vegetation and habitat on site, including within the Biodiversity Offset Strategy area; and

- ensure compliance with the rehabilitation objectives and progressive rehabilitation obligations in this consent;
- (f) include a detailed description of the measures that would be implemented over the next 3 years (to be updated for each 3 year period following initial approval of the plan) including the procedures to be implemented for:
- maximising the salvage of environmental resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse in the enhancement of the offset area or site rehabilitation;
 - restoring and enhancing the quality of native vegetation and fauna habitat in the biodiversity and rehabilitation areas through assisted natural regeneration, targeted vegetation establishment and the introduction of fauna habitat features;
 - protect, conserve, propagate, plant and/or regenerate Silver-leafed Mountain Gum (*Eucalyptus pulverulenta*) (including the propagation and planting of at least 1,000 individuals of this species);
 - protecting vegetation and fauna habitat outside the approved disturbance area on-site;
 - minimising the impacts on native fauna, including undertaking pre-clearance surveys;
 - establishing vegetation screening to minimise the visual impacts of the site on surrounding receivers;
 - ensuring minimal environmental consequences for threatened species, populations and habitats;
 - collecting and propagating seed;
 - controlling weeds and feral pests;
 - controlling erosion;
 - controlling access; and
 - managing bushfire risk;
- (g) include a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;
- (h) identify the potential risks to the successful implementation of the Biodiversity Offset Strategy, and include a description of the contingency measures that would be implemented to mitigate these risks; and
- (i) include details of who would be responsible for monitoring, reviewing, and implementing the plan.

Conservation and Rehabilitation Bond

30. Within 6 months of the approval of the Landscape Management Plan, the Applicant shall lodge a Conservation and Rehabilitation Bond with the Department to ensure that the Biodiversity Offset Strategy and rehabilitation of the site are implemented in accordance with the performance and completion criteria set out in the plan and relevant conditions of this consent. The sum of the bond shall be determined by:
- (a) calculating the cost of implementing the Biodiversity Offset Strategy over the next 3 years;
 - (b) calculating the cost of rehabilitating the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and
 - (c) employing a suitably qualified quantity surveyor or other expert to verify the calculated costs, to the satisfaction of the Secretary.

Notes:

- *Alternative funding arrangements for long term management of the Biodiversity Offset Strategy, such as provision of capital and management funding as agreed by OEH as part of a Biobanking Agreement, or transfer to conservation reserve estate can be used to reduce the liability of the conservation and rehabilitation bond.*
- *If capital and other expenditure required by the Landscape Management Plan is largely complete, the Secretary may waive the requirement for lodgement of a bond in respect of the remaining expenditure.*
- *If the Biodiversity Offset Strategy and rehabilitation of the site area are completed to the satisfaction of the Secretary, then the Secretary will release the bond. If the Biodiversity Offset Strategy and rehabilitation of the site are not completed to the satisfaction of the Secretary, then the Secretary will call in all or part of the bond, and arrange for the completion of the relevant works.*

31. Within 3 months of each Independent Environmental Audit (see condition 8 of Schedule 5), the Applicant shall review, and if necessary revise, the sum of the Conservation and Rehabilitation Bond to the satisfaction of the Secretary. This review must consider the:
- (a) effects of inflation;
 - (b) likely cost of implementing the Biodiversity Offset Strategy and rehabilitating the site (taking into account the likely surface disturbance over the next 3 years of the development); and
 - (c) performance of the implementation of the Biodiversity Offset Strategy and rehabilitation of the site to date.

VISUAL

32. The Applicant shall implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the development to the satisfaction of the Secretary.

WASTE

33. The Applicant shall:
- (a) manage on-site sewage treatment and disposal in accordance with the requirements of its EPL, and to the satisfaction of the EPA and Council;
 - (b) minimise the waste generated by the development;
 - (c) ensure that the waste generated by the development is appropriately stored, handled, and disposed of; and
 - (d) report on waste management and minimisation in the Annual Review, to the satisfaction of the Secretary.
34. Except as expressly permitted in an EPL, the Applicant must not receive waste at the site for storage, treatment, processing, reprocessing or disposal.

LIQUID STORAGE

35. The Applicant shall ensure that all tanks and similar facilities for storage of liquids (other than for water) are protected by appropriate bunding, which must exceed 110% of the stored volume of the liquid.

DANGEROUS GOODS

36. The Applicant shall ensure that the storage, handling, and transport of dangerous goods is done in accordance with the relevant *Australian Standards*, particularly AS1940 and AS1596, and the *Dangerous Goods Code*.

BUSHFIRE

37. The Applicant shall:
- (a) ensure that the development is suitably equipped to respond to any fires on site; and
 - (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire in the vicinity of the site.

SCHEDULE 4 ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. As soon as practicable after obtaining monitoring results showing:
 - (a) an exceedance of any relevant criteria in Schedule 3, the Applicant shall notify the affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the development is again complying with the relevant criteria; and
 - (b) an exceedance of any relevant air quality criteria in Schedule 3, the Applicant shall send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and current tenants of the land (including the tenants of land which is not privately-owned).

INDEPENDENT REVIEW

2. If an owner of privately-owned land considers the development to be exceeding the relevant criteria in Schedule 3, then he/she may ask the Secretary in writing for an independent review of the impacts of the development on his/her land.

If the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision, the Applicant shall:

- (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to:
 - consult with the landowner to determine his/her concerns;
 - conduct monitoring to determine whether the development is complying with the relevant criteria in Schedule 3; and
 - if the development is not complying with these criteria, then identify measures that could be implemented to ensure compliance with the relevant criteria; and
- (b) give the Secretary and landowner a copy of the independent review.

**SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING**

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Applicant shall prepare and implement an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:
 - (a) be submitted to the Secretary for approval within 6 months of the date of this consent;
 - (b) provide the strategic framework for environmental management of the development;
 - (c) identify the statutory approvals that apply to the development;
 - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
 - (e) describe the procedures that would be implemented to:
 - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
 - receive, record, handle and respond to complaints;
 - resolve any disputes that may arise during the course of the development;
 - respond to any non-compliance;
 - respond to emergencies; and
 - (f) include:
 - copies of any strategies, plans and programs approved under the conditions of this consent; and
 - a clear plan depicting all the monitoring to be carried out under the conditions of this consent.

Management Plan Requirements

2. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:
 - (a) detailed baseline data;
 - (b) a description of:
 - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
 - any relevant limits or performance measures/criteria; and
 - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;
 - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
 - (d) a program to monitor and report on the:
 - impacts and environmental performance of the development; and
 - effectiveness of any management measures (see (c) above);
 - (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;
 - (f) a program to investigate and implement ways to improve the environmental performance of the development over time;
 - (g) a protocol for managing and reporting any:
 - incidents;
 - complaints;
 - non-compliances with statutory requirements; and
 - exceedances of the impact assessment criteria and/or performance criteria; and
 - (h) a protocol for periodic review of the plan.

Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

Adaptive Management

3. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedule 3. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must, at the earliest opportunity:

- (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not reoccur;
- (b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
- (c) implement remediation measures as directed by the Secretary; to the satisfaction of the Secretary.

Annual Review

4. By the end of September each year, or other timing as may be agreed by the Secretary, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:
- (a) describe the development (including any rehabilitation) that was carried out in the previous financial year, and the development that is proposed to be carried out over the current financial year;
 - (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, which includes a comparison of these results against the:
 - relevant statutory requirements, limits or performance measures/criteria;
 - requirements of any plan or program required under this consent;
 - monitoring results of previous years; and
 - relevant predictions in the EIS;
 - (c) identify any non-compliance over the past financial year, and describe what actions were (or are being) taken to ensure compliance;
 - (d) identify any trends in the monitoring data over the life of the development;
 - (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
 - (f) describe what measures will be implemented over the current financial year to improve the environmental performance of the development.

Revision of Strategies, Plans & Programs

5. Within 3 months of the submission of an:
- (a) annual review under condition 4 above;
 - (b) incident report under condition 6 below;
 - (c) audit report under condition 8 below; and
 - (d) any modifications to this consent,
- the Applicant shall review the strategies, plans and programs required under this consent, to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted for the approval of the Secretary.

Note: The purpose of this condition is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve environmental performance of the development.

REPORTING

Incident Reporting

6. The Applicant shall immediately notify the Secretary and any other relevant agencies of any incident. Within 7 days of the date of the incident, the Applicant shall provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

Regular Reporting

7. The Applicant shall provide regular reporting on the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.

INDEPENDENT ENVIRONMENTAL AUDIT

8. Within a year of the date of this consent, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
- (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
 - (b) include consultation with the relevant agencies;
 - (c) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent and any relevant EPL or necessary water licences for the

- development (including any assessment, strategy, plan or program required under these approvals);
- (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; and
 - (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, strategy, plan or program required under the abovementioned approvals.

Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Secretary.

- 9. Within 6 weeks of completion of this audit, or as otherwise agreed by the Secretary, the Applicant shall submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report.

ACCESS TO INFORMATION

- 10. Within 6 months of the date of this consent, the Applicant shall:
 - (a) make the following information publicly available on its website:
 - the documents listed in condition 2 of Schedule 2;
 - current statutory approvals for the development;
 - all approved strategies, plans and programs required under the conditions of this consent;
 - a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;
 - a complaints register, updated monthly;
 - the annual reviews of the development;
 - any independent environmental audit, and the Applicant's response to the recommendations in any audit; and
 - any other matter required by the Secretary; and
 - (b) keep this information up-to-date, to the satisfaction of the Secretary.

APPENDIX 1 DEVELOPMENT AREA

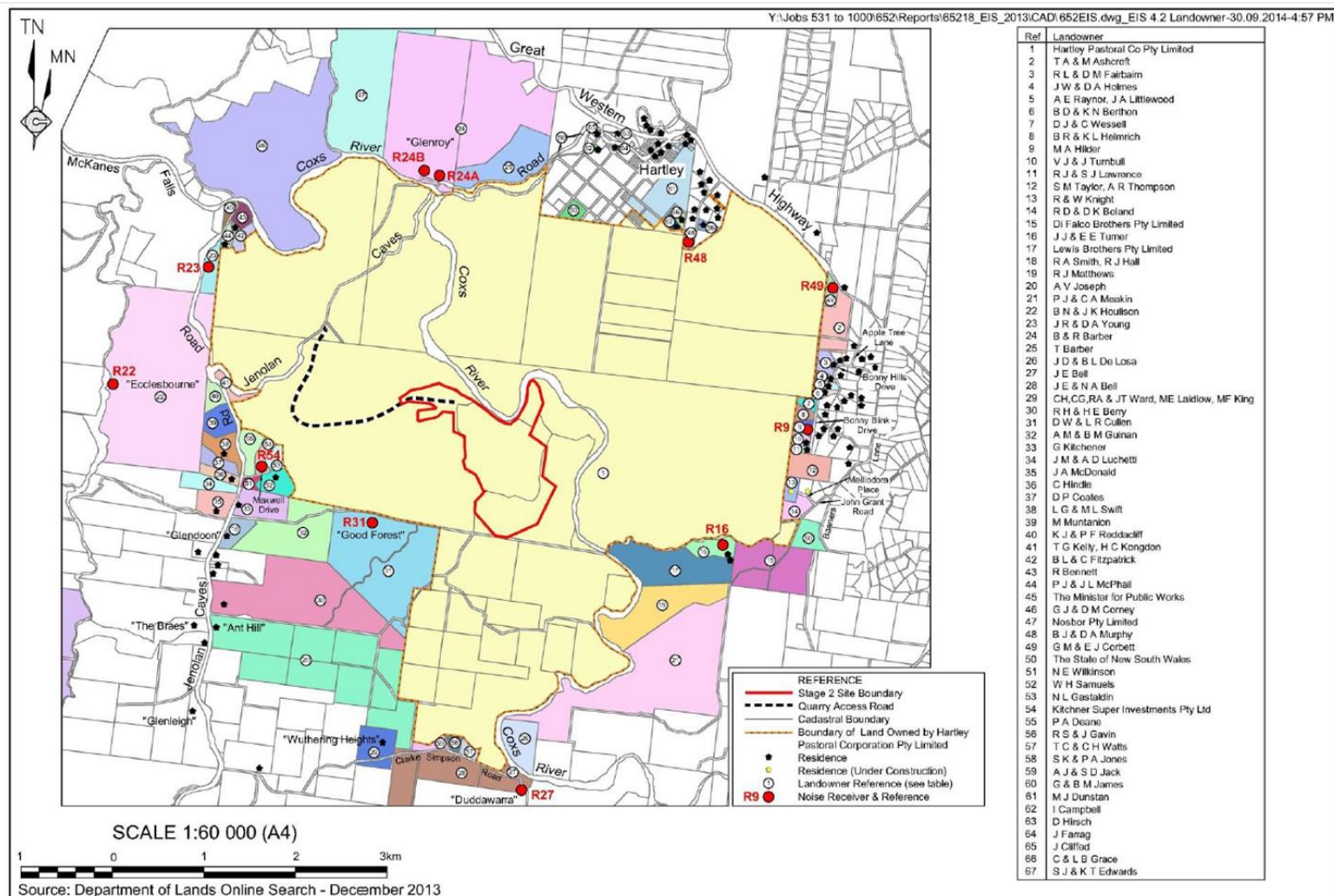
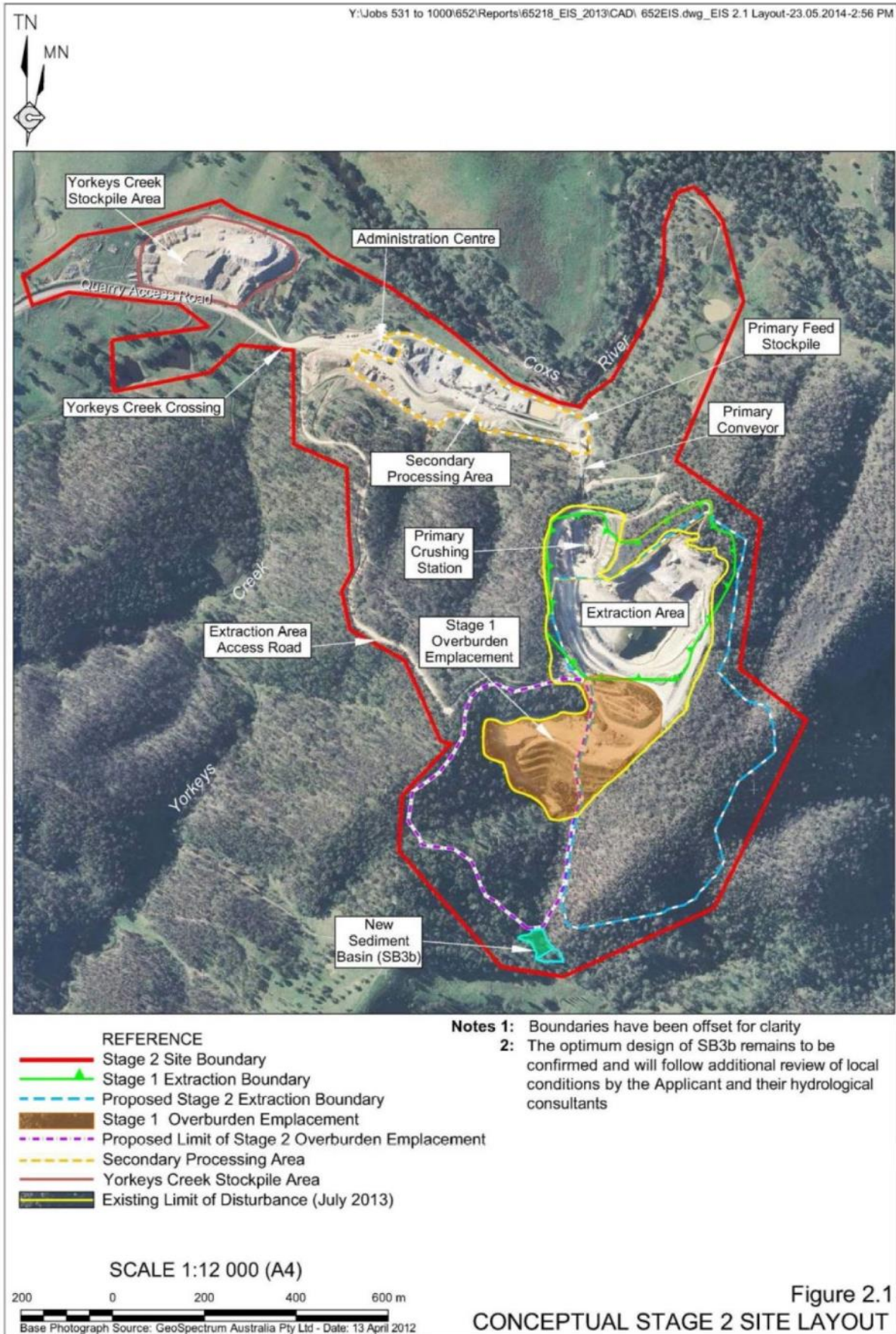


Figure 1: Development Area and nearby residences

APPENDIX 2 DEVELOPMENT LAYOUT



**APPENDIX 3
STATEMENT OF COMMITMENTS**

Desired Outcome	Action	Timing
1. Environmental Management		
Compliance with all conditional requirements in all approvals licences and leases.	1.1 Comply with commitments recorded in this table.	Continuous and as required.
	1.2 Comply with all conditional requirements included in the: <ul style="list-style-type: none"> • Development Consent; • Environment Protection Licence; • Approval under the EPBC Act; • Water Access Licence; and • any other approvals. 	Ongoing.
2. Waste Management		
Minimisation of general waste creation and maximisation of recycling, wherever possible.	2.1 Place all paper and general wastes originating from the site office, together with routine maintenance consumables from the daily servicing of equipment in waste skip bins located adjacent to the site office and workshop.	Ongoing.
	2.2 Segregate waste into recyclables and non-recyclable materials for removal by a licensed contractor.	Ongoing.
Minimisation of the potential risk of environmental impact due to waste creation, storage and/or disposal.	2.3 Ensure the appropriate storage and regular collection of industrial wastes including waste oils and scrap metal.	Monthly or on an as needs basis.
3. Rehabilitation and Biodiversity Offset Management		
The creation of a stable final landform, available for the proposed future use(s) of nature conservation and low intensity agriculture.	3.1 Retain all soil and suitable cleared vegetation resources for use in rehabilitation of the final landform.	Ongoing.
	3.2 Include <i>Eucalyptus pulverulenta</i> in the revegetation of the Stage 2 Site.	During rehabilitation activities.
	3.3 Re-instate the pre-disturbance soil and land capability in the area used for the secondary processing area and Yorkeys Creek stockpile area.	Ongoing and prior to quarry closure.
Establish and manage a Biodiversity Offset Area.	3.4 Mark, and where appropriate fence, boundaries relevant to the Biodiversity Offset Area.	Within 6 months of approval of the Biodiversity Offset Area.
4. Land Resources		
Ensure sections of the Site with higher land capability are returned to agricultural use.	4.1 Provide for rehabilitation of the secondary processing area and Yorkeys Creek stockpile area back to agricultural land.	Ongoing as available.
5. Traffic and Transport		
Transport operations are undertaken with minimal impact on	5.1 All transport contractors required to complete the Hy-Tec Chain of Responsibility: Driver Vehicle Check system.	Ongoing.
	5.2 Maintain a complaints management system to	Ongoing.

Desired Outcome	Action	Timing
other road users and residents.	appropriately respond to any complaints received through investigation and implementation of corrective treatments.	
	5.3 Monitor the delays for vehicles turning right onto the Great Western Highway at two-yearly intervals from 2022 onwards.	To begin in 2022.
6. Visibility		
Reduce the area of the Stage 2 Site exposed to surrounding vantage points.	6.1 Implement design and sequencing measures to minimise exposure of the Quarry, namely: <ul style="list-style-type: none"> a) undertake the extraction area and overburden emplacement extensions in accordance with the limits noted on Figure 2.4 of the EIS and sequence generally as presented on Figure 2.6 of the EIS; b) retain the primary crusher in its current location within the Stage 1 extraction area; c) retain the visual screen provided by the Northern Ridge; and d) restrict further extension of the secondary processing area and Yorkeys Creek stockpile area. 	Ongoing. Ongoing. Ongoing. Ongoing.
Reduce the impact of the areas of quarry disturbance visible from surrounding vantage points.	6.2 Implement management measures to limit impacts to visual amenity including the following. <ul style="list-style-type: none"> a) Complete a trial of short-term visual mitigation measures for the Yorkeys Creek stockpile area. b) Implement short-term visual mitigation measures for the Yorkeys Creek stockpile area. c) Progressive revegetation or rehabilitation of terminal faces of the extraction area and overburden emplacement and profiled slopes between the administration area and the extraction area. d) Maintain existing visual barriers including retained northern face of extraction area and tree-lined visual barriers. e) Apply a bituminous film to reduce the contrast between the pale rhyolite and darker background vegetation on completed western facing slopes where necessary. f) Minimise dust emissions through suppression measures such as regular watering of areas. g) Maintain the Site in a tidy and orderly manner. h) Minimise the impacts of lighting by directing lights away from critical receptors (to the south and east) and minimise the 'lume' created by the lights. <p>Note: If superseded by more effective measures, or no longer required due to progressive development of the Quarry Site, the above will cease to be implemented.</p>	Prior to November 2015. Prior to November 2016. Ongoing. Ongoing. Ongoing. Ongoing. Ongoing. Ongoing.
Monitor the progressive visual changes from nearby receptors.	6.3 Monitor the sequence of visual impacts using a series of annual photographs from vantage points surrounding the Quarry Site. These photos, along with a discussion as to compliance with the impact predicted, would be included in annual reporting.	Annually.
7. Surface Water		
Appropriately	7.1 Ensure any off-site discharge is monitored and reported	In the event of off-

Desired Outcome	Action	Timing
document water management measures including erosion and sediment control.	in accordance with EPL 12323.	site discharge.
Capture of sediment-laden water flows from Proposal-related disturbance.	7.2 Ensure the capacity of the various sediment basins and water storages of the Site provides the required water settlement and sediment storage volumes for a 5-day 95 th percentile rainfall event.	Ongoing.
Manage the discharge of water from the various sediment basins and storage dams.	7.3 Apply procedures established in the Water Management Plan for the appropriate treatment of water that is to be discharged to natural drainage.	In the event off-site discharge is required.
Prevention of hydrocarbon contamination of water on the Site.	7.4 Securely store all hydrocarbon products within designated and bunded areas.	Ongoing.
	7.5 Refuel and maintain all equipment within designated areas of the Site, i.e. workshop area.	Ongoing.
8. Groundwater		
Prevention of groundwater contamination.	8.1 Securely store all hydrocarbon products within designated and bunded areas.	Ongoing.
	8.2 Refuel and maintain all equipment within designated areas of the Site, i.e. workshop area.	Ongoing.
Appropriately license any removal of groundwater.	8.3 Obtain and maintain a Water Access Licence(s) for the volume of groundwater seepage into the extraction area annually.	Prior to commencement of development consent.
	8.4 Report annual and projected groundwater extraction to the NSW Office of Water.	Annual.
9. Terrestrial Ecology		
Avoid impacts on native flora and fauna.	9.1 Locate primary crushing station within extraction footprint.	Ongoing.
	9.2 Limit extent of extraction area as nominated in the development consent.	Ongoing.
Minimise or mitigate unavoidable impacts on native flora and fauna.	9.3 Operate a conveyor between the primary crushing station and secondary processing area to limit transportation of raw materials.	Ongoing.
	9.4 Maintain a 10m buffer and exclusion zone around the proposed area of disturbance.	Ongoing.
	9.5 Fence, as appropriate, sections of the Stage 2 Site not required for ongoing operations.	Ongoing as needed.
	9.6 Include the Silver-leafed mountain gum in progressive revegetation of the final landform.	Ongoing.
	9.7 Install appropriate erosion and sediment control measures prior to vegetation clearing activities (to reduce the potential for pollution of downstream riparian and aquatic habitat).	Ongoing.
	9.8 Limit vehicle speeds within the Site to limit the potential for vehicle trauma to wildlife.	Ongoing.
10. Aquatic Ecology		

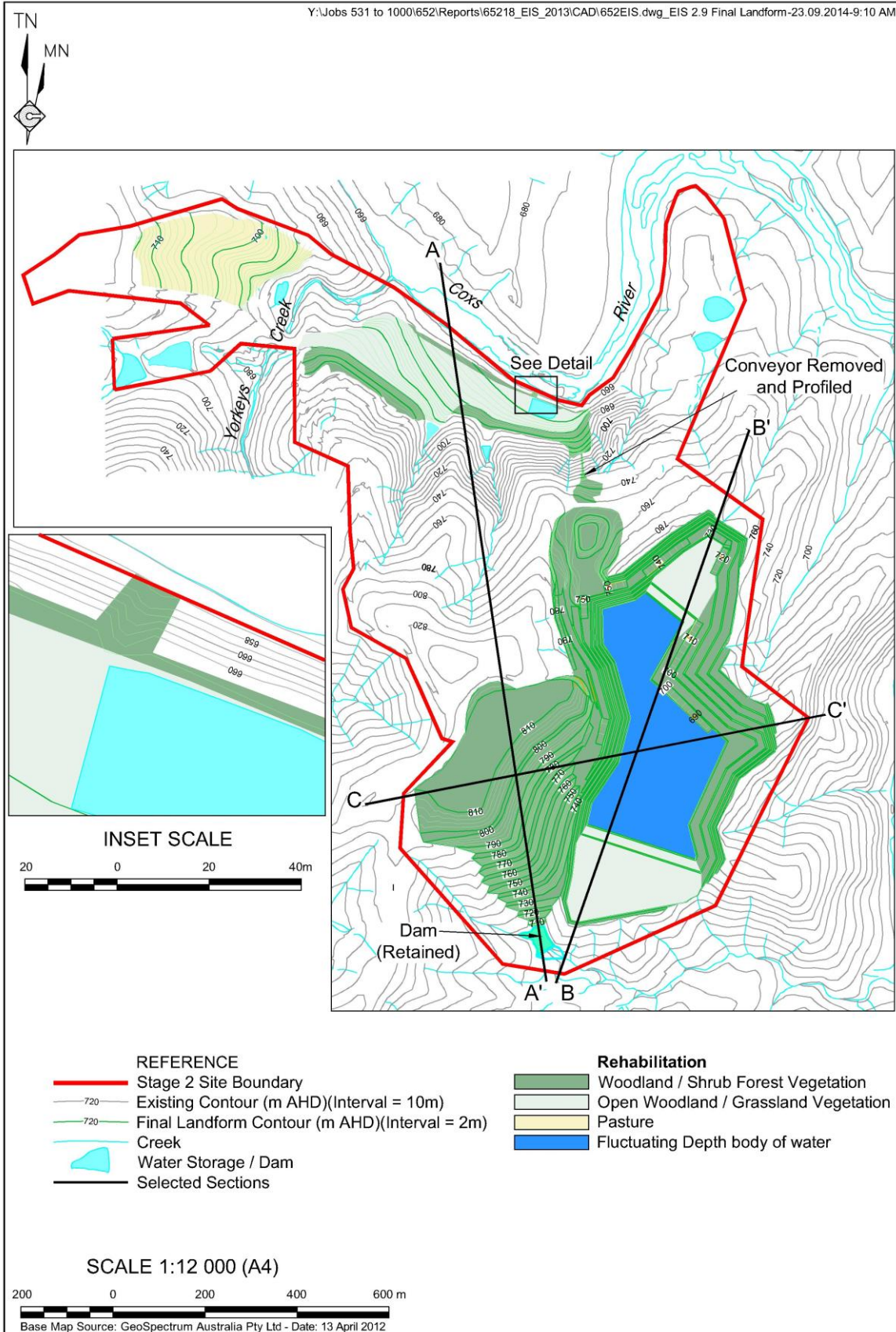
Desired Outcome	Action	Timing
Avoid, minimise or mitigate impacts as a result of operational activities on aquatic biota and habitats.	10.1 Design and construct any ancillary development works, e.g. access roads, in the vicinity of watercourses in accordance with the NSW DPI Policy and <i>Guidelines for Fish Habitat Conservation and Management</i>	As required.
	10.2 Minimise the occurrence of uncontrolled discharges of water by managing water in accordance with a Water Management Plan.	Ongoing.
	10.3 Maintain a bunded area for storage of fuels, oils, refuelling and appropriate maintenance of vehicles and mechanical plant.	Ongoing.
	10.4 Procedures would be implemented to manage handling of hazardous material and spill response protocols.	Ongoing.
	10.5 Install and maintain scour protection at pipe outlet points.	Ongoing.
11. Noise		
Noise emissions do not exceed intrusiveness criteria nor significantly impact on neighbouring landowners and/or residents.	11.1 Undertake processing operations with the current or equivalent crushing and screening plant.	Ongoing.
	11.2 Ensure all equipment on Site has sound power levels at or below that nominated for noise modelling purposes (see <i>Table 5-1</i> of Benbow, 2014a).	Ongoing.
	11.3 Limit transportation noise by ensuring: a) All trucks under control of Hy-Tec, or accredited contractors would comply at all times with RMS noise limits.	Ongoing.
	b) All truck drivers would be required to sign a Code of Conduct that includes noise limiting behaviour. c) Comply with conditional limits on truck movements. d) The internal road network would be graded, as required, to limit body noise from empty trucks	Ongoing. Ongoing. Ongoing.
	11.4 Maintenance work would be confined to standard daytime hours where practicable.	Ongoing.
12. Air Quality		
Site activities are undertaken without exceeding the nominated air quality criteria.	12.1 Undertake operations in accordance with an Air Quality Management Plan.	Ongoing.
Minimise greenhouse gas emissions from Site related activities.	12.2 Minimise the impacts of greenhouse gases relating to diesel consumption by: a) minimising use of haul trucks through use of an overland conveyor; b) minimising rehandling of overburden and products; c) maintaining and servicing equipment to ensure efficiency; d) minimising the quarry footprint to reduce land disturbance and travel distances; and e) optimising the design of the Processing Plant to f) maximise the use of gravity to move material throughout the plant and maximise energy efficient motors in major equipment.	Ongoing. Ongoing. Ongoing. Ongoing. Ongoing.
Record and monitor the local	12.3 Continue to monitor dust impacts through: a) the existing deposited dust gauges; and	Ongoing.

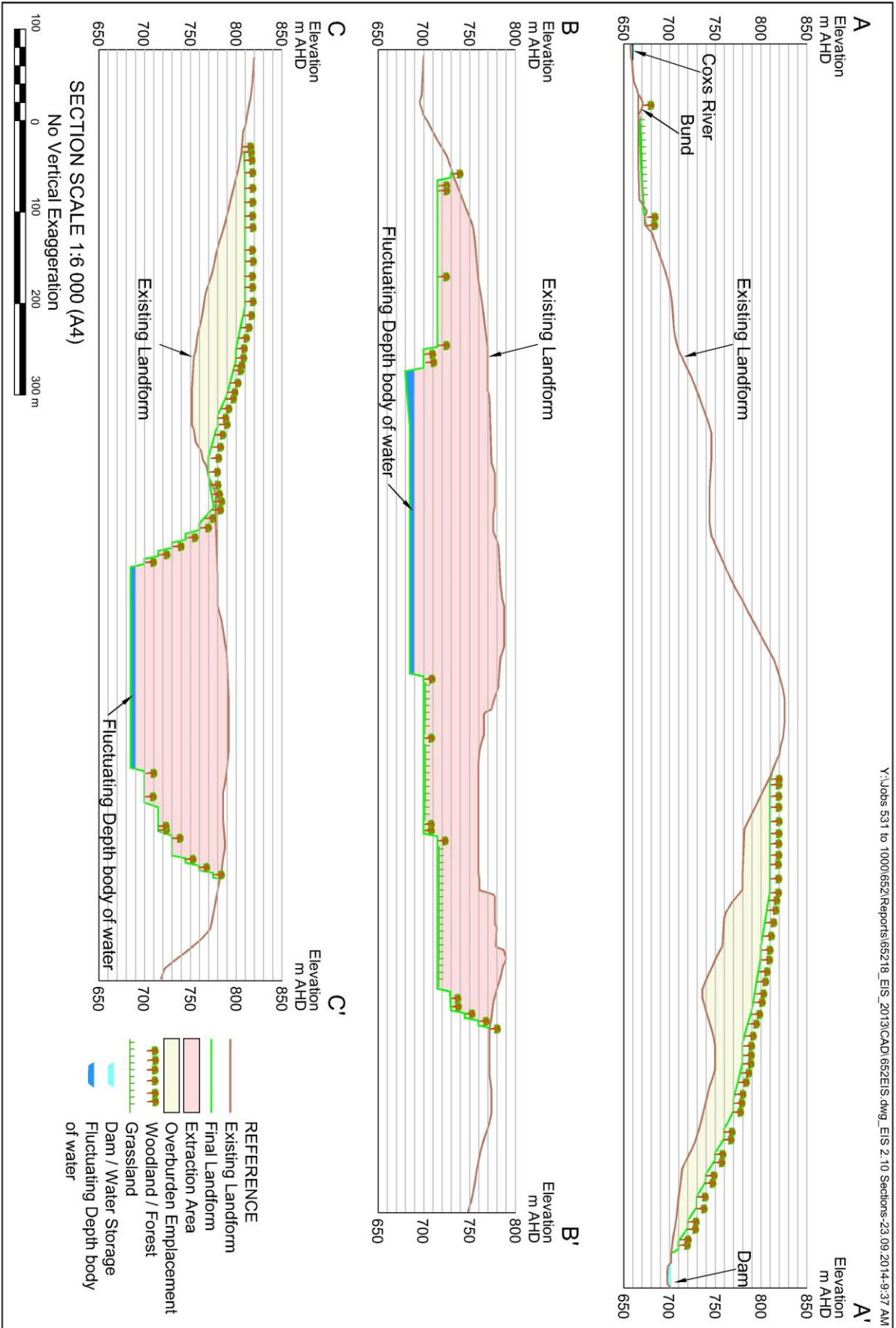
Desired Outcome	Action	Timing
environment regarding dust impacts.	b) on-site meteorological monitoring to record relevant parameters.	Ongoing.
13. Indigenous Heritage		
Minimise the potential for adverse Proposal-related impacts on indigenous heritage sites.	13.1 Include Indigenous heritage protocols and obligations within training and induction processes for the quarry.	Ongoing.
	13.2 Halt all works in the immediate area if cultural objects are found and contact a suitably qualified archaeologist and Aboriginal community representative.	Ongoing.
	13.3 Halt all works in the immediate area if human remains are found and contact NSW Police, Aboriginal community representative and OEH.	Ongoing.
	13.4 Maintain reasonable efforts to avoid impacts to Aboriginal cultural heritage values at all stages of the development works	Ongoing.
Maintain appropriate records of identified indigenous heritage sites.	13.5 Complete an Aboriginal Site Impact Recording Form and submit it to the Aboriginal Heritage Management Information Management System (AHIMS) Registrar, for each AHIMS site that is harmed through the proposed development.	Upon discovery of a site of heritage significance.
14. Historic Heritage		
Minimise the potential for adverse Proposal-related impacts on historic heritage sites.	14.1 Halt all works in the immediate area if cultural object(s) are found.	Ongoing.
	14.2 Secure the location, e.g. through the installation of protective fencing, flagging with high visibility tape.	
	14.3 Contact a suitably qualified archaeologist to determine the significance of the object(s).	
	14.4 Report discovery of relic (if advised of validity by archaeologist) in accordance within Section 146 of the <i>Heritage Act 1977</i> .	
	14.5 Do not recommence works within the secured area until advised by archaeologist.	
	14.6 Include the commitments of 14.1 to 14.4 within training and induction processes for the Site.	On induction of new personnel.
15. Hazards		
Manage bush fire risks on site to minimise the potential for property damage or personnel injury.	15.1 Ensure refuelling is undertaken within designated fuel bays and vehicles are turned off during refuelling.	Ongoing.
	15.2 Ensure no smoking policy is enforced in designated areas of the Site.	Ongoing.
	15.3 Ensure fire extinguishers are maintained within site vehicles and refuelling areas.	Ongoing.
	15.4 Ensure that a water cart is available to assist in extinguishing any fire ignited.	Ongoing.
	15.5 Establish and maintain an Outer Protection Area around the administration area.	Ongoing.
	15.6 Maintain the access road to the extraction area such that safe passage is guaranteed should an emergency evacuation be required.	Ongoing.
	15.7 Maintain access to water contained within SD1 to SD6,	Ongoing.

Desired Outcome	Action	Timing
	as well as SB1 for use in fighting ember attack.	
	15.8 Complete appropriate training with site personnel in relation to fire-fighting tasks and procedures.	Ongoing.
	15.9 Ensure access is provided for Rural Fire Service and its and other emergency services' authority is recognised and assistance offered in the event of a bush fire.	Ongoing.
Reduce risks of traffic accidents on roads used by Proposal-related traffic.	15.10 Ensure route selection for delivery of quarry products follows routes designated in the EIS for entry and exit to the Site, transportation through the Blue Mountains and local deliveries of products.	Ongoing.
	15.11 Operate a Traffic Management Plan for all trucks entering and exiting Austen Quarry.	Within 6 months of receipt of approval.
	15.12 Continue to implement the Chain of Responsibility – Driver Vehicle Check system for all transportation activities undertaken at the Site.	Ongoing.
All members of the public are safe when near the Austen Quarry.	15.13 Implement measures to ensure the safety of public including visitors, contractors and employees through recruitment, induction and training programs.	Ongoing.
Measures to be put in place to, where possible, restrict unauthorised entry and reduce the risk of accident to any trespasser on the Site.	15.14 Ensure gate at entrance on Jenolan Caves Road is locked outside standard operating hours.	Ongoing.
	15.15 Use of locks on equipment when site personnel are not working on or with this equipment or plant.	Ongoing.
	15.16 Installation and maintenance of safety signage around the Site and perimeter fencing, where necessary.	Ongoing.
	15.17 Instruct all visitors entering and departing the Site to visit either the Site office or weighbridge for registration including time of arrival and departure, and an induction, if required.	Ongoing.
	15.18 Install appropriate controls to ensure the stability of the open cut, overburden emplacement and stockpiles.	Ongoing.
16. Socio-economic Setting		
Continue to proactively consult with members of the community affected by the Proposal.	16.1 Maintain the existing 'open door' policy for community members to approach the management staff of the Austen Quarry.	Ongoing.
	16.2 Maintain the existing community complaints and response system.	Ongoing.
Consider local sources of service and supply contractors	16.3 Seek local supply and service contractors from within the Lithgow LGA where it is practicable to do so.	Ongoing.

APPENDIX 4 CONCEPTUAL FINAL LANDFORM

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APPENDIX 5 NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 2 are to apply under all meteorological conditions except the following:
 - a) wind speeds greater than 3 m/s at 10 m above ground level; or
 - b) temperature inversion conditions between 1.5°C and 3°C/100 m and wind speed greater than 2 m/s at 10 m above ground level; or
 - c) temperature inversion conditions greater than 3°C/100 m.

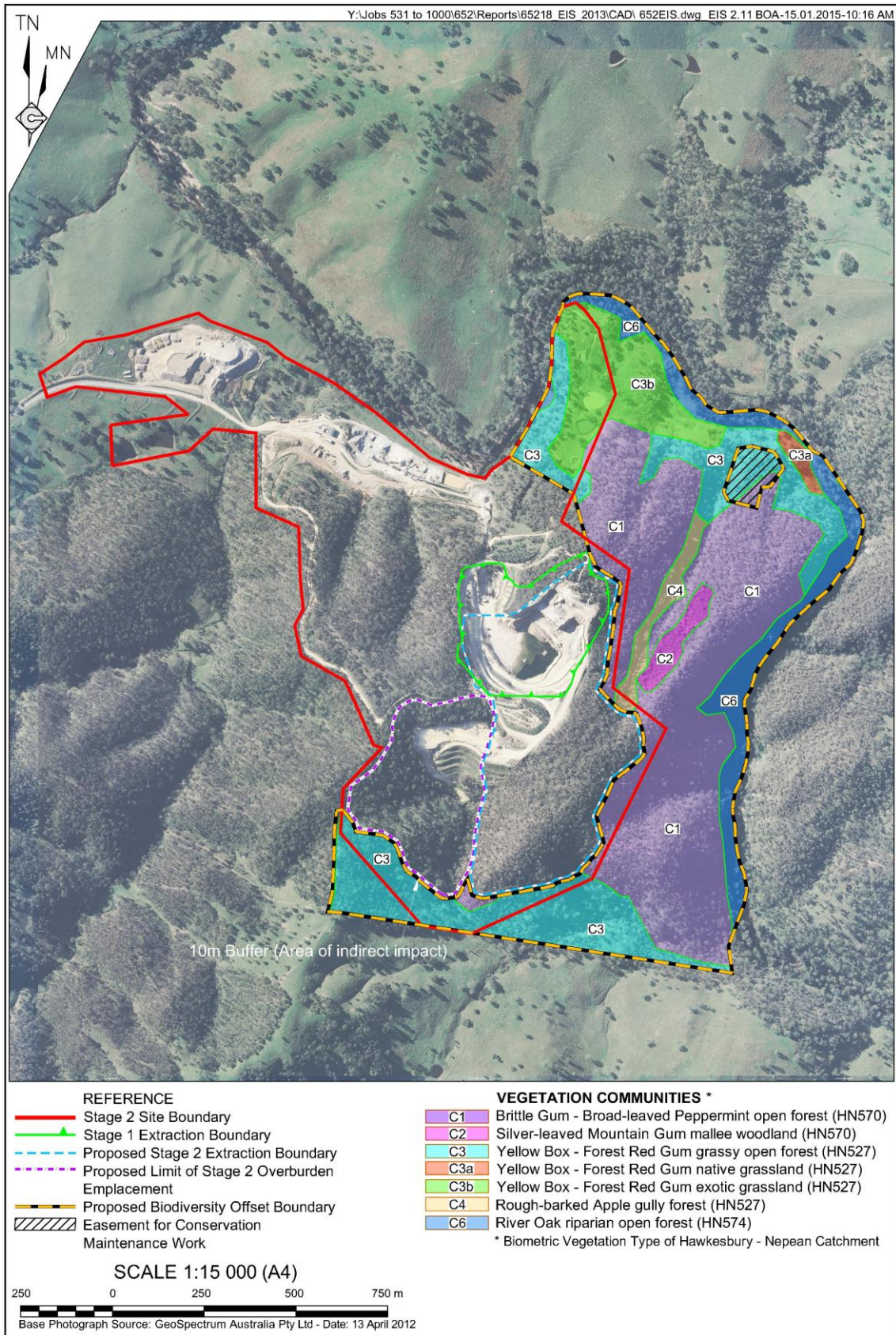
Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station required under condition 25 of Schedule 3.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.
4. Unless the Secretary agrees otherwise, this monitoring is to be carried out in accordance with the relevant requirements for reviewing performance set out in the *NSW Industrial Noise Policy* (as amended from time to time), in particular the requirements relating to:
 - a) monitoring locations for the collection of representative noise data;
 - b) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment;
 - c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration; and
 - d) the use of an appropriate modifying factor for low frequency noise to be applied during compliance testing at any individual residence if low frequency noise is present (in accordance with the INP) and before comparison with the specified noise levels in the consent.

APPENDIX 6 BIODIVERSITY OFFSET STRATEGY



**APPENDIX 7
PLANNING AGREEMENT**

1. The Applicant shall pay Council \$0.025 per tonne of quarry product extracted and transported from the Stage 2 Extraction Area on a quarterly basis. Each payment shall be:
 - (a) based on weighbridge records of the quantity of extraction material transported from the site in the relevant quarter;
 - (b) paid within 21 days of the end of the relevant quarter;
 - (c) adjusted in line with the Consumer Price Index calculated from the date of approval and applied annually from the first day of operation.

Appendix C: Environmental Protection Licence

Environment Protection Licence



Licence - 12323

Licence Details

Number:	12323
Anniversary Date:	01-July

Licensee

AUS - 10 RHYOLITE PTY LIMITED

GPO BOX 2155

ADELAIDE SA 5001

Premises

AUS-10 QUARRY

391 JENOLAN CAVES ROAD

HARTLEY NSW 2790

Scheduled Activity

Extractive activities

Fee Based Activity

Scale

Land-based extractive activity

> 500000-2000000 T annual capacity
to extract, process or store

Region

South - Bathurst

Lvl 2, 203-209 Russell Street

BATHURST NSW 2795

Phone: (02) 6332 7600

Fax: (02) 6332 7630

PO Box 1388 BATHURST

NSW 2795

Environment Protection Licence



Licence - 12323

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Environment Protection Licence

Licence - 12323



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 - 12323



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:

AUS - 10 RHYOLITE PTY LIMITED
GPO BOX 2155
ADELAIDE SA 5001

subject to the conditions which follow.

Environment Protection Licence

Licence - 12323



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
Extractive activities	Land-based extractive activity	> 500000 - 2000000 T annual capacity to extract, process or store

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
AUS-10 QUARRY
391 JENOLAN CAVES ROAD
HARTLEY
NSW 2790
LOT 1 DP 1005511, LOT 2 DP 1005511, LOT 31 DP 1009967

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

Environment Protection Licence



Licence - 12323

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.

<i>Air</i>			
EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
4	Ambient air monitoring		Dust monitoring location identified as "AQD-1" on Figure 1 Environment Protection Licence Monitoring Points - provided to EPA on 19/09/11 (DOC11/40371).
5	Ambient air monitoring		Dust monitoring location identified as "AQD-2" on "Figure 1 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.
6	Ambient air monitoring		Dust monitoring location identified as "AQD-3" on "Figure 1 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.
12	Weather Analysis		Weather monitoring location as identified on "Figure 2 Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371.

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 to Waters; Discharge Quality Monitoring	Discharge to Waters; Discharge Quality Monitoring	Location identified as "Dam 1" on "Figure 2 - Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371
2	Ambient water monitoring		Water monitoring location identified on Figure 6.1 of report entitled "Hartley Quarry - Annual Environmental Management Report" (2003), upstream of the processing area.
3	Ambient water monitoring		Water monitoring location identified on Figure 6.1 of report entitled "Hartley Quarry - Annual Environmental Management Report" (2003), downstream of the processing area.

Environment Protection Licence

Licence - 12323



8	Discharge to waters; Discharge quality monitoring	Discharge to waters; Discharge quality monitoring	Location identified as "Dam 2" on "Figure 2 - Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371
9	Discharge to waters; Discharge quality monitoring	Discharge to waters; Discharge quality monitoring	Location identified as "Dam 3" on "Figure 2 - Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371
10	Discharge to waters; Discharge quality monitoring	Discharge to waters; Discharge quality monitoring	Location identified as "Dam 4" on "Figure 2 - Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371
11	Discharge to waters; Discharge quality monitoring	Discharge to waters; Discharge quality monitoring	Location identified as "Dam 5" on "Figure 2 - Environment Protection Licence Monitoring Points" - provided to EPA on 19/09/11 as part of DOC11/40371

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 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.

L2.4 Water and/or Land Concentration Limits

POINT 1,8,9,10,11

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
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Environment Protection Licence

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Oil and Grease	milligrams per litre	10
pH	pH	6.5 - 8.5
Total suspended solids	milligrams per litre	30

- L2.5 The concentration limits stipulated by condition L2.1/L2.4 for EPA Identification Points 1,8, 9, 10 and 11 are deemed not to apply when the discharge from the stormwater control structures (sediment basins) occurs solely as a result of rainfall measured at the premises which exceeds:
- a) a total of 44 millimetres of rainfall over any consecutive 5 day period.

Note: A 44mm rainfall event is defined by the EPA endorsed publication "Managing urban stormwater: soils and construction" (Landcom, 2004) as the rainfall depth in millimetres for a 95th percentile, 5 day rainfall event for the Central Tablelands which is also consistent with the storage capacity (recommended minimum design criteria) for Type D sediment basins for mines and quarries (see "Managing urban stormwater: soils and construction, Volume 2E, mines and quarries" (DECC, 2008)).

- L2.6 The concentration limit for Total Suspended Solids stipulated by condition L2.1/L2.4 for EPA Identification Points 1, 8, 9, 10 and 11 are deemed not to have been breached where:
- a) the water discharged is not covered by condition L2.5; and
- b) the water discharged complies with a turbidity limit of 25 nephelometric turbidity units at the time of the discharge; and
- c) the EPA is advised within 3 working days of the completion of the sample testing and analysis as required by condition M2.1/M2.2 of any results above the concentration limit.

Note: The purpose of this condition is to expedite the assessment and subsequent discharge of any clarified water from the stormwater control structures (sediment basins).

L3 Waste

- L3.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.

Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.

Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.

This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Cured concrete waste from a batch plant	Recycled concrete aggregate sourced from Hy-Tec Industries Pty	Resource recovery Waste processing (non-thermal)	5,000 tonnes per year

Environment Protection Licence

Licence - 12323



		Limited's concrete batching plants	treatment) Waste storage	
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2005	As specified in each particular resource recovery exemption	NA

L4 Noise limits

L4.1 Noise from the premises must not exceed 35 dB(A) L_{Aeq} (15 minute) at any time.

Where L_{Aeq} means the equivalent continuous noise level - the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

L4.2 To determine compliance with condition(s) L4.1 noise must be measured at, or computed for, any affected noise sensitive locations (such as a residence, school or hospital). A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L4.3 The noise emission limits identified in this licence apply under all meteorological conditions except:
a) during rain and wind speeds (at 10m height) greater than 3m/s; and
b) under "non-significant weather conditions".

Note: Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

L5 Blasting

L5.1 Blasting in or on the premises must only be carried out between 1000 hours and 1500 hours Monday to Friday. Blasting in or on the premises must not take place on Saturdays, Sundays or Public Holidays without the prior approval of the EPA.

L5.2 The airblast overpressure level from blasting operations in or on the premises must not exceed:

- a) 115 dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and
- b) 120 dB (Lin Peak) at any time.

At the most affected noise-sensitive location not under the ownership or control of the licensee .

L5.3 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:

- a) 5mm/s for more than 5% of the total number of blasts carried out on the premises during each reporting period; and
- b) 10 mm/s at any time.

Environment Protection Licence

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At the most affected sensitive location not under the ownership or control of the licensee .

L5.4 The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed 2 mm/s at the most sensitive location within Hartley Village.

L6 Hours of operation

L6.1 Activities covered by this licence must only be carried out between the hours of 06:00 to 22:00 hours Monday to Friday, and 06:00 to 15:00 hours Saturday, and at no time on Sundays and Public Holidays.

L6.2 The loading and dispatch of trucks at the Premises and transport to and from the Premises is permitted between 05:00 hours and 22:00 hours Monday to Friday and between 05:00 hours and 15:00 hours on Saturdays only.

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 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O4 Other operating conditions

O4.1 The stormwater control structures (sediment basins) identified at EPA Identification Points 1, 8, 9, 10 and 11 must be drained or pumped out as necessary to maintain each basins design storage capacity within 5 days following rainfall.

Environment Protection Licence



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- O4.2 Water discharged to comply with condition O4.1 may only be discharged to waters from those stormwater control structures (sediment basins) identified at EPA Identification Points 1, 8, 9, 10 and 11 where the discharged water complies with the discharge limits stipulated at condition L2.1/L2.4 (and taking into consideration condition L2.6).
- O4.3 The licensee must undertake maintenance as necessary to desilt any stormwater control structures (sediment basins) identified at EPA Identification Points 1, 8, 9, 10 and 11 in order to retain each basins design storage capacity.

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:
- in a legible form, or in a form that can readily be reduced to a legible form;
 - kept for at least 4 years after the monitoring or event to which they relate took place; and
 - 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:
- the date(s) on which the sample was taken;
 - the time(s) at which the sample was collected;
 - the point at which the sample was taken; and
 - 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 4,5,6

Pollutant	Units of measure	Frequency	Sampling Method
Particulates - Deposited Matter	grams per square metre per month	Continuous	AM-19

M2.3 Water and/ or Land Monitoring Requirements

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POINT 1,8,9,10,11

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	milligrams per litre	Daily during any discharge	Grab sample
pH	pH	Daily during any discharge	Grab sample
Total suspended solids	milligrams per litre	Daily during any discharge	Grab sample

POINT 2,3

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	milligrams per litre	Special Frequency 1	Grab sample
pH	pH	Special Frequency 1	Grab sample
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

M2.4 For the purposes of the table(s) above Special Frequency 1 means the collection of samples monthly, with the exception of when a discharge is occurring from Point 1, where samples must be collected daily.

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:
- any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
 - 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
 - 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.

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".

- 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.

M4 Recording of pollution complaints

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- 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:
- the date and time of the complaint;
 - the method by which the complaint was made;
 - any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
 - the nature of the complaint;
 - the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
 - 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.

M6 Requirement to monitor volume or mass

- M6.1 For each discharge point or utilisation area specified below, the licensee must monitor:
- the volume of liquids discharged to water or applied to the area;
 - the mass of solids applied to the area;
 - the mass of pollutants emitted to the air;
- at the frequency and using the method and units of measure, specified below.

POINT 1,8,9,10,11

Frequency	Unit of Measure	Sampling Method
Daily during any discharge	kilolitres per day	Estimate

M7 Blasting

- M7.1 To determine compliance with condition(s) L5.2, L5.3 and L5.4

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- a) Airblast overpressure and ground vibration must be measured and electronically recorded at the nearest residence or sensitive receiver or as otherwise directed by an authorised officer of the EPA for all blasts carried out in or on the premises; and
- b) Instrumentation used to measure the airblast overpressure and ground vibration must meet the requirements of Australian Standard AS 2187.2-2006.

M8 Other monitoring and recording conditions

M8.1 Requirement to Monitor Weather

The applicant must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1. The applicant must use the sampling method, units of measure, averaging period and sample at the frequency specified opposite in the other columns unless otherwise approved by the EPA:

Parameter	Units of Measure	Frequency	Averaging Period	Sampling Method
Air temperature	oC	Continuous	1 hour	AM-4
Wind Direction	o	Continuous	15 minute	AM-2 &AM-4
Wind Speed	m/s	Continuous	15 minute	AM-2 & AM-4
Sigma theta	o	Continuous	15 minute	AM-2 & AM-4
Rainfall	mm	Continuous	24 hour	AM-4

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:
1. a Statement of Compliance,
 2. a Monitoring and Complaints Summary,
 3. a Statement of Compliance - Licence Conditions,
 4. a Statement of Compliance - Load based Fee,
 5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
 6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
 7. a Statement of Compliance - Environmental Management Systems and Practices.

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

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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 via eConnect *EPA* or 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 Statements 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.

R1.8 The results of the blast monitoring required by condition M7.1 must be submitted to the EPA at the end of each reporting period.

R2 Notification of environmental harm

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.

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

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

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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.

G2 Contact number for incidents and responsible employees

- G2.1 The licensee must operate 24-hour telephone contact lines for the purpose of enabling the EPA to directly contact one or more representatives of the licensee who can:
- a) respond at all times to incidents relating to the premises; and
 - b) contact the licensee's senior employees or agents authorised at all times to:
 - i) speak on behalf of the licensee; and
 - ii) provide any information or document required under this licence.
- G2.2 The licensee is to inform the EPA of the representative or representatives and their telephone number within 3 months of the date of the issue of this licence. The EPA must be notified of the telephone number on commencement of its operation.

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G2.3 The licensee is to inform the EPA in writing of the appointment of any subsequent contact persons, or changes to the person's contact details as soon as practicable and in any event within fourteen days of the appointment or change.

G3 Signage

G3.1 The location of EPA point number(s) 1 to 7 inclusive must be clearly marked by signs that indicate the point identification number used in this licence and be located as close as practical to the point.

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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 <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
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 <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
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

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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 Environment 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 described 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 months. 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 <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .

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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 Darryl Clift

Environment Protection Authority

(By Delegation)

Date of this edition: 01-July-2005

End Notes

- 1 Licence varied by notice 1057904, issued on 03-Apr-2006, which came into effect on 28-Apr-2006.
- 2 Licence varied by notice 1060537, issued on 30-May-2006, which came into effect on 30-May-2006.
- 3 Licence varied by notice 1068992, issued on 18-Oct-2007, which came into effect on 18-Oct-2007.
- 4 Licence varied by notice 1085280, issued on 07-Jul-2008, which came into effect on 07-Jul-2008.
- 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 1501563 issued on 26-Oct-2011
- 7 Licence varied by notice 1542576 issued on 17-Aug-2016
- 8 Licence varied by notice 1546618 issued on 12-Dec-2016

Appendix D: Water Licences

Information about a water licence or approval

Use this tool to search for information about water licences and approvals issued under the *Water Act 1912* or *Water Management Act 2000*.

Select the type of licence or approval and enter the licence or approval number:

- **Water access licence (WAL):** a WAL number starts with the letters 'WAL' followed by several numbers; a WAL also has a reference number that starts with a two digit number, followed by 'AL' and then several numbers.
- **1912 water licence:** a water licence number starts with a two digit number, followed by a two letter code and then several numbers. Note: a PT reference number cannot be entered.
- **Approval:** an approval number starts with a two digit number, followed by a two letter code (WA, UA, CA or FW) and then several numbers.

Search for information about either a:

- [Water access licence \(WAL\) issued under the *Water Management Act 2000*](#)
- [Water Act 1912 Licences and Authorities](#)

Approval issued under the *Water Management Act 2000*

Approval Number ▼ ▼

Notes: The search results will list the conditions imposed on the approval and also list the number/s of any water access licence/s that nominate the water supply works associated with the approval.

This search tool does not include information about [controlled activity approvals](#). Information publicly available from a register of controlled activity approvals is available at our [local offices](#).

Find out if a *Water Act 1912* licence has been converted

- [Water licence conversion status](#)

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Search Results

Kind of Approval	Issue Date	Expiry Date	Approval Number	Status	Water Source
Water Supply Works	01-JUL-2011	24-NOV-2025	10WA103330	Current	Upper Nepean And Upstream Warragamba Water Source

Work Type	Description	No of Works	Location (Lot/DP)
Diversion Works - Pumps	50mm Centrifugal Pump	1	Lot 31, DP 1009967

Water Access Licences nominating these works

Reference Number	WAL Number
10AL103329	25616

- Conditions

Plan Conditions

Water sharing plan

Greater Metropolitan Region Unregulated River Water Sources

Take of water

MW0655-00001 Any water supply work authorised by this approval must take water in compliance with the conditions of the access licence under which water is being taken.

Water management works

MW0491-00001 When a water supply work authorised by this approval is to be abandoned or replaced, the approval holder must contact the relevant licensor in writing to verify whether the work must be decommissioned.

The work is to be decommissioned, unless the approval holder receives notice from the Minister not to do so.

Within sixty (60) days of decommissioning, the approval holder must notify the relevant licensor in writing that the work has been decommissioned.

Monitoring and recording

MW0481-00001 A logbook must be kept and maintained at the authorised work site or on the property for each water supply work authorised by this approval, unless the work is metered and fitted with a data logger.

MW2338-00001 The completed logbook must be retained for five (5) years from the last date recorded in the logbook.

MW0482-00001 Where a water meter is installed on a water supply work authorised by this approval, the meter reading must be recorded in the logbook before taking water. This reading must be recorded every time water is to be taken.

Reporting

MW0051-00001 Once the approval holder becomes aware of a breach of any condition on this approval, the approval holder must notify the Minister as soon as practicable. The Minister must be notified by:
A. email: water.enquiries@dpi.nsw.gov.au,
or
B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.

Other Conditions

Water management works

DK0888-00001 Any water supply work authorised by this approval used for the purpose of conveying, diverting or storing water must be constructed or installed to allow free passage of floodwaters flowing into or from a river or lake.

DK0878-00001 A. The construction, installation or use of the water supply work authorised by this approval must not cause or increase erosion to the channel or bank of the watercourse.
B. If erosion is observed, the area must be stabilised with grass cover, stone pitching or any other material that will prevent any further occurrence of erosion.

Disclaimer: The NSW Office of Water does not warrant the data is current nor does it warrant that the data or the data capturing processes are free from corruption or error.

Privacy: The information provided is limited to meet the requirements of section 57 of the *Privacy and Personal Information Act 1998*.

Exporting and printing: Search results show a maximum of 50 rows per page. Search results can only be printed page by page.

More information: Should you require further information or technical assistance, please submit your request to water.enquiries@dpi.nsw.gov.au or contact 1800 353 104.

Information about a water licence or approval

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Select the type of licence or approval and enter the licence or approval number:

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- **Approval:** an approval number starts with a two digit number, followed by a two letter code (WA, UA, CA or FW) and then several numbers.

Search for information about either a:

- [Water access licence \(WAL\) issued under the *Water Management Act 2000*](#)
- [Water Act 1912 Licences and Authorities](#)

Approval issued under the *Water Management Act 2000*

Approval Number ▼ ▼

Notes: The search results will list the conditions imposed on the approval and also list the number/s of any water access licence/s that nominate the water supply works associated with the approval.

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Find out if a *Water Act 1912* licence has been converted

- [Water licence conversion status](#)

[<<Previous](#) [Search](#)

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Search Results

Kind of Approval	Issue Date	Expiry Date	Approval Number	Status	Water Source
Water Supply Works	25-MAR-2015	24-MAR-2025	10WA119180	Current	Coxs River Fractured Rock Groundwater Source

Work Type	Description	No of Works	Location (Lot/DP)
Extraction Works Gw	Excavation - Groundwater	1	Lot 1, DP 1005511 Lot 2, DP 1005511

Water Access Licences nominating these works

Reference Number **WAL Number**

- Conditions**Plan Conditions****Water sharing plan****Greater Metropolitan Region Groundwater Sources****Take of water**

MW0655-00001 Any water supply work authorised by this approval must take water in compliance with the conditions of the access licence under which water is being taken.

Water management works

MW0097-00001 If contaminated water is found above the production aquifer during the construction of the water supply work authorised by this approval, the licensed driller must:

- A. notify the relevant licensor in writing within 48 hours of becoming aware of the contaminated water, and
- B. adhere to the Minimum Construction Requirements for Water Bores in Australia (2012), as amended or replaced from time to time.

