



Oberon Quarries Pty Limited

OBERON QUARRIES

Annual Review
1 January 2017 - 31 December 2017

July 2018

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Annual Review Title Block

Name of operation:	Oberon Quarries
Name of operator:	Oberon Quarries Pty Limited
Development consent:	Oberon Quarry Continuation Project Development Consent (SSD_6333)
Name of holder of development consent:	Oberon Quarries Pty Limited
Mining Lease:	N/A
Water licence:	Water Access Licence (WAL 34279)
Name of holder of water licence:	Oberon Quarries Pty Limited
MOP or RMP start/end date:	N/A
Annual Review start date:	1 January 2017
Annual Review end date:	31 December 2017
I, Neil Hargraves, certify that this audit report is a true and accurate record of the compliance status of Oberon Quarry for the period 1 January to 31 December 2017, and that I am authorised to make this statement on behalf of Oberon Quarries Pty Limited. Note. <i>a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</i> <i>b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</i>	
Name of authorised reporting officer:	Neil Hargraves
Title of authorised reporting officer:	Managing Director
Signature of authorised reporting officer:	
Date:	30 July 2018

1.0 Statement of Compliance

Oberon Quarries Pty Ltd (Oberon Quarries) operates a hard rock quarry (referred to hereafter as the Quarry), which is located approximately 5 kilometres (km) south of Oberon, New South Wales (NSW) (refer to **Section 2.1**).

This annual review has been prepared to provide a summary of the performance of the Quarry over the period 1 January to 31 December 2017 (i.e. the reporting period). The compliance status of the Quarry operations against relevant approvals was managed during the reporting period by Oberon Quarries and the compliance status is summarised in **Table 1.1**.

The statement of compliance status in **Table 1.1** is based on compliance information provided by Oberon Quarries. In preparing this Annual Review Umwelt (Australia) Pty Limited has relied on this information in combination with other information sources such as; environmental monitoring documentation, discussions with the Oberon Quarries representatives and our general understanding of the operation. In preparing this report Umwelt has not sought to undertake a full compliance audit, including secondary verification of the collated documentary evidence with relevant government agency staff, construction personnel or operational staff, site records etc.

It is noted that an Independent Environmental Audit (IEA) was undertaken during the reporting period. The IEA identified a total of 14 non-compliances:

- One non-compliance: being the failure to install road signage as per the Development Consent
- Nine areas of administrative non-compliance: being six against the Development Consent, two against Management Plans and one against the statement of commitments, and
- Four observations: being two against the Development Consent, one against the Blast Management Plan (BMP) and one against the statement of commitments.

A copy of the IEA together with Oberon Quarries proposed action plan to address the non-compliance, administrative non-compliances and observations was submitted to the Department of Planning and Environment (DPE) on 2 August 2017, for the acceptance of the Secretary. Further details of the audit findings can be found in **Section 10.0**.

During the reporting period, one exceedance of the overpressure criteria was recorded (i.e. the blast undertaken on the 19 July 2017). This exceedance is associated with a non-routine blast to establish a new quarry bench. The blast was not typical of regular blasting activities as there was no free face which could be used to dissipate the blast energy. Given the small number of blasts undertaken by the Quarry during the reporting period, this one exceedance by default also results in an exceedance of the 5% allowance for the number of blasts above 115dBL. There were no complaints received or reports of physical impact to private property as a result of the 19 July 2017 blast. The Environment Protection Authority (EPA) and DPE was notified of the exceedance in a letter dated 25 July 2017 (i.e. within 7 days of the non-compliance occurring). The private landholder was also notified of the exceedance in accordance with Schedule 4, Condition 1 of the Development Consent. Refer to **Section 6.4** for further information.

The non-compliances recorded during the reporting period have been ranked according to the risk matrix included in **Table 1.2**. A brief description of each is provided in **Table 1.3**.

Table 1.1 Statement of compliance

Were all conditions of the relevant approval(s) complied with?	Yes / No
Development Consent SSD_6333 (<i>Environmental Planning and Assessment Act 1979</i>)	No
Environment Protection Licence 4442	No
Water Access Licence number 80AL 716303 (WAL 34279)	Yes

Table 1.2 Compliance Status Key for Table 1.3

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

Source: Annual Review Guideline (NSW Government, 2015).

Table 1.3 Non-compliances recorded during the 2017 report period

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment/Actions taken	Status	Where addressed in Annual Review
SSD_6333	Schedule 3, Condition 4	The Applicant shall: (c) carry out noise monitoring (at least every 3 months, unless otherwise approved by the Secretary) to determine whether the development is complying with the relevant conditions of this consent; and to the satisfaction of the Secretary.	Non - compliant	Oberon Quarry has established an agreement with relevant landowners to exceed the noise criteria in Development Consent. Oberon Quarry notified the Secretary of these agreements on 25 January 2017. Oberon Quarry obtained approval from the Secretary on 2 February 2017 to discontinue noise monitoring. Future monitoring will only be undertaken should a noise complaint be received.	Complete	Section 6.2
SSD_6333	Schedule 3, Condition 6	The Applicant shall ensure that blasting on site does not cause any exceedance of the criteria in Table 3. However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the limits in Table 3, and the Applicant has advised the Department in writing of the terms of this agreement.	Non - compliant	During the reporting period, one exceedance of the overpressure criteria was recorded (i.e. the blast undertaken on 19 July 2017). This exceedance is associated with a non-routine blast to establish a new quarry bench. The blast was not typical of regular blasting activities as there was no free face which could be used to dissipate the blast energy (refer to Section 6.4.4 for further details.	In progress	Section 6.4
SSD_6333	Schedule 3, Condition 16	The Applicant shall prepare and implement a Water Management Plan (WMP) for the development to the satisfaction of the Secretary. This plan must: (c) be submitted to the Secretary for approval within 6 months of the date of this consent, unless otherwise agreed by the Secretary;	Non - compliant	The water management plan had not been submitted to DPE within the required timeframe. An extension was provided by the Secretary until the 31 May 2016. The WMP was submitted on 2 June 2016.	Complete	Section 3.1

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment/Actions taken	Status	Where addressed in Annual Review
SSD_6333	Schedule 3, Condition 18	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.	Non - compliant	This non-compliance is associated with contractor trucks not having Oberon Quarries related signage. In accordance with the Oberon Quarry approved Transport Management Plan, all drivers are notified of the requirements for the transport of material offsite and the requirements of the approved Transport Management Plan dated March 2016 (Umwelt, 2016f). In addition to its own trucks, Oberon Quarry utilises a number of external contractors to transport Quarry products to customers. Oberon Quarry believes it is not reasonable for Oberon Quarry contact details to be displayed on contractor trucks as they do not work solely for Oberon Quarry. Oberon Quarry does however maintain a register of all vehicles entering and departing the Quarry on a daily basis. This register can be used to assist in identifying trucks in the event of a complaint.	Complete	Noted
SSD_6333	Schedule 3, Condition 19	Within 6 months from the date of this consent the Applicant shall provide and install "Intersection Advance" (G1-207) warning signage on eastbound approach to the intersection of Duckmaloi and Titania Roads.	Non - compliant	"Intersection Advance" (G1-207) warning signage had not been installed on the eastbound approach to the intersection of Duckmaloi and Titania Roads. Oberon Quarry will install the relevant warning signage as required.	In progress	Section 4.3
SSD_6333	Schedule 3, Condition 25	Within 6 months of the approval of the Landscape and Rehabilitation Management Plan, the Applicant shall lodge a Rehabilitation Bond with the Department to ensure that the rehabilitation of the site is implemented in accordance with the performance and completion criteria set out in the plan and relevant conditions of this consent.	Non - compliant	A draft Rehabilitation Bond was submitted to DPE on 23 March 2018 for consideration.	In Progress	Section 8.4

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment/Actions taken	Status	Where addressed in Annual Review
SSD_6333	Schedule 3, Condition 28	The Applicant shall: (d) report on waste management and minimisation in the Annual Review, to the satisfaction of the Secretary.	Non-Compliant	Oberon Quarry has included waste management and minimisation information within the 2016 and 2017 Annual Reviews.	Complete	Section 6.9
SSD_6333	Schedule 5, Condition 10	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.	Non - compliant	The initial audit of the development had not been commissioned within 12 months of the date of the consent (i.e. 12 September 2016). The on-site component of the audit was conducted on 12 January 2017. Subsequent audits will be commissioned in accordance with the timeframes included within the Development Consent.	Complete	Section 10.0
SSD_6333	Water Management Plan Section 4.3	Water use including the extraction from Racecourse Creek and management of water consumption will be reported in the Oberon Quarry Annual Review.	Non - compliant	2017 Annual Review updated with water usage information. There was no water extracted from Racecourse Creek during the reporting period.	Complete	Section 7.1.4
SSD_6333	Environmental Management Strategy Section 5.2	As a minimum, environmental inspections will be undertaken monthly to assist in the environmental management of the quarry and determine compliance with the legislation, standards, codes and other external requirements, the Project Approval and EPL. Outcomes of inspections shall be documented within the monitoring checklist to capture and track all actions.	Non - compliant	A formalised monitoring checklist has been developed. The checklist has been implemented and will be utilised for monthly environmental inspections of the Quarry.	Complete	Not Applicable

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment/Actions taken	Status	Where addressed in Annual Review
SSD_6333	Statement of Commitments – Aboriginal Archaeology	Oberon Quarries should ensure that all parties involved in the project are aware that it is an offence under Section 86 of the <i>National Parks and Wildlife Act</i> to harm or desecrate an Aboriginal object unless that harm or desecration is the subject to an AHIP.	Non - compliant	There are no known archaeological sites identified within the Project Area. Oberon Quarry will continue to notify all parties of their responsibilities as part of the site induction process and display this information in the site office.	Complete	Not Applicable
SSD_6333	Blast Management Plan	Not all blast monitored during report period in accordance with requirements of Blast Management Plan	Non-Compliant	Oberon Quarry did not monitor all blast during the report period. There were two ‘rock popping’ blast undertaken in June 2017 where blast monitoring was not completed, refer to Section 6.4.4.	Complete	Section 6.4.4.
EPL 4442	L4.1	The airblast overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	Non - Compliant	There was one blasting event which exceeded blast performance criteria during the reporting period. The event occurred on 19 July 2017. Refer to Section 6.4.4 for further details.	In Progress	Section 6.4
EPL 4442	L4.2	The airblast overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.	Non - compliant	There was one blasting event which exceeded blast performance criteria during the reporting period. The event occurred on 19 July 2017. Refer to Section 6.4.4 for further details.		

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment/Actions taken	Status	Where addressed in Annual Review
IEA Observation Findings						
SSD_6333	Schedule 3 Condition 16	The Applicant shall prepare and implement a WMP for the development to the satisfaction of the Secretary. (d) This plan must include a Surface Water Management Plan, that includes: - a detailed description of the surface water management system on site including the: - erosion and sediment controls	IEA Observation	Quarry operations are undertaken in accordance with the WMP (Umwelt 2016e). The water management controls were established at commencement of operations in 1995 and can be seen on Figure 3.1 of the approved WMP. Temporary erosion and sediment controls will continue to be implemented on an as needs basis. The implementation of these measures will be reported, as part of the annual review process.	Complete	Section 4.3
SSD_6333	Schedule 3 Condition 28	The Applicant shall: (a) manage on-site sewage treatment and disposal in accordance with the requirements of its EPL, and to the satisfaction of the EPA and Council; (b) minimise the waste generated by the development; (c) ensure that the waste generated by the development is appropriately stored, handled, and disposed of	IEA Observation	Environmental Management Strategy (EMS) has been updated to document waste management practices to be implemented on site and was submitted to DPE as noted in Table 3.2.	Complete	Not Applicable
SSD_6333	Management Plan Commitment - Blast Management Plan – Section 6.2	Blast monitoring will be undertaken at the nearest private residence and/or other sensitive locations (as required) to verify compliance with the relevant criteria.	IEA Observation	Oberon Quarry continues to monitor blasts at nearest Private and/or Sensitive Receptor in accordance with Project Approval and EPL requirements. Blast monitoring has and will continue to be undertaken at the Alvarez residence in accordance with DPE Blast Management Plan. The location of the blast monitoring which has been and will continue to be undertaken is shown on Figure 3.1 of the Blast Management Plan.	Complete	Section 6.4

2.0 Introduction

The Quarry is located approximately 5 km south of Oberon, NSW (refer to **Figure 2.1**). The initial Development Consent (DA92/164) for the Quarry was granted on 1 October 1993 by the NSW Minister for Planning to establish and operate a hard rock Quarry at 'Langley Heights', Oberon, NSW. Subsequent modifications of DA 92/164 were approved in 1999, 2004, 2007 and September 2013. This initial Development Consent (DA92/164) was surrendered on 2 December 2015.

