Environmental
Compliance
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Hy-Tec Industries Pty Ltd-
Adelaide Brighton Limited

Environmental Management Report
Austen Quarry
Via Hartley

Reporting Period: 1st January to 15th September 2016

Prepared by:

VGT Pty Ltd

in Conjunction with:

Adelaide Brighton Limited

Hy-Tec Industries Pty Ltd-
Adelaide Brighton Limited

Environmental Management Report
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Via Hartley

Reporting Period: 1st January to 15th September 2016

Prepared by:	
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	Tara O'Brien	Date: 30/11/2016
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Acronyms and Terms Used Throughout the Report

Through this document, a number of Acronyms and reference terms are frequently used. To assist the reader, the following lists are provided.

ACRONYMS	
ABL	Adelaide Brighton Limited
AHD	Australian Height Datum
DA 103/94	Development Consent No. 103/94
SSD 6084	State Significant Development 6084
dBL	Decibels linear
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EMR	Environmental Management Report
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
REMP	Rehabilitation and Environmental Management Plan
tPA	Tonnes per annum
VMP	Vegetation Management Plan

Terms

Extraction Area: A 12Ha area designated for the extraction of rhyolitic material during stage one of the development

New Resource and Overburden Placement Area: A 26Ha area designated for the extraction of rhyolitic material and overburden placement during Stage 2 of the development.

Overburden Emplacement (stage 1): A 7.4Ha area current being used for the storage of overburden material sourced from the extraction area.

Processing Area: A 5 Ha constructed hardstand area adjacent to Cox River designed for the secondary and tertiary crushing and screening of the extracted product.

Stockpile Area: A 5Ha constructed hardstand area adjacent to Cox River and the Processing area where the processed material is stored for haulage offsite.

Quarry Access: Road constructed between the processing and extraction area.

Site Access Road: A sealed road constructed between Jenolan Caves Rd and the processing area.

Visual Bund: Vegetated bund constructed to provide a visual screen from vantage points to the North and West

Section 1. Introduction

1.1. Background, Objectives and Report Scope

Consent approval was first awarded to Aus-10 Rhyolite Pty Ltd during March 1995 for the establishment of a hard rock quarry and associated processing area. This consent allowed for the extraction of rhyolitic material for a period of 20 years from the date of endorsement. In 2014, consent DA 103/94, was modified to allow the extraction of two additional benches at 715m and 700m AHD.

On the 15th of July 2015 consent SSD 6084 was issued to the Austen (Hartley) Quarry. The consent allows for the continued extraction of hard rock material and the extension of the quarry into areas of the newly approved reserves. As a requirement of Schedule 3 of the consent, the following Environmental Management Plans (EMP) have been prepared and submitted to the DPE describing the environmental management strategies to be implemented during Stage 2 of development.

Stage 2 Environmental Management Plans:

1. Noise Management Plan
2. Blast Management Plan
3. Air Quality Management Plan
4. Water Management Plan
5. Traffic Management Plan
6. Landscape and Rehabilitation management Plan

With the submission of these EMP documents, consent has thus been activated however, the physical commencement of Stage 2 operations of the quarry as approved under SSD 6084 has not yet occurred. Operations upon the site have continued to be conducted under the council DA 103/94 and its approved environmental management plans/strategies and will continue to do so after the surrender of the Council Consent on the 15th of September until the above mentioned “Stage 2 Environmental Management Plans” have been approved by the DPE as per Condition 16, Schedule 2 of SSD 6084. (*See Appendix E*).

As operations under SSD 6084 are yet to commence, this report has been prepared as per the conditions of Lithgow City Council DA 103/94 for the period of 1 January 2016 to 15 September 2016 as this Council consent was still operating during this time and continues to operate as per approved plans as per Condition 16 of schedule 2 of SSD 6084.

This 2016 EMR has been prepared in accordance with Conditions 7(a), 18(d) and 18(e) of Development Consent No. 103/94 (DA 103/94) for the Austen Quarry with consideration of the relevant elements of SSD – 6084.

The objectives of this report are to:

- Provide a summary of all quarry-related activities undertaken during the reporting period;
- Review compliance with the conditions of the development consent, report all complaints concerning operation of the quarry during the reporting period and summarise actions taken;
- Report and interpret environmental monitoring results;
- Report on specific environmental management activities during the reporting period;
- Review the effectiveness of environmental management;

- Present a Plan of Management for the reporting period;
- Review of DPE December 2015 Audit summary issued as DPE Audit Action Plan March 2016;
- Review of DPE letter of 3 November 2016.

Hy-Tec Industries predict that physical commencement of Stage 2 of quarry operations consented under SSD 6084 will commence during the upcoming reporting period. Therefore, this report will be the final submission to council under DA 103/94 though future DPE annual returns will be copied to Council.

1.2. Mine Contacts

Table 1. Mine Contacts

Contact	Daniel Reed	Rod Welsh	Lee Attard	Darryl Thiedeke	Greg Thomson
Title	Strategy and Business Development Analyst	Austen Quarry Production Manager	Quarry Operations Manager NSW	National Planning and Development Manager	Principal Geologist
Address	PO Box 6770, Silverwater NSW, 1811	391 Jenolan Caves Road, Hartley NSW 2790	PO Box 6770, Silverwater NSW, 1811	PO Box 6770, Silverwater NSW, 1811	4/30 Glenwood Dr, Thornton NSW 2322
Mobile	0428 688 895	0418 292 843	0427 166 152	0409 652 022	0428 279 023
Phone	(02) 9647 2866	02 6355 0268			(02) 4082 6412
Email	Daniel.Reed@Hy-Tec.com.au	rod.welsh@hy-tec.com.au	Lee.Attard@Hy-Tec.com,.au	Darryl.Thiedeke@adbri.com.au	greg@vgt.com.au

1.3. Site Location

The Austen Quarry 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 Austen (Hartley) Quarry is situated on land categorised as RU1: Primary Production.

The Austen Quarry is consisted of the following components and are displayed on *Figure 2*;

- Extraction process area (12 Ha);
- Future extraction reserves and overburden placement area (26 Ha);
- Visual bund constructed to partially shield the visibility of extraction;
- Operation area;
- Processing area adjacent to Coxs River (5 Ha);
- Stockpile Area (5 Ha);
- 3.5 km sealed road linking Jenolan Caves Road and the processing area and a Pit access road, 1.2 km in length for equipment access linking the extraction and processing areas; and
- Surface water management structures adjacent to the road.

1.4. Quarry Operations

The rhyolitic material is extracted by drilling and blasting, i.e. explosives loaded in holes drilled within the extraction area are detonated causing fracturing and fragmenting of the rock into smaller manageable sizes. The blasted material is loaded to a primary crusher within the extraction area and the crushed material passed through a scalping plant and transferred to the processing area via a conveyor system. The use of the Quarry Access Road, which has been previously used to transport the rhyolitic material from the extraction area to a temporary crushing plant on the processing area, had been restricted to the movement of vehicles and equipment to the extraction area. Traffic management and signage has been developed to specify the gear selection and other recommendations for future use by loaded haul trucks. The Quarry Access Road also forms an integral part of the emergency management and recovery plan.

From the processing area, where the secondary crushing and screening plant processes the primary crushed product into various rhyolitic and sand products, the quarry products are transported in road-registered trucks to Jenolan Caves Road via a weighbridge and the Site Access Road.

The quarry produces high quality aggregate and crushed rock for sale to regional and Sydney markets. Production commenced in 2005, with output to rise to over 1 Million TPA as the quarry continues to develop. It is expected, however, that there may be periods of higher or lower production, consistent with the fluctuations in the local and regional demand and the progressive depletion of other hard rock resources in the Sydney region.

The resource of the Austen Quarry has inferred total reserves estimated at between 40 and 100 million tonnes (Mt). Of this, there are proven reserves of 40+Mt. The initial quarry plan provided for the extraction of almost 9.5Mt over a 20 year period at an approved production rate of over a million tonnes per annum. With the Stage 2 approval being granted July 2015, the quarry can produce volumes of up to 1.1 million tonnes of product for sale under the SSD 6084 approval till the 30th June 2050. Actual production and sales will depend on the market forces of supply and demand.

1.5. Reporting Period

This EMR covers the period 1st of January to the 15th of September 2016. As stated, this Environmental Management Report will be the last under DA 103/94, all following reports will be submitted under SSD 6084 and will report on quarry activities as per the consents requirements.

Plan of:	Austen Quarry Environmental Management Report 2016 - Location Plan	***Location:***	Off Jenolan Caves Road, Hartley, NSW	***Source:***	Google Map - Image Date 06/10/2015 & Google Maps 2015	***Our Ref:***	3265_HY_H_EMR16_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 26/08/2016	***Client:***	Hy-Tec Industries Pty Ltd - Adelaide Brighton Limited	***Contour Interval:***	N/A	***Office:***	Thornton

N

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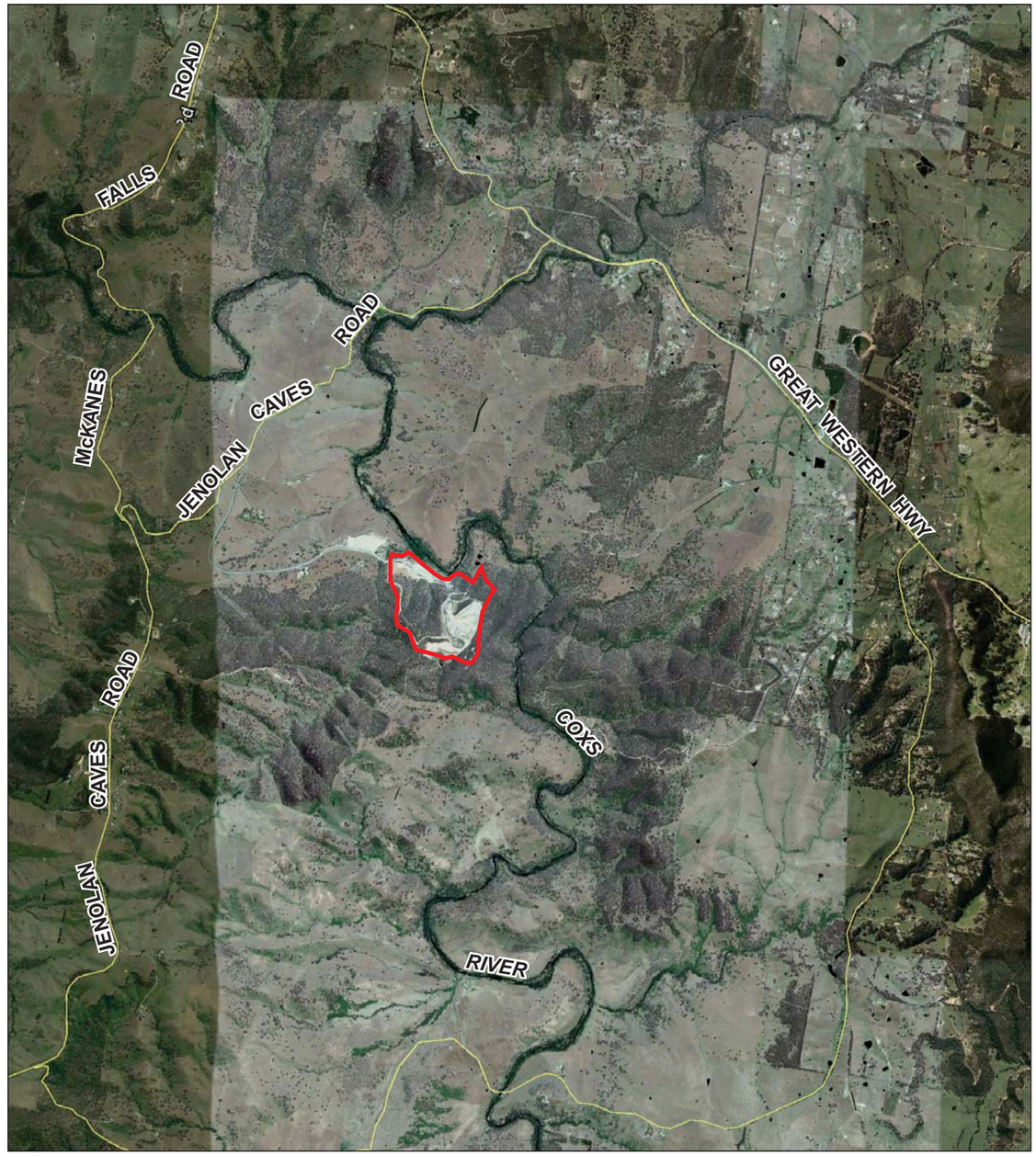
Approx Scale: 0 2 4km



Approx Scale: 0 0.5 1.0 1.5km

Legend

Site

Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke
Signed:
Date: 15/09/2016

Project Manager VGT: Tara O'Brien
Signed:
Date: 15/09/2016

Section 2. Activities during the Reporting Period

2.1. Introduction

This section describes the activities undertaken during the reporting period 1st of January to 15th of September 2016. The existing site layout is shown in *Figure 2*.

2.2. Site Environmental Activities

2.2.1. Vegetation Clearing and Soil Stripping

There were no new vegetation and soil stripping activities undertaken during the reporting period.

2.2.2. Removal of Overburden and Unsuitable Materials

During the reporting period overburden and weathered surface materials unsuitable for crushing continued to be removed and transferred by quarry trucks to the overburden emplacement. It is estimated that 10,000 Tonnes were transferred.

2.3. Extraction Activities

Current extraction plans are based on the approved concept plans prepared by Minenco Pty Ltd and the subsequent *Hartley Quarry Development Plan* prepared by Mineconsult in 1996.

Extraction activities in this reporting period were consistent with the Plan of Management, that being:

i. Continue to extract according to the approved mine plans.

Extraction from the 730m down to the 715m elevations was undertaken. An estimated 592,300 tonnes of Rhyolite was extracted during the reporting period. In recent years, the extraction of material progressed northwards. During this reporting period (I January 2016 to 15 September), the extraction footprint has not been expanded.

The extraction of rhyolite was undertaken as a drill and blast operation with 14 blasts initiated between 1st of January and the 15th of September 2016.

It is a requirement to monitor the Peak Vector Sum Velocity (dBL) and Peak Overpressure at the most sensitive residence adjoining the property. This monitoring is conducted in Hartley Village. None of the blasts triggered the monitor in either peak vector sum velocity or peak overpressure.

The blasted rhyolite was loaded into 40 or 60 tonne capacity dump trucks by an excavator. The loaded trucks transported the material to the Primary Crusher Hopper.

Plan of:	Austen Quarry Environmental Management Report 2016 - Site Layout	***Location:***	Off Jenolan Caves Road, Hartley, NSW	***Source:***	Client and Google Map - Image Date 31/07/2015	***Our Ref:***	3265_HY_H_EMR16_C002_V0_F2.cdr
Figure:	TWO	***Council:***	Lithgow City Council	***Survey:***	Client	***Plan By:***	TO/JD
Sheet:	1 of 1	***Tenure:***	N/A	***Projection:***	MGA	***Project Manager:***	TO
Version/Date:	V0 26/08/2016	***Client:***	Hy-Tec Industries Pty Ltd - Adelaide Brighton	***Contour Interval:***	5m	***Office:***	Thornton

N

0 100 200 300 400 500m

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234000 E 234500 E 235000 E 235500 E 236000 E 236500 E 237000 E 237500 E

6282500 N 6282000 N 6281500 N 6281000 N

Coxs River

EPL Point 2 EPL Point 8 EPL Point 10 EPL Point 1 EPL Point 3 EPL Point 11 EPL Point 9

New Rehabilitation

Extension of Stockpile Area

Stockpiles

Access Road

Haul Road Realignment

Spray Mulch Applied to Quarry Face

Continuation of Overburden Emplacement

Yorkey's Creek

Scalping Plant

Crushing Plant

Quarry

Sump 1 Sump 2

SB2a SB2b SB1 SB3a

SD1 SD2 SD3 SD4 SD5 SD6

EST1 EST2 EST3 EST4 EST5 EST6

K1 K2 J1 J2 J3 A1 A2 B C D E F G1 G2 H I1 I2 L

780 755 700 740 760 730 810 830 680 670 660 665 700 720 710 735 800

Legend

- Lease Boundary
- Approved Pit Area
- Proposed Extension to Approved Pit Area
- SD6 Storage Dam
- SB6 Sediment Basin
- EST1 Excavated Sediment Trap
- J2 Catchment Boundary
- Areas Disturbed by Infrastructure
- Overburden Emplacement
- Previously Rehabilitated Areas
- Rehabilitation this period
- EPA Licence Monitoring Point
- Weather Station

Manager/Authorisation Holder
Hy-Tec Industries: Darryl Thiedeke
Signed:
Date: 15/09/2016

Project Manager VGT: Tara O'Brien
Signed:
Date: 15/09/2016

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2.4. Processing Activities

During the period of 1 January and 15 September 2016, 850,960 tonnes of product were sold from the quarry with 27,447 loads with an average of 109 loads per day during the reporting period.

2.5. Environmental Maintenance Activities

The following is a list of the types of activities carried out throughout the reporting period.

- Monitoring and/or maintenance of the sedimentation dams;
- Periodic grading, (as required) of the Quarry Access Road;
- Regular inspections and cleaning of the under road stormwater pipes on the Site Access Road;
- Monitoring and/or maintenance of the rock linings on the drains adjacent to the Site Access road;
- Watering and periodic grading of the quarry roads to minimise the potential for dust generation;
- Periodic removal of consolidated sediment from the Quarry Access Road sediment basins;
- Pumping of water from sediment dams to storage dams to ensure capacity in the event of a significant rain event;
- Monitoring of the surge pile base and scalps conveyor by external surveyor, to check for any movement. To date no movement has been detected;
- Ensure appropriate treatment and testing of dam water prior to discharge from the EPA licensed discharge points.

Activities to desilt the settling dams are currently being conducted however, heavy rainfall over the previous months has slowed the process. The desilted material is dried and then disposed of in the overburden disposal area. Once complete, this will improve capture capabilities.

2.6. Rehabilitation

2.6.1. Rehabilitation Objectives

The rehabilitation objectives for the Austen Quarry can be defined in both the short term (this includes ongoing works as the extraction process moves within the quarry) and long term.

In the short term, the objective is to stabilise all earthworks, drainage lines and disturbed areas in order to minimise erosion and the associated generation of sediment-laden water. This is achieved by re-establishing vegetation as soon as possible after disturbance. Consideration is given to establishing effective drainage from a newly disturbed area to prevent erosion and enable revegetation. During this reporting period vegetative cover, previously established, on all areas not intended for future disturbance improved due to the favourable weather conditions.

The long term objectives are to ensure that all conditions stated in the EIS (SKM, 1994), the Development Consent No. 103/94 (DA 103/94), Part 3A Permit PAR9012617 and the Environmental Protection Licence (EPL) No. 12323 that relate to rehabilitation works are met. Some of these conditions will not be met until the end of life of the quarry as they refer to total rehabilitation.

The Vegetation Management Plan (VMP) which forms part of the 3A Permit PAR9012617 requires revegetation of the Riparian corridor as well as final rehabilitation after the completion of all quarry activities.

2.6.2. Rehabilitation Works

Trees planted in the previous reporting period have continued to grow and are well established. Some of these trees are becoming much more effective in visual screening.

A significant amount of rehabilitation work has been conducted to address the visual aspect of the quarry. During the previous reporting periods a large high wall adjacent to the primary crusher, which was visible from the ranges surrounding the quarry, was battered, topsoiled and grassed. In consultation with the Soil Conservation Service, a spray emulsion was applied on the uppermost faces to camouflage the remaining faces. This proved to be very effective and a program of regular spraying all the visible faces has been undertaken. Sprayed surfaces that had weathered and were fading were re-sprayed on the 24th of September 2013. No further spraying has been undertaken.

In February 2016, 500 trees were planted and this will be followed by planting of 2,000 native trees in the coming months (see *Section 4.3*). Areas previously planted include around the perimeter of the quarry where extraction is complete, the overburden emplacement area, visual bunding around the stockpile area near Yorkies Creek and the visual crest of the quarry entrance. These areas are progressing satisfactorily.

Minor weed control measures were undertaken during the reporting period and further control measures are planned for October/November 2016 (see *Section 4.3*).

Section 3. Environmental Monitoring and Management

3.1 Introduction

This section provides the relevant details of environmental performance, monitoring and management at the Austen Quarry site. *Section 3.2* presents an assessment of operational compliance against commitments made in the original EIS for the Austen Quarry and the conditions of DA103/94, PAR9012617 and EPL 12323. *Section 3.2* presents the detail of any complaints received during the reporting period as well as the response of the Company to these complaints. The section concludes with a description of the environmental monitoring undertaken during the reporting period and overall environmental management of the site (see *Section 3.3*).

3.2 Compliance

3.2.1 Introduction

The following sections summarise the results of a review of compliance undertaken of the development consent for the Austen Quarry (DA 103/94), commitments made in the original EIS for the quarry (SKM, 1994), Environment Protection Licence (EPL) 12323 issued by the Environment Protection Authority (EPA) and RFI Permit No. PAR9012617 issued by the NSW Office of Water (NOW).

3.2.2 Development Consent SSD 6084

The DPE conducted a site audit of the Austen Quarry development against SSD 6084 conditions in December 2015, the audit concluded that *'an adequate level of compliance'* was identified as well as 3 Administrative Non-Compliances. An updated summary of the non-compliances, observations and action plan developed by the proponent was submitted to the DPE in March 2016 in response to the December Audit. Refer to *Appendix E* and *Appendix F* for compliance to SSD 6084.

Since the submission of the action plan, a code of conduct for all transport operators with the objective of minimising the impact of the quarry transport operations on the environment and members of the public has been rolled out mid 2016 (see *Appendix G*). In addition, the sprinkler system has been installed and commissioned on the access and exit roads to assist with dust suppression.

3.2.3 Development Consent 103/94

The compliance status of the Austen Quarry against the 29 conditions of DA 103/94 (modified 15th December 2014) have changed from the previous report;

- Compliant Conditions 25
- Ongoing Conditions 4

Ongoing consent conditions during the 2016 reporting period include the following.

- Condition 5. b); This condition relates to a 40km/hr speed limit to be enforced between the quarry and The Great Western Highway along Jenolan Caves Road.

This condition is managed as part of the Austen Quarry Truck Traffic Management Plan.

- Condition 18 f) The annual water quality report shall be provided to the Sydney Catchment Authority for comment.

At this stage no separate Water Quality Monitoring Report is prepared. Water quality monitoring results are presented and discussed in the Annual Performance Report. It is Hy-Tec's understanding that the Annual Report was distributed to the agencies nominated in Condition 18 e) and 18 f) by Council. Confirmation with Council will be again sought on submission of this annual report.

• Condition 26. The Operational Environmental Management Plan for the site shall be reviewed and updated in consultation with the Sydney Catchment Authority within six months of this modification approval.

At the time of inclusion of Condition 26 to DA 103/94 (27th November 2012) the Austen Quarry was, and continues to be, managed in accordance with a series of specific environmental management plans and procedures. These are reviewed annually. In response to Condition 26, Hy-Tec commissioned the preparation of an Operations Environmental Management Plan (OEMP) in 2012 to consolidate environmental management requirements into a single document. A draft OEMP was prepared, however, in early 2013 plans for a significant extension of the Austen Quarry were formalised with the Department of Planning & Environment, and relevant government agencies and public authorities (including the Sydney Catchment Authority- SCA) consulted with respect to assessment requirements. Development of the sites Water Management Plan as part of SSD 6084 requirements has been made with involvement from DPI Water and Water NSW to ensure water management on site is as required.

• Condition 29. The applicant has to obtain a current Controlled Activity Approval from Office of Water for any “works” (as defined by the EPA Act) carried out in, or under the Waterfront land (bed, bank and 40m from top of bank).

The application was lodged in August 2013 with the Office of Water and no response has been received by Hy-Tec at the time of this report writing. Notably, receipt of development consent (Note: SSD-6084 consent has been granted) under Division 4.1 of the Environmental Planning and Assessment Act (1979) would make Controlled Activity Approval redundant (refer to Section 89J of the EPAA Act).

Other conditions that were added to the 2012 DA103/94 consent modification such as Conditions 24, 25, 27 & 28 relate to sediment and erosion control and to works undertaken on the water management systems that have now been completed. The works are documented in the Northrop report which is available on request.

3.2.3 1994 EIS Commitments

A total of 46 commitments were made in the 1994 EIS for the Austen Quarry. The compliance status is as follows;

- Compliant 42
- Ongoing or not applicable 4

Incomplete or ongoing commitments from the EIS include the following. These remain unchanged.

- The 4 commitments have become “not applicable” as they relate to the installation of a truck wash. The truck wash commitment was to prevent dirt being tracked outside the property from the unsealed entrance road. It was decided to seal the entire 3 km internal road to eliminate the risk of this occurring. The 3 km sealed road has proven to be successful with no issues relating to dirt being tracked outside the property.

3.2.4 Part 3A Permit PAR9012617

RFI Permit No. PAR9012617 relates to approval to “Undertake Earthworks and site Rehabilitation” within 40m of the banks of the Cox’s River.

The Permit was given by the NSW Office of Water (NOW) subject to a number of conditions.

The permit consists of two stages;

- Stage 2 relates to decommissioning and rehabilitation at the end of the life of the quarry. Therefore this will not be relevant for some years.

- Stage 1 consists of 5 main components;
    - Construction of bund, *(complete)*
    - Construction of hardstand *(complete)*
    - Construction of sediment basin *(complete)*
    - Soil and water management works *(complete)*
    - **Rehabilitation of riparian area to, and including, top of bund wall. *(ongoing) see notes below;***

The rehabilitation of the Riparian Zone is to be implemented according to a Vegetation Management Plan. This plan has been approved and rehabilitation of the area has commenced. Significant natural regeneration has occurred and further planting is to be done of tube stocks of trees and shrubs regenerated in the local nursery from seeds collected on site.

Seeds of most of the required species have been collected and supplied to the nursery. These were planted during spring of 2014. An additional 500 mixed native species were planted during February 2016

3.2.5 Environment Protection Licence

EPL 12323 contains a total of 65 assessable conditions.

The 2014 to 2015 annual return, noted two non-compliances. The non-compliances related to the exceedance of TSS concentration limits at EPA point 1 due to high intensity rainfall over a two day period as well as a noncompliance with monitoring requirements at EPA Points 1, 2 and 3 due to lab closure over ANZAC day long weekend. The EPA has written to Hy-Tec Industries regarding the non-compliance and the relevant action.

The 2015/2016 annual return noted 0 non-compliance for the Austen Quarry as summarised below

Table 2. EPL Annual Return

Licence number:	**12323**
Annual Return Start:	01 July 2015
Annual Return End:	30 Jun 2016
Date Received:	25/08/2016
Non Compliances	No

3.2.6 Conclusion

Apart from the conditions and commitments that relate to the latter part of the quarry life, there is very little outstanding in terms of compliance issues.

3.2 Complaints

The Company maintains a complaints register through Hy-Tec's safety and incident reporting program "Cintellate". Should a complaint be registered, the date, time and name of the complainant is noted along with the nature of the complaint. The follow-up action would also be recorded once undertaken. There were no complaints recorded during the reporting period.

3.3 Environmental Monitoring

3.3.1 Introduction

During the reporting period, the Company undertook the following monitoring.

- Noise and vibration monitoring during blasts.
- Monthly dust deposition monitoring at three locations, Sawmill Paddock, Baaners Lane and Bald Hill.
- Monitoring of water quality within the Cox's River and quarry water storages.
- Monitoring of flora and fauna habitat
- Monitoring of Cox's River Macroinvertebrates

3.3.2 Meteorology

The EPA licence requires the weather to be monitored at the site.

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

Data from the on-site meteorological station is collected by Pacific Environment Ltd. The data is not reproduced in this report but is available on request.

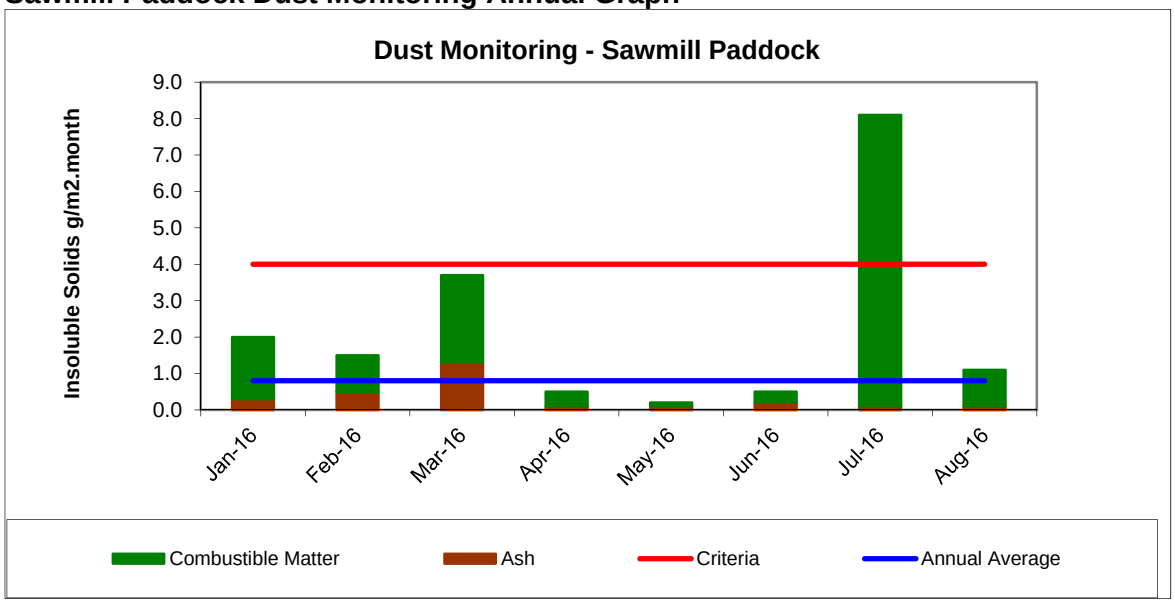
3.3.3 Dust

Table 3 and the graphs below represent the results of dust monitoring undertaken around the Austen Quarry during the reporting period (*refer to Figure 1 for location*). Samples from each of the three dust gauges placed surrounding the Austen Quarry were collected by the Company's nominated Environmental Officer and analysed by ACIRL Lithgow.

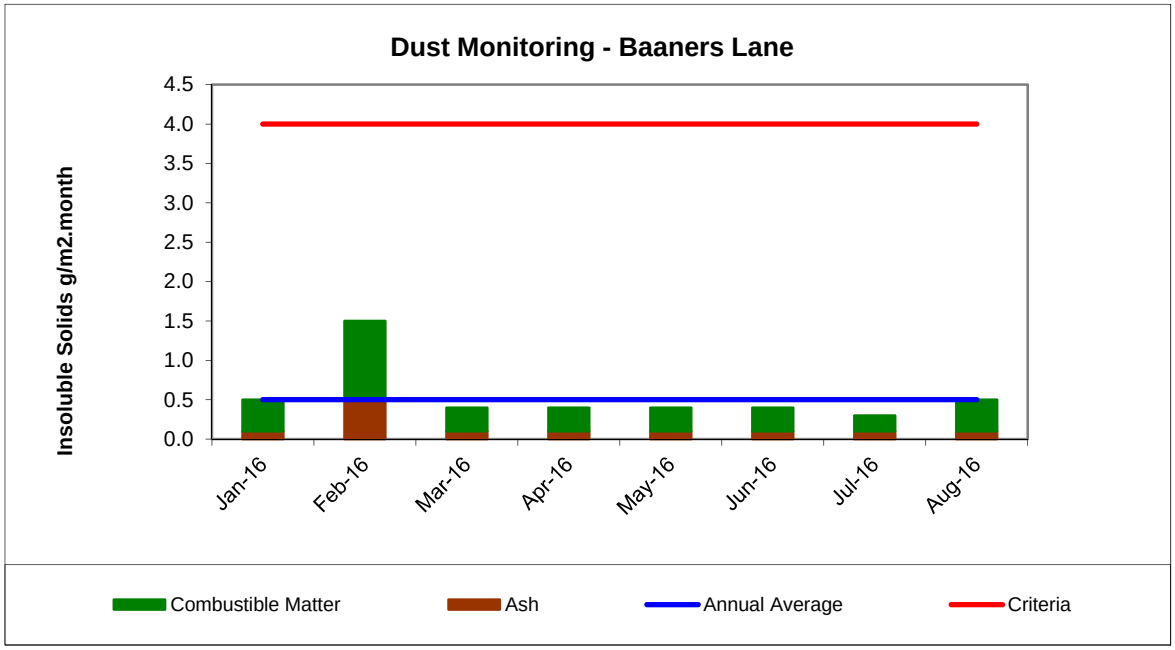
Table 3. Dust Monitoring results for 2016

Monitoring Period	Monitoring Location								
	1. Sawmill Paddock EPL4			2. Baaners Lane EPL5			3. Bald Hill EPL6		
	Insoluble Solids	Combustible Matter	Ash	Insoluble Solids	Combustible Matter	Ash	Insoluble Solids	Combustible Matter	Ash
	(g/m^2/month)			(g/m^2/month)			(g/m^2/month)		
Jan- 2016	2.0	1.7	0.3	0.4	0.4	0.1	0.4	0.4	0.1
Feb-2016	1.5	1.0	0.5	1.5	1.0	0.5	1.2	0.7	0.5
Mar-2016	3.7	2.4	1.3	0.4	0.3	0.1	1.1	0.7	0.4
Apr-2016	0.5	0.4	0.1	0.4	0.3	0.1	1.0	0.6	0.4
May-2016	0.2	0.1	0.1	0.4	0.3	0.1	0.3	0.2	0.1
Jun-2016	0.5	0.3	0.2	0.4	0.3	0.1	0.2	0.2	0.1
Jul-2016	8.0	8.0	ND	0.2	0.2	0.1	0.3	0.2	0.1
Aug-2016	1.0	1.0	ND	0.4	0.4	0.1	0.4	0.4	0.1
Annual Average	**0.8**	**1.1**	**0.3**	**0.5**	**0.4**	**0.2**	**0.6**	**0.4**	**0.3**
ND: Not Detected									
Source: ABL and ACIRL Lithgow									

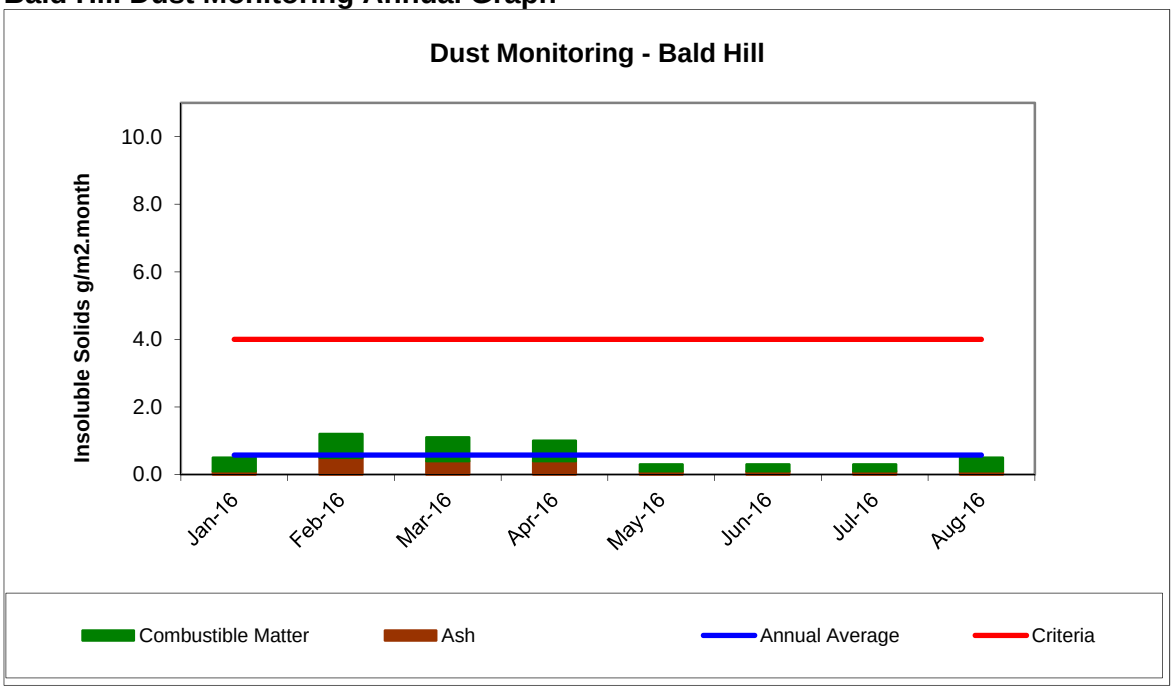
Sawmill Paddock Dust Monitoring Annual Graph



Baaners Lane Dust Monitoring Annual Graph



Bald Hill Dust Monitoring Annual Graph



While the EPL specifies no limits, the NSW EPA recommended guidelines for Insoluble Solids is less than 4 g/m^2/month averaged annually. There was an irreggular result recorded at Sawmill Padock EPL 4 for the month of July, which was deemed to have been due to local works or unit being tampered with; the result had not been repeated. Even with the anomalie, the recorded annual average amounts of ash and insoluble solids for each gauge were below this guideline for the reporting period.

3.3.4 Water Quality

Water quality monitoring was undertaken both within on-site water storages and the Coxs River during the reporting period (refer to *Figure 2* for locations). Water within on-site water storages was analysed for pH, suspended sediment levels and electrical conductivity whereas water sampled within the Coxs River (upstream and downstream of the site) was also tested for a suite of anions and cations.

The following parameter limits for the Austen (Hartley) Quarry water storage devices are listed below and are located in *Appendix B*

For EPL Monitoring Points 1, 8, 9, 10 and 11:

- *Oil and Grease:* *10mg/L*
- *pH:* *6.5-8.5*
- *Total Suspended Solids:* *30mg/L*

Table 4 to Table 8 and the following graphs represent the results of water quality monitoring within the Cox's River and the sites stormwater storage dam's, which based on the similarity of results at the Top and Bottom Crossings suggest the impact of the quarry on water quality of the Cox's River system was negligible during the reporting period.

Table 4. EPL Point 1/AQW-2 Primary Sediment Dam

Sampling Period	pH	Conductivity µS/cm	Turbidity NTU	TDS mg/L	TSS mg/L	BOD mg/L	O&G mg/L
Jan- 2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Feb-2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mar-2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Apr-2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
May-2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jun-2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jul-2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aug-2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Usually there is no discharge from this dam as water is transferred to other sediment dams on the site or used for dust suppression. As no discharge took place, there was no requirement to sample EPL Point 1.

Table 5. EPL Point 2/AQW-1 Cox's River Upper Crossing

Sampling Period	pH	Conductivity µS/cm	Turbidity NTU	TDS mg/L	TSS mg/L	BOD mg/L	O&G mg/L
Jan- 2016	7.22	500	3	300	<5	<2	<5
Feb-2016	7.53	419	4	228	<5	<2	<5
Mar-2016	7.94	513	4	334	<5	<2	<5
Apr-2016	8.24	540	2	329	<5	<2	<5
May-2016	8.22	551	2	368	<5	<2	<5
Jun-2016	8.24	588	6	358	<5	3	<5
Jul-2016	7.66	481	4	316	<5	<2	<5
Aug-2016	6.9	369	19	242	18	2	<5

EPL Point 2 is the up-stream sample location of the Cox's River, samples taken as per EPL 12323 requirements.

Table 6. EPL Point 3/AQW-3 Cox's River Final Crossing

Sampling Period	pH	Conductivity µS/cm	Turbidity NTU	TDS mg/L	TSS mg/L	BOD mg/L	O&G mg/L
Jan- 2016	7.44	502	3	306	<5	<2	<5
Feb-2016	7.48	438	4	236	<5	<2	<5
Mar-2016	8.16	479	3	310	<5	<2	<5
Apr-2016	8.62	530	1	322	<5	<2	<5
May-2016	8.16	550	2	346	<5	<5	<5
Jun-2016	8.14	598	4	348	<5	4	<5
Jul-2016	8.03	471	6	303	<5	<2	<5
Aug-2016	7.14	331	33	186	26	2	<5
8th August 2016	6.54	N/A	N/A	N/A	N/A	N/A	N/A

EPL Point 3 is the down-stream sample location of the Cox's River, samples taken as per EPL 12323 requirements.

Table 7. Storage Dam 3 (EPL9)

Sampling Period	pH	Conductivity µS/cm	Turbidity NTU	TDS mg/L	TSS mg/L	BOD mg/L	O&G mg/L
Jan- 2016							
Feb-2016							
Mar-2016							
Apr-2016	8.09				12		<5
Apr-2016	8.27	1120	8	768	10		<5
May-2016							
Jun-2016							
Jul-2016	6.68				19		<5
Jul-2016	7.45				7		<5
Aug-2016	6.58				<5		5
Sep-2016	6.66				8		<5

EPL Point 9 is stormwater Storage Dam 3, for which water-quality is assessed prior to discharge to the Cox's River system.

In April, July, August and September, water-quality samples were taken and results were within EPL Limits (pre-discharge quality-assurance sampling occurred in April and July).

With ~3.5ML of water discharged to the Cox's River system during the reporting period.

Table 8. EPL Point 10/AQW-7 Storage Dam 4

Sampling Period	pH	Conductivity µS/cm	Turbidity NTU	TDS mg/L	TSS mg/L	BOD mg/L	O&G mg/L
Jan- 2016	8.07	839	4	634	6	3	6
Jan- 2016	6.61	887	5		<5		6
Feb-2016	7.71	913	4		<5		<5
Feb-2016	6.96	895	5		<5		<5
Mar-2016							
Apr-2016							
May-2016							
Jun-2016	8	908	4	607	<5		<5
Jun-2016	7.97				<5		<5
Jul-2016	7.7				<5		<5
Jul-2016	7.48				<5		<5
Jul-2016	7.32				<5		<5
Jul-2016	7.22				<5		<5
Aug-2016	7.44				<5		<5
Aug-2016	6.78				<5		<5
Sep-2016	6.76				6		<5
Sep-2016	6.77				<5		<5

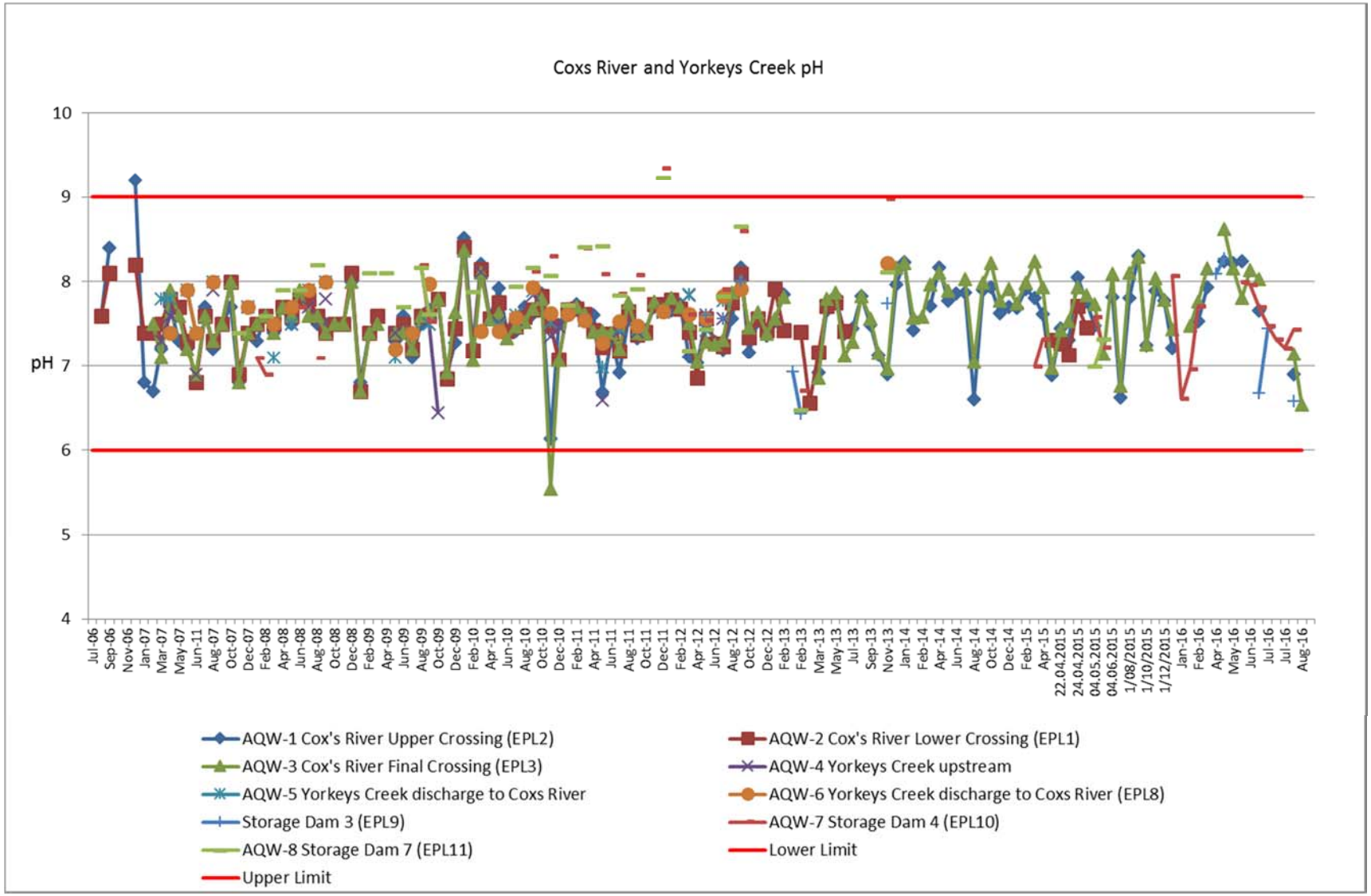
EPL Point 10 is stormwater Storage Dam 4, for which water-quality is assessed prior to discharge to the Cox's River system.