MW0487-00001 The water supply work authorised by this approval must be constructed within three (3) years from the date this approval is granted.

MW0044-00001 A. When a water supply work authorised by this approval is to be abandoned or replaced, the approval holder must contact the relevant licensor in writing to verify whether the work must be decommissioned.

B. The work is to be decommissioned, unless the approval holder receives notice from the Minister not to do so.

C. When decommissioning the work the approval holder must:

- i. comply with the minimum requirements for decommissioning bores prescribed in the Minimum Construction Requirements for Water Bores in Australia (2012), as amended or replaced from time to time, and
- ii. notify the relevant licensor in writing within sixty (60) days of decommissioning that the work has been decommissioned.

Monitoring and recording

MW0484-00001 Before water is taken through the water supply work authorised by this approval, confirmation must be recorded in the logbook that cease to take conditions do not apply and water may be taken.

The method of confirming that water may be taken, such as visual inspection, internet search, must also be recorded in the logbook.

If water may be taken, the:

- A. date, and
- B. time of the confirmation, and
- C. flow rate or water level at the reference point in the water source must be recorded in the logbook.

MW2338-00001 The completed logbook must be retained for five (5) years from the last date recorded in the logbook.

MW2336-00001 The purpose or purposes for which water is taken, as well as details of the type of crop, area cropped, and dates of planting and harvesting, must be recorded in the logbook each time water is taken.

MW2337-00001 The following information must be recorded in the logbook for each period of time that water is taken:

- A. date, volume of water, start and end time when water was taken as well as the pump capacity

- per unit of time, and
- B. the access licence number under which the water is taken, and
- C. the approval number under which the water is taken, and
- D. the volume of water taken for domestic consumption and/or stock watering.

MW0482-00001 Where a water meter is installed on a water supply work authorised by this approval, the meter reading must be recorded in the logbook before taking water. This reading must be recorded every time water is to be taken.

MW2339-00001 A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by the relevant licensor.

Reporting

MW0051-00001 Once the approval holder becomes aware of a breach of any condition on this approval, the approval holder must notify the Minister as soon as practicable. The Minister must be notified by:
A. email: water.enquiries@dpi.nsw.gov.au,
or
B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.

MK0485-00001 Within sixty (60) days of completing construction of the water supply work authorised by this approval, the approval holder must provide a completed Form A for that work to the relevant licensor.

Other Conditions

Monitoring and recording

DS2431-00001 A. Within 6 months of granting this approval, a monitoring plan to measure the water table, groundwater and surface water quality must be submitted to, and approved by, the relevant licensor, Parramatta Office.

B. Then, the water table, groundwater and surface water quality must be measured according to the approved plan.

C. All monitoring records must be kept for 10 years and provided to the relevant licensor when requested.

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Select the type of licence or approval and enter the licence or approval number:

- **Water access licence (WAL):** a WAL number starts with the letters 'WAL' followed by several numbers; a WAL also has a reference number that starts with a two digit number, followed by 'AL' and then several numbers.
- **1912 water licence:** a water licence number starts with a two digit number, followed by a two letter code and then several numbers. Note: a PT reference number cannot be entered.
- **Approval:** an approval number starts with a two digit number, followed by a two letter code (WA, UA, CA or FW) and then several numbers.

Search for information about either a:

Water access licence (WAL) issued under the *Water Management Act 2000*

Water Access Licence (WAL) Number

WAL

A WAL number starts with the letters 'WAL' followed by several numbers

Can't find your WAL number? Do you have a reference number? A reference number starts with a two digit number, followed by 'AL' and then several numbers. Use the following tool to find your WAL by entering your reference number. [Enter the reference number to find the WAL number.](#)

Notes:

The search results will list the conditions imposed on the water access licence. Any approved water supply work/s nominated on the water access licence are identified by the approval number/s for the work/s.

The information about a water access licence provided in the search results is a summary and may not always be up to date. If you require full and up to date details about a particular water access licence (including current holders, share and extraction component details, encumbrances and notations) you should search the [Water Access Licence Register](#) administered by Land and Property Information.

- [Water Act 1912 Licences and Authorities](#)
- [Approval issued under the *Water Management Act 2000*](#)

Find out if a *Water Act 1912* licence has been converted

- [Water licence conversion status](#)

[<<Previous](#) [Search](#)

[Print](#) [Export](#)

Search Results

Category [Subcategory]	Status	Water Source	Tenure Type	Management Zone	Share Components (units or ML)
---------------------------	--------	--------------	----------------	--------------------	--------------------------------------

Unregulated River	Current	Upper Nepean And Upstream Warragamba Water Source	Continuing	Dharabuladh Management Zone	20.00
-------------------	---------	---	------------	-----------------------------	-------

Extraction Times or Rates

Subject to conditions water may be taken at any time or rate

Nominated Work Approval(s)

10WA103330

- Conditions

Plan Conditions

Water sharing plan

Greater Metropolitan Region Unregulated River Water Sources

Take of water

- MW0112-00001 The maximum water allocation that may be carried over in the account for this access licence from one water year to the next water year is:
A. a volume equal to 100 % of the share component of the licence, or
B. 1 ML/unit share of the share component of the licence.
- MW0017-00023 From 1 July 2011, water must not be taken from the Dharabuladh Management Zone of the Upper Nepean and Upstream Warragamba Water Source when flows are in the Very Low Flow Class, which means that the flow at Coxs River at the Island Hill gauge [No. 212045] is:
A. equal to or less than 17 ML/day on a rising river,
or
B. equal to or less than 15 ML/day on a falling river.
This restriction does not apply if water is to be taken from a runoff harvesting dam or an in-river dam pool.
- MW0036-00002 The volume of water taken in any three (3) consecutive water years from 1 July 2012 must be recorded in the logbook at the end of those three water years. The maximum volume of water permitted to be taken in those years must also be recorded in the logbook.
- MW0605-00001 Water must be taken in compliance with the conditions of the approval for the nominated work on this access licence through which water is to be taken.
- MW0670-00001 Water must only be taken if there is visible flow in the water source at the location where water is to be taken.
This restriction does not apply if water is to be taken:
A. from an off-river pool, an in-river pool, a runoff harvesting dam or an in-river dam pool, or
B. from the following Weirs: Maldon, Douglas Park, Menangle, Camden, Sharpes, Cobbity, Mount Hunter Rivulet, Brownlow Hill, Theresa Park and Wallacia.
- MW0004-00002 From 1 July 2012, the total volume of water taken in any three (3) consecutive water years under this access licence must not exceed a volume which is equal to the lesser of either:
A. the sum of:
i. water in the account from the available water determinations in those 3 consecutive water years, plus
ii. water in the account carried over from the water year prior to those 3 consecutive water years, plus
iii. any net amount of water assigned to or from this account under a water allocation assignment in those 3 consecutive water years, plus
iv. any water re-credited by the Minister to the account in those 3 consecutive water years,
or

- B. the sum of:
- i. the share component of this licence at the beginning of the first year in those 3 consecutive water years, plus
 - ii. the share component of this licence at the beginning of the second year in those 3 consecutive water years, plus
 - iii. the share component of this licence at the beginning of the third year in those 3 consecutive water years, plus
 - iv. any net amount of water assigned to or from this account under a water allocation assignment in those 3 consecutive water years, plus
 - v. any water re-credited by the Minister to the account in those 3 consecutive water years.

Monitoring and recording

MW2337-00001

The following information must be recorded in the logbook for each period of time that water is taken:

- A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time, and
- B. the access licence number under which the water is taken, and
- C. the approval number under which the water is taken, and
- D. the volume of water taken for domestic consumption and/or stock watering.

MW2339-00001

A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by the relevant licensor.

Reporting

MW0051-00002

Once the licence holder becomes aware of a breach of any condition on this access licence, the licence holder must notify the Minister as soon as practicable. The Minister must be notified by:

- A. email: water.enquiries@dpi.nsw.gov.au,
or
- B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.

Other Conditions

NIL

Disclaimer: The NSW Office of Water does not warrant the data is current nor does it warrant that the data or the data capturing processes are free from corruption or error.

Privacy: The information provided is limited to meet the requirements of section 57 of the *Privacy and Personal Information Act 1998*.

Exporting and printing: Search results show a maximum of 50 rows per page. Search results can only be printed page by page.

More information: Should you require further information or technical assistance, please submit your request to water.enquiries@dpi.nsw.gov.au or contact 1800 353 104.

Information about a water licence or approval

Use this tool to search for information about water licences and approvals issued under the *Water Act 1912* or *Water Management Act 2000*.

Select the type of licence or approval and enter the licence or approval number:

- **Water access licence (WAL):** a WAL number starts with the letters 'WAL' followed by several numbers; a WAL also has a reference number that starts with a two digit number, followed by 'AL' and then several numbers.
- **1912 water licence:** a water licence number starts with a two digit number, followed by a two letter code and then several numbers. Note: a PT reference number cannot be entered.
- **Approval:** an approval number starts with a two digit number, followed by a two letter code (WA, UA, CA or FW) and then several numbers.

Search for information about either a:

Water access licence (WAL) issued under the *Water Management Act 2000*

Water Access Licence (WAL) Number

WAL

A WAL number starts with the letters 'WAL' followed by several numbers

Can't find your WAL number? Do you have a reference number? A reference number starts with a two digit number, followed by 'AL' and then several numbers. Use the following tool to find your WAL by entering your reference number. [Enter the reference number to find the WAL number.](#)

Notes:

The search results will list the conditions imposed on the water access licence. Any approved water supply work/s nominated on the water access licence are identified by the approval number/s for the work/s.

The information about a water access licence provided in the search results is a summary and may not always be up to date. If you require full and up to date details about a particular water access licence (including current holders, share and extraction component details, encumbrances and notations) you should search the [Water Access Licence Register](#) administered by Land and Property Information.

Approval issued under the *Water Management Act 2000*

Find out if a *Water Act 1912* licence has been converted

Water licence conversion status

« Previous Search

Print Export

Search Results

Category [Subcategory]	Status	Water Source	Tenure Type	Management Zone	Share Components (units or ML)
Aquifer	Current	Coxs River Fractured Rock Groundwater Source	Continuing		20.00

Extraction Times or Rates

Subject to conditions water may be taken at any time or rate

Nominated Work Approval(s)

10WA119180

- Conditions

Plan Conditions

Water sharing plan

Greater Metropolitan Region Groundwater Sources

Take of water

- MW0929-00001 From 1 July 2018, if the water supply work nominated on this access licence is located at or less than 40 m from the top of the high bank of a river then:
- A. water must not be taken in this groundwater source when flows are in the Very Low Flow Class for an unregulated river access licence in that river.
 - B. This restriction will only apply when the system that confirms when water can be taken is available on DPI Water website.
 - C. DPI Water will inform the licence holder in writing of the applicable restrictions and how to access the information on its website when this system becomes operative.
- MW0605-00001 Water must be taken in compliance with the conditions of the approval for the nominated work on this access licence through which water is to be taken.
- MW0919-00001 A maximum water allocation of 0.1 ML/unit share may be carried over in the account for this access licence from one water year to the next water year if a water meter is installed on each water supply work nominated on this licence and each meter is maintained in working order.
- MW0547-00001 The total volume of water taken under this licence in any water year must not exceed a volume equal to:
- A. the sum of water in the account from the available water determination for the current year, plus
 - B. the water carried over in the account from the previous water year, plus
 - C. the net amount of water assigned to or from the account under a water allocation assignment, plus
 - D. any water re-credited by the Minister to the account.
- ##### Monitoring and recording
- MW2338-00001 The completed logbook must be retained for five (5) years from the last date recorded in the logbook.
- MW2336-00001 The purpose or purposes for which water is taken, as well as details of the type of crop, area cropped, and dates of planting and harvesting, must be recorded in the logbook each time water is taken.
- MW2337-00001 The following information must be recorded in the logbook for each period of time that water is taken:
- A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time, and
 - B. the access licence number under which the water is taken, and
 - C. the approval number under which the water is taken, and
 - D. the volume of water taken for domestic consumption and/or stock watering.
- MW2339-00001 A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by DPI Water.
- ##### Reporting
- MW0051- Once the licence holder becomes aware of a breach of any condition on this access licence, the

00002 licence holder must notify the Minister as soon as practicable. The Minister must be notified by:
A. email: water.enquiries@dpi.nsw.gov.au,
or
B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.

Other Conditions

NIL

Disclaimer: The NSW Office of Water does not warrant the data is current nor does it warrant that the data or the data capturing processes are free from corruption or error.

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More information: Should you require further information or technical assistance, please submit your request to water.enquiries@dpi.nsw.gov.au or contact 1800 353 104.

Appendix E: Extractive Materials Return



RETURN FOR EXTRACTIVE MATERIALS: YEAR ENDED 30 JUNE 2018

Quote RIMS ID in all correspondence

Quarry Id: _____ Rims ID: <u>400891</u> Operators Name: <u>AUS-10 RHYOLITE PTY LTD.</u> Address: <u>P.O. BOX 6770</u> <u>SILVERWATER</u> <u>NSW 1811</u> Email: <u>darryl.thiedeke@hy-tec.com.au</u> Quarry Name: <u>AUSTEN QUARRY</u> Quarry Address: <u>391 JENOLAN CAVES RD.</u> <u>HARTLEY, NS. W.</u>	Inquiries please telephone: (02) 4063 6713 Completed or Nil Returns Email – mineral.royalty@planning.nsw.gov.au Postal Address (see address below)	2017-2018
Please amend name, postal address and location of mine or quarry if incorrect or incomplete		

The return should be completed and forwarded to the **MANAGER ASSESSMENT COORDINATION, RESOURCE OPERATIONS, NSW PLANNING & ENVIRONMENT, PO BOX 344 HUNTER REGION MAIL CENTRE NSW 2310** on or before **31 October 2018**. If completion of the return is unavoidably delayed, an application for extension of time should be requested before the due date. If no work was done during the year, a **NIL** return must be forwarded.

The return should relate to the above quarrying establishment, and should cover the operations of quarrying and treatment (such as crushing, screening, washing etc.) carried out at or near the quarry. A return is required even if the operations are solely of a developmental nature, and whether the area being worked is held under a mining title or otherwise.

Director Titles Assessments

Please complete all of the following information to assist in identifying the location of the Quarry

Typical Geology RHYOLITE

Nearest Town to Quarry HARTLEY

Local Council Name LITHGOW

Deposited Plan and Lot Number/s of Quarry LT1, DP1005511, LT2, DP1005511, LT31, DP1009967

Email Address of Operator AS ABOVE

Name of Owner or Licensee AS ABOVE

Postal Address of Licensee AS ABOVE

Licence/Lease Number/s (if any)
 From Mineral Resources NSW (Industry & Investment NSW) N/A
 From Department of Lands or other Department N/A

If any output was obtained from land NOT held under licence from the above Departments, state the Name/s and Address/es of the Owners of the land _____

- To the best of my knowledge, the particulars which have been entered in this return are correct and no blank spaces have been left where figures should have been inserted.
- SIGNATURE of PROPRIETOR or MANAGER [Signature] DATE 27/9/2018
- PERSON to be contacted if queries arise regarding this return DARRYL THIEDEKE
- NAME (Block letters) DARRYL THIEDEKE Telephone 02 9647 2866

SALES During 2017-2018

Production information may be published in aggregated form for statistical reporting. However, production data for individual operations is kept strictly confidential.

Product	Description	Quantity Tonnes
Virgin Materials		
• Crushed Coarse Aggregates		
Over 75mm		2,202
Over 30mm to 75mm		2,179
5mm to 30mm		701,421
Under 5mm		
Natural Sand		
Manufactured Sand		250,138
Prepared Road Base & Sub Base		53,761
Other Unprocessed Materials		16,797
Recycled Materials		
• Crushed Coarse Aggregates		
Over 75mm		
Over 30mm to 75mm		
5mm to 30mm		
Under 5mm		
Natural Sand		
Manufactured Sand		
Prepared Road Base & Sub Base		
Other Unprocessed Materials		
• River Gravel		
Over 30mm		
5mm to 30mm		
Under 5mm		
• Construction Sand	Excluding Industrial	
• Industrial Sand		
Foundry, Moulding		
Glass		
Other (Specify)		
• Dimension Stone	Building, Ornamental, Monumental	
Quarried in Blocks		
Quarried in Slabs		
• Decorative Aggregate	Including Terrazzo	
• Loam	Soil for Topdressing, Garden soil, Horticultural purposes)	
• TOTAL SITE PRODUCTION		1,026,498
• Gross Value (\$) of all Sales	\$29.7 MILL.	
• Type of Material	CONCRETE AGGREGATES + ROADBASE MATERIALS	
• Number of Full-Time Equivalent (FTE) Employees	Employees: 18	Contractors 3

Please Note: A return for clay based products can be obtained by contacting the inquiry number.

Appendix F: E-Sampler Repair Report



CBased Environmental Pty Limited

ABN 62 611 924 264

3 January 2018

Attention: Rodd Welsh
Quarry Production Manager
Austen Quarry
Submitted via email: rod.welsh@hy-tec.com.au

E-Sampler Repairs

Dear Rodd,

Please find below and attached the details of the recent repairs to the E-Sampler at Austen Quarry.

1. Background

CBased Environmental supplied a Met-One E-Sampler (distributed in Australia by Ecotech Pty Ltd as the Protinus-1000) to Austen Quarry which was fully commissioned and operational on the 13th March 2017. CBased Environmental was also engaged to complete quarterly calibrations of the E-Sampler, which were completed in June 2017 and September 2017.

2. Identification of Fault

Around mid October the E-Sampler started experiencing faults, which were identified by CBased Environmental when setting up email/sms alarms (on the 20th October) at the request of Austen Quarry personnel.

The system was power cycled by Austen Quarry personnel, however the fault was not rectified and CBased Environmental attended site on the 24th October 2017.

3. Fault Details

When onsite on the 24th October the E-Sampler error logs were reviewed on the machine. Numerous zero calibrate errors and solenoid errors were found to have been occurring since the 14th October.

The unit was power cycled again and the self test came back ok, a flow check and leak check were also conducted, both results were good, however the current PM₁₀ level was reading ~120µg/m³ which appeared excessive given the apparent air quality on the day. A zero filter was installed on the E-Sampler inlet to remove all PM₁₀ from the air entering the E-Sampler, however the PM10 levels recorded still remained ~120µg/m³ indicating the unit was not functioning correctly.

The OEM was called and advised of the faults being encountered, the OEM recommended the unit be removed from site and taken back to them for repairs.

The CBased Environmental Field Service Report from the 24th October is attached as **Appendix 1**.

The E-Sampler was delivered to Ecotech's Sydney office on the same day it was removed from site (24th October 2017).

4. Unit Repair

The E-Sampler was sent from Sydney to Ecotech's Melbourne service department for repairs, timeline of repairs as below:

31/10/17 – CBased Environmental requested update on repairs

3/11/17 – Ecotech advised waiting on report from Service Department

7/11/17 - CBased Environmental requested further update on repairs

14/11/17 - CBased Environmental requested further update on repairs

15/11/17 – Ecotech advised the E-Sampler was scheduled for dispatch the same day (15/11/2017)

27/11/17 – CBased Environmental had not received or heard from Ecotech about E-Sampler, issue escalated to Ecotech's NSW Branch Manager.

30/11/17 – Ecotech identified E-Sampler repaired but requesting PO prior to shipping

1/12/17 – PO sent by CBased Environmental

14/12/17 – E-Sampler back at CBased Environmental office

19/12/17 – E-Sampler re-installed onsite at Austen Quarry by CBased Environmental however datalogger no longer successfully polling the E-Sampler for air quality data.

2/1/18 – Remote firmware and configuration update to datalogger. All data now being logged successfully.

The Ecotech Service Report (**Appendix 2**) indicates that contamination was found in the optical bench of the unit, which was cleaned and serviced as part of the repairs, there was no further written detail provided regarding what the contamination was and how it occurred, however verbal communication with personnel at Ecotech indicated that tiny insects have previously been found in the optical bench and it was recommended that the monitoring compound be maintained (grass kept to a minimum) and insecticide application be considered within the compound area and around the monitoring equipment enclosure.

Should you wish to discuss the above in further detail please contact me on the details below.

Yours faithfully



Chris Ellis

General Manager

CBased Environmental Pty Ltd

Mobile: 0429774246

Email: chris.ellis@cbased.com.au

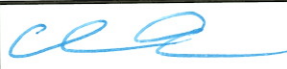
Appendix 1

CBased Environmental Field Service Report



CBASED ENVIRONMENTAL PTY LTD

Field Service Report

Customer / Site	Austen Quarry		Site Contact:	R. Welsh
Customer PO #			CBE Technician:	Collis
Plant / Equipment / Unit Type Details	E-Sampler		Serial #	16-1799
Work Requested / Fault	E-Sampler not working really high readings followed by flatlined readings (zeros).			
Item / Part	Description	Qty	Source/Cost	
1.				
2.				
3.				
4.				
Day	Tuesday			
Date	24/10/17			
Time Started	1036			
Time Finished	1200			
Travel Time				
Total Time				
Work Performed	<p>from 14/10/17 - zero calibrate errors & Solenoid errors</p> <p>Flows - 2.04 Lpm - Good.</p> <p>Leak Check - 0.00 - PASS</p> <p>self test - ok</p> <p>Current PM₁₀ ~ 120 µg/m³ → High.</p> <p>checked PM₁₀ with zero filter installed → still 120 µg/m³</p> <p>called OEM → recommended return for repair</p> <p>Unit taken offsite for repairs</p>			
Outstanding Action	<input checked="" type="checkbox"/> YES / NO repairs @ OEM and return to service.			
Sign off to confirm report reflects service provided	CBE Technician			Client

Appendix 2

Ecotech Customer Service Report

Date Printed: 1-12-2017

Customer

Customer Code: CAR007
Customer Name: CBased Environmental Pty Ltd
Customer PO:
Ecotech Invoice:
Contact: Colin Davies
Environmental Scientist/ Director
P: 02 6571 3334
M: 0439 604 443
cbased@bigpond.com
Invoice To: CBased Environmental Pty Ltd
Unit 3 2 Enterprise Crescent, McDougalls Hill NSW 2330
Deliver To: CBased Environmental Pty Ltd
Unit 3 2 Enterprise Crescent McDougalls Hill, NSW 2330
Shipping Details:

Service Work

Service Work Record: SWR-017828
Description: E-Sampler for repair. Lots of errors - zero calibrate errors and solenoid errors. Customer was able to run the unit after a self test with no errors, but PM10 levels were high. Zero filter was installed on the inlet but PM10 was still 120ug/m3 so something amiss with the unit.
Work Summary: The following service work was performed:

INSPECTION SERVICE
- General function operation ~ Passed but having high zero readings
- Contamination found in optical bench (engine)

REPAIR and CALIBRATION SERVICE
- Optical bench (engine) ~ Serviced
- Pump Filter ~ Replaced
- Ambient Temp ~ Calibrated
- Barometric Pressure ~ Calibrated
- Flow ~ Calibrated
- Instrument was for 12 hours and then data retrieved
- Zero and Span check ~ Passed

FINAL QA SERVICE
- Final QA ~ Passed

Parts Consumed

Qty	Part Number	Description
1	F010014	FILTER FOR PURGE FLOW TO SUIT PROTINUS (EACH)
1	F010015	FILTER ELEMENT ONLY - VACUUM TO SUIT IN-LINE PROTINUS E-BAM (EACH)
4	ZZ-SC-0010-00	Labour per hour Included in Service/Repairs (EACH)

Appendix G: Completed Checklist and Training Examples



HY-TEC Industries - Austen Quarry
Environmental Inspection Check List

MONTH AND DATE RECORD

Annual Sign Off (Quarry Manager):

Category:	Checklist:	Timing:	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Notes / Comments:
Environmental Management Strategy	Perimeter and area check (markers, fencing, flagging etc.)	Monthly	CPD	CPD	MT	MS	MT	MT	CPD	MT					
	Pit boundary inspection	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					
	Quarry boundary inspection	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					
	Inspection of areas around refuelling locations and chemical stores	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					Areas are clean and free of spills / waste
	Spill kit inspections	Quarterly	RD			RD			FR						Ensure all kits are available and in working condition
	Safety Data Sheets (SDS) maintained for site	Biannual Check of Records	CPD	CPD	CPD	CPD	CPD	CPD	CPD	CPD	CPD				Are records accurate and up to date?
	Lighting inspection	Monthly	CPD	CPD	CPD	CPD	CPD	CPD	CPD	CPD	CPD				General check of lighting - glow experienced by neighbours is minimised.
	E Sampler check	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					Functioning and data downloaded
	Weather station check	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					Functioning and data downloaded
	Dust monitoring stations check	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					Take sample for analysis
Rehabilitation areas inspection	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					Condition of rehabilitation areas	
Seed/grass propagation	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					Condition of seed/grass	
Tree/tube stock propagation	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					Condition of saplings	
Topsoil stockpile inspection	Monthly	MS	CPD	MT	MS	MT	MT	CPD	MT					Topsoil stockpiles are not eroding and have stabilising groundcover	
Revegetation Inspection	Periodically in first year (3/5/12 months) and then every two years	MS	MS	MS	MS	MS	MS	MS	MS					Inspection checklist to be completed.	
Weed Inspections	Quarterly visual inspection	MS	MS	MS	MS	MS	MS	MS	MS					Visual check for infestations.	
Weed inspections	Commission Biannual Weed Treatment	MS	MS	MS	MS	MS	MS	MS	MS					Professional spraying	
Environmental Safety	Visual Amenity - At external vantage point	Biannual photo record at Hassans Walls	CPD	CPD	CPD	CPD	CPD	CPD	CPD	CPD					Photos taken for annual reporting
	Evacuation access roads	Quarterly	MS	MS	MS	MS	MS	MS	MS	MS					Access not limited / restricted
	Quarry pit evacuation access	Monthly	MS	MS	MS	MS	MS	MS	MS	MS					Access not limited / restricted
	EPL point signage	Monthly	MS	MS	MS	MS	MS	MS	MS	MS					Signage in good condition
	Check fire breaks/buffer zones for fuel sources	Annually Prior to Fire Season	MS	MS	MS	MS	MS	MS	MS	MS					
	Check access to water sources for firefighting purposes	Annually Prior to Fire Season	MS	MS	MS	MS	MS	MS	MS	MS					
	Flora & fauna monitoring	Commission Consultant for Annual Monitoring	MS	MS	MS	MS	MS	MS	MS	MS					Commission ecologist for surveys
Livestock / flora / fauna	Feral animal sightings/signs	Monthly	MS	MS	MS	MS	MS	MS	MS	MS					Report any sightings or evidence.
	Livestock sightings/signs	Monthly	MS	MS	MS	MS	MS	MS	MS	MS					Report any sightings or evidence.

Concrete & Aggregates

HTA-S-SFT-050

Austen Quarry

Safety Management System

Appendix 12Q

"Uncontrolled Copy When Printed"

Mobile Plant and Equipment Access to Site Checklist

Plant Owner: <u>Premier drill and Blast</u>		Date: <u>27.6.18</u>	
Make: <u>Atlas Copco</u>		Equipment ID (Rego/vin): <u>T40</u>	
Model: <u>T40</u>			

Circle Applicable Item of Plant															
Mobile Screen	Front End Loader	Backhoe	Drill Rig	Air compressor, water trucks	Crane *note	Dozer / Tractor	Excavator/ Trencher	Forklift	Grader	Petrol/diesel pump	Elevated Work Platform	Skid Steer loader	Dump Truck	Trailer	Other
✓ Appropriate Columns															
Compliant															
Not Applicable															
Current Registration / Conditional Registration Certificate															
Current Pressure Vessel Certificate															
Operating Manual and Logbook Supplied															
Statutory Inspections up to date (* note)															
Equipment is in fit state to work (No current defects identified in logbook)															
Fault reporting / rectification system used															
Daily safety inspection procedures / checklists supplied															
All braking systems (Retarder, Emergency and park) inspected/tested as per OEM															
Steering system (normal & emergency) inspected/tested as per OEM															
Lights working (warning, flashing, headlights, reversing, working)															
Reverse Siren fitted and working															
Fire Extinguisher supplied and in current test date															
Seat belt or personal restraining device fitted and working correctly.															
Air conditioning unit fitted and working correctly															
Tools, leads and safety switches inspected and electrical Test & Tag in date															
Hoses, fittings, cables, plugs, switches and controls inspected and in good condition															
Any visual leaks to hoses or fittings.															
Pins and bushes good condition, all safety clips/pins attached correctly.															

Concrete & Aggregates

HTA-S-SFT-050

Austen Quarry

Safety Management System

"Uncontrolled Copy When Printed"

✓ Appropriate Columns			
Compliant	Non Compliant	Not Applicable	Comments
✓			Operators trained and licenced
✓			Warning and instructions displayed
✓			Tyres / tracks serviceable, fitted correctly and in good condition
		NA	SWL of lifting equipment displayed / Compliance plate fitted
✓			Manufacturers guarding fitted.
✓			Emergency stops / lanyards appropriately placed, clearly identified and working correctly
		NA	LPG cylinders within ten year stamp and in good condition
✓			All work platforms have secure handrails and access ladders fitted and in good condition
✓			ROP's and FOP's fitted and in good condition
✓			Two way radio fitted or supplied
✓			Mobile plant and equipment is free of soil and vegetation.
✓			Mobile plant and equipment is free of soil and vegetation before exit from site.
			Other:

Premier drill and blast

Equipment's Authorised Company Representative

..... (Company name that owns the equipment) have completed the above checklist and certify ABL Concrete & Aggregates have been supplied with the necessary Operating Instructions to ensure the safe use of the above identified equipment, that the equipment is in a safe condition and is "fit for purpose" when used in accordance with the Operating Instructions supplied.

Name:
(Please Print)

Anthony Vealton

Signature:



Date:

27-6-18

ABL C&A Authorised Representative

I have inspected the above identified equipment and checked the necessary controls as set out in this checklist:

Name:
(Please Print)

Made Taylor

Signature:



Date:

27.6.18



*Note: Certificate of yearly inspection is required and if older than 10 years, a 10 years major inspection certificate must also be provided.


WEED IDENTIFICATION MANUAL


Ecological surveys of the Austen Quarry site have identified that the following weed species occur within the site. The following summary of weed species provides an overview of weed habitat, flowering periods and treatment.


If weed infestations of any of these species are identified within the site please notify the Quarry Production Manager or Quarry Supervisor.

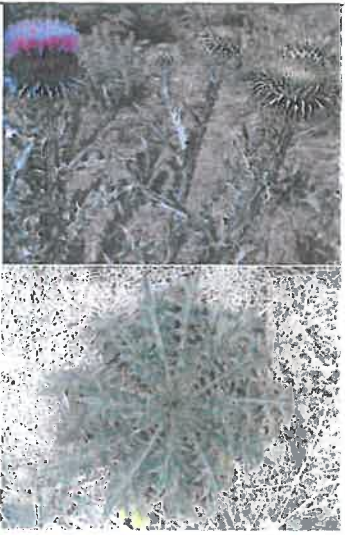


 	Name of Weed:	<i>Eragrostis curvula</i> (African lovegrass)
	Biosecurity Duty (Central Tablelands)	General - prevent, eliminate or minimise any biosecurity risk
	Habitat:	Along roads and in grazing areas in sandy soils or soils with low fertility. 30 cm to 120 cm tall
	Flowering period:	November to April. Can seed anytime during the year.
	Timing and Method for Management:	September to March. Herbicide spraying and sowing/managing pastures to outcompete the plant. Spraying alone may not be effective. Prevent spread (through vehicles or machinery). Regular monitoring for infestations.



	Name of Weed:	<i>Rubus fruticosus</i> agg. Spp. (Blackberry)
	Biosecurity Duty (Central Tablelands)	Prohibition on Dealings: Must not be imported or sold (excluding some commercial varieties)
	Habitat:	Australia-wide weed infestations grow in most locations where there is sufficient rainfall.
	Flowering period:	White or pink flowers 2-3 cm in diameter appear from November to January.
	Timing for Management:	Prevention where possible, or spraying during flowering period. Requires ongoing and long-term management in form of: <ul style="list-style-type: none"> - Hand weeding and slashing - Spraying with herbicides - Grazing (goats are best) - Pasture management to out compete weeds.



	Name of Weed:	<i>Nassella trichotoma</i> (Serrated tussock)
	Biosecurity Duty (Central Tablelands):	Prohibition on Dealings: Must not be imported or sold. Recommended Measure: Limit risk of introduction and mitigate possible spread.
	Habitat:	Appears in grazing lands, grassy woodlands and forests
	Flowering period:	Anytime except June/July
	Timing for Management:	February to October Treatment of this weed may involve the following. <ul style="list-style-type: none"> - Chipping or grubbing out manually - Spraying with herbicides - Pasture management to out-compete weeds.

	Name of Weed:	<i>Conium maculatum</i> (Hemlock)
	Biosecurity Duty (Central Tablelands):	General - prevent, eliminate or minimise any biosecurity risk
	Habitat:	Appears in disturbed areas such as stockyards and along roadsides and riverbanks. Plant is highly toxic to humans and livestock
	Flowering period:	Spring
	Timing for Management:	All year in regular intervals. Use herbicides for management.

	Name of Weed:	<i>Onopordum spp.</i> (Scotch, Stemless, Illyrian and Taurian thistles)
	Biosecurity Duty (Central Tablelands):	General - prevent, eliminate or minimise any biosecurity risk
	Habitat:	Mainly pasture areas with moderate to high rainfall. Prefers soils that are well drained and of moderate to high fertility.
	Flowering period:	October to February
	Timing for Management:	September to December. Treatment of this weed may involve the following. <ul style="list-style-type: none"> - Chipping or grubbing out manually - Spraying with herbicides - Pasture management to out-compete weeds.

	Name of Weed:	<i>Hypericum perforatum</i> (St John's wort)
	Biosecurity Duty (Central Tablelands):	Recommended Measure: Limit risk of introduction and mitigate possible spread.
	Habitat:	It is found in pastures, water catchment reserves, forests and national parks. It is most suited to areas receiving more than 600 mm annual rainfall and above 500 m altitude.
	Flowering period:	October to April
	Timing for Management:	November to January. Treatment of this weed may involve the following. <ul style="list-style-type: none"> - Chipping or grubbing out manually - Spraying with herbicides - Burning - Pasture management to out-compete weeds.

 	Name of Weed:	<i>Rosa rubiginosa</i> (Sweet briar)
	Biosecurity Duty (Central Tablelands):	General - prevent, eliminate or minimise any biosecurity risk
	Habitat:	Small 1.5m to 3m shrub common in cooler areas with high rainfall. Found in unimproved grasslands and disturbed bushland. It prefers well-drained areas of moderate fertility with little competition and light grazing. The weed can grow on most soil types.
	Flowering period:	October to December
	Timing for Management:	November to March (foliar spraying is most effective). Treatment of this weed may involve the following. <ul style="list-style-type: none"> - Slashing and deep ploughing or ripping in winter to bring the roots to the surface - Spraying with herbicides - Grazing with goats - Pasture management to out-compete weeds.

Name of Trainee	<u>Craig McDonald</u>	Name of Trainer	<u>David Bone</u>
Signature & Date	<u> 30/11/17</u>	Signature & Date	<u> 30/11/17</u>

ENVIRONMENTAL MANAGEMENT INDUCTION

The Austen Quarry is located in a rural area adjacent to the Coxs River and a short distance from the Blue Mountains. Operators and contractors need to be aware of general operational requirements to limit potential environmental impacts and activities that may be the cause of a complaint.



Hours of Operation

The following are the approved hours of operations for the Austen Quarry.

Activity	Permissible Hours	Please Tick
Extraction operations Processing operations Overburden Management Stockpile Management	6 am to 10 pm Monday to Friday; 6 am to 3 pm Saturday; and At no time on Sundays or public holidays.	/
Blasting	10 am to 3 pm Monday to Friday (except public holidays).	
Loading and dispatch	5 am to 10 pm Monday to Friday; 5 am to 3 pm Saturdays; and At no time on Sundays or public holidays.	
Maintenance	Anytime.	
All activities outside these hours of operation need to be discussed with the Quarry Production Manager or Quarry Supervisor before they occur.		

Noise and Dust Management

There are several activities that may result in unnecessary noise or cause significant dust emissions. Please be aware of these activities while operating.

	Please Tick
Truck noise on roads	/
Equipment noise – is the equipment more noisy than usual or requires maintenance.	/
Impact noise from material being loaded to trucks.	/
Weather conditions causing more than usual dust lift off from roads or stockpiles.	/
Do any unsealed roads need watering to limit dust	/
Be considerate of neighbours during early mornings and late evenings.	/
If you have concerns about any of the above, raise them with the Quarry Supervisor.	/

Hydrocarbon Management

Hydrocarbons are stored and used at the Austen Quarry that may be a potential fire hazard or contamination risk. All hydrocarbons are stored in secured and bunded areas, however it is your responsibility to carefully manage use of these materials.

	Please Tick
Ensure you are aware of the locations of spill kits and fire extinguishers in the area you are working.	/
Handle all hydrocarbons with appropriate care when refuelling or in maintenance works.	/
Clean up spills of diesel fuel or oils immediately using the spill kits provided.	/
Smoking is only permitted in designated areas.	/
If there is a risk of fire, contamination or the spill might enter a waterbody, report the incident to the Quarry Production Manager or Quarry Supervisor immediately.	/

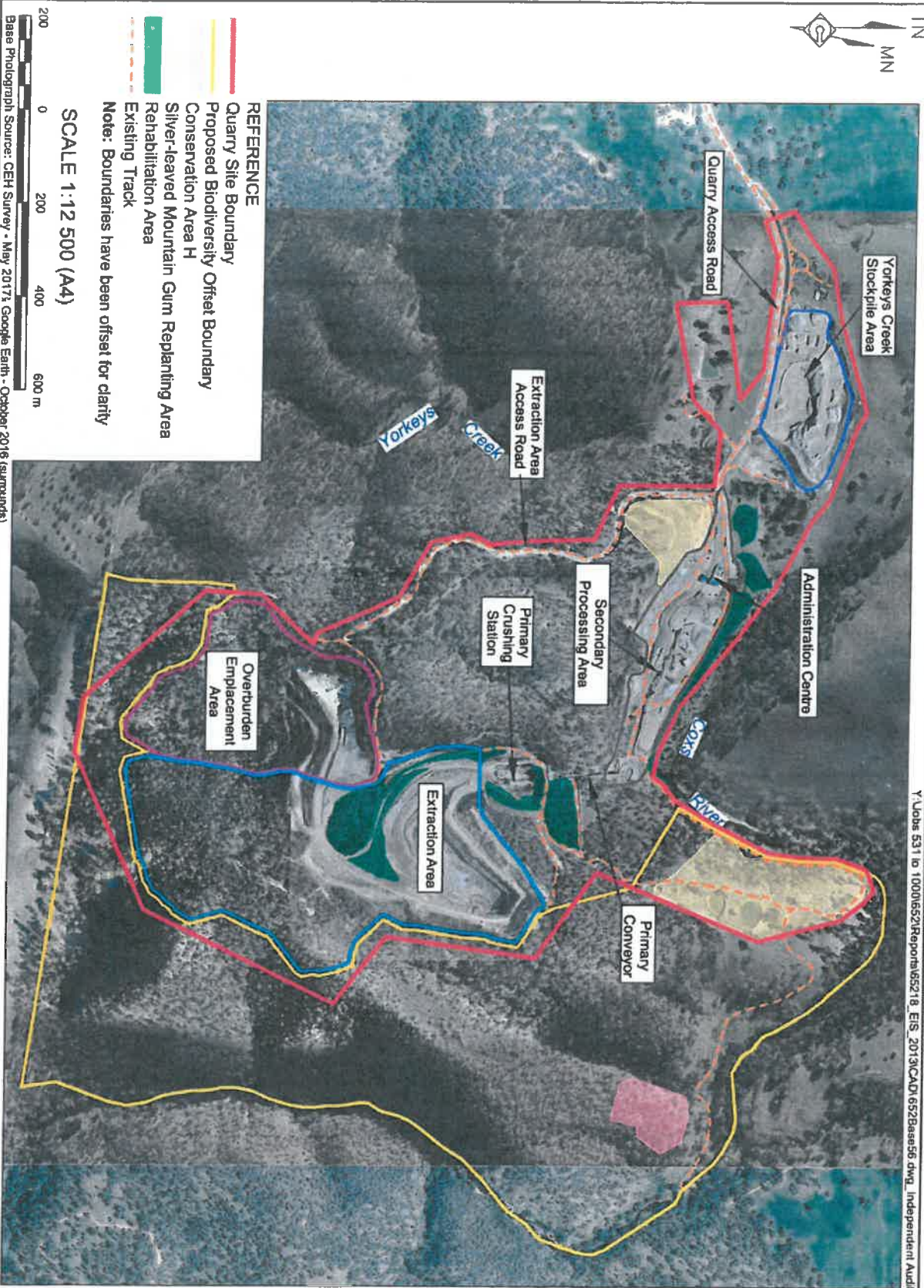
Waste Management	Please Tick
Hy-Tec aims to recycle or reuse as much material as possible at the Austen Quarry.	/
Waste materials at the Austen Quarry should be separated into the following types.	/
<ul style="list-style-type: none"> • General refuse • Recyclables – bottles, cardboard, paper • Scrap metals • Tyres • Batteries • Oily wastes • Concrete wastes 	/
Ensure you are aware of storage areas for all separated wastes.	/
Under no circumstances is waste material to be burnt or buried on site.	/
If you are unsure what is required for any waste materials you encounter, please ask the Quarry Supervisor.	/

Water Management	Please Tick
The Austen Quarry implements a water management system to separate clean and dirty water and to ensure that any water from within the site that enters the Coxs River does not damage the aquatic environment.	
Report any failure or overflow of dams or other water management structures to the Quarry Supervisor	/
Report any failure of pumps or pipelines to the Quarry Supervisor	/
Report any unusual evidence of erosion to the Quarry Supervisor	/
If you have any queries regarding water management at the site, please ask the Quarry Supervisor or Quarry Production Manager.	/

Flora and Fauna Management	Please Tick
Hy-tec manages some areas within the Austen Quarry to conserve the existing native flora and fauna. It is the responsibility of all operators and contractors to limit impacts to native vegetation and animals and ensure that these areas of the site are not inadvertently damaged.	
The Austen Quarry is home to a threatened species of plant called the Silver Leafed Mountain Gum (<i>Eucalyptus pulverulenta</i>). Unless the plant is in an area approved for extraction activities, this plant must be protected.	/
<p>The Austen Quarry contains several areas that are designated for vegetation and native fauna habitat conservation. These include the following.</p> <ul style="list-style-type: none"> • Proposed Biodiversity Offset Area • Conservation Area H • Rehabilitation Areas • Silver Leafed Mountain Gum Replanting Area <p>The attached figure shows the location of these areas. All native flora and fauna is to be protected in these areas.</p>	/
The attached figure displays the existing access roads within the Quarry. All operators and contractors must drive on these tracks unless there is an emergency.	/
Please report all sightings of feral animals including cats, dogs, rabbits, rats, goats and foxes to the Quarry Supervisor.	/
Please report significant weed infestations to the Quarry Supervisor.	/
Please report any dead or dying vegetation to the Quarry Supervisor	/
If you are unsure if you should be operating in an area, please check with the Quarry Supervisor.	/

Name of Inductee	<u>Jayant Chavan</u>	Name of Inductor	<u>[Signature]</u>
Signature & Date	<u>[Signature] 27/4/18</u>	Signature & Date	<u>Craig [Signature] 27/4/18</u>

TN
MN



- REFERENCE**
- Quarry Site Boundary
 - Proposed Biodiversity Offset Boundary
 - Conservation Area H
 - Silver-leaved Mountain Gum Replanting Area
 - Rehabilitation Area
 - - - Existing Track
- Note:** Boundaries have been offset for clarity

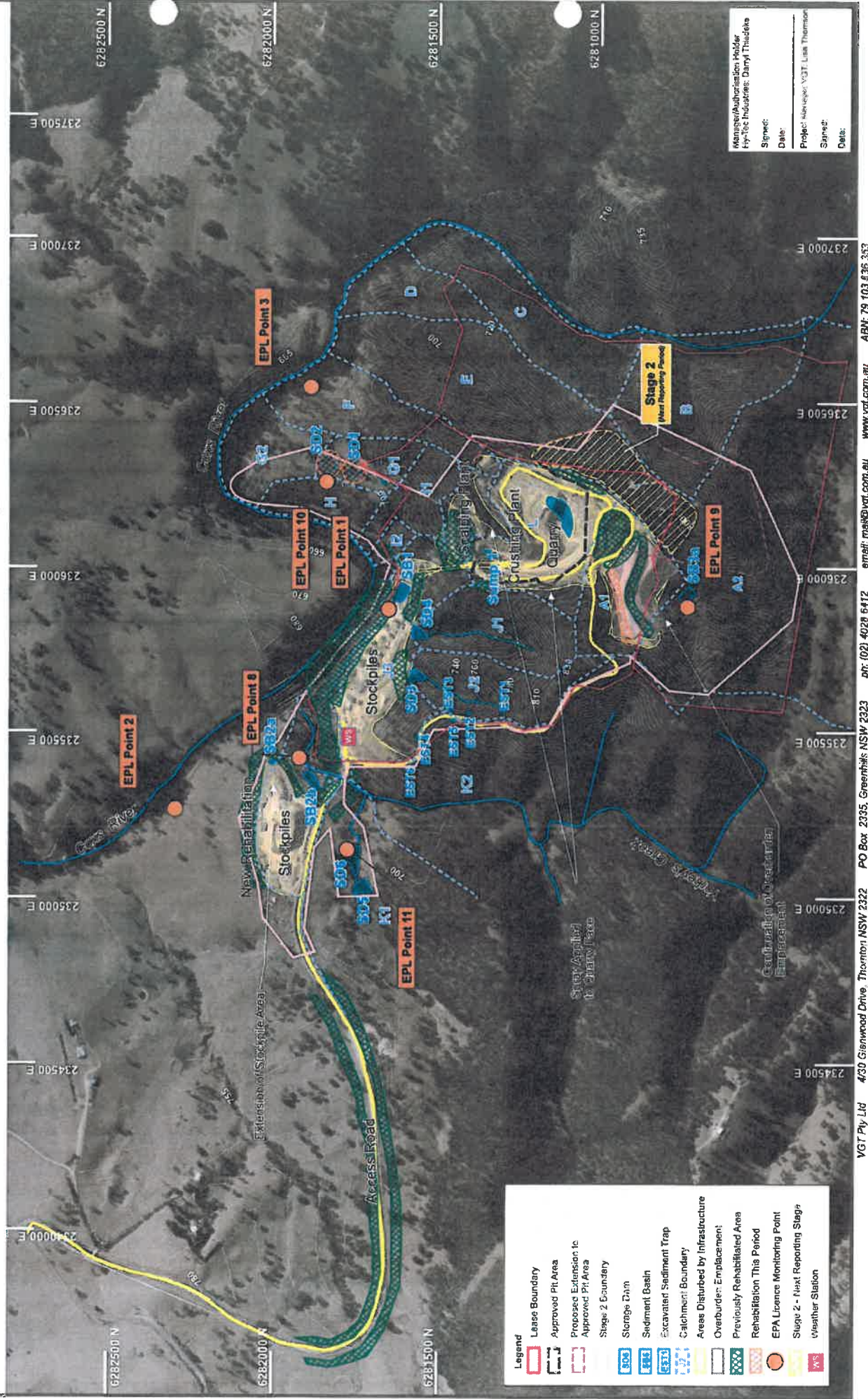
SCALE 1:12 500 (A4)



Base Photograph Source: CEH Survey - May 2017; Google Earth - October 2016 (surrounds)

Y:\Jobs 531 to 1000\652\Reports\65218_EIS_2013\CAD\652Base56.dwg_Independent Audit_09 11 2017 9:24 AM

Plan of:	Annual Review for the Austin Quarry Extension July 2016 to June 2017 - Proposed Site Operations	Location:	Off Jenabai Caves Road	Source:	Client 2016 and Google Map - Image Date 31/07/2015	Our:	4574_HY_H_AR16-17_C003_V0_F3.cdr
Figures:	THREE	Council:	Lithgow City Council	Survey:	Client 2016	Plan By:	TO:JD
Sheet:	1 of 1	Tenure:	N/A	Projection:	MGA	Project Manager:	LT
Version/Date:	V0 28/05/2017	Client:	Hy-Tac Industries Pty Ltd - Adelaide Brighton Limited	Contour Interval:	5m	Office:	Thronon



Legend

- Lease Boundary
- Approved PI Area
- Proposed Extension to Approved PI Area
- Stage 2 Boundary
- Storage Dam
- Sediment Basin
- Excavated Sediment Trap
- Catchment Boundary
- Areas Disturbed by Infrastructure
- Overburden: Emplacement
- Previously Rehabilitated Area
- Rehabilitation This Period
- EPA Licence Monitoring Point
- Stage 2 - Next Reporting Steps
- Weather Station

Manager/Authorisation Holder
 Hy-Tac Industries: Daryl Thistle
 Signed: _____
 Date: _____
 Project Manager: VGT, Liah Thomson
 Signed: _____
 Date: _____

REVEGETATION MONITORING RECORD

Revegetation monitoring records and actions required for all areas subject to revegetation procedures.

Quarry personnel are responsible for inspection of replanted areas at intervals of 3 months, 6 months and 12 months following planting. Monitoring after this time is to occur every 2 years in conjunction with annual ecological monitoring.



Contractor / Person Responsible for Planting	Skillset - Land Workers			
Plants Used (attach list if needed)	Species	Area Planted	Date Planted	Number
	Eucalyptus pulverulenta	Back Dams	April 18	630
	Mixed Natives	Overburden batter	"	335
	Mixed Natives	North quarry bund	"	280
	Mixed Natives	Crusher bund wall	"	35

3 Month Monitoring		
Person Conducting Monitoring	Craig McDonald	
Date	26-7-18	
Status	Comments	Completed (please tick)
Condition of plants	Good/Moderate/Poor Evidence of disease or dieback:	✓
Estimate number of dead or dying plants.	Percentage of total planted: (Survival rates below 85% will require remedial planting) 95%	✓
Evidence of herbivores		✓
Photographic evidence taken		✓
Action needed	Need to water trees Organised skillset to water	✓
Signature	<i>[Signature]</i>	Date 26-7-18

6 Month Monitoring		
Person Conducting Monitoring		
Date		
Status	Comments	Completed (please tick)
Condition of plants	Good/Moderate/Poor Evidence of disease or dieback:	
Estimate number of dead or dying plants.	Percentage of total planted: (Survival rates below 85% will require remedial planting)	
Evidence of herbivores		
Photographic evidence taken		
Action needed		
Signature		Date

12 Month Monitoring		
Person Conducting Monitoring		
Date		
Status	Comments	Completed (please tick)
Condition of plants	Good/Moderate/Poor Evidence of disease or dieback:	
Estimate number of dead or dying plants.	Percentage of total planted: (Survival rates below 85% will require remedial planting)	
Evidence of herbivores		
Photographic evidence taken		
Action needed		
Signature		Date

Quarry Production Manager or Quarry Supervisor Sign-off on Final Monitoring		
Vegetation surviving without Quarry personnel management.		
Records and photos of monitoring complete.		
Signature		Date

Bush Fire Emergency Evacuation Plan

Name and Address of site:	Austen Quarry, 391 Jenolan Caves Road, Hartley, NSW 2790		
PPE required:	Long, Hi visibility clothing, Safety Helmet, Safety boots, Safety glasses		
Evacuation Muster Point 1:	Car Park	Evacuation Muster Point 2:	Top Plant
Fire Safe assembly Area 1:	Main Shed	Fire Safe assembly area 2:	Extraction Pit
Hazards:	Vehicle to person Vehicle to vehicle/plant	Smoke inhalation Isolation	Slips, trips and falls Chaotic behavior
Tools Required:	Visitor sign in register Daily Toolbox/sign in sheet	Cell Phone UHF 2 way radio	First Aid Kit (Mobile) Bottled water
Nominated Fire Warden 1 details:	Name: Rod Welsh Mob. No. 0418 292 843	Nominated Fire Warden 2 details:	Name: Craig McDonald Mob. No. 0405 123 700
Nominated First Aider 1 details:	Name: Rod Welsh Mob. No. 0418 292 843	Nominated First Aider 2 details:	Name: Craig McDonald Mob. No. 0405 123 700

Emergency Response Plan

The call is made over the 2- way Ch 26 and Ch27 via the Fire Warden (nominated via the site fire emergency nomination form) Emergency, Emergency, Emergency	2-Way Radio
The Fire Warden Issues the direction to both top and bottom area safety wardens to meet with all personnel at the safe assembly area West of the bottom Dam. Both top and bottom area safety wardens reply back to the Fire warden confirming their intention.	Ensure that the radio airways are clear
The top Area safety warden contacts the pit employees and or contractors and ensures that all vehicles are parked in a clear and safe area. The top Safety warden drives the ute and picks the passengers up and makes his way down to the safe assembly area west of the bottom dam.	All vehicles parked in the designated area and switched off. Do not rush and walk to the light vehicle
The Bottom area safety warden makes Contact with the plant man and instructs the operator to turn the plants off and make their way down to the safe assembly area west of the bottom dam.	Do not rush and walk to the safe assembly area
The Fire warden Makes contact with the nominated site securing officer and instructs him to; <ol style="list-style-type: none"> 1. Drive to the front Gate and secure the site from any persons entering by closing it 2. Drive back to the office and bring the emergency bag, first aid Kit and any staff members in the office down to the safe assembly area west of the bottom dam. 3. Musters all drivers that are on site to the safe assembly areas (trucks parked and shut down where they stand) 	Drive with caution and ensures all safety equipment is fitted on vehicle
All persons on site are accounted for and then the Fire Warden must make a decision on the best course of action to take. If it is safe to evacuate the quarry all personnel will be allowed to exit using their own vehicles. If the quarry exit is blocked all personnel will be advised to go to the designated Fire Safe Assembly area and await further instructions from the emergency services.	Checks with external authorities and ensures that the areas leading out of the quarry are clear for all employees. Do not panic and walk to the fire safe assembly area.
If fire has surrounded the site and there is no exit out of the quarry or there has been an injury the fire warden contacts 000 and requests the relevant emergency service to attend the site.	Cell Phone required
The fire warden instructs the nominated site securing officer to drive to the front gate and wait for emergency services to arrive. The site securing officer drives to the gate and escorts the emergency services into the site.	Only if it is deemed safe to do so.
Contact the General Manager and HSE manager for support.	Ensure list of contact telephone numbers is available.

Appendix H: OnSite Environmental Ecological Monitoring Reports



**Aus-10
Rhyolite
Pty Ltd**

**Ecological
Monitoring
Report
November
2017
Aus-10
Quarry,
Hartley**

J061_V1_Aus-10
Quarry Eco Mon
Report Nov 2017

**November
2017**

Document Control

File name	J061_V1_Aus-10 Quarry Eco Mon Report Nov 2017		
Report name	Ecological Monitoring Report November 2017 - Aus-10 Quarry, Hartley		
Document Version	1		
Prepared by:	Callan Douchkov	Date:	1/12/2017
Authorised by:	David Bone	Date:	12/1/2018

Disclaimer

This report has been prepared by Onsite Environmental Management Pty Ltd, with all reasonable skill, care and diligence within the terms of the Contract with the client. We disclaim any responsibility to the client and others in respect of any matters outside the agreed scope of work. This report is confidential to the client and we accept no responsibility whatsoever for third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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Appendices

Appendix A Survey Species List

Appendix B Noxious Weed Information Sheets

Appendix C Threatened Species Database Searches

1. Introduction

1.1 Introduction

The objective of this assessment is to:

-) Undertake an ecological sampling program to provide the data required to assess whether the quarry is compliant with the consent conditions under which it operates;
-) Sample flora and fauna species at representative sites;
-) Conduct flora and fauna surveys across all parts of the quarry lease area to assess areas to be impacted during the upcoming seasons;
-) Identify any threatened species or communities occurring in the vicinity of the quarry which have been newly listed since the previous survey;
-) Analyse the data and determine if the quarry site is having any indirect impacts on the ecology of the surrounding area; and,
-) Provide management recommendations to preserve significant ecology that may be present on the project site and minimise negative impacts to the local ecology in general.

1.2 Site Visit

Flora and Fauna surveys were conducted by David Bone over a three day and two night period between the 29th of November 2017 and the 1st of December 2017. Weather conditions during the survey were mild mornings and warm throughout the day, ranging between 13 – 28 degrees. Average wind speeds were calm to moderate with gusty NNW winds on 1st December. A small amount of rain was recorded on 29th of November, 0.4mm during the survey period.

2. Background Information

2.1 Existing Site Description

The project site comprises the mining lease area which contains an active mining area, processing and workshop areas, material stockpiles, and steep rocky woodland areas. The site is approximately 12.9 hectares (ha). To the immediate north of the site is the Cox's River. The river is sparsely vegetated close to the quarry areas as a result of past grazing activities. The river currently has a thin strip of vegetation along the banks of the creek (20m to 50m) and is then open grazing land.

To the east of the quarry area is naturally vegetated steep and rocky ridgelines. To the south and west of the site the steep naturally vegetated ridgelines continue with some cleared section

at the bases of the ridges used for grazing. These cleared areas are over two kilometres from the quarry to the south. The project site can be seen in Figures 1 and 2.

The site is located approximately 3.5km south of the village of Hartley which is to the west of the Blue Mountains Escarpment. The elevation of the site varies from approximately 650 to 750 metres (m) above sea level. Yorkey's Creek, a tributary of the Cox's River enters from the south near the processing area.



061-2006



Source: Google Maps Imagery 2015

Aus-10 Quarry Ecological Monitoring 2017

**Aerial Photograph of Project Sites
Aus-10 Rhyolite Pty Ltd, Hartley**

Figure 1

2.2 History of Monitoring Programs

Development for the quarry was granted by Lithgow City Council in 1995 (DA 104/93).

A modification was approved for the operation under the EP&A Act 1979 in July 2015 (SSD_6084). Condition 29 of this approval required the preparation and approval of a Landscape and Rehabilitation Management Plan. This was prepared by others and approved in December 2016.

This report has been prepared to satisfy the requirements of this plan. OSEM understands that surveys of fauna have been undertaken since 2003 with flora species added to the surveys at the site since 2006.

The approach undertaken by OSEM for this survey has been to survey the sites using the techniques nominated in the 2016 approved Landscape and Rehabilitation Management Plan.

To assess the indirect impact of quarry activities on flora, fauna and their habitats the following approach was taken.

Species were surveyed across a range of habitats present on the site in both disturbed and undisturbed (by quarry activities) sites. The species identified were analysed against previous years data to assess if species were present or absent during that time of year. The single survey season is only able to detect species active during that season; however the purpose of the assessment is to check on the indirect impacts of the quarry around the operation and not to compile a complete species inventory for the site. The spring/summer season was chosen to coincide with higher levels of faunal activity usually present at this time of the year in this area as compared with the autumn/winter period which is often subject to very cold and wet conditions including snow.

Flora species were surveyed for in the same areas as fauna species with the analysis focussing on the abundance of weed species present in each area.

3. Survey Methodology

3.1 Survey Timing

The ecological survey was conducted during the end of November 2017 over a three day and two night period. This time period was proposed as the latest acceptable time of the year to conduct a comprehensive flora and fauna survey. This was based on the weather conditions being suitable for a majority of flora species to be in flower or above ground and the foraging resources to be at a peak for fauna species.

Reasonable weather conditions prevailed, with warm days and clear nights with no significant rain recorded. Temperatures ranged from 13 – 28 degrees Celsius at Lithgow Bureau of Meteorology Site 063226.

3.2 Fauna Survey Techniques

Fauna surveys were conducted using point census methods for diurnal species and spotlight transects for nocturnal species.

Diurnal fauna survey included:

-) 20 minute bird census periods at discrete points along flora transects.
-) 20 minute reptile searches beneath logs and rocks at bird census points.
-) Bird call taping at dusk and dawn for 1 hour periods at impact and control locations.
-) Opportunistic survey along flora transects.

Nocturnal fauna survey included:

-) Spotlight transects in all vegetation communities over one night.
-) Call playback and listening for threatened fauna species from elevated positions at dusk.
-) Amphibian call recording for 2 hour at dusk and spotlight searches where calls were detected.
-) Echolocation call recording for 2 x 2hour periods at impact and control sites.
-) Infrared camera bait station recording at two locations.