On 14 September 2015, Oberon Quarries was granted approval of the Oberon Quarry Continuation Project Development Consent (SSD_6333) by the NSW Minister for Planning. This 2015 Development Consent extended the life of the Quarry for an additional 30 years.

The 2015 Development Consent (SSD_6333) allows for the ongoing extraction of the proven high quality basalt resource, with only minor changes to that undertaken the previous Development consent (DA92/164). The most notable change being the inclusion of a 1.0 hectare (ha) extension to the existing extraction area. This inclusion avoids the sterilisation of approximately 500,000 tonnes of high quality basalt resource. The 2015 Development Consent (SSD_6333) approves a maximum production limit of 400,000 tonnes per annum (tpa) and the transport of up to 3,000 tonnes per day of product from the Quarry.

2.1 Quarry Contacts

The Quarry Manager is responsible for all aspects of environmental compliance at the site and supervises the day-to-day site environmental management and reporting, including monitoring and supervision of environmental works. The contact details of the key personnel responsible for the environmental performance of the operation are summarised in **Table 2.1**.

Table 2.1 Key Personnel Responsible for Environmental Management during the 2017 Report Period

Name	Title	Company	Contact No.
John Fisher	Quarry Manager	Oberon Quarries Pty Ltd	(02) 6336 0259
Neil Hargraves	Managing Director	Oberon Quarries Pty Ltd	(02) 6336 0259

2.2 Annual Review Requirements

The Annual Review summarises the environmental performance of the Quarry for the reporting period and has been prepared to address Schedule 5, Condition 9 of Development Consent (SSD_6333). A summary of where each requirement has been addressed is provided in **Table 2.2**.

The structure and content of this Annual Review was prepared consistent with the requirements of the 'Annual Review Guideline, Post-Approval requirements for State significant mining developments' (NSW Government, 2015).

Table 2.2 Development Consent (SSD_6333) Annual Review Requirements

Conditions		Addressed in Section
Schedule 5 – Environmental Management, Reporting and Auditing Annual Review		
9.	By the end of March each year, or other timing as may be agreed by the Secretary, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:	This document
	(a) describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year.	Section 4.0 and Section 12.0
	(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar 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. - relevant predictions in the EIS.	Section 6.0 to Section 9.0
	(c) identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance.	Section 1.0 and Section 6.0
	(d) identify any trends in the monitoring data over the life of the development.	Section 6.0
	(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies.	Section 6.0
	(f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.	Section 6.0 and Section 11.0

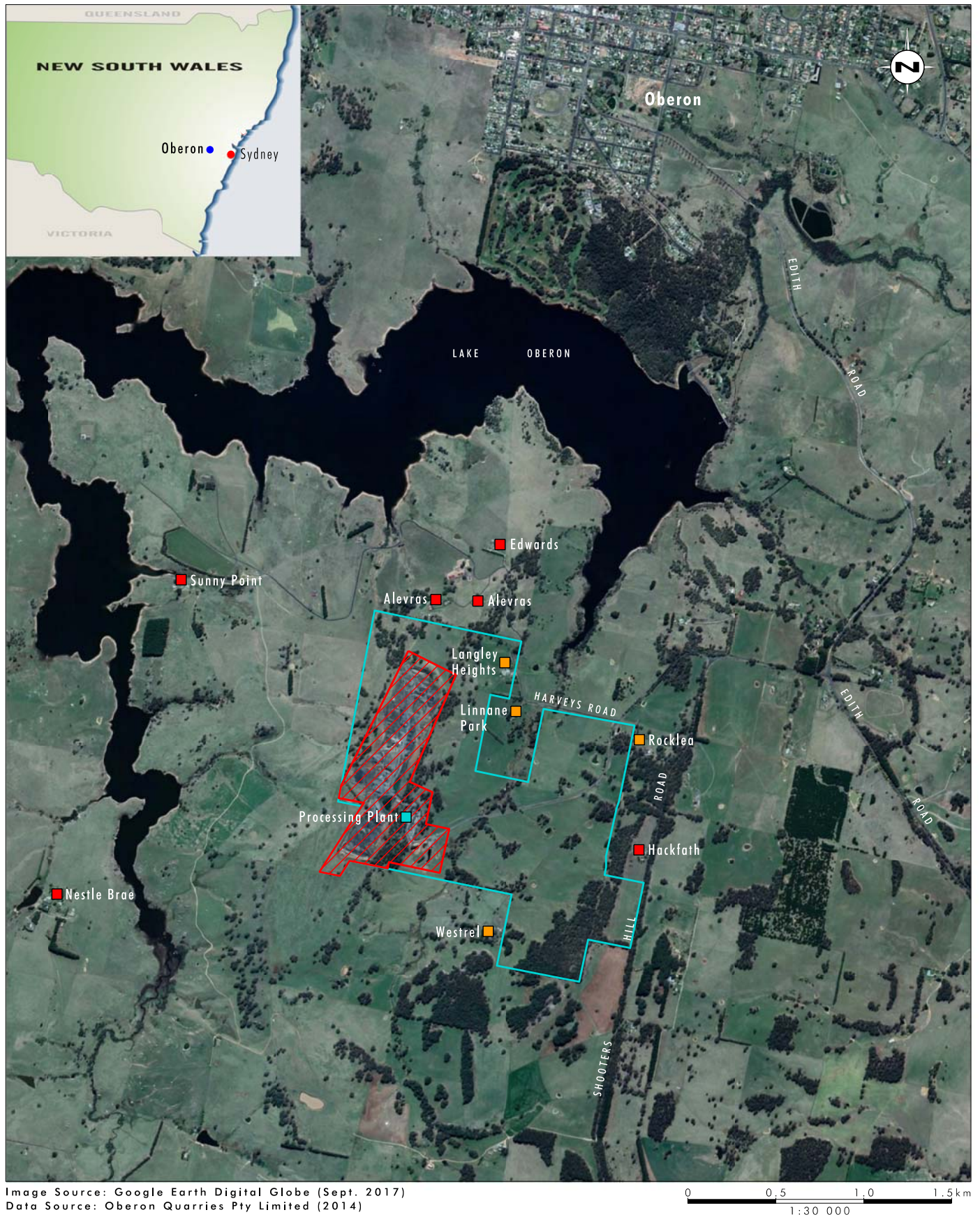


Image Source: Google Earth Digital Globe (Sept. 2017)
Data Source: Oberon Quarries Pty Limited (2014)

Legend

- Project Area
- Langley Heights Property
- Private Residence
- Residence Owned by Oberon Quarries or Associated with Quarry
- Processing Plant

FIGURE 2.1
Locality Map

3.0 Approvals

The operation of the Quarry during the reporting period was regulated by a range of approvals and licences. **Table 3.1** provides a list of the relevant approvals, licences and their status for reporting period.

Table 3.1 Current Approvals and Licences

Approval	Development	Date Granted	Expiry Date	Status	Authority
Development Consent (SSD_6333)	Oberon Quarry Continuation Project	14 September 2015	14 September 2045	Current	DPE
Environment Protection Licence 4442	Oberon Quarries Pty Ltd	January 1994	NA. Renewed annually	Current	EPA
Water Access Licence 34279 (80SL051088)	Part 2 surface water licence under the <i>Water Act 1912</i> for the extraction of water from Racecourse Creek	03 October 2012	Perpetuity	Current	DPI Water

3.1 Status of Management Plans

In accordance with the 2015 Development Consent, the Quarry is required to implement a range of environmental management plans as part of the Oberon Quarry Environmental Management Strategy (EMS). **Table 3.2** identifies the environmental management strategy and plans and their approval status as at the end of the reporting period.

Throughout the reporting period Oberon Quarries operated under a set of DPE approved management plans. As a result of the Independent Environmental Audit undertaken in January 2017 and 2015 Development Consent requirements, the plans were reviewed and updated where relevant. The updated plans were submitted to DPE for approval on 22 February 2017 with the current approval status shown in **Table 3.2**.

Quarrying operations will continue to be undertaken in accordance with the approved management plans, until such time as the revised plans are approved by DPE.

Table 3.2 Status of SSD_6333 Management Plans

Management Strategy / Plan	Revision Date of the Approved Plan	Revision Date of Modified Plan Submitted for Approval	Approval Date	Relevant Agency
Environmental Management Strategy (EMS)	December 2016	August 2017	Pending	DPE
Noise Management Plan (NMP)	March 2016	March 2017	Pending	DPE
Air Quality Management Plan (AQMP)	May 2016	August 2017	Pending	DPE
Blast Management Plan (BMP)	May 2016	August 2017	Pending	DPE
Landscape and Rehabilitation Management Plan	May 2016	August 2017	Pending	DPE
Water Management Plan (WMP)	August 2016	August 2017	Pending	DPE
Transport Management Plan (TMP)	March 2016	August 2017	Pending	DPE

Note: All references to management plans within this document refer to the current DPE approved version of the management plan unless specified.

4.0 Operations Summary

A summary of the operations undertaken at the Quarry during the reporting period are included in the following sections.

4.1 Quarrying Operations

During the reporting period, Quarrying operations saw the continued extraction of basalt resource from the Quarry (refer to **Figure 4.1**). Extraction activities have primarily focused at the northern end of the Quarry. The Quarry has not yet reached the full extent of the extraction boundary and continues to extract basalt from the first bench. It is predicted that there is approximately 5 years of basalt resource within the first bench.

Basalt is won by drill and blast operations. The blasted rock is loaded into off-road rear dump trucks using an excavator and transported to the crushing and screening plant for further processing. The resulting basalt products are stockpiled within the processing area and on the Quarry floor from where it is loaded into highway trucks for transport to markets in the Central NSW Tablelands and Sydney areas.

Oberon Quarries has completed a visual inspection of the Quarry's extraction operations against the extraction boundary as submitted to DPE in accordance with Schedule 2 Condition 2 and has confirmed that extraction operations during 2017 occurred within the Extraction Boundary as submitted to DPE during the reporting period. All extraction activities have been undertaken within the Project Area during the reporting period and have been undertaken on the Deposited Plan and Lots as described in the 2015 EIS.

The extraction boundary in the 2015 EIS was defined by a combination of the existing quarrying area from previous development consents held for the operation (since relinquished) and an approximate one hectare extension area. It is noted that the existing approved quarry area as shown in the 2015 EIS was a non-geo rectified schematic that was sourced from the 1992 EIS. The surveyed extraction boundary submitted to DPE in accordance with Schedule 2 Condition 2 has been used on the figures in this Annual Review. This boundary is a combination of the existing and previously approved quarrying area (pre 2015 development application) and the approximately one hectare extension approved as part of the 2015 development application. Oberon Quarries will consult with DPE in April 2018 regarding whether or not there is a need to reference the survey accurate boundary in the development consent.

During August 2017, Oberon Quarries commenced construction of an internal access road between the diesel storage area and plant loading area (refer to **Figure 4.1**). Construction of this access road is expected to be completed during 2018.

4.2 Production Limits

During the reporting period, a total of 304,659 tonnes of Quarry product was transported from the Quarry. This is below the 400,000 tonnes per annum permitted under the 2015 Development Consent. During the reporting period the maximum daily tonnage of material transported off site of 3,000 tonnes per day was not exceeded. **Table 4.1** provides the annual amount of product transported for the 2016 and 2017 reporting years and forecast for the 2018 reporting period. The estimates provided are based on the weighbridge data for the reporting period. A monthly summary of product transported from the site is summarised in **Appendix 2**.