In January, February, June, July, August and September, water-quality samples were taken and results within EPL Limits (pre-discharge quality-assurance sampling occurred in January, February, June and July).

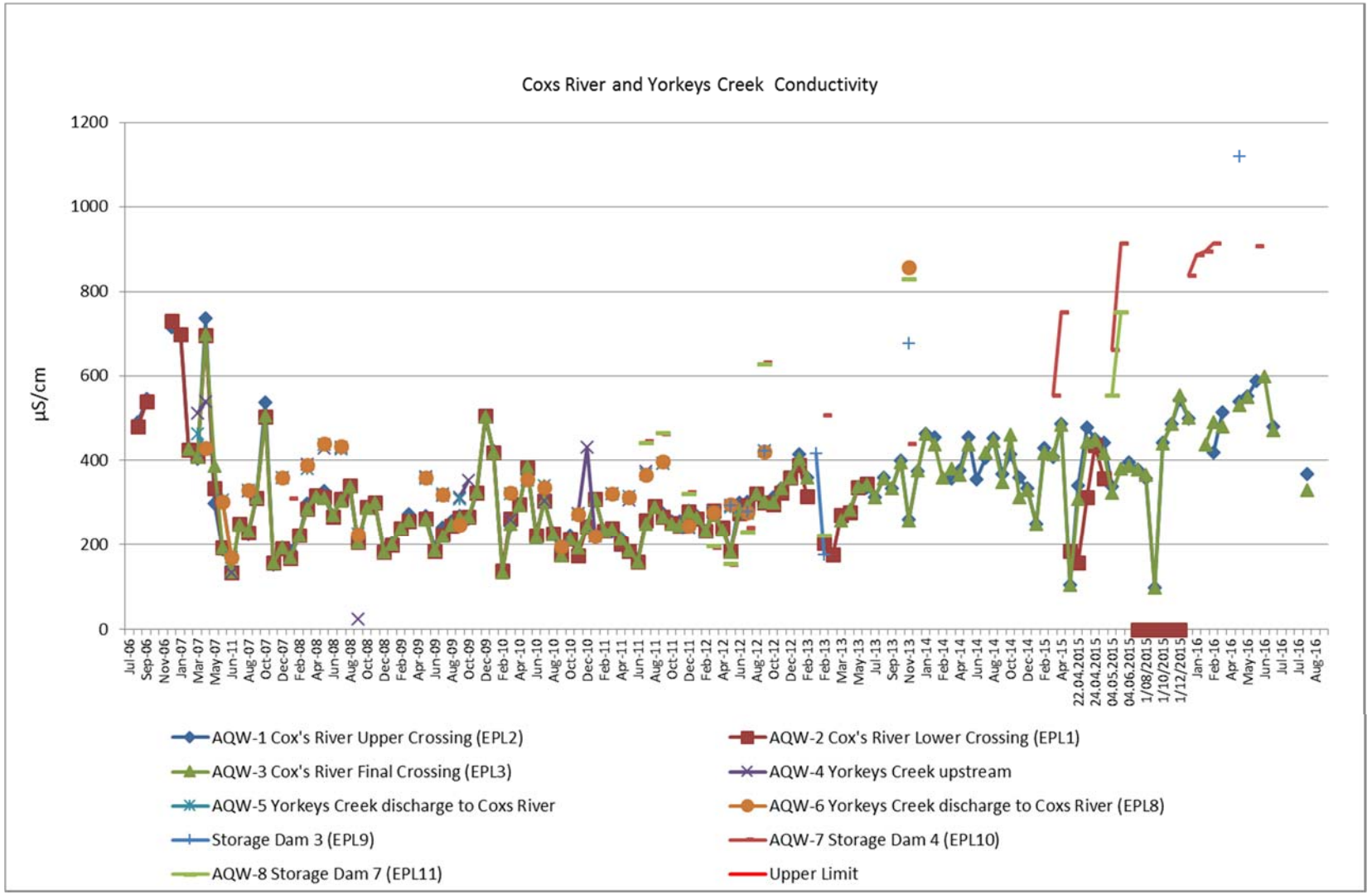
With ~18ML of water discharged to the Cox's River system during the reporting period.

There were no discharges from EPL Points 1, 8 and 11 during the reporting period.

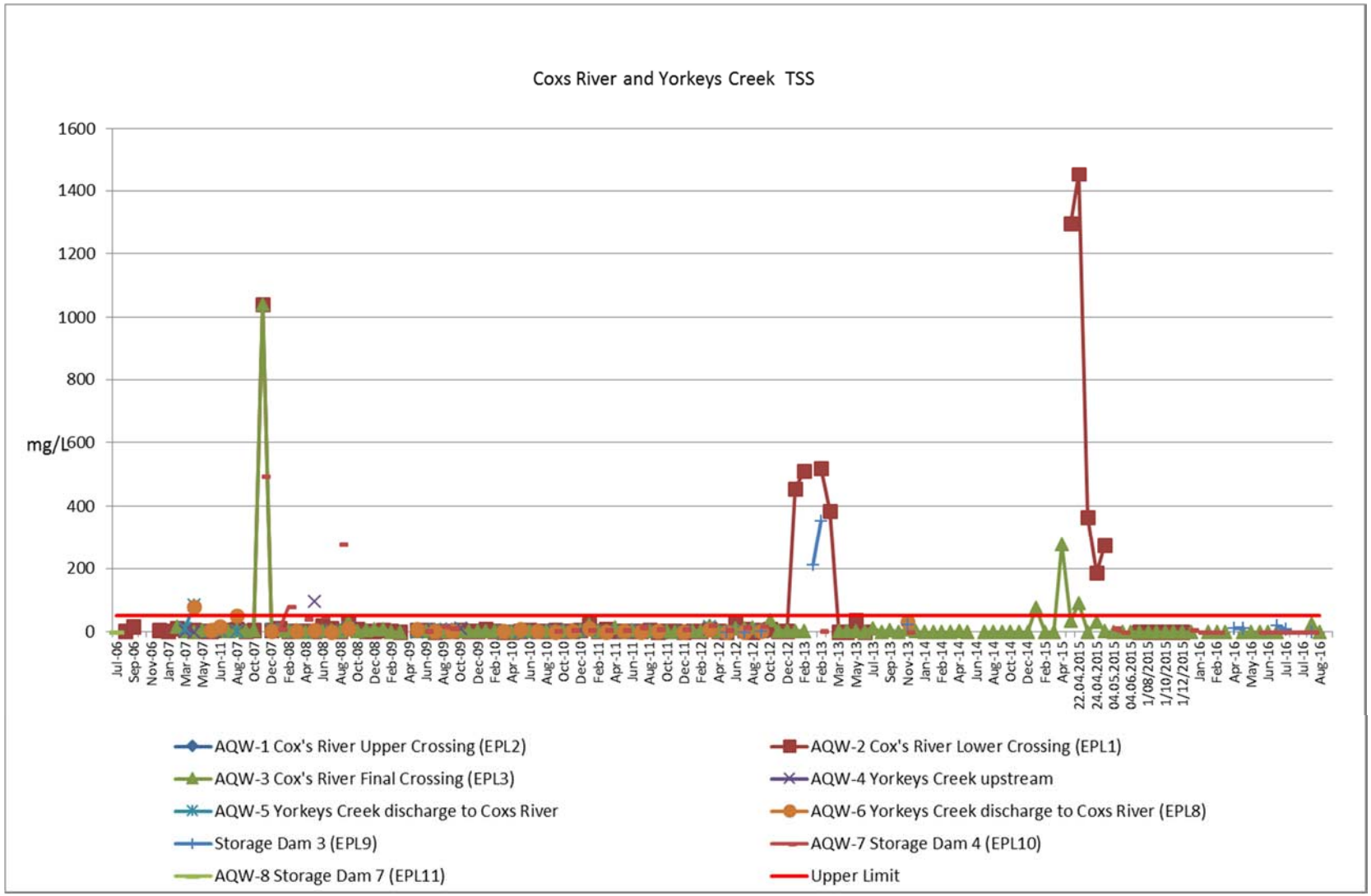
Cox River and Yorkeys Creek pH Graph



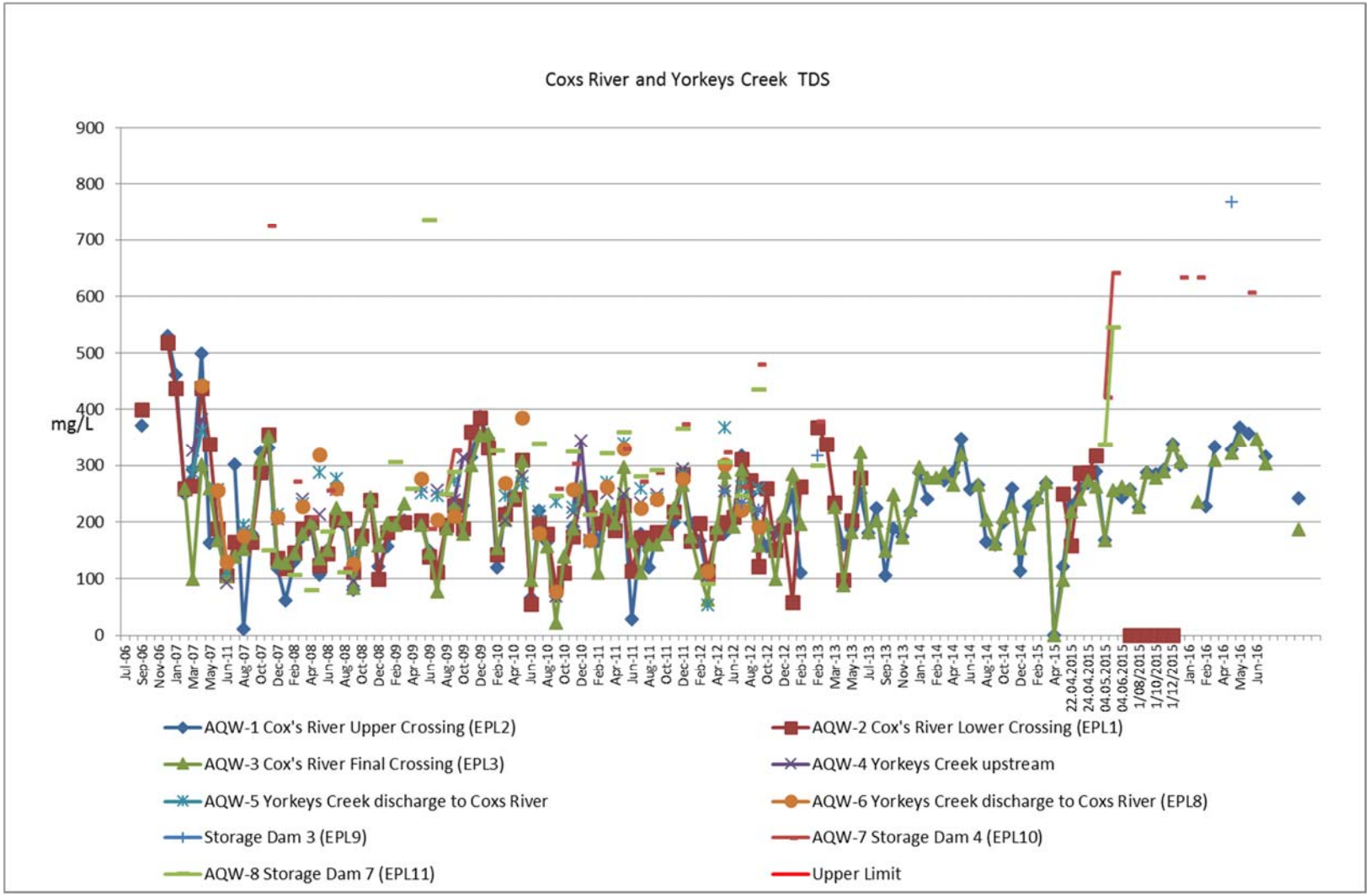
Cox River and Yorkeys Creek Conductivity Graph



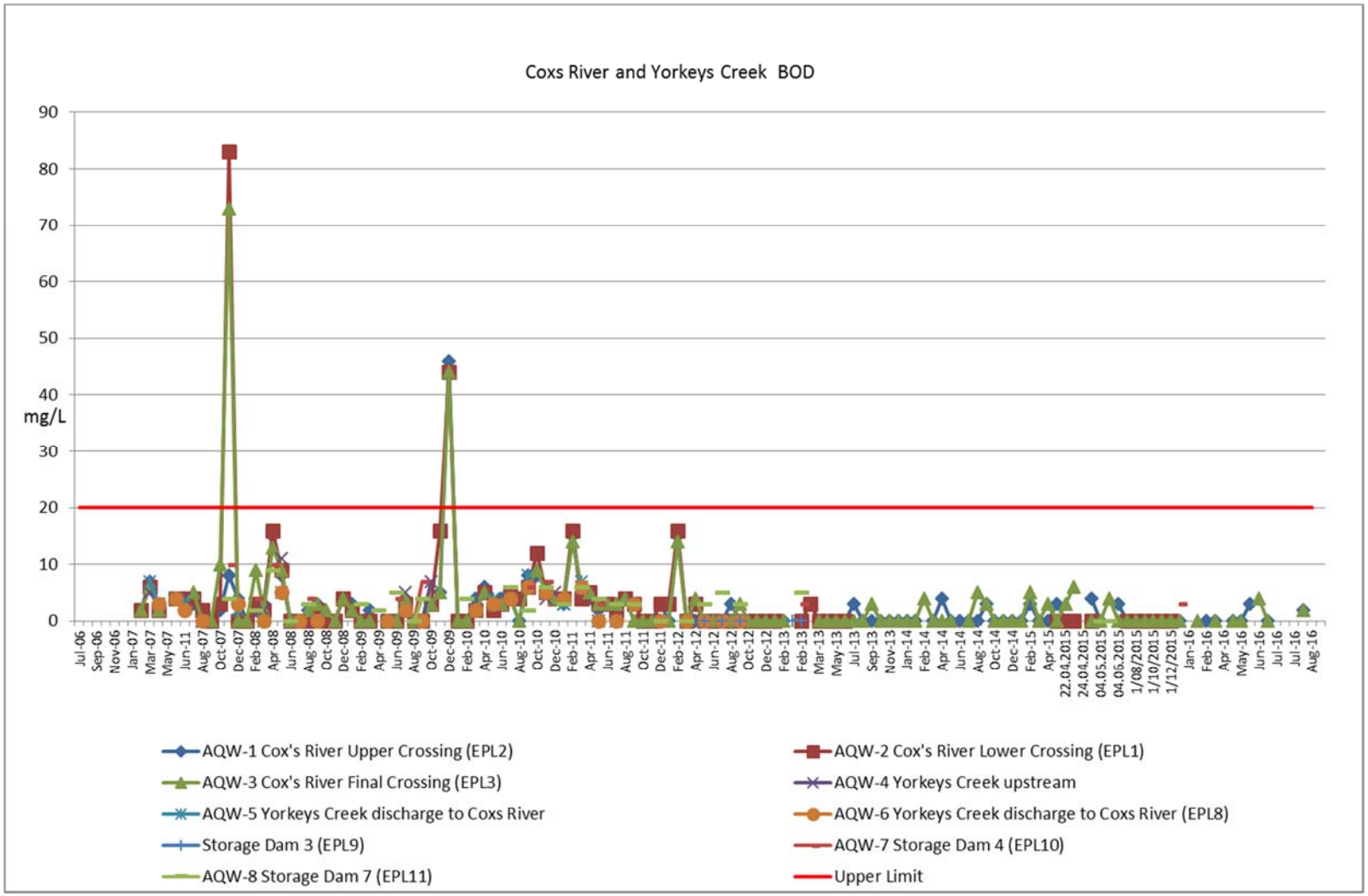
Cox River and Yorkeys Creek Total Suspended Solids Graph



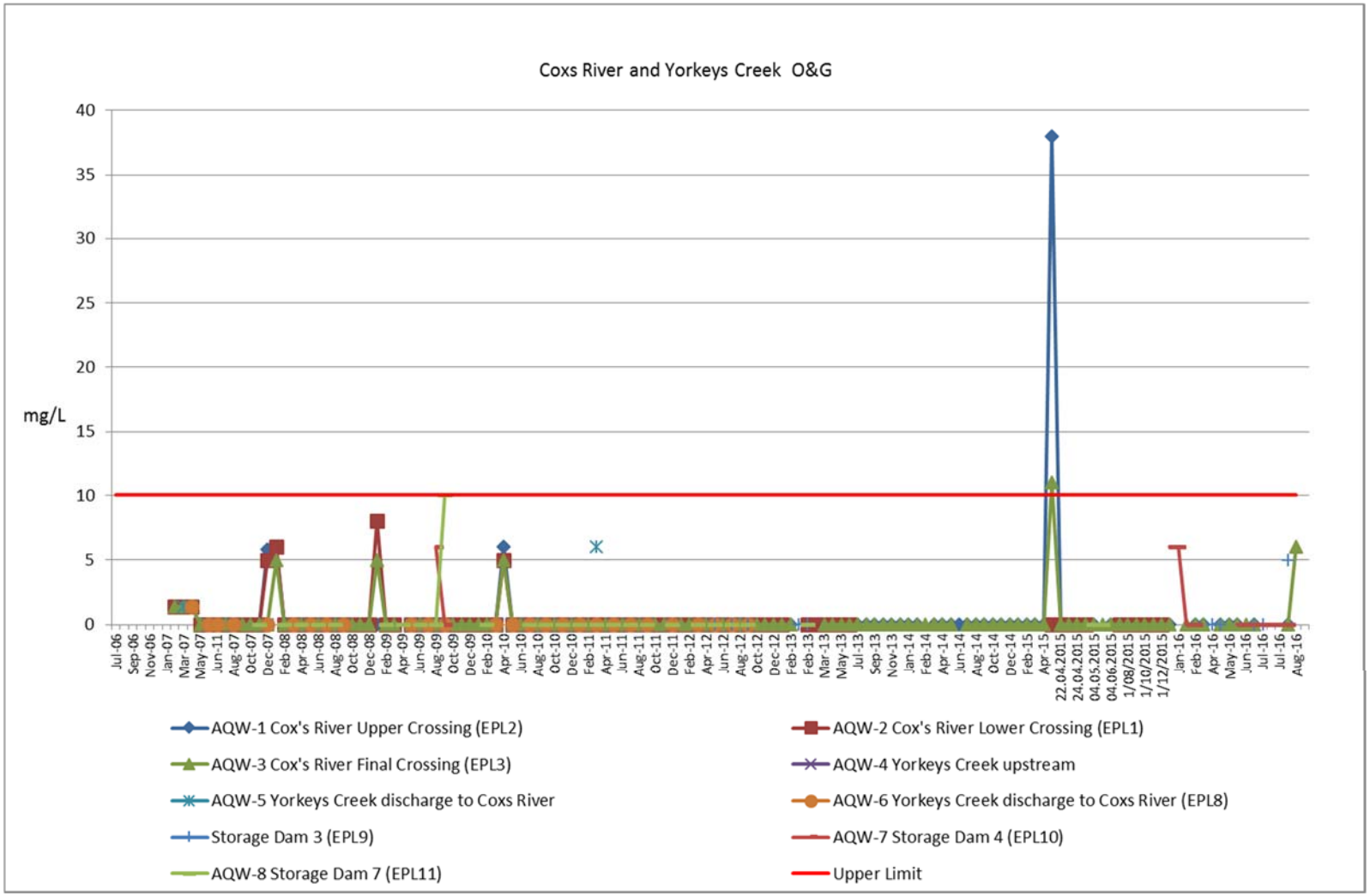
Cox River and Yorkeys Creek Total Dissolved Solids Graph



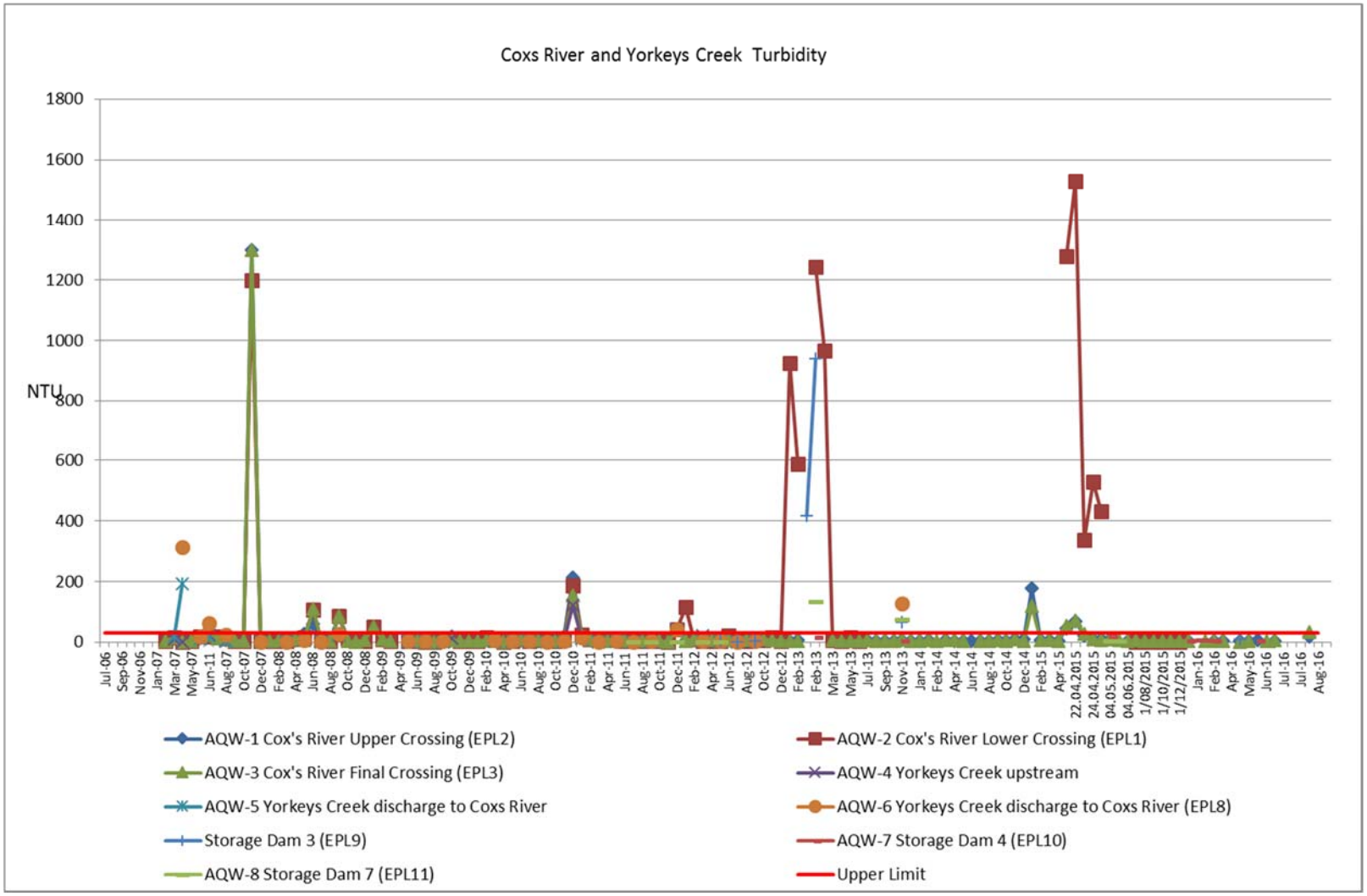
Cox River and Yorkeys Creek BOD Graph



Cox River and Yorkeys Creek Oil and Grease Graph



Cox River and Yorkeys Creek Turbidity Graph



3.3.5 Noise and Vibration

Monitoring of noise and vibration during the reporting period was conducted to the Environmental Protection Licence requirements of peak particle velocity (ppv) and air blast overpressure for each of the blasts initiated. Monitoring was undertaken at the Hartley Village. *Table 9* presents the air blast overpressure and ground vibration levels recorded during the reporting period all of which were within the nominated criteria.

No blasts exceeded the air blast overpressure or ground vibration criterion (115dBL and 5mm/s respectively), with no results over 100dBl and 2mm/s respectfully.

Table 9. Blast Monitoring Results

Blasting	Frequency	Date	Blast Number	Limits	Units of measure	Results	Monitor Location Hartley Village
Ground Vibration	Per Blast	27.01.2016	100	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	27.01.2016	100	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	10.02.2016	101	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	10.02.2016	101	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	24.02.2016	102	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	24.02.2016	102	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	09.03.2016	103	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	09.03.2016	103	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	23.03.2016	104	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	23.03.2016	104	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	06.04.2016	105	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	06.04.2016	105	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	04.05.2016	106	5 - trigger point >0.51	mm/s	1.36	√
Overpressure	Per Blast	04.05.2016	106	115 - Trigger point <88	dB	95.9	√
Ground Vibration	Per Blast	18.05.2016	107	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	18.05.2016	107	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	01.06.2016	108	5 - trigger point >0.51	mm/s	0.59	√
Overpressure	Per Blast	01.06.2016	108	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	15.06.2016	109	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	15.06.2016	109	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	05.07.2016	110	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	05.07.2016	110	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	25.07.2016	111	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	25.07.2016	111	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	10.08.2016	112	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	10.08.2016	112	115 - Trigger point <88	dB	Nil Trigger	√
Ground Vibration	Per Blast	30.08.2016	113	5 - trigger point >0.51	mm/s	Nil Trigger	√
Overpressure	Per Blast	30.08.2016	113	115 - Trigger point <88	dB	Nil Trigger	√

Note: Monitoring equipment is located in Hartley Village.

3.3.6 Flora and Fauna Habitat

Onsite Environmental Management Pty Ltd was commissioned by the Austen Quarry to undertake Ecological monitoring at the quarry during November 2015 (*Appendix C*). Condition 7a of Development consent (DA 103/94) requires annual monitoring of flora and fauna habitats in the vicinity of the quarry and stockpile areas to monitor impacts on local fauna attributable to the quarry.

Objectives

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*

Methodology

Flora and Fauna surveys were conducted by David Bone, Chris Churcher, Hunsamon Churcher, Brooke Weber and Callan Douchkov over a three day and one night period between the 10th of November 2015 and the 12th of November 2015

As stated in the report:

Survey Timing

The ecological survey was conducted during the middle of November 2015 over a three day and one 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 only 0.4mm of rain recorded. After the night surveying had been completed. Temperatures ranged from 6.1 to 25.6 degrees Celsius at Lithgow Bureau of Meteorology Site 063226.

It should be noted that quarry operations have made incursions into the ridge monitoring sites since the 2012 monitoring period, in particular the Impact Ridge and South Ridge sites. These changes are highlighted in Figures 3 and 4 below, which show a comparison between previous mapping containing 2009 imagery, and 2015 aerial photographs.

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 an control locations*
- *Opportunistic survey along flora transects*

Nocturnal fauna survey included:

- *Spotlight transects in all vegetation communities over two nights*
- *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.*

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) were added to the monitoring program for this period.

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.

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 2015.

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 had declined from last monitoring period, most likely due to the inclement weather and light rain during the survey. Forest/woodland insectivore species had the most notable decline from last monitoring period. Overall the number of bird species recorded across each group has remained relatively consistent throughout the monitoring program.

Amphibian numbers have increased slightly, being the highest recorded since 2008. Reptile and mammal numbers have decreased in relation to previous years, with mammal numbers being the lowest recorded for since 2008.

Wombat activity was noted to be high with four active burrows noted and two burrows captured on camera with activity.

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.

The presence of feral animals was observed around the quarry premise. Rabbit scats were observed to be present on the quarry grounds at all survey locations. No foxes were observed during the survey, however given the observation of the species during previous monitoring periods, the presence is highly likely. A control program for foxes and rabbits should be implemented to ensure that species number do not increase further.

Examination of data from previous surveys shows no significant change in the pattern and distribution of native flora species at each site. November 2015 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.

Three 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 4. This is largely due to the spread of weeds along the watercourse from upstream outside the mining lease. Impact Creek recorded the highest number of weeds (42) and followed by Control Creek (35). South Ridge had the lowest recorded number of weeds (2), followed closely by Control Ridge (4).

No direct impacts from quarry operations were noted in relation to the distribution and abundance of weeds within the lease area. However it is the responsibility of the quarry to manage the spread of weeds within the lease area, in particular noxious species, as part of their operations.

It was noted that Serrated Tussock is still prevalent throughout the site, with no evidence of management observed during this period, such as spraying. 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 2016.

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.

Rehabilitation site 1 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 Rehabilitation 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.

Rehabilitation site 3 was planted in 2014 with additional areas planted in 2014. The area planted in 2014 contained no obvious signs of natural regeneration and significant weed germination from the topsoil. Some planted stock was also observed to have been overgrown by weeds and urgent weeding of Site 3 is required to ensure similar success to sites 1 and 2. The newly planted areas showed a similar high weed growth possibly due to topsoil placement. Tube stock in the newer areas was shown to be growing at the time of the survey.

Greater consistency is needed when applying restoration techniques to ensure unknown variations (ie: from topsoil sourced from agricultural areas) do not compromise success. The use of topsoil as a growth medium will require continued maintenance at least in the short to medium term to control issues such as weed growth.

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 2016 period:

- *Ongoing management of the noxious weed infestations of Broomrapes* – Orobanche species (Class 1 Noxious weed under City of Lithgow Council) at the Impact Ridge site. As the species is classified as Class 1 Noxious weed, the landowner is required to immediately contact the local council weeds officer who will provide assistance with identification, removal and eradication. Please note that the City of Lithgow Council falls under jurisdiction of the Upper Macquarie County Council who is the local government authority for control of noxious weeds in the area.
- *Ongoing management of the noxious weed infestations of Serrated Tussock - Nassella trichotoma (Class 4 Noxious weed) at the riverine sites and Impact Ridge site is required by herbicide spraying, to prevent further spreading 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. Attention should be given to management of Serrated Tussock in the Rehabilitation sites as its presence was observed in this monitoring period. These Rehabilitation sites present the best opportunity for effective control due to low levels of invasion and small plant numbers.*
- *Ongoing management of the noxious weed infestations of African Lovegrass - Eragrostis curvula (Class 4 Noxious weed) at the riverine sites, Impact Ridge site and Rehabilitation areas. Effective control of African Lovegrass requires an*

integrated approach. It is recommended the landowner contact the local council weeds officer to establish the best eradication strategy.

- *A control program for feral animals should be undertaken to ensure fox, rabbit and cat numbers do not increase at the site.*

Although already submitted in the previous EMR, the 2015 Flora and Fauna study has been included here in this report for completeness, with the 2016 on site study being completed between the 22nd to the 24th of November 2016, which shall be included in next year's DPE Annual Environmental Review.

3.3.7 Cox's River Macroinvertebrates

From the AquaScience Spring 2015 Aquatic Ecology Monitoring Report (*Appendix D*);

'In 2005, R.W. Corkery & Co Pty Ltd, on behalf of Aus10 Rhyolite Pty Ltd (now HY-TEC), commissioned The Ecology Lab Pty Ltd (now Cardno) to undertake five years of monitoring of aquatic macroinvertebrates in compliance with condition 18(c) of DA 103/94. The overall aim of this monitoring program was to determine whether the occasional discharges of water, or quarry operations generally, had detectable impacts on river biota. The monitoring program was originally based on comparisons of macroinvertebrate assemblages in riffle and edge habitats at a location situated just downstream of the licensed discharge with that in a control location situated upstream of the discharge point and with those found at two distant control locations, located several kilometres upstream and downstream of the discharge point, respectively. Sampling for the program was based on the standardised Australian River Assessment System (AUSRIVAS) protocol endorsed by the NSW Office of Environment and Heritage (OEH) and Department of Planning and Infrastructure (DoPI). This methodology allowed the results of the survey to be interpreted in a standardised format, within a regional context and against the AUSRIVAS reference condition (representing minimally disturbed condition). The sampling design used in the monitoring program augmented the AUSRIVAS methodology by allowing changes in the macroinvertebrate community due to the discharge of water, or other impacts, from the Austen Quarry into the Coxs River to be distinguished from those that occur naturally.

The 2005-2011 monitoring program did not detect any changes in the aquatic macroinvertebrate fauna that could be explicitly attributed to the activities of the Quarry (Cardno, 2011). Variability was observed in the macroinvertebrate community assemblages of river-edge habitat, yet it appeared likely that these were due to extraneous environmental factors, rather than specific quarrying related factors (Cardno, 2011). Importantly, it was noted that impacts on stream invertebrates from episodic discharges were unlikely to be detected by the existing monitoring program and, as such, a recommendation was made for its cessation in favour of a program involving quantitative sampling triggered by discharge events (Cardno, 2011). Although these recommendations continue to be relevant for ongoing work, the historical program was designed to detect impacts resulting from the Quarry, albeit at a broader scale than may occur following episodic discharge events. Therefore, the historical monitoring program was re-established for the spring 2014 sampling, with further results, analysis, discussion and recommendations contained in this report.

Since the culmination of the 2005-2011 monitoring program, HY-TEC has submitted an application for the 'Stage 2' extension of the Quarry, which would involve extension of the extraction area, overburden emplacement and water management systems. Sampling of the aquatic ecosystem was completed in 2013 as part of the Stage 2 extension application (Cardno, 2014). This involved sampling of several of the monitoring sites sampled in 2005-2011, along with some additional sites on smaller tributaries. Data collected during the 2013 Stage 2 monitoring have not been used for historical comparison in this report, as the sites sampled were not consistent with the 2005-2011 program…….

Study Area

A total of six sites were sampled during the current survey (Figure 2-1). These sites are consistent with those sampled in previous monitoring and allows for a valid 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 5 and 6).

The Quarry Treatment sites are used to represent parts of the river potentially affected by quarry operations, whilst the Quarry Control and Upstream Control are used to represent areas unaffected by quarry operations. These control groups are used as a comparison for data collected at the Quarry Treatment group and allows for a valid experimental design to be employed throughout the monitoring program.

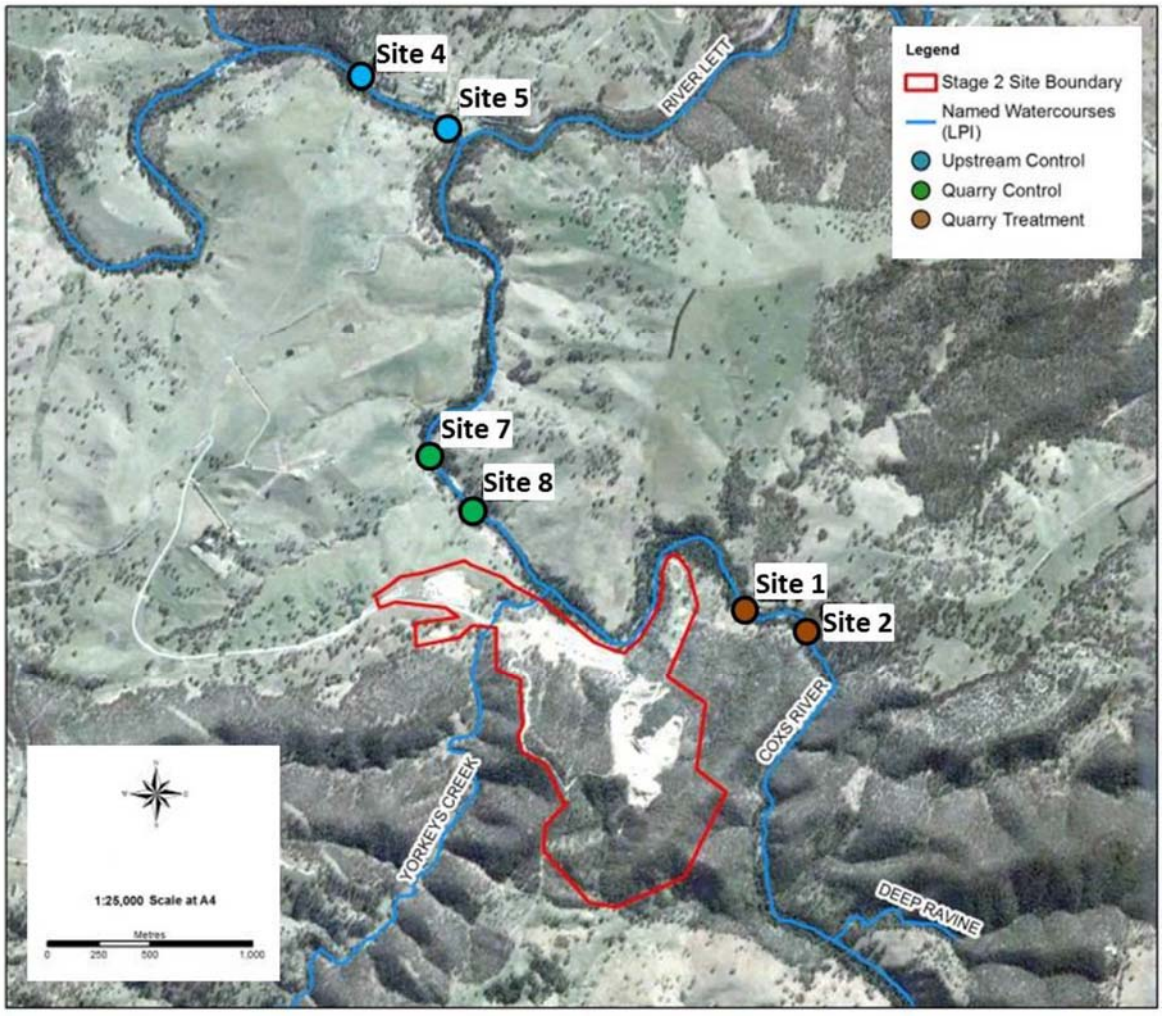


Figure 2-1 Map of the six sites sampled on the Coxs River during the monitoring program. Map is taken and modified from Cardno (2015).

Discussion

Key Findings

> At the time of the 2015 survey, the environmental quality of the river near the quarry discharge point was in the same condition, or for some variables in better condition, compared with reaches of the river which are not under the influence of the quarry

> Similar patterns and variability have been displayed by all ecological variables examined throughout the entire monitoring program to date (i.e. 2005 to 2015) and it appears that very little of the variability detected is as a direct result of quarry operations.

2015 Survey

During the 2015 survey, aquatic macroinvertebrate assemblages associated with edge and riffle habitat within the vicinity of Austen Quarry were generally assessed as equivalent to the AUSRIVAS reference condition. In addition, the sites that represented areas of the river under the potential influence of quarry operations were similar to other areas of the river that could be considered not to be affected by the quarry.

All AUSRIVAS indices indicated that the sites within close proximity to the quarry were generally the same, or in better environmental condition than what was expected by the AUSRIVAS model for both edge and riffle habitat. Signal score, which assesses the environmental quality of a site based on macroinvertebrate taxa response to chemical pollutants, indicated that sites within the vicinity of the quarry had fewer pollution tolerant taxa than either of the Control groups, which was the case for both edge and riffle habitat. This suggests that at the time of the survey, the environmental quality of the river near the quarry discharge point was in better condition than reaches of the river which are not under the influence of the quarry.

Elevated electrical conductivity and pH values (compared to ANZECC/ARMCANZ (2000) water quality guidelines) were observed at all sites, although these elevated readings could not be attributed to any quarry operations as Control group sites had similar elevated values. Likewise, low dissolved oxygen levels and low turbidity were recorded within the Quarry Treatment sites, however, both Upstream Control sites and Quarry Control sites showed similar discrepancies compared to the suggested guidelines. This suggests that other factors, other than quarry operations, are influencing water quality within the area.

Spatial and Temporal Trends over Time

There was significant spatial and temporal variability in macroinvertebrate assemblage structure as well as AUSRIVAS indices, however, this variability could not be conclusively attributed to quarry operations. Most spatial differences were often favourable for the Quarry Treatment sites (i.e. sites within the vicinity of the quarry) compared to the Control group sites. For example, O0Signal scores were significantly greater at the Quarry Treatment group compared to either of the Control groups, which suggests that areas within the vicinity of the quarry were in better environmental condition than other reaches of the river not influenced by quarry operations. In addition, this pattern was consistent for both sampling years analysed (i.e. 2014 and 2015). Many of the differences detected were most likely a result of inherent natural variability which is common in aquatic environments, and other influences such as surrounding land use practices are most likely influencing ecological patterns within the Coxs River.

Previous monitoring surveys (e.g. Cardno 2011, Cardno 2015) have reported similar results to those presented here and it appears that the addition of the 2015 data has not shown any great differences in the spatial and temporal patterns observed throughout the monitoring program to date. In general, similar variability has been shown for all ecological variables examined throughout the entire monitoring program to date and it appears that

very little of the variability detected is as a direct result of quarry operations. Therefore, it appears that the environmental management practices used at the quarry are providing suitable protection to the aquatic environment of the Coxs River.

Conclusion

In conclusion, there were no distinct negative patterns of variability in the aquatic macroinvertebrate fauna observed at the Quarry Treatment location compared to either of the Control locations that could be attributed to the activities of the Quarry. Results suggest that, at present, the ecological health of the river (as measured through aquatic macroinvertebrate assemblages) within the vicinity of Austen Quarry is no different, or sometimes better, than other areas of the river not influenced by quarry operations.

As discussed in previous reports (e.g. Cardno 2011, Aquascience 2015), the AUSRIVAS sampling protocol is designed for use in rapid assessment of river health and therefore, is useful in detecting larger scale, more persistent changes in macroinvertebrate assemblage structure and ultimately the condition of the aquatic environment. Impacts on aquatic macroinvertebrates from smaller magnitude, episodic discharge events would most likely not be detected by the sampling protocols adopted within the current monitoring program. In addition, upstream activities are most likely confounding any patterns observed at the current monitoring sites.

Although already submitted in the previous EMR, the 2015 Cox's River Macroinvertebrates study has been included here in this report for completeness, with the 2016 on site study completed on the 10th and 11th of October 2016. This shall be included in next year's DPE Annual Environmental Review.

3.3.8 Hazardous and Explosives Materials Management

Explosives used at the Austen Quarry are transported to the site by the Company's blasting contractor on the day of each blast.

The Company holds Material Safety Data Sheets (MSDS) for all materials used at the Austen Quarry. All personnel handling these materials are trained and licensed in the appropriate use of the materials.

3.3.9 Visual Amenity

The Austen Quarry is visible locally from vantage points on Jenolan Caves Road and more distantly from the Hassans Walls Lookout east of Lithgow and the Great Western Highway both east and west of Jenolan Caves Road. A description of the current visual amenity and management measures being undertaken to minimise the visibility of the quarry is as follows.

3.3.9.1 Jenolan Caves Road

Tree screens have been planted at locations along the perimeter. The vegetation screens have become effective at visual screening due to favourable climatic conditions. The reestablishment and continued planting of trees is expected to occur during the coming years.

3.3.9.2. Hassan's Walls Lookout

As required under DA103/94, a vegetated bund wall was established across the western opening of the extraction area. Native trees and shrubs are well established over the bund wall, especially towards the top of the bund wall. The vegetated bund wall is effective in screening activities at lower elevations within the quarry. Planting of local native species has commenced across the top visual areas of the quarry. These have been planted as early in the life of the quarry as possible. It will take a number of years for these to become an effective visual screen.

A significant amount of rehabilitation work has been conducted to address the visual aspect of the quarry. During previous reporting periods a large high wall adjacent to the primary crusher, which was visible from the ranges surrounding the quarry, was battered, topsoiled and grassed. In consultation with the Soil Conservation Service, a spray emulsion was applied on the uppermost face to camouflage the remaining face. This proved to be very effective and a program of spraying all the visible faces has been undertaken. Hy-Tec have advised that an investigation is currently underway with regard to the possible use of seeded spray on the vertical faces. However, during the reporting period this was not conducted as there is no free faces for spraying.

It should be noted that the design of the quarry as per the approved quarry plan shows quarry visibility increasing at periods within the development of the quarry. There is commitment on behalf of the Hy-Tec Quarry management personnel to keep this visibility at a minimum wherever possible. This involves the innovative use of the applied spray to vertical walls, areas being revegetated wherever possible. A focus has been placed on establishing as many trees as early as possible in the most visible areas.

3.3.9.3. Great Western Highway

Eastbound traffic on the Great Western Highway may observe the west facing faces of the extraction area from several points whilst travelling down River Lett Hill. Unobstructed views would also be possible into the extraction area from one residence on the southern side of the Great Western Highway on River Lett Hill (above the visual bund wall). East of Jenolan Caves Road, the east facing areas of the quarry are observable at several locations between Hartley and Little Hartley on the Great Western Highway. The “Karingal” residence (on the property owned by HPC) has clear and unobstructed views of the easterly advancing extraction area. From the Hartley Diner, views of the Austen Quarry are obstructed by roadside vegetation. A comprehensive tree planting program was undertaken along the front boundary of the “Karingal” property, in conjunction with the land owner. A combination of fast growing and longer term trees were planted to assist in reducing the visual exposure of the quarry to the traffic along the Great Western Highway.

Section 4. Plan of Management 2016/2017

4.1. Introduction

The following section discusses the following:

- Overburden removal, quarry development and production;
- Rehabilitation and landscape works;
- Soil and water management programs; and
- Environmental monitoring programs.

4.2. Overburden Removal and Quarry Production

4.2.1. Extraction Operations

Extraction and production volumes will continue to increase as the quarry customer base grows. This is expected to be in excess of 1,000,000 tonnes in the next reporting period as the quarry approaches the sales limit of 1,100,000 tonnes per annum.

4.2.2. Overburden Management

Overburden and unsuitable materials will continue to be transferred to the overburden emplacement. The volume of material is expected to be similar to previous years and should be approximately 50,000 tonnes.

4.3. Rehabilitation and Landscape Works

Short term rehabilitation will be conducted in areas that require stabilisation. Long term rehabilitation and revegetation will continue as extraction areas are complete.

Hy-Tec Industries envisage to continue overburden emplacement, topsoiling and revegetation activities on areas of the quarry no longer required for extraction activities when required. It is proposed that these activities will be conducted within the next 12 months.