3.3 Flora Survey Techniques

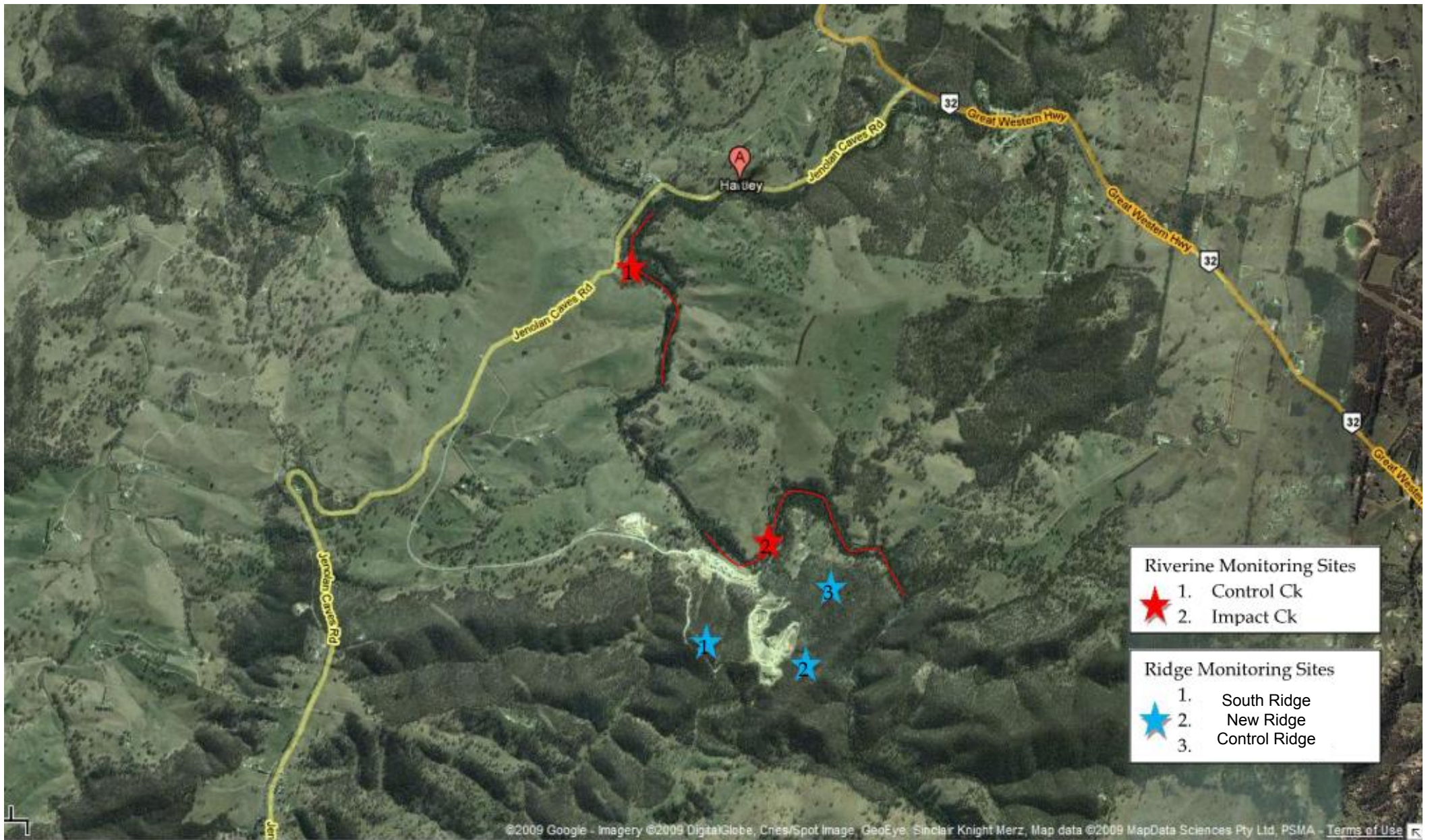
Flora surveys were conducted using 2 x 50m transects within each vegetation community survey location. Surveys of rehabilitated areas at the active quarry (ridge area) are also undertaken, which are displayed in Figure 5 below.

Within each survey location two 50m line transects were set up and the presence of vegetation (weeds and natives), bare areas, rock and leaf litter was recorded at 1m intervals along the transect to provide 100 survey points. In addition to this, all plant species present were recorded using two 20 x 20m plots located at each end of the transects. This method has been adapted from OEH *Biometric 3.1 (OEH 2011)* used for the rapid survey and assessment of clearing and impacts from proposals under the Native Vegetation Conservation Act 2003. This rapid technique allows for the determination of abundance of species, weeds, or other variables. When a point is reached along the line transect the presence of weeds, natives, bare ground, rock or leaf litter is recorded. The scores from each line transect in each survey area are then averaged and an average score is recorded.

The 20m x 20m quadrats located at the ends of the line transect also record the relative abundance of each species identified. This data is used to prepare the cumulative data analysis from previous years of survey.

The majority of plant species were identified in the field with the aid of field keys and from experience.

The location of transects are shown on Figures 2 and 3.



- | Riverine Monitoring Sites | |
|---------------------------|---------------|
| ★ | 1. Control Ck |
| ★ | 2. Impact Ck |
-
- | Ridge Monitoring Sites | |
|------------------------|------------------|
| ★ | 1. South Ridge |
| ★ | 2. New Ridge |
| ★ | 3. Control Ridge |



Source: Google Maps Imagery 2009

Survey Site Locations



Transect Detail

Source: Google Maps Imagery 2018



Flora Survey Transects (2018 Imagery)

4. Results

4.1 Flora Communities

There are two distinct vegetation communities present on the lease:

-) Riparian forest along the Cox’s River.
-) Dry Schlerophyll Open Woodland on the ridges around the quarry.

The flora species present along the Cox’s River lie generally to the north of the site. Two areas are examined to determine the degree of impact of the quarry operations, upstream of the quarry (to the north-west) and downstream of the quarry (to the north).

The ridge sites lie to the north-east and south-west of the active mining area. Impact sites are to the south east of the quarry area.

The focus of the survey work is to examine the impact of quarry operations on fauna habitats and the extent of exotic or weed species present in these areas as indicators of habitat health where the quarry has an indirect impact.

Rehabilitation progress and health is also surveyed to provide data on the success of the quarry rehabilitation and to record fauna and flora species recolonising these areas.

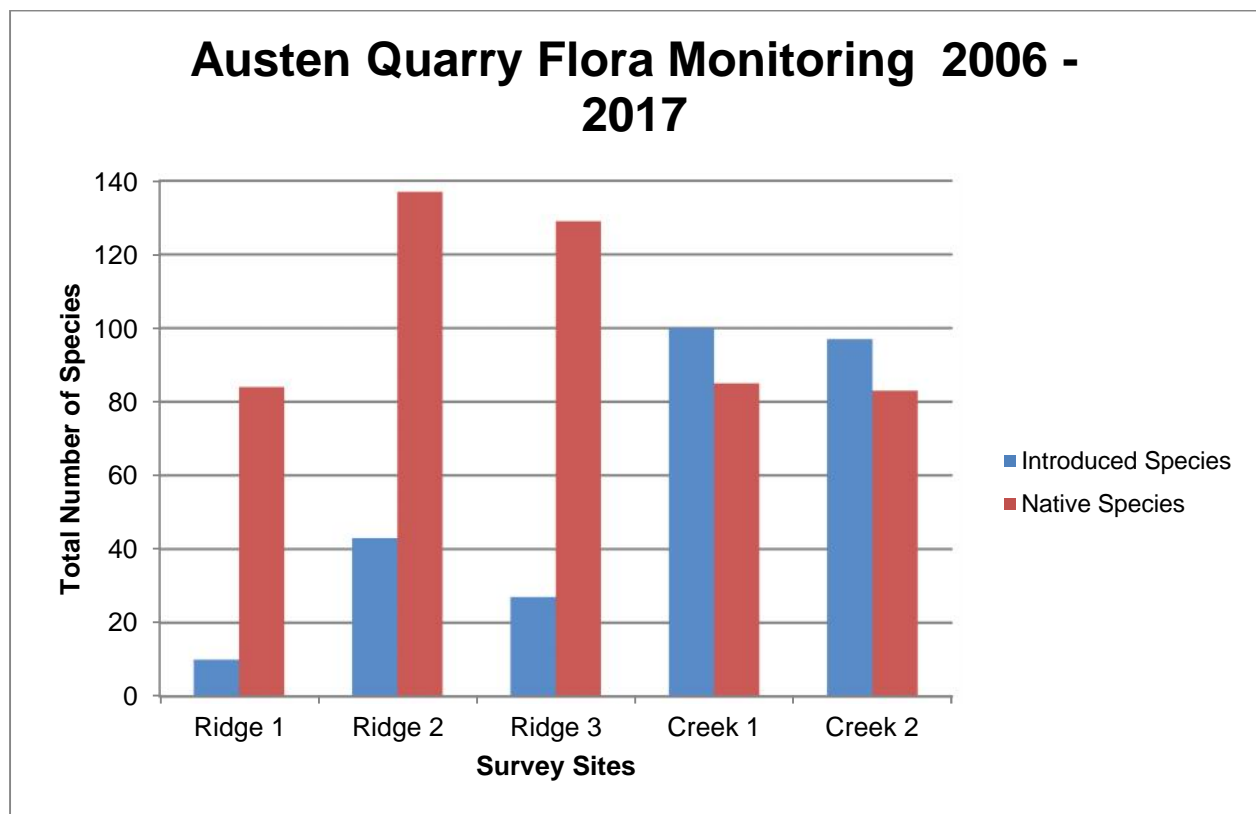


Chart 1: Cumulative Flora Survey data 2006 – 2017.

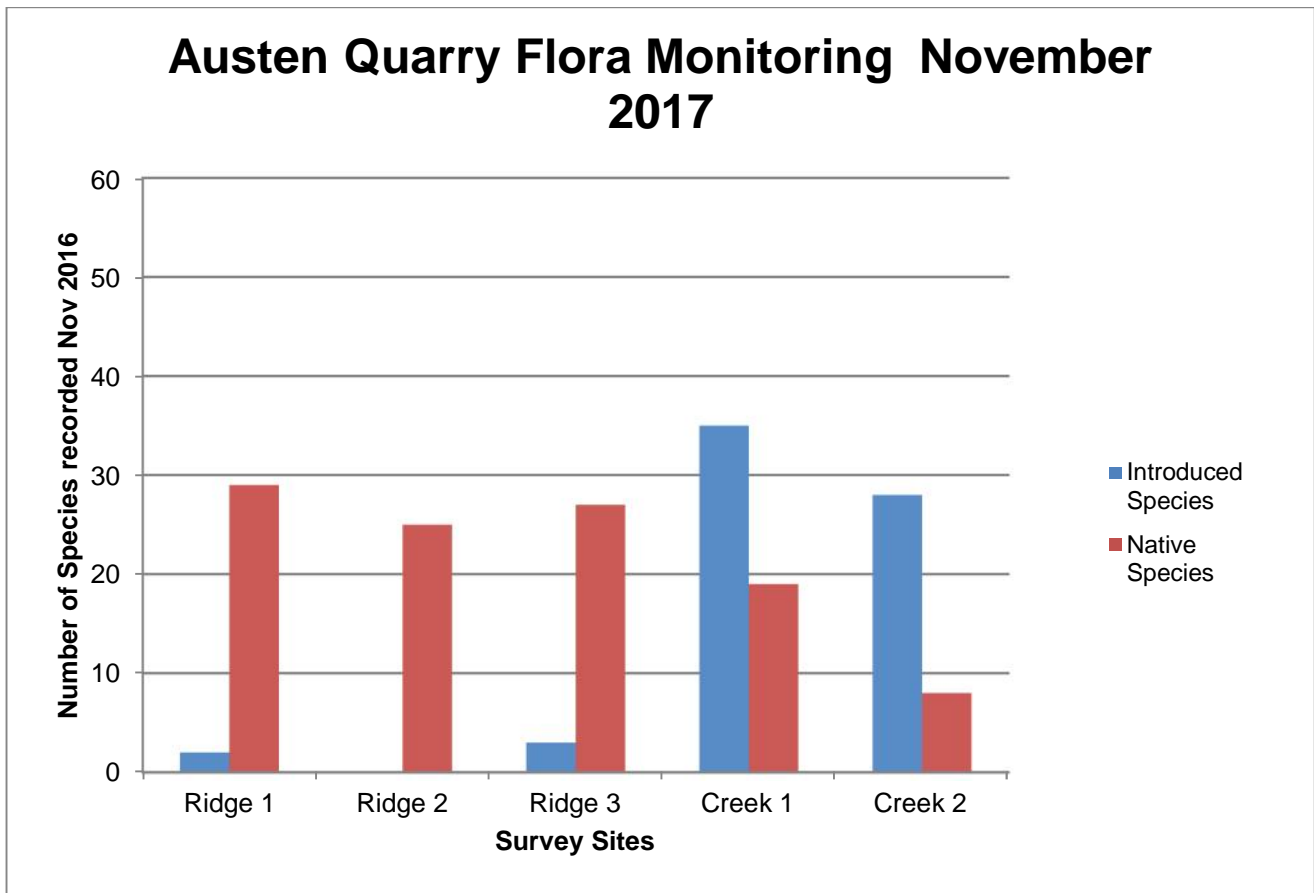


Chart 2: November 2017 Flora Survey data.

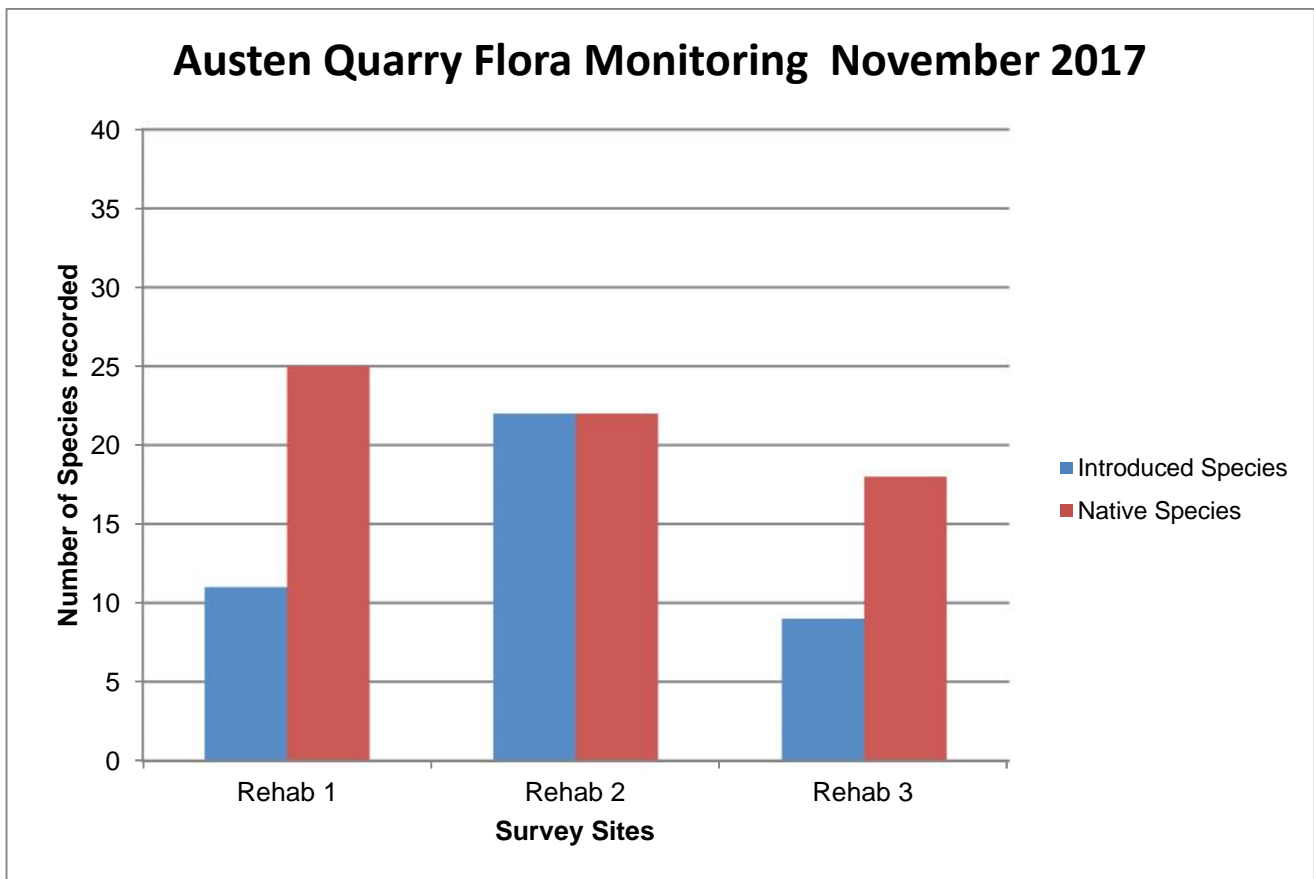


Chart 3: November 2017 Rehabilitation Sites Survey Data

Similar to the previous monitoring results, Chart 2 shows that the ridge sites continue to display low levels of weed species in both impact and control sites, with the presence of introduced species being significantly lower than that of native species in all transects.

The river sites continue to show a trend of higher weed concentrations, with the presence of introduced species being far higher than that of native species at both sites. Very little native groundcovers exist in these areas to suppress the spread of weed and pasture species from adjacent grazing areas. Exotic species dominate the ground layers; however the large, established canopy trees are mostly native. No noticeable difference in native species numbers from the 2016 monitoring period was recorded at both riverine sites. Therefore there was no indication that quarry operations were having any impacts on species diversity in this area.

In general a higher concentration of weed species was noted along the river sites both on the upstream (control) site and the downstream (impact) sites.

The following general changes between the data sets from the 2016 and 2017 monitoring periods was noted including:

-) Decrease in weed species recorded at Ridge 1 site.

No new native or new introduced species were identified during the survey period. No new threatened species or noxious weeds were recorded.

Monitoring of rehabilitated areas continued this period, with three sites adjacent to the quarry pit operations known as Rehab 1, Rehab 2 and Rehab 3, shown in Figure 4.

Site 1 has been revegetated since 2010, Site 2 was revegetated in 2012, and Site 3 was revegetated prior to 2010 on the upper raises of the lower overburden emplacement. The results of the rehabilitation flora survey can be seen in Chart 3, with an overview of each site below.

Rehab 1 - Rehabilitation in this area has been complete for some time, with planted species now providing good canopy cover, reaching up to 5 – 6m in height. Weeds are present in the ground layers and native regeneration of groundcovers and shrubs is occurring from seed recruitment from adjacent bushland. Topsoil cover was observed to be sparse to not existing in this area.



Rehab Transects
2017

Source: Near Maps 2018



Rehabilitation Area Transects



Plate 1: Rehabilitation Area 1

Rehab 2 – This area has been planted with tree and shrub species, and also sown with a grass cover crop of Couch. Growth of planted species was observed to be progressing well with most plants observed to be healthy. However the couch cover crop dominates the ground cover, which has restricted natural germination and recruitment of native ground covers and shrubs, but has also reduced annual weed species growth. Some regeneration was recorded from planted Acacias self-seeding and germinating outside of growth tube protection.



Plate 2: Rehabilitation Area 2

Rehab 3 – This area has been planted for the longest time of all sites monitored. The grass and weed growth through this area was noted to be heavy in early years however the 2017 data shows that natives now exceed weeds species throughout the transect, with the area now considered to be stable and planted species growing well.



Plate 3: Rehabilitation Area 3

Noxious weeds are also being closely monitored, with an assessment undertaken of their presence and abundance over all monitoring sites. This is displayed in Table 1 below, which shows at which sites each noxious weed species was recorded, and provides an abundance rating based on the criteria below and averaged across 2 transects:

-) 1-Less than 5% cover <3 Individuals
-) 2-Less than 5% cover <= 10 individuals
-) 3- 5% – 25%
-) 4 - 25%-50%
-) 5- 50% - 75%
-) 6 - >75%

From Table 1 it is clear that African Lovegrass and Serrated Tussock are the most abundant noxious weeds throughout the site, occurring at 5 of the 8 sites. St. Johns Wort is the next most prevalent species at the quarry occurring at 4 of the 8 sites. Table 1 provides the averaged data taken from the two 20x20m quadrats undertaken at the ends of each 50m line transects as described in section 3.

Blackberry was previously confined to the riverine sites however has been located on the ridge sites. Serrated Tussock, African Lovegrass and St. John's Wort continue to be the greatest management issue in terms of weed control at the site, which can be seen from consistently high abundance ratings.

All of these species display the potential for further invasion throughout the site as they are found in high numbers on both ridge and riverine sites, and have also been observed within Rehab sites. They are easily transported by seed attached to livestock, fauna, personnel, or vehicles / machinery and require vigilanced to prevent and control their spread.

In general, no significant increases in the abundance of weeds on site were recorded during the 2016 monitoring period. This chart displays the averaged data from the line transect method used. The numbers displayed are the average of the two 50m transects undertaken and show the average number of times the species was recorded in the survey area.

Scientific Name	Common Name	Ridge 1	Ridge 2	Ridge 3	Creek 1	Creek 2	Rehab 1	Rehab 2	Rehab 3
<i>Cytisus scoparius</i>	Scotch Broom				1.0				
<i>Eragrostis curvula</i>	African Love grass		2.5		3.0	2.5	1.0		2.0
<i>Lycium ferocissimum</i>	African Boxthorn					0.5			
<i>Nassella trichotoma</i>	Serrated Tussock		1.5	1.0		2.0	1.0	1.0	1.0
<i>Orobanche sp.</i>	Broomrape								
<i>Rubus fruticosus</i>	Blackberry	0.5			1.5	2.5			
<i>Salix sp.</i>	White/ Weeping Willow					1.0			
<i>Senecio madagascarinensis</i>	Fireweed						1.0		
<i>Hypericum perforatum</i>	St. Johns Wort	2.5	2.0			3.0			1.0

Table 1 – Declared Weeds Relative Abundance 2017

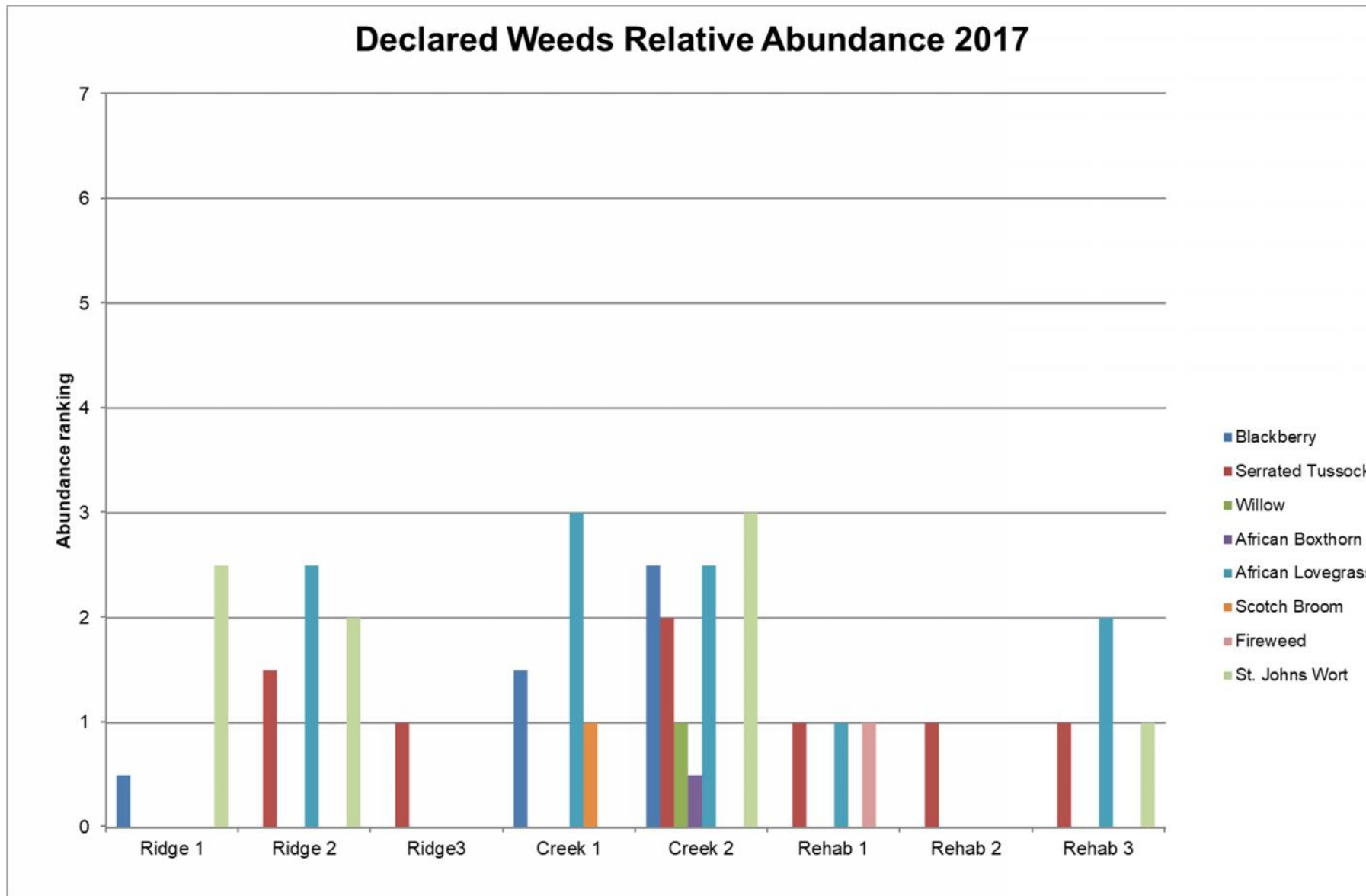


Chart 5: Declared Weed Abundance Scores 2017.

4.2 Fauna Survey Results

The results presented in charts 6 to 16 have been broken up into the following groups or assemblages:

-) Amphibians.
-) Reptiles.
-) Mammals.
-) Total Birds.
-) Birds of Prey (including magpies, crows etc.).
-) Nocturnal birds.
-) Riverine birds (ducks, coots, moorhens, egrets etc.).
-) Parrots.
-) Forest woodland species (Whipbirds, kingfishers, pigeons and doves, pipits and song larks, quails, starlings and myna's).
-) Robins, wrens and finches.
-) Honeyeaters.

No new birds, were identified during this monitoring period.

Most groups have recorded similar numbers during this monitoring period compared to previous year's results, with more mammals recorded across the site.

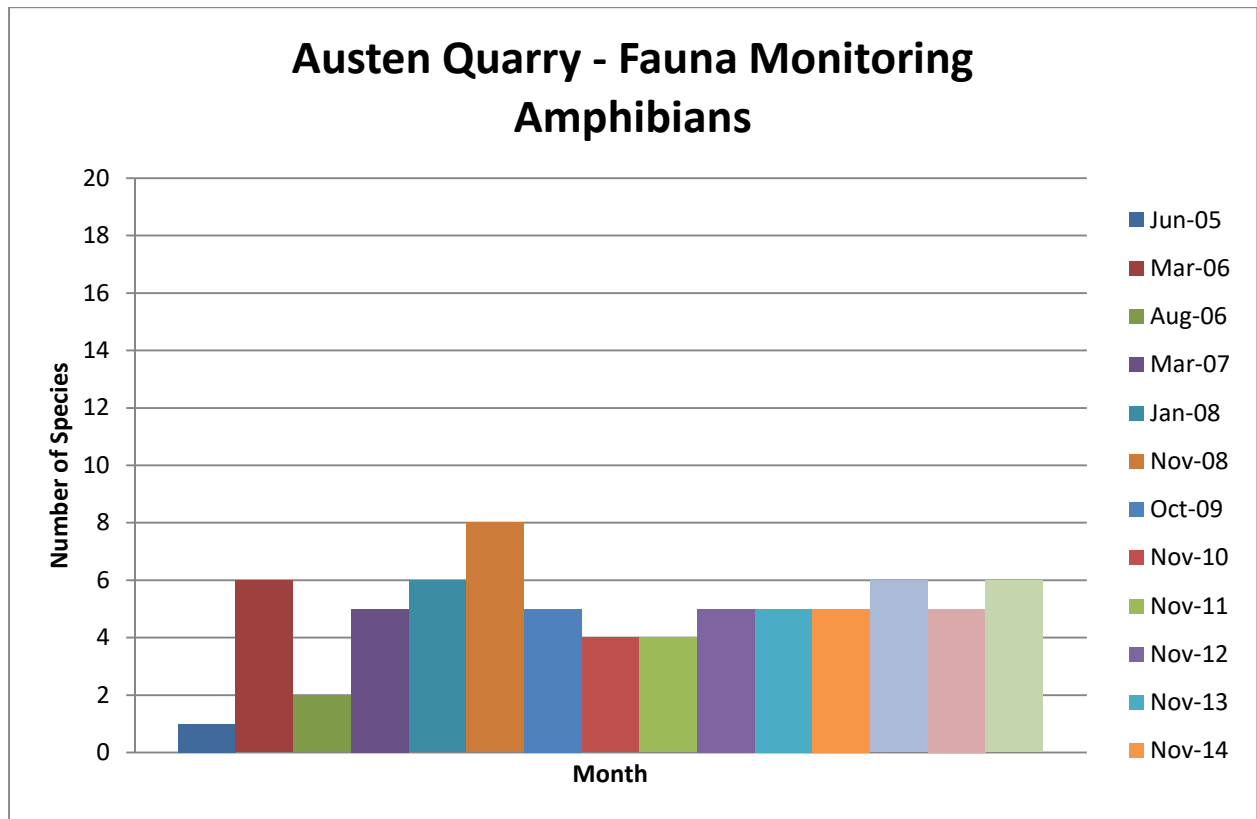


Chart 6: Amphibian results.

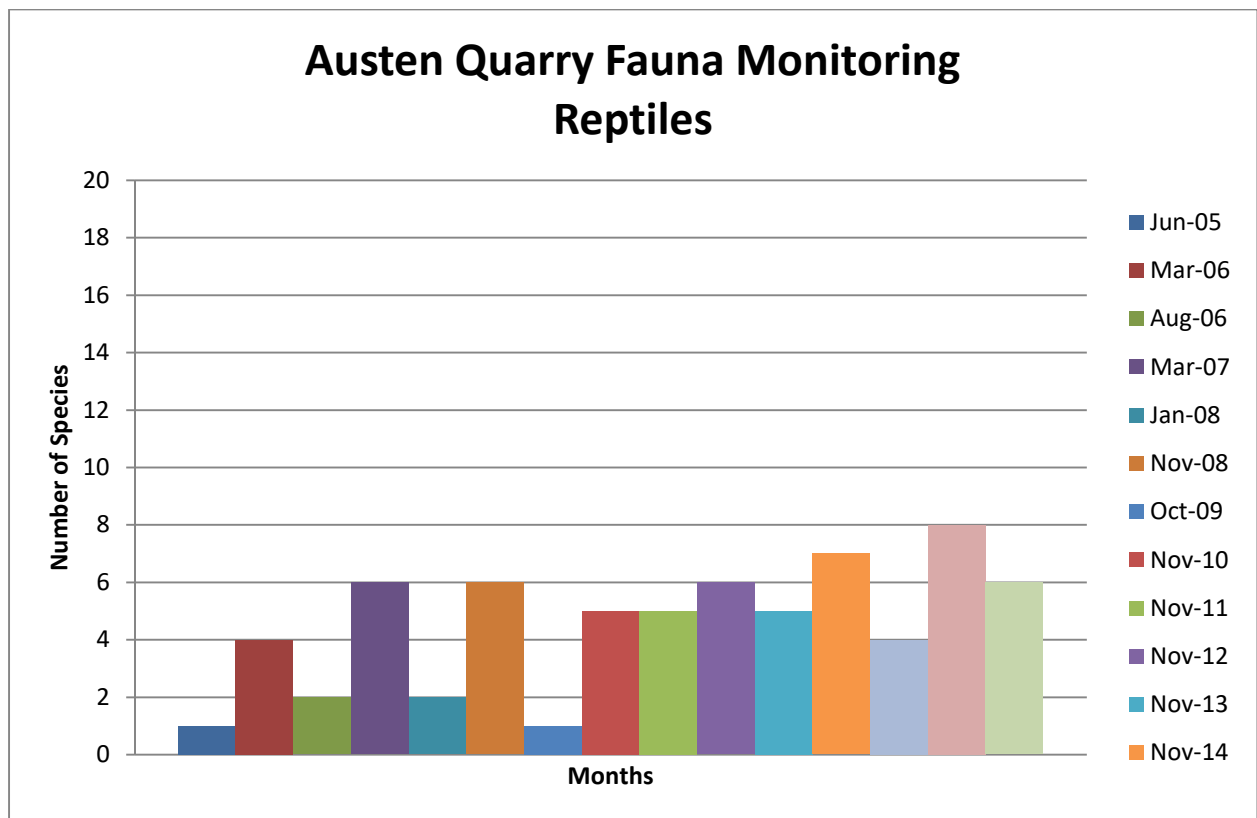


Chart 7: Reptile results.

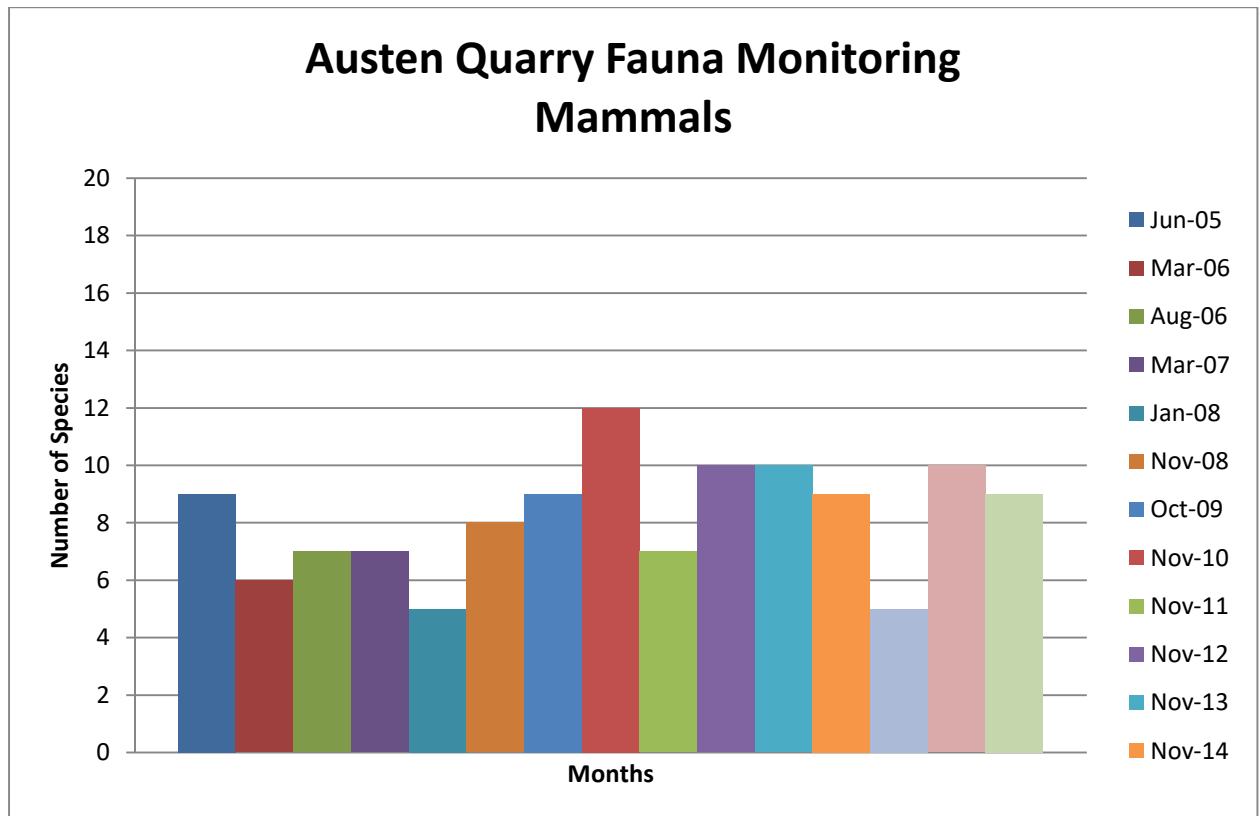


Chart 8: Mammal results.

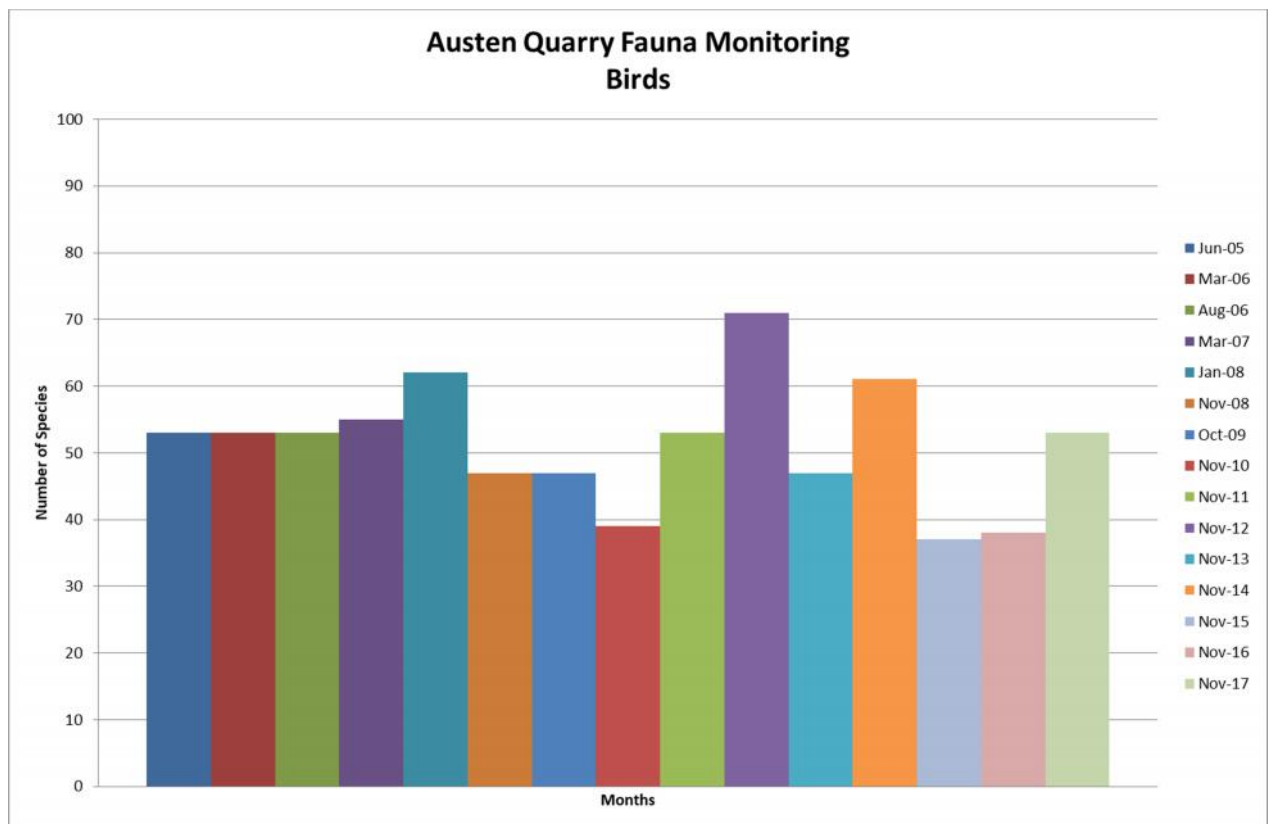


Chart 9: Total Bird results.

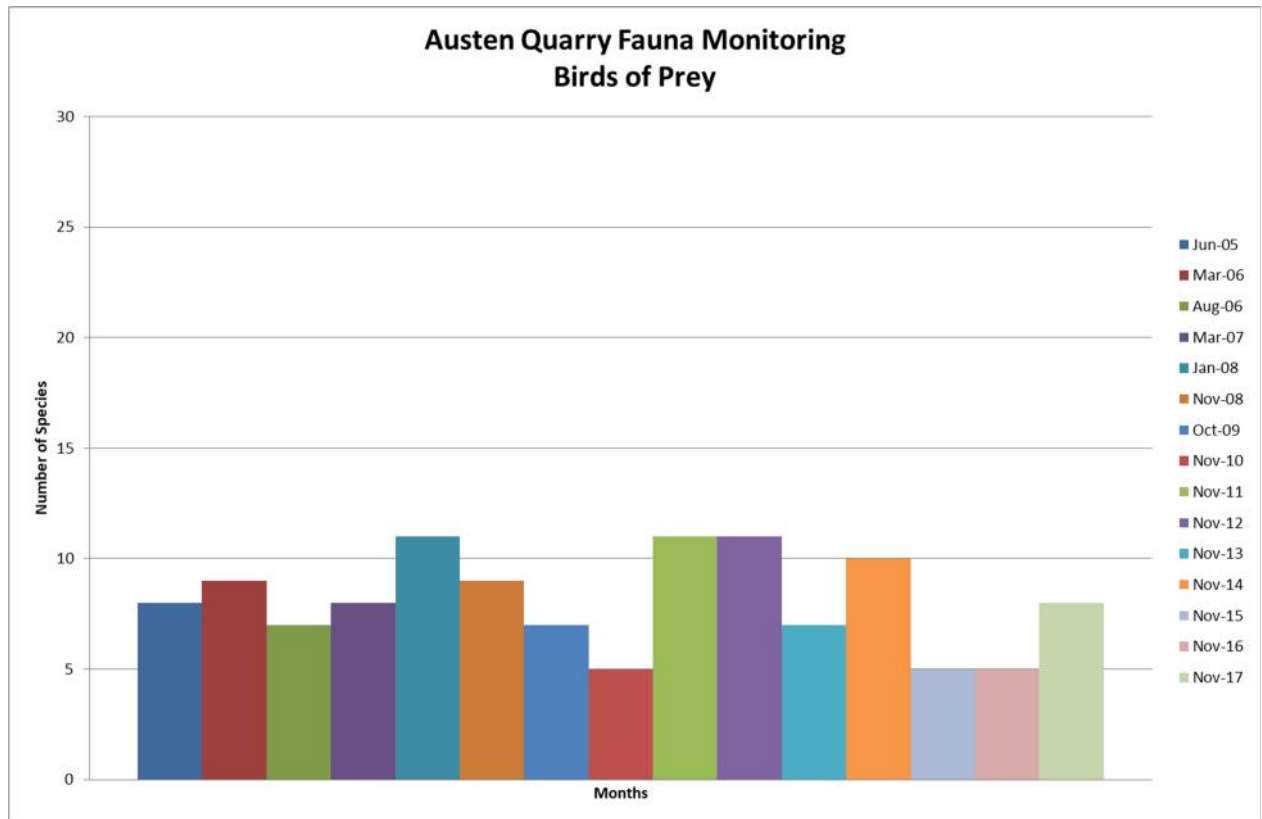


Chart 10: Birds of Prey results.

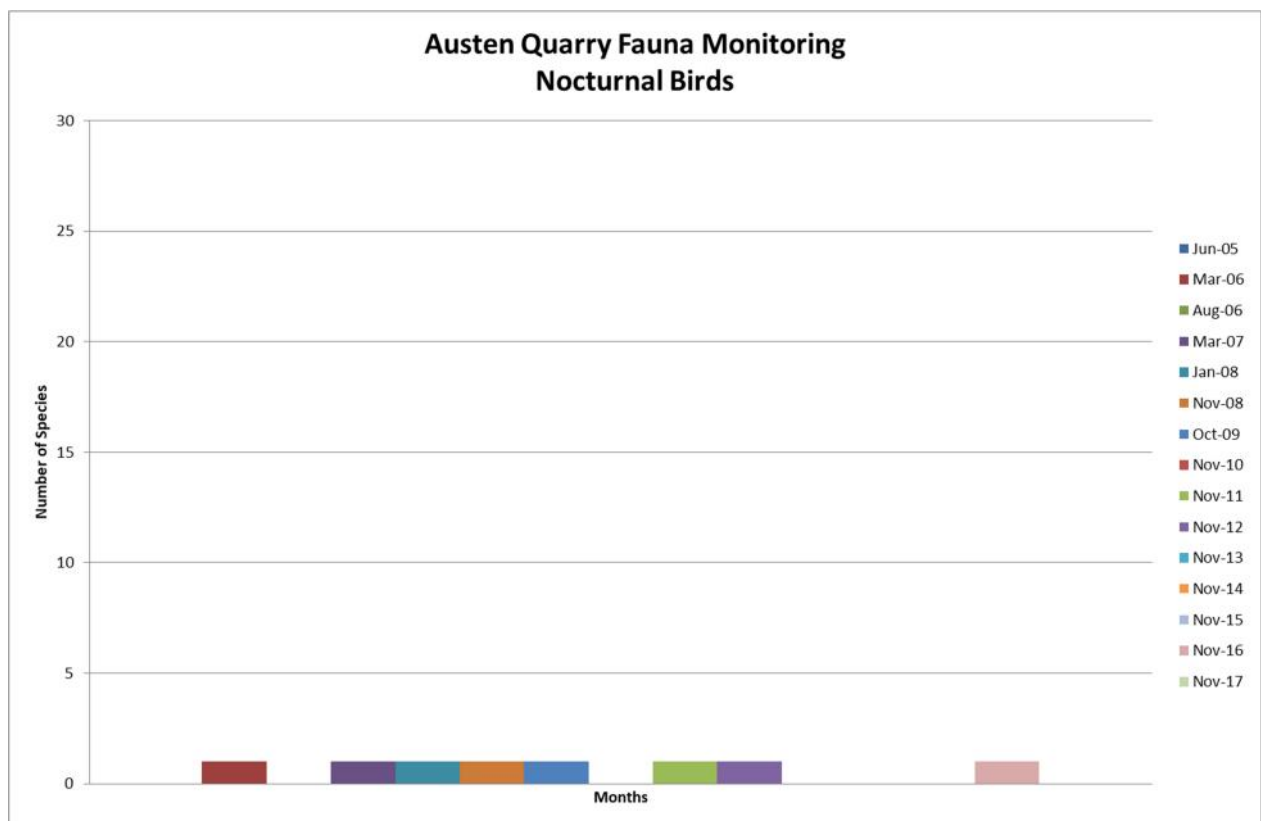


Chart 11: Nocturnal Birds results.

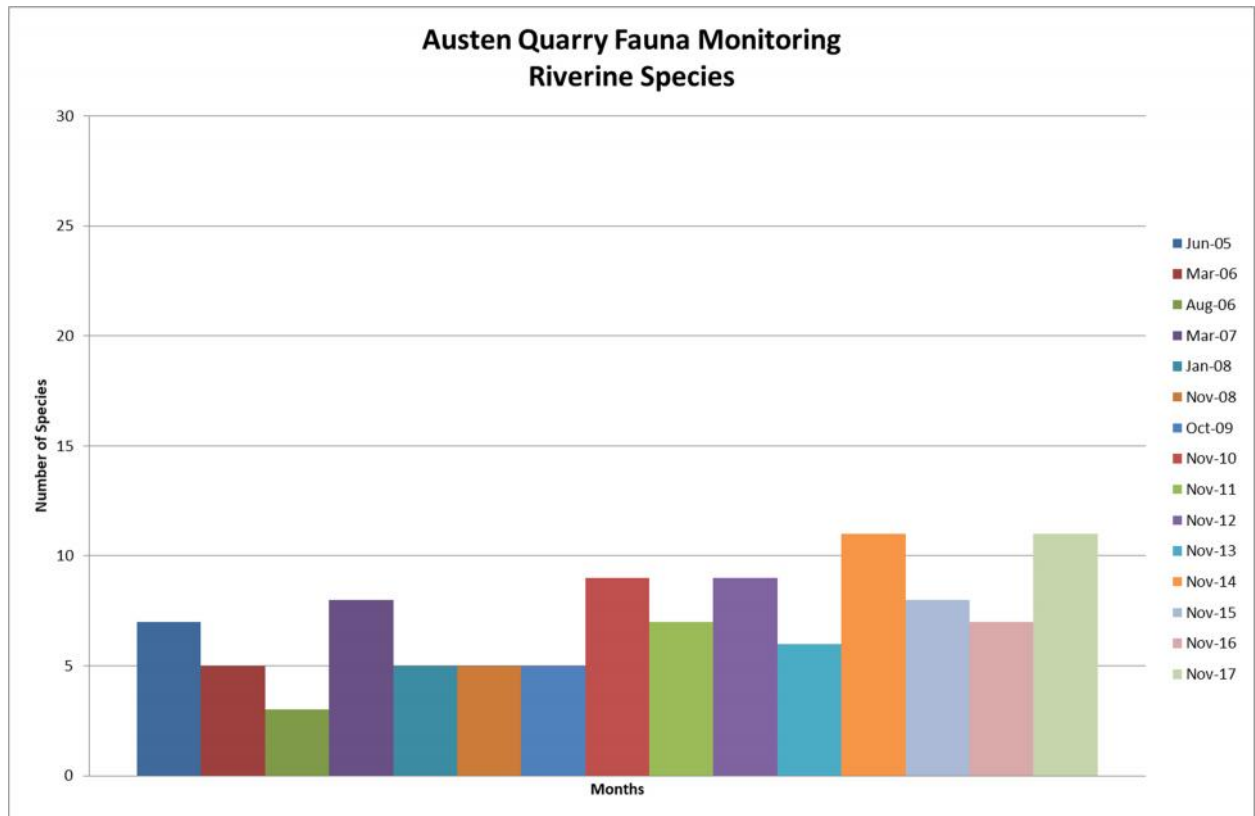


Chart 12: Riverine Bird species results.

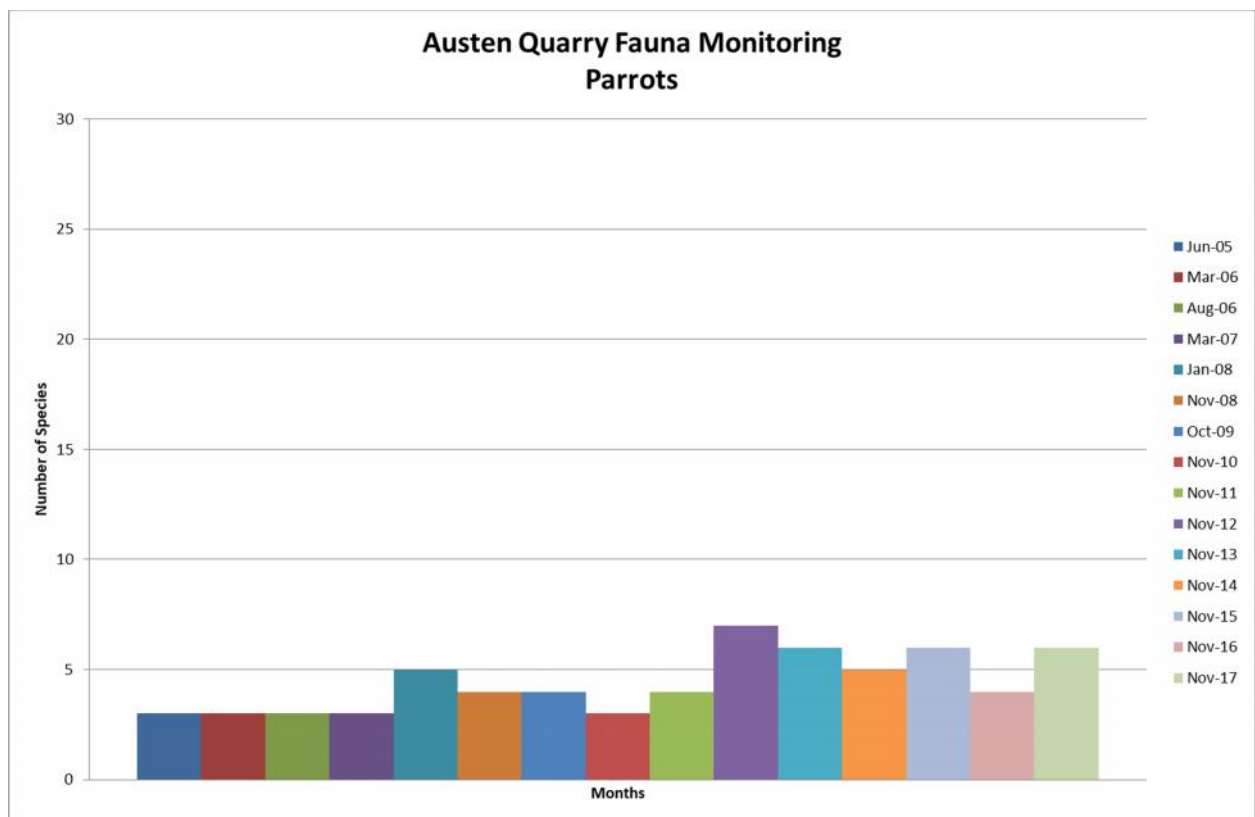


Chart 13: Parrot species results.

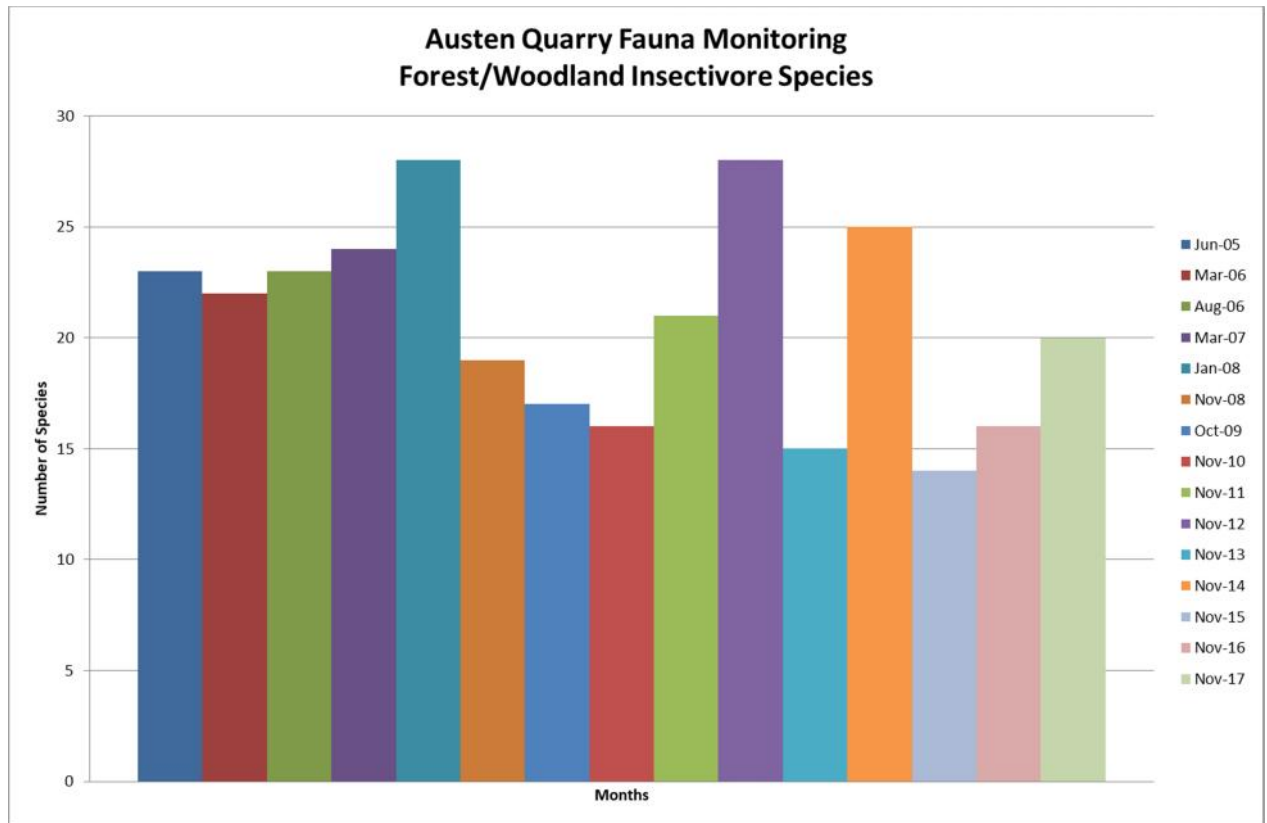


Chart 14: Forest and Woodland Bird Insectivore species results.

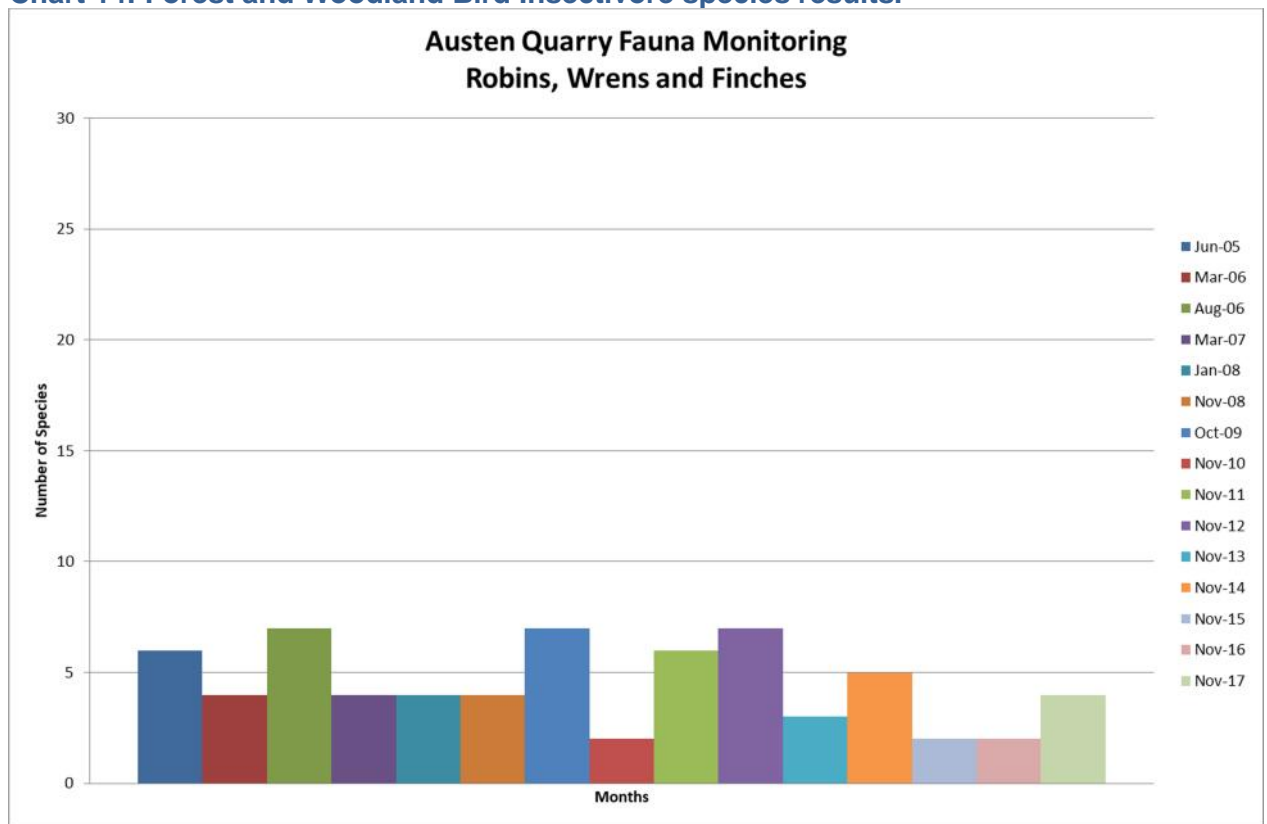


Chart 15: Robins, Wrens and Finch results.

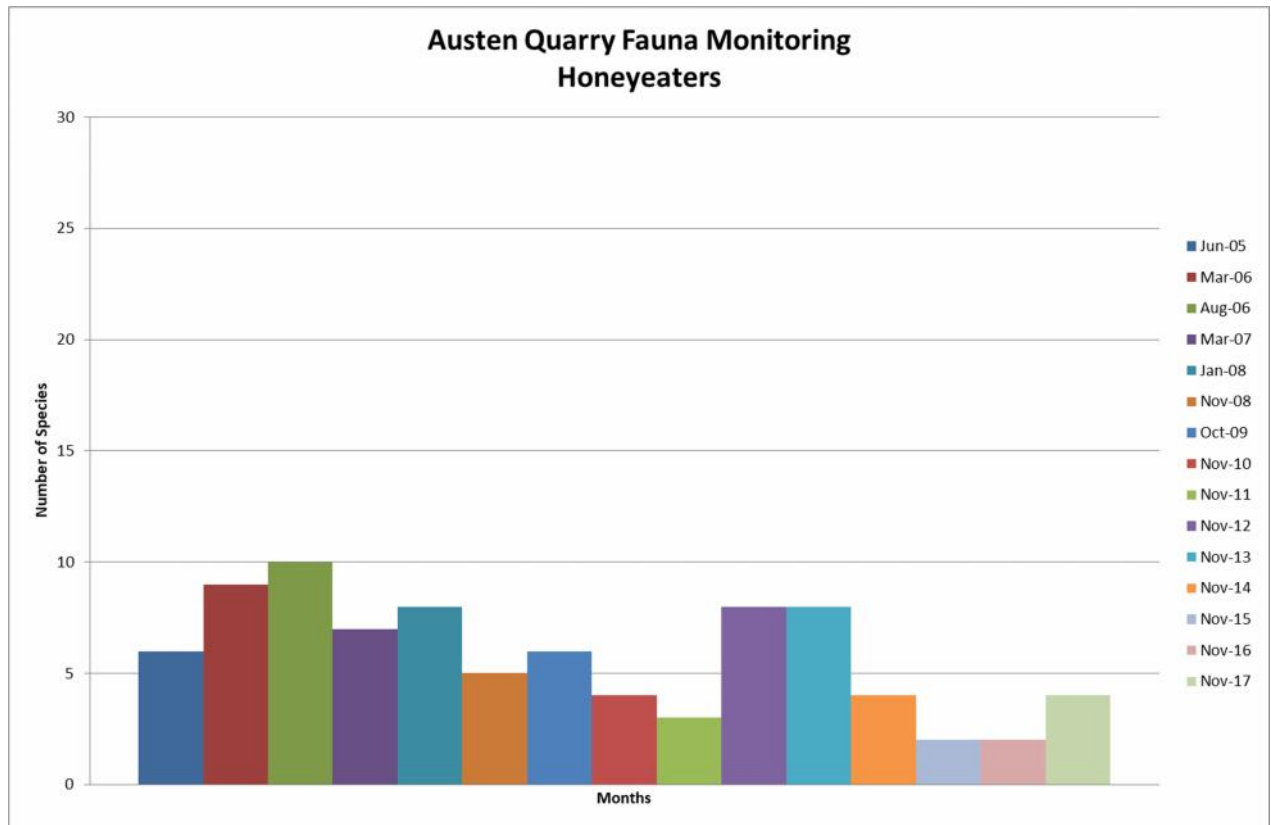


Chart 16: Honeyeaters results.