Table 4.1 Production Summary

Material	Approved limit (SSD_6333)	2016 reporting period (actual)	2017 reporting period (actual)	2018 reporting period (forecast)	Compliance with Criterion
Saleable Product	400,000 tonnes from the site in any calendar year.	376,952 tonnes	304,659 tonnes	Approx. 300,000 tonnes	Yes

4.2.1 Hours of Operations

Oberon Quarry operates in accordance with the operating hours specified by Condition 1 of Schedule 3 of the Development Consent, refer to **Table 4.2**. Oberon Quarry continued to operate within the operating hours specified by the 2015 Development Consent throughout the reporting period.

Table 4.2 Operating Hours Summary

Activity	Operating Hours	Complied with Operating Hours and Activity during this reporting period
Extraction operations	7am to 6pm Monday to Friday 7am to 5pm Saturday	Yes
Loading and dispatch	6am to 10pm Monday to Friday 6am to 5pm Saturday	Yes
	No more than 4 laden vehicles per hour occurred between the hours of 6am to 7am and 6pm to 10pm	Yes
Construction and maintenance activities	7am to 6pm Monday to Friday 7am to 4pm Saturday	Yes
Blasting	9am to 5pm Monday to Saturday	Yes

4.3 Construction Activities

Construction of a new access road commenced in August 2017. The expansion of existing access road from the fuel bowzers and diesel storage area to light vehicle carpark and weighbridge commenced in August 2017 with the intention for improved traffic and dust management along the main road entry into the sales plant. As a result of this expansion, water management drains between the processing area and dams were modified. Expansion works are scheduled for completion in 2018.

The access road around perimeter of Quarry and the bund walls were improved to enable tractor access for rehabilitation operations (e.g. temporary stabilisation with vegetation and weed spraying, as required).

The new crusher was also installed during February 2017, as indicated in the EIS. The new screening plant is likely to be installed during 2019.

4.4 2018 Operations

Extraction is confined to the basalt plateau on top of Racecourse Hill. Quarrying operations proposed for the 2018 reporting period will see the continuation of the extraction of basalt resource from primarily the first bench with possibly of extraction within the second bench at the northern end of the Quarry.

Extraction within the second bench is subject to the rock qualities required by the end user and its availability within the first bench. The Quarry floor at present is approximately 10 to 12 metres (m) below the top of Racecourse Hill. The depth of the Quarry floor will increase over time to approximately 20 m below the top of Racecourse Hill following the extraction of the Quarry benches.

Oberon Quarries, in collaboration with Oberon Council's Technical Services Director are in the process of arranging for the "Intersection Advance" (G1-207) warning signage on the eastbound approach to the intersection of Duckmaloi Road and Titania Road. The signage is planned to be installed by the end of April 2018.



Image Source: Google Earth Digital Globe (Sept. 2017)

Data Source: Oberon Quarries Pty Limited (2014)

Note: Figure is not survey accurate. As discussed in Section 4.1, Oberon Quarries has confirmed that Extraction Activities during 2017 were undertaken within the Approved Extraction Boundary (as surveyed).

Legend

- ▬ Project Area
- ▬ Crown Road Reserve
- ▬ Approved Extraction Boundary (As Surveyed)
- ▬ Right of carriageway (12m Wide)
- ▬ Proposed Duplication of Internal haul Road
- Residence Location

FIGURE 4.1
Approved Extraction Area

5.0 Actions Required from 2016 Annual Review

Oberon Quarries committed to undertake various activities in the 2017 Annual Reporting period (see Section 13 of the Oberon Quarries 2016 Annual Review). **Table 4.2** provides a progress status update against each commitment during 2017. Oberon Quarry notes that the status of the action marked as “ongoing” have since been completed, although outside the reporting period of 2017.

Table 4.2 Operating Hours Summary

Activity to be Undertaken During the 2017 Report Period	Status as at 31 December 2017	Comment
Undertake quarrying operations as detailed in Section 4 of the 2016 AR	Complete	See Section 4.0 of this document
Continued liaison with the EPA regarding an EPL variation to replace the current upstream and downstream surface water monitoring with a ‘monitoring during discharge point’	Ongoing	A draft notice to vary the EPL was received by Oberon Quarries on 23 February 2018. The EPA issued the variation to the EPL on 2 May 2018
Review and revise (if required) Oberon Quarry management plans following the submission of this Annual Review and the Independent Environmental Audit in accordance with Condition 5 of Schedule 5 of the Development Consent	Complete	See Table 3.2 of this document.
Installation of a meteorological station in accordance with Condition 13 of Schedule 3 of the Development Consent	Complete	An investigation in early 2017 identified the Bureau of Meteorology’s Oberon (Springbank) Weather Station located in the vicinity of the Quarry. This station has been used to provide required data in Section 6.7 of this document.
Address non-compliances identified in the Independent Environmental Audit	Complete	See Table 1.3 this document.
Lodge the Rehabilitation Bond in accordance with Condition 25 of Schedule 3 of the Development Consent.	Ongoing	A final draft of the bank guarantee was submitted to the Department for approval on 9 July 2018. As of 24 July 2018, the Department confirmed its approval of the bank guarantee with Oberon Quarries

6.0 Environmental Performance

In accordance with the *Annual Review Guideline* (NSW Government, 2015), this section describes Oberon Quarries' environmental monitoring, management measures undertaken at the Quarry during the reporting period and assesses their performance.

To facilitate the implementation and effectiveness of control strategies for identified environmental risks, a number of management plans have been developed in consultation with government departments and other relevant stakeholders. See **Section 3.1** for further information.

A range of environmental monitoring is required to be undertaken by the Development Consent, EPL and management plans.

Figure 6.1 shows the Quarry's environmental monitoring locations.

Oberon Quarries environmental monitoring data and environmental management plans have been published on the Oberon Quarries Pty Ltd website (www.oberonquarries.com.au) in accordance with Condition 12 of Schedule 5 of the Development Consent.

6.1 Summary of Performance against EIS Predictions

Oberon Quarry was subject to an Environmental Impact Statement (EIS) which was approved on 14 September 2015 (Umwelt, 2015).

The proposed extended life of operations and development changes involved an assessment of extending the life of operations for an additional 30 year period and development changes across the site to improve the efficiency of environmental performance. Prediction from the 2015 EIS for the operation are summarised in the sections below.

6.1.1 Noise Predictions

While at times generating noise levels under certain meteorological conditions in excess of the target Project Specific Noise Level (PSNL) of 35 dB(A), the EIS identified that the Quarry has been operating without noise complaints for many years.

Modelling of the Quarry's activities during the day, evening and night time period indicated the noise levels were not predicted to exceed the target PSNL of 35 dB(A) under calm conditions or under conditions associated with significant wind conditions as defined by the INP (EPA, 2000) at all surrounding residences. The modelling however, identified potential exceedances under non-significant 3 m/s westerly winds, predicting noise levels of up to 41 dB(A) at Location 1 (Hackfath) during Quarry operations and 42 dB(A) during Quarry operations and product dispatch.

Modelling also identified potential exceedances under temperature inversion conditions with a 2 m/s southerly drainage flow associated with product dispatch on the private Quarry haul road during evening and night time periods, predicting noise levels of 38 dB(A) at Location 5 (Langley Heights).

Road traffic noise predictions were based on a maximum of 8 truck movements per hour, an average speed on Shooters Hill Road, Edith Road and Titania Road of 100 km/h with no noise barriers included in the traffic noise prediction model. The road traffic noise levels associated with product trucks travelling to and from the Quarry are not predicted to exceed the day or night-time period road traffic noise criteria.

6.1.2 Air Quality Predictions

The air quality impact assessment completed as part of the EIS considered the direct and the cumulative air quality impacts associated with the Quarry's ongoing operations. Modelling of the Quarry's direct and cumulative dust emissions are predicted to be below the EPA's PM₁₀, Total Suspended Particulate (TSP) and depositional dust goals at all surrounding residences.

Predicted emissions from diesel and NO_x from blasting were predicted to be negligible.

6.1.3 Blasting Predictions

The EIS, presented the blast monitoring results for the 2012 calendar year. This showed that there had been two exceedances of 120 dB overpressure and no exceedances of the 5 mm/s vibration limit.

The overpressure exceedances were due to irregularities along the blasting face, which resulted in some of the blast energy not being absorbed. The EIS predicted that future blast operations and blast design can be modified such that overpressure and vibration is less than 115 dBL and 5 mm/second.

6.1.4 Cultural Heritage Predictions

There are no known sites of Aboriginal cultural heritage significance recorded at the Quarry. Therefore, there are no impacts to Aboriginal cultural heritage expected as part of Quarrying operations.

6.1.5 Water Quality Predictions

The EIS noted Quarry's existing water management system would be adequate to capture runoff within a series of existing on-site dams. Sediment Dams 1 and 2 are constructed to have sufficient surcharge capacity to contain 1600 m³ runoff which is in excess of the runoff from the processing plant area from a 1 in 100 year 24 hour rainfall event of 154 millimetres (mm) of rain.

The Quarry floor has been designed to contain runoff from the extraction area from a Probable Maximum Flood event which is the equivalent of 380 mm of rainfall in 1 hour. This system can be readily augmented to accommodate runoff from the proposed 1.0 ha extension area to ensure that EPA licence criteria for surface water quality would be met.

Groundwater springs are located around the northern perimeter of Racecourse Hill, which are fed by groundwater flows from a gravel layer and will not be directly impacted by the Quarry's operation. No additional regional groundwater impacts are predicted to occur as a result of the Quarry and therefore the groundwater impacts are not expected to change from that approved by the 1993 development consent.

6.1.6 Rehabilitation Predictions

The EIS identified that the ongoing operation of the Quarry will not alter the timing of when the rehabilitation works can commence. Once sufficient basalt resource has been extracted from the Quarry and sufficient space has been provided between extraction and rehabilitation activities, rehabilitation will commence and be undertaken progressively to achieve the approved final landform.

6.1.7 Biodiversity Predictions

The Quarry is not predicted to result in any additional ecological impacts on ecological values, threatened species or ecological communities.

The associated ecological assessment predicted the Project will have a similar low impact on the flora and fauna to that was assessed and approved by the 1993 development consent (DA 92/164) even with the minor change to the Quarry footprint.

A summary of the environmental performance of the Quarry is included in **Table 6.1** below with further contextual information included within **Sections 6.2 to Section 8.0**.



Image Source: Google Earth Digital Globe (Sept. 2017)

Data Source: Oberon Quarries Pty Limited (2014)

Note: Figure is not survey accurate.

Legend

- ▨ Project Area
- Right of Carriageway (12m Wide)
- ▭ Approved Extraction Boundary (As Surveyed)
- ▭ Processing Plant
- ▨ Approved Extension (1.0ha)

- Depositional Dust Gauge Location
- Surface Water Monitoring Location
- Groundwater Monitoring Location
- Noise Monitoring Location
- Blast Monitoring Location

- Private Residence
- Residence Owned by Oberon Quarries/Associated with Oberon Quarry

0 250 500 750m
1:15 000

FIGURE 6.1

Environmental Monitoring Locations

Table 6.1 Summary of Environmental Performance during the Report Period

Aspect	Approval Criteria/ EIS Prediction	Performance during the reporting period	Trend / key management implications	Proposed additional management actions
Noise	Refer to Section 6.1.1	Noise performance is compliant with the 2015 Development Consent criteria and conforms with EIS predictions. Refer to Section 6.2	Noise agreements have been established with nearby residents. DPE endorsed the agreement and the approved the discontinuance of noise monitoring on 2 February 2017. No noise complaints were received during the reporting period. This is consistent with previous years. The Noise Management Plan has been amended to reflect monitoring changes and was approved by the Secretary in March 2017.	As per the Secretary's requirements, noise monitoring will be undertaken if a noise complaint relating to Quarry operations is unable to be resolved by Oberon Quarries or a landowner requests DPE to reinstate more frequent monitoring to assess compliance with relevant criteria.
Air Quality	Refer to Section 6.1.2	Air Quality performance is compliant with the 2015 Development Consent criteria and conforms to EIS predictions. Refer to Section 6.3 .	Dust monitoring results across the four monitoring locations remained generally consistent with previous results. A number of contaminated samples were observed at D1 and D4 during the report period.	Oberon Quarries has implemented bird deterrent devices on all depositional dust gauges to reduce potential future contamination from animal droppings and organic material. In the event of continual receipt of contaminated samples, Oberon Quarries will relocate the dust gauges as required. Oberon Quarries has also clarified with tenants and property owners living nearby the contaminated gauges that the gauges are not to be tampered with.
Blasting	Refer to Section 6.1.3	There was one blasting event which exceeded blast performance criteria during the reporting period. The event occurred on 19 July 2017 Refer to Section 6.4 .	See Section 6.4.4 for further detail.	Oberon Quarries is seeking to establish an agreement with the nearest residential receiver in accordance with the Development Consent. Further detail in the revisions made to blast management practices are detailed in Section 6.4.4 .