It is planned to plant approximately another 2,000 silver leaved mountain gum over the next 12 months. Of these trees to be planted, 1,000 have been planted around the EPL Point 10 dam during October / November 2016 and an additional 1,000 will be planted on the northern hill to the south of the site office, scheduled for planting in Autumn 2017. Weed management measures are to be implemented during late October to early November 2016. These measures are to be focussed on the spraying pampas grasses.

On the 19th and 20th of November 2016 ~60 hectares was sprayed by helicopter for treatment of Serrated Tussock affected areas.

4.4. Soil and Water Management Programs

The soil and water management systems will be maintained and upgraded where required. The water sampling procedures will be reviewed for safety aspects and also suitability of sampling sites for accurate readings will be reviewed.

4.5. Environmental Monitoring

Dust, water and blast monitoring will continue as required by the existing licensing and documentation.

4.6. Environmental Performance

Improvements to the environmental performance of the Austen Quarry will continue during the upcoming reporting period. Catchment dams currently undergoing desilting, will have an increased capacity to contain runoff from the quarry catchment. In addition, silt traps will be maintained.

Section 5. References

Ref. 1. Onsite Environmental Pty Ltd (2016), *Ecological Monitoring Report, Austin Quarry Hartley*.
Ref. 2. Sinclair Knight Merz (1994). *Hartley Rhyolite Quarry Environmental Impact Statement.* Prepared on behalf of AUS10 Rhyolite Pty Limited.
Ref. 3. Aqua-science Aquatic Ecology (2015), Austen Quarry Aquatic Ecology Monitoring.
Ref. 4. VGT Pty Ltd (2014), *Environmental Management Report –Austin Quarry via Hartley 2013-2014.*
Ref. 5. Bureau of Meteorology (2016) Daily Rainfall: Little Hartley (Roscommon) NSW.

Appendix A: Council Conditions

103/94DA PGC:SMD
S96029/14
Environment & Development Dept.

22 December 2014

DARRYL THIEDEKE C/- HY-TEC INDUSTRIES PTY LTD
PO BOX 6770
SILVERWATER NSW 1811

Dear Sir/Madam

DEVELOPMENT APPROVAL – 103/94DA
MODIFICATION OF CONSENT – S96029/14
PROPOSED – HARD ROCK QUARRY AND ASSOCIATED PROCESSING PLANT
LOT 1 & 2 DP 1005511, LOT 31 DP 1009967 & LOT 4 DP 876394 – JENOLAN CAVES ROAD HARTLEY NSW 2790

Please find enclosed your abovementioned Section 96 Modification of Consent Approval. You are advised that the following conditions of your consent have been amended:

Condition 1.
Condition 27.
Condition 28.
Condition 29.

Added:

Condition 9A.
Condition 9B.

As shown in **Bold.**

We seek your assistance in minimising delays to your application by quoting the full reference application no. in all your correspondence and enquiries to Council.

Your Development Planner is Paul Cashel who can be contacted on 63549999 between 12.00pm – 1.00pm Monday to Friday in Council's Environment & Development Department. Interviews at other times may be arranged by appointment.

Please do not hesitate to contact your Development Planner should you have any concern or enquiry in respect to your development.

Yours sincerely

Paul Cashel

P G Cashel
TEAM LEADER DEVELOPMENT PLANNING

enc

NOTICE OF DETERMINATION
OF SECTION 96 MODIFICATION OF CONSENT

(Pursuant to Pt 4, Div 2, Section 96 of the Environmental Planning & Assessment Act 1979)

Development Application No	103/94DA
Modification of Consent No.	S96029/14
Applicant's Name & Address	DARRYL THIEDEKE C/- HY-TEC INDUSTRIES PTY LTD PO BOX 6770 SILVERWATER NSW 1811
Owner's Name(s)	HARTLEY PASTORAL COMPANY PTY LTD
Land to Be Developed	LOTS 1 & 2 DP 1005511, LOT 31 DP 1009967 & LOT 4 DP 876394 JENOLAN CAVES ROAD HARTLEY NSW 2790
Proposed Modification	HARD ROCK QUARRY AND ASSOCIATED PROCESSING PLANT – THE EXTRACTION OF TWO ADDITIONAL BENCHES, AT ELEVATIONS OF 715M AHD AND 700M AHD TO QUARRY 2 MILLION TONNES
Classification of Building(s)	N/A
Determination	Consent granted subject to conditions in attached Schedule A
Integrated Approval Bodies / General Terms of Approval	The NSW Office of Water – Confirms the existing General Terms of Approval (for 'works' requiring a Controlled Activity Approval under the Water Management Act 2000), remain unchanged for the amended proposal and no amendments to the General Terms of Approval are necessary. However, the applicant will need to apply to amend the Controlled Activity Approval 10 ERM2012/0616 to reflect these changes.
Approved Documentation	Hy-Tec Industries Pty Limited Statement of Environmental Effects dated July 2014 and "Response to Submissions" dated October 2014
Other Approvals Under Section 68 of Local Government Act 1993	Nil

Consent to Lapse On	22 March 2000 (unless 'physically commenced' in accordance with provisions of the Environmental Planning & Assessment Act 1979)
Consent to Operate from	22 March 1995
Determination Made On	15 December 2014
Schedules / Attachments	A. Conditions of Consent (Consent Authority) B. Reasons for Imposition of Consent Conditions
Rights of Appeal	In accordance with Section 82A of the Environmental Planning Assessment Act 1979 you may request the Council to review the determination of the application within 6 months from the date of this determination. However, Section 82A does not apply to Designated Development, Integrated Development or State Significant development. If you are dissatisfied with the decision, Section 97 of the Environmental Planning and Assessment Act 1979 gives you the right to appeal to the Land and Environment Court within 6 months after the date on which you receive this notice. Section 98 of the Environmental Planning Assessment Act 1979 allows an objector who is dissatisfied with the determination of a consent authority to grant consent to a development application for Designated Development within 28 days after the date on which notice of the determination was given, appeal to the Land and Environment Court.
Name of Authorised Officer	P G Cashel
Signature of Authorised Officer (on behalf of the Consent Authority)	Paul Cashel
Position of Authorised Officer	TEAM LEADER DEVELOPMENT PLANNING

Schedule A
Conditions of Consent (Consent Authority)

Please Note: It should be understood that this consent in no way relieves the owner or applicant from any obligation under any covenant affecting the land.

The amended and additional conditions have been highlighted in bold for your reference.

ADMINISTRATIVE CONDITIONS

1. The development is to be carried out generally in accordance with the development application and accompanying Environmental Impact Statement prepared by Sinclair Knight Merz, dated 2nd August, 1994, as amended by the Revised Hartley Quarry Proposal prepared by Minenco Pty Ltd, dated February, 1995, except as may be modified by the conditions of this consent.

   Note: The development is to be carried out generally in accordance with the modified development application and accompanying Environmental Impact Statement prepared by Darryl Moore, Principle Consultant, Evermoore Environmental Services, dated August 2009 and the Statement of Environmental Effects prepared by R.W. Corkery & Co. Pty Limited, dated June 2012.

   The development is to also be carried out generally in accordance with the modified development application (Stage 1A) and accompanying Statement of Environmental Effects prepared by R.W. Corkery & Co. Pty. Limited, dated July 2014 (Ref No. 652/25).
   (Amended 9 August 2011 – S96)
   (Amended 27 November 2012 – S96023/12)
   (Amended 15 December 2014 – S96029/14)

2. There is to be no quarrying, processing, loading or transportation on Sundays and Public Holidays.

3. This consent shall lapse 25 years from the date of endorsement.

   Note: the date of endorsement relevant to this condition is 22 March 1995.
   (Amended 27 November 2012 – S96023/12)

Environment Protection Authority

4. a) That the developer shall obtain from the Environment Protection Authority all statutory approvals required under the Clean Air Act, 1961, Clean Waters Act, 1970 and the Noise Control Act, 1975. Further, the approval of the E.P.A. is also required in relation to the siting, installation and management of the effluent disposal system to be installed on the site. Approval is also required for the operation, control and management of the truck wash bay.

   b) In the event of emissions from the development exceeding the approved levels, or in the event that there are adverse effects on the environment beyond those anticipated at the date of this consent and which can be reasonably attributed to emissions from the proposal, the developer shall comply with the conditions, directions or notices issued under the foregoing Acts aimed at achieving the approved levels of emissions or at mitigating or eliminating the adverse effects.

Transportation and Access

5. a) Intersection of the internal haul road with the Jenolan Caves Road to be upgraded to the satisfaction of the Roads and Traffic Authority, incorporating an AUL layout, designed in accordance with the guidelines set down under Section 4 of the Road Design Guide. The Authority reserves the right to monitor the operation of this intersection and if it proves unsatisfactory, the intersection will have to be upgraded to a composite AUR/AUL intersection at full cost to the developer.

b) Imposition of a 40km/h speed restriction on trucks and buses on the section of Jenolan Caves Rd, from its intersection with the Great Western Highway to the haul road intersection.

c) All appropriate road side signs and furnishings including guide posts, linemarking and protection fencing, to be provided to the satisfaction of the R.T.A.

d) Engineering plans to be submitted to Council for the construction of the internal haul road. Such to be submitted, approved and the road installed prior to the operation commencing.

e) The developer is required to progressively seal the access road into the quarry. The initial stage will be the section between the Caves Rd and the Truck Wash Station, which will be required to be completed prior to the operation commencing. In consultation with Council Officers and the Soil Conservation Service, the remaining sections of the access road will be sealed commencing in the steeper sections. The developer is required to complete the sealing of the access road within 5 years of the commencement of the operation or when production reaches 300,000 tonnes per annum. The developer is required to take any dust suppression measures required by the Council until such time as the road is fully sealed.

f) The developer to provide details of means of access to the quarry area from the haul road.

Infrastructure

6. a) The developer to consult with Prospect Electricity regarding the provision of an electricity supply to the proposed development.

b) The developer to consult with Telecom Australia regarding the provision of a telephone supply to the proposed development.

Flora and Fauna

7. a) The developer to undertake a program of annual monitoring of fauna and fauna habitats in the vicinity of the quarry and stockpile areas, to monitor any indirect impacts from the operation. Such to be included in the annual report to be submitted to Council.

   b) The developer is to pursue the attainment and fund implementation of a Conservation Agreement or flora preservation conditions over suitable E Pulvurulenta habitat identified by the National Parks and Wildlife Service of N.S.W., within the Hartley area.

   c) The developer is to provide funding for the ex-situ growing of the species, E Pulverulenta, under the supervision of the National Parks and Wildlife Service and in conjunction with the Mt Tomah annex of the Royal Botanic Gardens, or other appropriately qualified organisation acceptable to the Service.

   d) The developer is required to establish a riparian corridor prior to construction commencing. The riparian corridor should be constructed to the satisfaction of the Department of Water Resources.

   e) The proponent to consult with the Department of Agriculture regarding the eradication of Serated Tussock with the site of the processing area.

Archaeology

8. a) The developer is to comply with the recommendations of the Archaeological Assessment as undertaken by Mills and Wilkinson Archaeology Consultants, as incorporated in the E.I.S.

   b) The developer, shall consult with the Gandangara Local Aboriginal Land Council, during construction and operation of the quarry.

Water Management

9. a) The developer shall produce a site specific Soil and Water Management Plan for each component of the development detailing all proposed drainage diversion channels, collection pits and sedimentation dams to be constructed on site. Such plan to be developed in consultation with the Soil Conservation Service and be to the satisfaction of Council and the Soil Conservation Service.

b) The developer shall manage surface runoff within the site in accordance with the Soil and Water Management Plan.

c) The developer shall consult with the Soil Conservation Service prior to the construction of runoff diversion, erosion and sedimentation control works and sediment dams, and these work areas to be constructed to capacities and standards satisfactory to Council and the Soil Conservation Service.

d) All activities involving oil, fuel and other chemicals which have the potential to pollute groundwater should be contained within an impermeable bunded area, roofed to the satisfaction of the Environment Protection Authority.

e) All drainage channels/trenches, sedimentation ponds/dams and pollution control structures should be lined and sealed with impermeable material to the satisfaction of the Department of Water Resources.

f) The developer to apply for a permit from the Department of Water Resources for the construction works at Yorkeys Creek, under Section 3A of the Rivers and Foreshores Improvement Act.

9A. An appropriate and scientifically robust groundwater and surface water assessment shall be prepared within six months of the approval [15/12/14] and shall be provided to Council and the SCA for review and comments. The assessment shall address the following:

- **quantification of groundwater to be dewatered**
- **impacts on baseflows of Yorkeys Creek and Coxs River and associated ecosystems**
- **details on existing volumes, frequency and quality of controlled and uncontrolled discharges to Yorkeys Creek and Coxs River over the last 5 years**
- **estimation of volumes, frequency and quality of controlled and uncontrolled discharges from the proposed modification**
- **existing water quality in Yorkeys Creek and Coxs River and impacts of discharges from the proposed modification on the water quality of these waterways, and**
- **existing and proposed surface water and groundwater monitoring programs.**

(Inserted 15 December 2014 – S96029/14)

9B. "The applicant is to provide an Operations Environmental Management Plan (OEMP) (draft is acceptable) within one month of the approval of the 'Stage 1A' modification application [15/12/14] for comments to ensure the site has appropriate surface and ground water management measures and monitoring programs including locations, frequencies and analytes are in place at the site."

(Inserted 15 December 2014 – S96029/14)

Noise Management

10. a) The developer is to implement all noise attenuation measures as outlined in the E.I.S. This includes either fully enclosing the primary and secondary crushers or installing environmental grade mufflers and engine side covers on these facilities.

b) Blasting shall only occur at the site between 10.00am and 3.00pm, Monday to Friday.

c) The developer or any other person operating the mine, shall advise owners of adjoining land by telephone or mail, 1 week prior to each blast, of the intended date and time of the proposed blast.

Fire Protection

11. The developer to provide details of all proposed fire fighting facilities and measures to be installed on the site including water storage capacities, location of hydrants etc.

Internal Roads and Buildings

12. The developer shall, prior to the commencement of construction of the development, obtain the consent of Council for design plans and specifications for all roads, carparking facilities and buildings upon the site.

Building Applications

13. Submission and approval of a building application for all structural work to be carried out in association with the development, including all structural engineering details certified by a structural engineer.

Landscaping

14. That the developer shall prepare and submit to Council for its consideration and approval, within six months of development approval:

a) fully detailed landscaping plans covering all components of the development, including proposed bunding and landscape screening, as identified in the E.I.S. as amended. The developer shall employ a qualified landscape architect to assist in this component of the development.
b) proposals for the visual appearance of the structural components of the development incorporating paint colour and specifications. Buildings and structures are to be constructed of non-reflective material, and designed so as to present a neat orderly appearance and to blend with the surrounding landscape.
c) A comprehensive Plan of Management, which shall consist of detailed plans, specifications and staged work programs to be undertaken whilst the quarry is in operation, including rehabilitation and landscape works, soil and water management

programs, infrastructure installation and maintenance and the environmental monitoring program.

Rehabilitation

15. a) As part of the overall Plan of Management, the developer shall submit a "Stage Specific Management Plan" for approval. The "Stage Specific Management Plan" shall provide detailed information relative to each stage or sequence of extraction and rehabilitation of that area. The rehabilitation plans shall clearly identify finished contours, top soil depths, drainage/siltation controls, plant and grass materials to be used and proposed means of camouflaging the exposed quarry face. It should also detail means of maintaining all rehabilitation works.

b) Prior to preparation of the rehabilitation program to be submitted to Council in accordance with (a), above, the applicant shall consult with the Soil Conservation Service and National Parks and Wildlife Service in relation to the content of each rehabilitation program.

c) The developer shall, before commencing quarrying of each stage shall lodge with the Council a guarantee deposit or bank guarantee for a sum equal to the cost of carrying out restoration work associated with that specific stage rehabilitation plan, to fully compensate the Council in the event of any expense being incurred by Council in relation to the restoration work specified in this consent.

d) Upon satisfactory completion of restoration works for each stage, Council will release the particular monetary guarantee.

e) The developer shall conserve all topsoil from disturbed areas for use in rehabilitation and consult with the Soil Conservation Service during topsoil stripping and stockpiling in respect to erosion protection and long term viability of the stockpiles where immediate reuse is not possible.

f) The developer shall consult with the Soil Conservation Service in respect to progressive and final implementation of rehabilitation works and these are to be carried out to the satisfaction of the Soil Conservation Service and Council.

g) The developer shall consult with the Soil Conservation Service to obtain the necessary authority to destroy trees on "Protection Land" under the Soil Conservation Act, 1938.

h) The developer shall consult with the N.S.W Department of Agriculture and the Soil Conservation Service of N.S.W. concerning appropriate vegetative species selection, seedling establishment techniques, soil testing and fertilizer selection and application for all rehabilitation works.

Approvals to Council

16. The developer shall furnish to Council copies of all required approvals from Government Departments and other statutory authorities

Mineral Resource Approval

17. a) The proponent shall comply with the provisions of the Mines Inspection Act 1901, as amended.

b) The proponent shall not commence any physical work upon the site, including construction work, until they have fully complied with the Mines Inspection Act 1901, as amended, and particularly in regard to the appointment and registration of a mine manager.

c) The proponent is to supply a copy of the Company's safety policy to the Department.

d) The proponent is to provide details to the Department of Mineral Resources on how it proposes to suppress dust at each phase of the quarrying operation.

e) All fixed plant must comply with Australian Standard 1657-1992, Fixed Platforms, Walkways, Stairways and Ladders- Design, Construction and Installation.

f) All explosives and detonator magazines will require Depot Licences.

g) The proponent to investigate whether or not the proposed quarry development involves a prescribed mineral, as defined under the Group 4 list of Minerals in the Mining Act 1992.

Monitoring

18. a) The developer shall carry out all those operating and monitoring measures as describe and specified in the environmental impact statement to prevent, minimise or ameliorate adverse environmental impact except where there is inconsistency between the said measures and the conditions of this consent or the reasonable requirements of the authorities referred to herein, the conditions of this consent, or the requirements of the authorities shall prevail.

b) The developer shall institute and implement a comprehensive monitoring program for air, water and noise emissions and their effects on flora, fauna, agriculture and domestic landuses, surface and underground waters, to meet the requirements of the Environment Protection Authority, the other relevant Government Departments and Council.

c) The developer is to undertake microinvertebrate monitoring upstream and downstream of the development site prior to and during the life of the quarry, to monitor and minimise impacts to the aquatic environment.

d) The developer shall prepare an annual report containing all monitoring data with an analysis of the data and providing an assessment of the effectiveness or otherwise of its environmental control measures and methodologies.

e) The first of such reports shall be completed and submitted within 12 months of the date of commencement of construction at the site, and thereafter within each succeeding 12 months, to Council, the Environment Protection Authority, Soil Conservation Service, Water Resources and the National Parks and Wildlife Service.

f) The annual water quality monitoring report shall be provided to the Sydney Catchment Authority for comment.
(f) Inserted 27 November 2012 – S96023/12)

Transportation

19. Trucks and transport are permitted to be loaded and unloaded at the Premises between 5.00am and 10.00pm Monday to Friday and 5.00am to 3.00pm on Saturdays.
(Inserted 9 August 2011 – S96)

20. The applicant must pay the RTA its costs of $42,340 to undertake the works on the Glenroy Bridge outlined in the correspondence from the RTA to the Applicant dated 22 June 2011.
(Inserted 9 August 2011 – S96)

21. The applicant must install, at its cost, two reduce noise signs on the north and the south of the Glenroy Bridge, Jenolan Caves Road, Jenolan Caves, subject to the requirements of the RTA.
(Inserted 9 August 2011 – S96)

22. The applicant must implement the Austen Quarry – Road and Traffic Management Plan, dated 22 June 2011.
(Inserted 9 August 2011 – S96)

23. The Applicant must obtain a variation of Condition L8 (Hours of Operation) of its Environmental Protection Licence numbered 12323 to the following effect:

> *"The loading and unloading of trucks and transport is permitted at the Premises between the hours of 5.00am and 10.00pm Monday to Friday and 5.00am to 3.00pm on Saturdays only."*

(Inserted 9 August 2011 – S96)

Dams

24. A properly engineered wall of the main Sedimentation Dam (Dam 1) and associated spillway and discharge point shall be constructed within twelve months of this modification approval.
(Inserted 27 November 2012 – S96023/12)

25. A review shall be undertaken of the structural stability of all stormwater dams on the site, including any discharge points, and any identified upgrade works implemented as soon as practicable.
(Inserted 27 November 2012 – S96023/12)

26. The Operational Environmental Management Plan for the site shall be reviewed, and updated in consultation with the Sydney Catchment Authority within six months of this modification approval.
(Inserted 27 November 2012 – S96023/12)

Erosion and Sediment Control

27. **A detailed Erosion and Sediment Control Plan shall be prepared for any earthworks, by a person with experience in the preparation of such plans. The Plan shall be consistent with the requirements outlined in Chapter 2 of NSW Landcom's *Soils and Construction: Managing Urban Stormwater Volume 1* (2004), and the requirements outlined in DECC's *Soils and Construction: Managing Urban Stormwater Volume 2E Mines and Quarries* (2008).**
(Inserted 27 November 2012 – S96023/12)
(Amended 15 December 2014 –S96029/14)

28. **Effective erosion and sediment controls shall be installed prior to any construction activity, and shall prevent sediment-laden runoff leaving the site or entering any natural drainage system for storm events up to and including the design storm event as required by Landcom's *Soils and Construction: Managing Urban Stormwater Volume 1* (2004), and the requirements outlined in DECC's *Soils and Construction: Managing Urban Stormwater Volume 2E Mines and Quarries* (2008). The control shall be regularly maintained and retained until works have been completed and groundcover established.**
(Inserted 27 November 2012 – S96023/12)
(Amended 15 December 2014 – S96029/14)

Water

29. The applicant has to obtain a current Controlled Activity Approval from Office of Water for any "works' (as defined by the EPA Act) carried out in, on or under the Waterfront Land (bed, bank and 40m from top of bank) within the subject site.

The Water Management Plan proposed for the extended operations should be developed in consultation with the Office of Water prior to implementation, including suitable consultation on the proposed surface water and groundwater monitoring activities [following approval of the Stage 1A Modification – 15/12/14].
(Inserted 27 November 2012 – S96023/12)
(Amended 15 December 2014 – S96029/14)

Schedule B

REASONS FOR CONDITIONS

The conditions in Attachment 1 have been imposed for the following reasons:

- To ensure compliance with the terms of the relevant Planning Instruments
- To ensure no injury is caused to the existing and likely future amenity of the neighbourhood
- Due to the circumstances of the case and the public interest.
- To protect the environment.
- To prevent, minimise, and/or offset adverse environmental impacts.
- To ensure there is no unacceptable impact on the water quality.
- To ensure adequate soil conservation and protect against movement of soil and sediments.

Appendix B: EPA Licence

Environment Protection Licence

Licence - 12323

Licence Details	
Number:	12323
Anniversary Date:	01-July

Licensee

AUS - 10 RHYOLITE PTY LIMITED

391 JENOLAN CAVES ROAD

HARTLEY NSW 2790

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

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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
391 JENOLAN CAVES ROAD
HARTLEY NSW 2790

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.

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.

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	Dischare to Waters; Discharge Quality Monitoring	Dischare 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

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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\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

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

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

L2.4 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

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 fron 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

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.

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 0600 hours and 1800 hours Monday to Friday, and 0700 hours and 1500 hours Saturday, and at no time on Sundays and Public Holidays.

L6.2 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.

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.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

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

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

M2 Requirement to monitor concentration of pollutants discharged

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

Environment Protection Licence

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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

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

POINT 11,8,9,10,1

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

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 occuring 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:
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.

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

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

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

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

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

M5 Telephone complaints line

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

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

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

M6 Requirement to monitor volume or mass

M6.1 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;

at the frequency and using the method and units of measure, specified below.

POINT 11,8,9,10,1

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

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 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 harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

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

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

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

7 General Conditions

G1 Copy of licence kept at the premises or plant

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

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

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

Environment Protection Licence

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.

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.

Environment Protection Licence

Licence - 12323

Dictionary

General Dictionary

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

Environment Protection Licence

Licence - 12323

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder 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 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

Licence - 12323

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

Appendix C: Flora and Fauna Report 2015

HY-TEC Quarries Pty Ltd

Ecological Monitoring Report November 2015 Austen Quarry, Hartley

J061_RPT8_ Austen Quarry Eco Mon 2015 v1.0

February 2016

Document Control

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Authorised by:	David Bone	Date:	02/02/2016

Disclaimer

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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, Chris Churcher, Hunsamon Churcher, Brooke Weber and Callan Douchkov over a three day and one night period between the 10th of November 2015 and the 12th of November 2015. Weather conditions during the survey were mild mornings and warm throughout the day, ranging between 6.1 – 25.6 degrees. Average wind speeds were calm to moderate, not exceeding 7 km/h, with 0.4 mm of rainfall during the survey period.

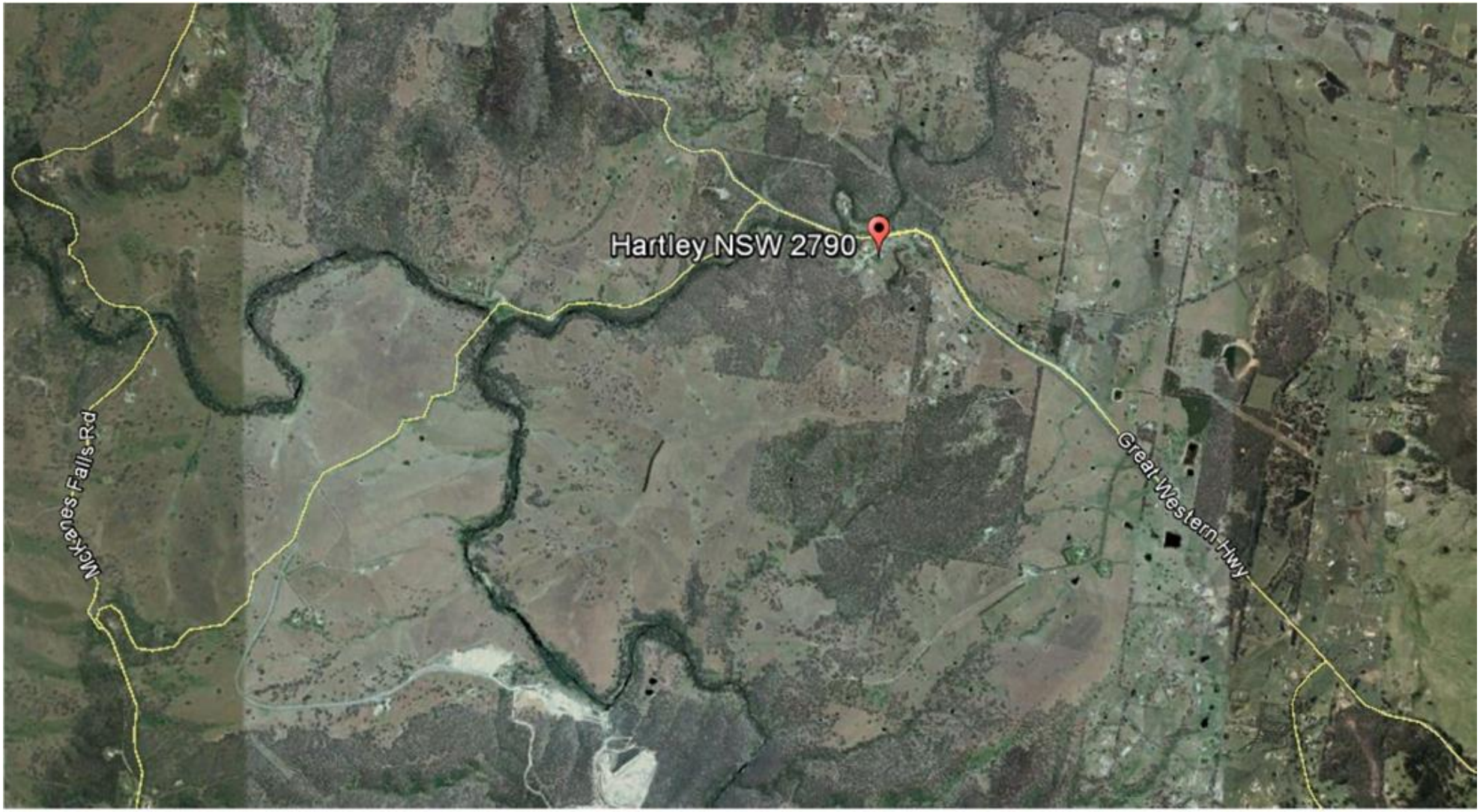
2. Background Information

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.



Source: Google Maps Imagery 2015

Aerial Photograph of Project Sites
HY-TEC Austen Quarry, Hartley

061-2015

Austen Quarry Ecological Monitoring 2015

Figure 1

2.2 History of Monitoring Programs

Development for the quarry was granted by Lithgow City Council in 1995 (DA 104/93). Flora and fauna issues are dealt with in section 7. In particular, condition 7a requires that the developer undertake:

"*a program of annual monitoring of fauna and fauna habitats in the vicinity of the quarry and stockpile areas, to monitor any indirect impacts from the operation"*

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

The approach undertaken by OSEM for this survey has been to survey the site utilising the sites used during the 2006 monitoring and to focus on flora and fauna habitat quality as required by the consent.

To assess the indirect impact of quarry activities on fauna and their habitats as required by condition 7(a), the following approach was taken.

Fauna 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 the 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.

2.3 Threatened Species

A search of the NSW Bionet Atlas of Australian Wildlife and the Federal EPBC Protected Matters Search Tool databases, determined threatened species potentially present within a 10 kilometre radius of the project site. One new plant species, *Acacia meiantha*, was listed within this radius from the previous 2014 monitoring period. The threatened species list and database searches can be found in Appendix C.

3. Survey Methodology

3.1 Survey Timing

The ecological survey was conducted during the middle of November 2015 over a three day and one 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 only 0.4mm of rain recorded. After the night surveying had been completed. Temperatures ranged from 6.1 to 25.6 degrees Celsius at Lithgow Bureau of Meteorology Site 063226.

It should be noted that quarry operations have made incursions into the ridge monitoring sites since the 2012 monitoring period, in particular the Impact Ridge and South Ridge sites. These changes are highlighted in Figures 3 and 4 below, which show a comparison between previous mapping containing 2009 imagery, and 2015 aerial photographs.

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.

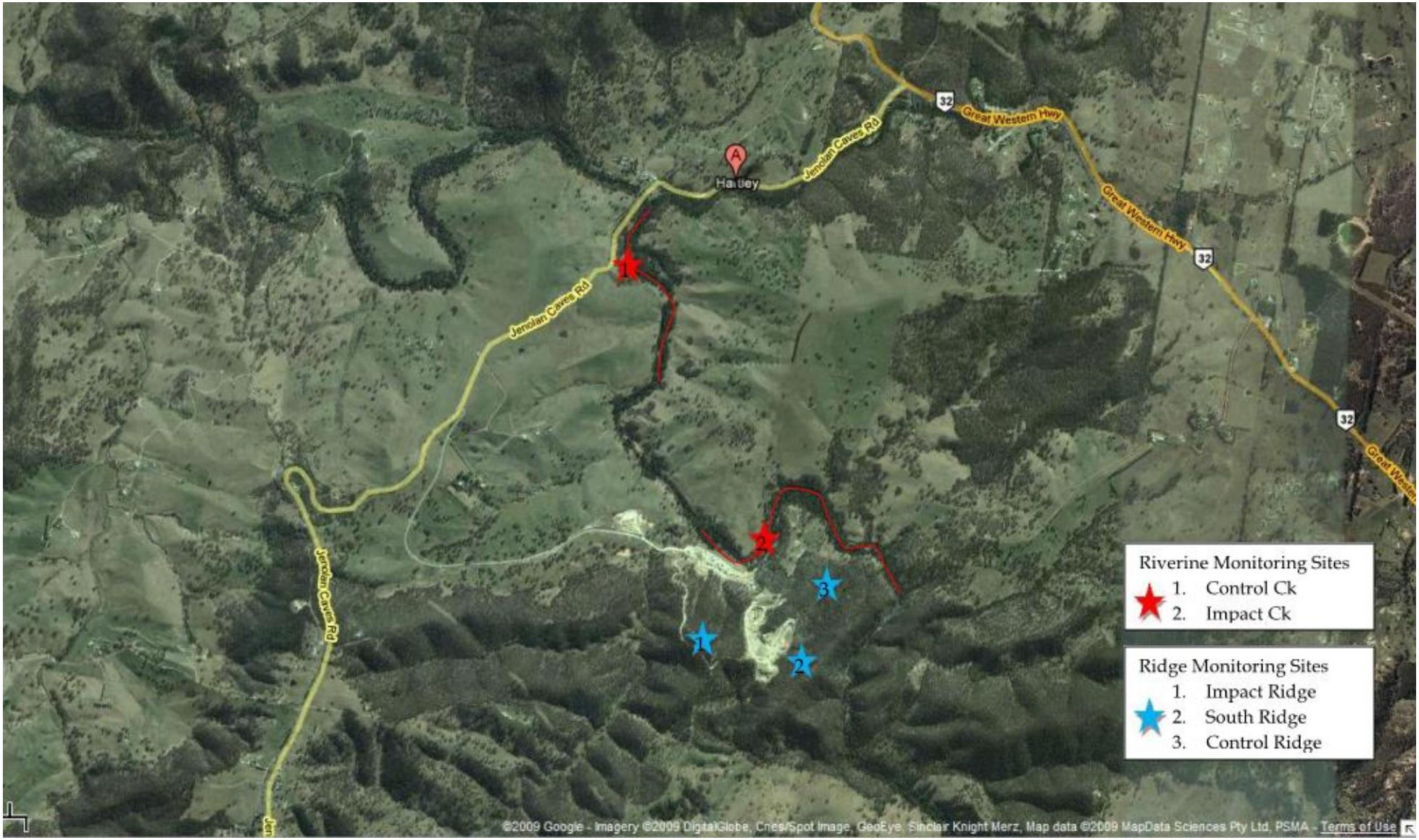
3.3 Flora Survey Techniques

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) were added to the monitoring program for this period, 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.



Source: Google Maps Imagery 2009

Survey Site Locations

061-2015

Austen Ecological Monitoring 2015

Figure 2

N

061-2015

OnSite Environmental Management

Source: Google Maps Imagery 2009

Flora Survey Transects (2009 Imagery)

Austen Ecological Monitoring 2015

Figure 3

Source: Google Maps Imagery 2014

Flora Survey Transects (2014 Imagery) and new quarry operations

061-2015

Austen Ecological Monitoring 2015

Figure 4

N

061-2015

OnSite Environmental Management

Source: Near Maps 2015

Rehabilitation Area Transects

Austen Quarry Ecological Monitoring 2015

Figure 5

4. Results

4.1 Flora Communities

There are two distinct vegetation communities present on the lease:

- Riparian forest along the Cox's River.
- Dry Sclerophyll 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 and north-east).

The ridge sites lie to the east, west and south of the active mining area. Impact sites are to the west of the operations and between the quarry area and the access road to the quarry. The eastern site is only accessible by foot, and the southern site is accessed off the emplacement area road to the south of the quarry.

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 only 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.

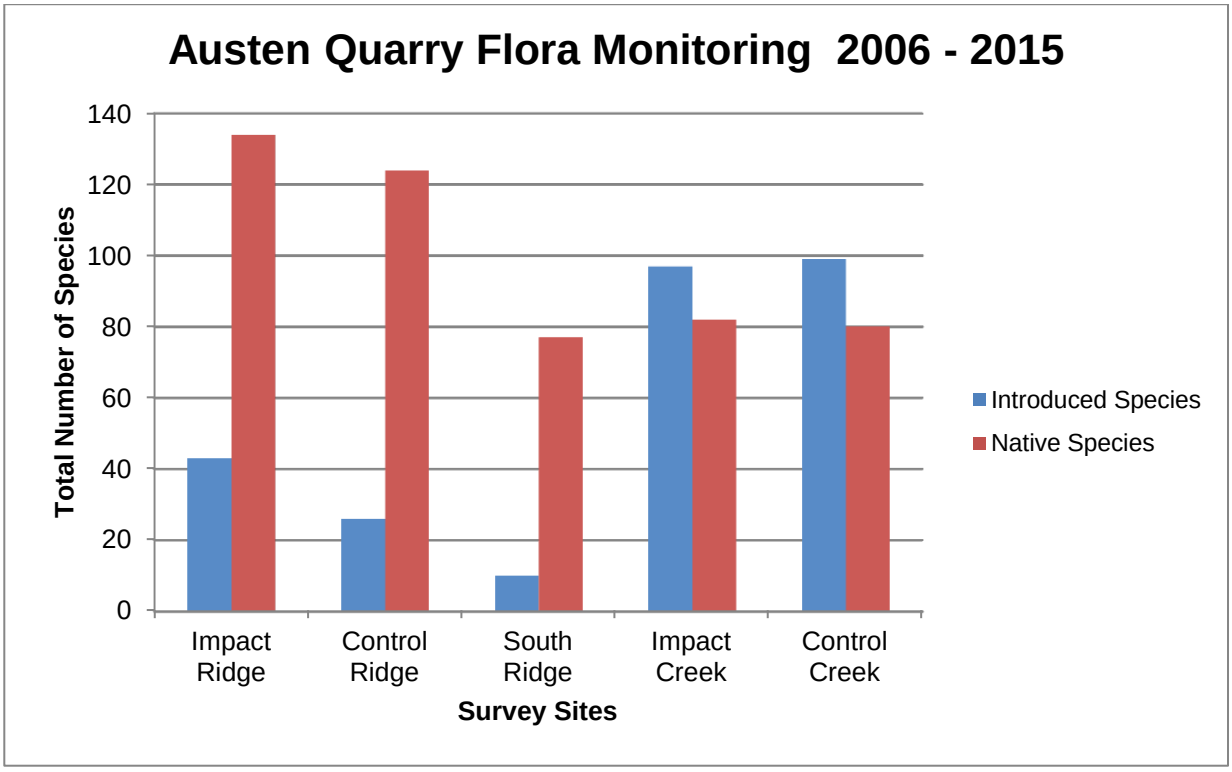


Chart 1: Cumulative Flora Survey data 2006 – 2015.

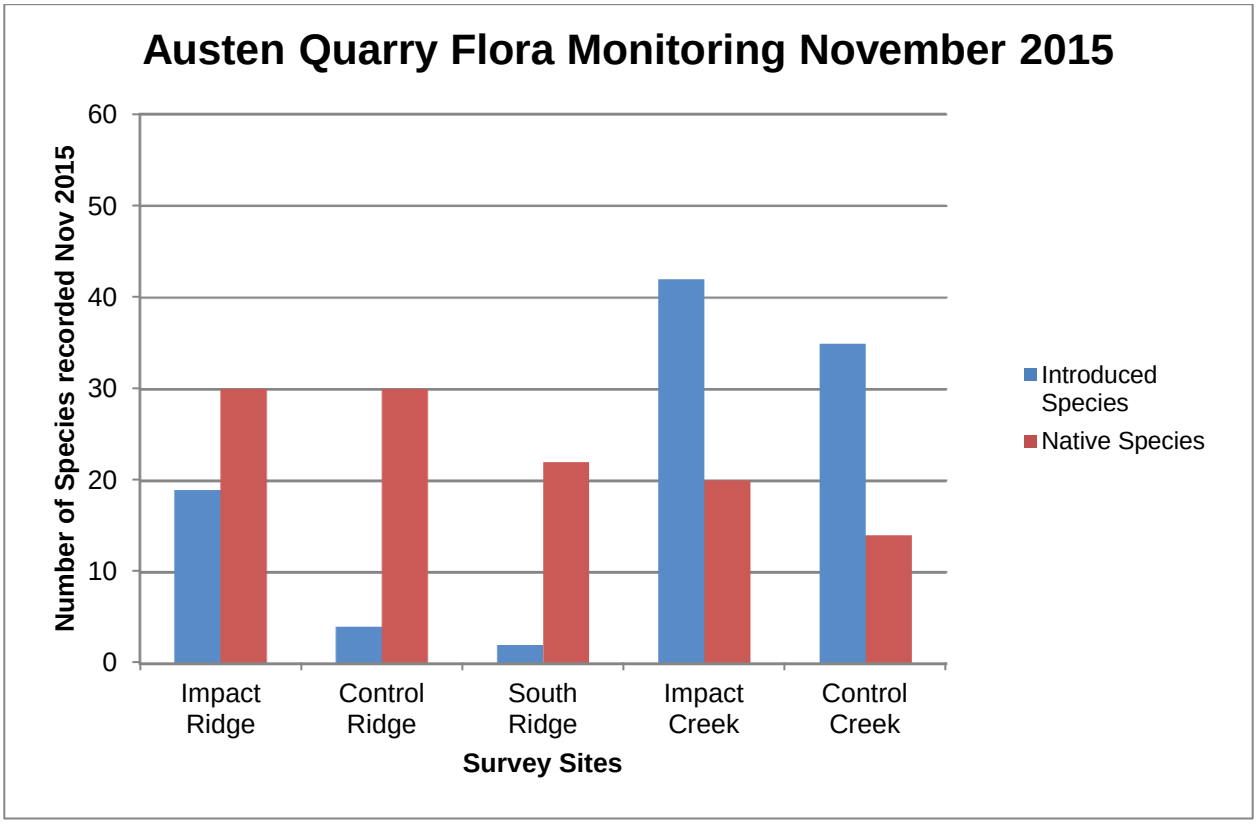


Chart 2: November 2015 Flora Survey data.

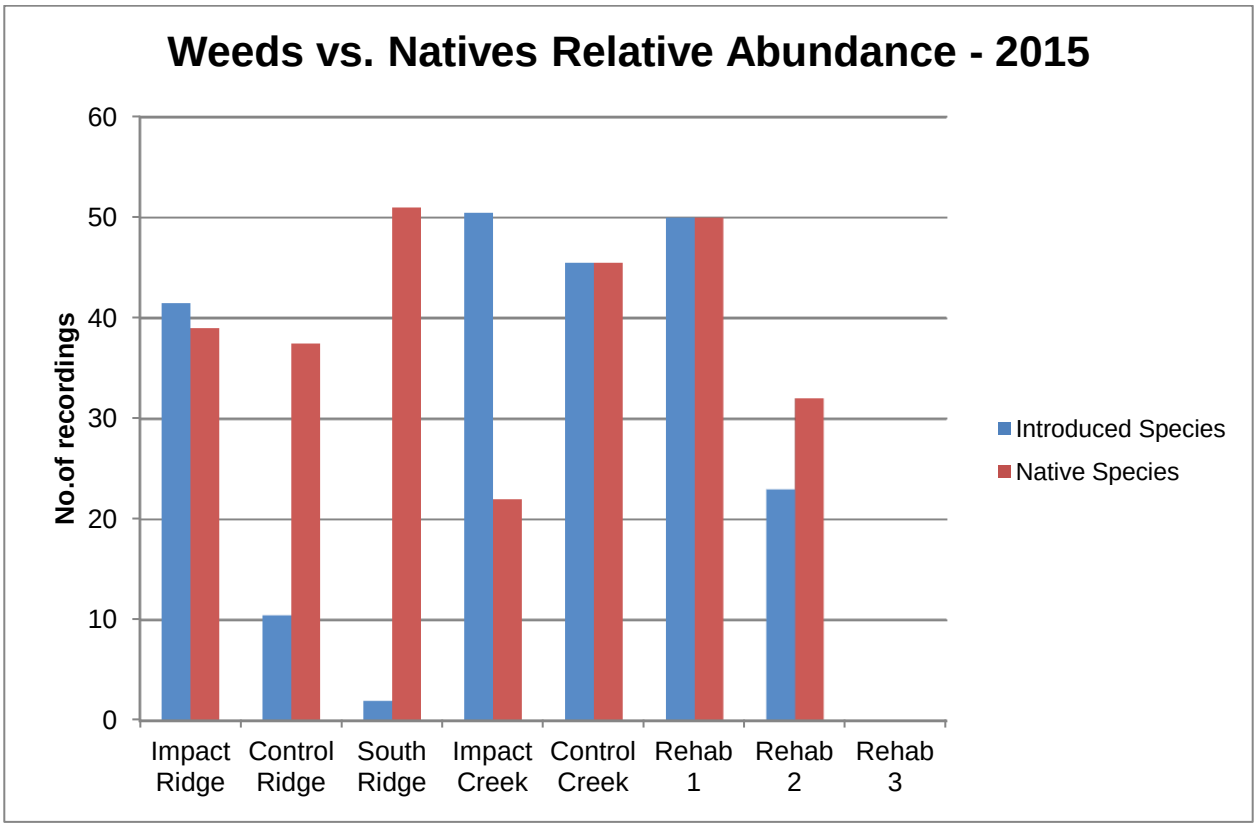


Chart 3: November 2015 Weeds Vs Natives Relative Abundance

Similar to the previous 2014 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. During the survey it was observed that quarry operations are expanding into or in close vicinity to Impact Ridge and South Ridge sites. For example exploratory works for approved quarry expansions adjacent to the South Ridge site have impacted on vegetation within the transect; including some *Eucalyptus pulverulenta* individuals. This transect site will be relocated further to the south in an area of adjacent similar vegetation outside the impact area of the quarry.

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. Little native groundcovers exist in these areas to suppress the spread of weed species, which dominate the ground layers; however the large, established canopy trees are native. An increase in native species numbers from the 2014 monitoring period was recorded at both riverine sites. Impact Creek had a slight reduction in introduced species whilst Control Creek remained stable. 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.
Changes between the 2014 and 2015 monitoring period was noted from the monitoring results as seen in Charts 2 and 3 including a:

- Increase in weed species recorded at Impact Ridge.
- Increase of native species at all sites, particularly at South Ridge and Control Creek.