4.3 Threatened Species

No new plant species, were listed within the area from the previous monitoring period. The threatened species list and database searches can be found in Appendix C.

No other new threatened species have been observed during the monitoring period.

5. Discussion

The requirement of the condition of approval that the indirect impacts of the quarrying operations on fauna and fauna habitats being monitored was undertaken in November 2017.

The results show that no significant changes have occurred to flora and fauna communities in particular there was no significant changes in species numbers recorded during the surveys.

Bird species numbers are similar to the previous monitoring periods, most likely due favourable weather during the survey. No notable declines from last monitoring period were recorded. Overall the number of bird species recorded across each group has remained relatively consistent throughout the monitoring program.

Amphibian numbers are steady and reptile and mammal numbers have increased in relation to previous years.

Wombat activity was noted to be high with four active burrows noted around the river and ridge sites.

Overall fluctuations in species numbers within each fauna type have been small over the entire monitoring program, with no significant decline in species number of each fauna type.

Records of feral animals remained similar to other years with fox activity noted on night surveys around the river sites. Numerous active rabbit burrows were also observed on site in river and ridge sites and in rehab sites. Given this activity, a control program for foxes and rabbits should be implemented to ensure that species number do not increase further.

There has been no significant change in the pattern and distribution of native flora species at each site. November 2017 monitoring results show a very similar pattern among the cumulative flora monitoring data, in terms of the relationship between weeds and natives for each site and the presence of noxious weeds at the site.

No new weed species were recorded during this monitoring period (see section 4.1). The majority of weed species recorded on site are concentrated along the edges of the Cox's River; see Table 1 and Chart 5. This is largely due to the spread of weeds along the watercourse from upstream areas outside the mining lease. Creek 1 and Creek 2 sites recorded the highest number of weeds (28 and 35). Due to the expansion of the quarry area and emplacement area on the ridge monitoring sites, increased weed growth has been observed across this area in 2017.

No direct impacts from quarry operations were noted in relation to the distribution and abundance of weeds within the lease area.

It was noted that Serrated Tussock is still prevalent throughout the site. This noxious weed remains one of the most abundant, next to African Love Grass, and has the highest potential to be further spread throughout the site, which is highlighted by its presence within newly rehabilitated areas. Therefore it is recommended that additional weed control measures (spraying) are undertaken on Serrated Tussock Grass at the riverine sites, and ridge sites in 2018-19. The presence of dense stands of this species around dam rehab sites was noted during amphibian surveys.



Plate 4 – Serrated Tussock growth around dam rehabilitation area

The purpose of the monitoring is to assess the indirect impacts of the quarry on fauna and fauna habitats adjacent to the quarry. No significant changes to species composition have occurred to date throughout the monitoring program. The active quarry operations show that the controls employed at the quarry are effective in controlling weeds which are a major cause of habitat degradation.

Surveys of rehabilitated areas determined that three different revegetation methodologies have been utilised at the site, with differing results.

Site 3 is the oldest site and contained moderately good rehabilitation, showing good planting densities, canopy cover, and evidence of natural regeneration from planted species and recruitment from adjacent bushland.

Planting density and canopy cover was sparser at Site 2 and in addition regeneration was limited due to a dense groundcover of Couch, which was added to the site as a cover crop. Two declared weed species were noted on the edges of area 2, Serrated Tussock and African Lovegrass. These species should be manually removed prior to further flowering and seed set to prevent spreading to other areas.

Site 1 was planted in 2014 with additional areas planted in 2015. The area planted in 2014 contained strong signs of natural regeneration and germination from the topsoil. Planted stock was also observed to be growing strongly.

6. Recommendations

The current management tasks at the quarry should continue as they appear to be effective in controlling impacts to adjacent areas and show continued good environmental management of the adjacent environment:

The following tasks are recommended for the 2018 period:

-) Ongoing management of the noxious weed infestations of Serrated Tussock at the riverine sites and Dam rehabilitation areas is required by herbicide spraying, to prevent further spread of these weeds into good quality vegetation surrounding the quarry. Care should be taken with vehicle movements around the dam areas and with the reuse of soil materials within areas containing these species, such as around the office and stockpile areas.
-) A control program for feral animals should be undertaken to ensure fox, rabbit and cat numbers do not increase at the site.

Appendix A – Survey Species List

			New species recorded														
Family	common name	scientific name	65	71	64	75	77	71	62	60	70	93	67	82	52	62	74
			Jun-05	Mar-06	Aug-06	Mar-07	Jan-08	Nov-08	Oct-09	Nov-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-17
Amphibians			1	6	2	5	6	8	5	4	4	5	5	5	6	5	6
Hylidae	Brown Tree Frog	<i>Litoria ewingii</i>		1	1		1										
	Lesueur's Frog	<i>Litoria lesueuri</i>		1		1	1										1
	Peron's Tree Frog	<i>Litoria peronii</i>		1				1		1	1	1	1	1	1	1	1
	Leaf-green Tree Frog	<i>Litoria phyllochroa</i>					1										
	Verreaux's Tree Frog	<i>Litoria verreauxii</i>						1									
	Keferstein's Tree Frog	<i>Litoria dentata</i>						1		1		1	1	1	1	1	
	Dwarf Green Tree Frog	<i>Litoria fallax</i>											1				1
Myobatrachidae	Common Eastern Froglet	<i>Crinia signifera</i>	1	1	1	1	1	1			1	1	1	1	1	1	1
	Eastern Banjo Frog	<i>Limnodynastes dumerilii</i>		1		1		1		1		1			1	1	1
	Spotted Grass Frog	<i>Limnodynastes tasmaniensis</i>		1		1	1	1				1					
	Striped Marsh Frog	<i>Limnodynastes peronii</i>				1	1	1					1	1	1	1	1
	Keferstein Smooth Toadlet	<i>Uperioia laevigata</i>						1		1	1	1	1	1	1	1	1
Reptiles			1	4	2	6	2	6	1	5	5	6	5	7	4	8	6
Agamidae	Eastern Water Dragon	<i>Physignathus iesueurii</i>		1		1	1			1	1	1	1	1	1	1	1
	Jacky Lizard	<i>Amphibolurus muricatus</i>				1						1	1	1			
	Goanna	<i>Varanus varius</i>						1				1				1	1
Chelidae	Eastern Long-necked Turtle	<i>Chelodina longicollis</i>				1				1				1	1	1	1
Elapidae	Eastern Brown Snake	<i>Pseudonaja textilis</i>				1											1
	Red-Bellied Black Snake	<i>Pseudechis porphyriacus</i>							1		1				1	1	
Scincidae	Copper-tailed Skink	<i>Ctenotus taeniolatus</i>		1	1	1		1		1		1	1			1	1
	Eastern Water Skink	<i>Eulamprus quoyii</i>		1			1	1		1	1	1	1	1		1	1
	Delicate Skink	<i>Lampropholis delicata</i>	1	1		1		1		1	1	1	1	1			
	Grass Skink	<i>Lampropholis guichenoti</i>						1				1	1	1	1	1	1
	Blue Tongue Lizard	<i>Tiliqua scincoides</i>						1			1			1			
Typhlopidae	Blind Snake	<i>Ramphotyphlops</i> sp.			1												
Birds																	
Accipitridae	Black-shouldered Kite	<i>Elanus axillaris</i>	1	1		1	1	1			1			1			1
	Brown Goshawk	<i>Accipiter fasciatus</i>					1									1	
	Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>					1							1			
	Nankeen Kestrel	<i>Falco cenchroides</i>			1		1	1			1	1		1	1		
	Wedge-tailed Eagle	<i>Aquila audax</i>	1	1		1		1		1	1		1				1
	White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>					1	1									
Aegothelidae	Australian Owllet-nightjar	<i>Aegotheles cristatus</i>		1			1									1	
	Tawny Frogmouth	<i>Podargus strigoides</i>						1		1	1						
Alcedinidae	Azure Kingfisher	<i>Alcedo azurea</i>	1			1				1	1	1					
Anatidae	Australian Wood Duck	<i>Chenonetta jubata</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
	Chestnut Teal	<i>Anas castanea</i>	1									1		1		1	1
	Grey Teal	<i>Anas gracilis</i>				1									1		1
	Hardhead	<i>Aythya australis</i>				1					1				1		
	Pacific Black Duck	<i>Anas superciliosa</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
Ardeidae	White-faced Heron	<i>Egretta novaehollandiae</i>	1	1		1				1		1	1	1			1
Artamidae	Australian Magpie	<i>Gymnorhina tibicen</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
	Dusky Woodswallow	<i>Artamus cyanopterus</i>			1	1	1	1			1	1	1	1	1	1	1
	White-browed Woodswallow	<i>Artamus superciliosus</i>													1		
	Grey Butcherbird	<i>Cracticus torquatus</i>	1	1	1	1	1				1	1	1	1			
	Pied Butcherbird	<i>Cracticus nigrogularis</i>									1	1	1	1			1
	Magpie-lark	<i>Gallinula cyanoleuca</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
	Pied Currawong	<i>Strepera graculina</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
Cacatuidae	Galah	<i>Cacatua roseicapilla</i>	1	1	1	1	1	1				1	1		1		
	Gang-gang Cockatoo	<i>Calocephalon fimbriatum</i>			1	1	1	1		1		1	1	1	1	1	1
	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	1	1	1	1	1	1			1	1	1	1	1	1	1

			Jun-05	Mar-06	Aug-06	Mar-07	Jan-08	Nov-08	Oct-09	Nov-10	Nov-11	Nov-12	Nov-13	Nov-14	Nov-15	Nov-16	Nov-17
	Yellow-tailed Black- Cockatoo	<i>Calyptorhynchus funereus</i>	1	1										1			
Campephagidae	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	1	1	1	1	1	1		1	1	1	1			1	1
	Cicada Bird	<i>Coracina tenuirostris</i>											1				
	White-Winged Triller	<i>Lalage tricolor</i>											1	1		1	
Charadriidae	Masked Lapwing	<i>Vanellus miles</i>		1			1			1		1	1	1		1	1
	black fronted dotterel	<i>Elsayornis melanops</i>									1			1		1	1
Cinlosomatidae	Eastern Whipbird	<i>Psophodes olivaceus</i>			1		1	1		1	1			1		1	1
Climacteridae	White-throated Treecreeper	<i>Cormobates leucophaeus</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
Columbidae	Bar-shouldered Dove	<i>Geopelia humeralis</i>					1										
	Common Bronzewing	<i>Phaps ehalcoptera</i>				1				1							
	Crested Pigeon	<i>Ocyphaps lophotes</i>	1	1	1	1	1					1					
	Peaceful Dove	<i>Geopelia striata</i>	1	1				1				1		1		1	
Coraciidae	Dollarbird	<i>Eurystomus orientalis</i>					1	1		1	1	1	1	1	1		
Corcoracidae	White-winged Chough	<i>Corcorax melanorhamphos</i>	1		1	1	1	1		1	1	1		1	1	1	
Corvidae	Australian Raven	<i>Corvus coronoides</i>	1	1	1	1	1	1		1	1	1				1	1
	Little Raven	<i>Corvus mellori</i>		1								1					
	Torresian Crow	<i>Corvus orru</i>									1	1	1				
Cuculidae	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>		1	1	1	1	1				1		1			1
Dicaeidae	Mistletoebird	<i>Dicaeum hirundinaceum</i>	1		1		1							1			
Dicruridae	Grey Fantail	<i>Rhipidura fuliginosa</i>	1	1	1	1	1	1		1	1	1	1	1	1		1
	Restless Flycatcher	<i>Myiagra iniqueta</i>	1	1	1		1					1					
	Satin Flycatcher	<i>Myiagra cyanoleuca</i>									1	1					
	Willie Wagtail	<i>Rhipidura leucophrys</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
	Leadend Flycatcher							1			1	1		1			
Falconidae	Brown Falcon	<i>Falco berigora</i>	1														
	Peregrine Falcon	<i>Falco peregrinus</i>		1													
Halcyonidae	Laughing Kookaburra	<i>Dacela novaeguineae</i>	1	1	1	1	1			1	1	1	1	1	1	1	1
	Sacred Kingfisher	<i>Todiramphus sanetus</i>		1				1		1	1	1	1	1	1	1	1
	Forest Kingfisher	<i>Todiramphus macleayi</i>															
Hirundinidae	Unidentified Martin	<i>Hirundo sp.</i>				1		1								1	
	Welcome Swallow	<i>Hirundo neoxena</i>		1		1	1	1		1	1	1	1	1	1	1	1
Maluridae	Superb Fairy-wren	<i>Malurus cyaneus</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
	Variagated Fairy-wren	<i>Malurus lamberti</i>	1		1						1	1					
Meliphagidae	Brown-headed Honeyeater	<i>Melithreptus validirostris</i>		1	1		1										
	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	1	1	1	1	1					1					
	Noisy Miner	<i>Manorina melanocephala</i>	1	1	1	1	1	1		1	1	1	1	1			
	New Holland	<i>Phylidonyris novaehollandiae</i>		1	1	1	1	1				1	1				
	Noisy Friarbird	<i>Philemon corniculatus</i>		1	1	1	1	1		1	1	1	1	1	1	1	1
	Red Wattlebird	<i>Anthochaera carunculata</i>	1	1	1	1	1						1		1		
	White-eared Honeyeater	<i>Lichenostomus leucotis</i>	1	1	1							1	1				
	White-naped Honeyeater	<i>Melithreptus lunatus</i>	1	1	1	1	1					1					
	White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>			1					1							1
	Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>	1	1	1	1	1	1		1	1	1	1	1	1	1	1
	Lewins Honeyeater	<i>Meliphaga lewinii</i>						1				1		1			1
	Black-chinned Honeyeater	<i>Melithreptus gularis</i>											1				
	Rainbow Bee-eater	<i>Merops ornatus</i>						1					1				
Motacillidae	Richard's Pipit	<i>Anthus novaeseelandiae</i>	1	1									1	1			1
	Brown Songlark							1					1				
Muscicapidae	Australian Reed-Warbler	<i>Acrocephalus australis</i>					1			1	1	1	1	1	1	1	1
Neosittidae	Varied Sittella	<i>Daphoenositta chrysoptera</i>				1				1							
Oriolidae	Olive-backed Oriole	<i>Oriolus sagittatus</i>										1		1			
Pachycephalidae	Golden Whistler	<i>Pachycephala pectoralis</i>	1		1	1	1					1		1			1
	Grey Shrike-thrush	<i>Colluricincla harmonica</i>	1	1	1	1	1				1	1		1	1	1	1
	Rufous Whistler	<i>Pachycephala rufiventris</i>		1		1	1	1		1	1	1	1	1	1	1	1
Pardalotidae	Brown Thornbill	<i>Acanthiza pusilla</i>	1	1	1	1	1	1			1	1		1		1	1
	Buff-rumped thornbill	<i>Acanthiza reguloides</i>	1		1		1					1					1
	Spotted Pardalote	<i>Pardalotus punctatus</i>	1	1	1	1	1	1				1	1	1		1	

Flora Detected within Survey sites 2017		Ridge 1	Ridge 2	Ridge 3	Creek 1	Creek 2	Rehab 1	Rehab 2	Rehab 3
*Trifolium arvense	Haresfoot Clover						4	3	
*Trifolium repens	White Clover						2	1	
*Urtica urens	Stinging Nettle								
*Verbascum thapsus	Great Mullein								
*Verbascum virgatum	Twiggy Mullein								
*Verbena bonariensis	Purpletop				2	2		1	
*Verbena rigida	Purpletop								
*Veronica anagallis-aquatica	Blue Water Speedwell								
*Veronica persica	Creeping Speedwell								
*Vicia satava	Vetch								
*Vulpia bromoides	Silver Grass				2	5		4	4

Flora Detected within Survey sites 2017		Ridge 1	Ridge 2	Ridge 3	Creek 1	Creek 2	Rehab 1	Rehab 2	Rehab 3
Eucalyptus albens	White Box								
Eucalyptus dives	Broad-leaved Peppermint	1							
Eucalyptus oblonga	Sandstone Stringybark	2	1	1			2	4	2
Eucalyptus mannifera	Brittle Gum	3							
Eucalyptus praecox	Brittle Gum		4	4			1	2	4
Eucalyptus pulverulenta	Silver-leaved Mountain Gum						1	1	1
Eucalyptus viminalis	Ribbon Gum				1	2	2		
Euchiton sphaericus	Cudweed								
Exocarpos cupressiformis	Native Cherry								
Galium gaudichaudii	Rough Bedstraw								
Galium leptogonium	Galium								
Geranium solanderi var. <i>solanderi</i>	Geranium	1						2	3
Glossostigma elatinoides	Mud Mat								
Glycine clandestina	Glycine							1	1
Glycine tabacina	Glycine	1							
Gonocarpus tetragynus	Raspwort								
Gonocarpus teuricoides	Raspwort	2		1					
Goodenia bellidifolia		1							
Goodenia hederacea ssp. <i>hederacea</i>	Goodenia	1	1	2					
Grevillea arenaria	Hoary Grevillea				3				
Grevillea aspleniifolia				3					
Haemodorum corymbosum									
Haemodorum planifolium									
Hakea dactyloides	Broad-leaved Hakea								
Hardenbergia violacea	False Sarsparilla								
Hibbertia aspera	Hairy Guinea Flower	2	3	3					
Hibbertia cistiflora							1		
Hibbertia obtusifolia	Hoary Guinea Flower	1	2						
Hovea linearis									
Hovea rosmarinifolia									
Hydrocotyle laxiflora	Pennywort								
Hydrocotyle tripartita	Pennywort							1	
Hymenanthera dentata	Tree Violet								
Hypericum gramineum	Small St.Johns Wort								
Imperata cylindrica var. <i>major</i>	Blady Grass				3				
Indigofera australis	Australian Indigo								1
Isolepis inundata	Club-sedge				4	4			
Isotoma axillaris	Rock Isotome								
Joycea pallida	Red-anther Wallaby Grass		1				1	1	1
Juncus spp.									
Juncus usitatus									
Lachnagrostis filiformis	Blown Grass								
Lagenophora stipitata	Blue-bottle Daisy								
Laxmannia compacta	Slender Wire Lily								
Lepidosperma gunnii									
Lepidosperma laterale		1	1	5			1		
Lepidosperma viscidum									
Leptospermum parvifolium			2						

Flora Detected within Survey sites 2017		Ridge 1	Ridge 2	Ridge 3	Creek 1	Creek 2	Rehab 1	Rehab 2	Rehab 3
<i>Leptospermum polygalifolium</i> ssp. <i>polygalifolium</i>			4					4	4
<i>Leptospermum trinervium</i>					2	1			
<i>Leucopogon appressus</i>		3	1	1					
<i>Leucopogon ericoides</i>	Pink Beard-heath	4	1					1	
<i>Lindsaea linearis</i>	Screw Fern								
<i>Lissanthe strigosa</i> ssp. <i>strigosa</i>	Peach Heath	3							1
<i>Lomandra filiformis</i> ssp. <i>coriacea</i>	Wattle Matt-rush								
<i>Lomandra filiformis</i> ssp. <i>filiformis</i>	Wattle Matt-rush	4		4			1		
<i>Lomandra glauca</i>	Pale Matt-rush			2				1	1
<i>Lomandra longifolia</i>	Spiny Matt-rush	2			3			4	2
<i>Lomandra multiflora</i> ssp. <i>multiflora</i>			3						
<i>Lomandra</i> spp.	Matt Rush	2							1
<i>Lomatia myricoides</i>	River Lomatia								
<i>Mentha diemenica</i>	Slender Mint			1			1		
<i>Microlaena stipoides</i>	Weeping Meadow Grass								
<i>Mirbelia platylobioides</i>				1					
<i>Monotoca elliptica</i>	Tree Broom-heath	3	1						
<i>Monotoca scoparia</i>									
<i>Notodanthonia longifolia</i>	Long-leaved Wallaby Grass								
<i>Opercularia hispida</i>	Stinkweed								
<i>Opercularia varia</i>	Stinkweed								
<i>Oplismenus aemulus</i>	Basket Grass								
<i>Oplismenus imbecillis</i>	Basket Grass								
<i>Oxalis exilis</i>	Oxalis								
<i>Panicum effusum</i>	Hairy Panic								
<i>Panicum simile</i>	Two-colour Panic								
<i>Paspalum distichum</i>	Water Couch								
<i>Patersonia sericea</i>	Silky Purple Flag			1					
<i>Persicaria decipiens</i>	Knotweed								
<i>Persicaria hydropiper</i>	Knotweed								
<i>Persicaria praetermissa</i>	Knotweed								
<i>Persicaria strigosa</i>	Knotweed								
<i>Persicaria lapathifolia</i>	Knotweed								
<i>Persoonia linearis</i>	Narrow-leaved Geebung								
<i>Philothea</i> spp.	Wax Flower	1					1		
<i>Phragmites australis</i>	Common Reed								
<i>Phyllanthus hirtellus</i>	Thyme Spurge		1	3					
<i>Plantago gaudichaudii</i>	Narrow-leaved Plantain								
<i>Platysace ericoides</i>			1	1					
<i>Poa affinis</i>									
<i>Poa labillardierei</i> var. <i>labillardierei</i>	Tussock Grass			1			2	1	
<i>Poa sieberiana</i>									
<i>Pomaderris</i> spp.									
<i>Pomax umbellata</i>			3	1			1		
<i>Poranthera microphylla</i>									
<i>Portulaca oleracea</i>	Pigweed								
<i>Prasophyllum</i> spp.	Leek Orchid								
<i>Prostathera incana</i>	Velvet Mint-bush								
<i>Pteridium esculentum</i>	Bracken				3	3			

Appendix B – Declared weeds of Central Tablelands

Priority weeds for the Central Tablelands

Note: this region includes the local council areas of Bathurst Regional, Blayney, Cabonne, Cowra, Lithgow, Mid-Western Regional, Oberon, Orange

[Select another region](#)

Weed

All plants

[African boxthorn](#)

Lycium ferocissimum

[African boxthorn](#)

Lycium ferocissimum

[African olive](#)

Olea europaea subsp. *cuspidata*

[Alligator weed](#)

Alternanthera philoxeroides

Duty

General Biosecurity Duty

All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Mandatory Measure

Must not be imported into the State or sold

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Protect primary production lands that are free of African boxthorn

Regional Recommended Measure

Exclusion zone: whole region except the core infestation area of the Cowra Council area

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should mitigate spread from their land.

Mandatory Measure

Must not be imported into the State or sold

Alligator weed

Alternanthera philoxeroides

Biosecurity Zone

The Alligator Weed Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens).

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Anchored water hyacinth

Eichhornia azurea

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Athel pine

Tamarix aphylla

Mandatory Measure

Must not be imported into the State or sold

Bellyache bush

Jatropha gossypifolia

Mandatory Measure

Must not be imported into the State or sold

Bitou bush

Chrysanthemoides monilifera subsp.
rotundata

Mandatory Measure

Must not be imported into the State or sold

Bitou bush

Chrysanthemoides monilifera subsp.
rotundata

Biosecurity Zone

The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south.

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Black knapweed
Centaurea X moncktonii

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Black willow
Salix nigra

Mandatory Measure

Must not be imported into the State or sold

Blackberry
Rubus fruticosus species aggregate

Mandatory Measure

Must not be imported into the State or sold

All species in the *Rubus fruticosus* species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree

Blackberry
Rubus fruticosus species aggregate

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Protect conservation areas, natural environments and primary production lands that are free of blackberry

Boneseed
Chrysanthemoides monilifera subsp.
monilifera

Mandatory Measure

Must not be imported into the State or sold

Boneseed
Chrysanthemoides monilifera subsp.
monilifera

Control Order

Bonseed Control Zone: Whole of NSW

Boneseed Control Zone (Whole of NSW): Owners and occupiers of land on which there is boneseed must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of boneseed must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.

Boxing glove cactus
Cylindropuntia fulgida var. *mamillata*

Mandatory Measure

Must not be imported into the State or sold

Bridal creeper
Asparagus asparagoides

Mandatory Measure

Must not be imported into the State or sold

***this requirement also applies to the Western Cape form of bridal creeper**

Bridal creeper
Asparagus asparagoides

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Protect conservation areas and natural environments that are free of bridal creeper

Bridal veil creeper
Asparagus declinatus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Broomrapes
Orobanche species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Orobanche* are Prohibited Matter in NSW, except the natives *Orobanche cernua* var. *australiana* and *Orobanche minor*

Burr ragweed
Ambrosia confertiflora

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Cabomba
Cabomba caroliniana

Mandatory Measure

Must not be imported into the State or sold

Cane cactus
Austrocylindropuntia cylindrica

Mandatory Measure

Must not be imported into the State or sold

All species in the *Austrocylindropuntia* genus have this requirement

Cape broom
Genista monspessulana

Mandatory Measure
Must not be imported into the State or sold

Cape broom
Genista monspessulana

Regional Recommended Measure
Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Protect conservation areas and natural environments that are free of Cape broom

Cat's claw creeper
Dolichandra unguis-cati

Mandatory Measure
Must not be imported into the State or sold

Chilean needle grass
Nassella neesiana

Mandatory Measure
Must not be imported into the State or sold

Chilean needle grass
Nassella neesiana

Regional Recommended Measure
Exclusion zone: whole region except for the core infestation area of Bathurst Council, Blayney Council, Lithgow Council, Oberon Council, Cabonne Council and Cowra Council
Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should mitigate spread from their land.

Climbing asparagus
Asparagus africanus

Mandatory Measure
Must not be imported into the State or sold

Climbing asparagus fern
Asparagus plumosus

Mandatory Measure
Must not be imported into the State or sold

Common pear
Opuntia stricta

Mandatory Measure
Must not be imported into the State or sold

Coolatai grass
Hyparrhenia hirta

Regional Recommended Measure
Exclusion zone: whole region except for the core infestation areas of Lithgow Council and Mid-Western Regional Council areas
Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should mitigate spread from their land.

Eurasian water milfoil
Myriophyllum spicatum

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Fireweed
Senecio madagascariensis

Mandatory Measure

Must not be imported into the State or sold

Fireweed
Senecio madagascariensis

Regional Recommended Measure

Exclusion zone: Whole region except for the core infestation area of Bylong Valley and Kanimbla Valley (lower Cox River Catchment)

Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land.

Core infestation area: Land managers should mitigate spread from their land.

Flax-leaf broom
Genista linifolia

Mandatory Measure

Must not be imported into the State or sold

Frogbit
Limnobium laevigatum

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Limnobium* are Prohibited Matter

Gamba grass
Andropogon gayanus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Giant Parramatta grass
Sporobolus fertilis

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Giant reed
Arundo donax

Regional Recommended Measure

Exclusion zone: whole region except for the core infestation area of Bathurst Council, Cabonne Council and Cowra Council areas

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should mitigate spread from their land.

Gorse
Ulex europaeus

Mandatory Measure

Must not be imported into the State or sold

Gorse
Ulex europaeus

Regional Recommended Measure

Exclusion zone: whole region except for the core infestation area of Bathurst Council, Blayney Council, Lithgow Council and Oberon Council

Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land.

Core infestation area: Land managers should mitigate spread from their land.

Green cestrum
Cestrum parqui

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.

Contain within riparian areas to protect grazing land that is free of green cestrum

Grey sallow
Salix cinerea

Mandatory Measure

Must not be imported into the State or sold

Ground asparagus
Asparagus aethiopicus

Mandatory Measure

Must not be imported into the State or sold

Harrisia cactus
Harrisia species

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

This Regional Recommended Measure does not apply to cultivated plants.

Hawkweeds
Hieracium species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the genus *Hieracium* are Prohibited Matter

Honey locust
Gleditsia triacanthos

Regional Recommended Measure

*Exclusion zone: whole region except for the core infestation area of the Capertree Valley and Orange urban areas
Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should mitigate spread from their land.*

Horsetails
Equisetum species

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Hudson pear
Cylindropuntia rosea

Mandatory Measure

Must not be imported into the State or sold

Hudson pear
Cylindropuntia rosea

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

This Regional Recommended Measure applies to all species of *Cylindropuntia*.

Hydrocotyl

Hydrocotyle ranunculoides

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Hygrophila

Hygrophila costata

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Hymenachne

Hymenachne amplexicaulis and hybrids

Mandatory Measure

Must not be imported into the State or sold

Karoo thorn

Vachellia karroo

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Kochia

Bassia scoparia

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Excluding the subspecies *trichophylla*

Koster's curse

Clidemia hirta

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Lagarosiphon

Lagarosiphon major

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Lantana

Lantana camara

Mandatory Measure

Must not be imported into the State or sold

Long-leaf willow primrose

Ludwigia longifolia

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Ludwigia

Ludwigia peruviana

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Madeira vine

Anredera cordifolia

Mandatory Measure

Must not be imported into the State or sold

Mesquite

Prosopis species

Mandatory Measure

Must not be imported into the State or sold

All species in the genus *Prosopis* have this requirement

Mexican feather grass

Nassella tenuissima

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Miconia

Miconia species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Miconia* are Prohibited Matter in NSW

Mikania vine

Mikania micrantha

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

***all species in the genus *Mikania* are Prohibited Matter in NSW**

Mimosa

Mimosa pigra

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Mother-of-millions

Bryophyllum species

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.

Protect conservation areas, natural environments and grazing land that is free of mother-of-millions

Ox-eye daisy

Leucanthemum vulgare

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.

Protect conservation areas, natural environments and primary production lands that are free of ox-eye daisy

Parkinsonia

Parkinsonia aculeata

Mandatory Measure

Must not be imported into the State or sold

Parkinsonia

Parkinsonia aculeata

Control Order

Parkinsonia Control Zone: Whole of NSW
Parkinsonia Control Zone (Whole of NSW): Owners and occupiers of land on which there is parkinsonia must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of parkinsonia must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.

Parthenium weed

Parthenium hysterophorus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Parthenium weed

Parthenium hysterophorus

Mandatory Measure

The following equipment must not be imported into NSW from Queensland: grain harvesters (including the comb or front), comb trailers (including the comb or front), bins used for holding grain during harvest operations, augers or similar for moving grain, vehicles used to transport grain harvesters, support vehicles driven in paddocks during harvest operations, mineral exploration drilling rigs and vehicles used to transport those rigs, unless set out as an exception in Division 5, Part 2 of the Biosecurity Order (Permitted Activities) 2017

Pond apple

Annona glabra

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Prickly acacia

Vachellia nilotica

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Prickly pears - Austrocyliindropuntias

Austrocyliindropuntia species

Mandatory Measure

Must not be imported into the State or sold

All species in the *Austrocyliindropuntia* genus have this requirement

Prickly pears - Cyliindropuntias

Cyliindropuntia species

Mandatory Measure

Must not be imported into the State or sold

All species in the *Cyliindropuntia* genus have this requirement

Prickly pears - Cylindropuntias

Cylindropuntia species

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.

This Regional Recommended Measure does not apply to cultivated plants

Prickly pears - Opuntias

Opuntia species

Mandatory Measure

Must not be imported into the State or sold

Except for *Opuntia ficus-indica* (Indian fig)

Privet - broad-leaf

Ligustrum lucidum

Regional Recommended Measure

Exclusion zone: urban areas of Bathurst Council, Blayney Council, Lithgow Council, Oberon Council, and Orange City Council

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant is prevented from flowering and fruiting. Land managers should mitigate spread from their land. Land managers should mitigate the risk of the plant being introduced to their land.

Privet - European

Ligustrum vulgare

Regional Recommended Measure

Exclusion zone: urban areas of Bathurst Council, Blayney Council, Lithgow Council, Oberon Council, and Orange City Council

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant is prevented from flowering and fruiting. Land managers should mitigate spread from their land. Land managers should mitigate the risk of the plant being introduced to their land.

Privet - narrow-leaf

Ligustrum sinense

Regional Recommended Measure

Exclusion zone: urban areas of Bathurst Council, Blayney Council, Lithgow Council, Oberon Council, and Orange City Council

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant is prevented from flowering and fruiting. Land managers should mitigate spread from their land. Land managers should mitigate the risk of the plant being introduced to their land.

Rope pear
Cylindropuntia imbricata

Mandatory Measure

Must not be imported into the State or sold

All species in the *Cylindropuntia* genus have this requirement

Rope pear
Cylindropuntia imbricata

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

This Regional Recommended Measure applies to all species of *Cylindropuntia*

Rubber vine
Cryptostegia grandiflora

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Sagittaria
Sagittaria platyphylla

Mandatory Measure

Must not be imported into the State or sold

Sagittaria
Sagittaria platyphylla

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.

Salvinia
Salvinia molesta

Mandatory Measure

Must not be imported into the State or sold

Scotch broom
Cytisus scoparius subsp. *scoparius*

Mandatory Measure

Must not be imported into the State or sold

Scotch broom
Cytisus scoparius subsp. *scoparius*

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Protect conservation and natural environments that are free of Scotch broom

Serrated tussock
Nassella trichotoma

Mandatory Measure

Must not be imported into the State or sold

Serrated tussock
Nassella trichotoma

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Protect conservation areas, natural environments and primary production lands that are free of serrated tussock

Siam weed
Chromolaena odorata

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Silverleaf nightshade
Solanum elaeagnifolium

Mandatory Measure

Must not be imported into the State or sold

Silverleaf nightshade
Solanum elaeagnifolium

Regional Recommended Measure

Exclusion zone: whole region except the core infestation area of Cowra Council, Cabonne Council and Mid-Western Regional Council

Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land.

Core infestation area: Land managers should mitigate spread from their land.

Smooth tree pear
Opuntia monacantha

Mandatory Measure

Must not be imported into the State or sold

Snakefeather
Asparagus scandens

Mandatory Measure

Must not be imported into the State or sold

Spanish heath
Erica lusitanica

Regional Recommended Measure

Exclusion zone: whole region except for the core infestation area of Lithgow Council

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should mitigate spread from their land.

Spiny burrgrass - longispinus

Cenchrus longispinus

Regional Recommended Measure

Exclusion zone: whole region except the core infestation area of Mid-Western Regional Council, Bathurst Council, Cabonne Council and Cowra Council areas

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should mitigate spread from their land.

Spiny burrgrass - spinifex

Cenchrus spinifex

Regional Recommended Measure

Exclusion zone: whole region except the core infestation area of Mid-Western Regional Council, Bathurst Council, Cabonne Council and Cowra Council areas

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should mitigate spread from their land.

Spongeplant

Limnobium spongia

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Limnobium* are Prohibited Matter

Spotted knapweed

Centaurea stoebe subsp. *micranthos*

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

St. John's wort

Hypericum perforatum

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.

Protect grazing land that is free of St. John's wort

Tiger pear

Opuntia aurantiaca

Mandatory Measure

Must not be imported into the State or sold

Tiger pear

Opuntia aurantiaca

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Protect unimproved grazing lands that are free of tiger pear

Tropical soda apple

Solanum viarum

Control Order

Tropical Soda Apple Control Zone: Whole of NSW

Tropical Soda Apple Control Zone (Whole of NSW): Owners and occupiers of land on which there is tropical soda apple must notify the local control authority of new infestations; destroy the plants including the fruit; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of tropical soda apple must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant on the land, or on or in a carrier.

Tutsan

Hypericum androsaemum

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.

Protect conservation areas, natural environments and primary production land that is free of tutsan

Velvety tree pear

Opuntia tomentosa

Mandatory Measure

Must not be imported into the State or sold

Water caltrop

Trapa species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the *Trapa* genus are Prohibited Matter in NSW

Water hyacinth

Eichhornia crassipes

Mandatory Measure

Must not be imported into the State or sold

Water hyacinth
Eichhornia crassipes

Biosecurity Zone

The Water Hyacinth Biosecurity Zone applies to all land within the State, except for the following regions: Greater Sydney or North Coast, North West (but only the local government area of Moree Plains), Hunter (but only in the local government areas of City of Cessnock, City of Lake Macquarie, MidCoast, City of Maitland, City of Newcastle or Port Stephens), South East (but only in the local government areas of Eurobodalla, Kiama, City of Shellharbour, City of Shoalhaven or City of Wollongong).

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Water hyacinth
Eichhornia crassipes

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. Notify local control authority if found.

Water soldier
Stratiotes aloides

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Willows
Salix species

Mandatory Measure

Must not be imported into the State or sold

All species in the *Salix* genus have this requirement, except *Salix babylonica* (weeping willows), *Salix x calodendron* (pussy willow) and *Salix x reichardtii* (sterile pussy willow)

Witchweeds
Striga species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the *Striga* genus are Prohibited Matter in NSW, except the native *Striga parviflora*

Yellow burrhead

Limnocharis flava

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

The content provided here is for information purposes only and is taken from the *Biosecurity Act 2015* and its subordinate legislation, and the Regional Strategic Weed Management Plans (published by each Local Land Services region in NSW). It describes the state and regional priorities for weeds in New South Wales, Australia.



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Appendix C – Threatened Species Database Searches

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
Endangered Ecological Communities			
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	No scientific name	Dominated by White Box Yellow Box or Blakely's Red Gum where a tree canopy still exists. Must be greater than 0.1 hectares in size where these canopy species dominate.	EPBC Act 2000 Critically Endangered
Temperate Highland Peat Swamps on Sandstone	No scientific name	The Temperate Highland Peat Swamps all occur on sandstone and share similar vegetation. Sphagnum bogs and fens occupy the wetter parts while sedge and shrub associations occur in the drier parts of the swamps. Some, like the Blue Mountains Swamps, are hanging swamps that are prominent on steep valley sides, where water exits the ground between sandstone and clay stone layers of rock. A variety of native plants and animals make their homes in the Temperate Highland Peat Swamps. These include the nationally endangered Blue Mountains Water Skink, Giant Burrowing Frog and Wingecarribee Leek Orchid. The Giant Dragonfly, which is threatened in NSW, also occurs in this ecological community.	EPBC Act 2000 Endangered
Upland Basalt Eucalypt Forest of the Sydney Basin Bioregion	No scientific name	Tall open eucalypt forests found on igneous rock (predominately Tertiary basalt and microsyenite) in, or adjacent to, the Sydney Basin Bioregion. The ecological community occurs in areas of high rainfall, generally ranging from 950 to 1600 mm/year. The ecological community typically occurs at elevations between 650 and 1050 m above sea level although it has been recorded at elevations as low as 350 m at the back of the Illawarra Escarpment in the Upper Nepean Sydney Catchment Authority (SCA) lands where proximity to the coast provides higher rainfall at lower elevations. The ecological community may occur at elevations of 1200 m or more within its range, such as on the Boyd Plateau in the western Blue Mountains.	EPBC Act 2000 Endangered
Flora			
Bynoe's Wattle	Acacia bynoeana	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	TSC Act 1995 Endangered EPBC Act 2000 Vulnerable
Flockton Wattle	Acacia flocktoniae	The Flockton Wattle is found only in the Southern Blue Mountains (at Mt Victoria, Megalong Valley and Yerranderie) and grows in dry sclerophyll forest on sandstone.	TSC Act 1995 Vulnerable EPBC Act 2000 Vulnerable
	Acacia meiantha	Acacia meiantha is endemic to New South Wales. Three disjunct populations within the Central Tablelands occur within 100 km of each other. The Clarence population covers approx. 1 ha between Lithgow and Bell on Crown and Railway Corridor land. This is the main population and is on the east of the Great Dividing Range (GDR) in a headwater catchment of the Coxs River. The Mullions Range population is west of the GDR, approx.	TSC Act 1995 Endangered

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
		20 km northwest of Orange. A survey of this population has found that it consists of many widely distributed and disjunct stands covering ca. 5 ha with no stands known to occur on conservation land. The Aarons Pass population is west of the GDR in the Macquarie River catchment. This population is primarily confined to approx. 2.5 km of road easements.	
	<i>Asterolasia buxifolia</i>	Known from a single site at a granite outcrop in the riparian zone of the Lett River. Apparently restricted to dense riparian scrub along rocky watercourses with a granitic substrate. Rediscovered in 2000, little is known about the species. The growth rate appears to be very slow, and the flowering season short.	TSC Act 1995 Endangered
	<i>Asterolasia elegans</i>	Found in sheltered forests on mid- to lower slopes and valleys (on Hawkesbury sandstone) in or adjacent to gullies which support sheltered forest. The canopy at known sites includes Turpentine (<i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i>), Smooth-barked Apple (<i>Angophora costata</i>), Sydney Peppermint (<i>Eucalyptus piperita</i>), Forest Oak (<i>Allocasuarina torulosa</i>) and Christmas Bush (<i>Ceratopetalum gummiferum</i>).	EPBC 2000 Endangered
Deane's Boronia	<i>Boronia deanei</i>	There are scattered populations of Deane's Boronia between the far south-east of NSW and the Blue Mountains (including the upper Kangaroo River near Carrington Falls, the Endrick River near Nerriga and Nalbaugh Plateau), mainly in conservation reserves. Grows in wet heath, often at the margins of open forest adjoining swamps or along streams.	TSC Act 1995 Vulnerable EPBC Act 2000 Vulnerable
Thick Lip Spider Orchid	<i>Caladenia tessellata</i>	A terrestrial orchid generally found in grassy sclerophyll woodland on clay loam or sandy soils	EPBC Act 2000 Vulnerable
Leafless Tongue-orchid	<i>Cryptostylis hunteriana</i>	Populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>).	EPBC Act 2000 Vulnerable
A shrub	<i>Derwentia blakelyi</i>	<i>Derwentia blakelyi</i> is restricted to the western Blue Mountains, near Clarence, near Mt Horrible, Nullo Mountain and the Coricudgy Range. It grows in eucalypt forest often in moist areas. The species is currently known from less than 20 locations none of which is in a conservation reserve. Known locations all have small population sizes. It is a small glabrous and glaucous shrub or woody herb to 50 cm high, with one to several erect softly woody stems from a narrow rootstock; stems mostly unbranched below inflorescence and dying back after fruiting, internodes 1.5-6 cm long. Leaves usually recurved, V-shaped in cross section, ovate to lanceolate, mostly 2.5-5.5 cm long, 10-20 mm wide, apex more or less acute, base cordate or truncate or cuneate, margins with 8-18 pairs of shallow teeth; sessile. Racemes mostly 8-40 cm long, 15-35 flowered. Calyx lobes 3-5.5 mm long and 0.7-1.3 mm wide in fruit. Corolla 6-7 mm long, bright blue-violet. Capsule broad-ovate, 4-6.5 mm long, 3-3.5 mm wide, truncate or emarginate, glabrous, glaucous. Flowers summer.	TSC Act 1995 Vulnerable
Buttercup Doubletail	<i>Diuris aequalis</i>	Grows among grass in sclerophyll forest, mainly in the ranges and tablelands; chiefly from Braidwood to Kanangra and Liverpool.	TSC Act 1995 Endangered
Black Gum	<i>Eucalyptus aggregata</i>	Grows on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Often grows with other cold-adapted eucalypts,	TSC 1995 Vulnerable

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
		such as Snow Gum or White Sallee (<i>Eucalyptus pauciflora</i>), Manna or Ribbon Gum (<i>E. viminalis</i>), Candlebark (<i>E. rubida</i>), Black Sallee (<i>E. stellulata</i>) and Swamp Gum (<i>E. ovata</i>). Black Gum usually occurs in an open woodland formation with a grassy groundlayer dominated either by River Tussock (<i>Poa labillardierei</i>) or Kangaroo Grass (<i>Themeda australis</i>), but with few shrubs. Also occurs as isolated paddock trees in modified native or exotic pastures. Many populations occur on travelling stock reserves, though stands and isolated individuals also occur on private land. There are very few stands in conservation reserves.	
Silver-leaved Mountain Gum, Silver-leaved Gum	<i>Eucalyptus pulverulenta</i>	The Silver-leaved Gum is found in two quite separate areas, the Lithgow to Bathurst area and the Monaro (Bredbo and Bombala areas). Grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (<i>Eucalyptus mannifera</i>), Red Stringybark (<i>E. macrorhynca</i>), Broad-leaved Peppermint (<i>E. dives</i>), Silvertop Ash (<i>E. sieberi</i>) and Apple Box (<i>E. bridgesiana</i>).	TSC 1995 Vulnerable EPBC Act 2000 Vulnerable
A Herb	<i>Euphrasia arguta</i>	Its previous habitat consists of grassy areas near rivers in elevations until 700 m asl with an annual rainfall of 600 mm. The flowering period is from October to January.	EPBC Act 2000 Critically Endangered
Wingless Raspwort, Square Raspwort	<i>Haloragis exalata</i> subsp <i>exalata</i>	Square Raspwort occurs in 4 widely scattered localities in eastern NSW. It is disjunctly distributed in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW.	EPBC Act 2000 Vulnerable
Not available	<i>Leionema lachnaeoides</i>	Formerly known as <i>Phebalium lachnaeoides</i> . Populations occur on exposed sandstone cliff tops and terraces, at 960 - 1000m altitude and with aspects from south-east to south-west. Habitat vegetation is montane heath and commonly includes <i>Eucalyptus stricta</i> , <i>Allocasuarina nana</i> , <i>Dillwynia retorta</i> , <i>Epacris microphylla</i> and <i>Caustis flexuosa</i> . Has a life span greater than 10 years. Flowering occurs in winter to late spring. The age when plants first flower is not known. Pollination is thought to occur by insects.	TSC Act 1995 Endangered
Pepperpress	<i>Lepidium hyssopifolium</i>	Grows in open, bare ground with limited competition from other plants. Recently recorded localities have predominantly been in weed-infested areas of heavy modification, high degradation and high soil disturbance.	EPBC Act 2000 Endangered
Hoary Sunray	<i>Leucochrysum albicans</i> var. <i>tricolor</i>	In NSW and ACT, Hoary Sunray occurs in grasslands, grassy areas in woodlands and dry open forests, and modified habitats, on a variety of soil types including clays, clay loams, stony and gravelly soil (Sinclair 2010).	EPBC Act 2000 Endangered
Omeo Stork's-bill	<i>Pelargonium</i> sp. <i>Striatellum</i> (G.W.Carr 10345)	Narrow habitat that is usually just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the wetland or aquatic communities. Known from only 3 locations in NSW, with two on lake-beds on the basalt plains of the Monaro and one at Lake Bathurst.	EPBC 2000 Endangered
Needle Geebung	<i>Persoonia acerosa</i>	The Needle Geebung has been recorded only on the central coast and in the Blue Mountains, from Mt Tomah in the north to as far south as Hill Top where it is now believed to be extinct. Mainly in the Katoomba, Wentworth Falls, Springwood area. The Needle Geebung occurs in dry sclerophyll forest, scrubby low-woodland and heath on low fertility soils. Plants are	TSC Act 1995 Vulnerable EPBC Act 2000

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
		likely to be killed by fire and recruitment is solely from seed. This species seems to benefit from the reduced competition and increased light available on disturbance margins including roadsides.	Vulnerable
	<i>Persoonia hindii</i>	Occurs in dry sclerophyll forests and woodlands on sandy soils. Stoloniferous (has underground horizontal stems) and is thought to be clonal. Hence, each location may comprise only one to a few individuals. Flowers January to March, possibly with sporadic flowering in other months.	TSC Act 1995 Endangered
Hairy Geebung	<i>Persoonia hirsuta</i>	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other <i>Persoonia</i> species are) but will regenerate from seed.	EPBC Act 2000 Endangered
Clandulla Geebung	<i>Persoonia Marginata</i>	<i>P. marginata</i> is found in dry woodland communities associated with Shoalhaven. Group sediments. Soils are shallow hardsetting sandy loams, generally with gravel or rocks, and the topography is flat. The vegetation is part of the Tablelands Grassy Woodland Complex vegetation	TSC Act 1995 Vulnerable
Slaty Leek Orchid	<i>Prasophyllum fuscum</i>	The total population, based on a single observation in 2007, is estimated to be approximately 25 mature individuals. Grows in moist heath, often along seepage lines. The known population grows in moist sandy soil over sandstone amongst sedges and grasses in an area that appears to be regularly slashed by the local council. Flowering does not necessarily occur every year, often skipping years. Although successful flowering and reproduction is likely to be dependent on favourable weather and habitat conditions. Dies back after the flowering and fruiting phases and exist only as a dormant tuber for much of the year. Like most terrestrial orchids, the species is believed to be semi or fully dependent on a mycorrhizal symbiont. Dormant over summer and leaves emerge around April and flowering occurs from September to December. It has also been confused with <i>P. pallens</i> which can be distinguished by its paler-coloured flowers with a musty smell.	TSC 1995 Critically Endangered EPBC Act 2000 Vulnerable
Tarengo Leek Orchid	<i>Prasophyllum petilum</i>	Occurs on relatively fertile soils in grassy woodland or natural grassland.	
	<i>Prasophyllum</i> s p. <i>Wybong</i> (C.Phelps ORG 5269)	Occurs on relatively fertile soils in grassy woodland or natural grassland.	EPBC Act 2000 Critically Endangered
Smooth Bush-pea, Swamp Bush-pea	<i>Pultenaea glabra</i>	Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry sclerophyll forest and tall damp heath on sandstone. Flowers September to November, fruit matures October to December. Fire sensitive, with adults killed by fire and recruitment occurring from a persistent soil stored seed bank. Seed germination will not occur in the absence of fire as the hard-coated seed requires heat to break seed dormancy, as is typical of species within Fabaceae.	TSC Act 1995 Vulnerable EPBC Act 2000 Vulnerable
Eastern	<i>Rhizanthella</i>	Occurs from south-east Queensland to south-east NSW. In NSW, currently	EPBC Act 2000

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
Underground Orchid	slateri	known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed. Flowers October to November.	Endangered
Austral Toadflax, Toadflax	Thesium australe	Occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (<i>Themeda australis</i>). A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass.	EPBC Act 2000 Vulnerable
	Velleia perfoliata	Only known from the Hawkesbury district and upper Hunter Valley. Grows in heath and open forest over sandstone. Associated species include <i>Angophora bakeri</i> , <i>Corymbia eximia</i> , <i>Backhousia myrtifolia</i> , <i>Eucalyptus sparsifolia</i> , <i>E. crebra</i> , <i>E. notabilis</i> , <i>Allocasuarina torulosa</i> , and <i>Leptospermum attenuatum</i> . Found in shallow depressions on Hawkesbury sandstone shelves, on rocky hill sides, under cliffs or on rocky/sandy soils along tracks and trails. Occurs on fairly shallow soils of sandy loam texture. Often found growing on moss and lichen mats formed on rock.	TSC 1995 Vulnerable
Fauna			
Amphibians			
Giant Burrowing Frog	Heleioporus australiacus	Breeding habitat is generally soaks or pools within first or second order streams. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	EPBC Act 2000 Vulnerable
Booroolong Frog	Litoria booroolongensis	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Sometimes bask in the sun on exposed rocks near flowing water during summer. Breeding occurs in spring and early summer and tadpoles metamorphose in late summer to early autumn. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.	EPBC Act 2000 Endangered
Littlejohn's Tree Frog, Heath	Litoria littlejohni	This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground. Breeding is triggered by heavy rain and can potentially occur all year, but is usually from late summer to early spring when conditions are favourable. Males call from low vegetation close to slow flowing pools. Eggs are laid in loose gelatinous masses attached to small submerged twigs. Eggs and tadpoles are mostly found in still or slow flowing pools that receive extended exposure to sunlight, but will also use temporary isolated pools.	EPBC Act 2000 Vulnerable
Insects			
Bathurst Copper	Paralucia spinifera	Occurs on the Central Tablelands of NSW in an area approximately bounded by Oberon, Hartley and Bathurst. The butterfly is found at 35 locations, all within the Greater Lithgow, Bathurst Regional and Oberon local	TSC Act 1995 Endangered

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
Butterfly		government areas. It is possible that additional locations will be identified, and these may lie outside the currently known distribution.	EPBC Act 2000 Vulnerable
Giant Dragonfly	<i>Petalura gigantea</i>	Live in permanent swamps and bogs with some free water and open vegetation. Adults emerge from late October and are short-lived, surviving for one summer after emergence. Adults spend most of their time settled on low vegetation on or adjacent to the swamp. They hunt for flying insects over the swamp and along its margins. Adults fly over the swamp and along its margins hunting for flying insects. Females lay eggs into moss, under other soft ground layer vegetation, and into moist litter and humic soils, often associated with groundwater seepage areas within appropriate swamp and bog habitats. The species does not utilise areas of standing water wetland, although it may utilise suitable boggy areas adjacent to open water wetlands. Larvae dig long branching burrows under the swamp. Larvae are slow growing and the larval stage may last 10 years or more.	TSC 1995 Endangered
Birds			
Regent Honeyeater	<i>Anthochaera phrygia</i>	Regent Honeyeaters occur mainly in box-ironbark open-forests and riparian stands of Casuarina on the inland slopes of the Great Dividing Range. At times significant numbers also occur in coastal forests in NSW and eastern Victoria. Particularly when breeding, Regent Honeyeaters require access to nectar or another form of sugary plant exudate such as lerps or honeydew. A few species of Eucalyptus and mistletoe (<i>Amyema cambagei</i>) seem to be important in providing reliable and relatively predictable nectar flows. Lack of access to these dependable nectar flows at critical times, due to clearance of the most fertile stands, the poor health of many remnants, and competition for nectar from other honeyeaters, may be a major cause of the decline of this species.	EPBC 2000 Critically Endangered
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. May also occur in sub-alpine Snow Gum <i>Eucalyptus pauciflora</i> woodland and occasionally in temperate rainforests. Move to lower altitudes in winter, preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting.	TSC 1995 Vulnerable
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur. Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites.	TSC 1995 Vulnerable
Varied Sittella	<i>Daphoenositta chrysoptera</i>	Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	TSC 1995 Vulnerable

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
Little Lorikeet	Glossopsitta pusilla	The distribution of the Little Lorikeet extends from just north of Cairns, around the east coast of Australia, to Adelaide. In New South Wales Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. Little Lorikeets are gregarious, usually foraging in small flocks, often with other species of lorikeet. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including, melaleucas and mistletoes. On the western slopes and tablelands White Box Eucalyptus albens and Yellow Box E. meliodora are particularly important food sources for pollen and nectar respectively. They are also reported as feeding on fruits, particularly those of mistletoes.	TSC 1995 Vulnerable
Painted Honeyeater	Grantiella picta	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	EPBC 2000 Vulnerable
Swift Parrot	Lathamus discolor	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia. In NSW mostly occurs on the coast and south west slopes between March and October. Favoured feed trees include winter flowering species such as Swamp Mahogany Spotted Gum, Red Bloodwood, E. sideroxylon and White Box. Commonly used lerp infested trees include E. microcarpa, Grey Box and Blackbutt.	EPBC 2000 Endangered
Barking Owl	Ninox connivens	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Roosts in shaded portions of tree canopies. Preferentially hunts small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but also takes birds, invertebrates and rodents and rabbits. Requires very large permanent territories in most habitats due to sparse prey densities. Eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used.	TSC 1995 Vulnerable
Powerful Owl	Ninox strenua	In NSW, widely distributed throughout the eastern forests from the coast inland to tablelands. Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. They nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	TSC 1995 Vulnerable
Blue-billed Duck	Oxyura australis	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached.	TSC 1995 Vulnerable

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
		Blue-billed Ducks will feed by day far from the shore, particularly if dense cover is available in the central parts of the wetland. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies. Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer.	
Scarlet Robin	Petroica boodang	The Scarlet Robin breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. It forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris. The robin builds an open cup nest of plant fibres and cobwebs, sited in the fork of tree (often a dead branch in a live tree, or in a dead tree or shrub) which is usually more than 2 m above the ground.	TSC 1995 Vulnerable
Flame Robin	Petroica phoenicea	The Flame Robin is found in south-eastern Australia (Queensland border to Tasmania, western Victoria and south-east South Australia). In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains. There may be two disjunct breeding populations in NSW on the Northern Tablelands and the Central–Southern Tablelands. The Flame Robin forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris. The robin builds an open cup nest of plant fibres and cobweb, which is often near the ground in a sheltered niche, ledge or shallow cavity in a tree, stump or bank. Generation length has been estimated as 5 years.	TSC 1995 Vulnerable
Australian Painted Snipe	Rostratula australis	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally occurs from September to December. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	EPBC Act 2000 Endangered
Mammals			
Large-eared Pied Bat, Large Pied Bat	Chalinolobus dwyeri	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Hirundo ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects	TSC 1995 Vulnerable EPBC Act 2000 Vulnerable

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
		below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.	
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and may raid possum and glider dens and prey on roosting birds.	TSC Act 1995 Vulnerable EPBC Act 2000 Endangered
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	TSC Act 1995 Vulnerable
Southern Brown Bandicoot (eastern)	<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a healthy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees <i>Xanthorrhoea</i> sp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest.	EPBC Act 2000 Endangered
Little Bentwing-bat	<i>Miniopterus australis</i>	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats	TSC 1995 Vulnerable
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	Highly mobile species requiring either hollows, decorticating bark or cave structures for shelter. All forage over wide areas on insects.	TSC 1995 Vulnerable
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	Highly mobile species requiring either hollows, decorticating bark or cave structures for shelter. All forage over wide areas on insects.	TSC 1995 Vulnerable
Southern Myotis	<i>Myotis macropus</i>	Highly mobile species requiring either hollows, decorticating bark or cave structures for shelter. All forage over wide areas on insects.	TSC 1995 Vulnerable
Yellow-bellied Glider	<i>Petaurus australis</i>	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Live in small family groups of two - six individuals and are nocturnal. Den, often in family groups, in hollows of	TSC 1995 Vulnerable

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
		large trees. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources. Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar.	
Squirrel Glider	Petaurus norfolcensis	Inhabits mature or old growth Box, Box- Ironbark woodlands and Blackbutt-Bloodwood forest with heath understorey in Coastal areas. Prefers mixed species stands with a shrub or Acacia mid-storey. Requires abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	TSC 1995 Vulnerable
Brush-tailed Rock-wallaby	Petrogale penicillata	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha. Live in family groups of 2 to 5 adults and usually one or two juvenile and sub-adult individuals. Dominant males associate and breed with up to four females.	TSC 1995 Vulnerable EPBC Act 2000 Vulnerable
Koala	Phascolarctos cinereus	Inhabits eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spends most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	EPBC Act 2000 Vulnerable TSC 1995 Vulnerable
New Holland Mouse	Pseudomys novaehollandiae	Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. The home range of the New Holland Mouse can range from 0.44 ha to 1.4 ha. The New Holland Mouse is a social animal, living predominantly in burrows shared with other. The species is nocturnal and omnivorous, feeding on seeds, insects, leaves, flowers and fungi, and is therefore likely to play an important role in seed dispersal and fungal spore dispersal.	EPBC Act 2000 Vulnerable
Grey-headed Flying-fox	Pteropus poliocephalus	Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Travels up to 50 km to forage on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.	TSC 1995 Vulnerable EPBC Act 2000 Vulnerable
Yellow-bellied Sheath-tail-bat	Saccolaimus flaviventris	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.	TSC 1995 Vulnerable
Greater Broad-	Scoteanax	Highly mobile species requiring either hollows, decorticating bark or cave	TSC 1995 Vulnerable

Common Name	Scientific Name	Habitat Requirements	Listing
			New listings since last monitoring period
nosed Bat	rueppellii	structures for shelter. All forage over wide areas on insects.	
Reptiles			
Blue Mountains Water Skink	Eulamprus leuraensis	The Blue Mountains Water Skink occurs at high elevations between 560 m and 1060 m. Recent genetic research indicates that individual populations are genetically distinct especially between Newnes Plateau and Blue Mountains populations. It is restricted to an isolated and naturally fragmented habitat of sedge and shrub swamps that have boggy soils and appear to be permanently wet. The vegetation in these swamps typically takes the form of a sedgeland interspersed with shrubs, but may occur as a dense shrub thicket. The biology and ecology is poorly understood. Dispersal appears to be male biased, however gene flow between populations is so low that recolonisation after disturbance is likely to be low or non-existent. The Blue mountains Water Skink is semi-aquatic and is active on warm, sunny days from September until late April. It feeds on grasshoppers, flies, moths, weevils and wasps. A small fruit with a seed was found in a lizard dropping at Leura. When disturbed, this species has been observed to flee to shelter in dense grass tussocks or down holes.	EPBC Act 2000 Endangered
Broad-headed Snake	Hoplocephalus bungaroides	Nocturnal. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer. Feeds mostly on geckos and small skinks; will also eat frogs and small mammals occasionally. Females produce four to 12 live young from January to March, which is a relatively low level of fecundity.	TSC Act 1995 Endangered EPBC Act 2000 Vulnerable
Fish			
Macquarie Perch	Macquaria australasica	Originally widespread through the more midland–upland streams and rivers in the south-east corner of the Murray–Darling Basin (New South Wales, Victoria and the Australian Capital Territory), the distribution of this fish is now greatly reduced and patchy. In addition to inland populations, the Macquarie perch is also found in the Hawkesbury and Shoalhaven coastal catchments. While there are clear visual/ physical differences between these coastal and western populations, they are currently still considered to be the same species. Habitat for the Macquarie perch is bottom or mid-water in slow-flowing rivers with deep holes, typically in the upper reaches of forested catchments with intact riparian vegetation. In some parts of its range, the species is reduced to taking refuge in small pools which persist in midland–upland areas through the drier summer periods.	EPBC Act 2000 Endangered
Australian Grayling	Prototroctes maraena	This species spends only part of its lifecycle in freshwater, where running ripe specimens have been captured. The Tambo R. population inhabits a clear, gravel-bottomed stream with alternating pools and riffles, and granite outcrops. It has also been associated with clear, gravel-bottomed habitats in the Mitchell & Wonnangatta Rivers (Vic.) but was present in a muddy-bottomed, heavily silted habitat in the Tarwin R. (Vic.). Grayling migrate between freshwater streams and the ocean and as such it is generally accepted to be a diadromous (migratory between fresh and salt waters) species.	EPBC Act 2000 Vulnerable



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28 August 2017

Rod Welsh
Austen Quarry
C/o Austen Quarry Site Office

OSEM Reference: J061_RPT4_Pre-clearing survey August 2017_v1.0

Dear Rod

Re: Pre-Clearance Survey at Austen Quarry Stage 2 development

Introduction

Onsite Environmental Management (OSEM) Principal Ecologist Mr David Bone conducted a pre-clearance survey on 24/8/2017 for the Stage 2 clearing area proposed to be cleared in 2017/18 for the next stage of the Stage 2 quarry area.