Aspect	Approval Criteria/ EIS Prediction	Performance during the reporting period	Trend / key management implications	Proposed additional management actions
Heritage	Refer to Section 6.1.4	There were no activities in relation to heritage undertaken during the report period. Refer to Section 6.10 .	N/A	N/A
Water Quality	Refer to Section 6.1.5	Water quality performance is compliant with the 2015 Development Consent criteria and conforms with the EIS predictions. Refer to Section 6.5, 0 and 7.0 .	Surface water monitoring results across the two monitoring locations remained generally consistent with previous results.	No additional mitigation measures or monitoring procedures are proposed to be implemented which are outside that detailed in the WMP (Umwelt, 2016e).
Rehabilitation	Refer to Section 6.1.6	Temporary stabilisation works were undertaken during the report period on the bund wall. Refer to Section 8.0	As there is limited area available for rehabilitation due to the configuration of the Quarry, it is estimated that it will be approximately 9 years before any significant rehabilitation will be undertaken at the Quarry. Therefore, as planned, Oberon Quarry did not undertake any maintenance of rehabilitated lands during the report period.	No additional mitigation measures or monitoring procedures are proposed to be implemented which are outside that detailed in the Landscape and Rehabilitation Management Plan (Umwelt, 2016g).
Meteorological	Refer to Section 6.7	Compliant.	Meteorological data was obtained from the Bureau of Meteorology's Weather Station located approximately 10 km north of the Quarry.	Oberon Quarries will continue to monitor meteorological conditions at this location.
Ecology	Refer to Section 6.8	Administrative non-compliance.	The Rehabilitation Bond was not lodged within 6 months of the approval of the Landscape and Rehabilitation Management Plan.	The Rehabilitation Bond was submitted to DPE on 23 March 2018.

6.2 Operational Noise

6.2.1 Environmental Management Measures

In January 2017, Oberon Quarries established noise agreements with relevant landowners in accordance with Schedule 3, Condition 3 of the Development Consent. These agreements allow the Quarry to produce noise levels higher than those specified in the EPL and Development Consent. Oberon Quarries notified the Secretary of these agreements on 25 January 2017. The discontinuation of noise monitoring was subsequently approved by the Secretary on 2 February 2017. As per the Secretary's requirements, noise monitoring will be undertaken if a noise complaint relating to Quarry operations is unable to be resolved by Oberon Quarries or a landowner requests DPE to reinstate more frequent monitoring to assess compliance with relevant criteria.

The attended noise monitoring network consists of four monitoring locations (NM1 to NM4) (refer to **Figure 6.1**).

6.2.2 Noise Monitoring Locations

Noise monitoring was undertaken on 10 February 2017 at the locations shown in **Table 6.2**.

Table 6.2 Noise Monitoring Locations at Oberon Quarry

Monitoring Location	Description
NM1	Private residence – 174 Shooters Hill Road, Oberon
NM2	Private residence – 167 Harveys Road, Oberon
NM3	Private residence – 167 Harveys Road (Tourist Cabin), Oberon
NM4	Near access gate to 167 Harveys Road, Oberon

Note: Oberon Quarry has established noise agreements in place with private landholders to produce noise levels higher than criteria limits. These agreements, including the discontinuation of noise monitoring were approved by the Secretary on 2 February 2017.

6.2.3 Noise Performance Criteria

The noise impact assessment criteria specified in EPL 4442 and SSD_6333 are set out in **Table 6.3**.

Table 6.3 Noise Impact Assessment Criteria dB(A)

Receiver	Day / Evening SSD_6333 limit	Day / Evening EPL 4442 limit	Night	
	L _{Aeq} (15 min)	L _{Aeq} (15 min)	L _{Aeq} (15 min)	L _{A1} (max)
All privately-owned residences	35	36	35	45

Note: Oberon Quarry has established noise agreements in place with private landholders to produce noise levels higher than criteria limits. These agreements, including the discontinuation of noise monitoring were approved by the Secretary on 2 February 2017.

6.2.4 Noise Monitoring Outcomes

One round of attended noise monitoring was undertaken on 10 February 2017 after the approval of noise agreements with relevant landowners.

Noise monitoring results for the February 2017 monitoring campaign are presented in **Table 6.4** and **Table 6.5**.

Table 6.4 February 2017 Quarterly Day/Evening Noise Monitoring Results

Location	Monitoring Period	Measure	Measured Noise Level	Estimated Contribution from Quarry	Criteria	Meteorological Conditions
NM1	Day	LAeq,15min	47.8	43	35 ²	21°C, 62% RH, wind W at 1 to 1.1 m/s, gusting to 1.4 m/s; 1/8 okta cloud cover
		LA1,max	56.8	-	-	
	Night	LAeq,15min	44.4	<20	35	21°C, 61% RH, wind W at 1 to 1.1 m/s, gusting to 1.4 m/s; 1/8 okta cloud cover
		LA1,max	60.7	39	45	
NM4 ¹	Day	LAeq,15min	39.2	<25	35	25°C, 54% RH, wind WSW to W at 0.8 to 1.2 m/s, gusting to 1.6 m/s; 1/8 okta cloud cover
		LA1,max	52	-	-	
	Night	LAeq,15min	37.6	<16	35	18°C, 82% RH, wind SSE to SW at 0 to 0.5 m/s, gusting to 1.2 m/s; 0/8 okta cloud cover
		LA1,max	53.3	<28	45	

Note 1: NM4 is the reference monitoring location for NM2 and NM3.

Note 2: The owner of the residence at NM1 has a private agreement with Oberon Quarries.

Table 6.5 February 2017 Quarterly Night-time Noise Monitoring Results

Location	Period	Measured Noise Level (LAeq, 15 minute)	Estimated LAeq, 15 min Contribution from Quarry	LAeq, 15 min Criteria	Estimated LA1, max Contribution from Quarry	LA1, max Criteria
NM2	Day	39.2	<25	35	-	-
	Night	37.6	<16	35	<28	45
NM3	Day	39.2	<25	35	-	-
	Night	37.6	<16	35	<28	45

6.2.5 Trends in Data

Monitoring results recorded during the February monitoring campaign indicated noise levels above the criteria in **Table 6.4** at monitoring location NM1. A result of 43 dB(A) recorded at NM1 during the day/evening monitoring period, whilst a result of 39 dB(A) was recorded at NM1 during the night time monitoring period. Oberon Quarry has an agreement in place with the landowner of NM1 in accordance with Schedule 3, Condition 3 of the Development Consent. Therefore, this result is not considered an exceedance of the noise criteria in SSD_6333. There were no complaints received in relation no noise during the reporting period.

Additionally, access restrictions during the monitoring campaign prevented noise monitoring from being conducted at monitoring locations NM2 and NM3. Two attended noise monitoring sessions were undertaken at an alternate location, NM4 which is considered representative of NM2 and NM3 and were compliant with the criterion.

6.2.6 Proposed Improvements

No additional management or mitigation measures are proposed to be implemented which are outside the approved NMP.

6.3 Air Quality

6.3.1 Environmental Management Measures

Air quality monitoring is undertaken in accordance with the approved Air Quality Management Plan (AQMP) (Umwelt, 2016d) which sets out the procedures and management requirements for the management of dust at the Quarry. The air quality monitoring network consists of four dust deposition gauges (D1 to D4), which are used to measure depositional dust on a monthly basis (refer to **Figure 6.1**).

Oberon Quarries will continue to implement the existing air quality monitoring program at these locations as an indicator of overall air quality performance of the Quarry operations. Section 6.2 of the AQMP notes Oberon Quarry has operated since 1995 without any significant complaints in regard to TSP or PM10. It is proposed that TSP and PM10 concentrations set out in **Table 6.6** will be assumed to be complied with and not be monitored unless complaints in regard to TSP or PM10 concentrations. There were no complaints relating to air quality received by Oberon Quarries during the report period.

6.3.2 Performance Criteria

The air quality impact assessment criteria specified in the 2015 Development Consent are set out in **Table 6.6**.

Table 6.6 Air Quality Criteria

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

Notes to Table 6.6:

- a Cumulative impact (i.e. increase in concentrations due to the development plus background concentrations due to all other sources).*
- b Incremental impact (i.e. increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development).*
- c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.*
- d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.*
- e "Reasonable and feasible avoidance measures" includes, but is not limited to, the operational requirements in conditions 11 and 12 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.*

6.3.3 Air Quality Monitoring Outcomes

The annual average criterion for deposited dust ($4\text{g}/\text{m}^2/\text{month}$) was not exceeded at any of the monitoring locations during the reporting period. The increase in annual average dust levels was less than the criterion of $2\text{g}/\text{m}^2/\text{month}$ at all gauges, assuming a background of $2\text{g}/\text{m}^2/\text{month}$, which is considered to be typical of a rural location. There were no complaints received in relation to dust during the reporting period.

During the reporting period 5 contaminated samples were recorded. Dust gauge D4 was contaminated on two occasions (March 2017 and December 2017), while dust gauge D1 was contaminated on three occasions (March 2017, April 2017 and October 2017). An investigation was undertaken for each contaminated sample to determine the likely cause. On four occasions the samples were contaminated with high level of organic material, which is assumed to have been deposited by birds. While the fifth sample was contaminated with soil ($33.8\text{g}/\text{m}^2/\text{month}$) (see **Plate 1**). These samples have been excluded from the annual average results.

Oberon Quarries has since installed bird deterrents on all dust gauges in an effort to reduce the likelihood of future contamination. Oberon Quarries has also clarified with tenants and property owners living nearby the contaminated gauges that the gauges are not to be tampered with. The deposited dust monitoring results for the reporting period are shown in **Table 6.7**.



PLATE 1
Photo of Contaminated Dust Gauge

Table 6.7 2017 Depositional Dust Monitoring Results

Sample Date	D1	D2	D3	D4
	g/m ² /month	g/m ² /month	g/m ² /month	g/m ² /month
January 2017	3.9	3.4	1.3	1.3
February 2017	2.3	2.3	1.0	1.6
March 2017	12.6*	3.0	1.2	6.5*
April 2017	8.5*	1.3	1.1	3.9
May 2017	3.7	0.3	0.5	1.5
June 2017	3.8	0.4	0.7	1.4
July 2017	1.8	0.6	0.5	1.4
August 2017	0.7	0.8	0.6	0.8
September 2017	2.5	0.6	0.9	1.6
October 2017	12.8*	1.7	0.9	1.3
November 2017	2.7	1.2	0.9	1.1
December 2017	2.3	1.3	1.4	33.8*
Annual Average Criterion	4	4	4	4
Annual Average 2017	2.7	1.4	0.9	1.6
Compliance with Criterion	Yes	Yes	Yes	Yes

* Contaminated sample. This result has been excluded from the annual average calculations

6.3.4 Trends in Data

Table 6.8 shows the Annual average dust deposition levels for the 2013 to 2017 period. This information is also presented graphically in **Appendix 1**. The annual average dust deposition levels recorded at the Quarry during 2017 are within the range of results recorded in the previous 4 years and are well below criteria limits. The data also shows a positive correlation between the levels recorded at each location for all years.

Table 6.8 Annual averages for dust deposition 2013 – 2017

Year	Total Insoluble Solids (g/m ² /month)			
	D1	D2	D3	D4
	g/m ² /month	g/m ² /month	g/m ² /month	g/m ² /month
2013	2.39	1.79	1.28	1.76
2014	2.73	2.00	1.61	2.10
2015	3.25	2.33	1.81	3.02
2016	1.43	1.27	0.68	1.29
2017	2.70	1.40	0.90	1.60

6.3.5 Proposed Improvements

No additional management or mitigation measures are proposed to be implemented which are outside the approved AQMP.