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

Newly recorded native species-

- Jointed Twigrush *(Baumen articulate).*
- Eastern Nightshade *(Solanum pungentium).*

Newly recorded introduced species-

- Common Buttercup *(Ranunculus lappaceus).*
- Wild Turnip *(Brassica rapa spp sylvestris).*
- Apple of Sodom *(Solanum linnaeanum).*

Monitoring of rehabilitated areas continued this period, with two sites adjacent to the quarry pit operations known as Rehab 1 and Rehab 2, shown in Figure 5. Rehab 3 is currently in the process of being filled and was not accessible during this monitoring period.

Rehab Site 1 has been revegetated since 2010, Rehab Site 2 was revegetated in 2012, and Rehab Site 3 was revegetated in 2013. 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. Few weeds are present and native regeneration of groundcovers and shrubs is occurring from seed recruitment from adjacent bushland, which is evident from the native species richness and low number of weed recorded. A new weed species was recoded for Rehab 1, Wild Turnip; no other new weed species were identified. Topsoil cover was observed to be sparse to not existing in this area.

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

Noxious weeds are also being closely monitored, with an assessment undertaken of their presence and abundance over 7 monitoring sites. This is displayed in Table 2 below, which shows at which sites each noxious weed species was recorded, and provides an abundance rating based on the criteria below:

- 1 - Rare
- 2 - Occasional
- 3 - Common
- 4 - Dominant

From Table 1 it is clear that African Lovegrass (*Eragrostis curvula)*, the most abundant noxious weeds throughout the site, occurring at 5 of the 7 sites. Blackberry (*Rubus fruticosus)* and Serrated Tussock *(Nassella trichotoma)* are the next most prevalent species at the quarry. Table 1 provides the averaged data taken from the two 20x20m quadrats undertaken at the ends of each 50m line transect as described in section 3.

Blackberry was previously confined to the riverine sites however has been located on the impact ridge site. Serrated Tussock and Blackberry continue to be the greatest management issue in terms of weed control at the site, which can be seen from consistently high abundance ratings over the last 4 monitoring periods.

Serrated Tussock displays the potential for further invasion throughout the site as it is found on both ridge and riverine sites, and was also observed within Rehab 1 site. It is easily transported by seed attached to livestock, fauna, personnel, or vehicles / machinery and requires management to prevent and control its spread.

Blackberry continues to be the greatest noxious weed management issue at the riverine sites, with consistently high abundance scores over the last 4 monitoring periods. However given its newly noted presence at ridge sites, may have been transported via fauna such as birds or kangaroos, or with contaminated topsoil or other plant materials used in the rehabilitation areas.

In general, no significant increases in the abundance of weeds on site were recorded during the 2015 monitoring period. Chart 4 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.

Table 1 – Declared Weeds Relative Abundance 2015

Scientific Name	Common Name	Weed Class	Impact Ridge	Control Ridge	South Ridge	Impact Creek	Control Creek	Rehab 1	Rehab 2	Totals
Cytisus scoparius	Scotch Broom	4 WoNS					1.5			1.5
Eragrostis curvula	African Love grass	4 WoNS	2.5			3.5	3.5	2	2	13.5
Lycium ferocissimum	African Boxthorn	4 WoNS				0.5				0.5
Nassella trichotoma	Serrated Tussock	4 WoNS	1.5			1		1		3.5
Orobanche sp.	Broomrape	1 WoNS	0.5							0.5
Rubus fruiticosus	Blackberry	4 WoNS	0.5			1.5	2.5			4.5
Salix sp.	White/ Weeping Willow	4				1	2			3

WoNS – Weed of National Significance, see Appendix B for information on Weed Classes. Weed classes as per DPI classifications for the Lithgow Shire.

Abundance total score is the sum of all abundance ranks across the whole lease.

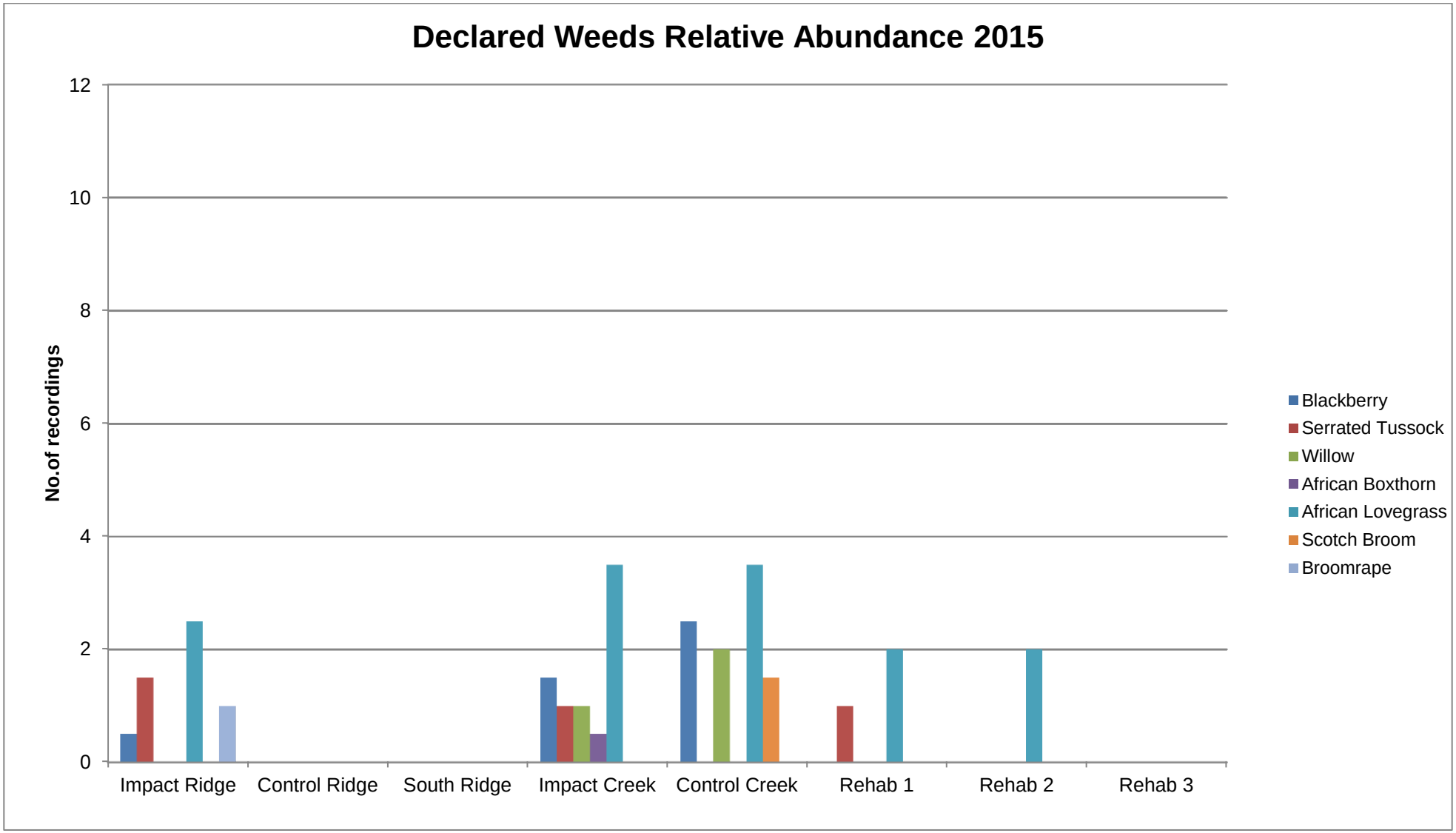


Chart 4: Declared Weed Abundance Scores 2015.

4.2 Fauna Survey Results

The results presented in charts 5 to 15 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.

One new bird, the White-browed Woodswallow *(Artamus superciliosus)* was identified during this monitoring period.

Most groups have recorded slightly lower numbers during this monitoring period compared to previous year's results, most noticeably for birds, with the 2015 monitoring period containing the lowest number of birds observed since monitoring began in 2005.

The amphibian fauna categories have recorded the highest number of observations since 2008.

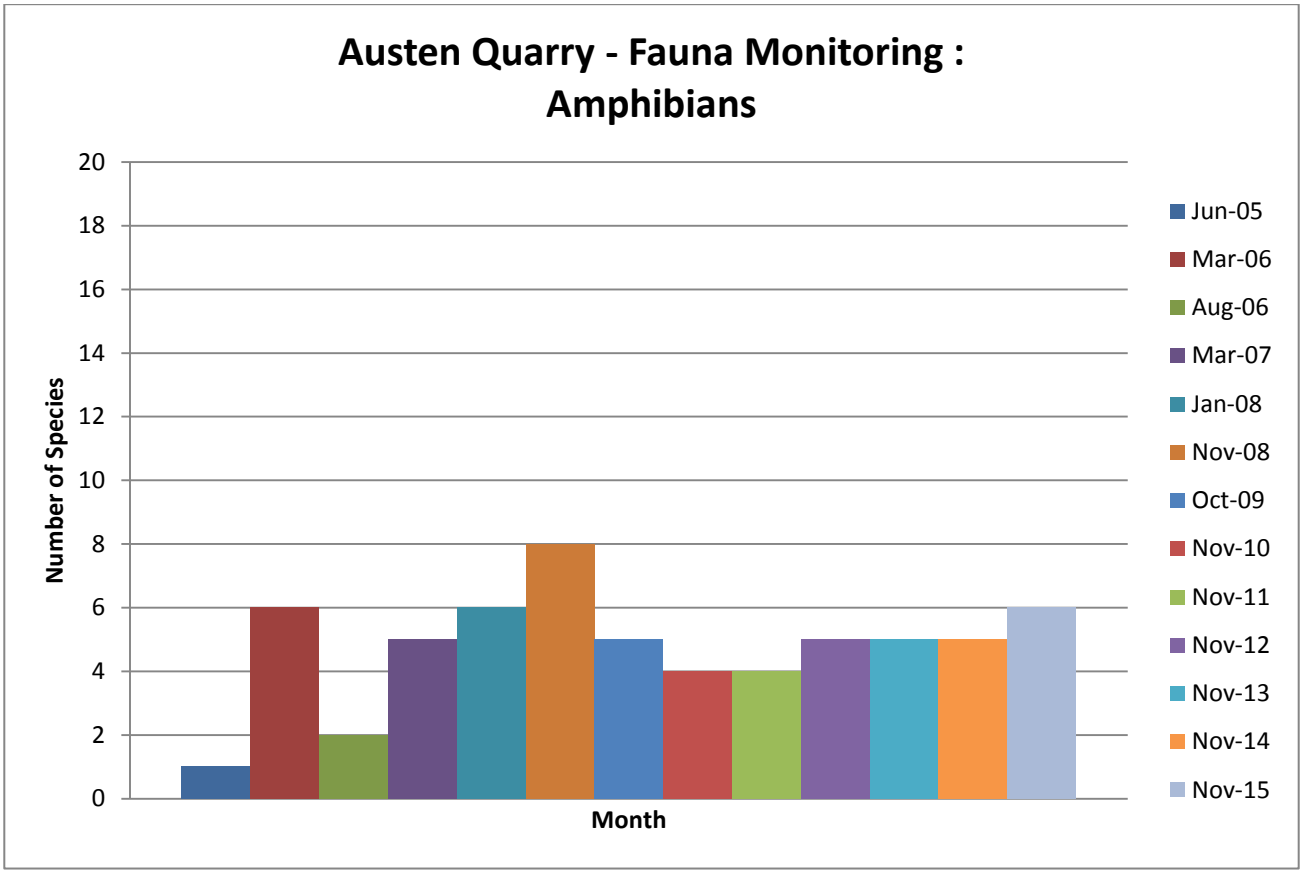


Chart 5: Amphibian results.

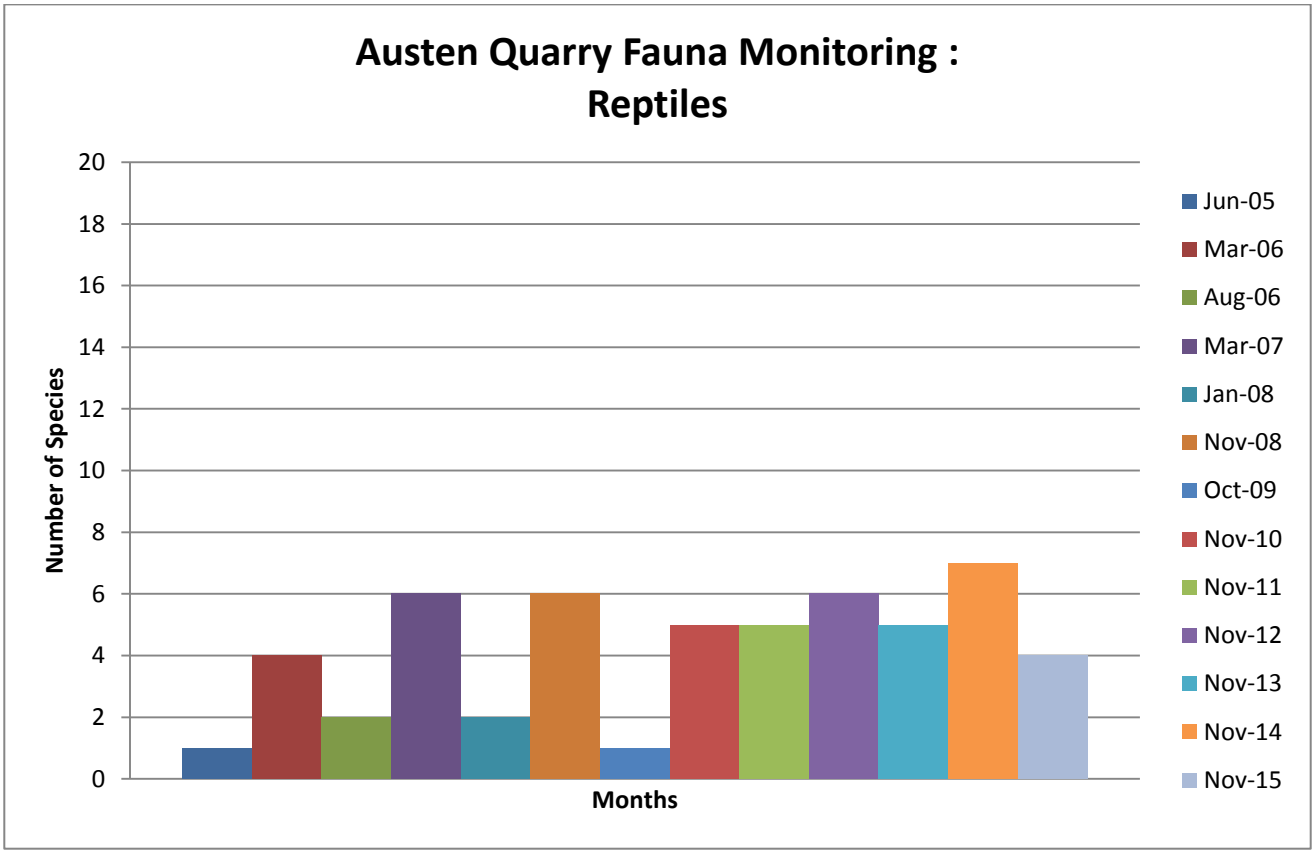


Chart 6: Reptile results.

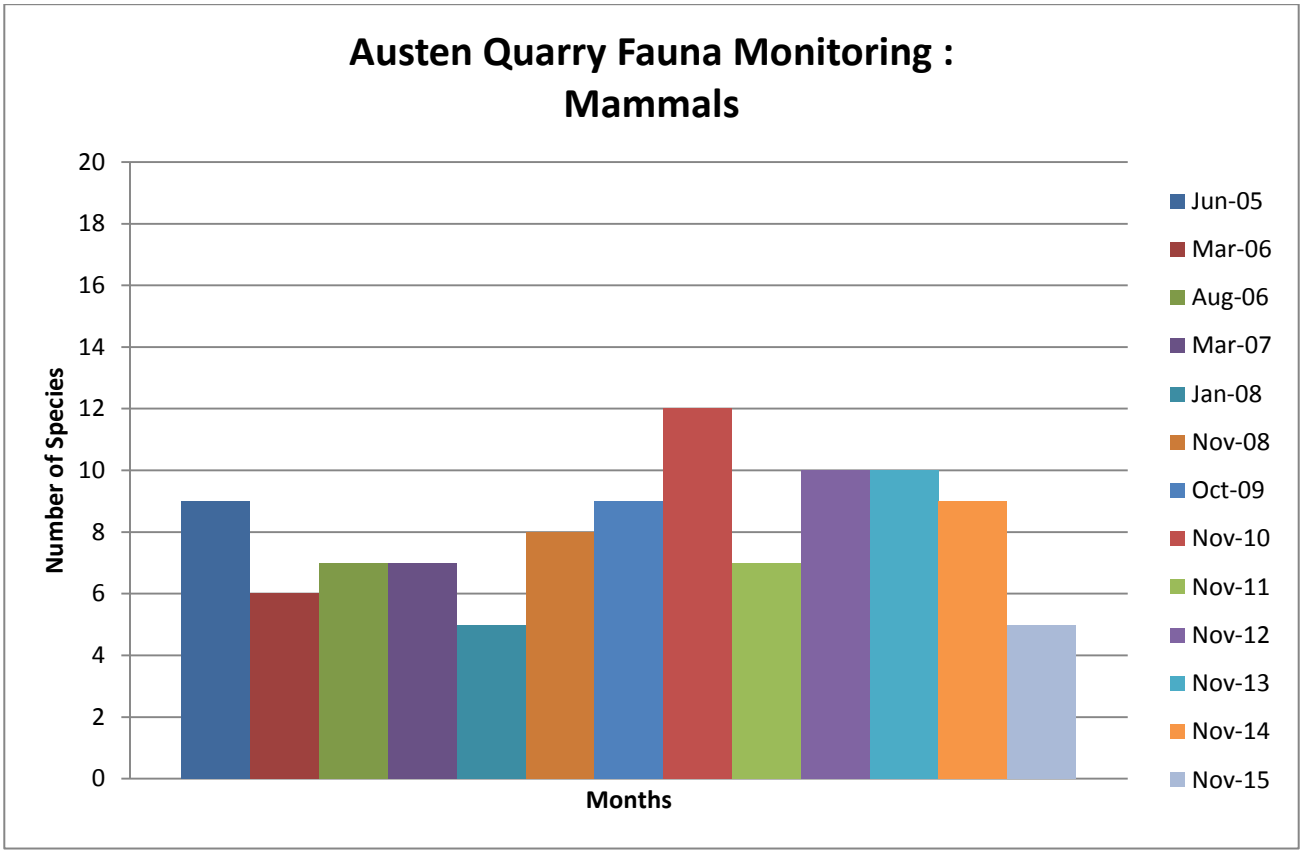


Chart 7: Mammal results.

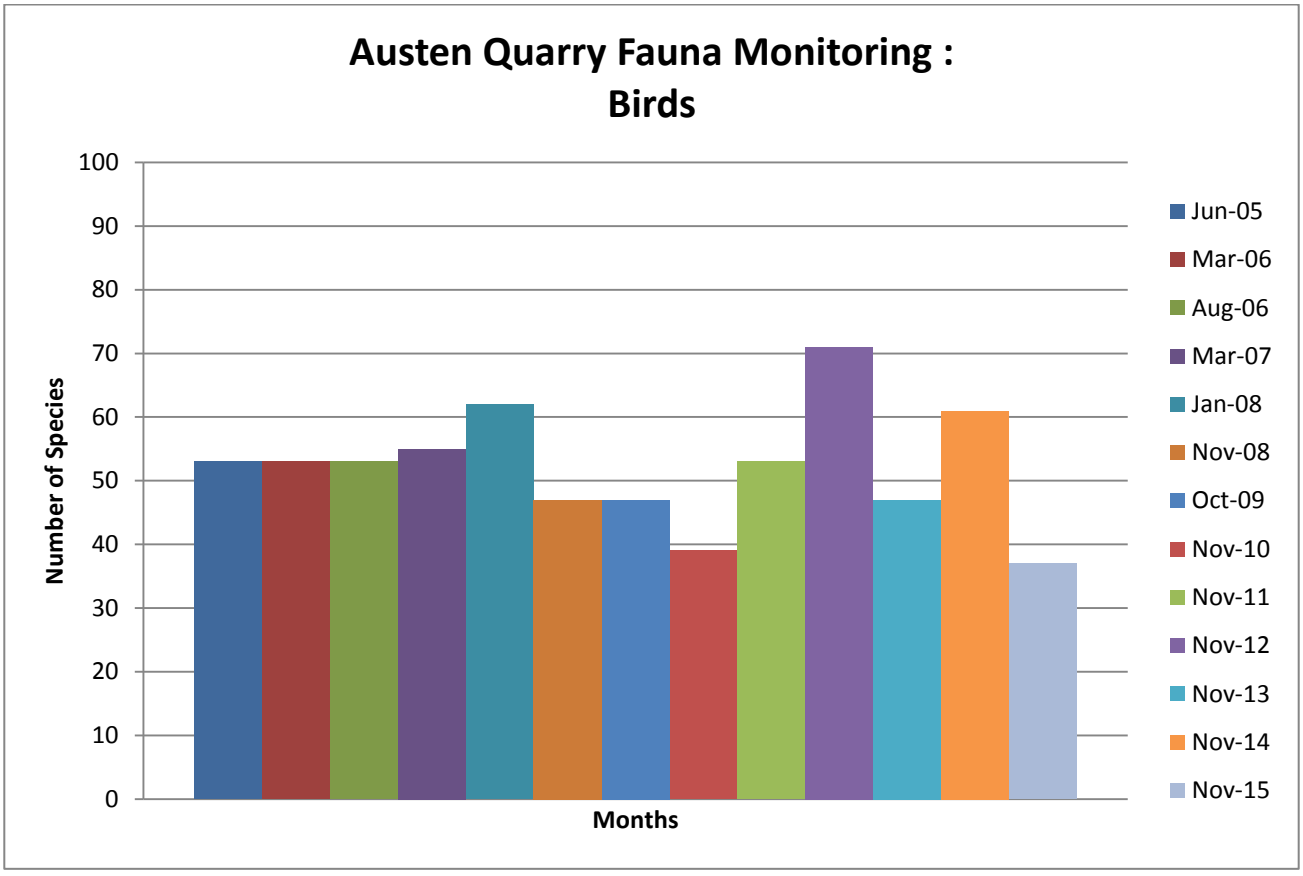


Chart 8: Total Bird results.

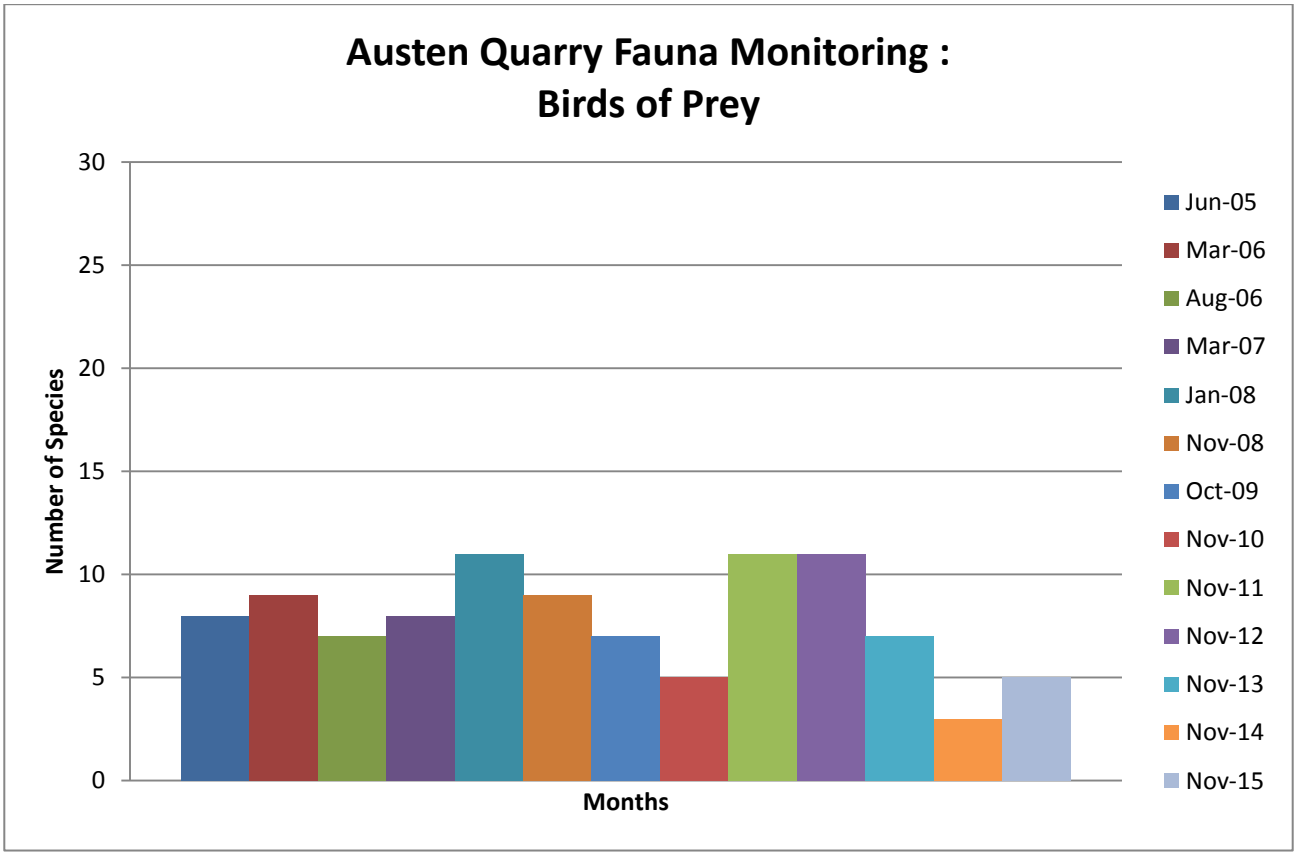


Chart 9: Birds of Prey results.

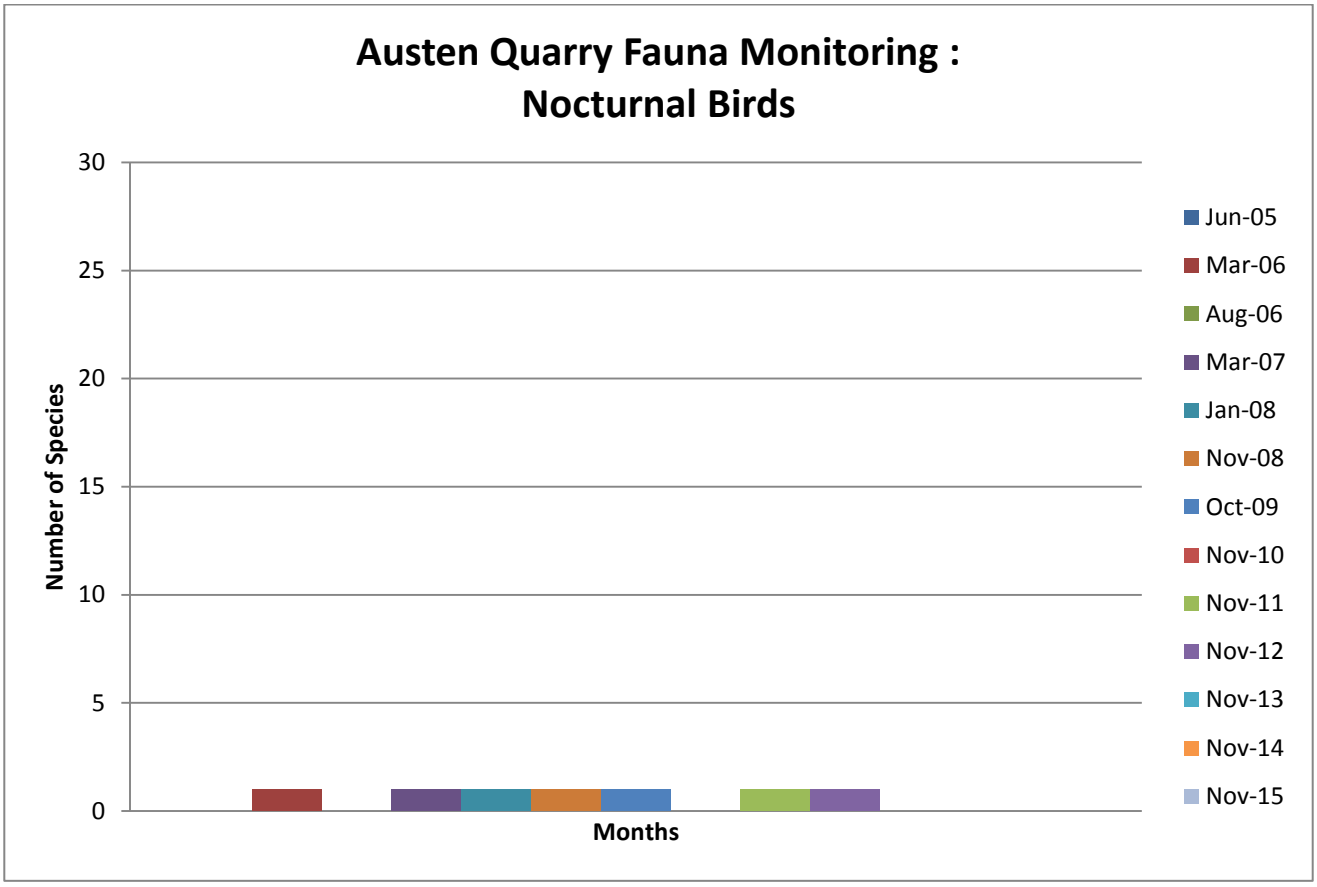


Chart 10: Nocturnal Birds results.

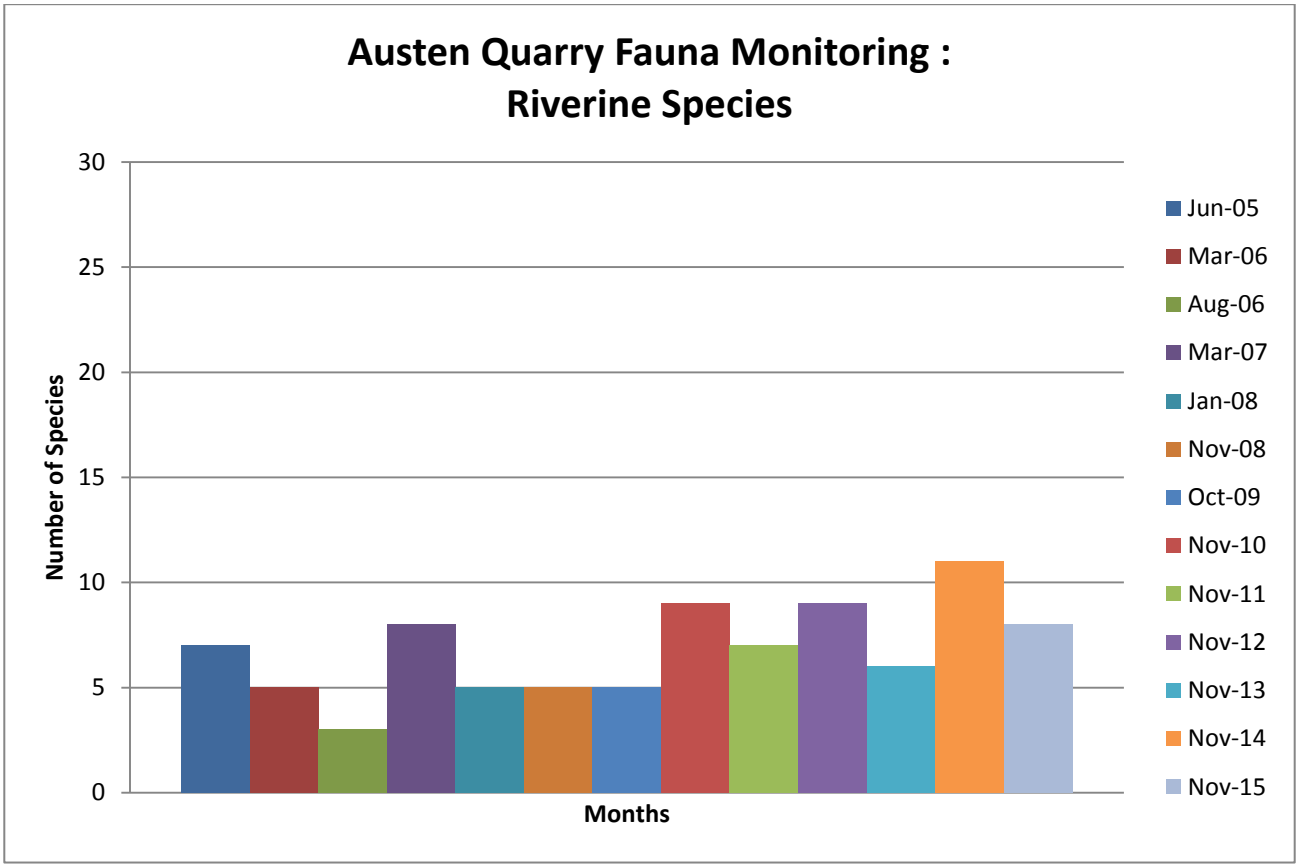


Chart 11: Riverine Bird species results.

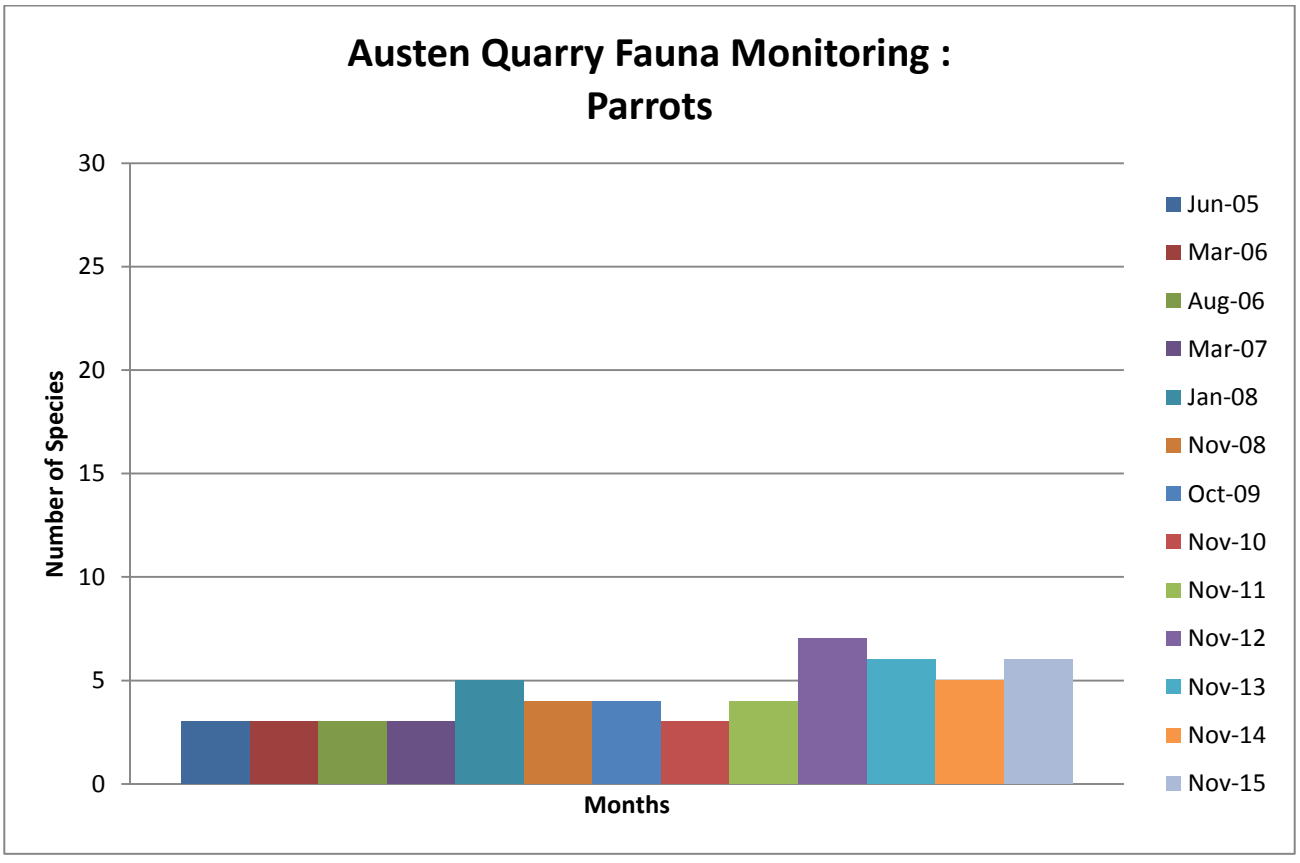


Chart 12: Parrot species results.

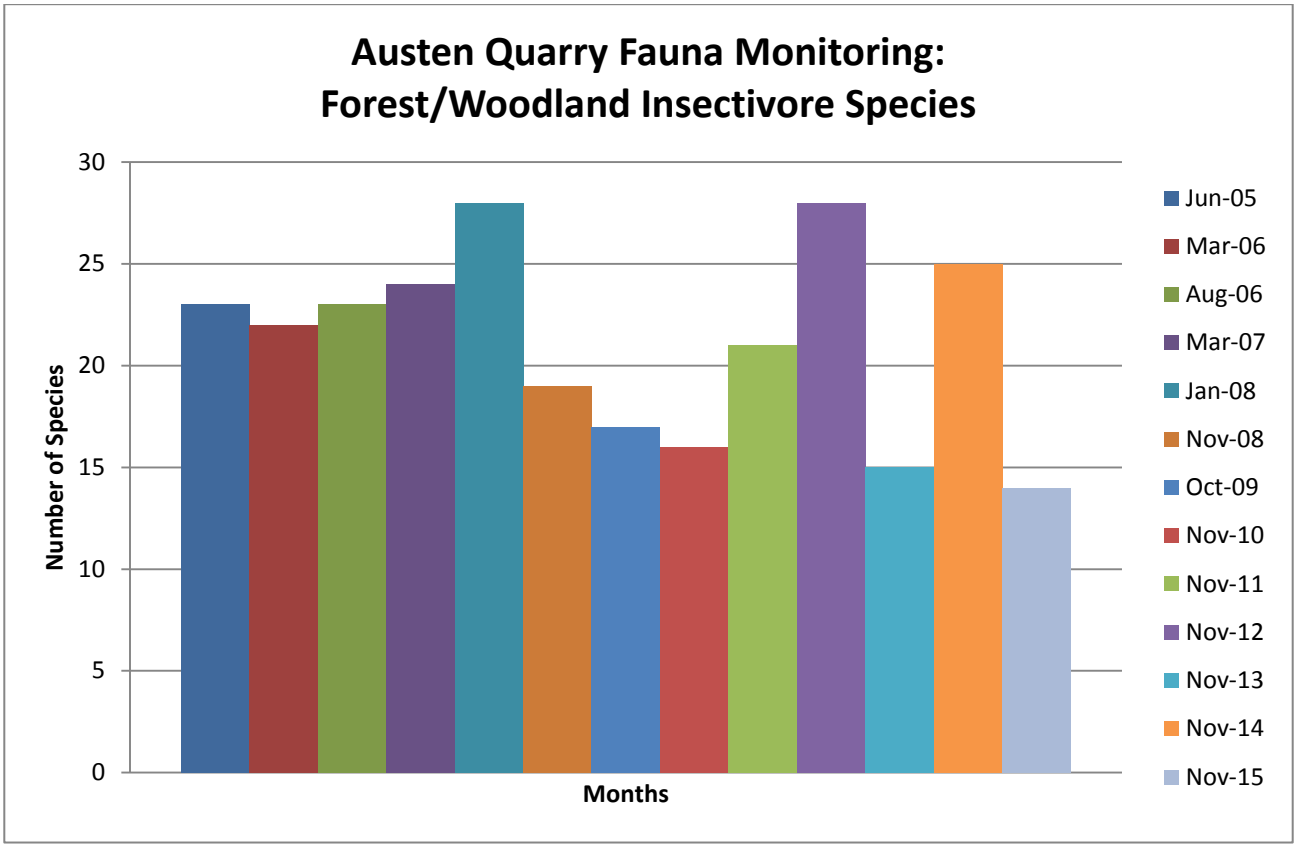


Chart 13: Forest and Woodland Bird Insectivore species results.

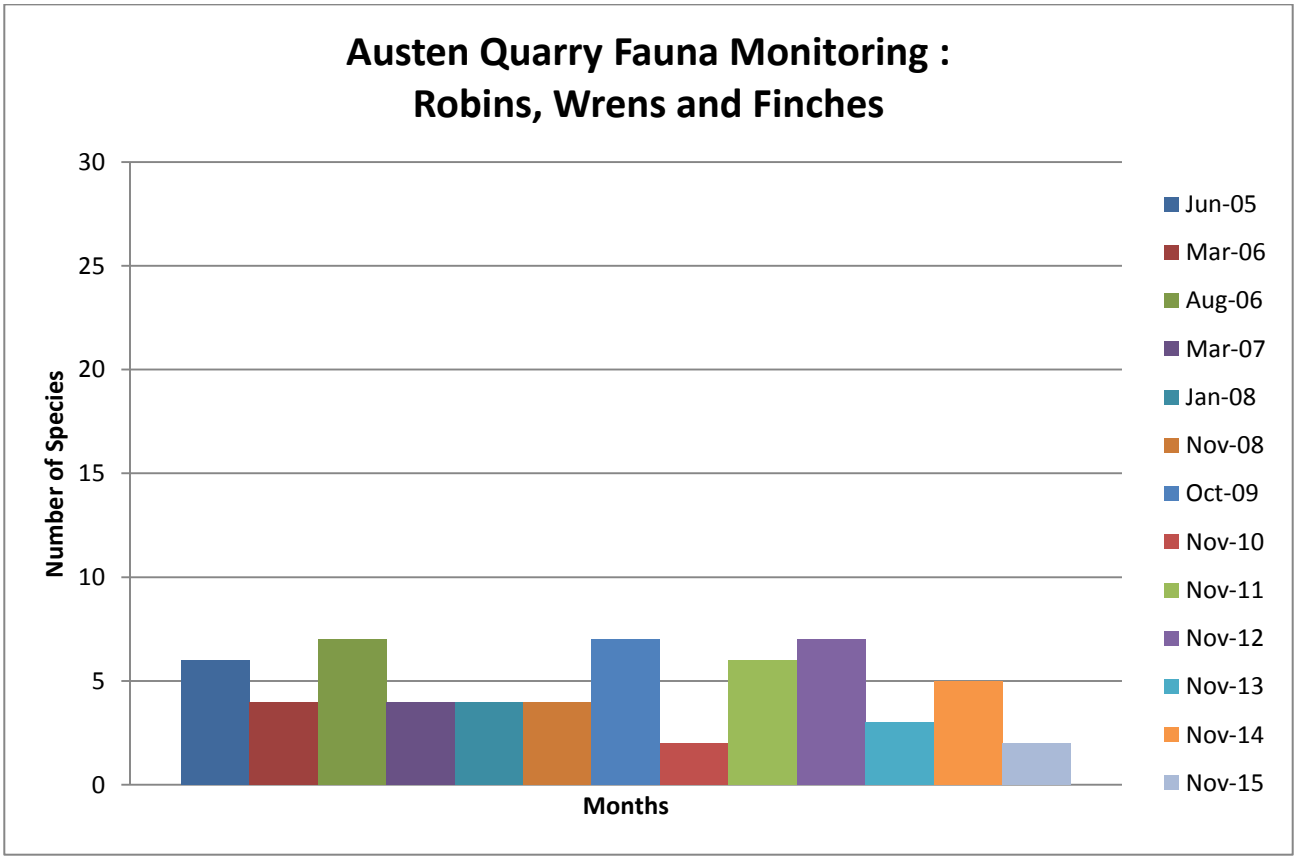


Chart 14: Robins, Wrens and Finch results.

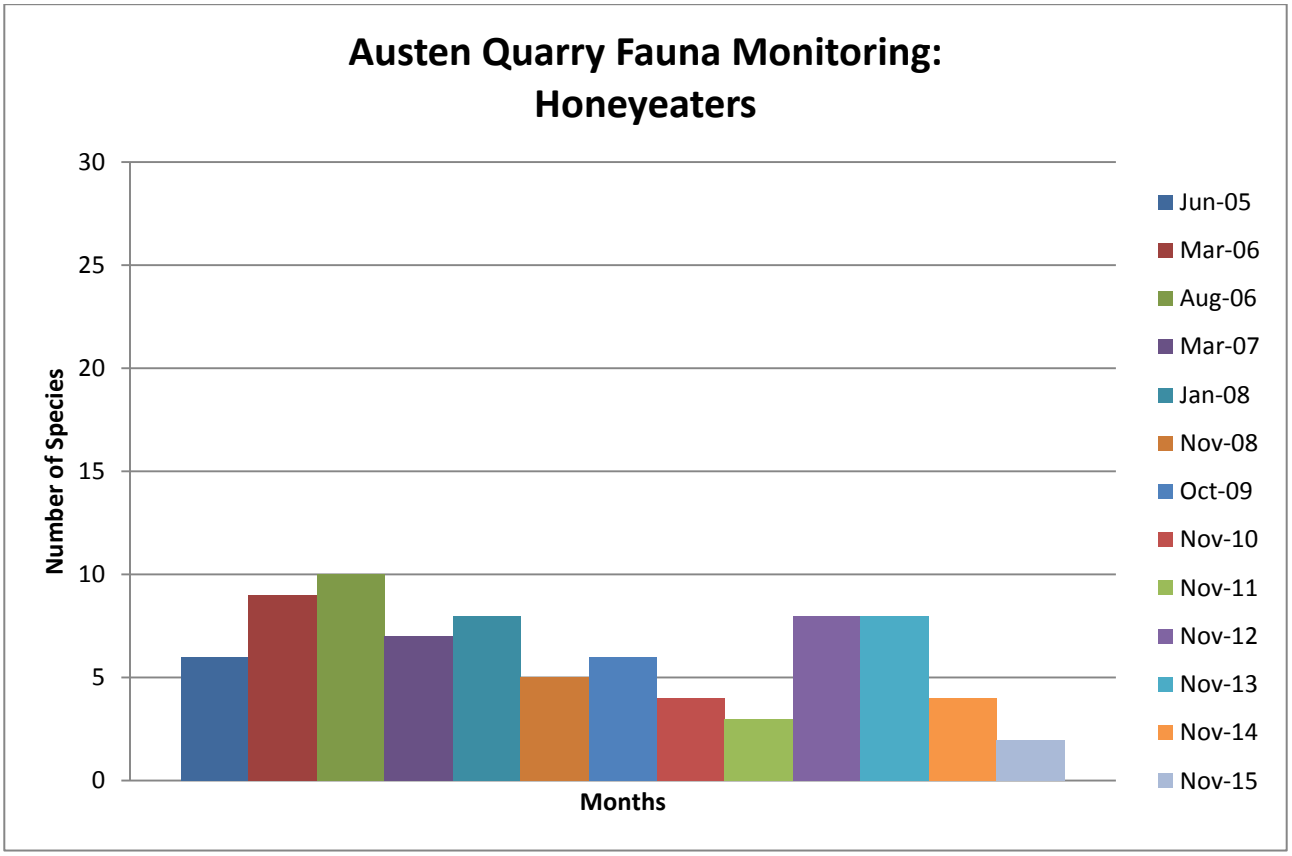


Chart 15: Honeyeaters results.