The purpose of the survey was to ground truth the vegetation proposed to be cleared and to determine if the vegetation contained any threatened species, fauna habitat, such as hollows or logs and to map these features and identify any appropriate mitigation measures to be implemented prior to and during vegetation clearing works.

Methodology

The survey involved an assessment and mapping of existing vegetation in the clearing area and the identification of any EEC, threatened species, habitat trees and noxious weeds in the area.

Trees identified as threatened species, containing hollows or other habitat elements were marked with a number and the location was recorded on GPS to allow the trees to be relocated during clearing.

Results

Fauna habitat features such as nests, scratching's or hollows were observed in 69 trees across the area proposed to be cleared. Ten (10) records of threatened species were recorded in the proposed clearing area.

No weeds were observed in the clearing area.

The updated habitat tree register is contained in Appendix A. Figure 1 shows the location of the habitat trees mapped.

Conclusion

Where required to be removed, the habitat trees should only be removed in the presence of a licensed ecologist or wildlife rescuer.

The process for tree removal is to be as follows:

-) Inspect tree for signs of potential fauna habitation, hollow presence, scratch marks, droppings, whitewash, fur, feathers etc.
-) Mark the tree and add to the habitat register, recording the hollow height, location, size and tree type
-) Clear the area around the habitat trees knocking the habitat tree without felling the tree.
-) Wait 24 hours
-) Knock the habitat tree and wait 1 minute for any fauna to leave the tree
-) Fell the tree as gently as possible
-) Inspect the tree for fauna presence
-) Where present capture and hold fauna for release or where injured, relocation to a wildlife carer or vet.
-) Record the outcome of tree felling

Management of clearing is to be undertaken in accordance with the Flora and Fauna Management Plan.

Yours faithfully



David Bone
Principal Ecologist - Onsite Environmental Management Pty Ltd

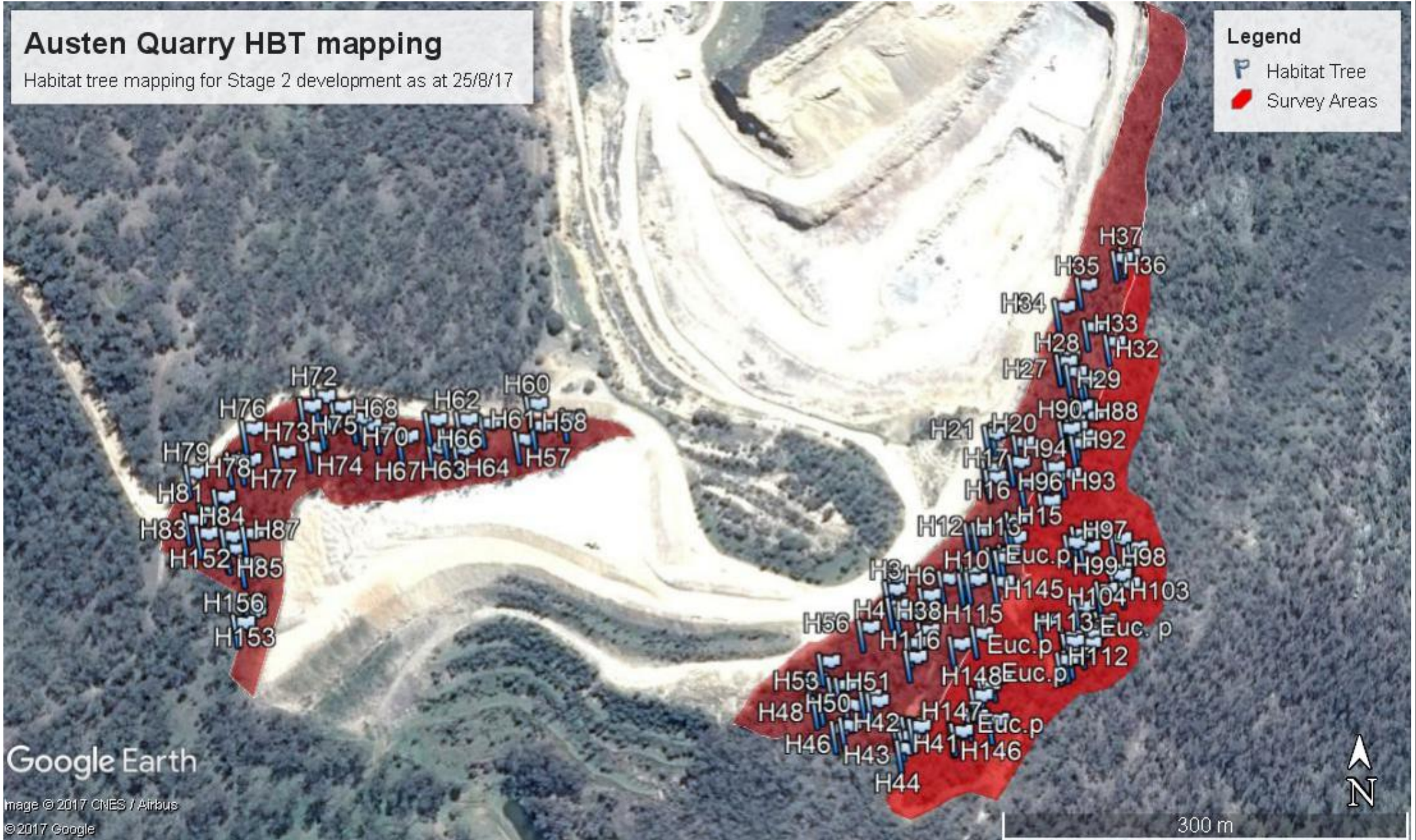
Appendix A – Habitat Tree Register

Austen Quarry HBT mapping

Habitat tree mapping for Stage 2 development as at 25/8/17

Legend

-  Habitat Tree
-  Survey Areas



Google Earth

Image © 2017 CNES / Airbus
© 2017 Google



Source: Google Earth Pro 2017

Habitat Tree Mapping

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
1	BLP	Stage 2 Year 1 (23/11/16)	A	3	B	70	Nil	6/4/17	Nil	Nil
2	BG	Stage 2 Year 1 (23/11/16)	A	2 3	T T	70 70	Nil	6/4/17	Nil	Nil
3	BG	Stage 2 Year 1 (23/11/16)	A	3 4	T T	80 80	Nil	6/4/17	Nil	Nil
4	BLP	Stage 2 Year 1 (23/11/16)	A	7	B	70, 50, 50	Nil	6/4/17	Nil	Nil
5	BG	Stage 2 Year 1 (23/11/16)	A	4	T	80 slit	Nil	6/4/17	Nil	Nil
6	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100 slit	Scratch Marks	6/4/17	Nil	Nil
7	BG	Stage 2 Year 1 (23/11/16)	A	3	T	100 pipe	Nil	6/4/17	Nil	Nil
8	BG	Stage 2 Year 1 (23/11/16)	A	4	B T	50 70	Nil	6/4/17	Nil	Nil
9	BG	Stage 2 Year 1 (23/11/16)	A	10	T	100 pipe	Nil	6/4/17	Nil	Nil
10	BG	Stage 2 Year 1 (23/11/16)	A	4 6	T B	150 100	Nil	6/4/17	Nil	Nil
11	Stag	Stage 2 Year 1 (23/11/16)	D	3.5	T Base	200	Nil	6/4/17	1 x Greater Broad-nosed Bat	Released alive 6/4/17
12	BG	Stage 2 Year 1 (23/11/16)	A	4 5 1	T T T	70 100 150	Nil	6/4/17	1 x Peron's Tree Frog	Released alive 6/4/17

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
13	BG	Stage 2 Year 1 (23/11/16)	A	5 6 8	T T T	100 100 150	Nil	6/4/17	Nil	Nil
14	BG	Stage 2 Year 1 (23/11/16)	A	5	T, slit	250	Nil	6/4/17	Nil	Nil
15	BG	Stage 2 Year 1 (23/11/16)	A	4	T, pipe	150	Nil	6/4/17	Nil	Nil
16	BG	Stage 2 Year 1 (23/11/16)	A	1 4	T B	120 100	Nil	6/4/17	Nil	Nil
17	BG	Stage 2 Year 1 (23/11/16)	A	4	T	150	Scratches	6/4/17	Nil	Nil
18	BG	Stage 2 Year 1 (23/11/16)	A	2 3 5	T T B	150 150 100	Scratches	6/4/17	1 x Owlet Nightjar	Flew away prior to tree felling
19	BG	Stage 2 Year 1 (23/11/16)	A	4 7	B B	100 70	Scratches	6/4/17	Nil	Nil
20	BG	Stage 2 Year 1 (23/11/16)	A	4 5 10	T T B	100 100 3 x 50	Eastern Rosella observed in vicinity	6/4/17	1 x micro bat	Flew away prior to tree felling
21	BG	Stage 2 Year 1 (23/11/16)	A	6	B, slit	100	Nil	6/4/17	Nil	Nil
22	BG	Stage 2 Year 1 (23/11/16)	A	6	T	100	Nil	6/4/17	Nil	Nil
23	BG	Stage 2 Year 1 (23/11/16)	A	6 8	B B	200 100	Nil	6/4/17	Nil	Nil
24	BG	Stage 2 Year 1 (23/11/16)	A	2	T slit	2000	Nil	6/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
25	BG	Stage 2 Year 1 (23/11/16)	A	2.5 4	T B	250 100	Nil	6/4/17	Nil	Nil
26	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100	Nil	6/4/17	Nil	Nil
27	BG	Stage 2 Year 1 (23/11/16)	A	8 10	T B	80 100	Nil	6/4/17	Nil	Nil
28	BG	Stage 2 Year 1 (23/11/16)	A	6 10	B B	60 100	Nil	6/4/17	Nil	Nil
29	BG	Stage 2 Year 1 (23/11/16)	A	3	B	80	Nil	6/4/17	Nil	Nil
30	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Scratches	6/4/17	Nil 2 x Scarlet Robin observed in cleared area	Nil.
31	BG	Stage 2 Year 1 (23/11/16)	A	3	T	200 Slit	Scratches	6/4/17	Nil	Nil
32	BG	Stage 2 Year 1 (23/11/16)	A	3	T	200 pipe	Nil	6/4/17	1 x Lace Monitor	Uninjured, left area after tree felled.
33	BG	Stage 2 Year 1 (23/11/16)	A	3	T	100 pipe	Nil	6/4/17	Nil 1 x Coppertail Skink on ground near tree	Nil.
34	BG	Stage 2 Year 1 (23/11/16)	A	5 10 11 12	T B B B	150 100 100 100	Nil	6/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
35	Stag	Stage 2 Year 1 (23/11/16)	D	4	T pipe	200 pipe	Scratches	6/4/17	Nil	Nil
36	Stag	Stage 2 Year 1 (23/11/16)	D	4	T pipe	100	Nil	6/4/17	Nil	Nil
37	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	6/4/17	Nil 12 x Gang Gang Cockatoo adjacent to tree	Nil Group flew away to nearby tree outside of clearing area
38	BG	Stage 2 Year 1 (23/11/16)	A	5	T	150	Nil	7/4/17	Nil	Nil
39	BG	Stage 2 Year 1 (23/11/16)	A	2 7	T T	100 100	Nil	7/4/17	Nil	Nil
40	BG	Stage 2 Year 1 (23/11/16)	A	7	B	100	Nil	7/4/17	Nil	Nil
41	BG	Stage 2 Year 1 (23/11/16)	A	4	T	100	Nil	7/4/17	Nil	Nil
42	BG	Stage 2 Year 1 (23/11/16)	A	3	T	50	Nil	7/4/17	Nil	Nil
43	Stag	Stage 2 Year 1 (23/11/16)	D	3	T	50	Nil	7/4/17	Nil	Nil
44	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100	Nil	7/4/17	Nil	Nil
45	BG	Stage 2 Year 1 (23/11/16)	A	3	T	150	Nil	7/4/17	Nil	Nil
46	BG	Stage 2 Year 1 (23/11/16)	A	4	B	150	Nil	7/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
47	BLP	Stage 2 Year 1 (23/11/16)	A	3	T	50	Nil	7/4/17	Nil	Nil
48	BG	Stage 2 Year 1 (23/11/16)	A	3 7	T B	150 100	Nil	7/4/17	Nil	Nil
49	BG	Stage 2 Year 1 (23/11/16)	A	5	B	150	Nil	7/4/17	Nil	Nil
50	BG	Stage 2 Year 1 (23/11/16)	A	4	T	100	Nil	7/4/17	Nil	Nil
51	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	7/4/17	Nil	Nil
52	BG	Stage 2 Year 1 (23/11/16)	A	8	B	70	Nil	7/4/17	Nil	Nil
53	BLP	Stage 2 Year 1 (23/11/16)	A	6	T	400 slit	Nil	7/4/17	Nil	Nil
54	BG	Stage 2 Year 1 (23/11/16)	A	6	T	70	Nil	7/4/17	Nil	Nil
55	BG	Stage 2 Year 1 (23/11/16)	A	6	T	70	Nil	7/4/17	Nil	Nil
56	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	7/4/17	Nil	Nil
57	BLP	Stage 2 Spoil Dump (7/4/17)	A	5 6	B B	100 100	Nil Nil	25/8/17		
58	BLP	Stage 2 Spoil Dump (7/4/17)	A	7	B	50	Nil	25/8/17		
59	SB	Stage 2 Spoil Dump (7/4/17)	A	5	T	300 slit	Nil	25/8/17		
60	BLP	Stage 2 Spoil Dump (7/4/17)	A	1 5	T B	100 50	Nil Nil			

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
61	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	1000 slit	Nil			
62	SB	Stage 2 Spoil Dump (7/4/17)	A	8	B	70	Nil			
63	BLP	Stage 2 Spoil Dump (7/4/17)	A	6	T	70	Nil			
64	SB	Stage 2 Spoil Dump (7/4/17)	A	5 8	T T	100 50	Nil Nil	25/8/17		
65	SB	Stage 2 Spoil Dump (7/4/17)	A	10 10	B B	70 70	Nil Nil	25/8/17		
66	SB	Stage 2 Spoil Dump (7/4/17)	A	12	B	70	Nil			
67	SB	Stage 2 Spoil Dump (7/4/17)	A	10 12	T T	100 70	Nil Nil			
68	SB	Stage 2 Spoil Dump (7/4/17)	A	6	B	50 slit	Nil			
69	SB	Stage 2 Spoil Dump (7/4/17)	A	10	T	100	Nil			
70	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	500 pipe	Nil			
71	SB	Stage 2 Spoil Dump (7/4/17)	A	5	T	300 pipe	Nil			
72	Stag	Stage 2 Spoil Dump (7/4/17)	D	12	T	70	Scratches			
73	Stag	Stage 2 Spoil Dump (7/4/17)	D	6	B	200 pipe	Nil			
74	SB	Stage 2 Spoil Dump (7/4/17)	A	12	B	50	Nil	25/8/17		

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
75	SB	Stage 2 Spoil Dump (7/4/17)	A	10	T	50	Nil			
76	Stag	Stage 2 Spoil Dump (7/4/17)	D	6	T	50	Nil			
77	Stag	Stage 2 Spoil Dump (7/4/17)	D	10	T	100	Nil			
78	BG	Stage 2 Spoil Dump (7/4/17)	A	8	T	50	Nil			
79	BG	Stage 2 Spoil Dump (7/4/17)	A	8	B	50	Nil			
80	Stag	Stage 2 Spoil Dump (7/4/17)	D	8	T	70	Nil			
81	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	50	Nil			
82	SB	Stage 2 Spoil Dump (7/4/17)	A	8	B	50	Nil			
83	SB	Stage 2 Spoil Dump (7/4/17)	A	6	T	50	Nil			
84	SB	Stage 2 Spoil Dump (7/4/17)	A	6	B	50	Nil			
85	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	100	Nil			
86	Stag	Stage 2 Spoil Dump (7/4/17)	D	8	T	50	Nil			
87	BG	Stage 2 Spoil Dump (7/4/17)	A	6	B	50	Nil			
88	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
89	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
90	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches	25/8/17	Nil	Nil
91	BG	Stage 2 Year 2 (24/8/17)	A	10	B	50	Scratches	25/8/17	Nil	Nil
92	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
93	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
94	Stag	Stage 2 Year 2 (24/8/17)	A	5	T	50	Nil	25/8/17	Nil	Nil
95	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Scratches	25/8/17	Nil	Nil
96	Stag	Stage 2 Year 2 (24/8/17)	D	6	T	1000	Nil	25/8/17	Nil	Nil
97	BG	Stage 2 Year 2 (24/8/17)	A	10	T	70	Nil	25/8/17	Nil	Nil
98	BG	Stage 2 Year 2 (24/8/17)	A	8	T	70	Nil	25/8/17	Yellow-rumped Thorn-Bill	Nil - Flew away
99	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Lots of Scratches			
100	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
101	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
102	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
103	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
104	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches			
105	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
106	BG	Stage 2 Year 2 (24/8/17)	A	6	B	50	Nil			
107	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
108	BG	Stage 2 Year 2 (24/8/17)	A	10	B	50	Nil			
109	BG	Stage 2 Year 2 (24/8/17)	A	8	T	60	Nil			
110	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil			
111	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
112	Yellow Box	Stage 2 Year 2 (24/8/17)	A	12	B	1000	Nil			
113	BG	Stage 2 Year 2 (24/8/17)	A	8	T	80	Nil	25/8/17	Nil	Nil
114	Yellow Box	Stage 2 Year 2 (24/8/17)	A	12	T	1000	Nil	25/8/17	Nil	Nil
115	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
116	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
117	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
118	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
119	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
120	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches	25/8/17	Nil	Nil
121	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
123	Stag	Stage 2 Year 2 (24/8/17)	D	6	B	80	Nil	25/8/17	Nil	Nil
124	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
125	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
126	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
127	Stag	Stage 2 Year 2 (24/8/17)	D	6	T	70	Nil	25/8/17	Nil	Nil
128	BG	Stage 2 Year 2 (24/8/17)	A	8	T	60	Nil	25/8/17	Nil	Nil
129	BG	Stage 2 Year 2 (24/8/17)	A	8	T	80	Nil	25/8/17	Nil	Nil
130	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
131	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
132	BG	Stage 2 Year 2 (24/8/17)	A	6	B	50	Nil	25/8/17	Nil	Nil
133	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Scratches	25/8/17	Nil	Nil
134	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Scratches	25/8/17	Nil	Nil
135	BG	Stage 2 Year 2 (24/8/17)	A	6	T	60	Scratches	25/8/17	Nil	Nil
136	BG	Stage 2 Year 2 (24/8/17)	A	8	B	70	Nil	25/8/17	Nil	Nil
137	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
138	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
139	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
140	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
141	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
142	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
143	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
144	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
145	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
146	BG	Stage 2 Year 2 (24/8/17)	A	10	B	70	Scratches	25/8/17	Nil	Nil
147	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
148	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
149	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
150	BG	Stage 2 Year 2 (24/8/17)	A	6		70	Nil	25/8/17	Nil	Nil
151	BG	Stage 2 Spoil Dump (25/8/17)	A	6	B	80	Nil	25/8/17	Nil	Nil
152	Stag	Stage 2 Spoil Dump (25/8/17)	D	5	T	60	Nil	25/8/17	Nil	Nil
153	Stag	Stage 2 Spoil Dump (25/8/17)	D	3	T	70	Nil	25/8/17	Nil	Nil
154	Stag	Stage 2 Spoil Dump (25/8/17)	D	4	B	70	Nil	25/8/17	Nil	Nil
155	Stag	Stage 2 Spoil Dump (25/8/17)	D	6	B	70	Nil	25/8/17	Nil	Nil
156	SB	Stage 2 Spoil Dump (25/8/17)	A	20	B	50	Nil	25/8/17	Nil	Nil



Legend

B = Branch, T = Trunk, Stag = Dead tree,

BLP = Broad Leaved Peppermint, BG = Brittle Gum, SB = Stringybark, Euc P = Eucalyptus pulverulenta



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28 August 2017

Rod Welsh
Austen Quarry
C/o Austen Quarry Site Office

OSEM Reference: J061_RPT5_Clearing Report Strip 2 Stage 2 2017_v2.0

Dear Rod

Re: Clearing Survey at Austen Quarry Stage 2 development – Strip 2, 2017

Introduction

Onsite Environmental Management (OSEM) Principal Ecologist Mr David Bone was present during the clearing of 65 habitat trees marked in November 2016 and August 2017 in strip 2. The clearing was undertaken over a two day period of August 24th and 25th 2017.

The purpose of the survey was to ensure that during clearing of identified potential habitat trees each tree was examined for the presence of fauna.

Methodology

The marked trees were located and the area around the trees was cleared or tracked through, during this process the tree was knocked and bumped to disturb any fauna present. The tree was then left alone overnight and the following morning the tree was again bumped and knocked followed by a one (1) minute waiting period. Any fauna leaving the tree during this period was watched to ensure it had left the area or located another hollow or roost.

The tree was then gently felled and the hollow sections of the tree were examined for the presence of fauna. Any fauna still within the hollow or captured from the felling process was captured, bagged and placed in a cool quite place away from the clearing operation.

Results

Fauna habitat features such as hollows were observed in all 65 trees across the area proposed to be cleared. No fauna were observed in any trees removed. No animals were observed leaving the trees prior to felling or after felling.

The updated habitat tree register is contained in Appendix A.

Clearing of a number of the threatened species *Eucalyptus pulverulenta* (Silver-leaved Mountain Gum) also occurred during the works within the approved extraction area. A summary of the clearing of this species to date is contained in Table 1.

Table 1 – Silver-leaved Mountain Gum Clearing Register

Location	Number of stems	Height (m)	New Growth	Fruits	Flowers
Cleared in April 2017					
Rehab 1	112	Avg 0.5	Present	No	No
Cleared in August 2017					
Stage 2 Strip 1	1	2.0	Present	No	No
Stage 2 Strip 1	1	2.5	Present	Present	No
Stage 2 Strip 1	1	1.0	Present	No	No
Stage 2 Strip 2	2	3.0	Present	Present	No
Stage 2 Strip 2	2	2.0	Present	Present	No
Stage 2 Strip 2	1	0.5	Present	No	No
Cleared to date	120				
Approved to Clear	721				
Remaining not cleared	601				

Remaining mapped plants					
Stage 2 Strip 3	2	1	Present	No	No
Stage 2 Strip 3	1	0.5	Present	No	No
Stage 2 Strip 3	2	3	Present	No	Present
Stage 2 Strip 3	5	3	Present	Present	Present
Stage 2 Strip 3	1	1	Present	Present	Present
Stage 2 Strip 3	1	3	Present	Present	Present
Stage 2 Strip 3	1	2	Present	Present	Present
Stage 2 Strip 3	1	4	Present	No	No

Location	Number of stems	Height (m)	New Growth	Fruits	Flowers
Stage 2 Strip 3	2	4	Present	No	No
Stage 2 Strip 3	1	2	Present	Present	No

Photograph 1 – Habitat tree marking



Photograph 2 – Silver-leaved Mountain Gum Flowering



Conclusion

The clearing of the stage 2 strip 2 area was undertaken in accordance with the approved Flora and Fauna Management Plan and no fauna was injured as a result of the works.

Yours faithfully

David Bone
Principal Ecologist - Onsite Environmental Management Pty Ltd

Appendix A – Updated Habitat Tree Register

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
1	BLP	Stage 2 Year 1 (23/11/16)	A	3	B	70	Nil	6/4/17	Nil	Nil
2	BG	Stage 2 Year 1 (23/11/16)	A	2 3	T T	70 70	Nil	6/4/17	Nil	Nil
3	BG	Stage 2 Year 1 (23/11/16)	A	3 4	T T	80 80	Nil	6/4/17	Nil	Nil
4	BLP	Stage 2 Year 1 (23/11/16)	A	7	B	70, 50, 50	Nil	6/4/17	Nil	Nil
5	BG	Stage 2 Year 1 (23/11/16)	A	4	T	80 slit	Nil	6/4/17	Nil	Nil
6	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100 slit	Scratch Marks	6/4/17	Nil	Nil
7	BG	Stage 2 Year 1 (23/11/16)	A	3	T	100 pipe	Nil	6/4/17	Nil	Nil
8	BG	Stage 2 Year 1 (23/11/16)	A	4	B T	50 70	Nil	6/4/17	Nil	Nil
9	BG	Stage 2 Year 1 (23/11/16)	A	10	T	100 pipe	Nil	6/4/17	Nil	Nil
10	BG	Stage 2 Year 1 (23/11/16)	A	4 6	T B	150 100	Nil	6/4/17	Nil	Nil
11	Stag	Stage 2 Year 1 (23/11/16)	D	3.5	T Base	200	Nil	6/4/17	1 x Greater Broad-nosed Bat	Released alive 6/4/17
12	BG	Stage 2 Year 1 (23/11/16)	A	4 5 1	T T T	70 100 150	Nil	6/4/17	1 x Peron's Tree Frog	Released alive 6/4/17

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
13	BG	Stage 2 Year 1 (23/11/16)	A	5 6 8	T T T	100 100 150	Nil	6/4/17	Nil	Nil
14	BG	Stage 2 Year 1 (23/11/16)	A	5	T, slit	250	Nil	6/4/17	Nil	Nil
15	BG	Stage 2 Year 1 (23/11/16)	A	4	T, pipe	150	Nil	6/4/17	Nil	Nil
16	BG	Stage 2 Year 1 (23/11/16)	A	1 4	T B	120 100	Nil	6/4/17	Nil	Nil
17	BG	Stage 2 Year 1 (23/11/16)	A	4	T	150	Scratches	6/4/17	Nil	Nil
18	BG	Stage 2 Year 1 (23/11/16)	A	2 3 5	T T B	150 150 100	Scratches	6/4/17	1 x Owlet Nightjar	Flew away prior to tree felling
19	BG	Stage 2 Year 1 (23/11/16)	A	4 7	B B	100 70	Scratches	6/4/17	Nil	Nil
20	BG	Stage 2 Year 1 (23/11/16)	A	4 5 10	T T B	100 100 3 x 50	Eastern Rosella observed in vicinity	6/4/17	1 x micro bat	Flew away prior to tree felling
21	BG	Stage 2 Year 1 (23/11/16)	A	6	B, slit	100	Nil	6/4/17	Nil	Nil
22	BG	Stage 2 Year 1 (23/11/16)	A	6	T	100	Nil	6/4/17	Nil	Nil
23	BG	Stage 2 Year 1 (23/11/16)	A	6 8	B B	200 100	Nil	6/4/17	Nil	Nil
24	BG	Stage 2 Year 1 (23/11/16)	A	2	T slit	2000	Nil	6/4/17	Nil	Nil



HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
25	BG	Stage 2 Year 1 (23/11/16)	A	2.5 4	T B	250 100	Nil	6/4/17	Nil	Nil
26	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100	Nil	6/4/17	Nil	Nil
27	BG	Stage 2 Year 1 (23/11/16)	A	8 10	T B	80 100	Nil	6/4/17	Nil	Nil
28	BG	Stage 2 Year 1 (23/11/16)	A	6 10	B B	60 100	Nil	6/4/17	Nil	Nil
29	BG	Stage 2 Year 1 (23/11/16)	A	3	B	80	Nil	6/4/17	Nil	Nil
30	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Scratches	6/4/17	Nil 2 x Scarlet Robin observed in cleared area	Nil.
31	BG	Stage 2 Year 1 (23/11/16)	A	3	T	200 Slit	Scratches	6/4/17	Nil	Nil
32	BG	Stage 2 Year 1 (23/11/16)	A	3	T	200 pipe	Nil	6/4/17	1 x Lace Monitor	Uninjured, left area after tree felled.
33	BG	Stage 2 Year 1 (23/11/16)	A	3	T	100 pipe	Nil	6/4/17	Nil 1 x Coppertail Skink on ground near tree	Nil.
34	BG	Stage 2 Year 1 (23/11/16)	A	5 10 11 12	T B B B	150 100 100 100	Nil	6/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
35	Stag	Stage 2 Year 1 (23/11/16)	D	4	T pipe	200 pipe	Scratches	6/4/17	Nil	Nil
36	Stag	Stage 2 Year 1 (23/11/16)	D	4	T pipe	100	Nil	6/4/17	Nil	Nil
37	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	6/4/17	Nil 12 x Gang Gang Cockatoo adjacent to tree	Nil Group flew away to nearby tree outside of clearing area
38	BG	Stage 2 Year 1 (23/11/16)	A	5	T	150	Nil	7/4/17	Nil	Nil
39	BG	Stage 2 Year 1 (23/11/16)	A	2 7	T T	100 100	Nil	7/4/17	Nil	Nil
40	BG	Stage 2 Year 1 (23/11/16)	A	7	B	100	Nil	7/4/17	Nil	Nil
41	BG	Stage 2 Year 1 (23/11/16)	A	4	T	100	Nil	7/4/17	Nil	Nil
42	BG	Stage 2 Year 1 (23/11/16)	A	3	T	50	Nil	7/4/17	Nil	Nil
43	Stag	Stage 2 Year 1 (23/11/16)	D	3	T	50	Nil	7/4/17	Nil	Nil
44	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100	Nil	7/4/17	Nil	Nil
45	BG	Stage 2 Year 1 (23/11/16)	A	3	T	150	Nil	7/4/17	Nil	Nil
46	BG	Stage 2 Year 1 (23/11/16)	A	4	B	150	Nil	7/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
47	BLP	Stage 2 Year 1 (23/11/16)	A	3	T	50	Nil	7/4/17	Nil	Nil
48	BG	Stage 2 Year 1 (23/11/16)	A	3 7	T B	150 100	Nil	7/4/17	Nil	Nil
49	BG	Stage 2 Year 1 (23/11/16)	A	5	B	150	Nil	7/4/17	Nil	Nil
50	BG	Stage 2 Year 1 (23/11/16)	A	4	T	100	Nil	7/4/17	Nil	Nil
51	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	7/4/17	Nil	Nil
52	BG	Stage 2 Year 1 (23/11/16)	A	8	B	70	Nil	7/4/17	Nil	Nil
53	BLP	Stage 2 Year 1 (23/11/16)	A	6	T	400 slit	Nil	7/4/17	Nil	Nil
54	BG	Stage 2 Year 1 (23/11/16)	A	6	T	70	Nil	7/4/17	Nil	Nil
55	BG	Stage 2 Year 1 (23/11/16)	A	6	T	70	Nil	7/4/17	Nil	Nil
56	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	7/4/17	Nil	Nil
57	BLP	Stage 2 Spoil Dump (7/4/17)	A	5 6	B B	100 100	Nil Nil	25/8/17	Nil	Nil
58	BLP	Stage 2 Spoil Dump (7/4/17)	A	7	B	50	Nil	25/8/17	Nil	Nil
59	SB	Stage 2 Spoil Dump (7/4/17)	A	5	T	300 slit	Nil	25/8/17	Nil	Nil
60	BLP	Stage 2 Spoil Dump (7/4/17)	A	1 5	T B	100 50	Nil Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
61	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	1000 slit	Nil	25/8/17	Nil	Nil
62	SB	Stage 2 Spoil Dump (7/4/17)	A	8	B	70	Nil			
63	BLP	Stage 2 Spoil Dump (7/4/17)	A	6	T	70	Nil	25/8/17	Nil	Nil
64	SB	Stage 2 Spoil Dump (7/4/17)	A	5 8	T T	100 50	Nil Nil	25/8/17	Nil	Nil
65	SB	Stage 2 Spoil Dump (7/4/17)	A	10 10	B B	70 70	Nil Nil	25/8/17	Nil	Nil
66	SB	Stage 2 Spoil Dump (7/4/17)	A	12	B	70	Nil			
67	SB	Stage 2 Spoil Dump (7/4/17)	A	10 12	T T	100 70	Nil Nil	25/8/17	Nil	Nil
68	SB	Stage 2 Spoil Dump (7/4/17)	A	6	B	50 slit	Nil			
69	SB	Stage 2 Spoil Dump (7/4/17)	A	10	T	100	Nil			
70	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	500 pipe	Nil			
71	SB	Stage 2 Spoil Dump (7/4/17)	A	5	T	300 pipe	Nil			
72	Stag	Stage 2 Spoil Dump (7/4/17)	D	12	T	70	Scratches			
73	Stag	Stage 2 Spoil Dump (7/4/17)	D	6	B	200 pipe	Nil			
74	SB	Stage 2 Spoil Dump (7/4/17)	A	12	B	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
75	SB	Stage 2 Spoil Dump (7/4/17)	A	10	T	50	Nil			
76	Stag	Stage 2 Spoil Dump (7/4/17)	D	6	T	50	Nil			
77	Stag	Stage 2 Spoil Dump (7/4/17)	D	10	T	100	Nil	25/8/17	Nil	Nil
78	BG	Stage 2 Spoil Dump (7/4/17)	A	8	T	50	Nil			
79	BG	Stage 2 Spoil Dump (7/4/17)	A	8	B	50	Nil			
80	Stag	Stage 2 Spoil Dump (7/4/17)	D	8	T	70	Nil			
81	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	50	Nil			
82	SB	Stage 2 Spoil Dump (7/4/17)	A	8	B	50	Nil			
83	SB	Stage 2 Spoil Dump (7/4/17)	A	6	T	50	Nil			
84	SB	Stage 2 Spoil Dump (7/4/17)	A	6	B	50	Nil			
85	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	100	Nil			
86	Stag	Stage 2 Spoil Dump (7/4/17)	D	8	T	50	Nil			
87	BG	Stage 2 Spoil Dump (7/4/17)	A	6	B	50	Nil			
88	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	24/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
89	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	24/8/17	Nil	Nil
90	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches	24/8/17	Nil	Nil
91	BG	Stage 2 Year 2 (24/8/17)	A	10	B	50	Scratches	24/8/17	Nil	Nil
92	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	24/8/17	Nil	Nil
93	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	24/8/17	Nil	Nil
94	Stag	Stage 2 Year 2 (24/8/17)	A	5	T	50	Nil	24/8/17	Nil	Nil
95	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Scratches	24/8/17	Nil	Nil
96	Stag	Stage 2 Year 2 (24/8/17)	D	6	T	1000	Nil	24/8/17	Nil	Nil
97	BG	Stage 2 Year 2 (24/8/17)	A	10	T	70	Nil	24/8/17	Nil	Nil
98	BG	Stage 2 Year 2 (24/8/17)	A	8	T	70	Nil	24/8/17	Yellow-rumped Thorn-Bill	Nil - Flew away
99	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Lots of Scratches			
100	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
101	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
102	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
103	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
104	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches			
105	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
106	BG	Stage 2 Year 2 (24/8/17)	A	6	B	50	Nil			
107	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
108	BG	Stage 2 Year 2 (24/8/17)	A	10	B	50	Nil			
109	BG	Stage 2 Year 2 (24/8/17)	A	8	T	60	Nil			
110	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil			
111	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
112	Yellow Box	Stage 2 Year 2 (24/8/17)	A	12	B	1000	Nil			
113	BG	Stage 2 Year 2 (24/8/17)	A	8	T	80	Nil	24/8/17	Nil	Nil
114	Yellow Box	Stage 2 Year 2 (24/8/17)	A	12	T	1000	Nil	24/8/17	Nil	Nil
115	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	24/8/17	Nil	Nil
116	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
117	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
118	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
119	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
120	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches	25/8/17	Nil	Nil
121	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
123	Stag	Stage 2 Year 2 (24/8/17)	D	6	B	80	Nil	25/8/17	Nil	Nil
124	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
125	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
126	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
127	Stag	Stage 2 Year 2 (24/8/17)	D	6	T	70	Nil	25/8/17	Nil	Nil
128	BG	Stage 2 Year 2 (24/8/17)	A	8	T	60	Nil	25/8/17	Nil	Nil
129	BG	Stage 2 Year 2 (24/8/17)	A	8	T	80	Nil	25/8/17	Nil	Nil
130	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
131	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
132	BG	Stage 2 Year 2 (24/8/17)	A	6	B	50	Nil	25/8/17	Nil	Nil
133	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Scratches	25/8/17	Nil	Nil
134	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Scratches	25/8/17	Nil	Nil
135	BG	Stage 2 Year 2 (24/8/17)	A	6	T	60	Scratches	25/8/17	Nil	Nil
136	BG	Stage 2 Year 2 (24/8/17)	A	8	B	70	Nil	25/8/17	Nil	Nil
137	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
138	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
139	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
140	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
141	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
142	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
143	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
144	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
145	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location (date mapped)	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
146	BG	Stage 2 Year 2 (24/8/17)	A	10	B	70	Scratches	25/8/17	Nil	Nil
147	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
148	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
149	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
150	BG	Stage 2 Year 2 (24/8/17)	A	6		70	Nil	25/8/17	Nil	Nil
151	BG	Stage 2 Spoil Dump (25/8/17)	A	6	B	80	Nil	25/8/17	Nil	Nil
152	Stag	Stage 2 Spoil Dump (25/8/17)	D	5	T	60	Nil	25/8/17	Nil	Nil
153	Stag	Stage 2 Spoil Dump (25/8/17)	D	3	T	70	Nil	25/8/17	Nil	Nil
154	Stag	Stage 2 Spoil Dump (25/8/17)	D	4	B	70	Nil	25/8/17	Nil	Nil
155	Stag	Stage 2 Spoil Dump (25/8/17)	D	6	B	70	Nil	25/8/17	Nil	Nil
156	SB	Stage 2 Spoil Dump (25/8/17)	A	20	B	50	Nil	25/8/17	Nil	Nil



Legend

B = Branch, T = Trunk, Stag = Dead tree,

BLP = Broad Leaved Peppermint, BG = Brittle Gum, SB = Stringybark, Euc P = Eucalyptus pulverulenta



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16 August 2018

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Rod Welsh
Austen Quarry
C/o Austen Quarry Site Office

OSEM Reference: J061_RPT6_Pre-clearing survey Stage 2 Strip 3 2018_v1.0

Dear Rod

Re: Pre-Clearance Survey at Austen Quarry Stage 2 – Southern Bench and Overburden Dump

Introduction

Onsite Environmental Management (OSEM) Ecologist Mr Callan Douchkov conducted a pre-clearance survey on 02/05/2018 for the Stage 2 clearing area proposed to be cleared in 2018 to facilitate growth of the overburden dump and the progression of works on the southern bench. The area surveyed covered the vegetated slope above and to the north of the overburden dump, and a 20 metre wide strip of vegetated land which wraps around the southernmost point of works and up to the eastern haul road. Figure 1 shows the extent of area surveyed.

The purpose of the survey was to ground truth the vegetation proposed to be cleared and to determine if the vegetation contained any fauna habitat, such as hollows or logs and to map these features and identify any appropriate mitigation measures to be implemented prior to and during vegetation clearing works.

Methodology

The survey involved an assessment and mapping of existing vegetation in the clearing area and the identification of any EEC, threatened species, habitat trees and noxious weeds in the area.

Trees identified as containing hollows or other habitat elements were marked with a number and the location was recorded on GPS to allow the trees to be relocated during clearing.

Results

Fauna habitat features such as nests, scratchings or hollows were observed in 47 trees across the area proposed to be cleared. Nine (9) records of a threatened species was recorded in the proposed clearing area, nine *Eucalyptus pulverulenta* were identified within the clearing area.

The plants details are:

E. pulverulenta 1

- 0.5m height
- No fruits 02/05/18
- No new growth

E. pulverulenta 2

- 1.0m height
- No fruits 02/05/18
- No new growth

E. pulverulenta 3

- 2.0m height
- No fruits 02/05/18
- No new growth

E. pulverulenta 4

- 0.5m height
- No fruits 02/05/18
- No new growth

E. pulverulenta 5

- 0.5m height
- No fruits 02/05/18
- No new growth

E. pulverulenta 6

- 2.0m height
- No fruits 02/05/18
- No new growth

E. pulverulenta 7

- 1.0m height
- Two stems
- No fruits 02/05/18
- No new growth

E. pulverulenta 8

- 0.5m height
- No fruits 02/05/18
- No new growth

E. pulverulenta 9

- 2.0m height
- No fruits 02/05/18
- No new growth

No noxious or regionally controlled weeds were observed during the preclearing survey. The updated habitat tree register is contained in Appendix A. Figure 1 shows the location of the habitat trees mapped.



Figure 1 – Mapped Habitat Trees & Surveyed Area 02/05/2018

Conclusion

Where required to be removed, the habitat trees should only be removed in the presence of a licensed ecologist or wildlife rescuer.

The process for tree removal is to be as follows:

- Inspect tree for signs of potential fauna habitation, hollow presence, scratch marks, droppings, whitewash, fur, feathers etc.
- Mark the tree and add to the habitat register, recording the hollow height, location, size and tree type
- Clear the area around the habitat trees knocking the habitat tree without felling the tree.
- Wait 24 hours
- Knock the habitat tree and wait 1 minute for any fauna to leave the tree
- Fell the tree as gently as possible
- Inspect the tree for fauna presence
- Where present capture and hold fauna for release or where injured, relocation to a wildlife carer or vet.
- Record the outcome of tree felling

Management of clearing is to be undertaken in accordance with the Flora and Fauna Management Plan.

Yours faithfully

Callan Douchkov
Ecologist - Onsite Environmental Management Pty Ltd

Appendix A – Habitat Tree Register

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
1	BLP	Stage 2 Year 1 (23/11/16)	A	3	B	70	Nil	6/4/17	Nil	Nil
2	BG	Stage 2 Year 1 (23/11/16)	A	2 3	T T	70 70	Nil	6/4/17	Nil	Nil
3	BG	Stage 2 Year 1 (23/11/16)	A	3 4	T T	80 80	Nil	6/4/17	Nil	Nil
4	BLP	Stage 2 Year 1 (23/11/16)	A	7	B	70, 50, 50	Nil	6/4/17	Nil	Nil
5	BG	Stage 2 Year 1 (23/11/16)	A	4	T	80 slit	Nil	6/4/17	Nil	Nil
6	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100 slit	Scratch Marks	6/4/17	Nil	Nil
7	BG	Stage 2 Year 1 (23/11/16)	A	3	T	100 pipe	Nil	6/4/17	Nil	Nil
8	BG	Stage 2 Year 1 (23/11/16)	A	4	B T	50 70	Nil	6/4/17	Nil	Nil
9	BG	Stage 2 Year 1 (23/11/16)	A	10	T	100 pipe	Nil	6/4/17	Nil	Nil
10	BG	Stage 2 Year 1 (23/11/16)	A	4 6	T B	150 100	Nil	6/4/17	Nil	Nil
11	Stag	Stage 2 Year 1 (23/11/16)	D	3.5	T Base	200	Nil	6/4/17	1 x Greater Broad-nosed Bat	Released alive 6/4/17
12	BG	Stage 2 Year 1 (23/11/16)	A	4 5 1	T T T	70 100 150	Nil	6/4/17	1 x Peron's Tree Frog	Released alive 6/4/17

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
13	BG	Stage 2 Year 1 (23/11/16)	A	5 6 8	T T T	100 100 150	Nil	6/4/17	Nil	Nil
14	BG	Stage 2 Year 1 (23/11/16)	A	5	T, slit	250	Nil	6/4/17	Nil	Nil
15	BG	Stage 2 Year 1 (23/11/16)	A	4	T, pipe	150	Nil	6/4/17	Nil	Nil
16	BG	Stage 2 Year 1 (23/11/16)	A	1 4	T B	120 100	Nil	6/4/17	Nil	Nil
17	BG	Stage 2 Year 1 (23/11/16)	A	4	T	150	Scratches	6/4/17	Nil	Nil
18	BG	Stage 2 Year 1 (23/11/16)	A	2 3 5	T T B	150 150 100	Scratches	6/4/17	1 x Owlet Nightjar	Flew away prior to tree felling
19	BG	Stage 2 Year 1 (23/11/16)	A	4 7	B B	100 70	Scratches	6/4/17	Nil	Nil
20	BG	Stage 2 Year 1 (23/11/16)	A	4 5 10	T T B	100 100 3 x 50	Eastern Rosella observed in vicinity	6/4/17	1 x micro bat	Flew away prior to tree felling
21	BG	Stage 2 Year 1 (23/11/16)	A	6	B, slit	100	Nil	6/4/17	Nil	Nil
22	BG	Stage 2 Year 1 (23/11/16)	A	6	T	100	Nil	6/4/17	Nil	Nil
23	BG	Stage 2 Year 1 (23/11/16)	A	6 8	B B	200 100	Nil	6/4/17	Nil	Nil
24	BG	Stage 2 Year 1 (23/11/16)	A	2	T slit	2000	Nil	6/4/17	Nil	Nil



HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
25	BG	Stage 2 Year 1 (23/11/16)	A	2.5 4	T B	250 100	Nil	6/4/17	Nil	Nil
26	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100	Nil	6/4/17	Nil	Nil
27	BG	Stage 2 Year 1 (23/11/16)	A	8 10	T B	80 100	Nil	6/4/17	Nil	Nil
28	BG	Stage 2 Year 1 (23/11/16)	A	6 10	B B	60 100	Nil	6/4/17	Nil	Nil
29	BG	Stage 2 Year 1 (23/11/16)	A	3	B	80	Nil	6/4/17	Nil	Nil
30	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Scratches	6/4/17	Nil 2 x Scarlet Robin observed in cleared area	Nil.
31	BG	Stage 2 Year 1 (23/11/16)	A	3	T	200 Slit	Scratches	6/4/17	Nil	Nil
32	BG	Stage 2 Year 1 (23/11/16)	A	3	T	200 pipe	Nil	6/4/17	1 x Lace Monitor	Uninjured, left area after tree felled.
33	BG	Stage 2 Year 1 (23/11/16)	A	3	T	100 pipe	Nil	6/4/17	Nil 1 x Coppertail Skink on ground near tree	Nil.
34	BG	Stage 2 Year 1 (23/11/16)	A	5 10 11 12	T B B B	150 100 100 100	Nil	6/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
35	Stag	Stage 2 Year 1 (23/11/16)	D	4	T pipe	200 pipe	Scratches	6/4/17	Nil	Nil
36	Stag	Stage 2 Year 1 (23/11/16)	D	4	T pipe	100	Nil	6/4/17	Nil	Nil
37	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	6/4/17	Nil 12 x Gang Gang Cockatoo adjacent to tree	Nil Group flew away to nearby tree outside of clearing area
38	BG	Stage 2 Year 1 (23/11/16)	A	5	T	150	Nil	7/4/17	Nil	Nil
39	BG	Stage 2 Year 1 (23/11/16)	A	2 7	T T	100 100	Nil	7/4/17	Nil	Nil
40	BG	Stage 2 Year 1 (23/11/16)	A	7	B	100	Nil	7/4/17	Nil	Nil
41	BG	Stage 2 Year 1 (23/11/16)	A	4	T	100	Nil	7/4/17	Nil	Nil
42	BG	Stage 2 Year 1 (23/11/16)	A	3	T	50	Nil	7/4/17	Nil	Nil
43	Stag	Stage 2 Year 1 (23/11/16)	D	3	T	50	Nil	7/4/17	Nil	Nil
44	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100	Nil	7/4/17	Nil	Nil
45	BG	Stage 2 Year 1 (23/11/16)	A	3	T	150	Nil	7/4/17	Nil	Nil
46	BG	Stage 2 Year 1 (23/11/16)	A	4	B	150	Nil	7/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
47	BLP	Stage 2 Year 1 (23/11/16)	A	3	T	50	Nil	7/4/17	Nil	Nil
48	BG	Stage 2 Year 1 (23/11/16)	A	3 7	T B	150 100	Nil	7/4/17	Nil	Nil
49	BG	Stage 2 Year 1 (23/11/16)	A	5	B	150	Nil	7/4/17	Nil	Nil
50	BG	Stage 2 Year 1 (23/11/16)	A	4	T	100	Nil	7/4/17	Nil	Nil
51	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	7/4/17	Nil	Nil
52	BG	Stage 2 Year 1 (23/11/16)	A	8	B	70	Nil	7/4/17	Nil	Nil
53	BLP	Stage 2 Year 1 (23/11/16)	A	6	T	400 slit	Nil	7/4/17	Nil	Nil
54	BG	Stage 2 Year 1 (23/11/16)	A	6	T	70	Nil	7/4/17	Nil	Nil
55	BG	Stage 2 Year 1 (23/11/16)	A	6	T	70	Nil	7/4/17	Nil	Nil
56	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	7/4/17	Nil	Nil
57	BLP	Stage 2 Spoil Dump (7/4/17)	A	5 6	B B	100 100	Nil Nil	25/8/17		
58	BLP	Stage 2 Spoil Dump (7/4/17)	A	7	B	50	Nil	25/8/17		
59	SB	Stage 2 Spoil Dump (7/4/17)	A	5	T	300 slit	Nil	25/8/17		
60	BLP	Stage 2 Spoil Dump (7/4/17)	A	1 5	T B	100 50	Nil Nil			

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
61	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	1000 slit	Nil			
62	SB	Stage 2 Spoil Dump (7/4/17)	A	8	B	70	Nil			
63	BLP	Stage 2 Spoil Dump (7/4/17)	A	6	T	70	Nil			
64	SB	Stage 2 Spoil Dump (7/4/17)	A	5 8	T T	100 50	Nil Nil	25/8/17		
65	SB	Stage 2 Spoil Dump (7/4/17)	A	10 10	B B	70 70	Nil Nil	25/8/17		
66	SB	Stage 2 Spoil Dump (7/4/17)	A	12	B	70	Nil			
67	SB	Stage 2 Spoil Dump (7/4/17)	A	10 12	T T	100 70	Nil Nil			
68	SB	Stage 2 Spoil Dump (7/4/17)	A	6	B	50 slit	Nil			
69	SB	Stage 2 Spoil Dump (7/4/17)	A	10	T	100	Nil			
70	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	500 pipe	Nil			
71	SB	Stage 2 Spoil Dump (7/4/17)	A	5	T	300 pipe	Nil			
72	Stag	Stage 2 Spoil Dump (7/4/17)	D	12	T	70	Scratches			
73	Stag	Stage 2 Spoil Dump (7/4/17)	D	6	B	200 pipe	Nil			
74	SB	Stage 2 Spoil Dump (7/4/17)	A	12	B	50	Nil	25/8/17		

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
75	SB	Stage 2 Spoil Dump (7/4/17)	A	10	T	50	Nil			
76	Stag	Stage 2 Spoil Dump (7/4/17)	D	6	T	50	Nil			
77	Stag	Stage 2 Spoil Dump (7/4/17)	D	10	T	100	Nil			
78	BG	Stage 2 Spoil Dump (7/4/17)	A	8	T	50	Nil			
79	BG	Stage 2 Spoil Dump (7/4/17)	A	8	B	50	Nil			
80	Stag	Stage 2 Spoil Dump (7/4/17)	D	8	T	70	Nil			
81	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	50	Nil			
82	SB	Stage 2 Spoil Dump (7/4/17)	A	8	B	50	Nil			
83	SB	Stage 2 Spoil Dump (7/4/17)	A	6	T	50	Nil			
84	SB	Stage 2 Spoil Dump (7/4/17)	A	6	B	50	Nil			
85	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	100	Nil			
86	Stag	Stage 2 Spoil Dump (7/4/17)	D	8	T	50	Nil			
87	BG	Stage 2 Spoil Dump (7/4/17)	A	6	B	50	Nil			
88	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
89	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
90	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches	25/8/17	Nil	Nil
91	BG	Stage 2 Year 2 (24/8/17)	A	10	B	50	Scratches	25/8/17	Nil	Nil
92	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
93	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
94	Stag	Stage 2 Year 2 (24/8/17)	A	5	T	50	Nil	25/8/17	Nil	Nil
95	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Scratches	25/8/17	Nil	Nil
96	Stag	Stage 2 Year 2 (24/8/17)	D	6	T	1000	Nil	25/8/17	Nil	Nil
97	BG	Stage 2 Year 2 (24/8/17)	A	10	T	70	Nil	25/8/17	Nil	Nil
98	BG	Stage 2 Year 2 (24/8/17)	A	8	T	70	Nil	25/8/17	Yellow-rumped Thorn-Bill	Nil - Flew away
99	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Lots of Scratches			
100	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
101	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
102	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
103	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
104	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches			
105	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
106	BG	Stage 2 Year 2 (24/8/17)	A	6	B	50	Nil			
107	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
108	BG	Stage 2 Year 2 (24/8/17)	A	10	B	50	Nil			
109	BG	Stage 2 Year 2 (24/8/17)	A	8	T	60	Nil			
110	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil			
111	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
112	Yellow Box	Stage 2 Year 2 (24/8/17)	A	12	B	1000	Nil			
113	BG	Stage 2 Year 2 (24/8/17)	A	8	T	80	Nil	25/8/17	Nil	Nil
114	Yellow Box	Stage 2 Year 2 (24/8/17)	A	12	T	1000	Nil	25/8/17	Nil	Nil
115	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
116	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
117	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
118	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
119	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
120	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches	25/8/17	Nil	Nil
121	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
123	Stag	Stage 2 Year 2 (24/8/17)	D	6	B	80	Nil	25/8/17	Nil	Nil
124	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
125	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
126	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
127	Stag	Stage 2 Year 2 (24/8/17)	D	6	T	70	Nil	25/8/17	Nil	Nil
128	BG	Stage 2 Year 2 (24/8/17)	A	8	T	60	Nil	25/8/17	Nil	Nil
129	BG	Stage 2 Year 2 (24/8/17)	A	8	T	80	Nil	25/8/17	Nil	Nil
130	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
131	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
132	BG	Stage 2 Year 2 (24/8/17)	A	6	B	50	Nil	25/8/17	Nil	Nil
133	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Scratches	25/8/17	Nil	Nil
134	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Scratches	25/8/17	Nil	Nil
135	BG	Stage 2 Year 2 (24/8/17)	A	6	T	60	Scratches	25/8/17	Nil	Nil
136	BG	Stage 2 Year 2 (24/8/17)	A	8	B	70	Nil	25/8/17	Nil	Nil
137	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
138	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
139	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
140	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
141	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
142	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
143	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
144	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
145	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
146	BG	Stage 2 Year 2 (24/8/17)	A	10	B	70	Scratches	25/8/17	Nil	Nil
147	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
148	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
149	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
150	BG	Stage 2 Year 2 (24/8/17)	A	6		70	Nil	25/8/17	Nil	Nil
151	BG	Stage 2 Spoil Dump (25/8/17)	A	6	B	80	Nil	25/8/17	Nil	Nil
152	Stag	Stage 2 Spoil Dump (25/8/17)	D	5	T	60	Nil	25/8/17	Nil	Nil
153	Stag	Stage 2 Spoil Dump (25/8/17)	D	3	T	70	Nil	25/8/17	Nil	Nil
154	Stag	Stage 2 Spoil Dump (25/8/17)	D	4	B	70	Nil	25/8/17	Nil	Nil
155	Stag	Stage 2 Spoil Dump (25/8/17)	D	6	B	70	Nil	25/8/17	Nil	Nil
156	SB	Stage 2 Spoil Dump (25/8/17)	A	20	B	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
157	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	7	B	70	Nil			
158	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	10	T	70	Nil			
159	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	6	T	80	Nil			
160	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	10	B	50	Nil			
161	BG	Stage 2 Spoil Dump (02/5/18)	A	20	B	60	Nil			
162	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	15	B	50	Nil			
163	Stag	Stage 2 Spoil Dump (02/5/18)	D	5	T	200	Nil			
164	Forest Red Gum	Stage 2 Spoil Dump (02/5/18)	A	15	B	Nil	Birds Nest Present			
165	Forest Red Gum	Stage 2 Spoil Dump (02/5/18)	A	20	B	70	Nil			
166	Yellow	Stage 2 Spoil	A	10	B	80	Nil			

HBT - Hollow Bearing Trees	Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
	Box	Dump (02/5/18)							
167	Stag	Stage 2 Strip 3 (02/5/18)	D	3	T	200	Nil		
168	Stag	Stage 2 Strip 3 (02/5/18)	D	5	T	250	Nil		
169	BG	Stage 2 Strip 3 (02/5/18)	A	4	T	100	Nil		
170	BG	Stage 2 Strip 3 (02/5/18)	A	7	B	90	Nil		
171	BG	Stage 2 Strip 3 (02/5/18)	A	8	T	80	Nil		
172	BG	Stage 2 Strip 3 (02/5/18)	A	12	T	90	Nil		
173	BG	Stage 2 Strip 3 (02/5/18)	A	12	T	80	Nil		
174	BG	Stage 2 Strip 3 (02/5/18)	A	8	T	100	Nil		
175	Stag	Stage 2 Strip 3 (02/5/18)	D	5	T	200	Nil		
176	BG	Stage 2 Strip 3 (02/5/18)	A	12	B	100	Nil		
177	Stag	Stage 2 Strip 3 (02/5/18)	D	5	T	150	Nil		
178	BG	Stage 2 Strip 3 (02/5/18)	A	16	B	80	Nil		
179	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	100	Nil		

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
180	Stag	Stage 2 Strip 3 (02/5/18)	D	10	T	200	Nil			
181	BG	Stage 2 Strip 3 (02/5/18)	A	8	T	100	Nil			
182	BG	Stage 2 Strip 3 (02/5/18)	A	7	T	50	Nil			
183	BG	Stage 2 Strip 3 (02/5/18)	A	7	T	60	Nil			
184	BG	Stage 2 Strip 3 (02/5/18)	A	11	T	60	Bird present.			
185	BG	Stage 2 Strip 3 (02/5/18)	A	12	B	90	Nil			
186	BG	Stage 2 Strip 3 (02/5/18)	A	11	B	50	Nil			
187	BG	Stage 2 Strip 3 (02/5/18)	A	8	T	100	Nil			
188	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	90	Nil			
189	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	90	Nil			
190	BG	Stage 2 Strip 3 (02/5/18)	A	9	B	100	Nil			
191	Yellow Box	Stage 2 Strip 3 (02/5/18)	A	8	T	100	Nil			
192	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	100	Nil			
193	BG	Stage 2 Strip 3 (02/5/18)	A	6	B	90	Nil			

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
194	BG	Stage 2 Strip 3 (02/5/18)	A	7	B	90	Nil			
195	Forest Red Gum	Stage 2 Strip 3 (02/5/18)	A	11	T	90	Nil			
196	BG	Stage 2 Strip 3 (02/5/18)	A	5	B	90	Nil			
197	BG	Stage 2 Strip 3 (02/5/18)	A	7	B	50	Nil			
198	BG	Stage 2 Strip 3 (02/5/18)	A	6	B	60	Nil			
199	Stag	Stage 2 Strip 3 (02/5/18)	D	10	T	150	Nil			
200	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	100	Nil			
201	BG	Stage 2 Strip 3 (02/5/18)	A	14	B	90	Nil			
202	BG	Stage 2 Strip 3 (02/5/18)	A	6	T	100	Nil			

Legend

B = Branch, T = Trunk, Stag = Dead tree,

BLP = Broad Leaved Peppermint, BG = Brittle Gum, SB = Stringybark, Euc P = Eucalyptus pulverulenta



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20 August 2018

Rod Welsh
Austen Quarry
C/o Austen Quarry Site Office

OSEM Reference: J061_RPT7_Clearing Report Strip 3 Stage 2 2018_v1.0

Dear Rod

Re: Clearing Survey at Austen Quarry Stage 2 development – Strip 3, 2018

Introduction

Onsite Environmental Management (OSEM) Ecologist Mr Callan Douchkov was present during the clearing of 43 habitat trees marked in May 2018 in strip 3. The clearing was undertaken over a two day period of May 2nd and 3rd 2018.

The purpose of the survey was to ensure that during clearing of identified potential habitat trees each tree was examined for the presence of fauna.

Methodology

The marked trees were located and the area around the trees was cleared or tracked through, during this process the tree was knocked and bumped to disturb any fauna present. The tree was then left alone overnight and the following morning the tree was again bumped and knocked followed by a one (1) minute waiting period. Any fauna leaving the tree during this period was watched to ensure it had left the area or located another hollow or roost.

The tree was then gently felled and the hollow sections of the tree were examined for the presence of fauna. Any fauna still within the hollow or captured from the felling process was captured, bagged and placed in a cool quite place away from the clearing operation.

Results

Fauna habitat features such as hollows were observed in all 65 trees across the area proposed to be cleared. No fauna were observed in any trees removed. No animals were observed leaving the trees prior to felling or after felling.

The updated habitat tree register is contained in Appendix A.

Clearing of a number of the threatened species *Eucalyptus pulverulenta* (Silver-leaved Mountain Gum) also occurred during the works within the approved extraction area. A summary of the clearing of this species to date is contained in Table 1.

Table 1 – Silver-leaved Mountain Gum Clearing Register

Location	Number of stems	Height (m)	New Growth	Fruits	Flowers
Cleared in April 2017					
Rehab 1	112	Avg 0.5	Present	No	No
Cleared in August 2017					
Stage 2 Strip 2	8	Avg 2.0	Present	Present	No
Cleared in May 2018					
Stage 2 Strip 3	1	0.5	No	No	No
Stage 2 Strip 3	1	1.0	Present	No	No
Stage 2 Strip 3	1	2.0	Present	No	No
Stage 2 Strip 3	1	0.5	No	No	No
Stage 2 Strip 3	1	0.5	Present	No	No
Stage 2 Strip 3	1	2.0	No	No	No
Stage 2 Strip 3	2	1.0	Present	No	No
Stage 2 Strip 3	1	0.5	Present	No	No
Stage 2 Strip 3	1	2.0	Present	No	No
Cleared to date	130				
Approved to Clear	721				
Remaining not cleared	591				

Conclusion

The clearing of the stage 2 strip 3 area was undertaken in accordance with the approved Flora and Fauna Management Plan and no fauna was injured as a result of the works.