6.4 Blasting

6.4.1 Environmental Management Measures

Blast monitoring is undertaken in accordance with the approved Blast Management Plan (BMP) (Umwelt, 2016c) which sets out the criteria, monitoring procedures and management measures for blasting (i.e. airblast overpressure and ground vibration). Blast monitoring is conducted at the nearest residence to the north of the Quarry (refer to **Figure 6.1**).

Oberon Quarries undertake each blast giving consideration to a range of influencing factors (e.g. the location within the quarry pit, geological characteristics of the strata and basalt resource and distance to sensitive receivers including residents/infrastructure and performance criteria.) These factors influence the blast design (e.g. the number, angle and depth of holes, spacing and configuration of holes and the Maximum Instantaneous Charge (MIC)). These design measures are implemented to meet airblast overpressure and ground vibration criteria in addition to the operational requirements to fracture the rock to a size which can be processed by the crusher.

6.4.2 Blasting Activities

Production Blasts

Production blasts are used to fracture the basalt to enable its extraction and transport by earth moving equipment and for subsequent processing (i.e. crushing, screening and stockpiling for sale). A production blast involves drilling a pre-determined pattern of holes (e.g. angle, depth and spacing). These holes are then filled with an explosive, an initiating device (e.g. detonator) and stemming material. Each hole is detonated to a pre-determined timing sequence.

The design of a blast depends on its location, geological structures in that area, volume of basalt in the target area, end product requirements and any limiting factors in relation to potentially sensitive locations (including residences and infrastructure). The blast design is therefore completed on a blast by blast basis, in consideration of the above factors.

Rock Popping

While the fragmentation pattern of a production blast (i.e. the maximum and minimum size of the blasted rock) is considered as part of the blast design process, rock fragments which are too large for the earthmoving equipment to handle and/or for the primary crusher do occur. These rock fragments are commonly called goolies. The goolies are separated from the fragmented rock and require further fragmentation before they can be processed (i.e. crushed and screened), if an alternative end use cannot be found (e.g. rock armouring etc.).

To fragment the goolies holes are drilled and filled with a small amount of explosives. The number of holes and amount of explosive is dependent on the size of the goolie and location within the extraction area in relation to potentially sensitive locations (including residences and infrastructure). Typically however, 1-2 holes are drilled and 1 kilogram per hole of explosive is used. This is known as rock popping.

The blasting site law developed for the Quarry by Richard Heggie and Associates for the 1992 EIS, indicates that a 40 kilogram MIC, results in an airblast overpressure of 114dBL and a ground vibration of 1.7mm/s at a distance of 400m.

6.4.3 Performance Criteria

The blast impact assessment criteria specified in the EPL 4442 and 2015 Development Consent are set out in **Table 6.9**.

Table 6.9 Blasting Criteria

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

6.4.4 Blasting Monitoring Outcomes

A total of 7 production blasts and 2 rock popping events were undertaken during the reporting period. The blast monitoring results for the reporting period are presented in **Table 6.10**.

During the reporting period, one exceedance of the overpressure criteria was recorded (i.e. the blast undertaken on the 19 July 2017). This exceedance is associated with a non-routine blast to establish a new quarry bench. The blast was not typical of regular blasting activities as there was no free face which could be used to dissipate the blast energy. Due to this blast being non-routine in nature, the blasting design was modified in consideration of the changed conditions. This included reducing both the volume of explosives (i.e. MIC) and depth of blast holes. Despite the modified blast design, an airblast overpressure reading of 128.7 dBL was recorded.

Upon further investigation Oberon Quarries also ascertained the monitoring device was placed in the incorrect position to monitor this blast ie, at approximately 95 m from the blast and not at 300 m which is the nearest residence. Oberon Quarries has subsequently conducted a review of all procedural and communications systems advising both internal and contracting blast personnel in regards to the blast motioning requirements to facilitate it does not happen in the future.

Given the small number of blasts undertaken by the Quarry during the reporting period, this one exceedance by default also results in an exceedance of the 5% allowance for the number of blasts above 115dBL. There were no complaints received or reports of physical impact to private property as a result of the 19 July 2017 blast. The EPA and DPE was notified of the exceedance in a letter dated 25 July 2017 (i.e. within 7 days of the non-compliance occurring). The private landholder was also notified of the exceedance in accordance with Schedule 4, Condition 1 of the consent. During 2018 Oberon Quarries will seek to establish a blast agreement with the nearest residential receiver in accordance with the Development Consent. It is noted that a noise agreement has already in place with this landholder.

There were also two rock popping blasts which were undertaken on 14 and 15 June 2017 which Oberon Quarries did not monitor. In accordance with the Oberon Quarries BMP, the relevant stakeholders were notified prior to the blast occurring, however blast monitoring was not undertaken. There were no complaints received in relation to the rock popping blasts. The failure to monitor is a non-compliance with the Oberon BMP which requires every blast to be monitored. Condition 8c of Schedule 3 the 2015 Development Consent) requires Oberon Quarries to: *“carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent”*. Oberon Quarries have reinforced the need to monitor all blasts at the Quarry. There has been no rock popping undertaken on site since June 2017. There were no complaints received regarding any blasting undertaken at the Quarry during 2017.

Table 6.10 Blast Monitoring Results for Oberon Quarry

Date / time	Air Blast Overpressure (dB (Linear Peak))	Ground Vibration (mm/s)	Complied with Blasting Criteria
13 March 2017 / 13:22	108.00	0.80	Yes
18 April 2017/ 14:02	109.10	0.95	Yes
22 May 2017 / 12:57	<100.0	<0.51	Yes
14 June 2017 / 12:52	Not monitored	Not monitored	Refer to Section 6.4.4
15 June 2017 /10:37	Not monitored	Not monitored	Refer to Section 6.4.4
22 June 2017/ 13:28	<100.0	<0.51	Yes
19 July 2017 / 12:51	128.7	4.97	No
27 October 2017/ 12:20	<100.0	<0.51	Yes
11 December 201713:09	<100.0	<0.51	Yes

6.4.5 Trends in Data

Appendix 1 shows the production blast monitoring results for the 2014 to 2017 period. During the period 2014 to 2017, only one blast has been recorded above the criteria limit for peak overpressure (dBL) set out in **Table 6.9** (i.e. 19 July 2017). The vibration levels for all blasts during the 2014 to 2017 period were typically well below the specified criteria limit.

6.4.6 Proposed Improvements

Oberon Quarry will review each blast design including drill pattern, number of holes and maximum instantaneous charge in consultation with its blasting contractor, with the objective of designing blasts which comply with the overpressure and vibration criteria. Oberon Quarry has reiterated to Orica (i.e. the blasting contractor) the importance of designing, managing and monitoring its blasting activities in accordance with the BMP. During the 2018 Annual Review period Oberon Quarry will seek to establish a blast agreement with private landowners in accordance with Schedule 3, Condition 6 of SSD_6333.

6.5 Surface Water

6.5.1 Environmental Management Measures

Surface water management is undertaken in accordance with the approved WMP (Umwelt, 2016e) and Environment Protection Licence (EPL 4442). The WMP sets out water quality trigger concentrations levels, mitigation measures and monitoring procedures for the management of surface water and groundwater.

Surface water management infrastructure at the Quarry has been established and operational since 1995. Water quality in Racecourse Creek has remained within the normal range since monitoring began in 1996. The water management system includes a series of clean water diversion drains, catch drains and sedimentation dams. These structures have been constructed to minimise the interaction between clean and dirty water and to provide controls to treat captured dirty water to a standard acceptable for discharge off-site.

Further discussion regarding water management and erosion and sediment control measures is included in **Section 7.0**. Water monitoring is undertaken at the locations shown on **Figure 6.1**.

6.5.2 Performance Criteria

Water captured and stored on site may be treated and discharged from the water management system in accordance with EPL and 2015 Development Consent requirements. There are no set EPL limits for the Quarry with trigger levels set out in the approved WMP. **Table 6.11** presents the trigger concentration limits specified in the WMP.

Table 6.11 Water Management Plan Surface Water Trigger Concentration Levels

Pollutant	Trigger Concentration Level
pH	>8.5
Conductivity	>300 μ S/cm
Oil & Grease (monitored as TPH)	>5 mg/L
Turbidity	>450 NTU
Total Phosphorus	>0.8 mg/L
Total nitrogen (TKN)	>4.5 mg/L
Total phosphorus (TP)	>5 mg/L
Total suspended solids – monitored as non-filterable residue (NFR)	N/A*

Note No EPL concentration limits have been defined for Oberon Quarry under EPL 4442.

No concentration limit has been defined for total suspended solids under the approved WMP (Umwelt, 2016) or EPL 4442.

6.5.3 Surface Water Monitoring Outcomes

Surface water monitoring is undertaken monthly at two sites in Racecourse Creek being W1 (upstream) and W2 (downstream) (refer to **Figure 6.1**). The samples were analysed for pH, conductivity, turbidity, Total Suspended Solids (TSS), total nitrogen (TKN), total phosphorus (TP) and total petroleum hydrocarbons (TPH).

Table 6.12 Water Quality Monitoring Results during 2017

Sampling date	pH	Conductivity	Turbidity	TSS	TKN	TP	TPH
W1 – Upstream (EPL point 5)							
January 2017	6.5	155	30.0	53	1.4	0.2	<0.5
February 2017	6.6	90	5.6	7	0.6	<0.1	1.00
March 2017	6.9	105	11.0	<2	0.5	<0.1	0.80
April 2017	7.1	95	10.0	12	0.5	0.1	<0.5
May 2017	6.9	85	8.2	3	1.0	<0.1	<0.5
June 2017	6.8	80	5.6	<2	0.2	<0.1	<0.5
July 2017	6.9	95	7.0	5	0.4	<0.1	<0.5
August 2017	6.9	90	15.0	14	0.5	0.1	<0.5
September 2017	6.8	95	7.0	<2	<0.1	<0.1	<0.5
October 2017	6.9	95	15.0	37	0.5	<0.1	<0.5
November 2017	7.1	105	6.5	4	0.5	<0.1	<0.5
December 2017	7.1	130	6.0	18	0.8	<0.1	<0.5
Compliance with Trigger Concentration Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sampling date	pH	Conductivity	Turbidity	TSS	TKN	TP	TPH
W2 – Downstream (EPL point 6)							
January 2017	6.6	155	27	62	1.6	0.22	<0.5
February 2017	6.7	90	6	5	0.5	<0.5	<0.5
March 2017	6.9	105	10	6	0.4	<0.1	<0.5
April 2017	7.1	95	11	15	0.5	0.11	<0.5
May 2017	6.9	85	8	<2	0.5	<0.1	<0.5
June 2017	6.9	85	7	<2	<0.1	0.12	<0.5
July 2017	6.9	90	8	3	0.8	<0.1	<0.5
August 2017	7	90	20	33	0.7	0.25	<0.5
September 2017	6.9	95	7	2	0.2	<0.1	<0.5
October 2017	7	95	7	3	0.3	<0.1	<0.5
November 2017	7.1	105	6	2	0.2	<0.1	<0.5
December 2017	7	130	7	37	0.8	<0.1	<0.5
Compliance with Trigger Concentration Level	Yes	Yes	Yes	NA	Yes	Yes	Yes

Note: < denotes monitoring results are below detection limit.

6.5.4 Trends in Data

Water quality results for the period 2013 to 2017 are presented graphically in **Appendix 1**. Discussion on the long term trend of each water quality analyte can be found below. Water quality in Racecourse Creek during the reporting period was below the trigger concentration limits for all analytes, as shown in **Table 6.12**. Water quality at W2, downstream from the Quarry, shows no deterioration or significant change compared with water quality at W1, upstream of the Quarry.

pH

The pH results during the reporting period for all samples were below the trigger concentration levels and are also within the recorded long term minimum and maximum range. The pH results at the upstream (W1) and downstream (W2) monitoring locations exhibit little variation for each sampling date (i.e. the monitoring locations show a strong positive relationship). Typically the pH result at both monitoring locations continues to be 7.0 ± 0.5 . This trend is consistent with the results for the 2013 to 2016 period. The long term linear trend for W1 and W2 shows a slight decline in surface water pH (see **Appendix 1**).