4.3 Threatened Species

One new plant species, *Acacia meiantha*, was listed within this radius from the previous 2014 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 2015 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 2015.

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 had declined from last monitoring period, most likely due to the inclement weather and light rain during the survey. Forest/woodland insectivore species had the most notable decline from last monitoring period. Overall the number of bird species recorded across each group has remained relatively consistent throughout the monitoring program.

Amphibian numbers have increased slightly, being the highest recorded since 2008. Reptile and mammal numbers have decreased in relation to previous years, with mammal numbers being the lowest recorded for since 2008.

Wombat activity was noted to be high with four active burrows noted and two burrows captured on camera with activity.

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.

The presence of feral animals was observed around the quarry premise. Rabbit scats were observed to be present on the quarry grounds at all survey locations. No foxes were observed during the survey, however given the observation of the species during previous monitoring periods, the presence is highly likely. A control program for foxes and rabbits should be implemented to ensure that species number do not increase further.

Examination of data from previous surveys shows no significant change in the pattern and distribution of native flora species at each site. November 2015 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.

Three 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 4. This is largely due to the spread of weeds along the watercourse from upstream outside the mining lease. Impact Creek recorded the highest number of weeds (42)

and followed by Control Creek (35). South Ridge had the lowest recorded number of weeds (2), followed closely by Control Ridge (4).

No direct impacts from quarry operations were noted in relation to the distribution and abundance of weeds within the lease area. However it is the responsibility of the quarry to manage the spread of weeds within the lease area, in particular noxious species, as part of their operations.

It was noted that Serrated Tussock is still prevalent throughout the site, with no evidence of management observed during this period, such as spraying. 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 2016.

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.

Rehabilitation site 1 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 Rehabilitation 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.

Rehabilitation site 3 was planted in 2014 with additional areas planted in 2014. The area planted in 2014 contained no obvious signs of natural regeneration and significant weed germination from the topsoil. Some planted stock was also observed to have been overgrown by weeds and urgent weeding of Site 3 is required to ensure similar success to sites 1 and 2. The newly planted areas showed a similar high weed growth possibly due to topsoil placement. Tube stock in the newer areas was shown to be growing at the time of the survey.

Greater consistency is needed when applying restoration techniques to ensure unknown variations (ie: from topsoil sourced from agricultural areas) do not compromise success. The use of topsoil as a growth medium will require continued maintenance at least in the short to medium term to control issues such as weed growth.

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 2016 period:

- Ongoing management of the noxious weed infestations of Broomrapes – *Orobanche* species (Class 1 Noxious weed under City of Lithgow Council) at the Impact Ridge site. As the species is classified as Class 1 Noxious weed, the landowner is required to immediately contact the local council weeds officer who will provide assistance with identification, removal and eradication. Please note that the City of Lithgow Council falls under jurisdiction of the Upper Macquarie County Council who is the local government authority for control of noxious weeds in the area.
- Ongoing management of the noxious weed infestations of Serrated Tussock - *Nassella trichotoma* (Class 4 Noxious weed) at the riverine sites and Impact Ridge site is required by herbicide spraying, to prevent further spreading 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. Attention should be given to management of Serrated Tussock in the Rehabilitation sites as its presence was observed in this monitoring period. These Rehabilitation sites present the best opportunity for effective control due to low levels of invasion and small plant numbers.
- Ongoing management of the noxious weed infestations of African Lovegrass - *Eragrostis curvula* (Class 4 Noxious weed) at the riverine sites, Impact Ridge site and Rehabilitation areas. Effective control of African Lovegrass requires an integrated approach. It is recommended the landowner contact the local council weeds officer to establish the best eradication strategy.
- 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

common name	scientific name	Impact Ridge		Control Ridge		South Ridge		Impact Creek		Control Creek	
		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.
Amphibians											
Brown Tree Frog	*Litoria ewingii*										
Lesueur's Frog	*Litoria lesueuri*										
Peron's Tree Frog	*Litoria peronii*	1								1	
Leaf-green Tree Frog	*Litoria phyllochroa*										
Verreaux's Tree Frog	Litoria verrauxii										
Keferstein's Tree Frog	Litoria dentata	1									
Common Eastern Froglet	*Crinia signifera*									1	
Eastern Banjo Frog	*Limnodynastes dumerilii*										
Spotted Grass Frog	*Limnodynastes tasmaniensis*	1									
Striped Marsh Frog	*Limnodynastes peronii*										
Keferstein Smooth Toadlet	Uperoia laevigata	1									

common name	scientific name	Impact Ridge		Control Ridge		South Ridge		Impact Creek		Control Creek	
Reptiles		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.
Eastern Water Dragon	*Physignathus iesueurii*							1		1	
Jacky Lizard	*Amphibolurus muricatus*										
Goanna	Varanus varius										
Eastern Long-necked Turtle	*Chelodina longicollis*										
Eastern Brown Snake	*Pseudonaja textilis*										
Red-Bellied Black Snake	*Pseudechis porphyriacus*										
Copper-tailed Skink	*Ctenotus taeniolatus*					1		1		1	
Eastern Water Skink	*Eulamprus quoyii*					1		1		1	
Delicate Skink	*Lampropholis delicata*	1		1		1		1		1	
Grass Skink	Lampropholis guicheniti					1		1		1	
Blue Tongue Lizard	Tiliqua scincoides					1					
Blind Snake	*Ramphotyphiops* sp.										

common name	scientific name	Impact Ridge		Control Ridge		South Ridge		Impact Creek		Control Creek	
Birds		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.
Black-shouldered Kite	*Elanus axillaris*		Olive backed Oriole						King Parrot		Olive backed Oriole
Brown Goshawk	*Accipiter fasciatus*										
Collared Sparrowhawk	*Accipiter cirrhocephalus*										
Nankeen Kestrel	*Falco cenchroides*									1	
Wedge-tailed Eagle	*Aquila audax*	1				1					
White-bellied Sea-eagle	*Haliaeetus leucogaster*										
Australian Owlet-nightjar	*Aegotheles cristatus*										
Tawny Frogmouth	Podargus strigoides	1									
Azure Kingfisher	*Alcedo azurea*							1			
Australian Wood Duck	*Chenonetta jubata*							1			
Chestnut Teal	*Anas castanea*										
Grey Teal	*Anas gracilis*										
Hardhead	*Aythya australis*										
Pacific Black Duck	*Anas superciliosa*							1		1	
White-faced Heron	*Egretta novaehollandiae*							1			
		Impact Ridge		Control Ridge		South Ridge		Impact Creek		Control Creek	
		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.

		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.
Australian Magpie	*Gymnorhina tibicen*	1		1		1		1		1	
Dusky Woodswallow	*Artamus cyanopterus*							1		1	
Grey Butcherbird	*Cracticus torquatus*					1		1		1	
Pied Butcherbird	*Cracticus nigrogularis*					1		1			
Magpie-lark	*Graliina cyanoleuea*					1		1		1	
Pied Currawong	*Strepera graculina*	1		1		1		1		1	
Galah	*Cacatua roseicapilla*							1			
Gang-gang Cockatoo	*Calocephalon fimbriatum*							1			
Sulphur-crested Cockatoo	*Cacatua galerita*					1		1			
Yellow-tailed Black- Cockatoo	*Calyptorhynchus funereus*										
Black-faced Cuckoo-shrike	*Coracina novaeholandiae*	1									
Masked Lapwinq	*Vanellus miles*	1									
black fronted dotterel	*Elseyornis melanops*										
Eastern Whipbird	*Psophodes olivaceus*										
White-throated Treecreeper	*Cormobates leueophaeus*					1		1		1	
Bar-shouldered Dove	*Geopelia humeralis*										
Common Bronzewing	*Phaps ehalcoptera*										
Crested Pigeon	*Ocyphaps lophotes*							1		1	
Peaceful Dove	*Geopelia striata*							1		1	
Dollarbird	*Eurystomus orientalis*							1			
White-winged Chough	*Corcorax melanorhamphos*					1		1		1	
Australian Raven	*Corvus coronoides*							1		1	
Little Raven	*Corvus mellori*			1				1		1	
Torresian Crow	*Corvus orru*			1				1		1	
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	1									
Mistletoebird	*Dicaeum hirundinaceum*										
Grey Fantail	*Rhipidura fuliginosa*			1				1		1	
Magpie Lark	*Grallina cyanoleuca*										
Restless Flycatcher	*Myiagra inquieta*							1			
Satin Flycatcher	*Myiagra cyanoleuca*							1		1	
Willie Wagtail	*Rhipidura leucophrys*					1		1		1	
Leaden Flycatcher										1	
Brown Falcon	*Falco berigora*										
Peregrine Falcon	*Falco peregrinus*										
Laughing Kookaburra	*Dacelo novaeguineae*	1		1		1		1		1	
Sacred Kingfisher	*Todiramphus sanetus*			1				1		1	
Unidentified Martin	*Hirundo sp_*										
Welcome Swallow	*Hirundo neoxena*							1		1	
Superb Fairy-wren	*Malurus cyaneus*							1		1	
Variegated Fairy-wren	*Malurus lamberti*							1			
Brown-headed Honeyeater	*Melithreptus validirostris*										
Eastern Spinebill	*Acanthorhynchus tenuirostris*									1	
Noisy Miner	*Manorina melanocephala*									1	
New Holland	*Phylidonyris novaehollandiae*							1			
Noisy Friarbird	*Philemon corniculatus*	1		1		1		1		1	
		Impact Ridge		**Control Ridge**		**South Ridge**		**Impact Creek**		**Control Creek**	
		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.
Red Wattlebird	*Anthochaera carunculata*										
White-eared Honeyeater	*Lichenostomus ieucotis*									1	
White-naped Honeyeater	*Melithretus lunatus*									1	

		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.
White-plumed Honeyeater	*Lichenostomus peniciliatus*										
Yellow-faced Honeyeater	*Lichenostomus chrysops*							1		1	
Lewins Honeyeater	*Meliphaga lewinii*							1			
Rainbow Bee-eater	Merops ornatus										
Richard's Pipit	*Anthus novaeseelandiae*										
Brown Songlark											
Clamorous Reed-Warbler	*Acrocephalus stentoreus*										
Varied Sitella	*Daphoenositta chrysoptera*										
Golden Whistler	*Pachycephaia pectoralis*									1	
Grey Shrike-thrush	*Colluricincia harmonica*	1								1	
Rufous Whistler	*Pachycephala rufiventris*			1		1		1		1	
Brown Thornbill	*Acanthiza pusilia*										
Buff-rumped thornbill	*Acanthiza reguloides*										
Spotted Pardalote	*Pardalotus punctatus*							1			
Striated Pardalote	*Pardalotus striatus*	1									
Striated Thornbill	*Acanthiza lineata*										
White-browed Scrubwren	*Sericomis frontalis*	1						1		1	
Brown Gerygone	*Gerygone mouki*										
White-throated Gerygone	*Gerygone olivacea*										
Yellow Thornbill	*Acanthiza nana*							1			
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*			1							
Double-barred Finch	*Taeniopygia bichenovli*										
Red-browed Finch	*Neochmia temporalis*							1		1	
Eastern Yellow Robin	*Eopsaltria australis*									1	
Flame Robin	*Petroica phoenicea*							1		1	
Jacky Winter	*Microeca fascinans*							1			
Rose Robin	*Petroica rosea*										
Scarlet Robin	*Petroica multicolor*										
Hooded Robin	Melanodryas cucullata							1		1	
Little Pied Cormorant	Phalacrocorax melanoleucos										
Pied Cormorant	*Phalacrocorax varius*										
Stubble Quail	*Cotumix pectoralis*										
Australasian Grebe	*Tachybaptus novaehollandiae*							1			
Crimson Rosella	*Platycercus elegans*					1		1		1	
Eastern Rosella	*Platycercus eximius*					1		1		1	
Red-rumped Parrot	*Psephotus haematonotus*									1	
Dusky Moorhen	*Gallinula tenebrosa*							1		1	
Eurasian Coot	*Fulica atra*										
Southern Boobook	*Ninox novaeseelandiae*										
Silyereye	*Zosterops lateralis*							1		1	
Common Myna	*Acridotheres tristis*										
Common Starling	*Sturnus vulgaris*										

common name	**scientific name**	**Impact Ridge**		**Control Ridge**		**South Ridge**		**Impact Creek**		**Control Creek**	
Mammals		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.
Common Wallaroo	*Macropus robustus*	1		1		1		1			
Eastern Grey Kangaroo	*Macropus giganteus*	1		1		1		1			

		Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.	Presence	New Sp.
Swamp Wallaby	*Wallabia bicolor*	1		1		1		1		1	
Red Necked Wallaby	*Macropus rufogriseus*									1	
White-striped Freetail-bat	*Tadarida australis*	1		1		1				1	
Unidentified Bush Rat	*Rattus sp.*							1			
Water-rat	*Hydromys chrysogaster*										
Platypus	*Ornithorhynchus anatinus*							1			
Sugar Glider	*Petaurus breviceps*										
Common Brushtail Possum	*Trichosurus vulpecula*									1	
Common Ringtail Possum	*Pseudocheirus peregrinus*	1						1			
Echidna	*Tachyglossus aculeatus*										
Gould's Long-eared Bat	*Nyctophilus gouldii*										
Western Broad-nosed Bat	*Scotorepans balstoni*										
Chocolate Wattled Bat	*Chalinolobus morio*										
Common Wombat	*Vombatus ursinus*			1		1		1			
*Fox	*Vulpes vulpes*										
*Cat	*Felis Catus*										
*Rabbit	*Oryctolagus cuniculus*										
*House Mouse	*Mus musculus*										

APPENDIX A Natives				Threatened Species						
				New Species 2015						
Flora Detected within Survey sites 2015		Impact Ridge	Control Ridge	South Ridge	Impact Creek	Control Creek	Rehab 1	Rehab 2	Rehab 3	Totals
Native Species		30	30	22	20	14	0	0	0	
Scientific	**Common**	Presence	Presence	Presence	Presence	Presence	Presence	Presence	Presence	
Acacia buxifolia	Box-leaf Wattle		1							1
Acacia clandullensis	Gold-dust Wattle									0
Acacia dealbata	Silver Wattle				1	1				2
Acacia falciformis	Hickory Wattle					1				1
Acacia homalophylla	Yarran									0
Acacia implexa	Hickory Wattle									0
Acacia longissima	Long-leaved Wattle									0
Acacia melanoxylon	Blackwood	1								1
Acacia myrtifolia	Myrtle Wattle									0
Acacia obtusata	Bluntleaf Wattle									0
Acacia uilicifolia	Prickly Moses		1							1
Acaena ovina	Sheeps Burr				1					1
Actinotus helianthi	Flannel Flower									0
Adiantum aethiopicum	Maiden Hair Fern									0
Allocasuarina distyla	Scrub She-oak									0
Allocasuarina littoralis	Black She-oak									0
Alternanthera denticulata	Lesser Joy-weed									0
Angophora floribunda	Rough-barked Apple									0
Anisopogon avenaceus	Oat Spear Grass									0
Aristida ramosa var. ramosa	Purple Wiregrass	1								1
Aristida vagans	Threeawn Speargrass	1	1							2
Asplenium flabellifolium	Spleenwort	1								1
Austrodanthonia caespitosa										0
Austrodanthonia penicillata	Wallaby Grass	1								1
Austrodanthonia racemosa var.	Wallaby Grass		1	1						2
Austrodanthonia spp.	Wallaby Grass									0
Austrodanthonia tenuior	Wallaby Grass									0
Austrostipa pubescens	Speargrass									0
Austrostipa ramosissima	Speargrass									0
Austrostipa rudis ssp.*australis*	Speargrass									0
Austrostipa rudis ssp.*rudis*	Speargrass	1								1
Austrostipa scabra ssp.*falcata*	Speargrass									0
Austrostipa scabra ssp.*scabra*	Speargrass	1								1
Austrostipa aristiglumis	Speargrass									0
Banksia spinulosa var. *spinulosa*	Hairpin Banksia									0
Baumen articulata	Jointed Twigrush				1	1				
Blechnum indicum	Swamp Waterfern									0
Bossiaea buxifolia	Matted Bossiaea									0
Bossiaea prostrata										0
Bothriochloa macra	Red-leg Grass									0
Bothriochloa spp.	Bluegrass									0
Brachyloma daphnoides ssp.*daph*	Daphne Heath									0
Bulbine bulbosa	Native Leek									0
Bursaria spinosa ssp. *spinosa*	Blackthorn					1				1
Caesia parviflora var vittata	Pale Grass Lily									0
Caladenia spp.	Spider Orchid									0
Callistemon sp.	Bottle Brush					1				1
Calochilus sp	Beard Orchid									0
Calytrix tetragona	Fringe Myrtle			1						1
Carex appressa	Tall Sedge				1					1
Carex fascicularis	Tassel Sedge				1	1				2
Carex inversa										0
Carex spp.										0
Cassinia uncata	Sticky Cassinia									0
Cassytha glabella f. *glabella*	Devils Twine		1	1						2

Casuarina cunninghamiana ssp.(	River Oak				1	1				2
Cheilanthes distans	Rock Fern	1								1
Cheilanthes sieberi ssp.sieberi	Rock Fern		1							1
Chloris truncata	Windmill Grass				1					1
Chrysocephalum apiculatum	Yellow Buttons									0
Clematis aristata	Old Man's Beard									0
Commelina cyanea	Commelina									0
Convolvulus erubescens	Bindweed									0
Craspedia variabilis	Billy-buttons									0
Crassula sieberiana ssp.*sieberia*	Stonecrop									0
Cryptandra amara	Bitter Cryptandra									0
Cymbonotus lawsonianus	Bears-ear									0
Cymbopogon refractus	Barbed Wire Grass									0
Cyperus gracilis	Slender Flat Sedge									0
Daviesia acicularis	Bitter Pea									0
Desmodium brachypodum	Tick-trefoil									0
Desmodium spp.	Tick-trefoil									0
Desmodium varians	Tick-trefoil									0
Dianella revoluta var. *revoluta*	Flax Lily	1			1					2
Dichelachne inaequiglumis	Plumegrass									0
Dichelachne micrantha	Plumegrass									0
Dichelachne spp.	Plumegrass									0
Dichondra repens	Kidney Weed	1								1
Digitaria brownii	Cotton Panic Grass									0
Digitaria parviflora	Finger Grass									0
Dillwynia phylicoides A.Cunn species complex				1						1
Diuris aurea										0
Drosera binata	Sundew									0
Echinopogon caespitosus var. *ca*	Hedgehog Grass	1								1
Echinopogon ovatus	Hedgehog Grass									0
Echinopogon spp.	Hedgehog Grass		1							1
Einadia hastata	Saltbush				1	1				2
Einadia nutans ssp.*nutans*	Saltbush									0
Einadia trigonos ssp.*trigonos*	Saltbush	1	1							2
Elymus scaber var. *scaber*	Wheatgrass									0
Entolasia marginata	Right-angle Grass									0
Entolasia stricta	Right-angle Grass		1							1
Eragrostis leptostachya	Paddock Lovegrass									0
Eucalyptus albens	White Box	1								1
Eucalyptus dives	Broad-leaved Peppermint	1	1	1						3
Eucalyptus oblonga	Sandstone Stringybark									0
Eucalyptus mannifera	Brittle Gum		1	1	1					3
Eucalyptus praecox	Brittle Gum									0
Eucalyptus pulverulenta	Silver-leaved Mountain Gum									0
Eucalyptus viminalis	Ribbon Gum	1		1	1					3
Euchiton sphaericus	Cudweed									0

Exocarpos cupressiformis	Native Cherry									0
Galium gaudichaudii	Rough Bedstraw									0
Galium leptogonium	Galium									0
Geranium solanderi var. *soland*	Geranium	1			1					2
Glossostigma elatinoides	Mud Mat									0
Glycine clandestina	Glycine	1								1
Glycine tabacina	Glycine									0
Gonocarpus tetragynus	Raspwort	1								1
Gonocarpus teuricoides	Raspwort									0
Goodenia bellidifolia			1	1						2
Goodenia hederacea ssp.*hedera*	Goodenia		1	1						2
Grevillea arenaria	Hoary Grevillea									0
Grevillea aspleniifolia										0
Haemodorum corymbosum										0
Haemodorum planifolium										0
Hakea dactyloides	Broad-leaved Hakea									0
Hardenbergia violacea	False Sarsparilla									0
Hibbertia aspera	Hairy Guinea Flower		1	1						2
Hibbertia cistiflora										0
Hibbertia obtusifolia	Hoary Guinea Flower									0
Hovea linearis										0
Hovea rosmarinifolia										0
Hydrocotyle laxiflora	Pennywort									0
Hydrocotyle tripartita	Pennywort	1	1							2
Hymenanthera dentata	Tree Violet									0
Hypericum gramineum	Small St.Johns Wort	1								1
Imperata cylindrica var. *major*	Blady Grass									0
Indigofera australis	Australian Indigo									0
Isolepis inundata	Club-sedge									0
Isotoma axillaris	Rock Isotome									0
Joycea pallida	Red-anther Wallaby Grass									0
Juncus spp.										0
Juncus usitatus					1	1				2
Lachnagrostis filiformis	Blown Grass									0
Lagenophora stipitata	Blue-bottle Daisy		1							1
Laxmannia compacta	Slender Wire Lily									0
Lepidosperma gunnii										0
Lepidosperma laterale				1						1
Lepidosperma viscidum										0
Leptospermum parvifolium				1						1
Leptospermum polygalifolium ssp.*polygalifolium*			1		1					2
Leptospermum trinervium										0
Leucopogon appressus			1	1						2
Leucopogon ericoides	Pink Beard-heath	1								1
Lindsaea linearis	Screw Fern									0
Lissanthe strigosa ssp. *strigosa*	Peach Heath									0
Lomandra filiformis ssp.*coriace*	Wattle Matt-rush		1							1
Lomandra filiformis ssp.*filiformis*	Wattle Matt-rush	1	1							2
Lomandra glauca	Pale Matt-rush			1						1
Lomandra longifolia	Spiny Matt-rush		1							1
Lomandra multiflora ssp. *multiflora*		1	1		1	1				4
Lomandra spp.	Matt Rush									0
Lomatia myricoides	River Lomatia					1				1
Mentha diemenica	Slender Mint	1	1							2
Microlaena stipoides	Weeping Meadow Grass									0
Mirbelia platylobioides										0
Monotoca eliptica	Tree Broom-heath									0
Monotoca scoparia										0
Notodanthonia longifolia	Long-leaved Wallaby Grass									0
Opercularia hispida	Stinkweed									0
Opercularia varia	Stinkweed									0

Oplismenus aemulus	Basket Grass									0
Oplismenus imbecillis	Basket Grass									0
Oxalis exilis	Oxalis									0
Panicum effusum	Hairy Panic									0
Panicum simile	Two-colour Panic									0
Paspalum distichum	Water Couch									0
Patersonia sericea	Silky Purple Flag									0
Persicaria decipiens	Knotweed									0
Persicaria hydropiper	Knotweed									0
Persicaria praetermissa	Knotweed									0
Persicaria strigosa	Knotweed				1					1
Persicaria lapathifolia	Knotweed									0
Persoonia linearis	Narrow-leaved Geebung			1						1
Philotheca spp.	Wax Flower									0
Phragmites australis	Common Reed									0
Phyllanthus hirtellus	Thyme Spurge			1						1
Plantago gaudichaudii	Narrow-leaved Plantain									0
Platysace ericoides										0
Poa affinis										0
Poa labillardierei var. *labillardie*	Tussock Grass	1	1	1						3
Poa sieberiana										0
Pomaderris spp.										0
Pomax umbellata			1	1						2
Poranthera microphylla			1	1						2
Portulaca oleracea	Pigweed									0
Prasophyllum spp.	Leek Orchid									0
Prostathera incana	Velvet Mint-bush									0
Pteridium esculentum	Bracken				1	1				2
Pterostylis reflexa	Greenhood Orchid									0
Pultanea sp.			1							1
Ranunculus lappaceus	Common Buttercup				1	1				2
Rubus parvifolius	Silky Bramble									0
Rumex brownii	Swamp Dock									0
Samolus valerandi	Brookweed									0
Schoenoplectus validus	River Club Rush									0
Schoenus ericetorum	Bog-rush									0
Schoenus moorei	Bog-rush									0
Scutellaria humilis	Dwarf Scullcap									0
Senecio diaschides	Fireweed									0
Senecio hispidulus	Fireweed									0
Senecio hispidulus var. *hispidul*	Fireweed	1	1							2
Senecio quadridentatus	Fireweed				1	1				2
Sigesbeckia orientalis	Indian Weed									0
Solanum americanum	Glossy Nightshade									0
Solanum chenopodinum										0
Solanum cinereum	Narrawa Burr									0
Solanum prinophyllum	Forest Nightshade									0
Solanum pungentium	Eastern Nightshade	1								
Stellaria pungens	Prickly Starwort	1	1	1	1					4
Stylidium sp.	Trigger Plant									0
Stypandra glauca	Nodding Blue-lily			1						1
Thelymitra sp.	Sun Orchid									0
Themeda australis	Kangaroo Grass									0
Thysanotus juncifolius	Fringe Lily									0
Typha domingensis	Cumbungi									0
Urtica incisa	Stinging Nettle									0
Veronica plebeia	Speedwell									0
Viola betonicifolia	Native Violet									0
Vittadinia cuneata var. *cuneata*	Fuzzweed									0
Wahlenbergia gracilis	Bluebell	1								1
Wahlenbergia planiflora	Bluebell									0
Wahlenbergia spp.		1	1							2

Wahlenbergia stricta ssp.*stricta*	Bluebell			1						1
Wahlenbergia victoriensis	Bluebell									0
Xerochrysum bracteatum	Golden Everlasting									0

APPENDIX A Weeds				Noxious						
				New Species 2015						
Flora Detected within Survey sites 2015		Impact Ridge	Control Ridge	South Ridge	Impact Creek	Control Creek	Rehab 1	Rehab 2	Rehab 3	Overall Totals
Introduced Species		19	4	2	42	35	1	1	1	0-8 sites
Scientific	**Common**	Presence	Presence	Presence	Presence	Presence	Presence	Presence	Presence	Presence
*Acetosella vulgaris	Sheep Sorrel									0
*Aira cupaniana	Silvery Hair Grass									0
*Alternanthera spp.										0
*Anagallis arvensis	Scarlet Pimpernel	1								1
*Anthoxanthum odoratum	Sweet Vernal Grass	1			1	1				3
*Aster subulatus	Wild Aster									0
*Avena barbarta	Oats					1				1
*Brassica fruticulosa	Twiggy Turnip				1					1
*Brassica rapa spp sylvestris	Wild Turnip			1	1	1	1	1	1	
*Briza maxima	Blowfly Grass				1	1				2
*Briza minor	Shivery Grass				1					1
*Bromus catharticus	Prairie Grass	1			1	1				3
*Bromus diandrus	Great Brome				1	1				2
*Bromus hordeaceus	Soft Brome									0
*Carduus pycnocephalus	Slender Thistle					1				1
*Carthamus lanatus	Saffron Thistle									0
*Centaurium tenuiflorum	Centaury									0
*Cerastium glomeratum	Chickweed									0
*Chenopodium album	Fat Hen									0
*Chenopodium pumilio	Small Crumbweed									0
*Chenopodium spp.										0
*Chondrilla juncea	Skeleton Weed									0
*Cirsium vulgare	Spear Thistle		1		1	1				3
*Conium maculatum	Hemlock				1	1				2
*Conyza bonariensis	Fleabane				1	1				2
*Conyza sumatrensis	Fleabane									0
*Crataegus monoguna	Hawthorn				1	1				2
*Cymbopogon refractus	Barbed Wire Grass									0
*Cynodon dactylon	Couch				1					1
*Cyperus eragrostis	Cyperus									0
*Cyperus sp.	Cyperus				1					1
*Cytisus scoparius ssp.scopar	Scotch Broom					1				1
*Dactylis glomerata	Cocksfoot				1	1				2
*Digitaria sanguinalis	Summer Grass									0
*Echium plantagineum	Pattersons Curse				1	1				2
*Echium vulgare	Vipers Bugloss					1				1
*Ehrharta erecta	Ehrharta					1				1
*Eleusine indica	Crowsfoot Grass									0
*Eleusine tristachya	Goose Grass									0
*Eragrostis curvula	African Love Grass	1			1	1				3
*Eragrostis tenuifolia	Elastic Grass									0
*Erodium cicutarium	Storksbill									0
*Euphorbia lathyris	Caper Spurge				1	1				2
*Euphorbia peplus	Petty Spurge				1					1
*Foeniculum vulgare	Fennel				1					1
*Fumaria muralis	Fumaria					1				1
*Fumaria spp.	Fumaria									0
*Galium tricomutum	Galium	1			1					2
*Genista monspessulana	Montpellier Broome									0
*Gnaphalium sp.	Cudweed		1		1					2
*Herschfeldia incana	Buchan Weed									0
*Holcus lanatus	Yorkshire Fog				1	1				2
*Hydrocotyle bonariensis	Pennywort									0
*Hypericum perforatum	St. Johns Wort	1			1					2

*Hypochaeris radicata	Flatweed	1	1	1	1	1				5
*Lactuca serriola	Prickly Lettuce									0
*Lepidium spp.	Peppercress									0
*Lepidium virginicum	Virginian Peppercress									0
*Lolium perenne	Perennial Ryegrass				1	1				2
*Lycium ferocissimum	African Boxthorn				1					1
*Lythrum hyssopifolia	Hyssop Loosestrife									0
*Malus spp.	Apple									0
*Malva parviflora	Small-flowered Mallow				1					1
*Medicago arabica	Spotted Burr Medic									0
*Medicago sativa	Lucerne	1			1	1				3
*Modiola caroliniana	Red-flowered Mallow									0
*Myosotis spp.	Forget-me-not	1								1
*Nassella trichotoma	Serrated Tussock	1			1					2
*Oenothera mollissima	Evening Primrose									0
*Onopordum acanthium	Scotch Thistle									0
*Orobanche sp.	Broomrape	1								1
*Oxalis corniculata	Yellow Wood Sorrel				1					1
*Panicum maximum	Green Panic					1				1
*Papaver somniferum	Poppy									0
*Parentucellia latifolia	Red Bartsia									0
*Paronychia brasiliana	Brasilian Witlow									0
*Paspalum dilatatum	Paspalum									0
*Pennisetum clandestinum	Kikuyu									0
*Petrorhagia nanteuilii	Childing Pink	1	1							2
*Phalaris aquatica	Phalaris					1				1
*Plantago lanceolata	Plantain				1	1				2
*Polygonum aviculare	Wireweed									0
*Prunella vulgaris	Self-heal	1				1				2
*Prunus spp.	Peach/Nectarine									0
*Pyracantha spp.	Firethorn									0
*Ranunculus lappaceus	Common Buttercup				1	1				
*Rorippa palustris	Yellow Cress									0
*Rosa sp.	Rose									0
*Rubus fruiticosus	Blackberry	1			1	1				3
*Rumex conglomeratus	Clustered Dock				1					1
*Rumex crispus	Curled Dock				1					1
*Rumex obtusifolius	Broadleaf Dock									0
*Rumex spp.	Dock					1				1
*Salix sp.	Willow									0
*Senecio madagascariensis	Fireweed									0
*Setaria gracilis	Pigeon Grass									0
*Silene gallica	Silene				1	1				2
*Silybum marianum	Variegated Thistle									0
*Solanum chenopodioides	Whitetip Nightshade									0
*Solanum linnaeanum	Apple of Sodom	1				1				2
*Solanum nigrum	Blackberry Nightshade	1								1
*Sonchus asper	Prickly Sowthistle	1				1				2
*Sonchus oleraceus	Sowthistle				1					1
*Sporobolus spp.	Parramatta Grass									0
*Stenotaphrun secundatum	Buffalo Grass									0
*Tagetes minuta	Stinking Roger									0
*Taraxacum officinale	Dandelion	1								1
*Trifolium angustifolium	Narrow Leaved Clover									0
*Trifolium arvense	Haresfoot Clover				1					1
*Trifolium repens	White Clover				1					1
*Urtica urens	Stinging Nettle	1								1
*Verbascum thapsus	Great Mullein				1					1
*Verbascum virgatum	Twiggy Mullein									0
*Verbena bonariensis	Purpletop				1	1				2

*Verbena rigida	Purpletop									0
*Veronica anagallis-aquatica	Blue Water Speedwell									0
*Veronica persica	Creeping Speedwell									0
*Vicia satavia	Vetch				1					1
*Vulpia bromoides	Silver Grass					1				1

Appendix B

Declared weeds of Upper Macquarie County Council

Weeds declared in the Local Control Authority area of Upper Macquarie County Council

Note: this Local Control Authority area includes the local council areas of Bathurst Regional Council, Blayney Shire Council, City of Lithgow Council, Oberon Council

Select another Local Control Authority area

Weed	Class	
African boxthorn *Lycium ferocissimum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
African feather grass *Cenchrus macrourus*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
African lovegrass *Eragrostis curvula*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
African turnip weed - eastern *Sisymbrium thellungii*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
African turnip weed - western *Sisymbrium runcinatum*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Alligator weed *Alternanthera philoxeroides*	2	Regionally Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Anchored water hyacinth *Eichhornia azurea*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Annual ragweed *Ambrosia artemisiifolia*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Arrowhead *Sagittaria calycina* var. *calycina*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Artichoke thistle *Cynara cardunculus*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Asparagus - climbing asparagus fern *Asparagus plumosus*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Asparagus - ground asparagus *Asparagus aethiopicus*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Asparagus weeds *Asparagus* species	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Athel pine *Tamarix aphylla*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Bear-skin fescue *Festuca gautieri*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Black knapweed *Centaurea X moncktonii*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Black willow *Salix nigra*	2	Regionally Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Blackberry *Rubus fruticosus* species aggregate	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold,*

		propagated or knowingly distributed
Boneseed *Chrysanthemoides monilifera* subsp. *monilifera*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Bridal creeper *Asparagus asparagoides*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Bridal veil creeper *Asparagus declinatus*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Broomrapes *Orobanche* species	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Burr - Bathurst burr *Xanthium spinosum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Burr - Californian burr *Xanthium orientale*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Burr - Italian cockleburr *Xanthium italicum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Burr - Noogoora burr *Xanthium occidentale*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Burr - South American burr *Xanthium cavanillesii*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Burr ragweed *Ambrosia confertiflora*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Cabomba *Cabomba caroliniana*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Cape broom *Genista monspessulana*	3	Regionally Controlled Weed *The plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed*
Cat's claw creeper *Dolichandra unguis-cati*	2	Regionally Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Cayenne snakeweed *Stachytarpheta cayennensis*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Chilean needle grass *Nassella neesiana*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Chinese violet *Asystasia gangetica* subsp. *micrantha*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Clockweed *Oenothera curtiflora*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Columbus grass *Sorghum* x *almum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Corn sowthistle *Sonchus arvensis*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Dodder *Cuscuta* species	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Espartillo - broad kernel	5	Restricted Plant

Amelichloa caudata		*The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Espartillo - narrow kernel *Amelichloa brachychaeta*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Eurasian water milfoil *Myriophyllum spicatum*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Fine-bristled burr grass *Cenchrus brownii*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Fireweed *Senecio madagascariensis*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Flax-leaf broom *Genista linifolia*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Fountain grass *Cenchrus setaceus*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Frogbit *Limnobium laevigatum*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Gallon's curse *Cenchrus biflorus*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Gamba grass *Andropogon gayanus*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Giant reed *Arundo donax*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Glaucous starthistle *Carthamus leucocaulos*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Golden dodder *Cuscuta campestris*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Golden thistle *Scolymus hispanicus*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Gorse *Ulex europaeus*	3	Regionally Controlled Weed *The plant must be fully and continuously suppressed and destroyed*
Green cestrum *Cestrum parqui*	3	Regionally Controlled Weed *The plant must be fully and continuously suppressed and destroyed*
Grey sallow *Salix cinerea*	2	Regionally Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Harrisia cactus *Harrisia* species	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Hawkweeds *Hieracium* species	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Horsetails *Equisetum* species	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Hydrocotyl *Hydrocotyle ranunculoides*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Hymenachne *Hymenachne amplexicaulis* and hybrids	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Illyrian thistle	4	Locally Controlled Weed

Onopordum illyricum		*The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Johnson grass *Sorghum halepense*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Karroo thorn *Vachellia karroo*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Kidney-leaf mud plantain *Heteranthera reniformis*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Kochia *Bassia scoparia*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Koster's curse *Clidemia hirta*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Lagarosiphon *Lagarosiphon major*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Leafy elodea *Egeria densa*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Lippia *Phyla canescens*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed* ***except incidentally in hay or lucerne***
Long-leaf willow primrose *Ludwigia longifolia*	3	Regionally Controlled Weed *The plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed*
Mesquite *Prosopis* species	2	Regionally Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Mexican feather grass *Nassella tenuissima*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Mexican poppy *Argemone mexicana*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Miconia *Miconia* species	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Mikania vine *Mikania micrantha*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Mimosa *Mimosa pigra*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Mossman River grass *Cenchrus echinatus*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Mother-of-millions *Bryophyllum* species	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Nodding thistle *Carduus nutans* subsp. *nutans*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Pampas grass *Cortaderia* species	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Parkinsonia *Parkinsonia aculeata*	2	Regionally Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of*

		the plant
Parthenium weed *Parthenium hysterophorus*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Pond apple *Annona glabra*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Prickly acacia *Vachellia nilotica*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Prickly pear - common pear *Opuntia stricta*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Prickly pear - Hudson pear *Cylindropuntia rosea*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Prickly pear - smooth tree pear *Opuntia monacantha*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Prickly pear - tiger pear *Opuntia aurantiaca*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Prickly pear - velvety tree pear *Opuntia tomentosa*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Privet - broad-leaf *Ligustrum lucidum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Privet - narrow-leaf *Ligustrum sinense*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Red rice *Oryza rufipogon*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Rhus tree *Toxicodendron succedaneum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Rubber vine *Cryptostegia grandiflora*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Sagittaria *Sagittaria platyphylla*	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Salvinia *Salvinia molesta*	2	Regionally Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Scotch broom *Cytisus scoparius* subsp. *scoparius*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Scotch thistle *Onopordum acanthium*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Senegal tea plant *Gymnocoronis spilanthoides*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Serrated tussock *Nassella trichotoma*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold,*

		propagated or knowingly distributed
Siam weed *Chromolaena odorata*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Silverleaf nightshade *Solanum elaeagnifolium*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Smooth-stemmed turnip *Brassica barrelieri* subsp. *oxyrrhina*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Soldier thistle *Picnomon acarna*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Spiny burrgrass - longispinus *Cenchrus longispinus*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Spiny burrgrass - spinifex *Cenchrus spinifex*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Spongeplant *Limnobium spongia*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Spotted knapweed *Centaurea stoebe* subsp. *micranthos*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
St. John's wort *Hypericum perforatum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Star thistle *Centaurea calcitrapa*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Stemless thistle *Onopurdum acaulon*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Sweet briar *Rosa rubiginosa*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Taurian thistle *Onopurdum tauricum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Texas blueweed *Helianthus ciliaris*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*
Tree-of-heaven *Ailanthus altissima*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed*
Tropical soda apple *Solanum viarum*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Water caltrop *Trapa* species	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Water hyacinth *Eichhornia crassipes*	2	Regionally Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Water lettuce *Pistia stratiotes*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Water soldier	1	State Prohibited Weed

Stratiotes aloides		*The plant must be eradicated from the land and that land must be kept free of the plant*
Wild radish *Raphanus raphanistrum*	4	Locally Controlled Weed *The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread*
Willows *Salix* species	4	Locally Controlled Weed *The plant must not be sold, propagated or knowingly distributed*
Witchweeds *Striga* species	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Yellow burrhead *Limnocharis flava*	1	State Prohibited Weed *The plant must be eradicated from the land and that land must be kept free of the plant*
Yellow nutgrass *Cyperus esculentus*	5	Restricted Plant *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*

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-leafed 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.	
	Asterolasia buxifolia	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
	Asterolasia elegans	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 (Syncarpia glomulifera subsp. glomulifera), Smooth-barked Apple (Angophora costata), Sydney Peppermint (Eucalyptus piperita), Forest Oak (Allocasuarina torulosa) and Christmas Bush (Ceratopetalum gummiferum).	EPBC 2000 Endangered
Deane's Boronia	Boronia deanei	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	Caladenia tessellata	A terrestrial orchid generally found in grassy sclerophyll woodland on clay loam or sandy soils	EPBC Act 2000 Vulnerable
Leafless Tongue-orchid	Cryptostylis hunteriana	Populations typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina littoralis).	EPBC Act 2000 Vulnerable
A shrub	Derwentia blakelyi	Derwentia blakelyi 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	Diuris aequalis	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	Eucalyptus aggregata	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 (Eucalyptus pauciflora), Manna or Ribbon Gum (E. viminalis), Candlebark (E. rubida), Black Sallee (E. stellulata) and Swamp Gum (E. ovata). Black Gum usually occurs in an open woodland formation with a grassy groundlayer dominated either by River Tussock (Poa labillardierei) or Kangaroo Grass (Themeda australis), 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	Eucalyptus pulverulenta	The Silver-leafed 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 (Eucalyptus mannifera), Red Stringybark (E. macrorhynca), Broad-leafed Peppermint (E. dives), Silvertop Ash (E. sieberi) and Apple Box (E. bridgesiana).	TSC 1995 Vulnerable EPBC Act 2000 Vulnerable
A Herb	Euphrasia arguta	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	Haloragis exalata subsp exalata	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	Leionema lachnaeoides	Formerly known as Phebalium lachnaeoides. 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 Eucalyptus stricta, Allocasuarina nana, Dillwynia retorta, Epacris microphylla and Caustis flexuosa. 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
Peppercress	Lepidium hyssopifolium	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	Leucochrysum albicans var. tricolor	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 gravely soil (Sinclair 2010).	EPBC Act 2000 Endangered
Omeo Stork's-bill	Pelargonium sp. Striatellum (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	Persoonia acerosa	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
	Persoonia hindii	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	Persoonia hirsuta	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 Persoonia species are) but will regenerate from seed.	EPBC Act 2000 Endangered
Clandulla Geebung	Persoonia Marginata	P. marginata 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	Prasophyllum fuscum	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 P. pallens which can be distinguished by its paler-coloured flowers with a musty smell.	TSC 1995 Critically Endangered EPBC Act 2000 Vulnerable
Tarengo Leek Orchid	Prasophyllum petilum	Occurs on relatively fertile soils in grassy woodland or natural grassland.	
	Prasophyllum sp. Wybong (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	Pultenaea glabra	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	Rhizanthella	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 (Themeda australis). 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 Angophora bakeri, Corymbia eximia, Backhousia myrtifolia, Eucalyptus sparsifolia, E. crebra, E. notabilis, Allocasuarina torulosa, and Leptospermum attenuatum. 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	Petalura gigantea	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	Anthochaera phrygia	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 (Amyema cambagei) 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	Callocephalon fimbriatum	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 Eucalyptus pauciflora 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	Calyptorhynchus lathami	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 (Allocasuarina littoralis), Forest She-oak (A. torulosa) or Drooping She-oak (A. verticillata) occur. Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites.	TSC 1995 Vulnerable
Varied Sittella	Daphoenositta chrysoptera	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	Dasyurus maculatus	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	Falsistrellus tasmaniensis	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)	Isoodon obesulus obesulus	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 heathy 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 Xanthorrhoea 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	Miniopterus australis	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	Miniopterus schreibersii oceanensis	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	Mormopterus norfolkensis	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	Myotis macropus	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	Petaurus australis	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 Sheathtail-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 biaised, 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

Appendix D: Aquatic Ecology Monitoring Report

Austen Quarry Aquatic Ecology Monitoring

Spring 2015

Prepared for Hy-Tec

AquaScience
Aquatic Ecology

Document Information

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Executive Summary

Hy-Tec Industries Pty Ltd (Hy-Tec) commissioned AquaScience to undertake the Spring 2015 aquatic ecology survey at Austen Quarry near Hartley, NSW as part of an ongoing monitoring program. The program examines the ecological health, via the use of the AUSRIVAS sampling protocol, of the Coxs River to assess whether quarry operations are impacting on the river ecosystem. The aims of the study were to:

> Examine the quality of aquatic habitats and physico-chemical water quality at each monitoring site;

> Collect macroinvertebrate samples consistent with previous sampling and AUSRIVAS Spring sampling protocol; and

> Examine the spatial and temporal patterns in macroinvertebrate assemblage structure and AUSRIVAS indices consistent with previous monitoring to ascertain whether quarry operations are impacting on the ecological health of the river.