Yours faithfully



Callan Douchkov
Ecologist - Onsite Environmental Management Pty Ltd

Appendix A – Updated Habitat Tree Register

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
1	BLP	Stage 2 Year 1 (23/11/16)	A	3	B	70	Nil	6/4/17	Nil	Nil
2	BG	Stage 2 Year 1 (23/11/16)	A	2 3	T T	70 70	Nil	6/4/17	Nil	Nil
3	BG	Stage 2 Year 1 (23/11/16)	A	3 4	T T	80 80	Nil	6/4/17	Nil	Nil
4	BLP	Stage 2 Year 1 (23/11/16)	A	7	B	70, 50, 50	Nil	6/4/17	Nil	Nil
5	BG	Stage 2 Year 1 (23/11/16)	A	4	T	80 slit	Nil	6/4/17	Nil	Nil
6	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100 slit	Scratch Marks	6/4/17	Nil	Nil
7	BG	Stage 2 Year 1 (23/11/16)	A	3	T	100 pipe	Nil	6/4/17	Nil	Nil
8	BG	Stage 2 Year 1 (23/11/16)	A	4	B T	50 70	Nil	6/4/17	Nil	Nil
9	BG	Stage 2 Year 1 (23/11/16)	A	10	T	100 pipe	Nil	6/4/17	Nil	Nil
10	BG	Stage 2 Year 1 (23/11/16)	A	4 6	T B	150 100	Nil	6/4/17	Nil	Nil
11	Stag	Stage 2 Year 1 (23/11/16)	D	3.5	T Base	200	Nil	6/4/17	1 x Greater Broad-nosed Bat	Released alive 6/4/17
12	BG	Stage 2 Year 1 (23/11/16)	A	4 5 1	T T T	70 100 150	Nil	6/4/17	1 x Peron's Tree Frog	Released alive 6/4/17

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
13	BG	Stage 2 Year 1 (23/11/16)	A	5 6 8	T T T	100 100 150	Nil	6/4/17	Nil	Nil
14	BG	Stage 2 Year 1 (23/11/16)	A	5	T, slit	250	Nil	6/4/17	Nil	Nil
15	BG	Stage 2 Year 1 (23/11/16)	A	4	T, pipe	150	Nil	6/4/17	Nil	Nil
16	BG	Stage 2 Year 1 (23/11/16)	A	1 4	T B	120 100	Nil	6/4/17	Nil	Nil
17	BG	Stage 2 Year 1 (23/11/16)	A	4	T	150	Scratches	6/4/17	Nil	Nil
18	BG	Stage 2 Year 1 (23/11/16)	A	2 3 5	T T B	150 150 100	Scratches	6/4/17	1 x Owlet Nightjar	Flew away prior to tree felling
19	BG	Stage 2 Year 1 (23/11/16)	A	4 7	B B	100 70	Scratches	6/4/17	Nil	Nil
20	BG	Stage 2 Year 1 (23/11/16)	A	4 5 10	T T B	100 100 3 x 50	Eastern Rosella observed in vicinity	6/4/17	1 x micro bat	Flew away prior to tree felling
21	BG	Stage 2 Year 1 (23/11/16)	A	6	B, slit	100	Nil	6/4/17	Nil	Nil
22	BG	Stage 2 Year 1 (23/11/16)	A	6	T	100	Nil	6/4/17	Nil	Nil
23	BG	Stage 2 Year 1 (23/11/16)	A	6 8	B B	200 100	Nil	6/4/17	Nil	Nil
24	BG	Stage 2 Year 1 (23/11/16)	A	2	T slit	2000	Nil	6/4/17	Nil	Nil



HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
25	BG	Stage 2 Year 1 (23/11/16)	A	2.5 4	T B	250 100	Nil	6/4/17	Nil	Nil
26	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100	Nil	6/4/17	Nil	Nil
27	BG	Stage 2 Year 1 (23/11/16)	A	8 10	T B	80 100	Nil	6/4/17	Nil	Nil
28	BG	Stage 2 Year 1 (23/11/16)	A	6 10	B B	60 100	Nil	6/4/17	Nil	Nil
29	BG	Stage 2 Year 1 (23/11/16)	A	3	B	80	Nil	6/4/17	Nil	Nil
30	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Scratches	6/4/17	Nil 2 x Scarlet Robin observed in cleared area	Nil.
31	BG	Stage 2 Year 1 (23/11/16)	A	3	T	200 Slit	Scratches	6/4/17	Nil	Nil
32	BG	Stage 2 Year 1 (23/11/16)	A	3	T	200 pipe	Nil	6/4/17	1 x Lace Monitor	Uninjured, left area after tree felled.
33	BG	Stage 2 Year 1 (23/11/16)	A	3	T	100 pipe	Nil	6/4/17	Nil 1 x Coppertail Skink on ground near tree	Nil.
34	BG	Stage 2 Year 1 (23/11/16)	A	5 10 11 12	T B B B	150 100 100 100	Nil	6/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
35	Stag	Stage 2 Year 1 (23/11/16)	D	4	T pipe	200 pipe	Scratches	6/4/17	Nil	Nil
36	Stag	Stage 2 Year 1 (23/11/16)	D	4	T pipe	100	Nil	6/4/17	Nil	Nil
37	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	6/4/17	Nil 12 x Gang Gang Cockatoo adjacent to tree	Nil Group flew away to nearby tree outside of clearing area
38	BG	Stage 2 Year 1 (23/11/16)	A	5	T	150	Nil	7/4/17	Nil	Nil
39	BG	Stage 2 Year 1 (23/11/16)	A	2 7	T T	100 100	Nil	7/4/17	Nil	Nil
40	BG	Stage 2 Year 1 (23/11/16)	A	7	B	100	Nil	7/4/17	Nil	Nil
41	BG	Stage 2 Year 1 (23/11/16)	A	4	T	100	Nil	7/4/17	Nil	Nil
42	BG	Stage 2 Year 1 (23/11/16)	A	3	T	50	Nil	7/4/17	Nil	Nil
43	Stag	Stage 2 Year 1 (23/11/16)	D	3	T	50	Nil	7/4/17	Nil	Nil
44	BG	Stage 2 Year 1 (23/11/16)	A	5	B	100	Nil	7/4/17	Nil	Nil
45	BG	Stage 2 Year 1 (23/11/16)	A	3	T	150	Nil	7/4/17	Nil	Nil
46	BG	Stage 2 Year 1 (23/11/16)	A	4	B	150	Nil	7/4/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
47	BLP	Stage 2 Year 1 (23/11/16)	A	3	T	50	Nil	7/4/17	Nil	Nil
48	BG	Stage 2 Year 1 (23/11/16)	A	3 7	T B	150 100	Nil	7/4/17	Nil	Nil
49	BG	Stage 2 Year 1 (23/11/16)	A	5	B	150	Nil	7/4/17	Nil	Nil
50	BG	Stage 2 Year 1 (23/11/16)	A	4	T	100	Nil	7/4/17	Nil	Nil
51	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	7/4/17	Nil	Nil
52	BG	Stage 2 Year 1 (23/11/16)	A	8	B	70	Nil	7/4/17	Nil	Nil
53	BLP	Stage 2 Year 1 (23/11/16)	A	6	T	400 slit	Nil	7/4/17	Nil	Nil
54	BG	Stage 2 Year 1 (23/11/16)	A	6	T	70	Nil	7/4/17	Nil	Nil
55	BG	Stage 2 Year 1 (23/11/16)	A	6	T	70	Nil	7/4/17	Nil	Nil
56	BG	Stage 2 Year 1 (23/11/16)	A	6	B	100	Nil	7/4/17	Nil	Nil
57	BLP	Stage 2 Spoil Dump (7/4/17)	A	5 6	B B	100 100	Nil Nil	25/8/17		
58	BLP	Stage 2 Spoil Dump (7/4/17)	A	7	B	50	Nil	25/8/17		
59	SB	Stage 2 Spoil Dump (7/4/17)	A	5	T	300 slit	Nil	25/8/17		
60	BLP	Stage 2 Spoil Dump (7/4/17)	A	1 5	T B	100 50	Nil Nil			

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
61	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	1000 slit	Nil			
62	SB	Stage 2 Spoil Dump (7/4/17)	A	8	B	70	Nil			
63	BLP	Stage 2 Spoil Dump (7/4/17)	A	6	T	70	Nil			
64	SB	Stage 2 Spoil Dump (7/4/17)	A	5 8	T T	100 50	Nil Nil	25/8/17		
65	SB	Stage 2 Spoil Dump (7/4/17)	A	10 10	B B	70 70	Nil Nil	25/8/17		
66	SB	Stage 2 Spoil Dump (7/4/17)	A	12	B	70	Nil			
67	SB	Stage 2 Spoil Dump (7/4/17)	A	10 12	T T	100 70	Nil Nil			
68	SB	Stage 2 Spoil Dump (7/4/17)	A	6	B	50 slit	Nil			
69	SB	Stage 2 Spoil Dump (7/4/17)	A	10	T	100	Nil			
70	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	500 pipe	Nil			
71	SB	Stage 2 Spoil Dump (7/4/17)	A	5	T	300 pipe	Nil			
72	Stag	Stage 2 Spoil Dump (7/4/17)	D	12	T	70	Scratches			
73	Stag	Stage 2 Spoil Dump (7/4/17)	D	6	B	200 pipe	Nil			
74	SB	Stage 2 Spoil Dump (7/4/17)	A	12	B	50	Nil	25/8/17		

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
75	SB	Stage 2 Spoil Dump (7/4/17)	A	10	T	50	Nil			
76	Stag	Stage 2 Spoil Dump (7/4/17)	D	6	T	50	Nil			
77	Stag	Stage 2 Spoil Dump (7/4/17)	D	10	T	100	Nil			
78	BG	Stage 2 Spoil Dump (7/4/17)	A	8	T	50	Nil			
79	BG	Stage 2 Spoil Dump (7/4/17)	A	8	B	50	Nil			
80	Stag	Stage 2 Spoil Dump (7/4/17)	D	8	T	70	Nil			
81	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	50	Nil			
82	SB	Stage 2 Spoil Dump (7/4/17)	A	8	B	50	Nil			
83	SB	Stage 2 Spoil Dump (7/4/17)	A	6	T	50	Nil			
84	SB	Stage 2 Spoil Dump (7/4/17)	A	6	B	50	Nil			
85	SB	Stage 2 Spoil Dump (7/4/17)	A	8	T	100	Nil			
86	Stag	Stage 2 Spoil Dump (7/4/17)	D	8	T	50	Nil			
87	BG	Stage 2 Spoil Dump (7/4/17)	A	6	B	50	Nil			
88	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
89	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
90	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches	25/8/17	Nil	Nil
91	BG	Stage 2 Year 2 (24/8/17)	A	10	B	50	Scratches	25/8/17	Nil	Nil
92	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
93	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
94	Stag	Stage 2 Year 2 (24/8/17)	A	5	T	50	Nil	25/8/17	Nil	Nil
95	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Scratches	25/8/17	Nil	Nil
96	Stag	Stage 2 Year 2 (24/8/17)	D	6	T	1000	Nil	25/8/17	Nil	Nil
97	BG	Stage 2 Year 2 (24/8/17)	A	10	T	70	Nil	25/8/17	Nil	Nil
98	BG	Stage 2 Year 2 (24/8/17)	A	8	T	70	Nil	25/8/17	Yellow-rumped Thorn-Bill	Nil - Flew away
99	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Lots of Scratches			
100	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
101	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
102	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
103	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
104	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches			
105	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
106	BG	Stage 2 Year 2 (24/8/17)	A	6	B	50	Nil			
107	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil			
108	BG	Stage 2 Year 2 (24/8/17)	A	10	B	50	Nil			
109	BG	Stage 2 Year 2 (24/8/17)	A	8	T	60	Nil			
110	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil			
111	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil			
112	Yellow Box	Stage 2 Year 2 (24/8/17)	A	12	B	1000	Nil			
113	BG	Stage 2 Year 2 (24/8/17)	A	8	T	80	Nil	25/8/17	Nil	Nil
114	Yellow Box	Stage 2 Year 2 (24/8/17)	A	12	T	1000	Nil	25/8/17	Nil	Nil
115	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
116	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
117	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
118	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
119	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
120	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Scratches	25/8/17	Nil	Nil
121	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
123	Stag	Stage 2 Year 2 (24/8/17)	D	6	B	80	Nil	25/8/17	Nil	Nil
124	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
125	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
126	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
127	Stag	Stage 2 Year 2 (24/8/17)	D	6	T	70	Nil	25/8/17	Nil	Nil
128	BG	Stage 2 Year 2 (24/8/17)	A	8	T	60	Nil	25/8/17	Nil	Nil
129	BG	Stage 2 Year 2 (24/8/17)	A	8	T	80	Nil	25/8/17	Nil	Nil
130	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
131	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
132	BG	Stage 2 Year 2 (24/8/17)	A	6	B	50	Nil	25/8/17	Nil	Nil
133	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Scratches	25/8/17	Nil	Nil
134	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Scratches	25/8/17	Nil	Nil
135	BG	Stage 2 Year 2 (24/8/17)	A	6	T	60	Scratches	25/8/17	Nil	Nil
136	BG	Stage 2 Year 2 (24/8/17)	A	8	B	70	Nil	25/8/17	Nil	Nil
137	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
138	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
139	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
140	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
141	BG	Stage 2 Year 2 (24/8/17)	A	6	T	50	Nil	25/8/17	Nil	Nil
142	BG	Stage 2 Year 2 (24/8/17)	A	8	T	50	Nil	25/8/17	Nil	Nil
143	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
144	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil
145	BG	Stage 2 Year 2 (24/8/17)	A	10	T	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
146	BG	Stage 2 Year 2 (24/8/17)	A	10	B	70	Scratches	25/8/17	Nil	Nil
147	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
148	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
149	BG	Stage 2 Year 2 (24/8/17)	A	8	B	50	Nil	25/8/17	Nil	Nil
150	BG	Stage 2 Year 2 (24/8/17)	A	6		70	Nil	25/8/17	Nil	Nil
151	BG	Stage 2 Spoil Dump (25/8/17)	A	6	B	80	Nil	25/8/17	Nil	Nil
152	Stag	Stage 2 Spoil Dump (25/8/17)	D	5	T	60	Nil	25/8/17	Nil	Nil
153	Stag	Stage 2 Spoil Dump (25/8/17)	D	3	T	70	Nil	25/8/17	Nil	Nil
154	Stag	Stage 2 Spoil Dump (25/8/17)	D	4	B	70	Nil	25/8/17	Nil	Nil
155	Stag	Stage 2 Spoil Dump (25/8/17)	D	6	B	70	Nil	25/8/17	Nil	Nil
156	SB	Stage 2 Spoil Dump (25/8/17)	A	20	B	50	Nil	25/8/17	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
157	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	7	B	70	Nil	03/5/18	Nil	Nil
158	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	10	T	70	Nil		Nil	Nil
159	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	6	T	80	Nil	03/5/18	Nil	Nil
160	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	10	B	50	Nil	03/5/18	Nil	Nil
161	BG	Stage 2 Spoil Dump (02/5/18)	A	20	B	60	Nil	03/5/18	Nil	Nil
162	Yellow Box	Stage 2 Spoil Dump (02/5/18)	A	15	B	50	Nil			
163	Stag	Stage 2 Spoil Dump (02/5/18)	D	5	T	200	Nil			
164	Forest Red Gum	Stage 2 Spoil Dump (02/5/18)	A	15	B	Nil	Birds Nest Present	03/5/18	Nest observed to be disused.	Inspected nest.
165	Forest Red Gum	Stage 2 Spoil Dump (02/5/18)	A	20	B	70	Nil	03/5/18	Nil	Nil
166	Yellow	Stage 2 Spoil	A	10	B	80	Nil	03/5/18	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
	Box	Dump (02/5/18)								
167	Stag	Stage 2 Strip 3 (02/5/18)	D	3	T	200	Nil	03/5/18	Nil	Nil
168	Stag	Stage 2 Strip 3 (02/5/18)	D	5	T	250	Nil	03/5/18	Nil	Nil
169	BG	Stage 2 Strip 3 (02/5/18)	A	4	T	100	Nil	03/5/18	Nil	Nil
170	BG	Stage 2 Strip 3 (02/5/18)	A	7	B	90	Nil	03/5/18	Nil	Nil
171	BG	Stage 2 Strip 3 (02/5/18)	A	8	T	80	Nil	03/5/18	Nil	Nil
172	BG	Stage 2 Strip 3 (02/5/18)	A	12	T	90	Nil	03/5/18	Nil	Nil
173	BG	Stage 2 Strip 3 (02/5/18)	A	12	T	80	Nil	03/5/18	Nil	Nil
174	BG	Stage 2 Strip 3 (02/5/18)	A	8	T	100	Nil	03/5/18	Nil	Nil
175	Stag	Stage 2 Strip 3 (02/5/18)	D	5	T	200	Nil	03/5/18	Nil	Nil
176	BG	Stage 2 Strip 3 (02/5/18)	A	12	B	100	Nil	03/5/18	Nil	Nil
177	Stag	Stage 2 Strip 3 (02/5/18)	D	5	T	150	Nil	03/5/18	Nil	Nil
178	BG	Stage 2 Strip 3 (02/5/18)	A	16	B	80	Nil	03/5/18	Nil	Nil
179	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	100	Nil	03/5/18	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
180	Stag	Stage 2 Strip 3 (02/5/18)	D	10	T	200	Nil	03/5/18	Nil	Nil
181	BG	Stage 2 Strip 3 (02/5/18)	A	8	T	100	Nil	03/5/18	Nil	Nil
182	BG	Stage 2 Strip 3 (02/5/18)	A	7	T	50	Nil	03/5/18	Nil	Nil
183	BG	Stage 2 Strip 3 (02/5/18)	A	7	T	60	Nil	03/5/18	Nil	Nil
184	BG	Stage 2 Strip 3 (02/5/18)	A	11	T	60	Bird present.	03/5/18	Crimson Rosella.	Nil. Flew away.
185	BG	Stage 2 Strip 3 (02/5/18)	A	12	B	90	Nil	03/5/18	Nil	Nil
186	BG	Stage 2 Strip 3 (02/5/18)	A	11	B	50	Nil	03/5/18	Nil	Nil
187	BG	Stage 2 Strip 3 (02/5/18)	A	8	T	100	Nil	03/5/18	Nil	Nil
188	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	90	Nil	03/5/18	Nil	Nil
189	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	90	Nil	03/5/18	Nil	Nil
190	BG	Stage 2 Strip 3 (02/5/18)	A	9	B	100	Nil	03/5/18	Nil	Nil
191	Yellow Box	Stage 2 Strip 3 (02/5/18)	A	8	T	100	Nil	03/5/18	Nil	Nil
192	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	100	Nil	03/5/18	Nil	Nil
193	BG	Stage 2 Strip 3 (02/5/18)	A	6	B	90	Nil	03/5/18	Nil	Nil

HBT - Hollow Bearing Trees		Location	Alive / Dead	Height of Hollow above ground (m)	Location of Hollow	Approx. Size of Hollow(s) >50mm (mm)	Fauna Notes (Scratches/Scats/Species)	Cleared	Fauna Presence	Actions Taken
194	BG	Stage 2 Strip 3 (02/5/18)	A	7	B	90	Nil	03/5/18	Nil	Nil
195	Forest Red Gum	Stage 2 Strip 3 (02/5/18)	A	11	T	90	Nil	03/5/18	Nil	Nil
196	BG	Stage 2 Strip 3 (02/5/18)	A	5	B	90	Nil	03/5/18	Nil	Nil
197	BG	Stage 2 Strip 3 (02/5/18)	A	7	B	50	Nil	03/5/18	Nil	Nil
198	BG	Stage 2 Strip 3 (02/5/18)	A	6	B	60	Nil	03/5/18	Nil	Nil
199	Stag	Stage 2 Strip 3 (02/5/18)	D	10	T	150	Nil	03/5/18	Nil	Nil
200	BG	Stage 2 Strip 3 (02/5/18)	A	10	T	100	Nil	03/5/18	Nil	Nil
201	BG	Stage 2 Strip 3 (02/5/18)	A	14	B	90	Nil	03/5/18	Nil	Nil
202	BG	Stage 2 Strip 3 (02/5/18)	A	6	T	100	Nil	03/5/18	Nil	Nil

Legend

B = Branch, T = Trunk, Stag = Dead tree,

BLP = Broad Leaved Peppermint, BG = Brittle Gum, SB = Stringybark, Euc P = Eucalyptus pulverulenta

Appendix I: Niche Environment and Heritage Aquatic Monitoring Report



Austen Quarry

Aquatic Ecology Monitoring Spring 2017

Prepared for Hy-Tech

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Cover photograph: Cox’s River

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Executive summary

Hy-Tec Industries Pty Ltd (Hy-Tec) commissioned Niche Environment and Heritage to undertake the spring 2011 aquatic ecology survey at Austen Quarry near Hartley, NSW as part of an ongoing monitoring program that examines the ecological health of the Coxs River. Field sampling for the monitoring program is undertaken throughout the Spring AUSRIVAS sampling period (15 September to 15 December) and has been conducted on an annual basis since 2005.

The purpose of this aquatic study is to assess stream health at sites above and below the mine water discharge and selected tributaries. This study describes the current stream health and specifically identify any impacts downstream of the mixing zone from mine water discharge. The objective are to:

- Examine the quality of aquatic habitats and physical-chemical water quality at each monitoring site.
- Collect macroinvertebrate samples consistent with previous sampling and AUSRIVAS Spring sampling protocol.
- Examine the spatial and temporal patterns in macroinvertebrate assemblage structure and AUSRIVAS indices consistent with previous monitoring to ascertain whether the quarry operations are impacting aquatic health.

Edge and riffle habitat was sampled at six sites for aquatic macroinvertebrates during November 2017 as part of the spring sampling period. Sampling was conducted according to AUSRIVAS protocol and was consistent with previous monitoring. The data collected was analysed using both univariate and multivariate statistical techniques to examine the spatial and temporal variability within aquatic macroinvertebrate assemblage structure. This conducted to ascertain whether quarry operations have had an effect on river health.

Results of the 2017 survey found:

- All water quality parameters to be within ANZECC Guideline Values and similar between locations.
- Macroinvertebrate assemblages were indicative of reference condition irrespective of location.
- Pollution resistant taxa of macroinvertebrates appeared to dominate assemblages irrespective of location.

Key Findings of the report where:

- At the time of the 2017 survey, water quality and macroinvertebrate assemblages near the quarry discharge point were found to be both in good condition (in comparison to ANZECC Guideline Values and the AUSRIVAS model), and similar in quality and ecological condition to other comparable reaches of the river.
- Some minor elevation in turbidity and lower than expected SIGNAL2 scores for macroinvertebrates indicates that there may be some minor impacts on habitat quality at Site 1.
- The biggest driver in variability amongst macroinvertebrate assemblages in the reaches of the Cox River surveyed in this program, appears to be those that occur through time irrespective of the Location and the quarry discharge point.

For all the ecological variables examined it appears that very little of the variability detected is as a direct result of quarry operations, while the sites exhibit good water quality and support macroinvertebrate assemblages that are reflective of reference conditions for the region. Furthermore, macroinvertebrate assemblages indicate that at present the ecological health of the river within the vicinity of Austen Quarry is no different, and sometimes better, than other areas of the river not influenced by quarry operations. It is likely that any impacts that are occurring are short-term in nature and confined to small spatial scales close to the discharge point. Thus, environmental management practices used at the quarry appear to be providing suitable protection to the aquatic environment of the Coxs River.

Glossary and abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council.
AUSRIVAS	Australian Rivers Assessment System.
Macroinvertebrates	Macroinvertebrates are animals without a backbone that can be seen with the naked eye.
PERMANOVA	Statistical procedure - Permutational Analysis of Variance
SIGNAL	Stream Invertebrate Grade Number Average Level.

1. Introduction

1.1 Background

Hy-Tec Industries Pty Ltd (Hy-Tec) commissioned Niche Environment and Heritage to undertake the Spring 2011 aquatic ecology survey at Austen Quarry near Hartley, NSW as part of an ongoing monitoring program that examines the ecological health of the Coxs River. Field sampling for the monitoring program is undertaken throughout the Spring AUSRIVAS sampling period (15 September to 15 December) and has been conducted on an annual basis since 2005.

Austen Quarry extracts rhyolite, a durable igneous rock, which is used for a variety of applications including concrete aggregates, asphalt aggregates, road base materials, rail infrastructure, landscaping and ceramic and glass products. As part of the quarry operations, various water management practices are utilised across the site and include the collection of water runoff for environmental control and for use in a variety of quarry processes and dust suppression. Water from the site is sometimes discharged into the nearby Coxs River (i.e. during significant wet weather events and controlled releases) via a number of Licensed Discharge Points (LDPs) to maintain water storage capacity within the various dams located onsite. As such, the discharge of water from the site must comply with the water quality criteria set out in Environment Protection Licence (EPL) 12323 and S.120 of the Protection of the Environment Operations Act 1997, which prohibits the pollution of surface waters unless expressly authorised by the EPL. To ensure water pollution is minimised prior to any releases, various processes, such as the addition of flocculants and other dam management practices, are utilised.

In previous years (prior to 2016), as part of the conditions of Development Consent issued by Lithgow Council for the quarry (DA 103/94), Hy-Tec monitored impacts on the aquatic environment by assessing macroinvertebrate assemblages within the Coxs River upstream and downstream of the quarry. As such, monitoring of aquatic macroinvertebrates was undertaken (since 2005) to determine whether the occasional discharge of water from the quarry site, or the operation of the quarry in general, has had any detectable impact on the ecology of the river. To date, no apparent impact from quarry operations on the aquatic macroinvertebrates within Coxs River has been detected throughout the monitoring program

1.2 Purpose and objectives of this report

The purpose of this aquatic study is to assess stream health at sites above and below the mine water discharge and selected tributaries. This study aims to describe the current stream health and specifically identify any impacts downstream of the mixing zone from mine water discharge. The objective are to:

- Examine the quality of aquatic habitats and physio-chemical water quality at each monitoring site.
- Collect macroinvertebrate samples consistent with previous sampling and AUSRIVAS Spring sampling protocol.
- Examine the spatial and temporal patterns in macroinvertebrate assemblage structure and AUSRIVAS indices consistent with previous monitoring to ascertain whether the quarry operations are impacting aquatic health.

2. Methods

2.1 Survey methods

The project area was investigated by Niche Aquatic Ecologists in Spring 2017. AUSRIVAS was the primary survey method employed, which is a standard rapid assessment methodology for assessing river health using macroinvertebrates (Turak *et al.* 2004). Further information on sampling methods and analysis is provided in Section 2.4.

2.2 Sampling locations and study design

A total of six sites were sampled during the current survey (Figure 1, Table 1). These sites are consistent with those sampled in previous monitoring and allows for comparison of collected data over time.

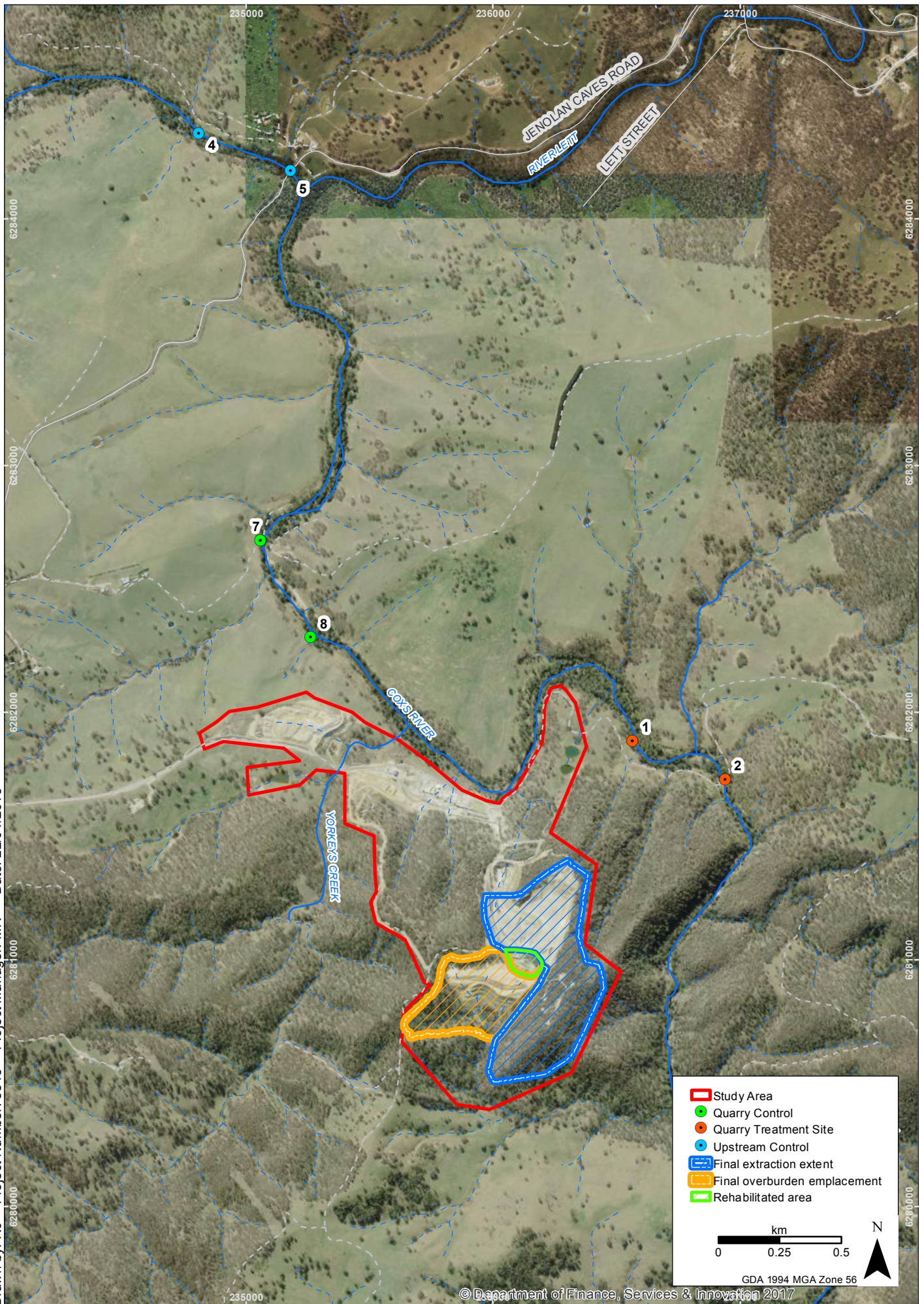
Sites are grouped into three pairs to allow for spatial replication, with each group representing a particular treatment:

- Quarry Treatment (Sites 1 and 2);
- Quarry Control (Sites 7 and 8); and
- Upstream Control (Sites 4 and 5).

Table 1 Location of aquatic ecology sampling sites

Location	Site Number	Easting	Northing
Quarry Treatment Site	1	236564	6281888
	2	236938	6281730
Upstream Control	4	234808	6284343
	5	235178	6284196
Quarry Control	7	235058	6282700
	8	235262	6282308

Drawn by: RJ Project Number: 3848 Project Manager: MR Date: 22/01/2018



Spring 2017 Aquatic Monitoring Program - Austen Quarry
Location of monitoring sites

2.3 Water quality sampling

Surface water quality was measured *in situ* using a Yeokal 611 water quality probe at each site. The following variables were recorded:

- Temperature (°C)
- Conductivity ($\mu\text{S}/\text{cm}$)
- pH
- Oxidation – Reduction Potential (ORP) (mV)
- Dissolved Oxygen (DO)(% saturation and mg/L)
- Turbidity (NTU).

Two replicates were measured for all above parameters at each site. Alkalinity (mg CaCa₃/L) was measured with a standard titration kit at each site only.

2.4 Macroinvertebrate survey

AUSRIVAS pool sampling

Samples were collected from pool edges for a length of 10 m either as a continuous line or in disconnected segments. Sampling in segments was undertaken to ensure the sampling of sub-habitats such as macrophyte beds, bank overhangs, submerged branches and root mats. Segmented sampling was also employed where pool length was short and it was logistically difficult to sample in a continuous line (e.g. due to the presence of in-stream logs). A 250 micrometre (μm) dip net was drawn through the water with short sweeps towards the bank to dislodge benthic fauna while scraping submerged rocks and debris, sides of the stream bank and the bed substrate. Further sweeps in the water column targeted the suspended fauna.

AUSRIVAS Riffle sampling

Riffles were sampled by disturbing the substratum with the feet while holding the net downstream with its mouth facing upstream, the flow of the riffle conveys the detritus and macroinvertebrates into the dip net. This process was continued for a total of 10 m of riffle habitat. Depending on the extent and structure of the riffle habitats being sampled this was either a continuous 10 m or consisted of a number of discrete segments totalling 10 m. Effort was made to ensure sub-habitats were sampled; all available combinations of flow (fast, moderate, and slow flowing), depth (shallow to deep), and substratum (boulder, cobble, pebble, etc.) were sampled where present.

Sorting

Each sample was rinsed from the net onto a white sorting tray from which animals were picked using forceps, pipettes and or paint brushes. Each tray was picked for a minimum period of forty minutes, after which they were picked at ten minute intervals for either a total of one hour or until no new specimens had been found. Care was taken to collect cryptic and fast moving animals in addition to those that were conspicuous or slow. The animals collected at each site were placed into a labelled jar containing 70% ethanol.

Physical parameters

The chemical and physical variables required for running the AUSRIVAS predictive model were also recorded. Alkalinity, modal depth and width of the stream, percentage bedrock, boulder or cobble and

latitude and longitude were recorded. Distance from source, altitude, land-slope and rainfall were also calculated.

2.4.1 Laboratory methods— invertebrate identification

Macroinvertebrate samples were identified to family level with the exception of Oligochaeta (to class), Polychaeta (to class), Ostracoda (to subclass), Nematoda (to phylum), Nemertea (to phylum), Acarina (to order) and Chironomidae (to subfamily). Identification keys used include:

- Dean, J., Rosalind, M., St Clair, M., and Cartwright, D. (2004) Identification keys to Australian families and genera of caddis-fly larvae (Trichoptera) Cooperative Research Centre for Freshwater Ecology.
- Gooderham, J. and Tsyrlin, E. (2002). The Waterbug Book: A guide to the Freshwater Macroinvertebrates of Temperate Australia, CSIRO Publishing.
- Hawking J. and Theischinger G. (1999). A guide to the identification of larvae of Australian families and to the identification of ecology of larvae from NSW.
- Madden, C. (2010) Key to genera of Australian Chironomidae. Museum Victoria Science Reports 12,1-31.
- Madden, C. (2011) Draft identification key to families of Diptera larvae of Australian inland waters La Trobe University.
- Smith, B. (1996) Identification keys to the families and genera of bivalve and gastropod molluscs found in Australian inland waters Murray Darling Freshwater Research Centre.
- Website - <http://www.mdfrc.org.au/bugguide/>.

2.5 Data analysis

2.5.2 Water quality

Water quality data from each site was tabulated and compared to ANZECC/ARMCANZ (2000) default trigger values (DTVs) for slightly disturbed upland streams.

2.5.3 Macroinvertebrates

AUSRIVAS

Samples collected using AUSRIVAS protocol were analysed using the predictive models for NSW pool edge/riffle habitats. The AUSRIVAS model predicts the aquatic macroinvertebrate fauna expected to occur at a site in the absence of environmental stress, such as pollution or habitat degradation. The AUSRIVAS spring models were used for the data collected. Observed to expected ratio (OE50), SIGNAL (Stream Invertebrate Grade Number Average Level), and number of taxa were the indices used to interpret stream health.

OE50

The Observed to Expected ratio is the ratio of the number of invertebrate families observed at a site (NTC50) to the number of families expected (NTE50) at that site. Only macroinvertebrate families with a greater than 50% predicted probability of occurrences are used by the model. OE50 provides a measure of biological impairment at the test site. Bands derived from the OE50 indicate the level of impairment of the assemblage. The OE50 ratios are divided into bands representing different levels of impairment (

Table 2).

Table 2 AUSRIVAS band interpretation

Band	Interpretation
Band X	Represents a more biologically diverse community than reference
Band A	Is considered similar to reference condition
Band B	Represents sites significantly impaired
Band C	Represents sites in a severely impaired condition
Band D	Represents sites that are extremely impaired

Other scores include:

O0Signal – This is the observed SIGNAL score for taxa that have a probability of occurrence of more than 0% calculated by the AUSRIVAS model. This is equivalent to the ‘raw’ SIGNAL score and those developed prior to SIGNAL2 by Chessman (2003)

OE50Signal – This is the ratio of the observed to expected SIGNAL score per site for taxa that have a probability of occurrence of more than 50%;

SIGNAL2 (Stream Invertebrate Grade Number Average Level) scores

Table 3 provides a broad guide for interpreting the health of the site according to the SIGNAL 2 score of the site. Note that SIGNAL2 scores are indicative only and that pollution does not refer to just anthropogenic pollution. Environmental stress may result in poor water quality occurring naturally in waterways. Low family richness and the occurrence of pollution tolerant invertebrates can give a low SIGNAL score even though they are natural condition.

Table 3 Guide to interpreting the SIGNAL 2 scores

SIGNAL2 Score	Habitat quality
Greater than 6	Healthy habitat
Between 5 and 6	Mild pollution
Between 4 and 5	Moderate pollution
Less than 4	Severe pollution

From Gooderham and Tsyrlin 2002. Note: This guide is indicative only. Streams can have low SIGNAL scores when they are in natural condition, due to the dominance of pollution tolerant fauna.

2.6 PERMANOVA

The statistical procedure, PERmutational Multivariate ANalysis Of VAriance (PERMANOVA), was used to examine the spatial and temporal changes in macroinvertebrate data collected throughout the study. PERMANOVA is a permutational approach to analysis of variance (ANOVA) that has a number of advantages of traditional statistical methods. These are detailed in Anderson *et al.* (2008).

Both multivariate (many variables) and univariate (single variable) analyses can be undertaken using PERMANOVA. In both cases, the significance level was set at $p < 0.05$ for all statistical tests undertaken for this report. In the case where the number of unique permutations for a particular test was less than 100, Monte Carlo probability values were used to assess the significance of the test as outlined in Anderson *et al.* (2008). As with previous surveys within the monitoring program, analyses were undertaken using the software package Primer v6 with the PERMANOVA+ add on.

In order to examine the spatial and temporal differences in macroinvertebrate data, two factors were analysed. These included:

- Year (5 levels: 2011, 2014, 2015, 2016 and 2017); and
- Location (3 levels: Quarry Treatment, Quarry Control and Upstream Control).

Both factors were considered as fixed and orthogonal factors for the purposes of the statistical analyses. Sites were treated as replicates within each location to provide replication at the Location level (i.e. $n = 2$). This experimental design was used in both multivariate and univariate style analyses.

Multivariate Analyses

Spatial and temporal variability in macroinvertebrate assemblages, for both edge and riffle habitat, were examined using the Bray-Curtis similarity measure on assemblage data transformed to presence/absence. This transformation was undertaken as per previous analyses, as the AUSRIVAS sampling and processing protocol does not generate reliable abundance data. However, it does provide robust presence/absence data for statistical analyses. Any significant tests were further analysed using pairwise comparisons to further investigate spatial and temporal variability and pin point which pairs of locations/surveys were different.

Principle Coordinates Analysis (PCoA) as used to provide a graphical representation of the spatial and temporal patterns in macroinvertebrate assemblages. Vector overlays based on the Spearman's Correlation Coefficients were added to the graphical output based to display the strongest drivers of differences. The PCoA routine allows for the multivariate assemblages to be visualised using metric multidimensional scaling. This approach is more appropriate when PERMANOVA is applied than traditional uses of non-metric Multidimensional Scaling (nMDS), as it models the actual dissimilarities of interest that provide a direct projection of the points considered using PERMANOVA (Anderson *et al* 2008). The PCoA analysis itself provides a measure of the amount of variation in the data that can be captured by the first two axes.

Univariate Analyses

The spatial and temporal variability in the total number of macroinvertebrate taxa and SIGNAL2 score, and the AUSRIVAS indices, OE50Taxa, OE50Signal and O0Signal, was examined using the Euclidean distance measure on untransformed data. As with the multivariate analyses, any significant tests were further analysed using pairwise comparisons to examine which pairs of locations/surveys were different.

3. Results

3.1 Spring 2017

3.1.1 Water Quality

Water quality results of temperature, electrical conductivity, and turbidity were generally consistent between sites and within ANZECC Default Trigger Values (DTVs) (Table 4). An exception to this is Site 8, which was slightly higher in dissolved oxygen than the upper DTV, and upstream controls which were slightly below turbidity DTV. Results of pH were elevated above DTV at all sites with the Quarry Control Sites recording the highest values. Electrical conductivity was also found to be slightly higher in Upstream Control Sites. A slightly elevated level of mean turbidity was recorded at Site 1 within the Quarry Treatment Location in comparison with other sites. Given this value has a very high Standard Error associated with it, it should be interpreted with caution (Table 4).

Table 4 Water quality results for spring 2017

Season	Location	Quarry treatment		Upstream Control		Quarry control		Default Trigger Values
Site	Site	1	2	4	5	7	8	
Temperature °C	Mean	16.76	17.67	16.15	16.65	17.48	17.885	-
	SE	0.39	0.23	0	0.015	0.01	0.003	
Electrical conductivity (mS/cm)	Mean	244.5	246	274	273	254.5	252.5	30-350
	SE	0.5	0	0	0	1.5	0.25	
Turbidity (NTU)	Mean	16.7	4.75	1.35	0.75	2.15	4.4	2-25
	SE	15.1	2.85	0.65	0.05	1.65	0.6	
Dissolved oxygen (% sat)	Mean	97	100.65	93.5	98.05	107.4	110.05	90-110
	SE	0.4	0.05	0.2	0.65	4.6	0.43	
Dissolved Oxygen mg/L	Mean	9.41	9.64	9.2	9.56	10.15	10.455	
	SE	0.05	0.01	0.02	0.06	0.44	0.375	
pH	Mean	8.18	8.38	8.27	8.32	8.73	8.86	6.5-8
	SE	0.05	0.02	0.015	0	0.125	0.005	
ORP	Mean	361.5	391.5	391	407	411	422.5	
	SE	0.5	1.5		2	0	0.25	
Alkalinity (mg CaCa3/L)		160	220	200	220	160	200	

Text in bold indicate those variables that exceeded the default trigger values.

3.1.2 Edge Habitat

AUSRIVAS spring results for pool edge habitat are presented in Table 5 and raw data is provided in Appendix 1. Overall, 42 different taxa were collected from the pool sampling with the number of taxa collected ranging 19-31 among pool sites. Pools edges were dominated numerically by Gripopterygidae (stoneflies), Leptophlebiidae and Caenidae (mayflies) and Leptoceridae (caddisflies), which together made up 50% of the total number of macroinvertebrates collected from this habitat.

In comparison to the AUSRIVAS model, edge habitat macroinvertebrate assemblages at each site were all equivalent of or taxonomically richer than the AUSRIVAS reference condition (bands A or X). The majority of sites (1, 4, 5, and 7) were above 1 for OE50 Taxa, indicating that more taxa were sampled at these sites during the survey than expected by the AUSRIVAS model. While site 8 was below (0.91), indicating that fewer taxa were sampled at this site than expected by the AUSRIVAS model, however, the site remains similar to reference condition (Table 5). For SIGNAL2 all sites with the exception of site 1, were within the 4-5 range indicating they are dominated by species that are able to withstand moderate levels of pollution, while site 1 was below 4, indicating the assemblage was very pollution tolerant (Table 5). These scores between 4 and 5 are can be indicative of a moderately polluted edge habitat, and severely polluted habitat where below 4. Further uses of SIGNAL based indices calculated using the AUSRIVAS Model found that OOSIGNAL was similar to SIGNAL2 albeit less conservative at some sites (Table 5).

Table 5 AUSRIVAS results for edge habitat (2017).

Season	Spring 2017					
Site	Quarry treatment		Upstream Control		Quarry Control	
	1	2	4	5	7	8
No of taxa	19	22	25	31	24	23
SIGNAL2	3.89	4.77	4.20	4.29	4.83	5.00
OOSIGNAL	3.89	4.77	4.44	4.29	4.83	5.00
OE50SIGNAL	0.91	0.98	0.99	1.01	1.08	1.13
OE50Taxa	1.06	1.00	1.09	1.27	1.06	0.91
Bands	A	A	A	X	A	A

Statistical analysis of the means for indices provided in Table 5 for edge habitat with data from previous years, found that statistically significant differences for comparisons of data collected in 2017 only occurred for SIGNAL2 and OOSIGNAL (Appendix 2). These differences were due to SIGNAL 2 (Figure 2) and OOSIGNAL (Figure 3) at the Quarry Control being higher in comparison with the Upstream Control Location (Appendix 2). Further description of differences that occurred at temporal scales or irrespective of the data collected in 2017 are provided in Section 3.2.1.

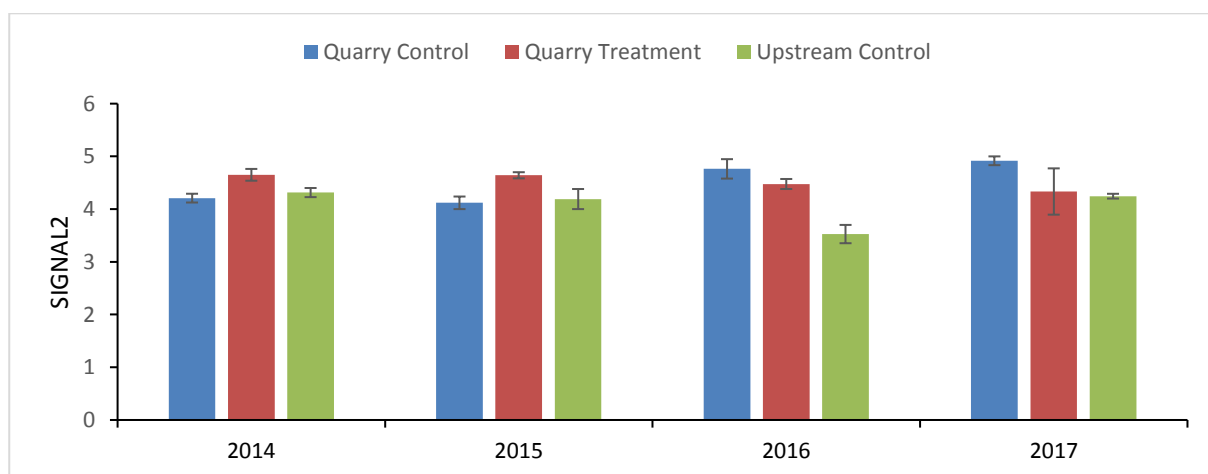


Figure 2: Mean (±SE) SIGNAL2 scores within edge habitat between Locations for each Year.

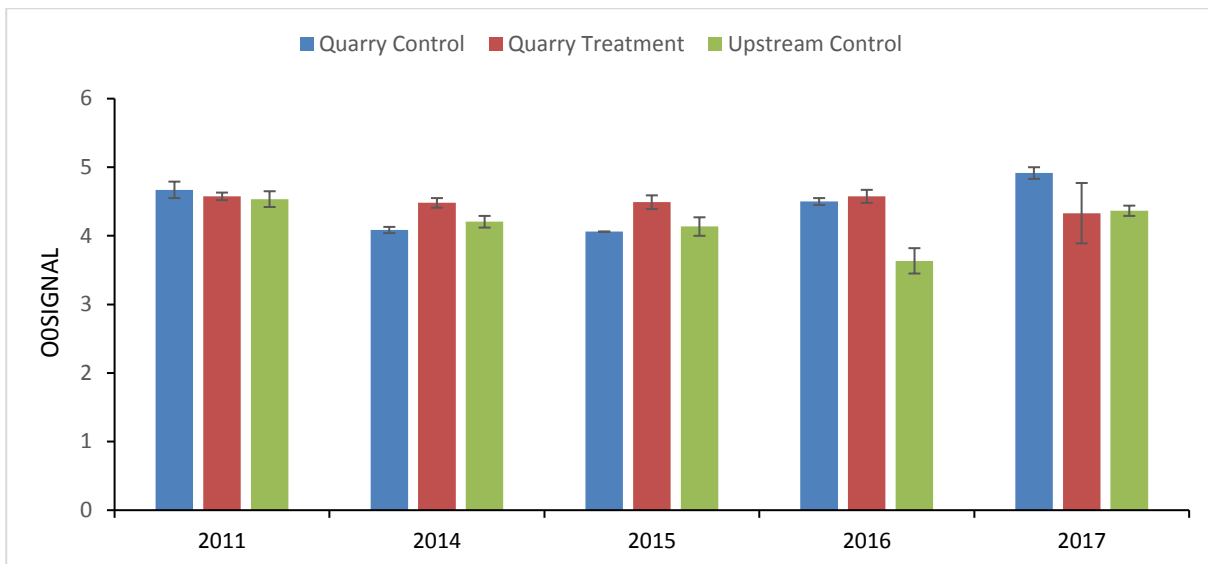


Figure 3: Mean (\pm SE) OOSIGNAL scores within edge habitat between Locations for each Year.

Assemblage Structure

Multivariate analysis of the assemblage detected a significant differences between the interaction of and Location (Appendix 2), indicating that any spatial differences were dependant on year, however, further statistical investigation using pair-wise comparisons was unable to identify the individual this difference (Figure 4). PCoA analysis found that the first two axes explained 35.7 % of the total variation. Visualisation of the assemblage using these first two axes showed some spatial variability among sites within the Quarry Treatment Location in 2017. The PCO plot indicates that there appears to be some grouping amongst Years, but minimal grouping based on Locations. The vectors indicate that the absence of the Dixidae family has a negative relationship with the PCO1 axis, while the presence of Hyracarina family has a positive relationship, and absence of the Chironomidae/Orthocladiinae and Coenagrionidae families a negative relationship with the PCO2 axis. The presence/absence of these species combined with the Copepoda family best explains variation in the assemblage based on the first two axis of the PCO. However, none of these alone clearly

distinguish differences between the Years and Locations (

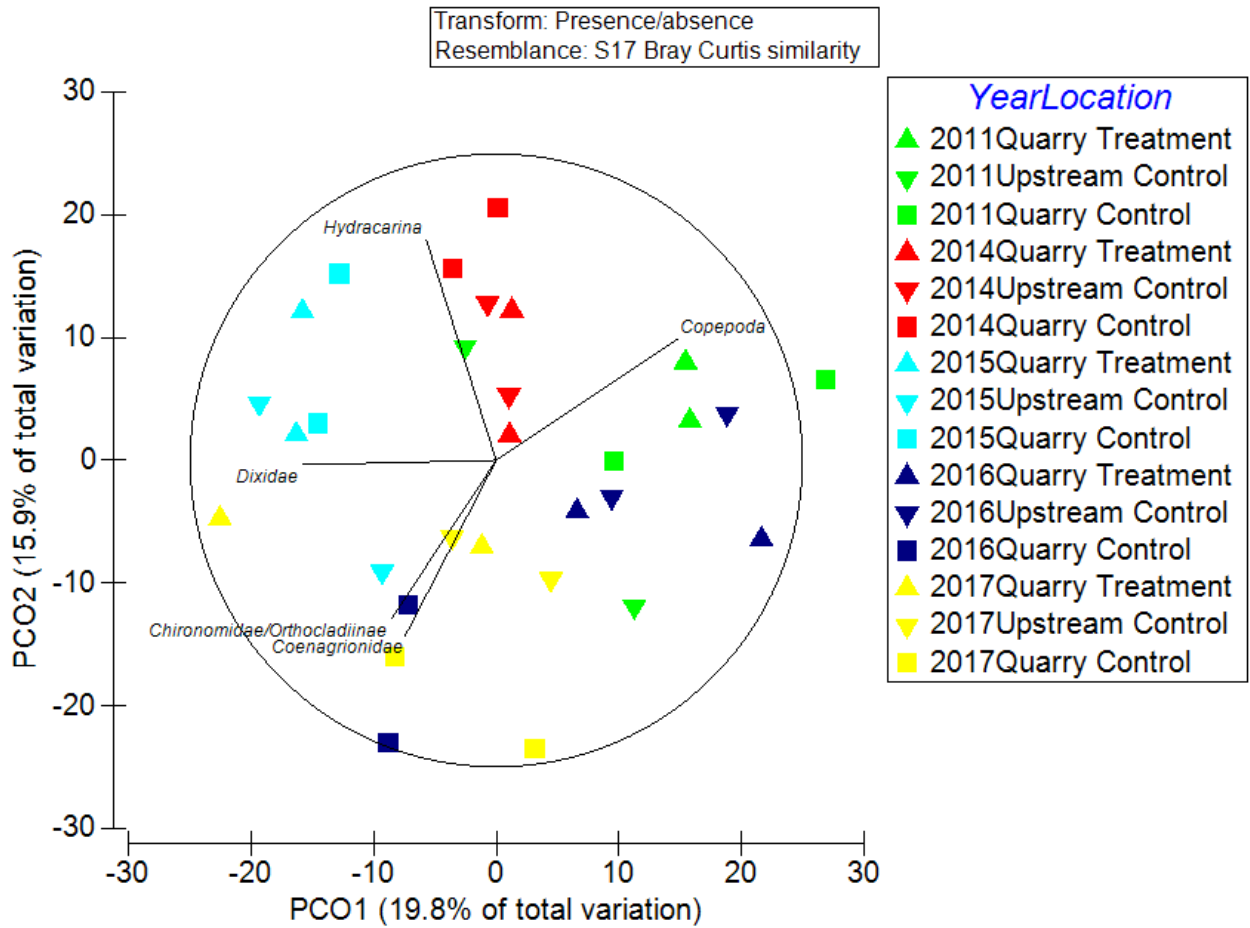


Figure 4).

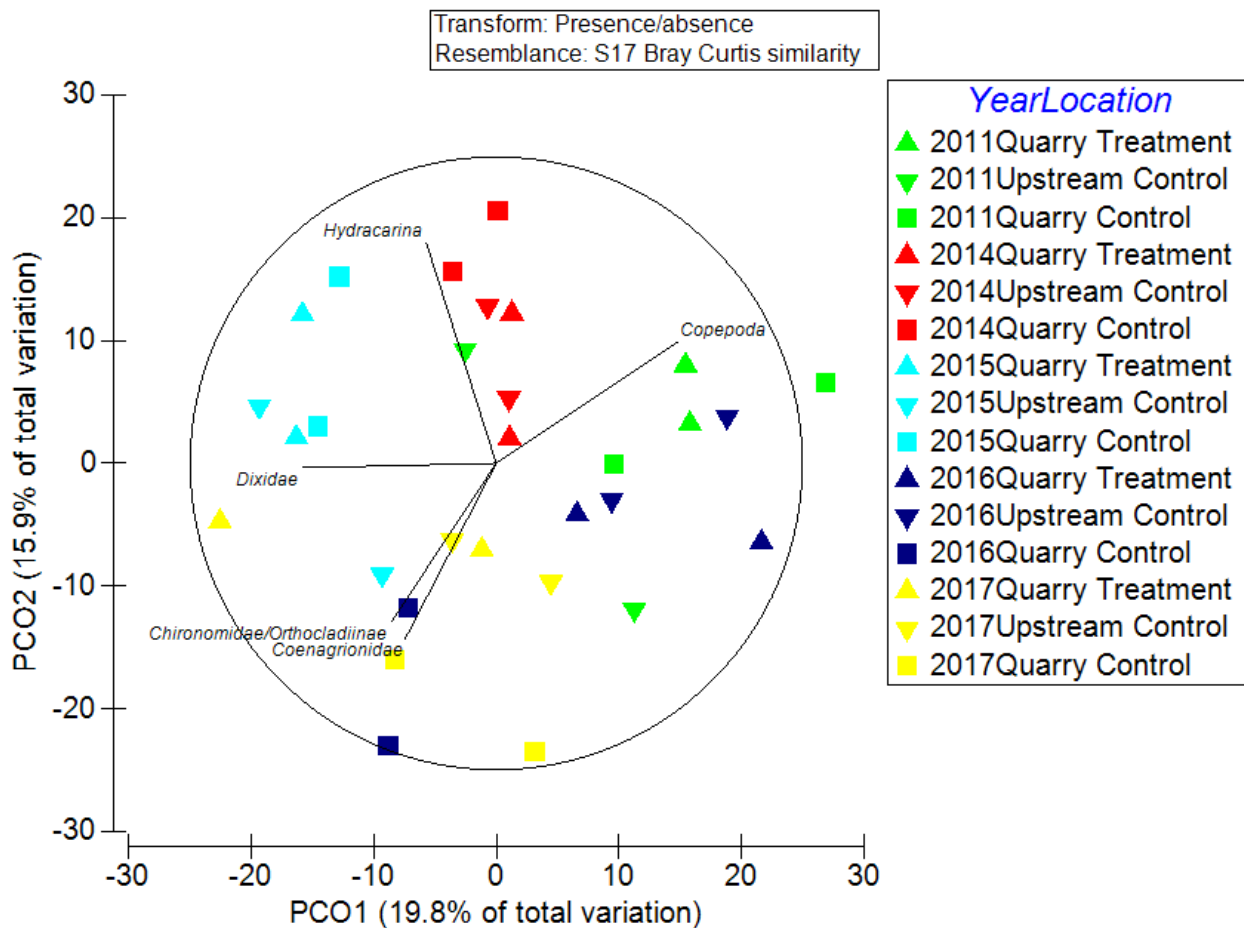


Figure 4: PCoA plot with vector overlays of taxa based on Spearman's Correlation ($r^2 > 0.61$) of edge habitat assemblages for Year and Location.

3.1.3 Riffle habitat

AUSRIVAS Indices and SIGNAL2

AUSRIVAS spring results for riffle habitat are presented in Table 7 and raw data is provided in Appendix 1. Overall, 34 different taxa were collected with the number of taxa collected ranging between 17-25 among at each site. Riffles were dominated numerically by Gripopterygidae (stoneflies), Hydropsychidae (caddisflies), and Leptophlebiidae (mayflies), which together made up 52% of the total number of macroinvertebrates collected from this habitat.

In comparison to the AUSRIVAS model for riffle habitat, macroinvertebrate assemblages at each site were all equivalent to the AUSRIVAS reference condition (bands A). All the sites were also above the 80th percentile for OE50Taxa, indicating they are similar to reference condition. While the Quarry Treatment sites (1 and 2) were slightly above reference condition (1) indicating that more taxa were sampled at these sites during the survey than expected by the AUSRIVAS model (Table 6). For both SIGNAL2 and OOSIGNAL all sites were within the 5-6 range indicating they are dominated by species that are able to withstand minor levels of pollution (Table 6).

Table 6: AUSRIVAS results for riffle habitat (2017).

Season	Spring 2017					
Site	Quarry treatment		Upstream Control		Quarry Control	
	1	2	4	5	7	8
No of taxa	21	17	24	17	25	20
SIGNAL2	5.62	6.00	5.71	5.17	5.52	5.25
OOSIGNAL	5.62	6.00	5.71	5.18	5.52	5.25
OE50SIGNAL	1.01	1.01	0.96	0.96	1.08	1.03
OE50Taxa	0.89	0.89	1.10	1.02	0.89	0.89
Bands	A	A	A	A	A	A

Statistical analysis of the means for indices provided in Table 6 for riffle habitat with data from previous years, did not detect any statistically significant differences for comparisons of data collected in 2017 (Appendix 3). Further description of differences that occurred at temporal scales or irrespective of the data collected in 2017 are provided in Section 3.2.2.

Assemblage Structure

Multivariate analysis of the assemblage detected a significant spatial difference between locations irrespective of the Year (Appendix 3). Visualisation of the assemblage with PCO analysis indicated that the assemblages from the Quarry Control Location may be more variable than those from the other Locations based on the first two axis of the PCO, however in general the assemblages had a substantial amount of overlap and appear relatively similar. The vectors indicate that the presence of the Glossomatidae family has a positive relationship with the PCO1 axis, while absence of the Parastacidae, Chironomidae/Chironominae, and Ecomidae families have a negative relationship with the PCO2 axis. The presence/absence of these species combined with Chironomidae/Orthocladiinae best explains variation in the assemblage based on the first two axis of the PCO, however none of these alone clearly distinguish differences between the Locations (Figure 5).

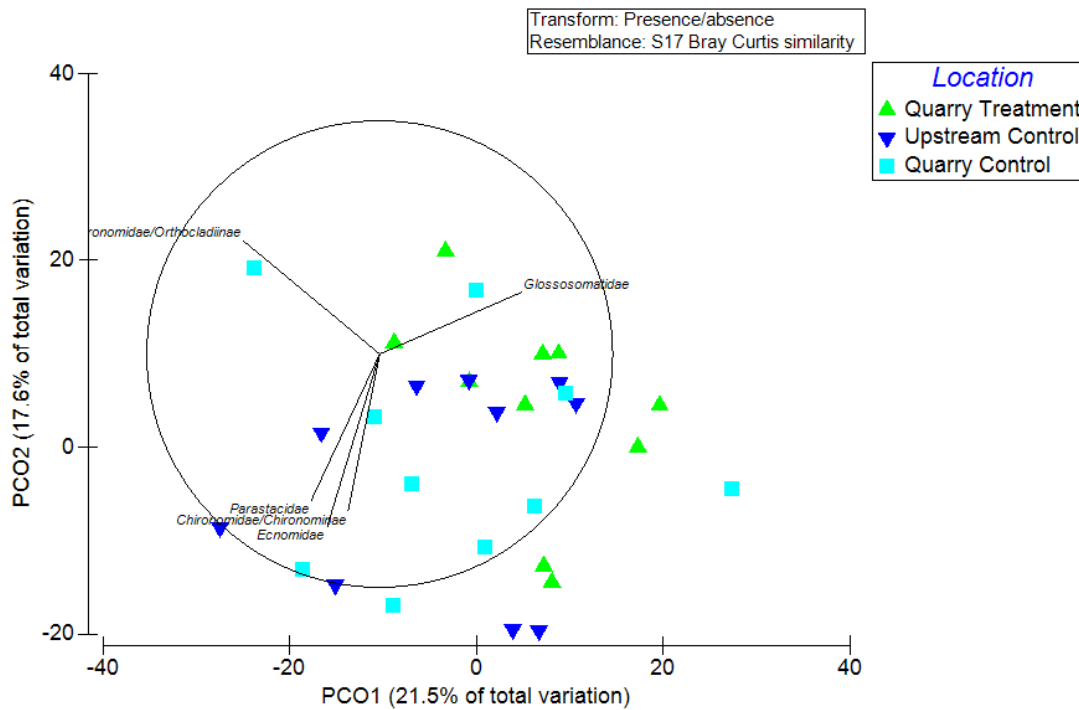


Figure 5: PCoA plot with vector overlays of taxa based on Spearman's Correlation ($r^2 > 0.65$) of riffle habitat assemblages for Locations.