Electronic Conductivity

The conductivity results for the upstream (W1) and downstream (W2) monitoring locations during the reporting period for all samples were below the trigger concentration levels and are also within the recorded long term minimum and maximum range. The conductivity results at the upstream (W1) and downstream (W2) monitoring locations exhibit little variation for each sampling date (i.e. the monitoring locations show a strong positive relationship). The conductivity trend during the year is one of a maximum at the beginning of the calendar year, which then declines steadily to a low in the middle of the year, after which it increases back towards the maximum.

This relationship is consistent with the results and trends seen for the 2013 - 2016 years. The long term linear trend shows a slight increase in surface water conductivity (See **Appendix 1**).

Turbidity

The results for Turbidity for the reporting period ranged between 5.6 NTU and 30 NTU at monitoring point W1 and 5.6 NTU and 27 NTU at monitoring point W2. The results recorded during the reporting period are within the range of results for the previous 4 years, are well below trigger level and are consistent with the long term trends (See **Appendix 1**).

TSS

The results for NFR, which are representative of TSS for the reporting period ranged from 2 mg/L to 53 mg/L at monitoring point W1 and 2 mg/L to 62 mg/L at monitoring point W2. Monitoring results at W1 and W2 were higher than the typical baseline during January, August and December 2017, but remained within the range of results for the previous four years. The downstream results for these months were higher than that recorded upstream. A higher than typical baseline result was also recorded in October, with the upstream results being higher than downstream, 37 and 3 mg/L respectively. Three results at W1 and four results at W2 were equal to the minimum NFR record of 2mg/L during the reporting period. Overall the TSS results at the upstream (W1) and downstream (W2) monitoring locations exhibit little variation for each sampling date (i.e. the monitoring locations show a strong positive relationship). These relationships are consistent with the results and trends seen for the 2013 - 2016 years. The long term linear trend shows a decrease in the NFR over time (See **Appendix 1**).

TKN

The results for TKN for the reporting period ranged from 0.1 mg/L to 1.4 mg/L at monitoring point W1 and 0.1 mg/L and 1.6 mg/L at monitoring point W2. The results recorded during the reporting period are within the range of results for the previous four years, are well below trigger values and are consistent with the long term trends (See **Appendix 1**).

TP

The results for TP for the reporting period ranged from 0.1 mg/L to 0.2 mg/L at monitoring point W1 and 0.1 mg/L to 0.5 mg/L at monitoring point W2. All but four of the samples returned levels which were equal to the minimum record of 0.1 mg/L. The results recorded during the reporting period are within the range of results for the previous 4 years, are well below the trigger level of 5 mg/L and are consistent with the long term trend (See **Appendix 1**).

TPH

TPH was detected on two occasions at the upstream (W1) monitoring location during the reporting period (February 1.0 mg/L and March 0.8 mg/L). These levels are well below the trigger level of 5mg/L. The corresponding TPH levels at the downstream (W2) monitoring location for February and March were less than the limit of detection (i.e. <0.5mg/L). The results recorded during the reporting period except for February and March, are consistent with the long term trend of <0.5mg/L (See **Appendix 1**).

6.5.5 Proposed Improvements

No additional mitigation measures or monitoring procedures are proposed to be implemented which are outside that detailed in the WMP (Umwelt, 2016e).

6.6 Groundwater

6.6.1 Environmental Management Measures

Groundwater monitoring is undertaken in accordance with the approved WMP (Umwelt, 2016e) which sets out the procedures and management requirements for the management of groundwater at the Quarry. During the reporting period, monthly groundwater quality monitoring was undertaken at monitoring location GW1 (refer to **Figure 6.1**).

GW1 is a spring-fed dam at 'Langley Heights', downslope of the Quarry on Racecourse Hill. Several small springs are located towards the base of Racecourse Hill in the Tertiary gravel layer that is located between the basalt and the underlying less pervious granitic material. Springs to the north and west of the site are located at approximately 40 m below the top of Racecourse Hill and are thought to be fed by water infiltrating to the alluvial gravel sediments that occur between the basalt and granite.

Due to the current progression of Quarry's operations and its proximity to potential groundwater sources, the quantity of groundwater has not been directly monitored. Groundwater quantity is currently assessed via observations/visual inspections of the presence of water in the Quarry pit floor.

6.6.2 Performance Criteria

There are no pollutant concentration limits for groundwater specified in the 2015 Development Consent or EPL. Groundwater monitoring results are reviewed against historic monitoring results to detect any trends in data. The Oberon Quarry WMP (Umwelt, 2016e) includes trigger values against which groundwater monitoring results are compared.

For the purposes of this Annual Review, the groundwater results obtained during the reporting period have been compared to these trigger values. Results outside these trigger values may trigger the response plan implemented as part of the approved WMP (Umwelt, 2016e). These concentration limits are provided in **Table 6.13**.

Table 6.13 Groundwater Trigger Concentration Levels

Pollutant	Concentration limit
pH	> 9.2
Conductivity	> 450 $\mu\text{S}/\text{cm}$

6.6.3 Groundwater Monitoring Outcomes

During the reporting period, groundwater quality monitoring was conducted on 12 occasions. These results are presented in **Table 6.4**. A discussion of the 2017 groundwater monitoring results and long term trends is included in **Section 6.6.4**.

Table 6.14 Groundwater Quality Monitoring Results during 2017

Sampling Date	pH	Conductivity (uS/cm)
January 2017	6.8	320
February 2017	7.1	350
March 2017	7.0	340
April 2017	7.1	320
May 2017	7.0	260
June 2017	6.9	240
July 2017	6.9	240
August 2017	7.2	250
September 2017	7.1	270
October 2017	8.9	250
November 2017	7.4	270
December 2017	7.0	220
Compliance with Trigger Concentration Level	Yes	Yes

6.6.4 Trends in Data

The pH and conductivity results for all samples were below the trigger concentration levels throughout the reporting period and are also within the recorded long term minimum and maximum range. The elevated monitoring result of 350 uS/cm recorded during February 2017 was outside the range of results for the previous 4 years however remained well below the trigger level of 450 uS/cm.

Oberon Quarries has undertaken groundwater quality monitoring since 1996. The results for the period 2013 - 2017 are presented graphically in **Appendix 1**. The 2017 pH and conductivity trends are consistent with the 2013 to 2016 trends. The long term pH trend is of a one month spike in pH above pH 8.5, which is below the trigger level of 9.2. This spike occurs towards the end of each calendar year (i.e. between September and December). Outside of this annual one month spike, the pH level ranges between approximately 6.75 and 7.25. The long term linear trend shows a slight decline in groundwater pH. The long term conductivity trend is of a maximum at the beginning of the year, which then declines steadily to a low in the middle of the year, after which it increases back towards the maximum. The long term linear trend shows a slight increase in groundwater conductivity. Conductivity and pH levels during 2017 were below trigger concentration levels. Groundwater monitoring in 2018 will continue to be undertaken with the management plan.

Drilling of the upper bench as part of blasting operations has not encountered groundwater. These drill holes extend approximately 11 m from the surface. As quarrying progresses into the lower bench, it is expected that groundwater associated with the jointing in the basalt will be intercepted. This water will be drained via the Quarry's water management system. It is estimated that groundwater inflow will be less than 2 ML/year. These results indicate the Quarry is not adversely impacting groundwater quality or quantity.

6.6.5 Proposed Improvements

No additional mitigation measures or monitoring procedures are proposed to be implemented which are outside that detailed in the WMP (Umwelt, 2016e).

6.7 Meteorological Monitoring

Meteorological data was obtained from the Bureau of Meteorology's Oberon (Springbank) Weather Station located in the vicinity of the Quarry. A summary of the monthly meteorological monitoring results are presented in **Table 6.15**.

6.7.1 Rainfall

The Quarry received approximately 837.1 mm of rainfall over 84 rain days during the report period. The highest mean monthly rainfall occurred during January 2017 (79.6 mm) while April had the lowest mean monthly rainfall recording 57.7 mm. A summary of mean monthly rainfall data is provided in **Table 6.15**.

6.7.2 Temperature

The mean maximum temperature recorded during the reporting period occurred during January (24.9 °C) and the lowest mean temperature occurred in July (-0.3°C). Monthly mean temperatures are provided in **Table 6.15**. Rainfall is relatively evenly spread throughout the year, at approximately 70mm ±10 mm per month.

Table 6.15 Oberon Quarry Summary of Meteorological Data

Month	Mean Rainfall (mm)	No of rain days	Air temp (°C)	
			Mean Minimum	Mean Maximum
January 2017	79.6	6.3	10.9	24.9
February 2017	60.9	5.8	11.2	23.9
March 2017	65.9	6.1	9.1	21.5
April 2017	57.7	5.6	5.4	17.2
May 2017	60.0	6.4	2.6	13.1
June 2017	78.6	9.0	0.9	9.5
July 2017	70.6	8.7	-0.3	8.7
August 2017	75.0	8.6	0.4	10.4
September 2017	67.2	7.5	2.3	13.8
October 2017	77.6	7.6	4.8	17.2
November 2017	70.7	6.8	6.8	20.1
December 2017	73.9	6.3	9.1	23.3
Total	837.1	84.7	-	-

Source: Bureau of Meteorology Oberon (Springbank) Meteorological Station
(http://www.bom.gov.au/climate/averages/tables/cw_063063.shtml)

6.8 Ecology

Ecological and rehabilitation monitoring will be undertaken in accordance with the approved Landscape and Rehabilitation Management Plan (Umwelt, 2016g) which sets out management measures and monitoring procedures for the management ecology and rehabilitation.

During the 2018 report period, residual vegetation monitoring will be established using analogue sites to identify any deterioration or improvement in habitat quality during the life of the operation as well as providing a comparison when assessing the performance of rehabilitation sites. Monitoring results will be reported in the 2018 Annual Review.

6.9 Waste Management

Oberon Quarry operates under the following waste minimisation principles:

- waste avoidance and reduction at the source
- waste re-use
- waste recycling and
- waste removal and disposal (all waste that cannot be re-used or recycled).

In addition to these principles, the underpinning strategies for management of waste are focused on minimisation through cleaner production as well as the appropriate segregation, storage and disposal of waste. Negligible amounts of paper and general waste equivalent with that generated by 2 - 3 personnel are disposed of in recycling bins located on site. Waste bins are collected regularly and waste is disposed of in a licensed landfill facility (estimated to be less than 10 tonnes per year).

Industrial waste collection is undertaken as required. Approximately 10 tonnes of steel waste per year is collected, recycled and disposed of from site. Oberon Quarries also has approval to operate a pump out sewage system. Sewage is directed to this septic system which is pumped out by a licensed waste collection and disposal contractor on an as-needs basis.

6.9.1 Hazardous Material Management

Hazardous material storage on site consists of the following:

- small amounts of oil waste – collected and taken off site to a recycling facility (estimated to be less than 1000 L/year);
- approximately 0.5 tonnes/year of batteries disposed of to a recycling facility
- approximately 20 tonnes of chrome iron per year used as part of the crushing process is returned to manufacturers for recycling;

Hazardous material for disposal is collected and disposed of by a licenced waste disposal contractor.

6.10 Heritage (Aboriginal and non-Aboriginal)

No actions or impacts in relation to Aboriginal and non-Aboriginal heritage occurred during the report period. Should impacts in relation to Aboriginal and non-Aboriginal heritage be expected as operations progress, Oberon Quarry will implement procedures as appropriate.

7.0 Water Management

7.1 Water Management System

The water management system at the Quarry is described in the Oberon Quarry WMP (Umwelt, 2016e). A summary of the water management system for the Quarry is provided in the sections below.

7.1.1 Clean Water Diversion System

The Quarry is located within the perimeter of Racecourse Hill. Racecourse Hill is a plateau and the Quarry extraction area and associated topsoil stockpiles and bunds occupy the majority of the top of the plateau at the northern end where the Quarry is located. As a result, there is negligible catchment area on top of the northern part of Racecourse Hill that is outside or upslope of the perimeter of the Quarry water management system.