Edge and riffle habitat was sampled at six sites for aquatic macroinvertebrates during November 2015 as part of the Spring sampling period within the AUSRIVAS protocol and consistent with previous monitoring. In addition, various habitat descriptors and water quality data were also collected during field work. The data collected was analysed using both univariate and multivariate statistical techniques to examine the spatial and temporal variability within aquatic macroinvertebrate assemblage structure to ascertain whether quarry operations have had an effect on river health.

Results suggest that aquatic macroinvertebrate assemblages associated with edge and riffle habitat within the vicinity of Austen Quarry were generally assessed as equivalent to the AUSRIVAS reference condition. In addition, the sites that represented areas of the river under the potential influence of quarry operations were similar to other areas of the river that could be considered not to be affected by the quarry.

There was significant spatial and temporal variability in macroinvertebrate assemblage structure as well as AUSRIVAS indices, however, this variability could not be conclusively attributed to quarry operations. Many of the differences detected were most likely a result of inherent natural variability which is common in aquatic environments, and other influences such as surrounding land use practices are most likely influencing ecological patterns within the Coxs River.

Previous monitoring surveys (e.g. Cardno 2011, Cardno 2014) have reported similar results to those presented here and it appears that the addition of the 2015 data has not shown any great differences in the spatial and temporal patterns observed throughout the monitoring program to date. In general, similar variability has been shown for all ecological variables examined throughout the entire monitoring program and it appears that very little of the variability detected could be considered to be as a direct result of quarry operations. Therefore, it appears that the environmental management practices used at the quarry are providing adequate protection to the aquatic environment of the Coxs River.

In conclusion, there were no distinct patterns of variability in the aquatic macroinvertebrate fauna observed at the Quarry processing plant location compared to either of the Control locations that could be attributed to the activities of the Quarry. Results suggest that, at present, the ecological health of the river (as measured through aquatic macroinvertebrate assemblages) within the vicinity of Austen Quarry is no different, or sometimes better, than other areas of the river not influenced by quarry operations.

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Appendices

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1 Introduction

1.1 Background

Hy-Tec Industries Pty Ltd (Hy-Tec) commissioned AquaScience to undertake the Spring 2015 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.

As part of the conditions of Development Consent issued by Lithgow Council for the quarry (DA 103/94), Hy-Tec must monitor 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 has been 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.

It should be noted that an Environmental Impact Statement (EIS) was prepared and submitted in 2014 for the 'Stage 2' extension of quarry operations (i.e. extension of the extraction area, overburden emplacement and water management systems) (R.W. Corkery 2014). As such, the monitoring program was temporarily put on hold in 2012 and re-established again in 2014 to allow for studies to be completed as part of the EIS preparation. The data collected during the EIS preparation is therefore, not examined during this report, as the objectives and sampling methodologies used throughout the EIS were not always consistent with that of the original monitoring program. It is emphasized though that there did not appear to be any discernible change in aquatic environment during the EIS period when data was qualitatively compared with previous data collected during the actual monitoring program.

1.2 Aims and Objectives

The aims and objectives of the current survey were to provide a continuation of the current aquatic ecological monitoring program already in place for Austen Quarry and to fulfil the conditions of the Development Consent issued by Council. More specifically, the study would;

> Examine the quality of aquatic habitats and physico-chemical water quality at each monitoring site;

> Collect macroinvertebrate samples consistent with previous sampling and AUSRIVAS Spring sampling protocol; and

> Examine the spatial and temporal patterns in macroinvertebrate assemblage structure and AUSRIVAS indices consistent with previous monitoring to ascertain whether quarry operations are impacting on the ecological health of the river.

It should be noted that only 2014 data of previous monitoring was included here as other monitoring data was not available during the preparation of this report. A qualitative comparison has been made, however, to other previous reports to aid in the interpretation of results.

2 Methodology

2.1 Study Area

A total of six sites were sampled during the current survey (**Figure 2-1**). These sites are consistent with those sampled in previous monitoring and allows for a valid 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 5 and 6).

The Quarry Treatment sites are used to represent parts of the river potentially affected by quarry operations, whilst the Quarry Control and Upstream Control are used to represent areas unaffected by quarry operations. These control groups are used as a comparison for data collected at the Quarry Treatment group and allows for a valid experimental design to be employed throughout the monitoring program.

GPS coordinates of each site are shown in **Appendix A**.

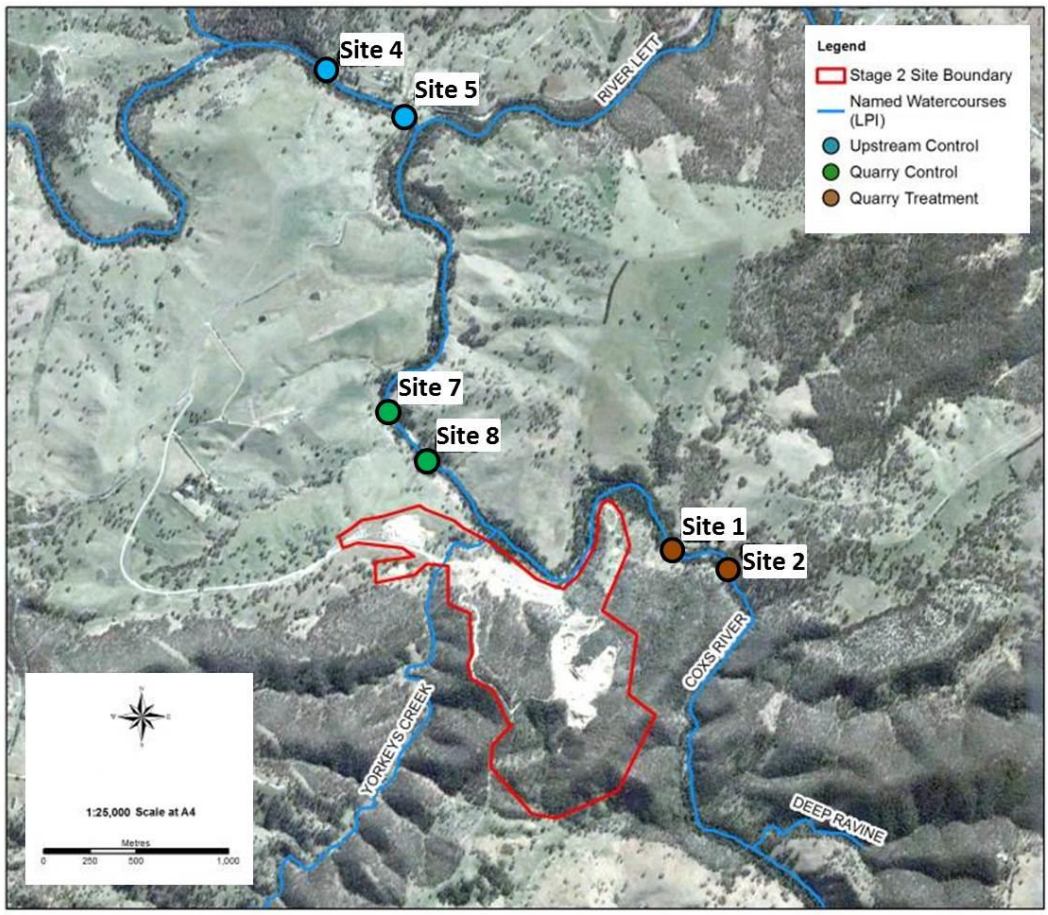

Figure 2-1 Map of the six sites sampled on the Coxs River during the monitoring program. Map is taken and modified from Cardno (2015).

2.2 Sampling Times

Sampling for the current survey was undertaken on 10 – 11 November 2015, within the designated AUSRIVAS Spring sampling season (15 September to 15 December).

Other sampling times throughout the entire monitoring program to date are shown in **Table 2-1**.

Table 2-1 Dates of sampling undertaken throughout the aquatic ecology monitoring program

Sampling Event	Sampling Dates	Comments
1	21 – 25 Nov 2005	Autumn sampling also completed 27-29 Apr
2	31 Oct – 1 Dec 2006	Autumn sampling also completed 17-31 Mar
3	15 – 17 Nov 2007	Spring sampling done mid-season
4	26 Sep – 1 Oct 2008	Spring sampling done early in season
5	19 – 22 Oct 2009	Spring sampling done mid-season
6	16 – 17 Sep 2010	Spring sampling done early in season
7	29 – 30 Sep 2011	Spring sampling done early in season
8	3 – 4 Dec 2014	Spring sampling done late in season
9	10 – 11 Nov 2015	Spring sampling done mid-season

2.3 Field Sampling Methods

2.3.1 Water Quality Sampling

A YSI Pro Plus Water Quality Meter was used to measure in-situ water quality at each site. Parameters recorded included:

> Temperature (°C);

> Electrical conductivity (EC) (ms/cm);

> pH (pH units); and

> Dissolved oxygen (DO) (% saturation and mg/L).

In addition, Turbidity (NTU) was measured at each site using a WQC24 Water Quality Meter. Two replicates were measured for all above parameters at each site.

A single replicate reading of total alkalinity (mg/L CaCO3) was also measured and recorded using a CHEMetrics titration kit at each site for use in the AUSRIVAS analysis.

2.3.2 Macroinvertebrate Sampling

Aquatic macroinvertebrates were collected using the NSW AUSRIVAS sampling protocol developed by Turak *et al*. (2004). One macroinvertebrate sample was collected from both 'edge' and 'riffle' habitat at each site using a 250µm mesh dip net. Each sample was collected over a period of 3 – 5 minutes from a total length of 10 m within each habitat type.

Following sample collection, a 'live' pick was conducted on site (using forceps and pipettes) to remove as many macroinvertebrates as possible from each sample. Picking from each sample was undertaken for a minimum of 40 minutes, up to a maximum of 60 minutes, dependent upon the discovery of new taxa within the final 20 minute period. Macroinvertebrates collected during the picking period were placed into a labelled jar containing 70% ethanol for taxonomic identification.

2.4 Laboratory Methods

Macroinvertebrate samples collected in the field were sorted and animals were identified to family level in accordance with NSW AUSRIVAS protocol (Turak *et al*. 2004). All organisms were identified using the standard taxonomic keys for aquatic macroinvertebrates.

Following enumeration of data, samples were transferred to 70% ethanol for long-term archiving.

2.5 Data Analyses

2.5.1 Water Quality

Water quality data collected from each site was tabulated and where possible, compared to the ANZECC/ARMCANZ (2000) default trigger values (DTVs) for slightly disturbed upland rivers. These guideline values are shown in **Table 2-2** for reference.

Table 2-2 ANZECC/ARMCANZ (2000) default trigger values for south-east Australian upland rivers

Parameter	Default Trigger Value (DTV)	Comment
DO	90 – 110%	Daytime measurement
pH	6.5 – 8.0	
EC	350 mS/cm	High values in NSW
Turbidity	25 NTU	Higher in high flow

2.5.2 Macroinvertebrates

SIGNAL2

The revised SIGNAL2 biotic index (Stream Invertebrate Grade Number Average Level) developed by Chessman (2003) was used to determine the "environmental quality" of sites on the basis of the presence or absence of families of macroinvertebrates. This method assigns grade numbers to each macroinvertebrate family or taxa found for a particular site, based on their responses to chemical pollutants.

The sum of all grade numbers for a particular habitat (i.e. edge or riffle) within a site was divided by the total number of families recorded for that habitat to calculate the SIGNAL2 index for that site. The SIGNAL2 index therefore uses the average sensitivity of macroinvertebrate families to indicate potential water pollution issues at each site.

There is no universally recognised reference point or value for assigning environmental health based on SIGNAL2 scores, as these values can vary across geographic location and habitat. They can be used, however, to compare different sites with one another over time.

AUSRIVAS

Macroinvertebrate data were examined using the AUSRIVAS predictive models for the NSW spring sampling season (Coysh et al. 2000). A number of key indices are generated from the model and are used to determine the level of impairment of a macroinvertebrate assemblage for a particular site compared with assemblages expected to occur at sites with similar habitat and physical characteristics. These key indices include:

> OE50Taxa – ratio of the number of macroinvertebrate families observed at a site (that have a probability of occurrence greater than or equal to 50%) to the number of families expected to occur at a site (that have a probability of occurrence greater than or equal to 50%); and

> Overall Bands – a measure of biological condition or level of impairment of a particular site and is based on OE50Taxa scores. The bands allocated for Spring Edge and Spring Riffle are shown in Table 2.3.

Table 2-3 AUSRIVAS OE50Taxa band limits for NSW Spring Edge and Spring Riffle models

Band	Description	Spring Edge	Spring Riffle
X	Richer than reference	Greater than 1.16	Greater than 1.18
A	Reference condition	0.84 to 1.16	0.81 to 1.18
B	Significantly impaired	0.52 to 0.83	0.44 to 0.80
C	Severely impaired	0.20 to 0.51	0.07 to 0.43
D	Extremely impaired	Equal to or below 0.19	Equal to or below 0.06

Other useful indices are also produced by the AUSRIVAS model and are used within univariate analyses (see below) to provide an additional comparison of macroinvertebrate assemblages among sampled sites over time. These include:

> 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%;

> O0Signal – This is the observed SIGNAL score for taxa that have a probability of occurrence of more than 0%. This is equivalent to the 'raw' SIGNAL score.

2.5.3 PERMANOVA

The statistical procedure, Pemutational 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 of each statistical test was set at $p < 0.05$ for all 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 (2 levels: 2014 vs 2015); and

> Location (3 levels: Quarry Treatment vs Quarry Control vs 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, is suitable for transforming to presence/absence 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.

Non-metric Multi-Dimensional Scaling (nMDS) (Clarke 1993) was used to provide a graphical representation of the spatial and temporal patterns in macroinvertebrate assemblages. In nMDS, samples with similar groups of organisms generally cluster closer together than samples containing different groups of organisms, and thus provides a visualisation of any differences in assemblage structure that may be detected with PERMANOVA. A "stress" value for each plot is also provided, which indicates how well the data fits the two dimensional representation of the plot. The smaller the stress value, the better the representation, and values less than 0.2 are considered acceptable (Clarke & Warwick 2001). Plots with stress levels greater than 0.2 are still valid, although any interpretations made from these plots should be treated with caution.

The SIMPER (Similarity Percentages) routine was used to identify the macroinvertebrate taxa primarily responsible for the differences in assemblages between Years and Locations identified as significant by PERMANOVA. SIMPER estimates the percentage contribution of each taxon to the dissimilarity between assemblages and computes them in decreasing order of importance (Clarke 1993; Clarke and Gorley 2006).

Univariate Analyses

The spatial and temporal variability in the total number of macroinvertebrate taxa 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 2015

3.1.1 Water Quality

Mean electrical conductivity and mean pH levels at each site exceeded the recommended DTVs for slightly disturbed upland rivers in south-east Australia as set out in the ANZECC/ARMCANZ (2000) guidelines (**Table 3-1**). Mean dissolved oxygen levels recorded at Site 1 (Quarry Treatment) and Sites 4 and 5 (Upstream Control) were below the recommended DTVs, whilst mean turbidity at Site 1 (Quarry Treatment), Site 4 (Upstream Control) and Site 8 (Quarry Control) were also lower than the recommended DTVs for slightly disturbed upland rivers in south-east Australia.

Spatially, most water parameters were similar across each site; although electrical conductivity recorded at sites within the Upstream Control treatment (Site 4 and Site 5) were slightly greater than those recorded at other sites during the 2015 survey (**Table 3-1**). In addition, dissolved oxygen levels were greater at Site 7 and Site 8 (Quarry Control) compared to the other sites during the survey.

Table 3-1 Water quality data collected during the 2015 Spring sampling survey. Bold values indicate values are outside ANZECC/ARMCANZ (2000) Default Trigger Values (DTVs). SE = standard error.

Parameter	Location	Quarry Treatment		Upstream Control		Quarry Control		ANZECC/ARMCANZ (2000) DTVs
	Site	1	2	4	5	7	8	
Temperature (°C)	Mean	18.20	19.55	18.50	18.40	19.75	20.35	-
	SE	0.00	0.05	0.00	0.00	0.05	0.05	
EC (mS/cm)	Mean	**469.50**	**468.80**	**503.75**	**505.45**	**467.35**	**468.25**	30 - 350
	SE	**0.50**	**0.20**	**0.05**	**0.05**	**0.05**	**0.05**	
pH	Mean	**8.26**	**8.34**	**8.48**	**8.54**	**8.60**	**8.73**	6.5 - 8.0
	SE	**0.00**	**0.01**	**0.01**	**0.01**	**0.00**	**0.01**	
ORP (mV)	Mean	82.95	73.90	82.30	74.20	72.45	69.40	-
	SE	0.15	1.10	0.30	0.10	0.05	0.20	
DO (% sat.)	Mean	**87.90**	96.05	**89.70**	**87.85**	91.45	100.00	90 - 110
	SE	**0.70**	0.45	**0.80**	**0.05**	0.95	1.00	
DO (mg/L)	Mean	8.24	8.80	8.37	8.24	8.38	9.03	-
	SE	0.04	0.03	0.06	0.00	0.17	0.09	
Turbidity (NTU)	Mean	**0.75**	4.35	**1.45**	6.35	8.45	**1.35**	2 - 25
	SE	**0.15**	0.15	**0.05**	0.25	0.05	**0.05**	

3.1.2 Aquatic Macroinvertebrates

Edge Habitat

A total of 47 taxa were collected from edge habitat during the 2015 survey. Edge samples were dominated numerically by Leptoceridae (stick caddisflies), Leptophlebiidae (prong-gilled mayflies) and Caenidae (square-gill mayflies), which together, made up just over 32% of the total number of macroinvertebrates collected during the survey within edge habitat (**Appendix B**).

Edge habitat macroinvertebrate assemblages at each site were all equivalent (Sites 2, 4, 5 and 8), or more taxonomically richer (Sites 1 and 7), compared to the AUSRIVAS reference condition (**Table 3-2**). OE50Taxa scores were all above 1.00 (with the exception of Site 4), which indicated more taxa were sampled during the survey than expected by the AUSRIVAS model.

SIGNAL2 and O0Signal scores at each site ranged between 4.00 (Site 4) and 4.70 (Site 2), which indicated the macroinvertebrate assemblages residing at these sites consisted of taxa able to withstand moderate levels of pollution (**Table 3-2**).

Table 3-2 AUSRIVAS scores for edge habitat sampled during the 2015 survey.

Habitat	Parameter	Quarry Treatment		Upstream Control		Quarry Control	
		1	2	4	5	7	8
Edge Habitat	Total No. Taxa	27	23	22	22	24	24
	SIGNAL2	4.58	4.70	4.00	4.38	4.24	4.00
	O0Signal	4.39	4.59	4.00	4.27	4.06	4.06
	OE50Signal	0.97	1.00	0.96	1.03	0.90	0.95
	OE50Taxa	1.21	1.00	0.97	1.02	1.20	1.08
	AUSRIVAS Bands	X	A	A	A	X	A

Riffle Habitat

A total of 34 taxa were collected from riffle habitat during the 2015 survey. Riffle samples were dominated numerically by Leptophlebiidae (prong-gilled mayflies), Hydropsychidae (net-spinning caddisflies), Baetidae (minnow mayflies), Gripopterygidae (stoneflies) and Gomphidae (square-gill mayflies), which together, made up just over 54% of the total number of macroinvertebrates collected during the survey within riffle habitat (**Appendix B**).

Macroinvertebrate assemblages within riffle habitat at each site were all equivalent to the AUSRIVAS reference condition (Band A), with the exception of Site 2 within the Quarry Treatment group. This site was designated as Band B, or significantly impaired compared to the AUSRIVAS reference condition (**Table 3-3**), although OE50Taxa scores for all sites were all below 1.00 (except for Site 1), which indicated that up to 20% of taxa expected to occur at these sites were not present.

SIGNAL2 and O0Signal scores ranged between 4.75 (Site 4) and 6.53 (Site 1), which as for edge habitat, indicated the macroinvertebrate assemblages residing at these sites consisted of taxa able to withstand moderate levels of pollution (**Table 3-3**). Interestingly, sites within the Quarry Treatment group had the greatest number of less pollutant tolerant taxa residing within riffle habitat compared with both Control groups. This suggested that the aquatic environment at the Quarry Treatment group was in better condition than the aquatic environment at either of the Control groups during the survey.

Table 3-3 AUSRIVAS scores for edge habitat sampled during the 2015 survey

Habitat	Parameter	Quarry Treatment		Upstream Control		Quarry Control	
		1	2	4	5	7	8
Riffle Habitat	Total No. Taxa	20	16	17	17	21	18
	SIGNAL2	6.17	6.53	4.75	5.36	5.80	6.13
	O0Signal	5.70	5.94	4.59	5.06	5.38	5.72
	OE50Signal	1.05	1.04	0.95	0.97	1.00	1.03
	OE50Taxa	1.05	0.80	0.89	0.89	0.89	0.89
	AUSRIVAS Bands	A	B	A	A	A	A

3.2 Trends in Macroinvertebrate Assemblages over Time

3.2.1 Edge Habitat

AUSRIVAS Indices

A summary of the spatial and temporal patterns of the key AUSRIVAS indices (number of taxa, O0Signal, OE50Signal and OE50Taxa) for edge habitat throughout 2014 and 2015 is given below. Also a basic qualitative comparison between 2015 edge data and the corresponding data collected during 2005 to 2011 is also summarised:

> No significant differences were detected in the number of edge taxa between 2014 and 2015, nor were there any differences in the number of edge taxa among Location groups (i.e. Quarry Treatment, Quarry Control and Upstream Control) (**Appendix C-1**),

> Significant differences in edge O0Signal scores were detected among Location groups, however, these spatial differences were consistent for both 2014 and 2015 (**Appendix C-1**). Pairwise tests revealed that edge O0Signal scores were significantly greater at the Quarry Treatment group compared to either of the two Control groups for both 2014 and 2015 (**Figure 3-1**) and indicates that the edge habitat of the river within the vicinity of the quarry is in better environmental condition than either of the reaches near the control sites,

> Significant differences in edge OE50Signal scores were detected among Location groups, however, these spatial differences were consistent for both 2014 and 2015 (**Appendix C-1**). Pairwise tests revealed that edge OE50Signal scores were significantly lower at the Quarry Control group compared to either of the Quarry Treatment group or Upstream Control group for both 2014 and 2015 (**Figure 3-2**),

> No significant spatial or temporal differences in edge OE50Taxa scores were detected (**Appendix C-1**).

> The edge AUSRIVAS indices of number of taxa, O0Signal, OE50Signal and OE50taxa recorded in 2015 were all similar for each site compared to those obtained during the surveys conducted in 2005 to 2011 (Cardno 2011). Therefore, no great departures in AUSRIVAS values for any site are apparent throughout the monitoring program to date.

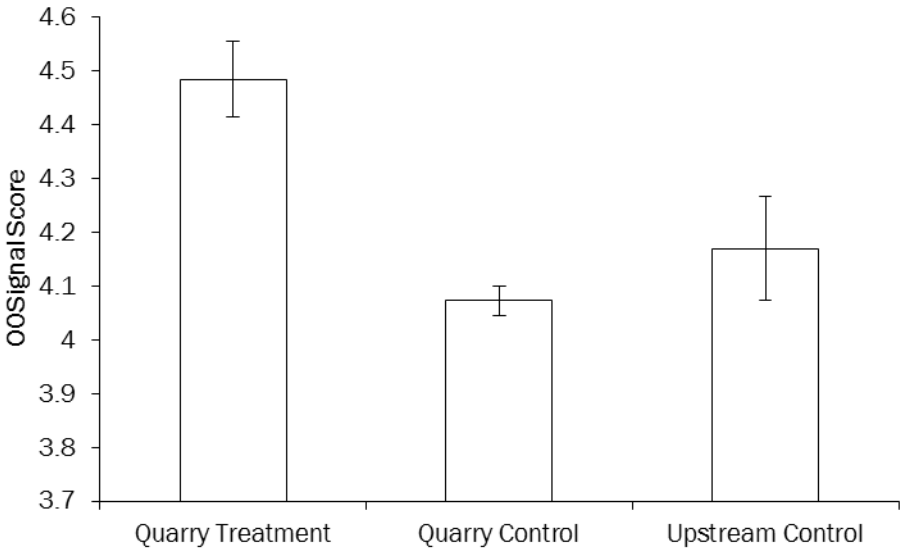

Figure 3-1 Mean (±SE) O0Signal scores for edge habitat at each Location group averaged across 2014 and 2015.

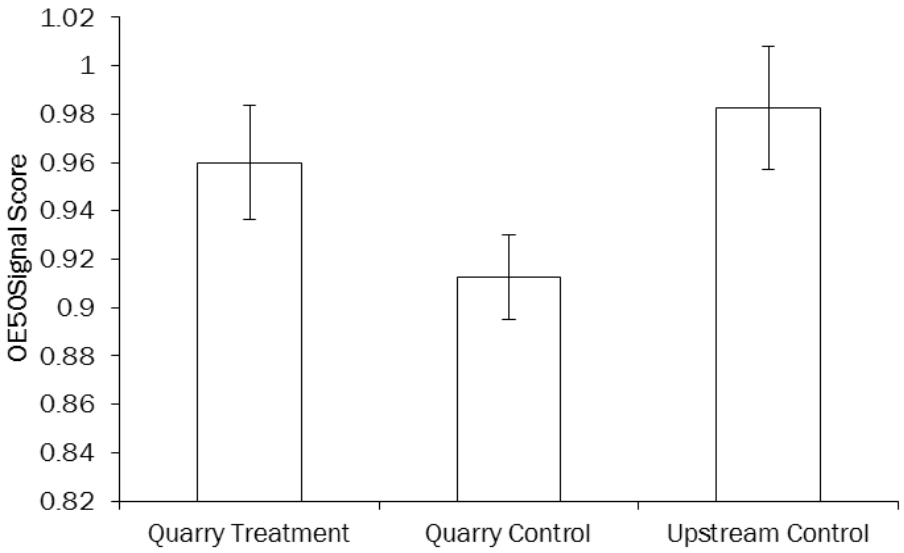

Figure 3-2 Mean (±SE) OE50Signal scores for edge habitat at each Location group averaged across 2014 and 2015.

Assemblage Structure

A summary of the spatial and temporal patterns for macroinvertebrate assemblage structure within edge habitat throughout 2014 and 2015 is given below:

> A significant interaction between Year and Location was detected for macroinvertebrate assemblage structure, however, pairwise tests were unable to detect which Years and/or Locations were significantly different from one another (**Appendix C-2**). The nMDS plot indicated that assemblages sampled at each Location group were somewhat different

between years, and there was some separation among Location groups within each sampling year which indicated differences at this level (**Figure 3-3**).

> Simper analysis revealed that the best discriminating taxa between Years were Cladocera, ostracoda, Copepoda, Ecnomidae, Parastacidae, Chironomidae/Tanypodinae and Dixidae, whilst the best discriminating taxa among Location groups were Cladocera, Telephlebiidae, Ostracoda, Philorheithridae, Parastacidae, Notonectidae and Chironomidae/Orthocladiinae (**Appendix C-2**).

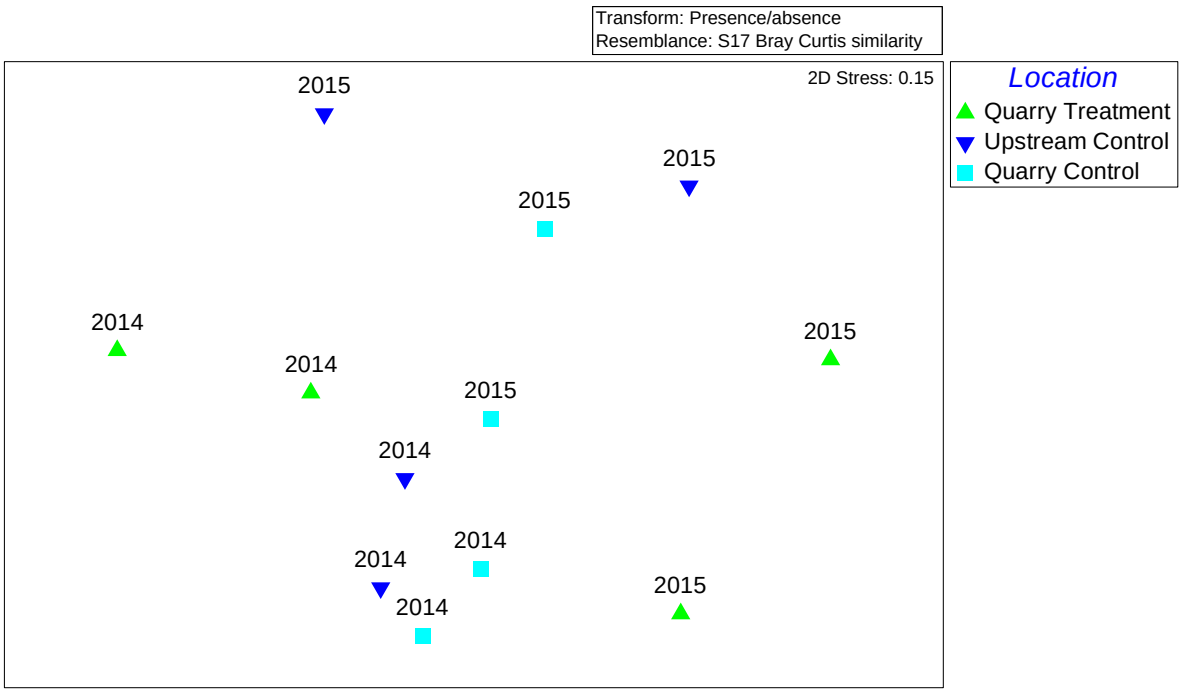

Figure 3-3 nMDS plot comparing macroinvertebrate assemblage structure within edge habitat sampled at each Location group during 2014 and 2015.

3.2.2 Riffle Habitat

AUSRIVAS Indices

A summary of the spatial and temporal patterns of the key AUSRIVAS indices (number of taxa, O0Signal, OE50Signal and OE50Taxa) for riffle habitat throughout 2014 and 2015 is given below. Also a basic qualitative comparison between 2015 riffle data and the corresponding data collected during 2005 to 2011 is also summarised:

> A significant difference was detected in the number of riffle taxa between 2014 and 2015 and this difference was consistent among the three Location groups (**Appendix D-1**). More taxa were sampled in 2014 compared to 2015 (**Figure 3-4**),

> Significant differences in riffle O0Signal scores were detected among Location groups and these differences were consistent for both sampling years (2014 and 2015). Pairwise tests (**Appendix D-1**) and **Figure 3-5** indicated that the Upstream Control group had significantly lower O0Signal scores compared to either the Quarry Treatment group and the Quarry Control group. A significant difference in O0Signal scores was also detected between sampling years and this difference was consistent for each of the Location groups (**Appendix D-1**). O0Signal scores were significantly greater in 2015 compared to 2014 for all three Location groups

(**Figure 3-6**), and suggest that the riffle habitat at all sites sampled in 2015 is in better environmental condition than when it was sampled in 2014,

> No significant spatial or temporal differences in riffle OE50Signal scores and OE50Taxa scores were detected during the analysis (**Appendix D-1**).

> The riffle AUSRIVAS indices of number of taxa and OE50taxa scores were slightly lower in 2015 compared to some other previous monitoring years, although O0Signal and OE50Signal scores were comparable, if not better than previous monitoring done from 2005 to 2011 (Cardno 2011).

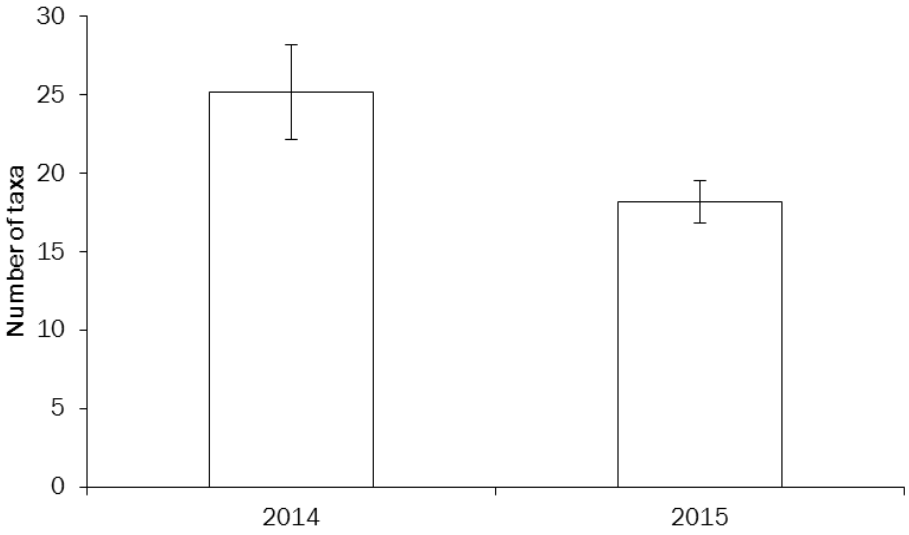

Figure 3-4 Mean (±SE) number of taxa within riffle habitat sampled in 2014 and 2015 averaged across Location groups.

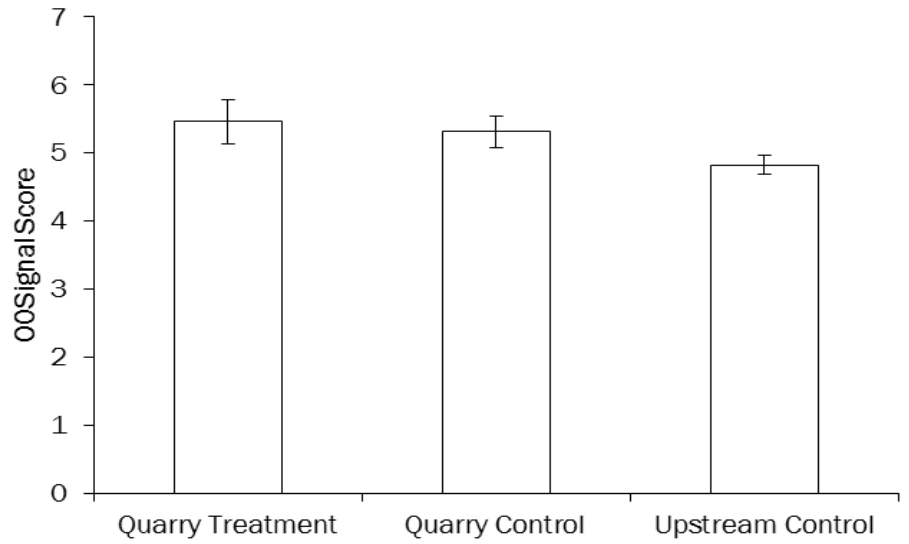

Figure 3-5 Mean (±SE) O0Signal scores within riffle habitat at each Location group averaged across 2014 and 2015.

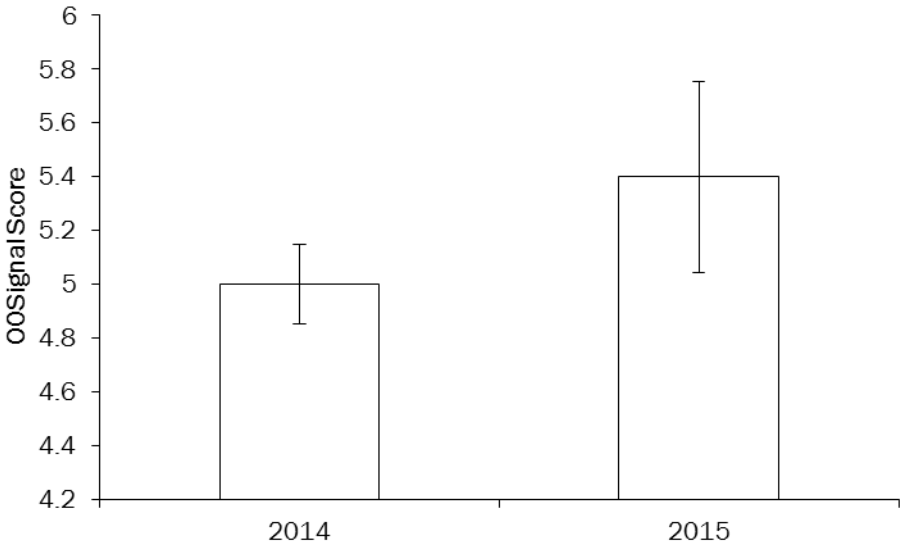

Figure 3-6 Mean (±SE) 00Signal scores within riffle habitat sampled in 2014 and 2015 averaged across Location groups.

Assemblage Structure

A summary of the spatial and temporal patterns for macroinvertebrate assemblage structure within riffle habitat throughout 2014 and 2015 is given below:

> A significant difference in macroinvertebrate assemblage structure was detected between 2014 and 2015, with this difference being consistent for all three Location groups (**Appendix D-2**). This temporal pattern was also highlighted within the nMDS plot, which showed a clear separation between samples collected during each year (**Figure 3-7**). Interestingly, assemblage structure for samples collected in 2014 appeared to be more similar to one another than those samples collected in 2015, with more variability among 2015 samples indicated in the nMDS plot.

> Simper analysis revealed that the best discriminating taxa between Years were Dugesiidae, Oligochaeta, Glossomatidae, Ecnomidae and Conoesucidae, which contributed to nearly 25% of the dissimilarity between sampling years (**Appendix D-2**).

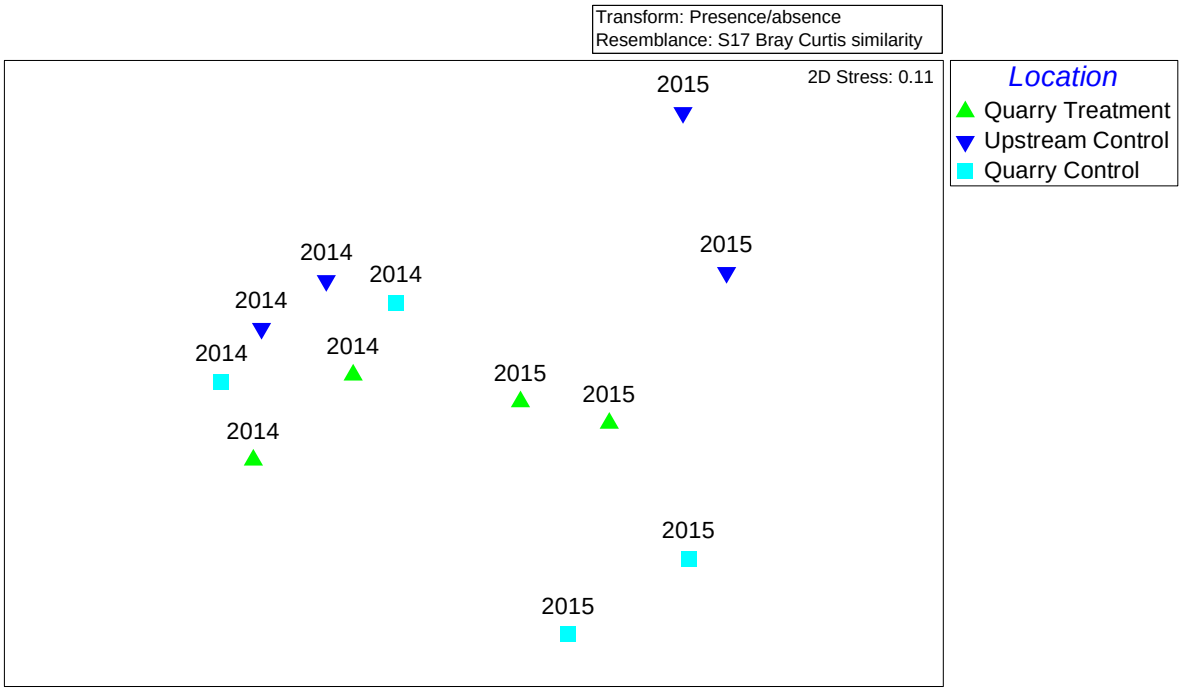

Figure 3-7 nMDS plot comparing macroinvertebrate assemblage structure within riffle habitat sampled at each Location group during 2014 and 2015.

4 Discussion

Key Findings

> At the time of the 2015 survey, the environmental quality of the river near the quarry discharge point was in the same condition, or for some variables in better condition, compared with reaches of the river which are not under the influence of the quarry

> Similar patterns and variability have been displayed by all ecological variables examined throughout the entire monitoring program to date (i.e. 2005 to 2015) and it appears that very little of the variability detected is as a direct result of quarry operations

4.1 2015 Survey

During the 2015 survey, aquatic macroinvertebrate assemblages associated with edge and riffle habitat within the vicinity of Austen Quarry were generally assessed as equivalent to the AUSRIVAS reference condition. In addition, the sites that represented areas of the river under the potential influence of quarry operations were similar to other areas of the river that could be considered not to be affected by the quarry.

All AUSRIVAS indices indicated that the sites within close proximity to the quarry were generally the same, or in better environmental condition than what was expected by the AUSRIVAS model for both edge and riffle habitat. Signal score, which assesses the environmental quality of a site based on macroinvertebrate taxa response to chemical pollutants, indicated that sites within the vicinity of the quarry had fewer pollution tolerant taxa than either of the Control groups, which was the case for both edge and riffle habitat. This suggests that at the time of the survey, the environmental quality of the river near the quarry discharge point was in better condition than reaches of the river which are not under the influence of the quarry.

Elevated electrical conductivity and pH values (compared to ANZECC/ARMCANZ (2000) water quality guidelines) were observed at all sites, although these elevated readings could not be attributed to any quarry operations as Control group sites had similar elevated values. Likewise, low dissolved oxygen levels and low turbidity were recorded within the Quarry Treatment sites, however, both Upstream Control sites and Quarry Control sites showed similar discrepancies compared to the suggested guidelines. This suggests that other factors, other than quarry operations, are influencing water quality within the area.

4.2 Spatial and Temporal Trends over Time

There was significant spatial and temporal variability in macroinvertebrate assemblage structure as well as AUSRIVAS indices, however, this variability could not be conclusively attributed to quarry operations. Most spatial differences were often favourable for the Quarry Treatment sites (i.e. sites within the vicinity of the quarry) compared to the Control group sites. For example, OOSignal scores were significantly greater at the Quarry Treatment group compared to either of the Control groups, which suggests that areas within the vicinity of the quarry were in better environmental condition than other reaches of the river not influenced by quarry operations. In addition, this pattern was consistent for both sampling years analysed (i.e. 2014 and 2015). Many of the differences detected were most likely a result of inherent natural variability which is common in aquatic environments, and other influences such as surrounding land use practices are most likely influencing ecological patterns within the Coxs River.

Previous monitoring surveys (e.g. Cardno 2011, Cardno 2015) have reported similar results to those presented here and it appears that the addition of the 2015 data has not shown any great differences in the spatial and temporal patterns observed throughout the monitoring program to date. In general, similar variability has been shown for all ecological variables examined throughout the entire monitoring program to date and it appears that very little of the variability detected is as a direct result of quarry operations. Therefore, it appears that the environmental management practices used at the quarry are providing suitable protection to the aquatic environment of the Coxs River.

4.3 Conclusion

In conclusion, there were no distinct negative patterns of variability in the aquatic macroinvertebrate fauna observed at the Quarry Treatment location compared to either of the Control locations that could be attributed to the activities of the Quarry. Results suggest that, at present, the ecological health of the river (as measured through aquatic macroinvertebrate assemblages) within the vicinity of Austen Quarry is no different, or sometimes better, than other areas of the river not influenced by quarry operations.

As discussed in previous reports (e.g. Cardno 2011, Cardno 2015), the AUSRIVAS sampling protocol is designed for use in rapid assessment of river health and therefore, is useful in detecting larger scale, more persistent changes in macroinvertebrate assemblage structure and ultimately the condition of the aquatic environment. Impacts on aquatic macroinvertebrates from smaller magnitude, episodic discharge events would most likely not be detected by the sampling protocols adopted within the current monitoring program. In addition, upstream activities are most likely confounding any patterns observed at the current monitoring sites.

5 References

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6 Plates

Plate 1. Site 1 (Quarry Treatment) looking upstream at edge habitat

Plate 2. Site 1 (Quarry Treatment) looking downstream at riffle habitat

Plate 3. Site 2 (Quarry Treatment) looking upstream at edge habitat.

Plate 4. Site 2 (Quarry Treatment) looking upstream at riffle habitat.