3.2 Trends in Macroinvertebrate Assemblages

3.2.1 Edge Habitat

AUSRIVAS Indices and SIGNAL2

The following temporal changes were identified from univariate analysis of key assemblage indices through time for edge habitat:

- Number of taxa surveyed were consistent in 2017 with previous Years. Statistically significant differences were restricted to differences between Locations within Years prior to 2017 (Appendix 2).
- The OE50Taxa score in 2017 was lower than 2015, but higher than all other previous Years (Figure 6). A statistically significant differences was detected for Year irrespective of Location. Pairwise comparisons indicated that these differences were only significant between 2017 and 2011 (Appendix 2).

Temporal changes in SIGNAL2 were restricted to differences within Locations between Years (

- Figure 2). For the Quarry Control Location, SIGNAL2 scores were detected to be statistically higher in 2017 in comparison with 2015 and 2014 (Appendix 2).
- Temporal changes in OOSIGNAL were restricted to differences within Locations between Years (Figure 3). For the Quarry Control Location, statistically significant differences included higher OOSIGNAL scores in 2017 in comparison with 2015 and 2014 (Figure 3, Appendix 2).
- Temporal changes in OE50SIGNAL were restricted to differences within Locations between Years (Figure 7). For the Quarry Control Location, OE50SIGNAL score was also detected to be statistically higher in 2017 in comparison with both 2015 and 2014 (Appendix 2).

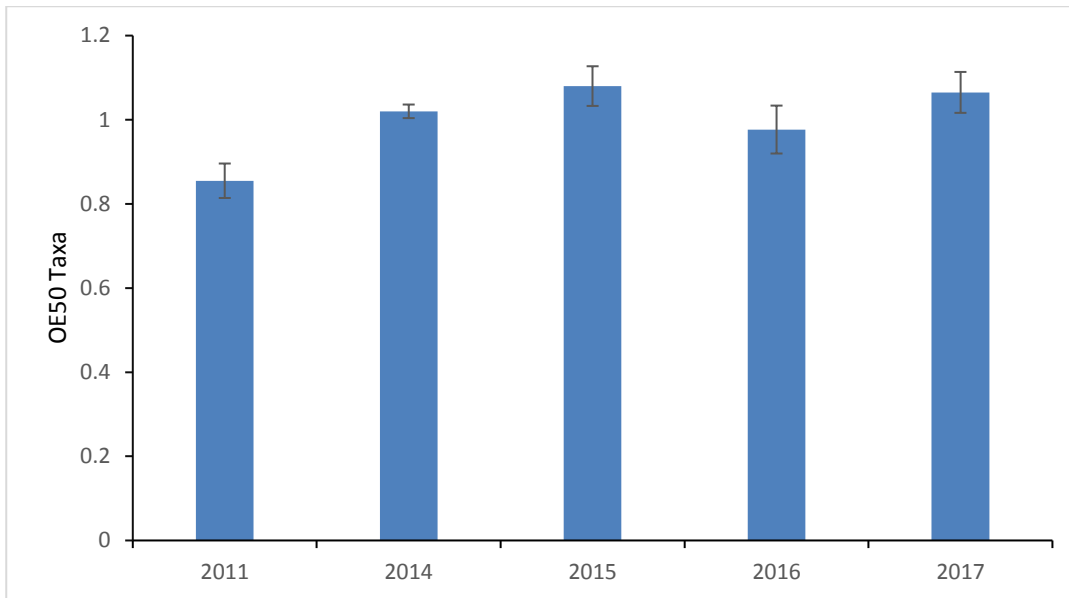


Figure 6: Mean (±SE) OE50Taxa scores within edge habitat between Years.

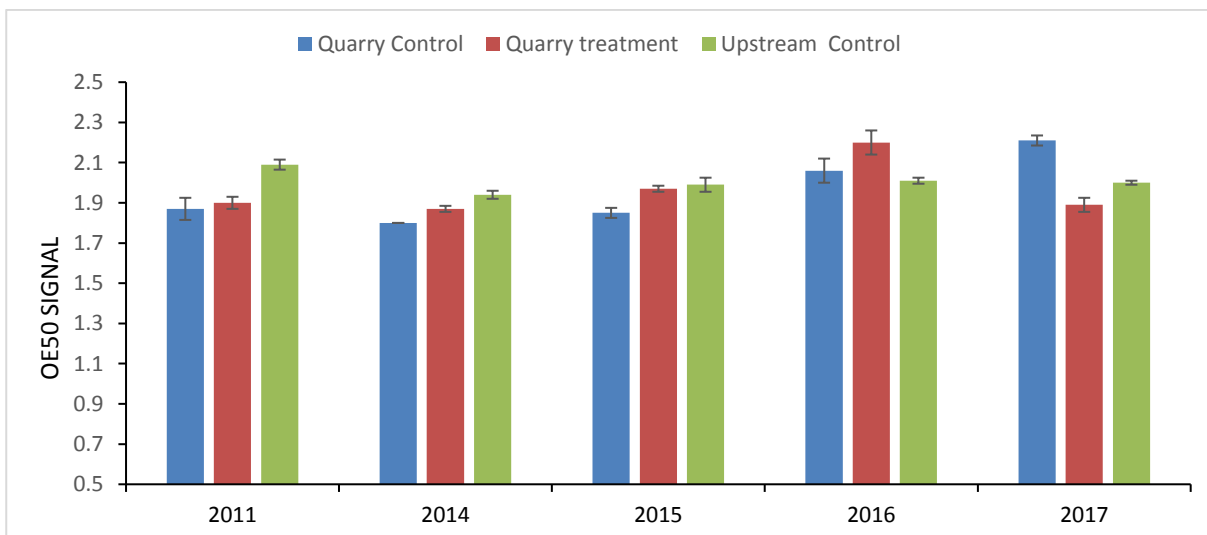


Figure 7: Mean (±SE) OE50SIGNAL scores within edge habitat between Locations for each Year.

Assemblage structure

Multivariate analysis of the assemblage detected a significant differences between the interaction of Year and Location, indicating that any temporal differences were depended on Location. However, further statistical investigation using pair-wise comparisons were unable to identify the individual comparisons contributing to this difference (Appendix 2). Visualisation of the assemblage with PCO analysis showed that there was clear grouping among Years, which appeared to be the stronger driver of differences in the assemblage, rather than differences between Locations (Figure 4).

3.2.2 Riffle Habitat

AUSRIVAS Indices and SIGNAL2

The following temporal changes were identified from univariate analysis of key assemblage indices through time for riffle habitat:

- Number of taxa surveyed were consistent in 2017 with previous Years, however significant differences between Years irrespective of Location existed between previous Years (Appendix 3).
- OE50Taxa was similar in 2017 as previous years. No statistically significant differences were detected for any spatial or temporal comparisons of OE50Taxa (Appendix 3).
- The SIGNAL2 score was significantly different between Years irrespective of Location. Pairwise comparisons indicated that this result was due to differences between Years previous to 2017 (Appendix 3). Likewise, SIGNAL2 was significantly different between Locations irrespective of Year. Pairwise comparisons indicated that this result was due to lower scores at the Upstream Control in comparison with both the Quarry Treatment and Control Locations (Figure 8, Appendix 3).
- The OOSIGNAL score was also significantly different between Years irrespective of Location. Pairwise comparisons indicated that this result was due to a lower score in 2014 in comparison with other Years that included 2017 (Figure 9, Appendix 3). Likewise, OOSIGNAL was significantly different between Locations irrespective of Year. Pairwise comparisons indicated that this result was due to higher scores at the Quarry Treatment in comparison with the other Locations (Figure 10, Appendix 3).
- Temporal changes in OE50SIGNAL were restricted to differences within Locations between Years. This result was due to lower OE50SIGNAL scores in 2017 in comparison with both 2015 within the Quarry Treatment, and 2016 within the Upstream Control Location (Figure 11, Appendix 3).

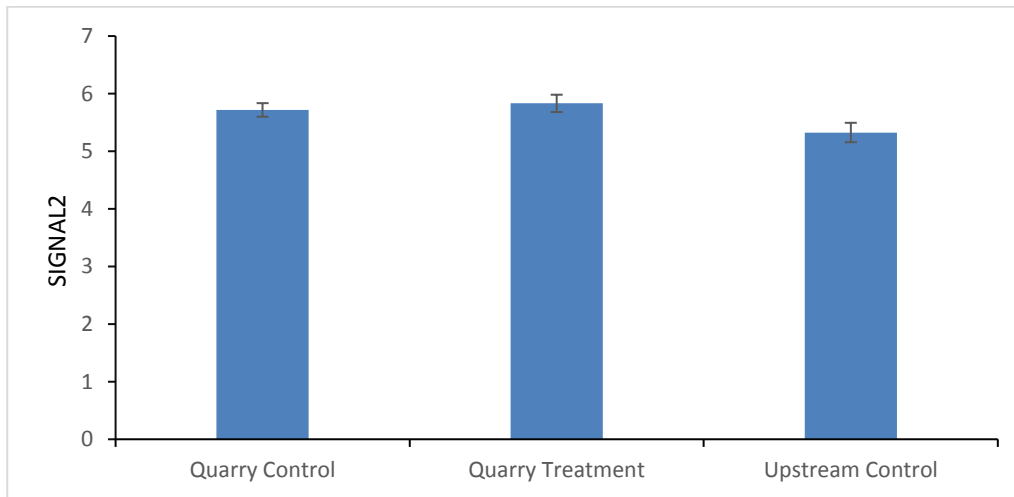


Figure 8: Mean (±SE) SIGNAL2 scores within riffle habitat between Locations.

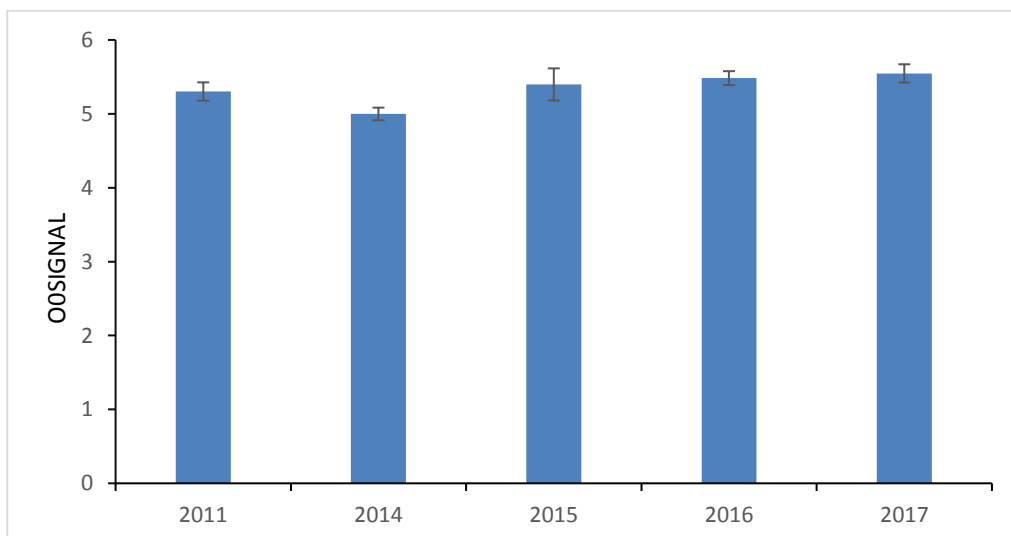


Figure 9: Mean (±SE) OOSIGNAL scores within riffle habitat between Years.

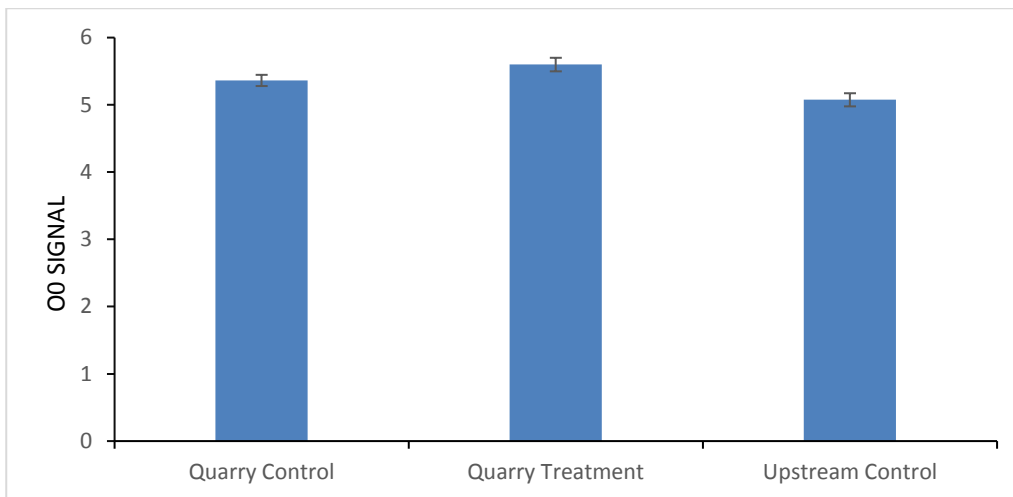


Figure 10: Mean (\pm SE) O0SIGNAL scores within riffle habitat between Locations.

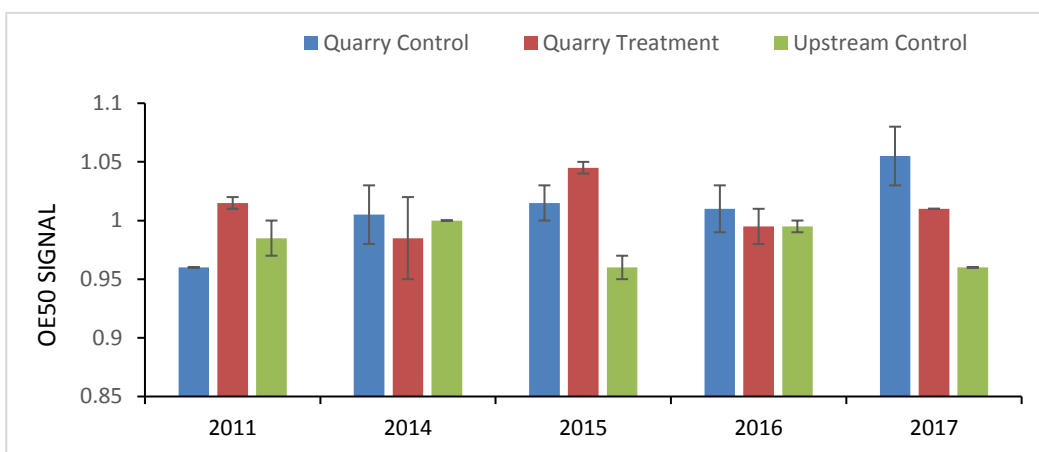


Figure 11: Mean (\pm SE) OE50SIGNAL scores within riffle habitat between Locations for each Year.

Assemblage structure

Multivariate analysis of the assemblage detected a significant temporal difference between Years irrespective of the Location (Appendix 3). Visualisation of the assemblage with PCO analysis showed that both PCO axis 1 and 2 accounted for some of the variation between the Years. Tight groupings of the 2014 and 2015 Years can be seen, while 2017 is quite dispersed and remains most similar to all previous Years. As mentioned above, the vectors indicate that the presence of the Glossomatidae family has a positive relationship with the PCO1 axis, while absence of the Parastacidae, Chironomidae/Chironominae, and Ecomidae families have a negative relationship with the PCO2 axis. The presence/absence of these species combined with Chironomidae/Orthocladiinae best explains variation in the assemblage based on the first two axis of the PCO, however none of these alone clearly distinguish differences between the Years (Figure 12Figure 5).

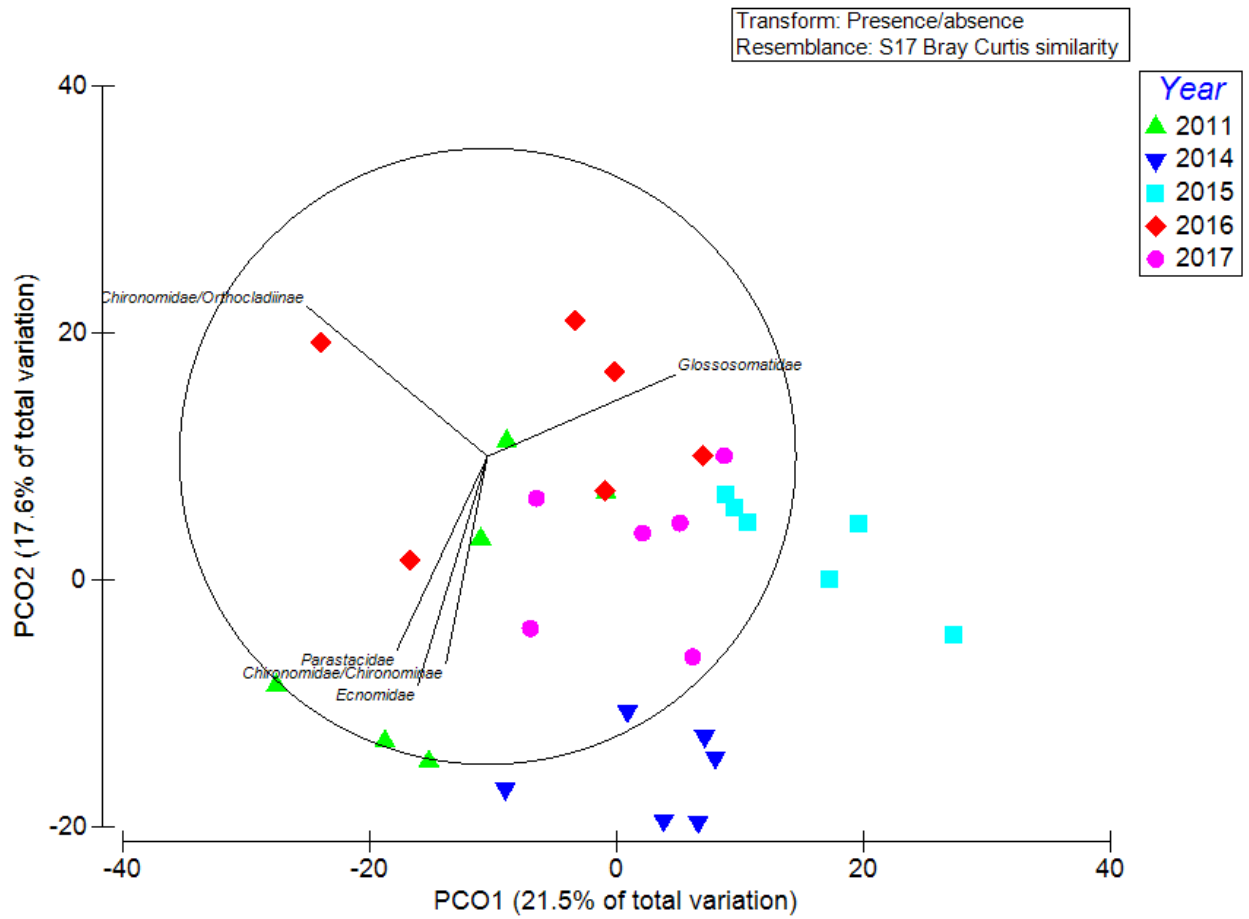


Figure 12: Figure 7: PCoA plot with vector overlays of taxa based on Spearman's Correlation ($r_2 > 0.65$) of riffle habitat assemblages for Years.

4. Discussion

4.1 Key findings

At the time of the 2017 survey, water quality and macroinvertebrate assemblages near the quarry discharge point were found to be both in good condition (in comparison to ANZECC Guideline Values and the AUSRIVAS model), and similar in quality and ecological condition to other comparable reaches of the river.

Some minor elevation in turbidity and lower than expected SIGNAL2 scores for macroinvertebrates indicates that there may be some minor impacts on habitat quality at Site 1.

The biggest driver in variability amongst macroinvertebrate assemblages in the reaches of the Coxs River surveyed in this program, appears to be those that occur through time irrespective of the Location and the quarry discharge point.

4.2 2017 Findings.

In 2017 the water quality within the reaches of the Cox River surveyed as part of this program were well within the ANZECC Guideline Values. The values collected at sites downstream of the quarry discharge point were similar to those collected in other reaches that are not influenced by the quarry's operation. In general the water quality was found to be good and did not indicate that any persistent impacts on water quality from the quarry's operation existed. One notable occurrence was an elevated level of turbidity at Site 1 near the quarry discharge point, this value was however still well within ANZECC Guideline Values, and data collected was highly variable indicating that there may have been some mobilisation of sediments when sampling or an unstable probe at the time of reading. The water quality data collected in this program only provided a 'snapshot in time' and should be interpreted with an understanding of its limitations in the detecting any pulse effects or short term impacts.

Macroinvertebrates provide strong indicators of ecological condition of freshwater streams, creeks and rivers (Chessman 2003). The AUSRIVAS sampling procedure utilises models to determine how macroinvertebrate assemblages compare with reference conditions (Turak *et al.* 2004). Data collected in 2017 indicates that the sites near the quarry discharge point are representative of reference condition for inland streams in NSW and very similar in condition to those sites nearby that are not influenced by the quarry. However SIGNAL2 scores and associated indices, were relatively low with scores that may imply moderate to severe levels of pollution. These scores were also lowest amongst the edge habitat, rather than riffle habitat but were typically consistent amongst sites irrespective of location. It is widely accepted, that streams may have low SIGNAL2 scores when yet they are in natural or good condition, due to the dominance of pollution tolerant fauna (Gooderham and Tsyrlin 2002). Of notable occurrence was a low score at Site 1, which is near the quarry discharge point, this site had the lowest SIGNAL2 score of any site. Interestingly the other site near the quarry discharge point (site 2) had one of the highest SIGNAL2 scores irrespective of location. This indicates that any impacts that may be occurring are spatially quite variable and occurring across very small spatial scales.

4.3 Spatial and temporal trends

In comparisons with water quality data collected in 2016 (AquaScience 2017), values obtained in this survey are relatively similar. One difference has been an improvement in Electrical Conductivity in the most recent survey where values were well within the ANZECC Guideline Value in comparison with 2016 when they exceeded the ANZECC Guideline Value. Electrical Conductivity provides a measure of the amount of

dissolved salts and ions in the water, which in freshwater systems can be a result of erosion and mobilisation of sediments. As a result elevated levels of Electrical Conductivity are typically reflective of recent rainfall events. It is likely that elevated levels detected in 2016 in comparison with this year's data are reflective of any differences in rainfall in the weeks before the subsequent survey. Interestingly, Site 1 was also found to have higher turbidity (albeit still low) in comparison with the other sites in 2016, which corresponds with findings in 2017. Thus, should turbidity continue to increase at this site, it may begin to exceed the ANZECC Guideline Trigger Value.

Findings from macroinvertebrate assemblage in 2017 were generally consistent with those reported in the previous survey in 2016 (AquaScience 2017). With sites typically representatives of reference or better condition based on the AUSRIVAS model, but SIGNAL2 scores and associated indices irrespective of location, remained below values that would be expected for good condition streams. Thus, it appears that typically pollution tolerant taxa dominate assemblages within the Coxs River sampled as part of this program, which may not necessarily be indicative of pollution itself. As described previously, variability in macroinvertebrate assemblage structure and associated indices remained significant across both spatial and temporal scales (AquaScience 2017). Differences across spatial scales could not be conclusively attributed to current quarry operations, while in many cases the most variability can be seen across temporal scales, which show that macroinvertebrate assemblages in the Coxs River can display variability from year to year irrespective of the quarry operations. This indicates that other pressures within the catchment of the Coxs River, such as grazing, erosion and regulation of flow are likely the most significant drivers of aquatic habitat quality.

4.4 Conclusion

In general, variability irrespective of quarry operations, has been shown throughout the entire monitoring program since 2011. For all the ecological variables examined it appears that very little of the variability detected is as a direct result of quarry operations, while the sites exhibit good water quality and support macroinvertebrate assemblages that are reflective of reference conditions for the region. Furthermore, macroinvertebrate assemblages indicate that at present the ecological health of the river within the vicinity of Austen Quarry is no different, and sometimes better, than other areas of the river not influenced by quarry operations. It is likely that any impacts that are occurring are short-term in nature and confined to small spatial scales close to the discharge point. Thus, environmental management practices used at the quarry appear to be providing suitable protection to the aquatic environment of the Coxs River.

5. References

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Appendix 1: Macroinvertebrate data

Macroinvertebrates recorded at survey sites

SITE	Quarry treatment				Upstream Control				Quarry Control			
	Site 1		Site 2		Site 4		Site 5		Site 7		Site 8	
Taxa	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle	Pool	Riffle
Turbellaria		1			1							3
Sialidae			1		6		5		1			
Corydalidae		9		6		2		2				6
Planorbidae							1					
Physidae	5		8		7		14		1	3	6	2
Corbiculidae		2		3	3			1	1	2		3
Sphaeridae	1				4	2	13		3	1		
Oligochaeta	1	5		2	5	6	9	7		3	5	13
Gripopterygidae	62	49	16	70	13	19	28	4	11	51	34	27
Pyrilidae		1				1						3
Acarina						1						
Ostracoda					7		12					2
Ceinidae	1											
Atyidae	4		9		4		5		4		4	
Parastacidae			3								1	
Dytiscidae	4		3		3		4					
Elmidae		2		7	1	15	2	5	1	6	2	4
Psephenidae		1		1		3	2			1		
Tipulidae		5		2		12	1	7		6		2
Dixidae			7		1				1			

Simuliidae		3	1	1		1		1				
Ceratopogonidae			1		1		4			1		1
Tanypodinae	1				3		1		1	2		
Orthoclaadiinae		9	2	6	10	15	2	4	2	4	5	8
Chironominae	1	2		2	14	2	15	3	5		2	3
Baetidae	3		3		18	4	21	2	2	1	4	
Leptophlebiidae		17	19	4	19	2	13	15	20	21	55	27
Caenidae	13	13	29	3	19	3	15	7	30	7	24	6
Onascigastridae	1								6	1	2	1
Mesoveliidae							1					
Micronecta/corixidae	17		7		21	1	10	4	21		2	
Veliidae	2		2				1			1		
Gerridae							1		1	1		
Corixidae							1					
Notonectidae	1		2		4		3		2			
Coenagrionidae	4		3		5		9		8		5	
Synlestidae			2		1				1		2	
Aeshnidae												
Gomphidae	1	3				3	1	3	1	3	1	1
Telephlebiidae	1	5	1	8		1					4	
Hydrobiosidae		1								2		1
Conoesucidae		14	1	5	1	7	4	12	2	29	3	6
Glossosomatidae		8		11		4	2			8		
Polycentropodidae												
Hydroptilidae							1					
Hydropsychidae		23		40		18	1	12		45	1	44
Ecnomidae									2	1	1	

Philorheithridae			3		2	1				1	5	
Philopotabidae				3		5				1		
Calamoceratidae									2			
Leptoceridae	9	6	27		3	2	13	3	6	4	23	2

Note: Raw data provided. Families with >10 animals were converted to 10 for the analysis.

Appendix 2: Statistical analysis – Edge Habitat

Univariate analysis

Name: Number of taxa
 Data type: Distance
 Selection: All
 Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)
 Fixed effects sum to zero for mixed terms
 Permutation method: Permutation of residuals under a reduced model
 Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Year	Ye	Fixed	5
Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	96.2	24.05	5.0104	0.0089	9945
Lo	2	9.6	4.8	1	0.3878	9921
YexLo	8	99.4	12.425	2.5885	0.0481	9953
Res	15	72	4.8			
Total	29	277.2				

PAIR-WISE TESTS

Term 'YexLo' for pairs of levels of factor 'Year'

Within level 'Quarry Treatment' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	0.68599	0.6558	3	0.5658
2011, 2015	0.2	1	2	0.8605
2011, 2016	0.63246	1	2	0.5861
2011, 2017	1.8856	0.3378	3	0.1989
2014, 2015	0.46852	0.6604	3	0.6833
2014, 2016	1.1767	0.6683	2	0.3689
2014, 2017	2.058	0.3331	3	0.1693
2015, 2016	0.72761	1	2	0.5482
2015, 2017	1.8	0.3349	3	0.2104
2016, 2017	1.8974	0.337	3	0.1972

Within level 'Upstream Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	2.8284	0.3358	3	0.1069
2011, 2015	1	1	1	0.4223
2011, 2016	1	0.664	3	0.4141
2011, 2017	2.2361	0.3329	3	0.1518
2014, 2015	3	0.3361	2	0.0975
2014, 2016	1.4	0.6668	2	0.2924
2014, 2017	0.44721	1	2	0.6951
2015, 2016	0.5	1	2	0.6681
2015, 2017	2	0.3292	2	0.1861
2016, 2017	1.3868	0.6686	2	0.3014

Within level 'Upstream Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	2.8284	0.3358	3	0.1069
2011, 2015	1	1	1	0.4223
2011, 2016	1	0.664	3	0.4141
2011, 2017	2.2361	0.3329	3	0.1518
2014, 2015	3	0.3361	2	0.0975
2014, 2016	1.4	0.6668	2	0.2924
2014, 2017	0.44721	1	2	0.6951
2015, 2016	0.5	1	2	0.6681
2015, 2017	2	0.3292	2	0.1861
2016, 2017	1.3868	0.6686	2	0.3014

Term 'YexLo' for pairs of levels of factor 'Location'

Within level '2017' of factor 'Year'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	2.2361	0.3304	3	0.1532
Quarry Treatment, Quarry Control	1.8974	0.3369	3	0.2042

Upstream Control, Quarry Control 1.4796 0.3359 3 0.2831

Significant differences confined to differences between treatments within years prior to 2017

Name: Signal2

Data type: Distance

Selection: All

Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)

Fixed effects sum to zero for mixed terms

Permutation method: Permutation of residuals under a reduced model

Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Year	Ye	Fixed	4
Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	3	0.19696	6.5653E-2	1.1079	0.3884	9971
Lo	2	1.0569	0.52844	8.9174	0.003	9950
YexLo	6	1.6856	0.28093	4.7406	0.0112	9957
Res	12	0.71112	5.926E-2			
Total	23	3.6505				

PAIR-WISE TESTS

Term 'YexLo' for pairs of levels of factor 'Year'

Within level 'Quarry Treatment' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2014, 2015	6.7573E-2	1	3	0.9511
2014, 2016	1.1852	0.6695	3	0.3619
2014, 2017	0.69859	1	3	0.5616
2015, 2016	1.4817	0.3393	3	0.2795
2015, 2017	0.69534	1	3	0.5619
2016, 2017	0.31713	1	3	0.7856

Within level 'Upstream Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2014, 2015	0.58889	0.6607	3	0.6129
2014, 2016	4.0611	0.323	3	0.0562
2014, 2017	0.70261	0.6673	3	0.5577
2015, 2016	2.577	0.3346	3	0.1295
2015, 2017	0.27935	1	3	0.8105
2016, 2017	4.0081	0.3387	3	0.0574

Within level 'Quarry Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2014, 2015	0.61442	0.6629	3	0.6037
2014, 2016	2.7442	0.3315	3	0.1051
2014, 2017	6.0104	0.3315	3	0.0263
2015, 2016	2.9367	0.3297	3	0.1002
2015, 2017	5.4889	0.3378	3	0.0329
2016, 2017	0.75926	0.6708	3	0.5271

Term 'YexLo' for pairs of levels of factor 'Location'

Within level '2017' of factor 'Year'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	0.2007	1	3	0.8598
Quarry Treatment, Quarry Control	1.3046	0.3286	3	0.3197
Upstream Control, Quarry Control	7.0846	0.329	3	0.0196

Name: OOSignal

Data type: Distance

Selection: All

Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)

Fixed effects sum to zero for mixed terms

Permutation method: Permutation of residuals under a reduced model

Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Year	Ye	Fixed	5
Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	0.77008	0.19252	4.4397	0.0148	9955
Lo	2	0.58201	0.291	6.7108	0.0066	9940
YexLo	8	1.3346	0.16682	3.847	0.0129	9955
Res	15	0.65045	4.3363E-2			
Total	29	3.3371				

PAIR-WISE TESTS

Term 'YexLo' for pairs of levels of factor 'Year'

Within level 'Quarry Treatment' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	1.0671	0.673	3	0.4
2011, 2015	0.74478	0.6617	3	0.5403
2011, 2016	Negative			
2011, 2017	0.55252	1	3	0.6393
2014, 2015	8.1923E-2	1	3	0.941
2014, 2016	0.80506	0.673	3	0.5153
2014, 2017	0.33668	1	3	0.7597
2015, 2016	0.61625	0.6641	3	0.5998
2015, 2017	0.35459	1	3	0.7585
2016, 2017	0.54428	1	3	0.6395

Within level 'Upstream Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	2.3076	0.3359	3	0.1447
2011, 2015	2.2555	0.3287	3	0.1542
2011, 2016	4.1317	0.3291	3	0.0527
2011, 2017	1.2382	0.6698	3	0.3328
2014, 2015	0.43879	0.6653	3	0.7019
2014, 2016	2.7997	0.332	3	0.1074
2014, 2017	1.4115	0.662	2	0.2945
2015, 2016	2.1832	0.3294	3	0.1655
2015, 2017	1.4893	0.3285	3	0.2784
2016, 2017	3.6569	0.3272	3	0.0711

Within level 'Quarry Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	4.5646	0.3289	3	0.0482
2011, 2015	5.0833	0.3355	2	0.0337
2011, 2016	1.3077	0.6714	2	0.3156
2011, 2017	1.666	0.3331	3	0.2349
2014, 2015	0.55556	1	2	0.6352
2014, 2016	6.1693	0.3331	3	0.0253
2014, 2017	8.6299	0.3306	3	0.0115
2015, 2016	8.8	0.3387	2	0.0138
2015, 2017	10.059	0.3322	2	0.0097
2016, 2017	4.2083	0.3341	3	0.0509

Term 'YexLo' for pairs of levels of factor 'Location'

Within level '2017' of factor 'Year'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	7.8414E-2	1	3	0.9433
Quarry Treatment, Quarry Control	1.3054	0.336	3	0.3245
Upstream Control, Quarry Control	4.8519	0.3347	3	0.0363

Name: OE50Signal

Data type: Distance

Selection: All

Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)

Fixed effects sum to zero for mixed terms

Permutation method: Permutation of residuals under a reduced model

Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Year	Ye	Fixed	5
Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	4.4367E-2	1.1092E-2	5.0038	0.0098	9961
Lo	2	3.3067E-3	1.6533E-3	0.74586	0.4913	9958
YexLo	8	5.7693E-2	7.2117E-3	3.2534	0.0243	9944
Res	15	3.325E-2	2.2167E-3			
Total	29	0.13862				

PAIR-WISE TESTS

Term 'YexLo' for pairs of levels of factor 'Year'

Within level 'Quarry Treatment' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	0.44721	1	2	0.7105
2011, 2015	1.0435	0.6641	3	0.4047
2011, 2016	2.2361	0.3386	3	0.153
2011, 2017	0.10847	1	2	0.917
2014, 2015	2.357	0.3332	3	0.1398
2014, 2016	2.6679	0.3273	3	0.123
2014, 2017	0.26261	1	3	0.8166
2015, 2016	1.8594	0.3388	3	0.2017
2015, 2017	1.0505	0.6719	3	0.3997
2016, 2017	2.2314	0.3306	3	0.1548

Within level 'Upstream Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	2.3426	0.3308	3	0.1422
2011, 2015	1.1625	0.6627	3	0.3696
2011, 2016	1.372	0.6737	2	0.3092
2011, 2017	1.6713	0.3321	3	0.2388
2014, 2015	0.62017	0.6653	3	0.5965
2014, 2016	1.4	0.6639	2	0.3104
2014, 2017	1.3416	0.6764	2	0.3224
2015, 2016	0.26261	1	3	0.8172
2015, 2017	0.13736	1	3	0.9049
2016, 2017	0.27735	1	2	0.8023

Within level 'Quarry Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	0.63636	1	2	0.5883
2011, 2015	0.16552	1	3	0.8834
2011, 2016	1.1672	0.6652	3	0.36
2011, 2017	2.8139	0.3235	3	0.1094
2014, 2015	1	1	1	0.43
2014, 2016	2.1667	0.3333	2	0.1645
2014, 2017	8.2	0.3251	2	0.0147
2015, 2016	1.6154	0.3325	3	0.2502
2015, 2017	5.0912	0.3332	3	0.0354
2016, 2017	1.1538	0.6702	3	0.3581

Term 'YexLo' for pairs of levels of factor 'Location'

Within level '2017' of factor 'Year'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	1.511	0.3331	3	0.265
Quarry Treatment, Quarry Control	3.7199	0.3227	3	0.063
Upstream Control, Quarry Control	3.8996	0.3355	3	0.0543

Name: OE50Taxa

Data type: Distance

Selection: All

Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)

Fixed effects sum to zero for mixed terms

Permutation method: Permutation of residuals under a reduced model

Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Year	Ye	Fixed	5
Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	0.19555	4.8888E-2	3.9855	0.0228	9956
Lo	2	3.3867E-3	1.6933E-3	0.13804	0.8691	9954
YexLo	8	9.2447E-2	1.1556E-2	0.94205	0.5071	9956
Res	15	0.184	1.2267E-2			
Total	29	0.47539				

PAIR-WISE TESTS

Term 'Ye'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	3.4509	0.0189	8444	0.0144
2011, 2015	3.6729	0.0146	9127	0.0114

2011, 2016	1.4892	0.1843	9209	0.1901
2011, 2017	3.4602	0.0161	9102	0.0147
2014, 2015	1.3685	0.2251	4687	0.2152
2014, 2016	0.62259	0.5555	8808	0.5557
2014, 2017	1.0454	0.3233	5879	0.3423
2015, 2016	1.3007	0.237	9293	0.2414
2015, 2017	0.26035	0.7896	6562	0.8013
2016, 2017	1.1181	0.3046	9233	0.3069

Multivariate analysis

PERMANOVA

Permutational MANOVA

Name: Edge Assemblage

Data type: Similarity

Selection: All

Transform: Presence/absence

Resemblance: S17 Bray Curtis similarity

Sums of squares type: Type III (partial)

Fixed effects sum to zero for mixed terms

Permutation method: Permutation of residuals under a reduced model

Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Year	Ye	Fixed	5
Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	7407	1851.8	4.3289	0.0001	9900
Lo	2	1573.4	786.69	1.8391	0.0457	9933
YexLo	8	7341	917.63	2.1452	0.0002	9851
Res	15	6416.5	427.77			
Total	29	22738				

PAIR-WISE TESTS

Term 'YexLo' for pairs of levels of factor 'Year'

Within level 'Quarry Treatment' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	1.4892	0.3309	3	0.209
2011, 2015	1.8058	0.3361	3	0.1185
2011, 2016	1.5643	0.3281	3	0.1846
2011, 2017	1.5794	0.3344	3	0.1811
2014, 2015	1.6903	0.3336	3	0.1463
2014, 2016	1.9901	0.3332	3	0.1064
2014, 2017	1.3915	0.3301	3	0.2429
2015, 2016	1.9684	0.3385	3	0.114
2015, 2017	1.0515	0.3333	3	0.4079
2016, 2017	1.6	0.3381	3	0.1906

Within level 'Upstream Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	1.4605	0.3365	3	0.2423
2011, 2015	1.5606	0.3404	3	0.1916
2011, 2016	1.7663	0.335	3	0.1362
2011, 2017	1.6899	0.3361	3	0.1547
2014, 2015	1.8296	0.3335	3	0.1526
2014, 2016	2.4412	0.3327	3	0.0661
2014, 2017	2.0323	0.3272	3	0.1004
2015, 2016	2.0257	0.3293	3	0.1004
2015, 2017	1.5981	0.334	3	0.1816
2016, 2017	2.1696	0.3339	3	0.0926

Within level 'Quarry Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	1.6799	0.3427	3	0.1667
2011, 2015	1.581	0.3349	2	0.1766
2011, 2016	1.4439	0.3379	3	0.2339
2011, 2017	1.658	0.3406	3	0.1632
2014, 2015	1.6003	0.3361	3	0.1732
2014, 2016	2.5048	0.3354	3	0.0672
2014, 2017	2.4294	0.3357	3	0.0661
2015, 2016	1.43	0.3339	3	0.2259
2015, 2017	1.8496	0.3338	3	0.1143
2016, 2017	1.1574	0.6753	3	0.3427

Term 'YexLo' for pairs of levels of factor 'Location'

Within level '2017' of factor 'Year'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	1.0281	0.6598	3	0.4256
Quarry Treatment, Quarry Control	1.0302	0.6615	3	0.4324
Upstream Control, Quarry Control	1.3716	0.3332	3	0.2452

No significant differences detected by pairwise comparisons in previous years

SIMPER

Similarity Percentages - species contributions

PCO

Principal Coordinates

Variation explained by individual axes

Axis	Eigenvalue	Individual%	Cumulative%
1	4503.7	19.81	19.81
2	3616.4	15.9	35.71
3	2990.5	13.15	48.86
4	2382.9	10.48	59.34
5	1999	8.79	68.14
6	1866.7	8.21	76.34
7	1634.8	7.19	83.53
8	1451.3	6.38	89.92
9	1272.6	5.6	95.51
10	962.4	4.23	99.75
11	731.85	3.22	102.97
12	694.64	3.05	106.02
13	579.46	2.55	108.57
14	470.36	2.07	110.64
15	329.46	1.45	112.09
16	286.11	1.26	113.35
17	207.37	0.91	114.26
18	45.127	0.2	114.46
19	9.2272	0.04	114.5
20	-29.541	-0.13	114.37
21	-124.03	-0.55	113.82
22	-208.15	-0.92	112.91
23	-284.69	-1.25	111.65
24	-335.37	-1.47	110.18
25	-361.6	-1.59	108.59
26	-428.62	-1.89	106.7
27	-438.52	-1.93	104.77
28	-498.14	-2.19	102.58
29	-587.45	-2.58	100

vectors displayed where spearman's correlation > 0.61

Appendix 3 – Statistical analysis - Riffle habitat

Univariate analysis

Name: Total Taxa
 Data type: Distance
 Selection: All
 Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)
 Fixed effects sum to zero for mixed terms
 Permutation method: Permutation of residuals under a reduced model
 Number of permutations: 9999

Factors	Name	Abbrev.	Type	Levels
	Year	Ye	Fixed	5
	Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	203.13	50.783	4.2202	0.02	9951
Lo	2	38.6	19.3	1.6039	0.2355	9948
YexLo	8	144.07	18.008	1.4965	0.2414	9954
Res	15	180.5	12.033			
Total	29	566.3				

PAIR-WISE TESTS

Term 'Ye'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	3	0.0304	6156	0.0222
2011, 2015	Negative			
2011, 2016	0.65275	0.5277	6465	0.5373
2011, 2017	1.2048	0.277	3518	0.2702
2014, 2015	3.3627	0.0235	6448	0.0173
2014, 2016	2.6015	0.048	8149	0.0406
2014, 2017	1.8162	0.1238	5967	0.1193
2015, 2016	0.80829	0.4687	6456	0.4494
2015, 2017	1.3988	0.203	2817	0.2136
2016, 2017	0.67612	0.5127	8000	0.5216

Name: Signal2
 Data type: Distance
 Selection: All
 Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)
 Fixed effects sum to zero for mixed terms
 Permutation method: Permutation of residuals under a reduced model
 Number of permutations: 9999

Factors	Name	Abbrev.	Type	Levels
	Year	Ye	Fixed	4
	Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	3	1.2638	0.42126	5.1234	0.0202	9961
Lo	2	1.1272	0.56358	6.8543	0.0111	9948
YexLo	6	1.1218	0.18697	2.274	0.1087	9941
Res	12	0.98667	8.2222E-2			
Total	23	4.4994				

PAIR-WISE TESTS

Term 'Ye'

Groups	t	P(perm)	Unique perms	P(MC)
2014, 2015	3.1296	0.0247	8089	0.0224
2014, 2016	3.9173	0.0121	8041	0.0071
2014, 2017	1.7251	0.1331	8137	0.1398
2015, 2016	0.48718	0.6012	9272	0.6426

2015, 2017 1.3178 0.2279 9296 0.2366
 2016, 2017 1.8942 0.1136 9252 0.1049

Term 'Lo'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	3.1991	0.0187	9584	0.0126
Quarry Treatment, Quarry Control	0.94159	0.3676	9831	0.3727
Upstream Control, Quarry Control	2.6436	0.0327	9820	0.0303

Name: OOSignal
 Data type: Distance
 Selection: All
 Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)
 Fixed effects sum to zero for mixed terms
 Permutation method: Permutation of residuals under a reduced model
 Number of permutations: 9999

Factors	Name	Abbrev.	Type	Levels
	Year	Ye	Fixed	5
	Location	Lo	Fixed	3

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	1.1082	0.27706	6.3211	0.0032	9954
Lo	2	1.3774	0.68869	15.713	0.0005	9940
YexLo	8	0.63148	7.8935E-2	1.8009	0.153	9951
Res	15	0.65745	4.383E-2			
Total	29	3.7745				

PAIR-WISE TESTS

Term 'Year'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	3.1721	0.0258	9222	0.021
2011, 2015	0.85147	0.4174	9350	0.4312
2011, 2016	2.6973	0.0417	9219	0.0359
2011, 2017	1.9503	0.1174	9239	0.1025
2014, 2015	2.9691	0.0314	9237	0.0214
2014, 2016	4.8999	0.0042	9215	0.0024
2014, 2017	3.7801	0.0117	9311	0.0076
2015, 2016	0.73044	0.4811	9212	0.4862
2015, 2017	0.94218	0.3712	9346	0.3816
2016, 2017	0.49405	0.6217	9339	0.636

Term 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	5.1767	0.0006	9818	0.0008
Quarry Treatment, Quarry Control	2.7751	0.0211	9805	0.018
Upstream Control, Quarry Control	3.0666	0.0139	9833	0.012

Name: OE50Signal
 Data type: Distance
 Selection: All
 Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)
 Fixed effects sum to zero for mixed terms
 Permutation method: Permutation of residuals under a reduced model
 Number of permutations: 9999

Factors	Name	Abbrev.	Type	Levels
	Year	Ye	Fixed	5
	Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	1.8133E-3	4.5333E-4	0.91275	0.4727	9924
Lo	2	5.8067E-3	2.9033E-3	5.8456	0.0145	9944
YexLo	8	1.4427E-2	1.8033E-3	3.6309	0.0164	9952
Res	15	7.45E-3	4.9667E-4			
Total	29	2.9497E-2				

PAIR-WISE TESTS

Term 'YexLo' for pairs of levels of factor 'Year'

Within level 'Quarry Treatment' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	0.84853	1	2	0.483
2011, 2015	4.2426	0.3441	3	0.0555
2011, 2016	1.2649	0.6677	2	0.3315
2011, 2017	1	1	1	0.4227
2014, 2015	1.6971	0.324	3	0.2292
2014, 2016	0.26261	1	3	0.821
2014, 2017	0.71429	1	2	0.5379
2015, 2016	3.1623	0.3334	3	0.0885
2015, 2017	7	0.3288	2	0.021
2016, 2017	1	1	1	0.4122

Within level 'Upstream Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	1	1	1	0.4285
2011, 2015	1.3868	0.6652	2	0.3016
2011, 2016	0.63246	1	2	0.5892
2011, 2017	1.6667	0.3293	2	0.2445
2014, 2015	4	0.3369	2	0.0553
2014, 2016	1	1	1	0.4241
2014, 2017	Denominator is 0			
2015, 2016	3.1305	0.3333	3	0.0899
2015, 2017	8.2318E-9	1	2	1
2016, 2017	7	0.3344	2	0.0198

Within level 'Quarry Control' of factor 'Location'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	1.8	0.3279	2	0.2157
2011, 2015	3.6667	0.3356	2	0.0671
2011, 2016	2.5	0.3311	2	0.1251
2011, 2017	3.8	0.3299	2	0.0607
2014, 2015	0.343	1	2	0.7623
2014, 2016	0.15617	1	2	0.8901
2014, 2017	1.4142	0.6711	2	0.2882
2015, 2016	0.2	1	2	0.8575
2015, 2017	1.372	0.6647	2	0.3055
2016, 2017	1.4056	0.6694	2	0.2939

Term 'YexLo' for pairs of levels of factor 'Location'

Within level '2017' of factor 'Year'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	Denominator is 0			
Quarry Treatment, Quarry Control	1.8	0.3375	2	0.2119
Upstream Control, Quarry Control	3.8	0.342	2	0.0671

significant differences confined to differences between treatments within years prior to 2017

Name: OE50Taxa

Data type: Distance

Selection: All

Resemblance: D1 Euclidean distance

Sums of squares type: Type III (partial)

Fixed effects sum to zero for mixed terms

Permutation method: Permutation of residuals under a reduced model

Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Year	Ye	Fixed	5
Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	0.1084	2.71E-2	3.0415	0.0504	9957
Lo	2	2.954E-2	1.477E-2	1.6577	0.2201	9959
YexLo	8	4.476E-2	5.595E-3	0.62795	0.7532	9951
Res	15	0.13365	8.91E-3			
Total	29	0.31635				

Multivariate analysis

PERMANOVA Permutational MANOVA

Resemblance worksheet

Name: Riffle Assemblage

Data type: Similarity

Selection: All

Transform: Presence/absence

Resemblance: S17 Bray Curtis similarity

Sums of squares type: Type III (partial)

Fixed effects sum to zero for mixed terms

Permutation method: Permutation of residuals under a reduced model

Number of permutations: 9999

Factors

Name	Abbrev.	Type	Levels
Year	Ye	Fixed	5
Location	Lo	Fixed	3

PERMANOVA table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Ye	4	9661.5	2415.4	6.4798	0.0001	9889
Lo	2	2351.5	1175.7	3.1542	0.0021	9913
YexLo	8	4001.2	500.14	1.3418	0.1171	9896
Res	15	5591.3	372.75			
Total	29	21605				

PAIR-WISE TESTS

Term 'Ye'

Groups	t	P(perm)	Unique perms	P(MC)
2011, 2014	2.5164	0.002	9433	0.0063
2011, 2015	2.5361	0.0029	9442	0.0071
2011, 2016	2.3707	0.0043	9426	0.0074
2011, 2017	2.2138	0.0032	9415	0.0154
2014, 2015	2.8669	0.0019	9421	0.0031
2014, 2016	2.9818	0.0016	9418	0.0027
2014, 2017	2.4918	0.0051	9399	0.0079
2015, 2016	2.8432	0.0015	9437	0.0046
2015, 2017	2.2852	0.0098	9418	0.0151
2016, 2017	2.3011	0.0043	9461	0.009

PAIR-WISE TESTS

Term 'Lo'

Groups	t	P(perm)	Unique perms	P(MC)
Quarry Treatment, Upstream Control	2.1412	0.006	9955	0.0098
Quarry Treatment, Quarry Control	1.7432	0.0292	9960	0.0326
Upstream Control, Quarry Control	1.5555	0.0494	9953	0.0633

PCO

Principal Coordinates

Variation explained by individual axes

Axis	Eigenvalue	Individual%	Cumulative%
1	4650.4	21.52	21.52
2	3808.9	17.63	39.15
3	3454.3	15.99	55.14
4	2620.3	12.13	67.27
5	2311	10.7	77.97
6	1713.2	7.93	85.9
7	1386.9	6.42	92.31
8	1322.7	6.12	98.44
9	1159.3	5.37	103.8
10	988.4	4.57	108.38
11	614.57	2.84	111.22
12	430.58	1.99	113.21
13	339.97	1.57	114.79
14	272.93	1.26	116.05
15	222.81	1.03	117.08
16	209.99	0.97	118.05
17	95.375	0.44	118.5
18	29.061	0.13	118.63
19	-64.704	-0.3	118.33

20	-110.03	-0.51	117.82
21	-185.15	-0.86	116.97
22	-270.83	-1.25	115.71
23	-309.14	-1.43	114.28
24	-344.01	-1.59	112.69
25	-412.02	-1.91	110.78
26	-442.94	-2.05	108.73
27	-545.58	-2.53	106.21
28	-587.68	-2.72	103.49
29	-753.16	-3.49	100

Vectors displayed where Spearman's Correlation > 0.5

Appendix 4 – Photographs



A



B

Plate 1 Site 1 (Quarry Treatment) A) Pool edge B) Riffle



A



B

Plate 2 Site 2(Quarry Treatment). A) Pool edge B) Riffle



A



B

Plate 3 –Site 4 (Upstream Control). A) Pool habitat B) Riffle habitat



A



B

Plate 4 Site 5 (Upstream Control). A) Pool habitat B) Riffle habitat



A



B

Plate 5 Site 7 (Quarry Control). A) Pool edge B) Riffle.



A



B

Plate 6 Site 8 (Quarry Control). A) Pool edge B) Riffle.

Niche Environment and Heritage

A specialist environmental and heritage consultancy.

Head Office

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All mail correspondence should be through our Head Office

Appendix J: Groundwater Monitoring Reports



Ground Doctor Pty Ltd

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24 September 2018

Hy-tec Industries Pty Ltd
Austen Quarry
391 Jenolan Caves Road
Hartley NSW 2790
rod.welsh@adbri.com.au

Attention: Mr Rodd Welsh

Dear Rodd,

**RE: JUNE 2018 GROUNDWATER MONITORING RESULTS,
AUSTEN QUARRY, HARTLEY, NSW**

Ground Doctor was engaged by Hy-tec Industries Pty Ltd (Hy-tec) to undertake the June 2018 round of baseline groundwater monitoring at the Austen Quarry, 391 Jenolan Caves Road, Hartley, NSW (the site).

1 Background Information

The Stage 2 Expansion of the Austen Quarry was approved on 15 July 2015 (development application SSD-6084). An updated site specific Water Management Plan (WMP) (Groundwork Plus, 2017) was developed as required by the conditions of consent for development. The WMP included provisions for managing both surface water and groundwater impacts at the site. The revised WMP was approved in late 2017.

The WMP required the establishment of groundwater monitoring bores at three locations around the periphery of the open pit, establishment of water level data loggers in each bore and collection of four rounds of baseline groundwater quality over two years following establishment of the monitoring bores.

The monitoring bores were established in December 2017. Ground Doctor conducted the first round of baseline monitoring in early January 2018. Water level loggers were installed into the monitoring bores at the completion of the January 2018 monitoring round.

2 Objectives

The objectives of the work undertaken was to complete the second round of baseline groundwater monitoring in accordance with the WMP.

3 Monitoring Bore Locations

The monitoring bore locations are shown on *Figure 1 of Attachment A*. Monitoring bore coordinates and details are summarised in *Table 1*. *Table 1* also presents a summary of the monitoring bore construction details.

Table 1: Monitoring Bore Construction Details

Bore ID	Easting	Northing	Approx. Surface Elevation (AHD)	Depth to Bottom (btc)	Screened Intervals (bgl)	Stickup (agl)	Depth to Water (btc)
MB01S	235245	6281077	700m	7.42m	3.7-6.7m	0.8m	4.63m
MB01D	235259	6281098	700m	29.30m	20-23m 26-28.5m	0.8m	5.49m
MB02	235915	6280398	710m	29.10m	10.5-13.5m 22.5-28.5m	0.6m	17.43m
MB03	236419	6281786	690m	25.31m	18.5-24.5m	0.4m	Dry

Eastings and northings are MGA Zone 56.

btc = below top of casing

bgl = below ground level

agl = above ground level

4 Groundwater Sampling Methodology

Each monitoring bore was gauged using an electronic dip meter prior to any disturbance of the water column. Bores were gauged on 21 June 2018. The depth to water was measured from the top of casing at each bore. MB03 was installed into a dry hole and the hole was found to be dry at the time of gauging.

The water level logger was removed from each borehole following gauging. Data stored within the water level loggers were downloaded on 22 June 2018. The water level loggers were reinstated in each monitoring bore following sampling on the morning of 22 June 2018.

Deep bores were purged dry using a bore specific disposable bailer. The deep bores were bailed dry on 21 June 2018. The wells were allowed to recover for a period of approximately 18 hours prior to sample collection. The bailer was lowered gently into the deep bores to collect samples that were free of suspended sediment. After samples had been collected additional water was bailed from the deep bores to allow measurement of field water quality parameters.

The shallow bore (MB01S) was also bailed dry prior to sampling. The well was allowed to recover for a period of approximately 20 minutes prior to sampling. Water quality parameters were measured regularly during purging of MB01S to assess the effectiveness of purging as well as being measured at the time of sampling.

A water sample was collected from a sump in the pit floor on 22 June 2018. An unpreserved sample bottle was filled directly from the ponded water in the sump. This bottle was then used to fill preserved sample bottles and samples requiring field filtering. Once sampling was complete field water quality parameters were measured. The water quality meter was placed in the pond and allowed to equilibrate for a period of approximately 10 minutes. The field water quality parameters were then recorded.

Water quality parameters were measured in Yorkeys Creek adjacent to MB01S on 22 June 2018. The water quality meter was left to equilibrate within standing water in the Creek for a period of approximately 10 minutes prior to recording the results. This location does not form part of the monitoring requirements outlined in the WMP, however, the data was collected to compliment

shallow groundwater measurements in the nearby MB01S, which may interact with water in the Creek or vice versa.

Water quality measurements were made using a YSI water quality meter hired from Airmet Scientific. The meter was calibrated prior to dispatch. A calibration record for the water quality meter is presented as *Attachment C*.

Water samples were collected into laboratory supplied bottles, each marked with the appropriate identification. Sample bottles were appropriately preserved where necessary. The samples for dissolved metals analysis were filtered in the field using disposable 45µm filters. The sampler wore disposable nitrile gloves at all times during sampling to minimise potential for cross contamination. Samples were placed into an esky with ice immediately after collection. Ice was replenished as required to ensure samples remained cool whilst in storage.

Water samples were dispatched to ALS Lithgow laboratory on the afternoon of 22 June 2018. It is understood that the samples were forwarded to the ALS Sydney laboratory for analysis on Monday 25 June 2018.

Groundwater samples collected from each monitoring bore were analysed for major cations, major anions, nutrients and dissolved metals as specified in Table 37 of the WMP (Groundwork Plus, 2017). The water samples collected from the pit were analysed for major cations, major anions, nutrients, dissolved metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs) as specified in Table 37 of the WMP (Groundwork Plus, 2017).

5 Field Observations

Field observations were recorded on bore sampling forms, which are presented as *Attachment B*. Depth to water results and measured field parameters at the time of sampling are presented in *Table 2* with data collected during the first (January 2018) monitoring round.

Table 2: Summary of Field Observations

Bore ID	Date	DTW (m btc)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
MB01S	Jan-18	4.63m	15.9	6.08	575	6.27	-11.6
	Jun-18	4.48m	16.5	5.41	343	7.41	94
MB01D	Jan-18	5.49m	16.7	2.64	1170	7.02	-22
	Jun-18	1.94m	14.7	1.56	779	7.44	85
MB02	Jan-18	17.43m	16.4	3.73	1210	7.03	-5
	Jun-18	17.54m	12.9	5.08	927	7.32	130
MB03	Jan-18	Dry	-	-	-	-	-
	Jun-18	Dry	-	-	-	-	-
Pit Water	Jan-18	-	21.9	4.30	820	7.00	8
	Jun-18	-	7.6	6.97	357	7.01	119
Yorkeys Creek	Jan-18	-	-	-	-	-	-
	Jun-18	-	6.7	12.25	353	7.93	104

6 Analytical Results

The certificate of analysis for water samples is presented as *Attachment E*.

A summary of analytical data is presented in *Table G1* of *Attachment G*. The summary table presented January 2018 and June 2018 baseline groundwater quality against preliminary triggers outlined in the WMP (Groundwork Plus, 2017).

Only two rounds of data have been collected from the site to date with the aim of establishing a baseline. There can be no meaningful interpretation of data trends in a two point data set.

Exceedances of preliminary triggers in the June 2018 monitoring round were as follows:

- The reported zinc concentration in the water sample collected from the “pit” exceeded the ANZECC (2000) threshold for 95% protection of fresh water aquatic ecosystems. Zinc was detected in the “pit” sample in both monitoring rounds, as well as in two of the groundwater monitoring bores.
- The reported cadmium concentration in the water sample collected from the “pit” exceeded the ANZECC (2000) threshold for 95% protection of fresh water aquatic ecosystems and the Australian Drinking Water (2011) threshold. Cadmium was detected in the “pit” sample in both monitoring rounds.
- The report manganese concentration in the sample collected from “MB01D” exceeded the Australian Drinking Water (2011) threshold.

There is no obvious source of metals contamination within the quarry. The observed occurrences of metals in water in the base of the quarry and in some groundwater monitoring wells is attributed to naturally occurring sources. The significance of the reported concentrations of metals at the designated monitoring points will be reassessed once four rounds of baseline data have been collected.

7 Water Level Logger Data

All water level loggers were set to record water level at 6 hour intervals commencing 12am on 12 January 2018. The water level data loggers were not vented. A barologger was deployed to record air pressure at the same recording interval to allow water level logger readings to be corrected to account for changes in air pressure.

Water level data loggers installed in MB01S, MB01D and MB02, and the barometric pressure logger installed at MB03, were downloaded on 22 June 2018.