The existing water management system includes grass bunds around the perimeter of the excavation to prevent runoff from the surrounding plateau entering the Quarry water management system. Any runoff from the area outside of the Quarry management system drains around or away from the Quarry.

7.1.2 Dirty Water Management System

The Quarry's dirty water management system provides a capacity of approximately 8150 KL of storage for sediment laden runoff with stored water being used for dust suppression. This is the equivalent of approximately 40 mm of runoff from the entire Quarry and processing plant area. In addition, the dams system has been designed to provide in excess of 33,600 KL of surcharge capacity making a total capacity equivalent to approximately 220 mm of runoff.

Catch drains have been constructed within the perimeter of the Quarry management system to convey potentially sediment laden runoff to the sediment dams. Catch drains have also been established along the sides of the haul road and include rock weirs at regular intervals that are now well vegetated and maintained in a stable condition.

All runoff from within the perimeter of the Quarry's water management system is conveyed to the sediment dams which have been constructed in series. Sediment Dams 1 and 2 are located down slope of the processing plant area. Both Sediment Dams 1 and 2 can be drawn down by a siphon system and constant flow devices to provide approximately 1 m depth or approximately 1600 m³ of surcharge capacity. A third Sedimentation Dam is located immediately downslope of the truck parking area and collects and treats runoff from this area. Sedimentation Dam 3 overflows to the 100 m long level spreader upslope of Racecourse Creek. Discharges from the level spreader occur as sheet flow over the 120 m grassed section between the level spreader and Racecourse Creek. This provides further sediment settling, nutrient uptake and water quality treatment before any discharges enter the Racecourse Creek system.

Runoff from the Quarry floor is controlled through a series of excavations, low berm and pipes to provide detention storage within the Quarry during periods of heavy rainfall. The Quarry floor and associated flow controls effectively provide the detention and settling capacity that will be provided by Sediment Dam 4 once it is constructed on the final Quarry floor. A low berm is maintained at the entrance to the extraction area to provide additional surcharge capacity during extreme rainfall events. Flow controls within the Quarry floor enable contained runoff to drain at a controlled rate from the Quarry floor through the processing plant area to Sedimentation Dams 1 and 2.

The processing area has also been designed to act as a detention basin during significant storm events with the ability to detain up to approximately 0.9 m depth of water.

7.1.3 Water storages

There are four active water storage areas (SD1, SD2, SD3 and Quarry floor/SD4) and one storage dam (2 ML storage dam) currently on site. The dam system provides a capacity of approximately 8150 KL of storage for sediment laden runoff with stored water being utilised for dust suppression when required. In addition, the dams system has been designed to provide in excess of 33,600 KL of surcharge capacity.

The system has been designed to contain runoff from in excess of a 1 in 100 year 24 hour rainfall event which is 154 mm of rainfall. The sediment and storage dam capacity at the Quarry is capable of holding a 5 day, 95% rainfall event which is 56.4 mm for Oberon/Lithgow area. Dams are cleaned out as required to maintain capacity in accordance with *Managing Urban Stormwater – Soils and Construction* (Landcom, 2001) and as a result uncontrolled discharges from the 2 ML Storage Dam are likely to be infrequent and small. No discharges from the 2ML Storage Dam have been observed over the 20 year period that the Quarry has been operating. The dam system is broken down into the capacities shown in **Table 7.1**.

Table 7.1 Water Storage Dam Storage and Surcharge Volumes

Dam	Storage Volume (kL)	Surcharge Volume(kL)
SD1	890	800
SD2	950	800
SD3	210	0
Quarry floor/ SD4	4,100	32,000+
2 ML Storage Dam	2,000	0 to 2000
Total (kL)	8,150	33,600+

7.1.4 Water Take

There has been no water drawn from external sources under the water licence detailed in **Table 7.2**. Licence and water take information is summarised in **Table 7.2**.

Table 7.2 Water Take during the Report Period

Water Licence #	Water sharing plan, source and management zone (as applicable)	Entitlement	Passive take/inflows	Active pumping	Total
WAL 34279	Macquarie Bogan Unregulated and Alluvial Water Sources.	2.0 units	0	0	0

7.2 Erosion and Sedimentation

7.2.1 Environmental Management Measures

Surface water management infrastructure at the Quarry has been established and operational since 1995. The existing water management system at the site includes diversion drains, catch drains and sedimentation dams. Diversion drains and embankments have been constructed around the disturbance area and are stabilised with established vegetation. Catch drains have been constructed with rock weirs and convey sediment-laden runoff from the extraction area to a series of designated sedimentation dams.

In addition to the diversion drains and sedimentation ponds, Oberon Quarries implements localised sediment and erosion controls, as required, in accordance with Managing Urban Stormwater – Soils and Construction (Landcom, 2001) to reduce the impacts on the water quality in the Quarry's dirty water management system.

The location of the Quarry in relation to Racecourse Creek, together with the erosion and sedimentation control measures implemented by Oberon Quarries provides a high level of protection to the existing water quality in Racecourse Creek and Lake Oberon.

8.0 Rehabilitation

Whilst every opportunity will be taken to rehabilitate areas not required for future operational use, rehabilitation opportunities were limited during the reporting period as the works undertaken during the report period focussed on continued Quarrying activities.

Ongoing opportunities for rehabilitation are likely to be limited to the rehabilitation of interburden/overburden stockpiles following their emplacement, as noted in **Section 4.3**. Where appropriate, temporary land shaping, seeding and other revegetation works may be undertaken in disturbed areas to minimise the potential for offsite impacts associated with the migration of windblown dust, particularly in regard to stockpiles and stripped soil surfaces not required for operational use. Topsoil stockpiles are temporarily stabilised via seeding to minimise the potential for loss of soil through wind or rainfall erosion.

8.1 Status of Quarrying and Rehabilitation

There were limited opportunities for rehabilitation at Oberon Quarry during the reporting period. Rehabilitation works undertaken during the reporting period are described in **Section 4.3**. Seeding was undertaken on the topsoil bund to establish ground cover and reduce the potential for loss of soil substrate which is planned for use in the final rehabilitation of the site following the completion of quarrying operations.

It is envisaged that rehabilitation of the bench and extraction area will commence in approximately 10 years. Once this stage is reached, progressive rehabilitation and revegetation of the Quarry bench and exhausted extraction area can be undertaken without impact the ability to efficiently extract basalt resources.

Table 8.1 Summary of Rehabilitation Status at Oberon Quarry during 2017

Mine Area Type	Previous reporting period (actual) 2016 (ha) ^a	This reporting period (actual) 2017 (ha)	Next reporting period (forecast) 2018 (ha)
Total Quarry Footprint	29.82	29.82	29.82
Total active disturbance	29.82	29.82	29.82
Land being prepared for rehabilitation	0	0	0
Land under active rehabilitation	0	0	0
Completed Rehabilitation	0	0	0

Note a: During the 2016 Annual Review the total quarry footprint was reported as 21 ha. The 21 ha represented only the extraction area as detailed in the 2015 EIS.

During the 2017 report period, the total quarry footprint has been recalculated as part of the development of the rehabilitation bond. During the development of the Rehabilitation Bond, the total quarry footprint has been calculated as approximately 29.82 ha which includes the area of rehabilitation works which would be required to be undertaken to rehabilitate disturbance with the approved project area incorporating disturbance associated with extraction, topsoil bunds and road around perimeter of the excavation, the processing area and the refuelling/truck parking area.

As there has been limited additional ground disturbance during 2017 as reported in **Section 4.0** (minor works were undertaken as part of the road upgrade), the '2016 previous reporting period' area in **Table 8.1** have been revised to reflect the areas calculated during the development of the Rehabilitation Bond.

8.2 Final Landform and Post Rehabilitation Land Use

The proposed final land use aims to emulate the pre-mining environment and will enhance local and regional ecological linkages throughout the pit and surface infrastructure areas and with adjacent surrounding landscape. The primary objective of site revegetation and regeneration is to create a stable final landform with acceptable post-mining land use and suitability. The final land use will be returned to grazing in accordance with the land owner's requirements.

Rehabilitation of the Quarry's benches will commence once sufficient areas of the lower basalt layer have been extracted and will be managed in accordance with the approved Landscape and Rehabilitation Management Plan (LRMP) (Umwelt, 2016g). It is envisaged that rehabilitation will commence in approximately 10 years. During the intervening period, extraction will continue with the same environmental controls as have been utilised over the past 23 years of operation. Rehabilitation areas will continue to be monitored on an annual basis and will be managed until self-sustaining. Final rehabilitation areas will achieve the rehabilitation completion criteria specified in the Landscape and Rehabilitation Management Plan.

8.3 Rehabilitation Activities

Rehabilitation areas will be monitored on an annual basis and will be managed until self-sustaining in accordance with the approved Landscape and Rehabilitation Management Plan (Umwelt, 2016g). There has been no renovation or removals of buildings and no new rehabilitation areas established during the 2017 reporting period.

8.4 Rehabilitation Actions for the 2018 Reporting Period

During 2018, rehabilitation works will involve:

- temporary rehabilitation works including seeding bund walls;
- implementation of an environmental checklist to assist in environmental management;
- weed spraying as required; and
- liaise with DPE to finalise and establish the Rehabilitation Bond as required Schedule 3, Condition 25 of the Development Consent.

9.0 Community

9.1 Community Consultation

During the report period, Oberon Quarries undertook consultation with the Oberon Council, EPA and landholders surrounding the Quarry. Blasting notifications were provided to the surrounding landholders prior to each blasting event.

Oberon Quarries in partnership with Rotary held an open day at the Quarry in June 2017 where members of the Columbia Aged Care Facility in Oberon town were given a tour of the quarry

Oberon Quarries also made donations and sponsorship to the following local organizations:

- Oberon Tigers Rugby League Club
- Oberon Agricultural Show
- Oberon Rodeo Jack Johnson Memorial Saddle Bronc.

9.2 Complaints

No community complaints received by Oberon Quarries since 2010. No complaints were received in 2017. Oberon Quarries maintains a complaints register to record and respond to complaints received from the community.

Oberon Quarries has an EMS (Umwelt, 2016a) which details complaints handling and dispute resolution procedures. The EMS was approved by the DPE during 2016. A community complaints line is also operated during the hours of operation at the site. The Quarry Manager is responsible for the implementation of the complaints management process to ensure a timely initial response to any complaints received and then, as appropriate, will provide a more detailed response outlining any complaint investigation findings and corrective actions implemented.

10.0 Audit Information

10.1 Independent Environmental Audit

An IEA was conducted during the reporting period to address the requirements of Schedule 5, Condition 10 of the Development Consent. Notification was provided to DPE in December 2016 advising the IEA was overdue and was scheduled to be undertaken in January 2017. The IEA was conducted on-site by AQUAS Consulting during January 2017. The audit report was submitted to DPE on 2 August 2017. The audit timeframe covered the period from September 2015 to January 2017.

The audit identified one non-compliance, nine administrative non-compliances and four observations. An Action Plan was developed as an outcome of the audit findings. The status of each action is detailed in **Section 1.0 Table 1.3**.

The next audit is due to be commissioned no later than 14 September 2019.

11.0 Incidents and Non-compliances during the Report Period

There were 14 non-compliances at Oberon Quarries during the 2017 report period (see **Section 1.0**). The majority were identified during the IEA and are administrative non-compliances.

The Quarry is currently addressing all issues identified during the audit and have substantially progressed rectification works.

Oberon Quarries' did not activate its Pollution Incident Response Management Plan during the reporting period.

12.0 Activities to be completed in the Next Period

Oberon Quarries proposes to undertake the following activities during the 2018 report period:

- ongoing extraction of the first bench primarily at the northern end of the Quarry;
- possibly commencing extraction of the second bench and progressing the Quarry southward as part of the existing approved pit expansion;
- install “Intersection Advance” (G1-207) warning signage on the eastbound approach to the intersection of Duckmaloi Road and Titania Road;
- undertake ecological monitoring;
- monitoring of a future rock popping event to validate overpressure and vibration site law;
- undertake Quarrying operations as detailed in **Section 4.0**;
- review and revise (if required) Oberon Quarry management plans following the submission of this Annual Review and the Independent Environmental Audit in accordance with Condition 5 of Schedule 5 of the Development Consent;
- implement the updated Oberon Quarry management plans following approval from DPE;
- update website, as required (e.g. monitoring data, management plans etc.);
- lodge the Rehabilitation Bond in required under Condition 25 of Schedule 3 of the 2015 Development Consent (NB completed 23 March 2018); and
- continue to complete outstanding actions from the IEA.