Plate 5. Site 4 (Upstream Control) looking downstream at edge habitat

Plate 6. Site 4 (Upstream Control) looking upstream at riffle habitat

Plate 7. Site 5 (Upstream Control) looking downstream at edge habitat

Plate 8. Site 5 (Upstream Control) looking upstream at riffle habitat

Plate 9. Site 7 (Quarry Control) looking upstream at edge habitat

Plate 10. Site 7 (Quarry Control) looking upstream at riffle habitat

Plate 11. Site 8 (Quarry Control) looking downstream at edge habitat

Plate 12. Site 8 (Quarry Control) looking downstream at riffle habitat

Appendix A – GPS Coordinates

Appendix A-1 GPS coordinates of sampling sites (WGS84 Zone56)

Location	Site	Easting	Northing
Quarry Treatment	1	236564	6281888
	2	236938	6281730
Upstream Control	4	234808	6284343
	5	235178	6284196
Quarry Control	7	235058	6282700
	8	235262	6282308

Appendix B – Macroinvertebrate Taxa Collected in 2015

Appendix B-1. Aquatic macroinvertebrate counts from edge habitat collected in Spring 2015

	Location	Quarry Treatment		Upstream Control		Quarry Control	
	Site	1	2	4	5	7	8
1	Ancylidae	1	0	0	0	0	0
2	Atyidae	2	2	4	1	2	0
3	Baetidae	5	1	9	1	3	1
4	Caenidae	10	5	3	4	2	10
5	Ceratopogonidae	2	0	0	0	0	0
6	Chironomidae/Chironominae	7	2	4	2	5	4
7	Chironomidae/Orthocladiinae	0	1	0	0	1	1
8	Chironomidae/Tanypodinae	2	0	0	2	0	0
9	Cladocera	1	1	0	0	0	0
10	Coenagrionidae	0	1	8	8	0	1
11	Copepoda	0	0	0	0	1	1
12	Corbiculidae/ Sphaeriidae	0	1	0	0	1	0
13	Corixidae	1	2	5	8	1	1
14	Culicidae	0	0	1	0	0	0
15	Dixidae	1	8	2	5	2	2
16	Dugesiidae	0	0	1	0	0	0
17	Dytiscidae	3	2	5	0	2	1
18	Ecnomidae	0	0	0	0	0	1
19	Gelastocoridae	1	0	0	0	0	0
20	Gerridae	0	0	0	1	0	0
21	Glossophoniidae	0	0	0	4	0	0
22	Gomphidae	0	0	1	0	0	0
23	Gripopterygiidae	4	3	0	3	0	6
24	Hydracarina	1	1	2	0	1	1
25	Hydraenidae	2	0	1	0	0	1
26	Hydridae	0	0	0	0	1	0
27	Hydrophilidae	2	0	1	0	1	1
28	Hydropsychidae	2	0	0	0	0	0
29	Leptoceridae	10	10	10	10	10	6
30	Leptophlebiidae	6	6	10	10	7	7
31	Megapodagrionidae	0	1	0	0	2	0
32	Notonectidae	0	0	0	1	1	1
33	Oligochaeta	2	0	1	3	1	3
34	Ostracoda	0	1	0	0	0	0
35	Parastacidae	0	0	0	1	1	1
36	Philorheithridae	0	0	3	2	1	0
37	Physidae	2	3	4	4	6	4
38	Psephenidae	0	1	0	0	0	0
39	Psychodidae	1	0	0	0	0	0
40	Pyralidae	0	0	0	0	0	1
41	Scirtidae	1	0	4	6	1	0
42	Sialidae	0	0	0	1	0	0
43	Simuliidae	4	1	0	0	0	0
44	Synlestidae	3	2	3	6	0	1
45	Telephlebiidae (=Aeshnidae)	1	1	0	0	1	0
46	Tipulidae	0	0	0	0	0	2
47	Veliidae	4	1	1	3	1	1

Appendix B-2. Aquatic macroinvertebrate counts from riffle habitat collected in Spring 2015

	Location	Quarry Treatment		Upstream Control		Quarry Control	
	Site	1	2	4	5	7	8
1	Baetidae	10	5	9	9	5	1
2	Caenidae	6	1	1	0	0	0
3	Ceratopogonidae	0	0	0	0	3	0
4	Chironomidae/Chironominae	0	0	1	4	2	5
5	Chironomidae/Orthocladiinae	0	0	1	2	2	0
6	Chironomidae/Tanypodinae	0	0	0	0	0	1
7	Conoesucidae	0	0	0	0	1	0
8	Corbiculidae/ Sphaeriidae	5	1	3	1	1	3
9	Corydalidae	5	4	0	6	0	5
10	Dixidae	0	0	0	0	2	1
11	Dolichopodidae	0	0	0	0	1	0
12	Dytiscidae	0	0	1	0	0	0
13	Ecnomidae	0	0	0	1	0	0
14	Elmidae	1	0	0	0	1	1
15	Empididae	0	0	1	0	0	0
16	Glossosomatidae	1	1	0	4	3	1
17	Gomphidae	10	5	4	6	2	1
18	Gripopterygiidae	10	4	4	7	1	10
19	Hydracarina	1	0	0	1	0	0
20	Hydridae	0	0	1	0	0	0
21	Hydrobiosidae	4	2	3	0	3	3
22	Hydrophilidae	0	0	0	0	1	0
23	Hydropsychidae	10	10	4	10	6	5
24	Leptoceridae	2	2	0	1	1	0
25	Leptophlebiidae	10	10	10	10	10	9
26	Nematode	0	0	0	1	0	1
27	Oligochaeta	4	4	2	5	9	1
28	Philopotamidae	2	2	0	0	0	1
29	Physidae	1	0	1	1	0	0
30	Psephenidae	1	1	3	0	1	1
31	Simuliidae	2	0	0	0	0	0
32	Telephlebiidae (=Aeshnidae)	1	2	0	0	2	0
33	Tipulidae	4	4	2	1	1	0
34	Veliidae	0	0	0	0	0	1

Appendix C – Statistical Analyses of Edge Habitat Data

Appendix C-1. Univariate analyses of edge habitat macroinvertebrate data collected in 2014 and 2015.

a) Number of taxa

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Year	1	27.000	27.000	6.000	0.052	421	0.0519
Location	2	5.167	2.583	0.574	0.572	1476	0.5840
YexLo	2	4.500	2.250	0.500	0.630	2048	0.6325
Residual	6	27.000	4.500				

b) OOSignal Score

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Year	1	0.002	0.002	0.171	0.679	8603	0.6912
Location	2	0.372	0.186	13.163	0.012	9256	0.0075
YexLo	2	0.003	0.002	0.114	0.885	9789	0.8960
Residual	6	0.085	0.014				

PAIR-WISE TESTS
Term 'Lo'

Groups	t	P(perm)	U. perms	P(MC)
Quarry Treatment, Upstream Control	3.136	0.039	302	0.034
Quarry Treatment, Quarry Control	6.342	0.028	177	0.004
Upstream Control, Quarry Control	1.176	0.308	173	0.308

c) OE50Signal Scor

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Year	1	0.003	0.003	3.704	0.101	1531	0.1056
Location	2	0.010	0.005	5.676	0.042	3523	0.0407
YexLo	2	0.000	0.000	0.231	0.792	5450	0.8053
Residual	6	0.005	0.001				

PAIR-WISE TESTS
Term 'Lo'

Groups	t	P(perm)	U. perms	P(MC)
Quarry Treatment, Upstream Control	0.988	0.381	152	0.382
Quarry Treatment, Quarry Control	2.898	0.046	37	0.044
Upstream Control, Quarry Control	2.952	0.048	42	0.044

d) OE50Taxa Score

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Year	1	0.011	0.011	1.873	0.252	2379	0.2238
Location	2	0.005	0.002	0.395	0.683	3737	0.6927
YexLo	2	0.022	0.011	1.912	0.236	6845	0.2294
Residual	6	0.035	0.006				

Appendix C-2. Multivariate analyses of edge habitat macroinvertebrate data collected in 2014 and 2015.

Source	df	SS	MS	Pseudo-F	P(perm)	perms	P(MC)
Year	1	1373.700	1373.700	3.808	0.012	9445	0.022
Location	2	831.810	415.900	1.153	0.354	9592	0.3582
YexLo	2	1793.400	896.720	2.486	0.017	9868	0.0386
Residual	6	2164.400	360.740				

PAIR-WISE TESTS

Term 'YexLo' for pairs of levels of factor 'Year'

Within level 'Quarry Treatment' of factor 'Location'

Groups	t	P(perm)	U. perms	P(MC)
2014, 2015	1.690	0.328	3	0.150

Within level 'Upstream Control' of factor 'Location'

Groups	t	P(perm)	U. perms	P(MC)
2014, 2015	1.830	0.331	3	0.151

Within level 'Quarry Control' of factor 'Location'

Groups	t	P(perm)	U. perms	P(MC)
2014, 2015	1.600	0.332	3	0.172

Term 'YexLo' for pairs of levels of factor 'Location'

Within level '2014' of factor 'Year'

Groups	t	P(perm)	U. perms	P(MC)
Quarry Treatment, Upstream Control	1.310	0.335	3	0.282
Quarry Treatment, Quarry Control	1.776	0.331	3	0.136
Upstream Control, Quarry Control	1.237	0.330	3	0.304

Within level '2015' of factor 'Year'

Groups	t	P(perm)	U. perms	P(MC)
Quarry Treatment, Upstream Control	1.332	0.332	3	0.262
Quarry Treatment, Quarry Control	1.312	0.327	3	0.260
Upstream Control, Quarry Control	1.137	0.336	2	0.359

(Cont.)

SIMPER results

Groups 2014 & 2015
Average dissimilarity = 37.07

Species	Group 2014 Av.Abund	Group 2015 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Cladocera	0.67	0.33	2.01	21.18	5.42	5.42
Ostracoda	0.67	0.17	1.69	2.13	4.57	9.99
Copepoda	0.83	0.33	1.68	2.13	4.54	14.53
Ecnomidae	0.83	0.17	1.68	2.13	4.53	19.07
Parastacidae	0.67	0.50	1.67	2.13	4.50	23.56
Chironomidae/Tanypodinae	1.00	0.33	1.35	1.35	3.64	27.20
Dixidae	0.33	1.00	1.35	1.35	3.64	30.84
Chironomidae/Orthocladiinae	0.17	0.50	1.34	1.35	3.61	34.45
Gripopterygiidae	0.17	0.67	1.34	1.35	3.61	38.05
Corbiculidae/ Sphaeriidae	1.00	0.33	1.34	1.35	3.60	41.66
Scirtidae	0.00	0.67	1.34	1.35	3.60	45.26
Telephlebiidae (=Aeshnidae)	0.83	0.50	1.33	1.35	3.60	48.86
Coenagrionidae	0.50	0.67	1.01	0.96	2.72	51.58
Megapodagrionidae	0.50	0.33	1.01	0.96	2.72	54.29
Gerridae	0.50	0.17	1.01	0.95	2.72	57.01
Philorheithridae	1.00	0.50	0.99	0.95	2.68	59.69
Hydraenidae	0.00	0.50	0.99	0.96	2.68	62.36
Sialidae	0.33	0.17	0.99	0.96	2.66	65.02
Ceratopogonidae	0.50	0.17	0.70	0.68	1.89	66.91
Gomphidae	0.17	0.17	0.69	0.68	1.87	68.78
Atyidae	0.67	0.83	0.68	0.68	1.83	70.60
Hydrophilidae	0.50	0.67	0.68	0.67	1.83	72.43
Dugesiidae	0.17	0.17	0.67	0.68	1.81	74.24
Hemicorduliidae (=Corduliidae)	0.33	0.00	0.67	0.68	1.80	76.04
Hydropsychidae	0.33	0.17	0.66	0.68	1.79	77.83
Pyralidae	0.33	0.17	0.66	0.68	1.79	79.62
Simuliidae	0.00	0.33	0.66	0.67	1.79	81.40
Hydracarina	0.67	0.83	0.66	0.68	1.78	83.18
Notonectidae	0.83	0.50	0.66	0.68	1.78	84.96
Tipulidae	0.17	0.17	0.64	0.68	1.74	86.70
Hydroptilidae	0.33	0.00	0.64	0.68	1.73	88.43
Veliidae	0.83	1.00	0.35	0.43	0.94	89.37
Culicidae	0.00	0.17	0.34	0.43	0.93	90.30

(Cont.)

SIMPER Results (Cont.)

Groups Quarry Treatment & Upstream Control
Average dissimilarity = 32.51

Species	Group Quarry Treatment Av.Abund	Group Upstream Control Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Cladocera	0.50	0.50	2.03	13.35	6.25	6.25
Telephlebiidae (=Aeshnidae)	0.75	0.50	1.52	1.60	4.69	10.94
Ostracoda	0.25	0.50	1.52	1.60	4.68	15.61
Philorheithridae	0.50	1.00	1.07	0.93	3.28	18.89
Simuliidae	0.50	0.00	1.07	0.93	3.28	22.17
Gomphidae	0.25	0.25	1.04	0.93	3.19	25.36
Hydrophilidae	0.50	0.25	1.04	0.93	3.19	28.56
Notonectidae	0.25	0.75	1.04	0.93	3.19	31.75
Gerridae	0.50	0.50	1.03	0.93	3.17	34.92
Chironomidae/Orthocladiinae	0.25	0.25	1.02	0.93	3.15	38.07
Megapodagrionidae	0.25	0.25	1.02	0.93	3.15	41.22
Oligochaeta	0.50	1.00	1.01	0.93	3.12	44.34
Psephenidae	0.50	0.00	1.01	0.93	3.12	47.46
Hydracarina	0.75	0.50	1.01	0.93	3.12	50.58
Coenagrionidae	0.25	0.75	1.01	0.93	3.10	53.67
Gripopterygiidae	0.50	0.50	1.00	0.93	3.08	56.75
Sialidae	0.25	0.25	0.99	0.93	3.05	59.80
Ceratopogonidae	0.75	0.25	0.98	0.93	3.01	62.81
Hydropsychidae	0.50	0.00	0.97	0.93	2.98	65.79
Dixidae	1.00	0.50	0.96	0.93	2.97	68.76
Corbiculidae/ Sphaeriidae	0.75	0.50	0.56	0.54	1.71	70.47
Scirtidae	0.25	0.50	0.56	0.54	1.71	72.18
Chironomidae/Tanypodinae	0.75	0.75	0.53	0.54	1.64	73.82
Culicidae	0.00	0.25	0.53	0.54	1.64	75.46
Dugesiidae	0.00	0.25	0.53	0.54	1.64	77.10
Dytiscidae	1.00	0.75	0.53	0.54	1.64	78.74
Glossophoniidae	0.00	0.25	0.53	0.54	1.64	80.37
Hydraenidae	0.25	0.25	0.53	0.54	1.64	82.01
Parastacidae	0.50	0.75	0.53	0.54	1.64	83.65
Ancylidae	0.25	0.00	0.51	0.54	1.57	85.22
Gelastocoridae	0.25	0.00	0.51	0.54	1.57	86.79
Psychodidae	0.25	0.00	0.51	0.54	1.57	88.36
Atyidae	0.75	1.00	0.51	0.54	1.55	89.92
Veliidae	0.75	1.00	0.51	0.54	1.55	91.47

(Cont.)

SIMPER Results (Cont.)

Groups Quarry Treatment & Quarry Control
Average dissimilarity = 35.05

Species	Group Quarry Treatment Av.Abund	Group Quarry Control Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Cladocera	0.50	0.50	1.99	17.44	5.67	5.67
Parastacidae	0.50	0.50	1.99	17.44	5.67	11.33
Notonectidae	0.25	1.00	1.53	1.62	4.36	15.69
Copepoda	0.50	0.75	1.51	1.61	4.30	19.99
Ostracoda	0.25	0.50	1.50	1.61	4.27	24.26
Coenagrionidae	0.25	0.75	1.47	1.61	4.21	28.47
Megapodagrionidae	0.25	0.75	1.47	1.61	4.21	32.67
Ceratopogonidae	0.75	0.00	1.45	1.61	4.15	36.82
Simuliidae	0.50	0.00	1.02	0.93	2.92	39.74
Atyidae	0.75	0.50	0.99	0.93	2.83	42.57
Hydrophilidae	0.50	1.00	0.99	0.93	2.83	45.40
Oligochaeta	0.50	1.00	0.99	0.93	2.83	48.22
Psephenidae	0.50	0.00	0.99	0.93	2.83	51.05
Ecnomidae	0.50	0.50	0.99	0.93	2.82	53.87
Pyralidae	0.00	0.50	0.99	0.93	2.82	56.69
Hydropsychidae	0.50	0.25	0.97	0.93	2.77	59.46
Telephlebiidae (=Aeshnidae)	0.75	0.75	0.97	0.93	2.77	62.23
Tipulidae	0.25	0.25	0.97	0.93	2.77	65.00
Dixidae	1.00	0.50	0.96	0.93	2.75	67.75
Gerridae	0.50	0.00	0.96	0.93	2.75	70.50
Corbiculidae/ Sphaeriidae	0.75	0.75	0.51	0.54	1.46	71.96
Gripopterygiidae	0.50	0.25	0.51	0.54	1.46	73.41
Hydraenidae	0.25	0.25	0.51	0.54	1.46	74.87
Hydridae	0.00	0.25	0.51	0.54	1.46	76.33
Philorheithridae	0.50	0.75	0.51	0.54	1.46	77.79
Scirtidae	0.25	0.25	0.51	0.54	1.46	79.24
Synlestidae	1.00	0.75	0.51	0.54	1.46	80.70
Gomphidae	0.25	0.00	0.51	0.54	1.44	82.14
Veliidae	0.75	1.00	0.51	0.54	1.44	83.58
Ancylidae	0.25	0.00	0.49	0.54	1.40	84.98
Chironomidae/Orthocladiinae	0.25	0.50	0.49	0.54	1.40	86.38
Chironomidae/Tanypodinae	0.75	0.50	0.49	0.54	1.40	87.78
Gelastocoridae	0.25	0.00	0.49	0.54	1.40	89.18
Psychodidae	0.25	0.00	0.49	0.54	1.40	90.58

(Cont.)

SIMPER Results

Groups Upstream Control & Quarry Control
Average dissimilarity = 25.69

Species	Group Upstream Control Av.Abund	Group Quarry Control Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Copepoda	0.50	0.75	1.56	1.61	6.09	6.09
Chironomidae/Orthocladiinae	0.25	0.50	1.55	1.60	6.02	12.10
Hydrophilidae	0.25	1.00	1.49	1.60	5.79	17.89
Parastacidae	0.75	0.50	1.49	1.60	5.79	23.68
Megapodagrionidae	0.25	0.75	1.03	0.93	4.00	27.69
Pyralidae	0.25	0.50	1.02	0.93	3.95	31.64
Atyidae	1.00	0.50	1.01	0.93	3.94	35.57
Dugesiidae	0.25	0.25	1.01	0.93	3.94	39.51
Ecnomidae	0.50	0.50	1.01	0.93	3.94	43.44
Sialidae	0.25	0.25	1.01	0.93	3.94	47.38
Coenagrionidae	0.75	0.75	1.00	0.93	3.90	51.28
Gerridae	0.50	0.00	1.00	0.93	3.90	55.18
Gripopterygiidae	0.50	0.25	1.00	0.93	3.90	59.08
Hydracarina	0.50	1.00	1.00	0.93	3.90	62.98
Chironomidae/Tanypodinae	0.75	0.50	0.54	0.54	2.12	65.10
Corbiculidae/ Sphaeriidae	0.50	0.75	0.54	0.54	2.12	67.21
Culicidae	0.25	0.00	0.54	0.54	2.12	69.33
Dytiscidae	0.75	1.00	0.54	0.54	2.12	71.44
Glossophoniidae	0.25	0.00	0.54	0.54	2.12	73.56
Gomphidae	0.25	0.00	0.54	0.54	2.12	75.67
Hydraenidae	0.25	0.25	0.54	0.54	2.12	77.79
Hydridae	0.00	0.25	0.54	0.54	2.12	79.91
Notonectidae	0.75	1.00	0.54	0.54	2.12	82.02
Philorheithridae	1.00	0.75	0.54	0.54	2.12	84.14
Scirtidae	0.50	0.25	0.54	0.54	2.12	86.25
Synlestidae	1.00	0.75	0.54	0.54	2.12	88.37
Telephlebiidae (=Aeshnidae)	0.50	0.75	0.54	0.54	2.12	90.48

Appendix D – Statistical Analyses of Riffle Habitat Data

Appendix D-1. Univariate analyses of riffle habitat macroinvertebrate data collected in 2014 and 2015.

a) Number of taxa

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Year	1	147.000	147.000	11.308	0.013	2500	0.0145
Location	2	3.167	1.583	0.122	0.885	6228	0.8874
YexLo	2	28.500	14.250	1.096	0.405	7423	0.3944
Residual	6	78.000	13.000				

b) OOSignal Score

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Year	1	0.480	0.480	8.815	0.031	9357	0.0258
Location	2	0.881	0.441	8.092	0.023	9639	0.0172
YexLo	2	0.269	0.134	2.468	0.170	9872	0.1670
Residual	6	0.327	0.054				

PAIR-WISE TESTS
Term 'Lo'

Groups	t	P(perm)	U. perms	P(MC)
Quarry Treatment, Upstream Control	3.665	0.030	312	0.022
Quarry Treatment, Quarry Control	0.921	0.400	312	0.403
Upstream Control, Quarry Control	3.059	0.036	303	0.038

c) OE50Signal Scor

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Year	1	0.000	0.000	0.409	0.538	997	0.5455
Location	2	0.003	0.001	1.955	0.225	2741	0.2197
YexLo	2	0.005	0.003	3.409	0.107	4135	0.1033
Residual	6	0.004	0.001				

d) OE50Taxa Score

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Year	1	0.092	0.092	4.817	0.071	438	0.0715
Location	2	0.003	0.001	0.074	0.920	726	0.9300
YexLo	2	0.001	0.000	0.025	0.975	1944	0.9736
Residual	6	0.114	0.019				

Appendix D-2. Multivariate analyses of riffle habitat macroinvertebrate data collected in 2014 and 2015.

Source	df	SS	MS	Pseudo-F	P(perm)	perms	P(MC)
Year	1	2706.900	2706.900	8.219	0.001	9463	0.0032
Location	2	1176.700	588.370	1.787	0.092	9645	0.1425
YexLo	2	1069.800	534.890	1.624	0.145	9853	0.1808
Residual	6	1976.100	329.350				

SIMPER Results

Groups 2014 & 2015
Average dissimilarity = 39.48

	Group 2014	Group 2015				
Species	Av.Abund	Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Dugesiidae	0.83	0.00	2.00	2.13	5.07	5.07
Oligochaeta	0.83	0.00	2.00	2.13	5.07	10.15
Glossosomatidae	0.17	0.83	1.75	1.55	4.43	14.58
Ecnomidae	0.83	0.17	1.74	1.56	4.41	19.00
Conoesucidae	0.83	0.17	1.73	1.57	4.37	23.37
Parastacidae	0.67	0.00	1.56	1.38	3.96	27.33
Hydracarina	0.67	0.00	1.53	1.38	3.88	31.21
Psephenidae	0.33	0.83	1.52	1.22	3.85	35.06
Veliidae	0.67	0.17	1.45	1.22	3.66	38.72
Chironomidae/Tanypodinae	0.67	0.17	1.44	1.22	3.64	42.36
Corixidae	0.50	0.00	1.29	0.98	3.26	45.62
Elmidae	1.00	0.50	1.26	0.98	3.18	48.81
Telephlebiidae (=Aeshnidae)	1.00	0.50	1.25	0.98	3.16	51.96
Chironomidae/Orthocladiinae	0.33	0.50	1.21	0.97	3.07	55.03
Caenidae	1.00	0.50	1.21	0.97	3.06	58.10
Philopotamidae	1.00	0.50	1.21	0.97	3.06	61.16
Physidae	0.83	0.50	1.20	0.98	3.05	64.21
Simuliidae	0.50	0.17	1.18	0.98	2.98	67.19
Diphlebiidae (=Amphipterygidae)	0.50	0.00	1.14	0.98	2.89	70.08
Dytiscidae	0.33	0.17	0.92	0.78	2.32	72.40
Ceratopogonidae	0.33	0.17	0.92	0.78	2.32	74.72
Leptoceridae	1.00	0.67	0.82	0.69	2.07	76.79
Gripopterygiidae	0.67	1.00	0.82	0.70	2.07	78.86
Chironomidae/Chironominae	1.00	0.67	0.81	0.69	2.05	80.90
Ostracoda	0.33	0.00	0.79	0.70	1.99	82.89
Corydalidae	1.00	0.67	0.78	0.69	1.98	84.87
Dixidae	0.00	0.33	0.78	0.69	1.98	86.85
Empididae	0.17	0.17	0.64	0.61	1.61	88.46
Hydridae	0.17	0.17	0.64	0.61	1.61	90.07

Appendix E: VGT Letter: Hy-Tec Quarry Reporting Requirements SSD 6084 dated 30/09/16

vgt
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Friday, 30 September 2016

Our ref: 3264_HY_DoP_Let2016_F3.docx

NSW Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Planning Officer

Megan Dawson

cc: Howard Reed

RE: Hy-Tec Austen Quarry Reporting Requirements SSD-6084

I refer you to your email 15th July 2016 to Daniel Reed of Hy-Tec Industries (the proponent) in which an Annual Review for SSD-6084 for the financial year ending 30th June 2016 was requested by the Department of Planning and Environment (DoP&E). It was recommended that the Annual Review assess compliance and summarise what activities have been undertaken and what activities are proposed for the following year. This letter serves to fulfil this requirement by the DoP&E.

Activities Undertaken under Consent SSD-6084

The SSD – 6084 consent was granted 15/7/2015, the following EMP's were prepared to meet the requirements of Schedule 3 conditions and submitted to the DoP&E on 15th June 2016.

1. Noise Management Plan (Condition 5)
2. Blast Management Plan (Condition 9)
3. Air Quality Management Plan (Condition 12)
4. Water Management Plan (Condition 20)
5. Traffic Management Plan (Condition 23)
6. Landscape and Rehabilitation Management Plan (Condition 29)

The consent has thus been 'activated' however the physical commencement of Stage 2 operations of the quarry as approved under SSD-6084 has not yet occurred. The proponent advises us that they were effectively operating under the council DA 103/94 and as well as adhering to continuing to operate to the plans and strategies as per Condition 16 of Schedule 2 of SSD-6084 until the above mentioned management plans have been approved by the Department.

<u>Reporting under SSD-6084</u>

Condition 4 of Schedule 5 requires the proponent to prepare an annual review for the period ending the 30th June 2016. This condition requires reporting on monitoring results, performance measures and criteria that are detailed within the above mentioned management plans which are yet to be approved by the Secretary.

In the absence of an approved criteria against which to report, the proponent feels that a meaningful annual review cannot be undertaken. However a recent site audit against the SSD-6084 conditions was undertaken by the DoP&E in December 2015 and the findings have been made available to Hy-Tec. The audit concluded that '*an adequate level of compliance'* was identified as well as three administrative non-compliances. An updated summary of the non-compliances, observations and action plan developed by the proponent are included below, with the full December 2015 DoP&E audit attached as an Appendix to this letter.

DoPE Audit Summary

Table 1. Summary of Development Consent Non-Compliances

ID number	Condition	Details of Non-compliance	Risk Rating	Recommendation	Actions Undertaken
1.1	Schedule 2, Condition 17	The proponent indicated that they have not received a copy of the DRE Form, and the annual production data has not been submitted in accordance with this condition.	Non - Compliant (Administrative)	Complete the DRE Form on an annual basis and submit to the DRE as required. Include a copy of this data in the Annual Review.	As advised DRE form submitted 24th Dec 2015 and correct email address provided for future notices.
1.2	Schedule 2, Condition 18	The applicant was required to submit a survey plan of the boundaries of the approved limits of extraction to the Secretary by 30 September 2015. The survey plan was not submitted by this date.	Non - Compliant (Administrative)	Submit the survey plan with applicable GPS requirements to the Secretary as required.	Survey has been carried out and submitted
1.3	Schedule 3, Condition 22	All reasonable measures are required to be taken such that laden trucks have appropriate signage, including a contact phone number, so they can be easily identified by road users. While a Cartage Agreement is in place, it does not currently contain this requirement and no other communication has been made to contractors requiring them to comply with this condition.	Non - Compliant (Administrative)	Systems to be implemented to ensure compliance with this condition of consent.	Hy-Tec has issued a code of conduct to all transport operators to address this requirement as well as perform regular truck audits on cartage contractors to ensure compliance with this condition..

Table 2. Summary of Observations

ID number	Condition	Observation	Recommendation	Actions Undertaken
2.1	Schedule 3 Condition 11 and 12	Dust emissions were noted around the raw material stockpile and processing area. It did not appear that dust suppression techniques were effective.	Implement or improve measures to reduce dust emissions from material transport and processing activities.	A new water cart truck has been purchased, and is in operation. A new fixed sprinkler system on the access and exit roads from the processing area has been commissioned and is working. Further dust suppression sprays and covers have been installed to the fixed plant processing areas. Hy-Tec is continuing to review this area to see if improvements can be made. External parties have been engaged to ascertain what options are now available over what is currently implemented.
2.2	Schedule 3 Condition 32 Statement of Commitment 6.1, 6.2 and 6.3	The Yorkeys Creek Stockpiles have a significant visual impact from the Jenolan Caves Road. It was noted that this material is being used in the 40 Bends Project and could be consumed within two years.	Interim measures to be implemented for screening the visual impact of the Yorkeys Creek Stockpiles until the remaining product is consumed. Use of this material to be prioritised where possible to reduce the size of/eliminate the stockpiles	Sales of this material is underway to the 40 bends project as discussed. Once the sales to the 40 bends project are concluded, it will be assessed to see what material remains and then we will advise on amelioration measure for the stockpile area.

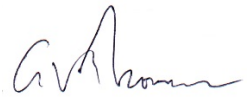
Conclusion

In conclusion, the above largely summaries the activities undertaken under SSD-6084 and the activities proposed until management plans and thus approved criteria have been finalised.

As you are aware the site, for the duration of the required reporting period of 2015-2016 financial year up to 30th June 2016, was operating under a valid Lithgow Council consent DA 103/94 which requires the submission of an annual Environmental Management Report. The council annual report will be completed for the period up to the 15th September 2016 and a copy will be subsequently submitted to the Department as well as Council.

It is envisaged that Hy-Tec will commence operations on the site under SSD-6084 within the next twelve months and a full Annual Review of the DoP&E consent, SSD-6084 will be submitted to the DoP&E in 2017.

Yours Sincerely



Greg Thomson

Director

FIQA, M Aus IMM

Appendix- DoP&E Audit Report

Austen Quarry

Compliance Audit as part of Hard Rock Quarries Campaign – Lithgow/Oberon/Cabonne LGAs (December 2015)

Austen Quarry – Extraction Area

Audit site inspection: 2 December 2015

Abbreviations

DP&E	NSW Department of Planning and Environment
DRE	Division of Resources and Energy
EA	Environmental Assessment
LGA	Local Government Area
The Act	Environmental Planning and Assessment Act 1979

Cover and Appendix A Photographs: Chris Schultz

Published January 2016

Department of Planning & Environment

www.planning.nsw.gov.au

Table of Contents

1 Introduction

The Department of Planning and Environment (the Department) operates a strategic campaign audit program. A Local Government Area (LGA) based hard rock quarries audit campaign is being undertaken by the Department, with the first part of the campaign focussed on the Lithgow/Oberon/Cabonne LGAs. The audits were undertaken in December 2015. This report has been prepared to document the findings of the compliance audit of the Austen Quarry operated by Hy-Tec (Aus10 Rhyolite Pty Ltd).

The Development Consent (SSD-6084) for Austen Quarry Extension was granted by the then NSW Minister for Planning on 15 July 2015.

Austen Quarry operations are located approximately 3.5 kilometres south-west of the village of Hartley (Figure 1) in the Lithgow LGA. Current quarrying operations are undertaken in accordance with an existing consent granted by the Lithgow City Council, which is required to be surrendered by 15 July 2016. The consent issued by the Department allows access to an additional 44 million tonnes of rhyolite resource, to be extracted over a period of 30 years.

The approval covers the extraction of material via conventional drill and blast, load and haul methods. The product is crushed and separated on site for transport by road to local and Sydney markets.

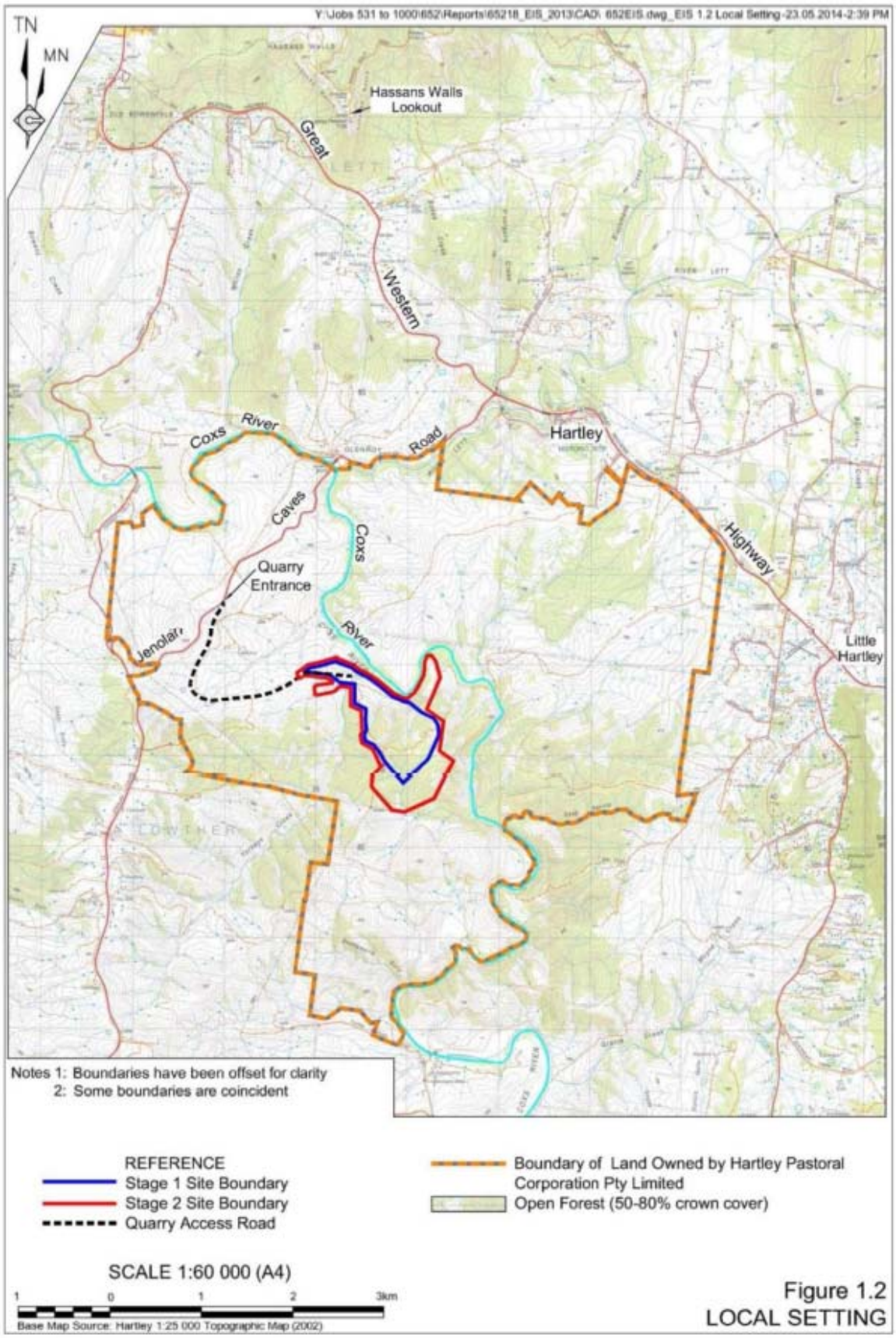


Figure 1: Austen Quarry location

Image taken from Secretary's Environmental Assessment Report July 2015

The compliance audit was undertaken by Chris Schultz and Dr Paul Rutherford, Senior Compliance Officers with the Department. The site component of the compliance audit was conducted on 2 December 2015.

1.1 Objectives / Scope

The objectives of this compliance audit were to:

- review compliance with the conditions of the Development Consent and identify areas where data gaps were present or proponent non compliances were likely; and
- assess the environmental performance of each operation and the ability of each quarry's environmental management systems and controls specifically relating to any areas identified through the desktop review or subsequent site inspection.

The assessment of compliance was against the selected Development Consent conditions, with particular focus on traffic/transport management.

The compliance audit scope also included undertaking an overall review of the performance of the site. Each audit scope included the 2014 and 2015 calendar years up to, and including, the date of the site inspections.

The Department advised that the following compliance matters, typical of a compliance audit, were specifically excluded from the scope of the audit: Environment Protection Licence (EPL) conditions, Mining Lease (ML) conditions and other licences, such as Water Access Licence conditions.

1.2 Compliance Audit Criteria

The compliance audit assessed the level of compliance and the environmental performance of the site operations against selected conditions in the Development Consent (SSD-6084).

1.3 Limitations

The findings of the compliance audit are based upon visual observations of the site and its vicinity, interviews with site personnel and our interpretation of documentation provided by the site.

Opinions presented herein apply to the site as it existed at the time of the audit and from information provided by site personnel and government agencies. Any changes to this information of which the Department is not aware and has not had the opportunity to evaluate therefore cannot be considered in this report.

Auditors have taken due care to consider all reasonably available information provided during the undertaking of this audit and have taken this information to represent a fair and reasonable characterisation of the environmental status of the site, but recognise that any site assessment program is necessarily limited in scope and true site conditions may differ from those inferred from the available data.

2 Compliance Audit Methodology

The process for the compliance audit involved a review of documentation and samples of records provided by the site, and a site inspection of the quarrying operations to determine the level of environmental performance and compliance of the project in relation to

implementation of the selected conditions of the Development Consent. The compliance audit process is described in more detail in **Section 2.1** to **2.5.**

2.1 Preliminary Document Review

The Department reviewed project approval documents for the quarry. These documents included, but were not limited to:

- Project Approval conditions;
- Statement of Commitments; and
- Complaints Registers.

2.2 Site Inspection and Interviews

The Department's compliance audit team introduced itself to the quarry's management team and outlined the purpose, depth and scope of the compliance audit being undertaken.

The Department conducted an inspection of the site with Lee Attard (NSW Operations Manager), Darryl Thiedeke (National Planning and Development Manager) and Rodd Welsh (Quarry Production Manager), and were accompanied by representatives of the Lithgow City Council. The inspections included visits of operational and non-active operational areas in order to assess the effectiveness of environmental management and associated compliance across the quarry. A selection of photographs taken during the inspection is provided in **Appendix 1**. Locations inspected included but are not limited to:

- Raw material stockpile;
- Material processing area;
- Primary crushing area;
- Extraction area;
- Stage 2 development area boundary;
- Yorkeys Creek Stockpiles; and
- Office area.

2.3 Evaluation of Compliance against the Audit Criteria

The level of impact of non-compliances were assessed utilising the Risk Analysis Matrix outlined in the Guidelines – Independent Environmental Audits of Mining Projects (DP&E 2014) which assesses the likelihood of an impact occurring and the estimated level of impact to produce an overall risk ranking of high, moderate or low.

Likelihood of impact occurring	*Estimated level of impact*			
	High	*Moderate*	*Low*	*Administrative, non-compliance*
Almost certain	**High**	**High**	**Moderate**	
Likely	**High**	**Moderate**	**Low**	
Unlikely	**Moderate**	**Low**	**Low**	
				Administrative non-compliance

Figure 2 – Risk Analysis Matrix (Table 1 from the Guidelines – Independent Environmental Audits of Mining Projects (DP&E 2014)

A non-compliance assessed as **'high'** is of considerable environmental significance and therefore must be dealt with and resolved as a matter of priority. A **'moderate'** assessment for non-compliance is still a significant risk of harm to the environment, however it can be given a lower priority than a red risk assessment. A non-compliance assessed as **'low'** suggests that it could receive a lower priority but still must be attended to.

There are also a number of conditions of consent, such as those relating to administration and reporting requirements that do not have a direct environmental /community significance, but are still important to the integrity of the regulatory system. Non–compliance with these conditions is given an **'Administrative'** rating.

The colour code is used as the basis for deciding on the priority of remedial action required by the proponent and the timeframe by which the non-compliances need to be addressed. This information is presented in the action plan along with target dates for the non-compliances to be addressed.

While the risk assessment of non-compliances is used to prioritise actions to be taken, the Department considers all non-compliances are important and proponents must ensure that all non-compliances are addressed as soon as possible.

2.4 Reporting

Following the completion of the site compliance audit, the Development Consent compliance checklists were completed and compliance audit notes were reviewed in order to compile a list of outstanding matters to be noted in the compliance audit reports. Reports were prepared for the site to provide an overview of the status of compliance by reference to the relevant compliance documentation and any other observations made during the site inspections and interviews.

Reports for the individual quarries were provided to the proponents with comments received and action plans agreed to address non-compliance.

2.5 Determining the Significance of Breaches/ Enforcement

Non-compliances (Section 2.3) shall be assessed in accordance with the Department's Compliance Policy (September 2010) to determine the significance of the breach and to enact appropriate enforcement response.

Enforcement action, as required, shall be completed separate to the audit process.

3 Compliance Audit Findings

3.1 Development Consent and Statement of Commitments

The site was found to be operating generally in compliance with the conditions of the Development Consent and Statement of Commitments; however, three (3) administrative non-compliances with conditions were identified where action is required to ensure compliance is achieved.

Fifteen (15) conditions were not triggered as work had not yet commenced in the Quarry Extension area.

A completed compliance checklist against the conditions of the Development Consent and Statement of Commitments is included in **Appendix 2**. A summary of the non-compliance issues is provided in **Table 1**.

Table 1: Summary of Development Consent Non-Compliances

ID number	Condition	Details of Non-compliance	Risk Rating	Recommendation
1.1	Schedule 2, Condition 17	The proponent indicated that they have not received a copy of the DRE Form, and the annual production data has not been submitted in accordance with this condition.	Non - Compliant (Administrative)	Complete the DRE Form on an annual basis and submit to the DRE as required. Include a copy of this data in the Annual Review. As advised DRE form submitted 24th Dec 2015 and correct email address provided for future notices
1.2	Schedule 2, Condition 18	The applicant was required to submit a survey plan of the boundaries of the approved limits of extraction to the Secretary by 30 September 2015. The survey plan was not submitted by this date.	Non - Compliant (Administrative)	Submit the survey plan with applicable GPS requirements to the Secretary as required. Survey has been carried out and submitted
1.3	Schedule 3, Condition 22	All reasonable measures are required to be taken such that laden trucks have appropriate signage, including a contact phone number, so they can be easily identified by road users. While a Cartage Agreement is in place, it does not currently contain this requirement and no other communication has been made to contractors requiring them to comply with this condition.	Non - Compliant (Administrative)	Systems to be implemented to ensure compliance with this condition of consent. As foreshadowed, we will be rolling out a code of conduct to all transport operators to address this requirement. We aim to have this rolled out by 30 June 2016

3.2 Observations

Observations are recorded where the audit identified issues of concern which do not strictly relate to the scope of the audit or assessment of compliance. Observations are considered to be indicators of potential non-compliances or areas where performed may be improved.

Two (2) observations were made during the site inspection.

A summary of the observations is provided in **Table 2**.

Table 2: Summary of Observations

ID number	Condition	Observation	Recommendation
2.1	Schedule 3 Condition 11 and 12	Dust emissions were noted around the raw material stockpile and processing area. It did not appear that dust suppression techniques were effective.	Implement or improve measures to reduce dust emissions from material transport and processing activities. As we normally do, this area is currently being reviewed to see if improvements can be made. We are engaging with external parties to see what options are now available over what is currently implemented. New water cart truck is planned to be sourced in the 2016 calendar year. Quotes currently being obtained for a fixed sprinkler system on the access and exit roads from the processing area.
2.2	Schedule 3 Condition 32 Statement of Commitment 6.1, 6.2 and 6.3	The Yorkeys Creek Stockpiles have a significant visual impact from the Jenolan Caves Road. It was noted that this material is being used in the 40 Bends Project and could be consumed within two years.	Interim measures to be implemented for screening the visual impact of the Yorkeys Creek Stockpiles until the remaining product is consumed. Use of this material to be prioritised where possible to reduce the size of/eliminate the stockpiles. Sales of this material is underway to the 40 bends project as discussed. Once the sales to the 40 bends project are concluded, it will be assessed to see what material is left and then we will advise what we will doing to ameliorate the stockpile area.

4 Conclusion

The compliance audit of Austen Quarry (SSD-6084) identified an adequate level of compliance, whilst also identifying several administrative non-compliances.

In summary, the site was found to be operating in compliance with a number of conditions and/or commitments. However, three (3) administrative non-compliances with conditions and Statement of Commitments (or sub elements of conditions/commitments) were identified where action is required to ensure compliance is achieved.

The key non-compliance issues identified as part of the compliance audit against the site's Development Consent and Statement of Commitments is in relation to the submission of documents as required by conditions of consent and failure to notify contract truck drivers of signage requirements under the consent. For further information please refer to **Section 3.1** and **Table 1**. Furthermore, a completed compliance checklist against the conditions of the Development Consent and Statement of Commitments is included in **Appendix 2**.

Two (2) observations were made during the site inspection relating to the failure to implement effective systems for the management of dust and for failure to effectively implement visual screening of the Yorkeys Creek Stockpiles. For further information please refer to **Section 3.2** and **Table 2**.

There is a demonstrated understanding of the importance of environmental management and compliance with conditions of consent and the site staff acknowledged this intention. Of particular note, the site paints the walls of the quarry to minimise visual impacts from the highway and for residents able to see into the valley, and the downhill raw material conveyor is able to generate electricity which is utilised by the site.

In relation to the above non-compliances identified in Table 1, all non-compliances will be actioned in accordance with the Department's Compliance Policy.

Appendix 1 – Photographs *(all photos taken 2 December 2015)*

Photograph 1: Driver Chain of Responsibility sign on.

Photograph 2: Truck loading in progress.

Photograph 3: Raw material stockpile and conveyor. Dusty conditions around the end of the raw material conveyor and in the processing area were noted.

Photograph 4: Offices and car park.