The raw data was corrected for changes in air pressure using the barometric pressure data. The manual water level measurement collected at the time the loggers were removed from each borehole were used to convert the water level logger data to a depth to water relative to the top of the PVC bore casing.

At the completion of the monitoring round the water level loggers were redeployed in their respective boreholes.

Corrected water level data is presented graphically as *Attachment D*.

Water levels within MB01S and MB02 were relatively consistent across the monitoring period. The water level within MB01D stayed below the water level logger for a period of approximately 3 weeks after deployment owing to the slow rate of groundwater recharge following purging and sampling in January 2018. Once groundwater had risen above the data logger in MB01D the depth

to water varied by more than 3m over the monitoring period. The reason for variation in MB01D is not well understood but should become more apparent with the collection of longer term water level data.

At the time of reporting relative bore elevation data was not available. Using the observable elevation difference between MB01D and MB01S it is apparent that the standing water level in MB01D is higher than that in the nearby MB01S. This observation indicates that there is upward flow of groundwater toward Yorkeys Creek in the vicinity of those monitoring bores. That is, water within Yorkeys Creek is likely to be comprised of both surface water and groundwater discharge.

8 Estimated Groundwater Inflow to Pit

The WMP specifies that water inflow to the pit should be estimated on a quarterly basis by measuring changes to water levels within the pit during a period of fine weather and no water extraction. Ground Doctor monitored water level changes in a sump excavated into the lowest part of the pit between 9am on 21 June 2018 and 9am on 22 June 2018.

Water had not been removed from the pit for several days prior to monitoring. There had been no significant rainfall in the days leading up to the monitoring period and there was no obvious overland flow of water into the pit floor during the monitoring period.

A measuring benchmark was established in the sump at the commencement of monitoring and the height of standing water was noted to the nearest millimetre. The height of water at the benchmark was noted 24 hours later. Ground Doctor recorded a change in water level of 15mm during the 24 hour monitoring period.


A photographic log of the measurement point and the extent of the pit and location of the sump is presented as *Attachment F*.

The sump had direct connection to rock in the base of the pit that had been blasted, but not excavated. The pit floor at the time of monitoring was estimated to be approximately 230m long with an average width of 30m, giving an estimated area of approximately 6900m². The average porosity of the material in the base of the pit was assumed to be 20%. This was considered conservative as the rock had not previously been excavated so was likely to have a much lower porosity. A 15mm (0.015m) change in water levels across 6900m² area with average porosity of 20% equates to approximately 20.7m³/day (20,700L) of groundwater inflow. The estimated rate of inflow is equivalent to an annual rate of 7,555m³/yr (or 7.6ML/yr). The calculated groundwater inflow is less than Hy-Tec's licensed annual take of groundwater from the pit.

The procedure outlined in the WMP includes incorporation of evaporation data into calculations of water level changes. The monitoring methodology outlined in the WMP was developed on the assumption that water was present in an open lake at the base of the pit. The site conditions at the time of monitoring differed from those inferred when the water inflow measurement procedure was developed. Most of the water in the base of the pit is situated beneath the surface in previously blasted rock. As such, evaporation would be minimal and has been assumed to have not influenced water levels in the pit sump during the monitoring period.

If you have any questions regarding the works outlined in this report please contact the undersigned on 0407 875 302.

Kind Regards



James Morrow
Environmental Engineer
Ground Doctor Pty Ltd

2018-GD001-L2v2

Attachment A – Figure

Attachment B – Groundwater Sampling Forms

Attachment C – Water Quality Meter Calibration Record

Attachment D – Groundwater Level Charts

Attachment E – Laboratory Certificate of Analysis

Attachment F – Pit Water Level Monitoring Photographs

Attachment G – Analytical Results Summary Table

9 References

- Groundwork Plus (2017), “*Austen Quarry Water Management Plan*”, Report Number 1517_610_002_RPTO_Water Management Plan_V8, 10 October 2017

Attachment A

Figure



Figure 1

Project Name: Groundwater Monitoring Bore Installation and January 2018 Groundwater Monitoring Round

Project Number: 2018-GD001

Groundwater Monitoring Bore Locations

Ground Doctor Pty Ltd

PO Box 6278
22 Tamworth Street
Dubbo NSW 2830

ABN: 32 160 178 656
E: admin@grounddoc.com.au
W: www.grounddoc.com.au



1:9,028
0 100 200m

Attachment B

Groundwater Sampling Forms



**Austen Quarry
Groundwater Monitoring Form**

Monitoring Bore ID:	MB01S
Date:	21 and 22 June 2018

Depth to Water:	4.480m
Depth to Bottom:	7.42m
Saturated Well Depth:	2.94m
Well Volume:	6L (Saturated Well Depth x 2L)

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
10L	16.5	3.71	464	7.44	68
20L	16.5	4.67	460	7.4	91
25L	16.5	5.41	343	7.41	94

Description of Works / Observations:

Good water inflow but bailed dry after 25L removed.

Groundwater was turbid (grey-brown) during purging.

Groundwater was allowed to settle before sampling to minimise turbidity in samples.



**Austen Quarry
Groundwater Monitoring Form**

Monitoring Bore ID:	MB01D
Date:	21 and 22 June 2018

Depth to Water:	1.94m
Depth to Bottom:	29.3m
Saturated Well Depth:	27.4m
Well Volume:	55L

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
55L	14.7	1.56	779	7.44	85

Description of Works / Observations:

Well bailed dry after 55L removed (well volume)

Water was turbid grey-brown during purging, becoming siltier with increased drawdown.

Well allowed to recover overnight.

Water sampled was clear and colourless (low turbidity).



**Austen Quarry
Groundwater Monitoring Form**

Monitoring Bore ID:	MB02
Date:	21 and 22 June 2018

Depth to Water:	17.535m
Depth to Bottom:	29.10m
Saturated Well Depth:	11.6m
Well Volume:	23.2L

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
35L	12.9	5.08	927	7.32	130

Description of Works / Observations:

Well bailed dry after 35L removed (well volume plus annulus volume)

Water was turbid grey during purging, becoming siltier with increased drawdown.

Well allowed to recover overnight.

Water sampled was clear and colourless (low turbidity).



**Austen Quarry
Groundwater Monitoring Form**

Monitoring Bore ID:	MB03
Date:	21 and 22 June 2018

Depth to Water:	Well Dry
Depth to Bottom:	25.31m
Saturated Well Depth:	NA
Well Volume:	NA

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
NA					

Description of Works / Observations:

Well was dry.



**Austen Quarry
Groundwater Monitoring Form**

Monitoring Bore ID:	Pit Sump
Date:	22-Jun-18

Depth to Water:	NA
Depth to Bottom:	NA
Saturated Well Depth:	NA
Well Volume:	NA

Field Parameters:

Purge Volume (L)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	ORP (mV)
NA	7.6	6.97	357	7.01	119

Description of Works / Observations:

Water in pit sump was clear and colourless.

No hydrocarbon sheen visible on surface of pit water.

No unnatural odour noted in sampled water.

Attachment C

Water Quality Meter Calibration Form



Air-Met Scientific Pty Ltd
1300 137 067

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 09K100887

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		309865	pH 9.71
1. pH 7.00		pH 7.00		307928	pH 7.02
2. pH 4.00		pH 4.00		307927	pH 4.13
3. mV		230.8mV		306014/311901	230.8mV
4. EC		2.76mS		306341	2.76mS
5. D.O		0.00ppm		5253	0.00ppm
6. Temp		20.5°C		MultiTherm	20.2°C

Calibrated by:

SB

Sophie Boler

Calibration date:

15/06/2018

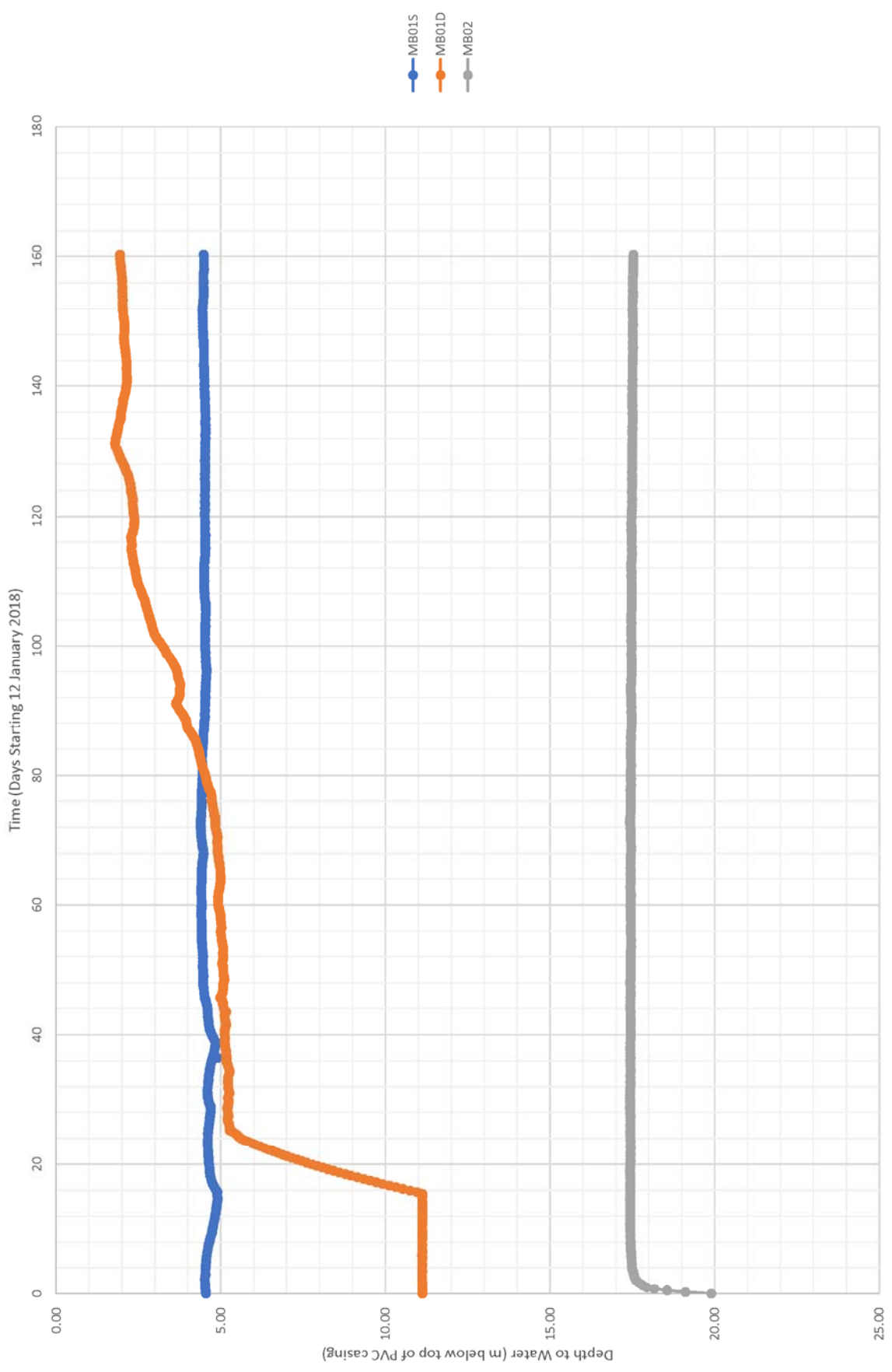
Next calibration due:

15/07/2018

Attachment D

Groundwater Level Chart

Depth to Water Vs Time



Attachment E

Laboratory Certificate of Analysis



Environmental

CERTIFICATE OF ANALYSIS

Work Order : ES1818613

Client : HY-TEC INDUSTRIES PTY LTD
Contact : MARK TAYLOR
Address : GATEWAY BUSINESS PARK 4/63-79 PARRAMATTA RD
 SILVERWATER NSW 2128
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Page : 1 of 7

Telephone : +61-2-8784 8555
Project : Hyltec Austen Quarry Baseline Groundwater Monitoring
Order number : 2201035512
C-O-C number : +61-2-8784 8555
Sampler : James Morrow
Site : +61-2-8784 8555
Quote number : EN/222/17
No. of samples received : 26-Jun-2018 08:30
No. of samples analysed : 27-Jun-2018 18:57



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Page : 2 of 7
Work Order : ES1818613
Client : HY-TEC INDUSTRIES PTY LTD
Project : Hyltec Austen Quarry Baseline Groundwater Monitoring

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+f) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Inceno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)	Client sample ID		Client sampling date / time		MB01S 22-Jun-2018 00:00 ES1818613-001 Result	MB01D 22-Jun-2018 00:00 ES1818613-002 Result	MB02 22-Jun-2018 00:00 ES1818613-003 Result	Pit 22-Jun-2018 00:00 ES1818613-004 Result	DUPB 22-Jun-2018 00:00 ES1818613-005 Result
	CAS Number	LOR	Unit	Result					
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	370	753	822	420	416	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	232	335	520	201	197	
Total Alkalinity as CaCO3	----	1	mg/L	232	335	520	201	197	
ED040F: Dissolved Major Anions									
Silicon	7440-21-3	0.05	mg/L	10.1	31.6	11.3	19.4	19.3	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	23	248	127	98	98	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	44	23	78	10	13	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	74	150	71	49	50	
Magnesium	7439-95-4	1	mg/L	13	15	31	26	25	
Sodium	7440-23-5	1	mg/L	22	59	190	25	25	
Potassium	7440-09-7	1	mg/L	1	1	2	3	3	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic	7440-38-2	0.001	mg/L	0.001	0.005	0.004	<0.001	<0.001	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Barium	7440-39-3	0.001	mg/L	0.013	0.055	0.085	0.029	0.029	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0019	0.0020	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.003	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.153	0.530	0.046	0.188	0.196	
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.004	0.002	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.003	0.002	0.001	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Strontium	7440-24-6	0.001	mg/L	0.245	0.897	3.01	0.231	0.233	
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			
Compound	CAS Number	LOR	Unit	Client sampling date / time	
EG020F: Dissolved Metals by ICP-MS - Continued					
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	<0.005	0.160
Boron	7440-42-8	0.05	mg/L	<0.05	0.27
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05
EG035F: Dissolved Mercury by FIMS					
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser					
Ammonia as N	7664-41-7	0.01	mg/L	0.05	0.08
EK057G: Nitrite as N by Discrete Analyser					
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser					
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser					
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01
EN055: Ionic Balance					
Total Anions	----	0.01	meq/L	6.36	12.5
Total Cations	----	0.01	meq/L	5.74	11.3
Ionic Balance	----	0.01	%	5.04	5.01
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons					
Naphthalene	91-20-3	1.0	µg/L	----	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	----	<1.0
Acenaphthene	83-32-9	1.0	µg/L	----	<1.0
Fluorene	86-73-7	1.0	µg/L	----	<1.0
Phenanthrene	85-01-8	1.0	µg/L	----	<1.0
Anthracene	120-12-7	1.0	µg/L	----	<1.0
Fluoranthene	206-44-0	1.0	µg/L	----	<1.0
Pyrene	129-00-0	1.0	µg/L	----	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	----	<1.0
Chrysene	218-01-9	1.0	µg/L	----	<1.0
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	----	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	----	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	<0.5
Indeno(1,2,3-cd)pyrene	193-39-5	1.0	µg/L	----	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	----	<1.0



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			
Compound	CAS Number	LOR	Unit	Client sampling date / time	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued					
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	22-Jun-2018 00:00	22-Jun-2018 00:00
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	Result	ES1818613-003
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	Result	ES1818613-004
EP080/071: Total Petroleum Hydrocarbons					
C6 - C9 Fraction	----	20	µg/L	Result	ES1818613-002
C10 - C14 Fraction	----	50	µg/L	Result	ES1818613-003
C15 - C28 Fraction	----	100	µg/L	Result	ES1818613-004
C29 - C36 Fraction	----	50	µg/L	Result	ES1818613-005
^ C10 - C36 Fraction (sum)	----	50	µg/L	Result	ES1818613-005
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
C6 - C10 Fraction	C6_C10	20	µg/L	Result	ES1818613-004
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	Result	ES1818613-004
>C10 - C16 Fraction	----	100	µg/L	Result	ES1818613-004
>C16 - C34 Fraction	----	100	µg/L	Result	ES1818613-004
>C34 - C40 Fraction	----	100	µg/L	Result	ES1818613-004
^ >C10 - C40 Fraction (sum)	----	100	µg/L	Result	ES1818613-004
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	Result	ES1818613-004
EP080: BTEXN					
Benzene	71-43-2	1	µg/L	Result	ES1818613-004
Toluene	108-88-3	2	µg/L	Result	ES1818613-004
Ethylbenzene	100-41-4	2	µg/L	Result	ES1818613-004
meta- & para-Xylene	108-38-3	2	µg/L	Result	ES1818613-004
ortho-Xylene	95-47-6	2	µg/L	Result	ES1818613-004
^ Total Xylenes	----	2	µg/L	Result	ES1818613-004
^ Sum of BTEX	----	1	µg/L	Result	ES1818613-004
Naphthalene	91-20-3	5	µg/L	Result	ES1818613-004
EP075(SIM)S: Phenolic Compound Surrogates					
Phenol-d6	13127-88-3	1.0	%	Result	ES1818613-004
2-Chlorophenol-D4	93951-73-6	1.0	%	Result	ES1818613-004
2,4,6-Tribromophenol	118-79-6	1.0	%	Result	ES1818613-004
EP075(SIM)T: PAH Surrogates					
2-Fluorobiphenyl	321-60-8	1.0	%	Result	ES1818613-004



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)	Client sample ID				
	MB01S	MB01D	MB02	Pit	DUPB
Compound	CAS Number	LOR	Unit	Client sampling date / time	Result
EP075(SIM)T: PAH Surrogates - Continued					
Anthracene-d10	1719-06-8	1.0	%	22-Jun-2018 00:00	ES1818613-001 Result 65.8
4-Terphenyl-d14	1718-51-0	1.0	%	22-Jun-2018 00:00	ES1818613-002 Result 76.6
EP080S: TPH(V)/BTEX Surrogates					
1,2-Dichloroethane-D4	17060-07-0	2	%	22-Jun-2018 00:00	ES1818613-003 Result 106
Toluene-D8	2037-26-5	2	%	22-Jun-2018 00:00	ES1818613-004 Result 100
4-Bromofluorobenzene	460-00-4	2	%	22-Jun-2018 00:00	ES1818613-005 Result 91.7



Surrogate Control Limits

Sub-Matrix: WATER			
Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2,4,6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128



Environmental

QUALITY CONTROL REPORT

Work Order : **ES1818613**

Page : 1 of 10

Client : **HY-TEC INDUSTRIES PTY LTD**
 Contact : **MARK TAYLOR**
 Address : **GATEWAY BUSINESS PARK 4/63-79 PARRAMATTA RD
 SILVERWATER NSW 2128**
 Telephone : **----**
 Project : **Hytex Austen Quarry Baseline Groundwater Monitoring**
 Order number : **2201035512**
 C-O-C number : **----**
 Sampler : **James Morrow**
 Site : **----**
 Quote number : **EN/222/17**
 No. of samples received : **5**
 No. of samples analysed : **5**

Laboratory : **Environmental Division Sydney**
 Contact : **Customer Services ES**
 Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
 Telephone : **+61-2-8784 8555**
 Date Samples Received : **26-Jun-2018**
 Date Analysis Commenced : **27-Jun-2018**
 Issue Date : **02-Jul-2018**



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories

Ankit Joshi	Inorganic Chemist	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymus = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method/Compound	Laboratory Duplicate (DUP) Report						
			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1764300)									
ES1818571-022	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1230	1360	9.59	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1757047)									
ES1818613-004	Pit	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	201	199	0.884	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	201	199	0.884	0% - 20%
ES1818579-042	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1910	1910	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1910	1910	0.00	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 1757544)									
ES1818613-001	MB01S	ED040F: Silicon	7440-21-3	0.05	mg/L	10.1	9.94	1.33	0% - 20%
ES1817359-003	Anonymous	ED040F: Silicon	7440-21-3	0.05	mg/L	1.56	1.56	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1757543)									
ES1818613-003	MB02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	127	108	16.0	0% - 20%
ES1817359-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	47	45	4.28	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1757542)									
ES1818491-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
ES1817359-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	35	36	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1757198)									
ES1818340-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	300	298	0.826	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	20	20	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	632	641	1.30	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit



Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 1757198) - continued										
ES1818574-002	Anonymous		ED093F: Calcium	7440-70-2	1	mg/L	13	13	0.00	0% - 50%
			ED093F: Magnesium	7439-95-4	1	mg/L	15	14	0.00	0% - 50%
			ED093F: Sodium	7440-23-5	1	mg/L	84	84	0.00	0% - 20%
			ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1757199)										
ES1818340-001	Anonymous		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
			EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
			EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Barium	7440-39-3	0.001	mg/L	0.114	0.113	1.14	0% - 20%
			EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.323	0.324	0.411	0% - 20%
			EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.005	0.005	0.00	No Limit
			EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
			EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
			EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
			EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
			EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
			EG020A-F: Boron	7440-42-8	0.05	mg/L	1.24	1.27	3.06	0% - 20%
			EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.12	0.00	No Limit
ES1818574-002	Anonymous		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
			EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Barium	7440-39-3	0.001	mg/L	0.029	0.029	0.00	0% - 20%
			EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.019	0.019	0.00	0% - 50%
			EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
			EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
			EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
			EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
			EG020A-F: Boron	7440-42-8	0.05	mg/L	0.09	0.10	0.00	No Limit
			EG020A-F: Iron	7439-89-6	0.05	mg/L	0.09	0.09	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1757200)										



Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1757200) - continued										
ES1818471-001	Anonymous		EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.866	0.856	1.28	0% - 20%
			EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1757202)										
ES1818613-003	MB02		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
			EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.00	No Limit
			EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Barium	7440-39-3	0.001	mg/L	0.085	0.085	0.00	0% - 20%
			EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
			EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.046	0.049	5.76	0% - 20%
			EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.002	0.002	0.00	No Limit
			EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.001	0.00	No Limit
			EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
			EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
			EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
			EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
			EG020A-F: Boron	7440-42-8	0.05	mg/L	0.27	0.28	4.23	No Limit
			EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1757201)										
ES1818477-002	Anonymous		EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1818613-004	Pit		EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1757534)										
ES1818392-002	Anonymous		EK055G: Ammonia as N	7664-41-7	0.01	mg/L	7.50	7.50	0.00	0% - 20%
ES1818636-001	Anonymous		EK055G: Ammonia as N	7664-41-7	0.01	mg/L	45.9	44.8	2.30	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1757546)										
ES1818613-001	MB01S		EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1757535)										
ES1818613-001	MB01S		EK059G: Nitrite + Nitrate as N	---	0.01	mg/L	<0.01	0.02	80.6	No Limit
ES1818701-001	Anonymous		EK059G: Nitrite + Nitrate as N	---	0.01	mg/L	0.13	0.14	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1759381)										
ES1818566-004	Anonymous		EP080: C6 - C9 Fraction	---	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
ES1818691-001	Anonymous		EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1759381)										
ES1818566-004	Anonymous		EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
ES1818691-001	Anonymous		EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1759381)										



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Method/Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1764300)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	102	87	109
				<10	293 mg/L	105	105	66	126
ED037P: Alkalinity by PC Titrator (QCLot: 1757047)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	105	105	81	111
				----	50 mg/L	94.0	94.0	70	130
ED040F: Dissolved Major Anions (QCLot: 1757544)									
ED040F: Silicon	7440-21-3	0.05	mg/L	<0.05	5 mg/L	114	114	91	123
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1757543)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	105	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 1757542)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	102	81	127
				<1	1000 mg/L	92.9	92.9	81	127
ED093F: Dissolved Major Cations (QCLot: 1757198)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	91.6	91.6	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	94.9	94.9	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	92.7	92.7	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.7	93.7	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757199)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.1	96.1	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.6	96.6	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.5	93.5	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.9	93.9	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.7	94.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.8	95.8	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.7	92.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	95.4	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.1	93.1	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.3	97.3	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	98.7	98.7	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.1	95.1	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	93.8	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	95.7	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.2	94.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	94.4	94.4	85	115



Sub-Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757199) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.4	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757200)								
EG020B-F: Silver	7440-22-4	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	99.2	81	113
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	99.6	77	119
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757202)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	96.8	80	116
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.2	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	97.7	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.2	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.5	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.8	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.3	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	93.9	82	110
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	98.2	79	113
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.3	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.9	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.5	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.1	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	95.9	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.7	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 1757201)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.3	83	105
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1757534)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	99.3	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1757546)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1757535)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.4	91	113
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1754565)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	71.0	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	70.8	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	69.7	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	72.8	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	90.9	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	71.6	64	116



Sub-Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) Report		
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)
Method Blank (MB) Report							
Laboratory Control Spike (LCS) Report							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1754565) - continued							
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	81.9	64 - 118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	80.1	63 - 118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	76.5	64 - 117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	78.3	63 - 116
EP075(SIM): Benzo(b+h)fluoranthene	205-99-2	1	µg/L	<1.0	5 µg/L	68.1	62 - 119
	205-82-3						
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	79.4	63 - 115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	79.0	63 - 117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	70.8	60 - 118
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	71.8	61 - 117
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	73.1	59 - 118
EP080/074: Total Petroleum Hydrocarbons (QCLot: 1754566)							
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	85.9	76 - 116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	99.4	83 - 109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	84.8	75 - 113
EP080/074: Total Petroleum Hydrocarbons (QCLot: 1759381)							
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	84.6	75 - 127
EP080/074: Total Recoverable Hydrocarbons - NIEPM 2013 Fractions (QCLot: 1754566)							
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	95.6	76 - 114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	96.2	81 - 111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	88.2	77 - 119
EP080/074: Total Recoverable Hydrocarbons - NIEPM 2013 Fractions (QCLot: 1759381)							
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	87.0	75 - 127
EP080: BTEXN (QCLot: 1759381)							
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	91.9	70 - 122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	90.2	69 - 123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	88.6	70 - 120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	84.9	69 - 121
	106-42-3						
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	87.3	72 - 122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	80.7	70 - 120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER		
Matrix Spike (MS) Report	Spike	Recovery Limits (%)
Matrix Spike (MS) Report	Spike	Recovery Limits (%)



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 Work Order : ES1818613
 Client : HY-TEC INDUSTRIES PTY LTD
 Project : Hyltec Austen Quarry Baseline Groundwater Monitoring

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MS	Recovery Limits (%)
Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MS	Recovery Limits (%)
Sub-Matrix: WATER								
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1757543)								
ES1817359-003	Anonymous		ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined		70 130
ED045G: Chloride by Discrete Analyser (QCLot: 1757542)								
ES1817359-003	Anonymous		ED045G: Chloride	16887-00-6	250 mg/L	107		70 130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757199)								
Anonymous								
ES1818340-002	Anonymous		EG020A-F: Arsenic	7440-38-2	1 mg/L	87.4		70 130
			EG020A-F: Beryllium	7440-41-7	1 mg/L	84.5		70 130
			EG020A-F: Barium	7440-39-3	1 mg/L	85.2		70 130
			EG020A-F: Cadmium	7440-43-9	0.25 mg/L	84.0		70 130
			EG020A-F: Chromium	7440-47-3	1 mg/L	82.3		70 130
			EG020A-F: Cobalt	7440-48-4	1 mg/L	84.7		70 130
			EG020A-F: Copper	7440-50-8	1 mg/L	86.7		70 130
			EG020A-F: Lead	7439-92-1	1 mg/L	79.8		70 130
			EG020A-F: Manganese	7439-96-5	1 mg/L	82.2		70 130
			EG020A-F: Nickel	7440-02-0	1 mg/L	85.4		70 130
			EG020A-F: Vanadium	7440-62-2	1 mg/L	85.2		70 130
			EG020A-F: Zinc	7440-66-6	1 mg/L	85.8		70 130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1757202)								
DUPB								
ES1818613-005	DUPB		EG020A-F: Arsenic	7440-38-2	1 mg/L	83.9		70 130
			EG020A-F: Beryllium	7440-41-7	1 mg/L	85.6		70 130
			EG020A-F: Barium	7440-39-3	1 mg/L	82.2		70 130
			EG020A-F: Cadmium	7440-43-9	0.25 mg/L	82.6		70 130
			EG020A-F: Chromium	7440-47-3	1 mg/L	72.8		70 130
			EG020A-F: Cobalt	7440-48-4	1 mg/L	81.2		70 130
			EG020A-F: Copper	7440-50-8	1 mg/L	82.0		70 130
			EG020A-F: Lead	7439-92-1	1 mg/L	79.2		70 130
			EG020A-F: Manganese	7439-96-5	1 mg/L	82.0		70 130
			EG020A-F: Nickel	7440-02-0	1 mg/L	82.2		70 130
			EG020A-F: Vanadium	7440-62-2	1 mg/L	81.9		70 130
			EG020A-F: Zinc	7440-66-6	1 mg/L	83.6		70 130
EG035F: Dissolved Mercury by FIMS (QCLot: 1757201)								
ES1818477-001	Anonymous		EG035F: Mercury	7439-97-6	0.01 mg/L	91.7		70 130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1757534)								
ES1818392-002	Anonymous		EK055G: Ammonia as N	7664-41-7	1 mg/L	# Not Determined		70 130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1757546)								
ES1818613-001	MB01S		EK057G: Nitrite as N	14797-65-0	0.5 mg/L	100		70 130



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 Work Order : ES1818613
 Client : HY-TEC INDUSTRIES PTY LTD
 Project : Hyltec Austen Quarry Baseline Groundwater Monitoring

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	Matrix Spike (MS) Report			
			Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1757535)						
ES1818613-001	MB01S	EK059G: Nitrite + Nitrate as N	0.5 mg/L	104	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1759381)						
ES1818566-004	Anonymous	EP080: C6 - C9 Fraction	325 µg/L	93.5	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1759381)						
ES1818566-004	Anonymous	EP080: C6 - C10 Fraction	375 µg/L	92.6	70	130
EP080: BTEXN (QCLot: 1759381)						
ES1818566-004	Anonymous	EP080: Benzene	25 µg/L	83.3	70	130
		EP080: Toluene	25 µg/L	90.6	70	130
		EP080: Ethylbenzene	25 µg/L	89.5	70	130
		EP080: meta- & para-Xylene	25 µg/L	90.8	70	130
		EP080: ortho-Xylene	25 µg/L	86.6	70	130
		EP080: Naphthalene	25 µg/L	105	70	130



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1818613	Page	: 1 of 8
Client	: HY-TEC INDUSTRIES PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MARK TAYLOR	Telephone	: +61-2-8784 8555
Project	: Hytec Austen Quarry Baseline Groundwater Monitoring	Date Samples Received	: 26-Jun-2018
Site	: ----	Issue Date	: 02-Jul-2018
Sampler	: James Morrow	No. of samples received	: 5
Order number	: 2201035512	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Page : 2 of 8
 Work Order : ES1818613
 Client : HY-TEC INDUSTRIES PTY LTD
 Project : Hyltec Austen Quarry Baseline Groundwater Monitoring

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1817359-003	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK055G: Ammonia as N by Discrete Analyser	ES1818392-002	Anonymous	Ammonia as N	7664-41-7	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: WATER

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural MB01S, MB02, DUPB	----	----	----	27-Jun-2018	24-Jun-2018	3

Outliers : Frequency of Quality Control Samples

Matrix: WATER

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date			Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation			



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 Work Order : ES1818613
 Client : HY-TEC INDUSTRIES PTY LTD
 Project : Hyltec Austen Quarry Baseline Groundwater Monitoring

Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date		Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
MB01S, MB02, DUPB	MB01D, Pt,	----	----	----	29-Jun-2018	29-Jun-2018	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
MB01S, MB02, DUPB	MB01D, Pt,	----	----	----	27-Jun-2018	06-Jul-2018	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural (ED040F)							
MB01S, MB02, DUPB	MB01D, Pt,	----	----	----	27-Jun-2018	20-Jul-2018	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
MB01S, MB02, DUPB	MB01D, Pt,	----	----	----	27-Jun-2018	20-Jul-2018	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
MB01S, MB02, DUPB	MB01D, Pt,	----	----	----	27-Jun-2018	20-Jul-2018	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
MB01S, MB02, DUPB	MB01D, Pt,	----	----	----	27-Jun-2018	20-Jul-2018	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)							
MB01S, MB02, DUPB	MB01D, Pt,	----	----	----	27-Jun-2018	19-Dec-2018	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MB01S, MB02, DUPB	MB01D, Pt,	----	----	----	27-Jun-2018	20-Jul-2018	✓



Matrix: WATER Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
			Date extracted	Due for extraction	Date analysed	Due for analysis
EK055G: Ammonia as N by Discrete Analyser						
Clear Plastic Bottle - Sulphuric Acid (EK055G)	MB01D, Pit,	22-Jun-2018	----	----	27-Jun-2018	20-Jul-2018
MB01S, MB02, DUPB						✓
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural (EK057G)	MB01D, Pit,	22-Jun-2018	----	----	27-Jun-2018	24-Jun-2018
MB01S, MB02, DUPB						✗
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser						
Clear Plastic Bottle - Sulphuric Acid (EK059G)	MB01D, Pit,	22-Jun-2018	----	----	27-Jun-2018	20-Jul-2018
MB01S, MB02, DUPB						✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons						
Amber Glass Bottle - Unpreserved (EP075(SIM))	DUPB	22-Jun-2018	29-Jun-2018	29-Jun-2018	29-Jun-2018	08-Aug-2018
Pit,						✓
EP080/071: Total Petroleum Hydrocarbons						
Amber Glass Bottle - Unpreserved (EP071)	DUPB	22-Jun-2018	29-Jun-2018	29-Jun-2018	29-Jun-2018	08-Aug-2018
Pit,						✓
Clear glass VOC vial - HCl (EP080)	DUPB	22-Jun-2018	29-Jun-2018	06-Jul-2018	29-Jun-2018	06-Jul-2018
Pit,						✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions						
Amber Glass Bottle - Unpreserved (EP071)	DUPB	22-Jun-2018	29-Jun-2018	29-Jun-2018	29-Jun-2018	08-Aug-2018
Pit,						✓
Clear glass VOC vial - HCl (EP080)	DUPB	22-Jun-2018	29-Jun-2018	06-Jul-2018	29-Jun-2018	06-Jul-2018
Pit,						✓
EP080: BTEXN						
Clear glass VOC vial - HCl (EP080)	DUPB	22-Jun-2018	29-Jun-2018	06-Jul-2018	29-Jun-2018	06-Jul-2018
Pit,						✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: **x** = Quality Control frequency not within specification ; **✓** = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count			Rate (%)		Evaluation
		QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Dissolved	ED040F	2	5	40.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	6	0.00	10.00	x	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	6	0.00	10.00	x	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Dissolved	ED040F	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Analytical Methods							
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Dissolved	EDC40F	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	EDC93F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Pheno's (GC/MS - SIM)	EP075(SIM)	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Pheno's (GC/MS - SIM)	EP075(SIM)	0	6	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	6	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2µm). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Major Anions - Dissolved	ED040F	WATER	In house: Referenced to APHA 3120. The 0.45µm filtered samples are determined by ICP/AES for Sulfur and/or Silicon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3) In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
			In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods		Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)	
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)	
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)	
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colorimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)	
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)	
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)	
TRH - Semivolatle Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)	
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)	
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)	
Preparation Methods		Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.	
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.	



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1818613

Client	: HY-TEC INDUSTRIES PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MARK TAYLOR	Contact	: Customer Services ES
Address	: GATEWAY BUSINESS PARK 4/63-79 PARRAMATTA RD SILVERWATER NSW 2128	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: mark.taylor@hy-tec.com.au	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: Hytec Austen Quarry Baseline Groundwater Monitoring	Page	: 1 of 3
Order number	: 2201033833	Quote number	: EB2017HYTIND0001 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: James Morrow		

Dates

Date Samples Received	: 26-Jun-2018 08:30	Issue Date	: 27-Jun-2018
Client Requested Due Date	: 02-Jul-2018	Scheduled Reporting Date	: 02-Jul-2018

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 7.2 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- 27/6/18: This is an updated SRN which indicates the removal of pH/EC/redox as per James as analysis was done in the field.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - ED040F Dissolved Major Anions	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG035F Dissolved Mercury	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - NT-04 Nitrite and Nitrate
ES1818613-001	22-Jun-2018 00:00	MB01S	✓	✓	✓	✓	✓	✓	✓
ES1818613-002	22-Jun-2018 00:00	MB01D	✓	✓	✓	✓	✓	✓	✓
ES1818613-003	22-Jun-2018 00:00	MB02	✓	✓	✓	✓	✓	✓	✓
ES1818613-004	22-Jun-2018 00:00	Pit	✓	✓	✓	✓	✓	✓	✓
ES1818613-005	22-Jun-2018 00:00	DUPB	✓	✓	✓	✓	✓	✓	✓

Matrix: WATER

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-07 TRH/TEXN/PAH
ES1818613-004	22-Jun-2018 00:00	Pit	✓
ES1818613-005	22-Jun-2018 00:00	DUPB	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: WATER

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator								
	DUPB	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	✗	----	----
	MB01D	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	✗	----	----
	MB01S	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	✗	----	----
	MB02	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	✗	----	----
	Pit	Clear Plastic Bottle - Natural	----	22-Jun-2018	26-Jun-2018	✗	----	----
EK057G: Nitrite as N by Discrete Analyser								
	DUPB	Clear Plastic Bottle - Natural	----	24-Jun-2018	26-Jun-2018	✗	----	----
	MB01D	Clear Plastic Bottle - Natural	----	24-Jun-2018	26-Jun-2018	✗	----	----
	MB01S	Clear Plastic Bottle - Natural	----	24-Jun-2018	26-Jun-2018	✗	----	----

HYTEC Groundwater Suite

Analyte Group	Analyte
Physical Parameters (measure in field)	EC, pH, Eh, Temperature
Dissolved Solids	Total Dissolved Solids
Major Cations	Magnesium
	Calcium
	Sodium
	Potassium
	Sulphate
Major Anions	Chloride
	Hydroxide as CaCO ₃
	Carbonate as CaCO ₃
	Bicarbonate as CaCO ₃
	Aluminium
Heavy Metals (Dissolved)	Arsenic
	Boron
	Barium
	Beryllium
	Cadmium
	Chromium
	Cobalt
	Copper
	Iron
	Lead
	Manganese
	Mercury
	Molybdenum
	Nickel
	Selenium
	Silicon
	Silver
	Strontium
	Titanium
	Vanadium
Zinc	
Nutrients	Ammonia
	Nitrate
	Nitrite

Attachment F

Pit Water Level Monitoring Photographs



Photograph of measuring post in pit sump. Taken 9am on 21 June 2018.



Photograph of measuring post in pit sump. Taken 9am on 22 June 2018.



Photograph of pit from the lookout. Photo taken at 0930am on 21 June 2018. The pit sump is visible at the far (north east) end of the pit.

Attachment G

Analytical Results Summary Table

Table G1
Baseline Analytical Data Summary - January 2018 to June 2018

	ANZECC (2000) 2000 (Fresh)	Aust. Drinking Water 2011	10/01/2018 MB01S	22/06/2018 MB01S	10/01/2018 MB01D	22/06/2018 MB01D	10/01/2018 MB02	22/06/2018 MB02	10/01/2018 PIT	22/06/2018 PIT	Units
Major Cations (mg/L)	Calcium	-	86	74	144	150	52	71	71	49	mg/L
	Magnesium	-	14	13	16	24	24	31	45	26	mg/L
	Sodium	-	23	22	95	59	200	190	26	25	mg/L
	Potassium	-	1	1	3	1	2	2	4	3	mg/L
	Sulphate	-	22	23	259	248	120	127	183	98	mg/L
	Chloride	-	43	44	58	23	68	78	9	10	mg/L
	Hydroxide as CaCO3	-	<1	<1	<1	<1	<1	<1	<1	<1	mg/L
	Bicarbonate as CaCO3	-	216	232	307	335	476	520	181	201	mg/L
	Aluminium	0.055	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/L
	Arsenic	0.013	0.01	0.003	0.001	0.005	0.003	0.004	0.004	<0.001	mg/L
Major Anions (mg/L)	Boron	0.37	<0.05	<0.05	0.33	0.32	0.32	0.27	<0.05	<0.05	mg/L
	Barium	-	2	0.015	0.08	0.055	0.055	0.085	0.052	0.029	mg/L
	Beryllium	-	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Cadmium	0.0002	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0088	0.0019	mg/L
	Chromium	0.001	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Cobalt	-	-	<0.001	<0.001	0.002	0.003	<0.001	0.003	<0.001	mg/L
	Copper	0.0014	2	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Iron	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/L
	Lead	0.0034	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Manganese	1.9	0.5	0.123	0.153	0.353	0.53	0.038	2	0.188	mg/L
Heavy Metals (Dissolved) (mg/L)	Mercury	0.6	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/L
	Molybdenum	-	0.05	<0.001	0.03	0.004	0.009	0.002	0.004	<0.001	mg/L
	Nickel	0.011	0.02	0.001	<0.001	0.018	0.003	0.003	0.008	0.001	mg/L
	Selenium	0.005	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/L
	Silicon	-	-	9.15	10.1	24.4	31.6	9.8	15.2	19.4	mg/L
	Silver	0.00005	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	mg/L
	Strontium	-	-	0.208	0.245	0.897	0.897	3.01	0.288	0.231	mg/L
	Titanium	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/L
	Vanadium	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/L
	Zinc	0.008	-	0.03	<0.005	<0.005	0.006	<0.005	0.443	0.16	mg/L
Nutrients (mg/L)	Nitrate*	10 (asN)	0.05	<0.01	0.08	<0.01	<0.01	<0.01	4.45	0.48	mg/L
	Nitrite	None	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	mg/L
	Ammonia	0.9	0.03	0.05	0.03	0.02	<0.01	0.08	0.4	0.05	mg/L
	TRH	-	-	-	-	-	-	-	<EQL	<EQL	ug/L
Hydrocarbons (ug/L)	Benzene	950	-	-	-	-	-	-	<1	<1	ug/L
	Toluene	-	800	-	-	-	-	-	<2	<2	ug/L
	Ethylbenzene	-	300	-	-	-	-	-	<2	<2	ug/L
	Xylene	200	600	-	-	-	-	-	<2	<2	ug/L
	Naphthalene	16	-	-	-	-	-	-	<5	<5	ug/L
	Benzo(a)pyrene	-	0.01	-	-	-	-	-	<0.5	<0.5	ug/L

Appendix K: Pumping Records

11/12/15

Meter Reading 006810^{m³}
Pumping from Cox's River
to EPL point 11
Dam 5
River level standard
Started pumping 6:30am
2mm Overnight Rain



11/12/15

Meter Reading 007832^{m³}
Pumping from Cox's River
to EPL point 11
Dam 5
River level standard
started pumping 6:30am
No Rain



24/7/17

Meter Reading 008104^{m³}
Pumping from Cox's River
to EPL point 11
Dam 5
River level standard
Started pumping 11:30am
No Rain



25/7/17

Meter Reading 008590 m³
 Pumping from Cois River
 to EPL point 11
 Dam 5
 River Level standard
 No Rain



26/7/17

Meter Reading 009175 m³
 Pumping from Cois River
 to EPL point 11
 Dam 5
 River level standard
 Overnight Rain
 Approx 2mm



27/7/17

Meter Reading 009737 m³
 Pumping from Cois River
 to EPL point 11
 Dam 5
 River level standard
 No Rain



1/3/17

Meter Reading 009882 m³
pumping from Cois River
to EPL point 11
Dom 5
River level standard
Approx 7mm 31/2/17
Stand pump at 7am



2/3/17

Meter Reading 010425 m³
pumping from Cois River
to EPL point 11
Dom 5
River level standard
No Rain



3/3/17

meter reading 010512 m³
pumping from Cois River
to EPL point 11
Dom 5
River level standard
No Rain
Starting to Rain at
5pm



6/8/17

Meter Reading 010897 m³
Pumping from Cox River
to EPL Point 11

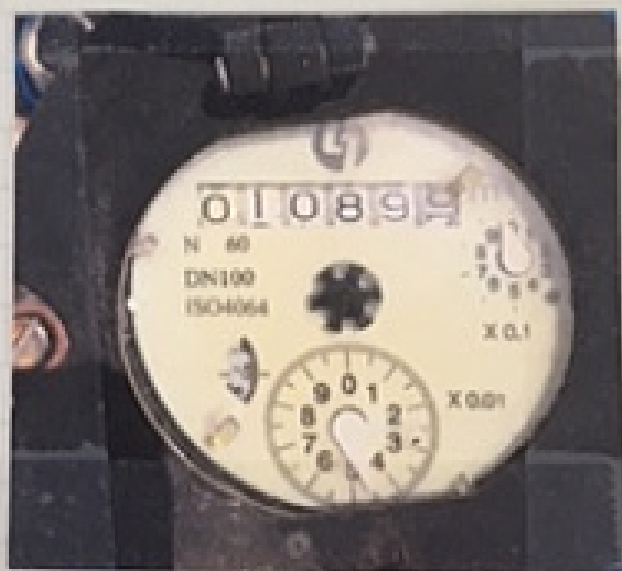
Dom 5
River level standard
Rain from 5pm 3/8/17
pump off at 7am 4/8/17
14-5mm overnight rain



12/9/17

Meter Reading 010897 m³
Pumping from Cox river
to EPL Point 11

Dom 5
River level slightly
Lower than standard
Started pumping 12-15pm
Very Dry windy conditions
Day time temp 23°C



13/9/17

Meter Reading 011777 m³
Pumping from Cox River
to EPL point 11

Dom 5
River level slightly
Lower than standard
No rain
Hot windy conditions
day time temp 25°C



14/9/17

Meter Reading 12717 m³
Pumping from Cox's River
to EPL point 11

Dam 5
River Level \nearrow Lower
standard
Cold temp around 8°C

Pump off at 10pm



15/9/17

Meter Reading 13320 m³
Pumping from Cox's River
to EPL point 11

Dam 5
Until 10pm 14/9/17
photo taken 15/9/17 Sam



19/9/17

Meter Reading 15117 m³
Pumping from Cox's River
to EPL Point 1

Dam 1
photo taken 19/9/17 Tom
River level Lower than
Standard
Temp around 20°C



21/3/17

Meter Reading 17453 m³
Pumping from Cox's River
To EPL point 11
Dam 5
River level lower than
normal - Photo taken 7am
Temp around 20°C



16/10/17

Meter Reading 18649 m³
Pumping from Cox's River
to EPL point 11
Dam 5
River level lower than
Normal - No Rain
Pump running from 2pm to 9pm
Temp around 20°C
clear sunny day



7/10/17

Meter Reading 18930 m³
Pumping from Cox's River
to EPL point 11
Dam 5
River level lower than
Normal - No Rain
Temp around 15°C
overcast day
pump started 7am 17/10/17



13/10/17

Meter Reading 19849 m³
Pumping from Cois River
to EPL point 11
Dam 5
River level lower
than normal - No Rain
Temp around 25°C
No Rain

pump run from 7am 17/10/17
running 24hrs a day



20/10/17

Meter Reading 20823 m³
Pumping from Cois River
To EPL point 11

Dam 5
River level standard to
lower than normal

Raining
temp around 15°C
pump off 9pm 20/10/17

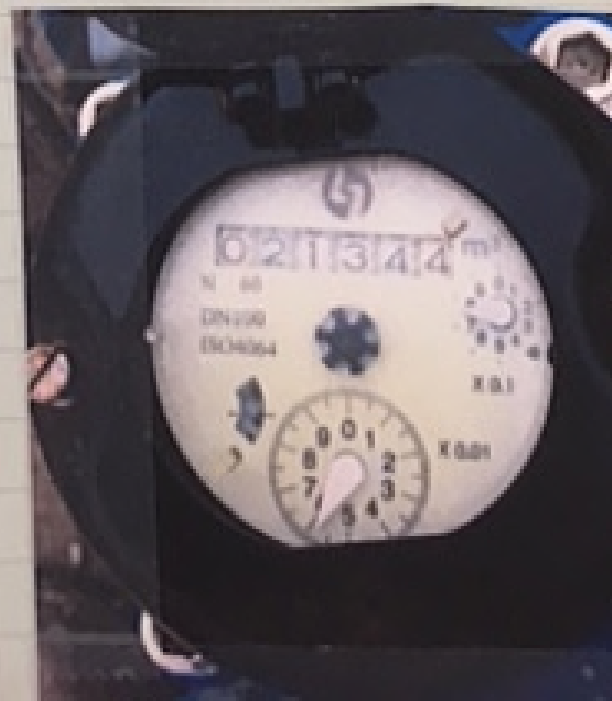


21/10/17

Meter Reading 21344 m³
Pumping from Cois River
to EPL point 11

Dam 5
River level high
Overnight Rain (40mm)
temp around 15°C

pump off 9pm 20/10/17
photo taken 7am 21/10/17



WATER EXTRACTION LOG BOOK

Water Access Licence 25616 requires that a log book be maintained to accurately record water pumped from the Coxs River. Water Access Licence 25616 permits extraction of 20ML (20 shares) over a 12-month period. Water levels in the Coxs River (Island Hill Gauge 212045) may be identified from the Department of Industry - Water website or from the Water Liver app.



Date:	21-6-18
Location / Destination:	Coxs to EPL point 11
Flow Level at the Island Hill gauge (212045) (rising/falling)	19ml falling
Meter reading at start:	21344 m ³
Meter reading at finish:	22086 m ³
Total water extracted:	742 m ³
Water Extracted to date (July to June)	13240 m ³
Duration of pumping and pump capacity:	start - 7am finish - 5pm 4000L/hr
Weather observations:	frost / fine



Date:	22-6-18
Location / Destination:	Coxs to EPL point 11
Flow Level at the Island Hill gauge (212045) (rising/falling)	25ml Rising
Meter reading at start:	22086 m ³
Meter reading at finish:	22510 m ³
Total water extracted:	424 m ³
Water Extracted to date (July to June)	13664 m ³
Duration of pumping and pump capacity:	start 7am finish 5pm 4000L/hr
Weather observations:	frost / fine



Date:	25-6-18
Location / Destination:	Coxs to EPL Point 11
Flow Level at the Island Hill gauge (212045) (rising/falling)	20 ML falling.
Meter reading at start:	22510 m ³
Meter reading at finish:	22969 m ³
Total water extracted:	459 m ³
Water Extracted to date (July to June)	14123 m ³
Duration of pumping and pump capacity:	start 7am finish 9pm 4000 LM
Weather observations:	frost / fine



WATER EXTRACTION LOG BOOK

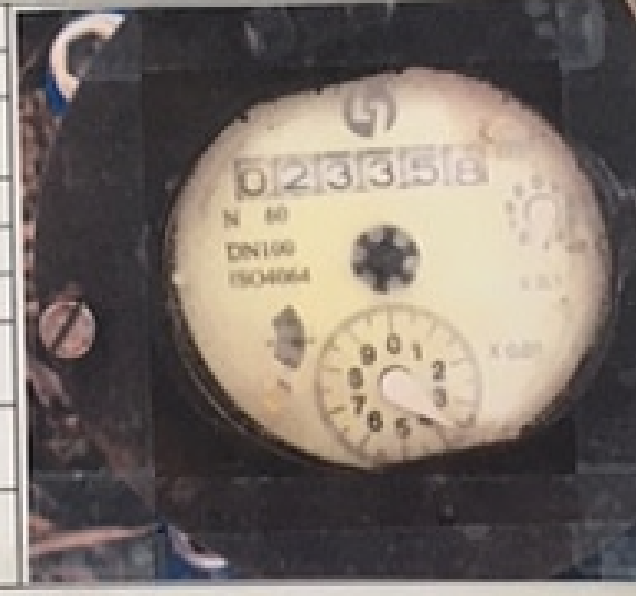
Water Access Licence 25616 requires that a log book be maintained to accurately record water pumped from the Coxs River. Water Access Licence 25616 permits extraction of 20ML (20 shares) over a 12-month period. Water levels in the Coxs River (Island Hill Gauge 212045) may be identified from the Department of Industry - Water website or from the Water Lver app.



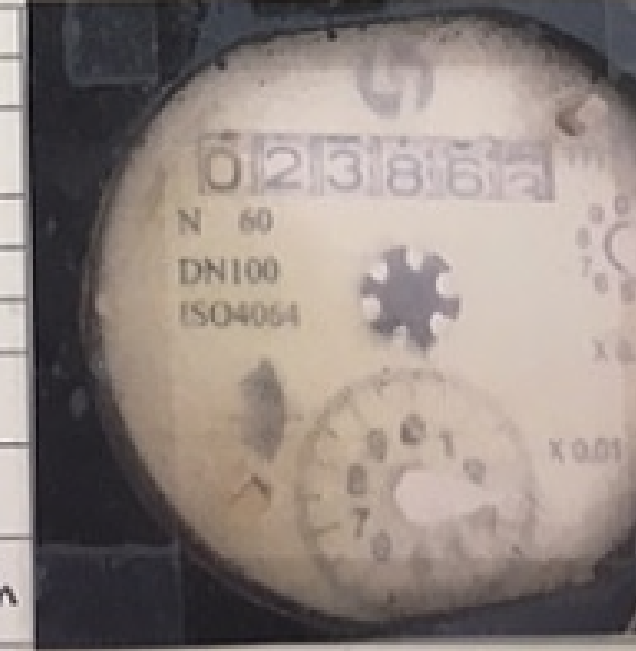
Date:	26-6-18
Location / Destination:	coxs to EPL Point II
Flow Level at the Island Hill gauge (212045) (rising/falling)	21ml Rising
Meter reading at start:	22969 m ³
Meter reading at finish:	23358 m ³
Total water extracted:	389 m ³
Water Extracted to date (July to June)	14512 m ³
Duration of pumping and pump capacity:	start - 11am finish - 9pm
Weather observations:	fine



Date:	27-6-18
Location / Destination:	coxs river to EPL II
Flow Level at the Island Hill gauge (212045) (rising/falling)	18ml falling
Meter reading at start:	23358 m ³
Meter reading at finish:	23863 m ³
Total water extracted:	505 m ³
Water Extracted to date (July to June)	15017 m ³
Duration of pumping and pump capacity:	start - 8am. finish - 9pm
Weather observations:	Overcast



Date:	28-6-18
Location / Destination:	coxs to EPL point II
Flow Level at the Island Hill gauge (212045) (rising/falling)	21ml Rising
Meter reading at start:	23863 m ³
Meter reading at finish:	24423 m ³
Total water extracted:	560 m ³
Water Extracted to date (July to June)	15577 m ³
Duration of pumping and pump capacity:	start - 7am finish - 9pm
Weather observations:	Light Overnight Rain



WATER EXTRACTION LOG BOOK

Water Access Licence 25616 requires that a log book be maintained to accurately record water pumped from the Coxs River. Water Access Licence 25616 permits extraction of 20ML (20 shares) over a 12-month period. Water levels in the Coxs River (Island Hill Gauge 212045) may be identified from the Department of Industry - Water website or from the Water Lifer app.



Date:	29-6-18
Location / Destination:	coxs to EPL point II
Flow Level at the Island Hill gauge (212045) (rising/falling)	25mL Rising
Meter reading at start:	24423 m ³
Meter reading at finish:	24916 m ³
Total water extracted:	493 m ³
Water Extracted to date (July to June)	16070 m ³
Duration of pumping and pump capacity:	start 7am finish 7am
Weather observations:	Overcast



Date:	8/8/18
Location / Destination:	coxs to EPL point II
Flow Level at the Island Hill gauge (212045) (rising/falling)	16 mL Falling
Meter reading at start:	24916 m ³
Meter reading at finish:	25762 m ³
Total water extracted:	846 m ³
Water Extracted to date (July to June)	846 m ³
Duration of pumping and pump capacity:	start 7am 8/8/18 finish 7am 9/8/18
Weather observations:	Windy - Cold.



Date:	10/8/18
Location / Destination:	coxs to EPL II
Flow Level at the Island Hill gauge (212045) (rising/falling)	22mL Rising
Meter reading at start:	25762 m ³
Meter reading at finish:	26717 m ³
Total water extracted:	955 m ³
Water Extracted to date (July to June)	1801 m ³
Duration of pumping and pump capacity:	start 7am 10/8/18 finish 7am 11/8/18
Weather observations:	fine



Appendix L: Land Works Quarry Revegetation Report



Hy-Tec Austen Quarry Revegetation

Ground work completed in April, May and June of 2018

Scope

Skillset Environment Land Works were engaged by Hy-Tec Austen Quarry at Hartley to install 1340 plants during the 2018 autumn planting season. All plants were grown at Lithgow District Community Nursery using local provenance seed. The planting plan included installing 50 *Casuarina* along the Cox's River, 35 mixed native plants along the Northern Ridge, 335 mixed native plants on the Overburden Site, 630 *Eucalyptus pulverulenta* at the Offset Site, and 280 along the Northern and Western Quarry Highwalls.

Method

Experienced and qualified bush regeneration and ecology staff implemented revegetation activities to meet the Austen Quarry revegetation requirements. Revegetation using native tube stock was completed in autumn to ensure that seedlings had enough time to establish before winter with future planting planned to take place in early spring. Revegetation planning should also take into account short and long-term rainfall and temperature forecasts.

Land Works crews established the project site and marked out planting locations using hardwood stakes and flagging tape. The arrangement of plants were as random as possible and mimicked the natural distribution of surrounding vegetation or be similar to historical vegetation composition and density. Seedling tubestock were placed into a bucket with water and tree tonic solution to soak. Holes are dug using an auger or shovel with a depth that plants are 50mm below the ground level. Any glazing of surrounding soil during the auguring process must be broken or disturbed to ensure that plants don't encounter root issues. Water crystals, mycorrhiza fungi and 1 native fertiliser tablet are mixed into the soil at the bottom of the hole. One litre of water is poured into the hole and allowed to soak in. Lower branches of the seedling may need to be trimmed or removed if it prevents the individual from being planted properly. The plant is placed into the hole and backfill with softer soil, any clods or rocks were left out of the backfill as it may cause air pockets and dry roots out. Once hole is half filled additional water was poured to remove any air pockets, process was repeated until soil reached the top of the hole. Once planted surrounding soil was smoothed out into a dish shape so that water will pool around the stem of the plant. Tree tonic solution was mixed with 4 litres of water and apply to each plant.

Planting conditions were extremely favourable, however planting should not be completed on days hotter than 35°C. If the day during planting and days after are above 30°C a second watering should be completed 2 days after installation. Tree guards and weed mats were installed on all tubestock plants. Mulch may be applied around each plant at a depth of 100mm for moisture retention, with lack of organic mulch rocks and sticks were placed around the guard of each plant. Maintenance and watering of revegetation should be completed monthly if conditions are preferable, during extended dry periods it is advised plants are watered fortnightly. Weeds within and around guards should be controlled to minimise competition and increase seedling growth rate.

Results

Fifty (50) *Casuarina cunninghamiana* were planted along the Cox's River at Glenroy Cottages and Campground. The planting will create habitat for riparian fauna while also sheltering the property from road noise.



Thirty five (35) mixed plants were installed across the Northern Ridge Line, species included *Eucalyptus pulverulenta*, *Eucalyptus mannifera*, *Eucalyptus dives*, *Eucalyptus bridgesiana*, *Acacia falciformis*, and *Acacia dealbata*. This corridor planting will replace old *Acacia dealbata* planting and connect two areas of natural woodland. The planting will also provide a visual screen for neighbouring properties.



Three hundred and thirty five (335) mixed plants were installed across the Overburden Site, species included *Eucalyptus pulverulenta*, *Eucalyptus mannifera*, *Eucalyptus dives*, *Eucalyptus bridgesiana*, *Acacia falciformis*, and *Acacia dealbata*. This corridor planting will rehabilitate a previously quarried area with local provenance species providing habitat, soil stabilisation, and nutrient cycling.



Six hundred and thirty (630) *Eucalyptus pulverulenta* were installed across the Offset Site. This offset planting will provide a host of ecosystem services including but not limited to flora and fauna habitat, soil stabilisation, and nutrient cycling. This planting will also help preserve the *Eucalyptus pulverulenta* threatened species.



One hundred and forty (140) mixed plants were installed across the Northern Quarry Highwall Site, species included *Eucalyptus pulverulenta*, *Eucalyptus mannifera*, *Eucalyptus dives*, *Eucalyptus bridgesiana*, *Acacia falciformis*, and *Acacia dealbata*.



One hundred and fifty (150) mixed plants were installed across the Western Quarry Highwall Site, species included *Eucalyptus pulverulenta*, *Eucalyptus mannifera*, *Eucalyptus dives*, *Eucalyptus bridgesiana*, *Acacia falciformis*, and *Acacia dealbata*. This corridor planting will rehabilitate a previously quarried area with local provenance species providing habitat, soil stabilisation, and nutrient cycling. This planting will also provide a screen for neighbouring residents.



Conclusion

The 2018 autumn planting session at HyTec was successful with all plants being installed with the Land Works scientific method. All tubestock were in great health when planted and with consistent watering, maintenance and monitoring will grow well and provide considerable habitat and ecosystem services.

A revegetation condition assessment methodology has been developed by Skillset Environment Land Works to accurately score the health condition of individual plants. This methodology will be implemented at HyTec Austen Quarry Hartley to achieve the best environmental outcome for all revegetation sites. The collection of plant condition data will allow Land Works to understand how plants are responding to post planting and how to best maintain them. The assessment also picks up specific influences and impacts (browsing, frost, dehydration, nutrient deficiency, and soil composition) that may cause a reduced health/condition score. Plants are rated 3 for healthy, 2 for moderately healthy, 1 for stressed and 0 for dead. This method allows an index calculation for individual species and the entire site which will be tracked over the life of the revegetation contract. It will allow Austen Quarry and Land Works to gain greater understanding of how species and revegetation sites are responding every six months.

Skillset Environment Land Works plan to return in spring 2018 to complete additional planting. This will provide an opportunity to complete plant condition assessments and replace any individuals that may have not survived.