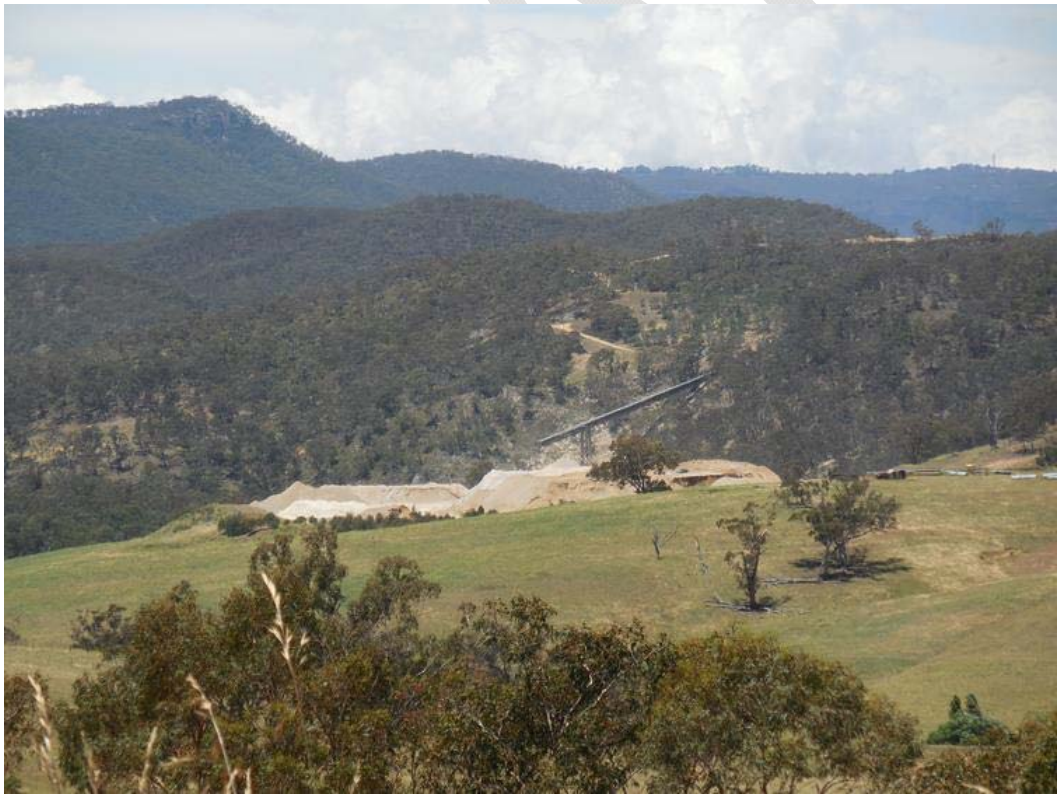
Photograph 5: Extraction area.

Photograph 6: Primary crusher.

Photograph 7: Conveyors from primary crusher.

Photograph 8: Excavation of material in pit.

Photograph 9: Yorkeys Creek Stockpiles (from offices).



Photograph 10: Yorkeys Creek Stockpiles (from access road). There is a significant visual impact from Jenolan Caves Road.

Photograph 11: Flagging tape marking the extraction boundary. It is noted that this is a temporary measure and permanent marking is yet to be installed.

Appendix 2 – Compliance Checklist

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
2	5	Administrative	**LAPSING OF CONSENT** If the development has not been physically commenced within 5 years of the date of this consent, then this development consent shall lapse.	Technically the project has not physically commenced. The proponent is still operating in Stage 1, which will be the case for the next 3-6 months. The surrender of the Council Consent is required within 12 months, and it is likely to be surrendered close to the 12 month mark (15/7/2016).	Not triggered	
2	6	Administrative	**LIMITS ON CONSENT** **Quarrying Operations** The Applicant shall not extract extractive materials below a level of 685 m AHD.	The Council Consent provided extraction to RL 730, which was modified to RL 700. SSD 6084 allows extraction to RL 685, which is above the water line. The Cox's River is located at RL 660. It was indicated that the site was operating at the RL 730 bench. A Survey Plan was provided dated 18/10/13 which indicates they are operating above RL 685, and this was confirmed by a follow up survey plan dated 14/12/15.	Compliant	Implement a system to demonstrate that limits of extraction are not being exceeded at any time.
2	8	Administrative	**LIMITS ON CONSENT**	Records were sighted for the period 1/07/2014 – 30/06/2015 (840,204.21	Compliant	Continue to develop the transport

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			Extractive Material Transport 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.	tonnes) and 1/01/2014 – 31/12/2014 (940,750.5 tonnes) and 1/1/2015 – date (768,046.91 tonnes) and daily records for the period 24-28 November. Other records were viewed directly on the computer. The records indicate compliance with this condition. It was noted that some additional reports were going to be developed to enable reports to be run to specifically address these conditions of consent.		management system to enable reports to demonstrate compliance with this condition to be readily run on demand. Implement a system to prevent additional trucks above the approved number exiting the site which will result in non-compliance with this condition.
2	9	Administrative	**SURRENDER OF EXISTING DEVELOPMENT CONSENTS** 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*	The consent is required to be surrendered by 15/7/2016. This has not yet occurred.	Not triggered	Surrender Development Consent DA 103/94 by 15/7/2016.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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.			
2	10	Administrative	**SURRENDER OF EXISTING DEVELOPMENT CONSENTS** 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.	No operations under SSD 6084 have commenced. Conditions are assessed on an individual basis.	Not triggered	
2	11	Administrative	**STRUCTURAL ADEQUACY** 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	No new buildings have been constructed since the date of approval of SSD 6084.	Not triggered	

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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.			
2	17	Administrative	**PRODUCTION DATA** 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).	The proponent indicated that they have not received a copy of the DRE Form at the time of the audit, and the data has therefore not been submitted. The Annual Review under SSD 6084 has not yet been developed. The Annual Review required under the Council Consent has not yet been completed, and will be submitted to the Department to meet the requirements of SSD 6084.	Non-compliant (Administrative)	Complete the DRE Form on an annual basis and submit to the DRE as required. Include a copy of this data in the Annual Review.
2	18	Administrative	**IDENTIFICATION OF APPROVED EXTRACTION LIMITS** 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	The survey was undertaken (plan dated 27/11/2015 sighted). The survey has not been submitted to the Department. The survey was required to be undertaken and submitted by 30 September 2015.	Non-compliant (Administrative)	Submit the survey plan with applicable GPS requirements to the Secretary as required.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			(b) submit a survey plan of these boundaries with applicable GPS coordinates to the Secretary.			
2	19	Administrative	**IDENTIFICATION OF APPROVED EXTRACTION LIMITS** 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.	The boundary marking was checked in the field. The boundary was marked with flagging tape, and it was identified that this is not a long term solution and more permanent marking will need to be installed. It was also noted that some of the marks are offset, and the actual boundary needs to be marked, in addition to any offset (and differentiated as such). It was noted that this will be done prior to commencing Quarry Extension works. This was not deemed to be non-compliant as quarrying activities in the Quarry Extension have not yet commenced.	Not triggered	Install permanent boundary markers clearly identifying the extraction area and any offsets associated with each boundary marker.
2	20	Administrative	**COMMUNITY ENHANCEMENT** 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	It was noted that a few meetings have been held regarding fund allocation. The Agreement has been lodged with the Lithgow City Council and will be going to a Council meeting next week. It will need to be put on public exhibition for 28 days. No projects have been nominated for the direction of the funds.	Not triggered	Enter into the Planning Agreement with the Lithgow City Council by 15/1/2016.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			□ 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.	It was indicated that payments will be made quarterly, and will be backdated to the date of the approval. It was noted that the Agreement is unlikely to be finalised by 15/1/16 as required under the approval. The proponent is a member of the Hartley District Progress Association (HDPA).		
3	1	Environmental Performance Conditions – Transport	**Hours of Operation** The Applicant shall comply with the operating hours set out in Table 1.	The EPL and Council Consent permitted operational hours are from 6 am to 6 pm Monday to Friday and 6 am to 3 pm on Saturday. Crusher operational records for November were sighted. These hours were compliant with SSD 6084. It was noted that the stop times on some occasions were later than 6 pm. 1-2 blasts are undertaken each month. Post Blast Reports for 2015 were viewed. All blasts viewed were compliant. Records for dispatch for the period 23 - 27 November 2015 were sighted on the	Compliant	

<table>
<tr><th>Schedule</th><th>Condition No.</th><th>Category</th><th>Condition</th><th>Evidence</th><th>Compliance Status</th><th>Recommendation</th></tr>
<tr><td></td><td></td><td></td><td>Table 1: Operating Hours<table><tr><th>Activity</th><th>Permissible Ho</th></tr><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 holida</td></tr><tr><td>• Blasting</td><td>• 10 am to 3 pm Monday to Friday (exce</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 holida</td></tr><tr><td>• Maintenance</td><td>• Anytime.</td></tr></table></td><td>computer. These records indicated compliance with this condition.</td><td></td><td></td></tr>
<tr><td>3</td><td>2</td><td>Environmental Performance Conditions – Transport</td><td>Hours of Operation

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</td><td>No requests have been received.</td><td>Not triggered</td><td></td></tr>
</table>

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			undertaking the activities, or as soon as is practical thereafter.			
3	21	Environmental Performance Conditions – Transport	**Monitoring of Product Transport** 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.	Records were sighted for the period 1/07/2014 – 30/06/2015 and 1/01/2014 – 31/12/2014 and 1/1/2015 – 2/12/2015 and daily records for the period 24-28 November 2015. Other records were viewed directly on the computer. The records indicate compliance with this condition. The website has not yet been developed and it is planned to commence in January 2016. This will include the period July 2015 – December 2015.	Not triggered	Ensure that records of transport movements are reported on the website six monthly.
3	22	Environmental Performance Conditions – Transport	**Operating Conditions** 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	22 a) No documentation has been provided to contractors at this stage regarding this requirement. A Cartage Agreement is in place with all contractors however this does not currently contain this requirement. 22 b) This issue is managed through contractor selection. All trucks are required to have tarping ability. Spot checks are undertaken (not documented). It is noted in the Traffic Management Plan that tarping of loads	Non-compliant (Administrative)	Systems to be implemented to ensure compliance with this condition of consent.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			fall on the road, before leaving the site; and (d) no trucks queue at the entrance to the quarry access road before 5 am.	is required and drivers are required to sign out as they are driving off the site. The truck driver induction covers the SWMS, which covers tarping and cleaning of trucks (Point 5). Trucks are checked at the Mt Boyce RMS facility. 22 c) There are no cameras or wash bay on site. The truck driver induction covers the SWMS, which covers tarping and cleaning of trucks (Point 5). The site has a long entry road and checks are taken to ensure that there are no materials spilled on the road (not documented). It is likely that if there was material on trucks that it would fall off prior to reaching the public road. 22 d) It was stated that the first employee arrives at site at 4.30 am. There is a parking area available on site. Notes are sent to contractor companies if trucks are observed queuing outside of the gate. Gates have been occasionally opened earlier to allow trucks access to site.		
3	23	Environmental Performance Conditions – Transport	**Transport Management Plan** The Applicant shall prepare and implement a Transport	A Traffic Management Plan is in place that meets the current requirements. It has not been revised to meet the	Not triggered	Prepare and implement the Traffic Management Plan to be developed to meet

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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.	requirements of SSD 6084 and has not been submitted to the Secretary. It is due to be submitted three months prior to the commencement of quarrying operations under this consent, which has not yet commenced.		the requirements of this condition.
5	4	Environmental Management, Reporting and Auditing	**Annual Review** 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	An Annual Review under SSD 6084 has not yet been developed and submitted. It was noted that the 2014/2015 Annual Report for Council is currently being developed and will be submitted in January 2016.	Not triggered	Seek approval from the Secretary for an amendment to the submission date for the Annual Review if required.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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;	It was also noted that Aquatic Studies undertaken on the site occur in September/October and that the proponent would be seeking to submit the report in November of each year.		Submit the Annual Review currently being developed to the Secretary to meet the requirements of this condition.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			(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.			
5	8	Environmental Management, Reporting and Auditing	**INDEPENDENT ENVIRONMENTAL AUDIT** 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	First audit due by 15/7/16	Not triggered	Undertake the audit by 15 July 2016 to meet the requirements of this condition.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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.*			
5	9	Environmental Management, Reporting and Auditing	**INDEPENDENT ENVIRONMENTAL AUDIT** 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.	First audit due by 15/7/16.	Not triggered	

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
5	10	Environmental Management, Reporting and Auditing	**ACCESS TO INFORMATION** 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,	Company website operational, however no project documents are available. It is planned for documents to be made available by the required date.	Not triggered	Update the proponent's website to meet the requirements of this condition by 15 January 2016.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			to the satisfaction of the Secretary.			
Appendix 3	5.1	Statement of Commitments	**Traffic and transport** All transport contractors required to complete the Hy-Tec Chain of Responsibility: Driver Vehicle Check system.	All drivers when coming on to site are required to sign onto a screen located outside of the office, which checks that they are inducted for the site and licence is valid (amongst other checks). All contracting companies are required to execute a Cartage Agreement, which covers the Chain of Responsibility requirements including driver fatigue, vehicle mass and dimension, load securing, speed, dangerous goods or any other matters relating to the safe operation of vehicles.	Compliant	
Appendix 3	5.2	Statement of Commitments	**Traffic and transport** Maintain a complaints management system to appropriately respond to any complaints received through investigation and implementation of corrective treatments.	A complaint diary is being maintained (viewed). Corrective actions taken were noted. A Hotline number is available on the website. 'Complaints' that have been noted in the diary include: • 11/11/15 – ute observed driving through quarry that was not approved. • 23/6/15 – shooting was occurring close to the MCC.	Compliant	

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
				• 23/10/14 – loud explosion at night was heard – identified to not be related to site. Complainant was brought to site. • 3/9/14 – near miss, truck crossed over road. An on-line system is used on site (Cintellate) in which complaints are able to be recorded, as well as environmental incidents and any other issue for the site. These get escalated to the manager as required. The system was not reviewed as part of this audit.		
Appendix 3	5.3	Statement of Commitments	**Traffic and transport** Monitor the delays for vehicles turning right onto the Great Western Highway at two-yearly intervals from 2022 onwards.	It was noted that this condition was related to the possible deterioration of the intersection by this date without further improvements.	Not triggered	
Appendix 7	1	Planning Agreement	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;	The Planning Agreement is not yet in place and payments are not yet being made. The Agreement is required to be in place by 15/1/2016. The plan is to back date the payments to the date of the Development Consent.	Not triggered	Implement the Planning Agreement by 15 January 2016.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			(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 F: DPE Audit December 2015

Austen Quarry

Compliance Audit as part of Hard Rock Quarries Campaign – Lithgow/Oberon/Cabonne LGAs (December 2015)

Austen Quarry – Extraction Area

Audit site inspection: 2 December 2015

Abbreviations

DP&E	NSW Department of Planning and Environment
DRE	Division of Resources and Energy
EA	Environmental Assessment
LGA	Local Government Area
The Act	Environmental Planning and Assessment Act 1979

Cover and Appendix A Photographs: Chris Schultz

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Department of Planning & Environment

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Table of Contents

1 Introduction

The Department of Planning and Environment (the Department) operates a strategic campaign audit program. A Local Government Area (LGA) based hard rock quarries audit campaign is being undertaken by the Department, with the first part of the campaign focussed on the Lithgow/Oberon/Cabonne LGAs. The audits were undertaken in December 2015. This report has been prepared to document the findings of the compliance audit of the Austen Quarry operated by Hy-Tec (Aus10 Rhyolite Pty Ltd).

The Development Consent (SSD-6084) for Austen Quarry Extension was granted by the then NSW Minister for Planning on 15 July 2015.

Austen Quarry operations are located approximately 3.5 kilometres south-west of the village of Hartley (Figure 1) in the Lithgow LGA. Current quarrying operations are undertaken in accordance with an existing consent granted by the Lithgow City Council, which is required to be surrendered by 15 July 2016. The consent issued by the Department allows access to an additional 44 million tonnes of rhyolite resource, to be extracted over a period of 30 years.

The approval covers the extraction of material via conventional drill and blast, load and haul methods. The product is crushed and separated on site for transport by road to local and Sydney markets.

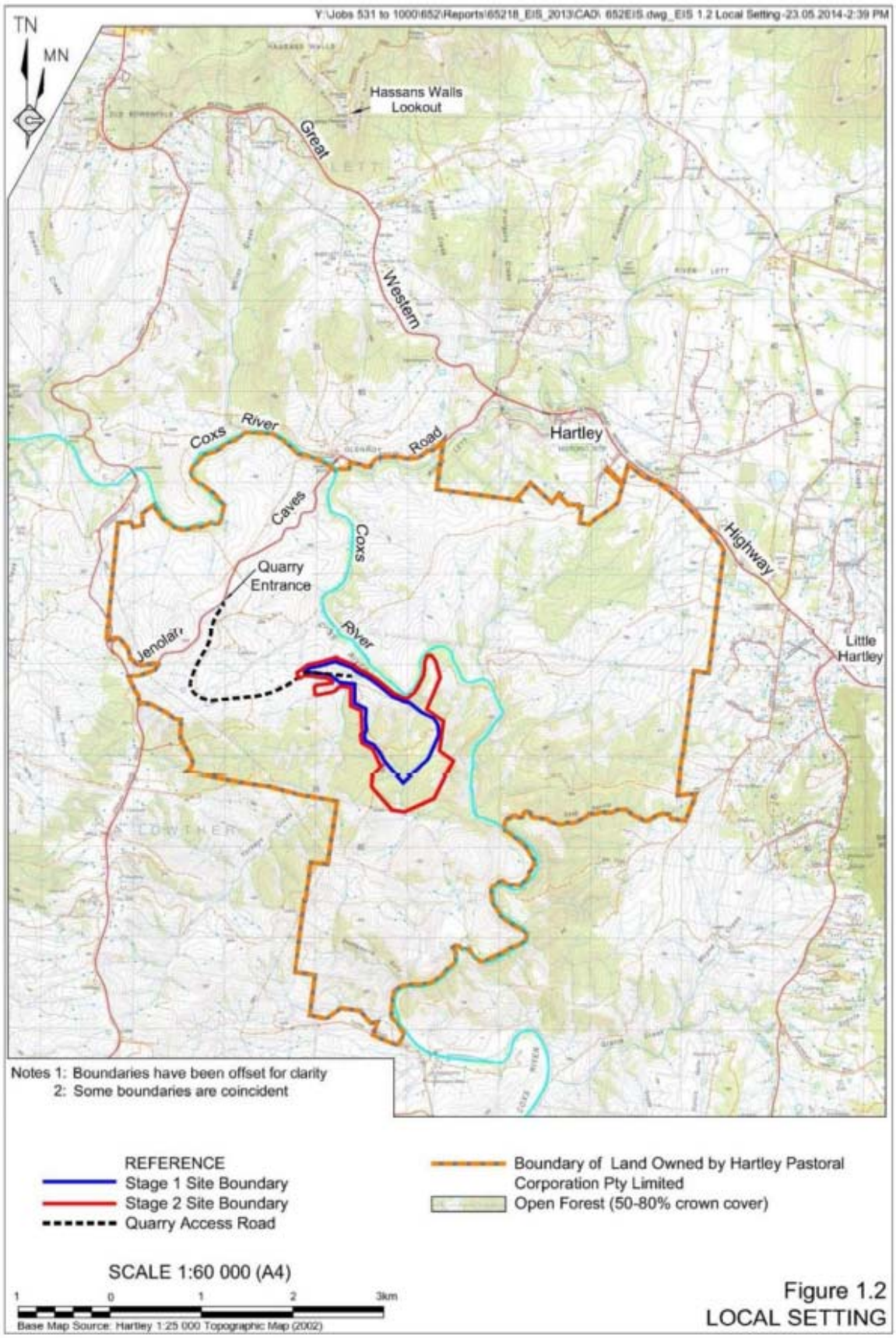


Figure 1: Austen Quarry location

Image taken from Secretary's Environmental Assessment Report July 2015

The compliance audit was undertaken by Chris Schultz and Dr Paul Rutherford, Senior Compliance Officers with the Department. The site component of the compliance audit was conducted on 2 December 2015.

1.1 Objectives / Scope

The objectives of this compliance audit were to:

- review compliance with the conditions of the Development Consent and identify areas where data gaps were present or proponent non compliances were likely; and
- assess the environmental performance of each operation and the ability of each quarry's environmental management systems and controls specifically relating to any areas identified through the desktop review or subsequent site inspection.

The assessment of compliance was against the selected Development Consent conditions, with particular focus on traffic/transport management.

The compliance audit scope also included undertaking an overall review of the performance of the site. Each audit scope included the 2014 and 2015 calendar years up to, and including, the date of the site inspections.

The Department advised that the following compliance matters, typical of a compliance audit, were specifically excluded from the scope of the audit: Environment Protection Licence (EPL) conditions, Mining Lease (ML) conditions and other licences, such as Water Access Licence conditions.

1.2 Compliance Audit Criteria

The compliance audit assessed the level of compliance and the environmental performance of the site operations against selected conditions in the Development Consent (SSD-6084).

1.3 Limitations

The findings of the compliance audit are based upon visual observations of the site and its vicinity, interviews with site personnel and our interpretation of documentation provided by the site.

Opinions presented herein apply to the site as it existed at the time of the audit and from information provided by site personnel and government agencies. Any changes to this information of which the Department is not aware and has not had the opportunity to evaluate therefore cannot be considered in this report.

Auditors have taken due care to consider all reasonably available information provided during the undertaking of this audit and have taken this information to represent a fair and reasonable characterisation of the environmental status of the site, but recognise that any site assessment program is necessarily limited in scope and true site conditions may differ from those inferred from the available data.

2 Compliance Audit Methodology

The process for the compliance audit involved a review of documentation and samples of records provided by the site, and a site inspection of the quarrying operations to determine the level of environmental performance and compliance of the project in relation to

implementation of the selected conditions of the Development Consent. The compliance audit process is described in more detail in **Section 2.1** to **2.5.**

2.1 Preliminary Document Review

The Department reviewed project approval documents for the quarry. These documents included, but were not limited to:

- Project Approval conditions;
- Statement of Commitments; and
- Complaints Registers.

2.2 Site Inspection and Interviews

The Department's compliance audit team introduced itself to the quarry's management team and outlined the purpose, depth and scope of the compliance audit being undertaken.

The Department conducted an inspection of the site with Lee Attard (NSW Operations Manager), Darryl Thiedeke (National Planning and Development Manager) and Rodd Welsh (Quarry Production Manager), and were accompanied by representatives of the Lithgow City Council. The inspections included visits of operational and non-active operational areas in order to assess the effectiveness of environmental management and associated compliance across the quarry. A selection of photographs taken during the inspection is provided in **Appendix 1**. Locations inspected included but are not limited to:

- Raw material stockpile;
- Material processing area;
- Primary crushing area;
- Extraction area;
- Stage 2 development area boundary;
- Yorkeys Creek Stockpiles; and
- Office area.

2.3 Evaluation of Compliance against the Audit Criteria

The level of impact of non-compliances were assessed utilising the Risk Analysis Matrix outlined in the Guidelines – Independent Environmental Audits of Mining Projects (DP&E 2014) which assesses the likelihood of an impact occurring and the estimated level of impact to produce an overall risk ranking of high, moderate or low.

Likelihood of impact occurring	*Estimated level of impact*			
	High	*Moderate*	*Low*	*Administrative, non-compliance*
Almost certain	**High**	**High**	**Moderate**	
Likely	**High**	**Moderate**	**Low**	
Unlikely	**Moderate**	**Low**	**Low**	
				Administrative non-compliance

Figure 2 – Risk Analysis Matrix (Table 1 from the Guidelines – Independent Environmental Audits of Mining Projects (DP&E 2014)

A non-compliance assessed as **'high'** is of considerable environmental significance and therefore must be dealt with and resolved as a matter of priority. A **'moderate'** assessment for non-compliance is still a significant risk of harm to the environment, however it can be given a lower priority than a red risk assessment. A non-compliance assessed as **'low'** suggests that it could receive a lower priority but still must be attended to.

There are also a number of conditions of consent, such as those relating to administration and reporting requirements that do not have a direct environmental /community significance, but are still important to the integrity of the regulatory system. Non–compliance with these conditions is given an **'Administrative'** rating.

The colour code is used as the basis for deciding on the priority of remedial action required by the proponent and the timeframe by which the non-compliances need to be addressed. This information is presented in the action plan along with target dates for the non-compliances to be addressed.

While the risk assessment of non-compliances is used to prioritise actions to be taken, the Department considers all non-compliances are important and proponents must ensure that all non-compliances are addressed as soon as possible.

2.4 Reporting

Following the completion of the site compliance audit, the Development Consent compliance checklists were completed and compliance audit notes were reviewed in order to compile a list of outstanding matters to be noted in the compliance audit reports. Reports were prepared for the site to provide an overview of the status of compliance by reference to the relevant compliance documentation and any other observations made during the site inspections and interviews.

Reports for the individual quarries were provided to the proponents with comments received and action plans agreed to address non-compliance.

2.5 Determining the Significance of Breaches/ Enforcement

Non-compliances (Section 2.3) shall be assessed in accordance with the Department's Compliance Policy (September 2010) to determine the significance of the breach and to enact appropriate enforcement response.

Enforcement action, as required, shall be completed separate to the audit process.

3 Compliance Audit Findings

3.1 Development Consent and Statement of Commitments

The site was found to be operating generally in compliance with the conditions of the Development Consent and Statement of Commitments; however, three (3) administrative non-compliances with conditions were identified where action is required to ensure compliance is achieved.

Fifteen (15) conditions were not triggered as work had not yet commenced in the Quarry Extension area.

A completed compliance checklist against the conditions of the Development Consent and Statement of Commitments is included in **Appendix 2**. A summary of the non-compliance issues is provided in **Table 1**.

Table 1: Summary of Development Consent Non-Compliances

ID number	Condition	Details of Non-compliance	Risk Rating	Recommendation
1.1	Schedule 2, Condition 17	The proponent indicated that they have not received a copy of the DRE Form, and the annual production data has not been submitted in accordance with this condition.	Non - Compliant (Administrative)	Complete the DRE Form on an annual basis and submit to the DRE as required. Include a copy of this data in the Annual Review. As advised DRE form submitted 24th Dec 2015 and correct email address provided for future notices
1.2	Schedule 2, Condition 18	The applicant was required to submit a survey plan of the boundaries of the approved limits of extraction to the Secretary by 30 September 2015. The survey plan was not submitted by this date.	Non - Compliant (Administrative)	Submit the survey plan with applicable GPS requirements to the Secretary as required. Survey has been carried out and submitted
1.3	Schedule 3, Condition 22	All reasonable measures are required to be taken such that laden trucks have appropriate signage, including a contact phone number, so they can be easily identified by road users. While a Cartage Agreement is in place, it does not currently contain this requirement and no other communication has been made to contractors requiring them to comply with this condition.	Non - Compliant (Administrative)	Systems to be implemented to ensure compliance with this condition of consent. As foreshadowed, we will be rolling out a code of conduct to all transport operators to address this requirement. We aim to have this rolled out by 30 June 2016

3.2 Observations

Observations are recorded where the audit identified issues of concern which do not strictly relate to the scope of the audit or assessment of compliance. Observations are considered to be indicators of potential non-compliances or areas where performed may be improved.

Two (2) observations were made during the site inspection.

A summary of the observations is provided in **Table 2**.

Table 2: Summary of Observations

ID number	Condition	Observation	Recommendation
2.1	Schedule 3 Condition 11 and 12	Dust emissions were noted around the raw material stockpile and processing area. It did not appear that dust suppression techniques were effective.	Implement or improve measures to reduce dust emissions from material transport and processing activities. As we normally do, this area is currently being reviewed to see if improvements can be made. We are engaging with external parties to see what options are now available over what is currently implemented. New water cart truck is planned to be sourced in the 2016 calendar year. Quotes currently being obtained for a fixed sprinkler system on the access and exit roads from the processing area.
2.2	Schedule 3 Condition 32 Statement of Commitment 6.1, 6.2 and 6.3	The Yorkeys Creek Stockpiles have a significant visual impact from the Jenolan Caves Road. It was noted that this material is being used in the 40 Bends Project and could be consumed within two years.	Interim measures to be implemented for screening the visual impact of the Yorkeys Creek Stockpiles until the remaining product is consumed. Use of this material to be prioritised where possible to reduce the size of/eliminate the stockpiles. Sales of this material is underway to the 40 bends project as discussed. Once the sales to the 40 bends project are concluded, it will be assessed to see what material is left and then we will advise what we will doing to ameliorate the stockpile area.

4 Conclusion

The compliance audit of Austen Quarry (SSD-6084) identified an adequate level of compliance, whilst also identifying several administrative non-compliances.

In summary, the site was found to be operating in compliance with a number of conditions and/or commitments. However, three (3) administrative non-compliances with conditions and Statement of Commitments (or sub elements of conditions/commitments) were identified where action is required to ensure compliance is achieved.

The key non-compliance issues identified as part of the compliance audit against the site's Development Consent and Statement of Commitments is in relation to the submission of documents as required by conditions of consent and failure to notify contract truck drivers of signage requirements under the consent. For further information please refer to **Section 3.1** and **Table 1**. Furthermore, a completed compliance checklist against the conditions of the Development Consent and Statement of Commitments is included in **Appendix 2**.

Two (2) observations were made during the site inspection relating to the failure to implement effective systems for the management of dust and for failure to effectively implement visual screening of the Yorkeys Creek Stockpiles. For further information please refer to **Section 3.2** and **Table 2**.

There is a demonstrated understanding of the importance of environmental management and compliance with conditions of consent and the site staff acknowledged this intention. Of particular note, the site paints the walls of the quarry to minimise visual impacts from the highway and for residents able to see into the valley, and the downhill raw material conveyor is able to generate electricity which is utilised by the site.

In relation to the above non-compliances identified in Table 1, all non-compliances will be actioned in accordance with the Department's Compliance Policy.

Appendix 1 – Photographs *(all photos taken 2 December 2015)*

Photograph 1: Driver Chain of Responsibility sign on.

Photograph 2: Truck loading in progress.

Photograph 3: Raw material stockpile and conveyor. Dusty conditions around the end of the raw material conveyor and in the processing area were noted.

Photograph 4: Offices and car park.

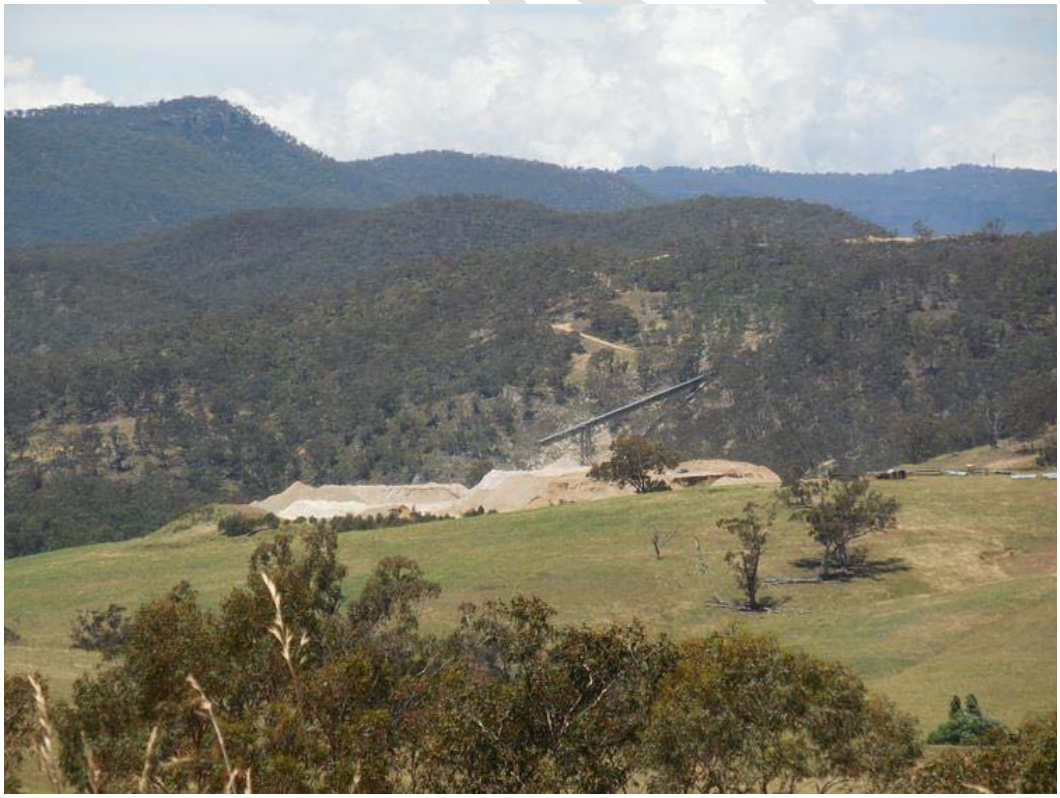
Photograph 5: Extraction area.

Photograph 6: Primary crusher.

Photograph 7: Conveyors from primary crusher.

Photograph 8: Excavation of material in pit.

Photograph 9: Yorkeys Creek Stockpiles (from offices).



Photograph 10: Yorkeys Creek Stockpiles (from access road). There is a significant visual impact from Jenolan Caves Road.

Photograph 11: Flagging tape marking the extraction boundary. It is noted that this is a temporary measure and permanent marking is yet to be installed.

Appendix 2 – Compliance Checklist

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
2	5	Administrative	**LAPSING OF CONSENT** If the development has not been physically commenced within 5 years of the date of this consent, then this development consent shall lapse.	Technically the project has not physically commenced. The proponent is still operating in Stage 1, which will be the case for the next 3-6 months. The surrender of the Council Consent is required within 12 months, and it is likely to be surrendered close to the 12 month mark (15/7/2016).	Not triggered	
2	6	Administrative	**LIMITS ON CONSENT** **Quarrying Operations** The Applicant shall not extract extractive materials below a level of 685 m AHD.	The Council Consent provided extraction to RL 730, which was modified to RL 700. SSD 6084 allows extraction to RL 685, which is above the water line. The Cox's River is located at RL 660. It was indicated that the site was operating at the RL 730 bench. A Survey Plan was provided dated 18/10/13 which indicates they are operating above RL 685, and this was confirmed by a follow up survey plan dated 14/12/15.	Compliant	Implement a system to demonstrate that limits of extraction are not being exceeded at any time.
2	8	Administrative	**LIMITS ON CONSENT**	Records were sighted for the period 1/07/2014 – 30/06/2015 (840,204.21	Compliant	Continue to develop the transport

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			Extractive Material Transport 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.	tonnes) and 1/01/2014 – 31/12/2014 (940,750.5 tonnes) and 1/1/2015 – date (768,046.91 tonnes) and daily records for the period 24-28 November. Other records were viewed directly on the computer. The records indicate compliance with this condition. It was noted that some additional reports were going to be developed to enable reports to be run to specifically address these conditions of consent.		management system to enable reports to demonstrate compliance with this condition to be readily run on demand. Implement a system to prevent additional trucks above the approved number exiting the site which will result in non-compliance with this condition.
2	9	Administrative	**SURRENDER OF EXISTING DEVELOPMENT CONSENTS** 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*	The consent is required to be surrendered by 15/7/2016. This has not yet occurred.	Not triggered	Surrender Development Consent DA 103/94 by 15/7/2016.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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.			
2	10	Administrative	**SURRENDER OF EXISTING DEVELOPMENT CONSENTS** 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.	No operations under SSD 6084 have commenced. Conditions are assessed on an individual basis.	Not triggered	
2	11	Administrative	**STRUCTURAL ADEQUACY** 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	No new buildings have been constructed since the date of approval of SSD 6084.	Not triggered	

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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.			
2	17	Administrative	**PRODUCTION DATA** 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).	The proponent indicated that they have not received a copy of the DRE Form at the time of the audit, and the data has therefore not been submitted. The Annual Review under SSD 6084 has not yet been developed. The Annual Review required under the Council Consent has not yet been completed, and will be submitted to the Department to meet the requirements of SSD 6084.	Non-compliant (Administrative)	Complete the DRE Form on an annual basis and submit to the DRE as required. Include a copy of this data in the Annual Review.
2	18	Administrative	**IDENTIFICATION OF APPROVED EXTRACTION LIMITS** 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	The survey was undertaken (plan dated 27/11/2015 sighted). The survey has not been submitted to the Department. The survey was required to be undertaken and submitted by 30 September 2015.	Non-compliant (Administrative)	Submit the survey plan with applicable GPS requirements to the Secretary as required.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			(b) submit a survey plan of these boundaries with applicable GPS coordinates to the Secretary.			
2	19	Administrative	**IDENTIFICATION OF APPROVED EXTRACTION LIMITS** 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.	The boundary marking was checked in the field. The boundary was marked with flagging tape, and it was identified that this is not a long term solution and more permanent marking will need to be installed. It was also noted that some of the marks are offset, and the actual boundary needs to be marked, in addition to any offset (and differentiated as such). It was noted that this will be done prior to commencing Quarry Extension works. This was not deemed to be non-compliant as quarrying activities in the Quarry Extension have not yet commenced.	Not triggered	Install permanent boundary markers clearly identifying the extraction area and any offsets associated with each boundary marker.
2	20	Administrative	**COMMUNITY ENHANCEMENT** 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	It was noted that a few meetings have been held regarding fund allocation. The Agreement has been lodged with the Lithgow City Council and will be going to a Council meeting next week. It will need to be put on public exhibition for 28 days. No projects have been nominated for the direction of the funds.	Not triggered	Enter into the Planning Agreement with the Lithgow City Council by 15/1/2016.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			□ 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.	It was indicated that payments will be made quarterly, and will be backdated to the date of the approval. It was noted that the Agreement is unlikely to be finalised by 15/1/16 as required under the approval. The proponent is a member of the Hartley District Progress Association (HDPA).		
3	1	Environmental Performance Conditions – Transport	**Hours of Operation** The Applicant shall comply with the operating hours set out in Table 1.	The EPL and Council Consent permitted operational hours are from 6 am to 6 pm Monday to Friday and 6 am to 3 pm on Saturday. Crusher operational records for November were sighted. These hours were compliant with SSD 6084. It was noted that the stop times on some occasions were later than 6 pm. 1-2 blasts are undertaken each month. Post Blast Reports for 2015 were viewed. All blasts viewed were compliant. Records for dispatch for the period 23 - 27 November 2015 were sighted on the	Compliant	

<table>
<tr><th>Schedule</th><th>Condition No.</th><th>Category</th><th>Condition</th><th>Evidence</th><th>Compliance Status</th><th>Recommendation</th></tr>
<tr><td></td><td></td><td></td><td>Table 1: Operating Hours<table><tr><th>Activity</th><th>Permissible Ho</th></tr><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 holida</td></tr><tr><td>• Blasting</td><td>• 10 am to 3 pm Monday to Friday (exce</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 holida</td></tr><tr><td>• Maintenance</td><td>• Anytime.</td></tr></table></td><td>computer. These records indicated compliance with this condition.</td><td></td><td></td></tr>
<tr><td>3</td><td>2</td><td>Environmental Performance Conditions – Transport</td><td>Hours of Operation

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</td><td>No requests have been received.</td><td>Not triggered</td><td></td></tr>
</table>

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			undertaking the activities, or as soon as is practical thereafter.			
3	21	Environmental Performance Conditions – Transport	**Monitoring of Product Transport** 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.	Records were sighted for the period 1/07/2014 – 30/06/2015 and 1/01/2014 – 31/12/2014 and 1/1/2015 – 2/12/2015 and daily records for the period 24-28 November 2015. Other records were viewed directly on the computer. The records indicate compliance with this condition. The website has not yet been developed and it is planned to commence in January 2016. This will include the period July 2015 – December 2015.	Not triggered	Ensure that records of transport movements are reported on the website six monthly.
3	22	Environmental Performance Conditions – Transport	**Operating Conditions** 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	22 a) No documentation has been provided to contractors at this stage regarding this requirement. A Cartage Agreement is in place with all contractors however this does not currently contain this requirement. 22 b) This issue is managed through contractor selection. All trucks are required to have tarping ability. Spot checks are undertaken (not documented). It is noted in the Traffic Management Plan that tarping of loads	Non-compliant (Administrative)	Systems to be implemented to ensure compliance with this condition of consent.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			fall on the road, before leaving the site; and (d) no trucks queue at the entrance to the quarry access road before 5 am.	is required and drivers are required to sign out as they are driving off the site. The truck driver induction covers the SWMS, which covers tarping and cleaning of trucks (Point 5). Trucks are checked at the Mt Boyce RMS facility. 22 c) There are no cameras or wash bay on site. The truck driver induction covers the SWMS, which covers tarping and cleaning of trucks (Point 5). The site has a long entry road and checks are taken to ensure that there are no materials spilled on the road (not documented). It is likely that if there was material on trucks that it would fall off prior to reaching the public road. 22 d) It was stated that the first employee arrives at site at 4.30 am. There is a parking area available on site. Notes are sent to contractor companies if trucks are observed queuing outside of the gate. Gates have been occasionally opened earlier to allow trucks access to site.		
3	23	Environmental Performance Conditions – Transport	**Transport Management Plan** The Applicant shall prepare and implement a Transport	A Traffic Management Plan is in place that meets the current requirements. It has not been revised to meet the	Not triggered	Prepare and implement the Traffic Management Plan to be developed to meet

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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.	requirements of SSD 6084 and has not been submitted to the Secretary. It is due to be submitted three months prior to the commencement of quarrying operations under this consent, which has not yet commenced.		the requirements of this condition.
5	4	Environmental Management, Reporting and Auditing	**Annual Review** 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	An Annual Review under SSD 6084 has not yet been developed and submitted. It was noted that the 2014/2015 Annual Report for Council is currently being developed and will be submitted in January 2016.	Not triggered	Seek approval from the Secretary for an amendment to the submission date for the Annual Review if required.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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;	It was also noted that Aquatic Studies undertaken on the site occur in September/October and that the proponent would be seeking to submit the report in November of each year.		Submit the Annual Review currently being developed to the Secretary to meet the requirements of this condition.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			(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.			
5	8	Environmental Management, Reporting and Auditing	**INDEPENDENT ENVIRONMENTAL AUDIT** 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	First audit due by 15/7/16	Not triggered	Undertake the audit by 15 July 2016 to meet the requirements of this condition.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			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.*			
5	9	Environmental Management, Reporting and Auditing	**INDEPENDENT ENVIRONMENTAL AUDIT** 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.	First audit due by 15/7/16.	Not triggered	

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
5	10	Environmental Management, Reporting and Auditing	**ACCESS TO INFORMATION** 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,	Company website operational, however no project documents are available. It is planned for documents to be made available by the required date.	Not triggered	Update the proponent's website to meet the requirements of this condition by 15 January 2016.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			to the satisfaction of the Secretary.			
Appendix 3	5.1	Statement of Commitments	**Traffic and transport** All transport contractors required to complete the Hy-Tec Chain of Responsibility: Driver Vehicle Check system.	All drivers when coming on to site are required to sign onto a screen located outside of the office, which checks that they are inducted for the site and licence is valid (amongst other checks). All contracting companies are required to execute a Cartage Agreement, which covers the Chain of Responsibility requirements including driver fatigue, vehicle mass and dimension, load securing, speed, dangerous goods or any other matters relating to the safe operation of vehicles.	Compliant	
Appendix 3	5.2	Statement of Commitments	**Traffic and transport** Maintain a complaints management system to appropriately respond to any complaints received through investigation and implementation of corrective treatments.	A complaint diary is being maintained (viewed). Corrective actions taken were noted. A Hotline number is available on the website. 'Complaints' that have been noted in the diary include: • 11/11/15 – ute observed driving through quarry that was not approved. • 23/6/15 – shooting was occurring close to the MCC.	Compliant	

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
				• 23/10/14 – loud explosion at night was heard – identified to not be related to site. Complainant was brought to site. • 3/9/14 – near miss, truck crossed over road. An on-line system is used on site (Cintellate) in which complaints are able to be recorded, as well as environmental incidents and any other issue for the site. These get escalated to the manager as required. The system was not reviewed as part of this audit.		
Appendix 3	5.3	Statement of Commitments	**Traffic and transport** Monitor the delays for vehicles turning right onto the Great Western Highway at two-yearly intervals from 2022 onwards.	It was noted that this condition was related to the possible deterioration of the intersection by this date without further improvements.	Not triggered	
Appendix 7	1	Planning Agreement	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;	The Planning Agreement is not yet in place and payments are not yet being made. The Agreement is required to be in place by 15/1/2016. The plan is to back date the payments to the date of the Development Consent.	Not triggered	Implement the Planning Agreement by 15 January 2016.

Schedule	Condition No.	Category	Condition	Evidence	Compliance Status	Recommendation
			(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 G: Code of Conduct

Hy-Tec Industries Pty Ltd
ACN 070 100 702
ABN 90 070 100 702

PROCEDURE: DRIVER'S CODE OF CONDUCT

Be Professional – It's Your Job!

Applicability of Procedure

This procedure applies to all transport related activities conducted by ……..employees or contractors to any of Hy-Tec's Quarries located in NSW.

Objective

This Driver's Code of Conduct has been established to minimise the impact of the Austen Quarry, Hartley, Penrose Quarry, Penrose and Tinda Creek Sand Quarry, Mellong, transport operations on the environment and the members of the public and to ensure a high quality, reliable and safe service.

Process

THE DRIVER WILL:

- Have completed the Hy-Tec induction process
- comply with all road rules and regulations regarding speed, load limits and driving hours;
- make themselves familiar with the Personal Protection Equipment requirements for each work site and strictly adhere to them;
- comply with all rules and regulations such as speed restrictions when operating on private or company property;
- ensure that all loads are correctly secured and covered before entering a public road;
- limit the use of the engine brakes and other noisy driving practices in built-up areas;
- show courtesy to all customers and to all road users at all times; and
- ensure that your actions bring credit upon yourself, your Company, Hy-Tec and the transport industry in general.
- Ensure that a site specific induction has been completed at all Hy-Tec sites annually and when requested
- Comply with the Hy-Tec Driver vehicle Check when requested by Hy-Tec personnel
- Ensure laden trucks have appropriate signage, including a contact phone number, so they can be easily identified by road users
- Ensure all laden vehicles are have been cleaned off of any quarry material or other materials that may fall on the road before leaving the site
- Ensure no trucks are to queue at the entrance before 5 am (except Penrose Quarry)

HY-TEC Industries PTY. LTD.
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PROCEDURE: **DRIVER'S CODE OF CONDUCT**

Be Professional – It's Your Job!

Disciplinary Action

You will face disciplinary action if you fail to meet the requirements in this Code of Conduct or Hy-Tec receives a community complaint regarding your driving or vehicle. Disciplinary action can include a verbal warning, a written warning, temporary or permanent dismissal from the site and/or termination of any contract/agreement with Hy-Tec.

Transport Company	
Driver's Name (please print)	
Driver's Signature	
Date	

Quality Endorsed Company
ISO 9002 Lic QEC 1872
Standards Australia

HY-TEC Industries PTY. LTD.
ACN 070 100 702

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