13.0 References

Umwelt (Australia) Pty Limited (2015). Environmental Impact Statement (EIS) – Proposed Extended Life of Operations. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2016a). Oberon Quarry Environmental Management Strategy. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2016b). Oberon Quarry Noise Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2016c). Oberon Quarry Blast Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2016d). Oberon Quarry Air Quality Management Plan. Prepared for Oberon Quarries Pty Limited.

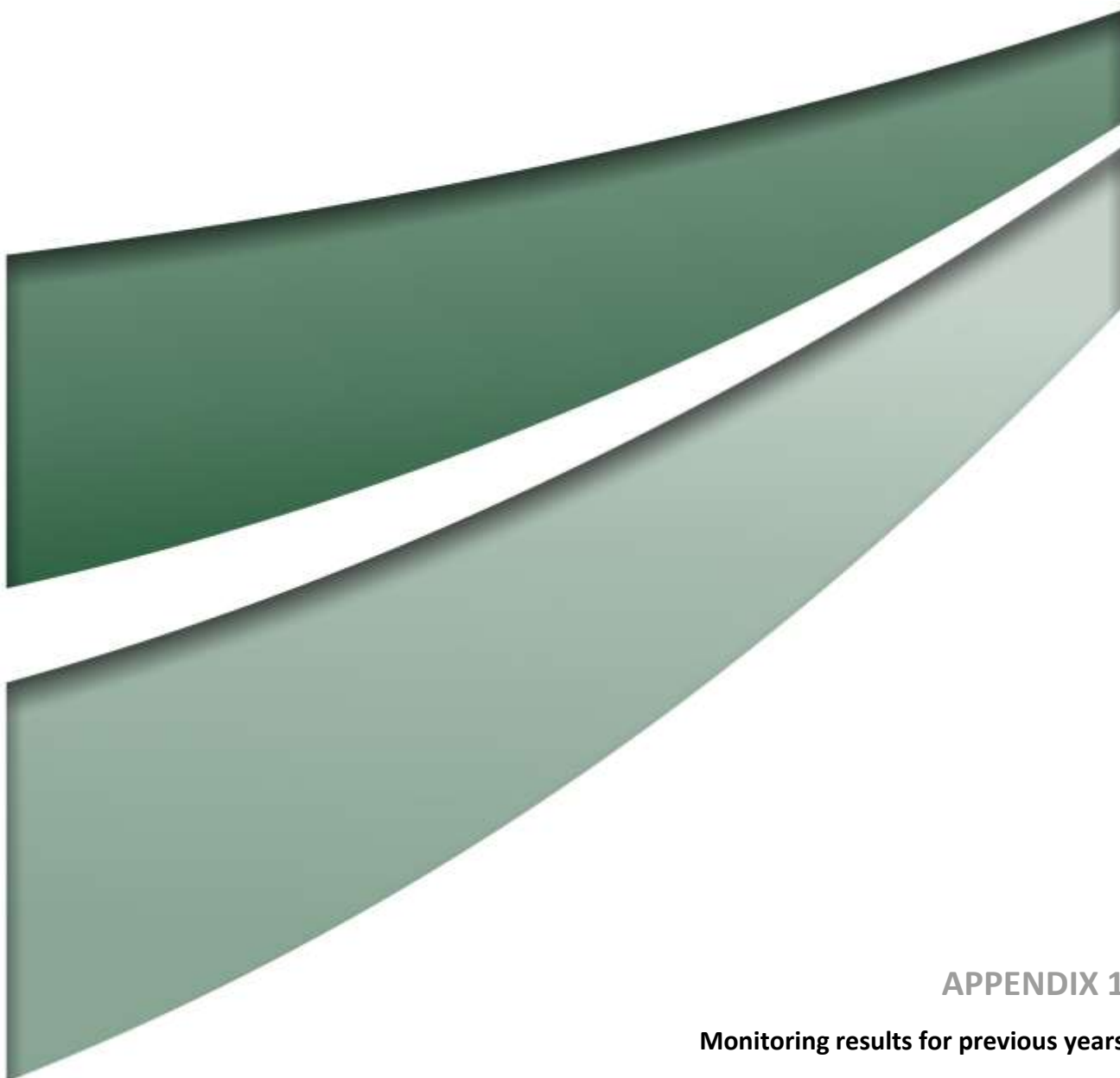
Umwelt (Australia) Pty Limited (2016e). Oberon Quarry Water Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2016f). Oberon Quarry Transport Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2016g). Oberon Quarry Landscape and Rehabilitation Management Plan. Prepared for Oberon Quarries Pty Limited.

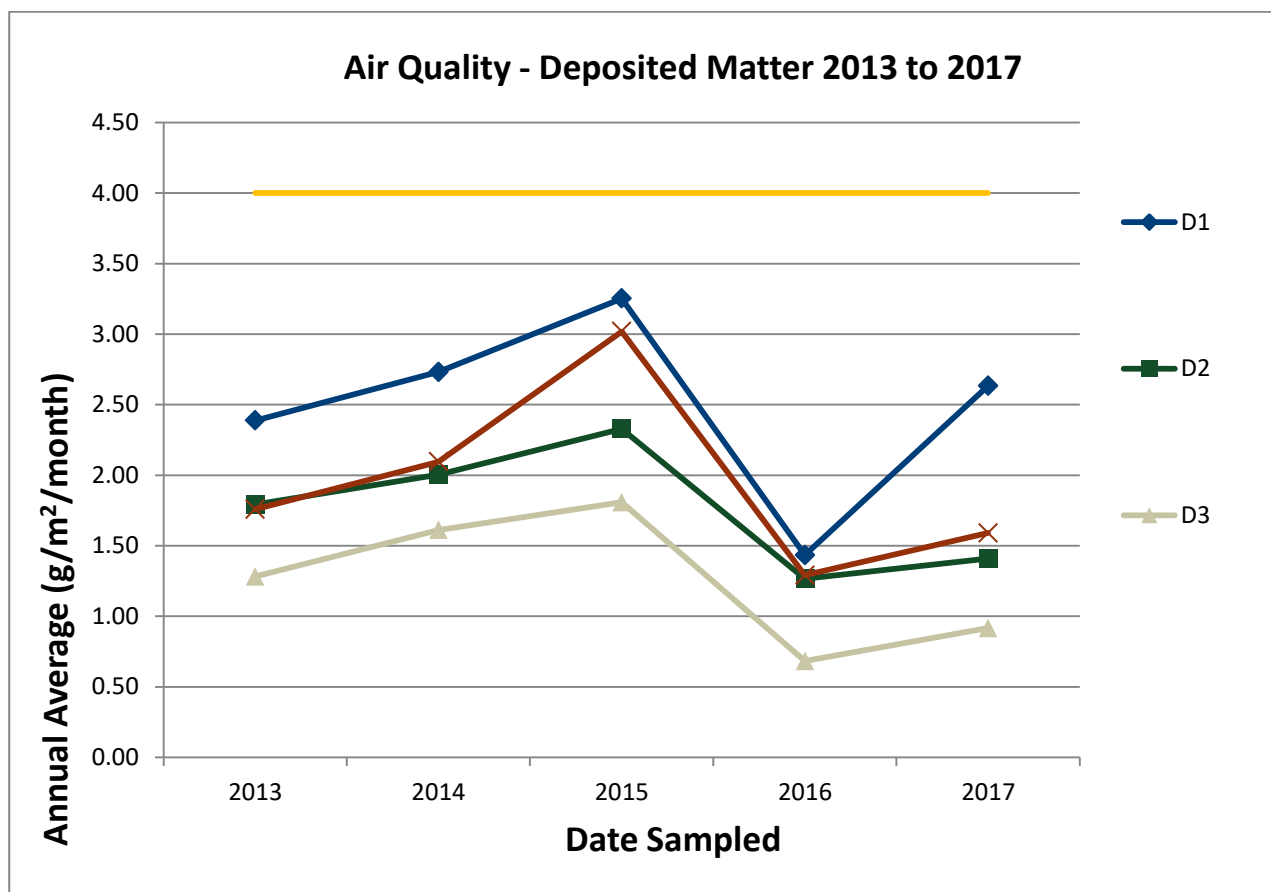
Umwelt (Australia) Pty Limited (2017). Summer Noise Monitoring. Prepared for Oberon Quarries Pty Limited.

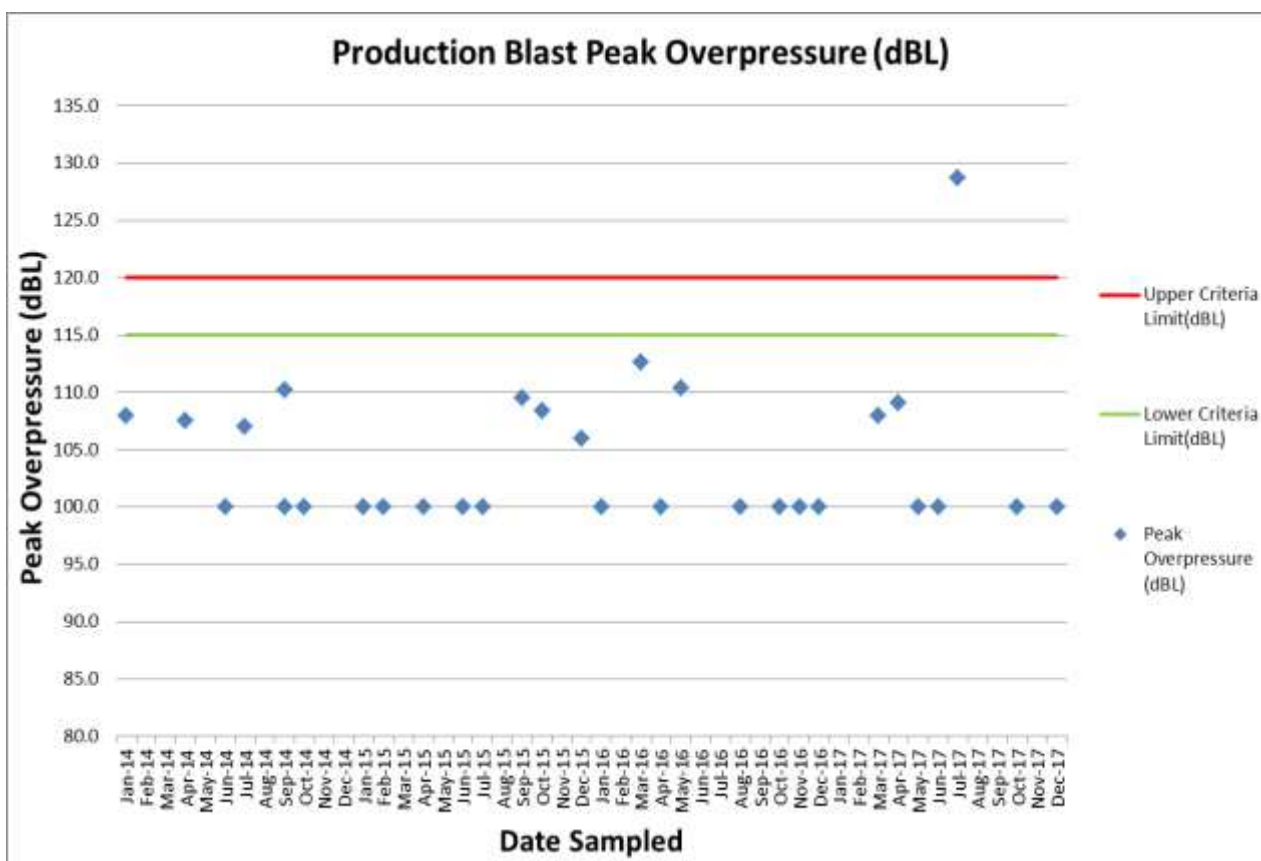
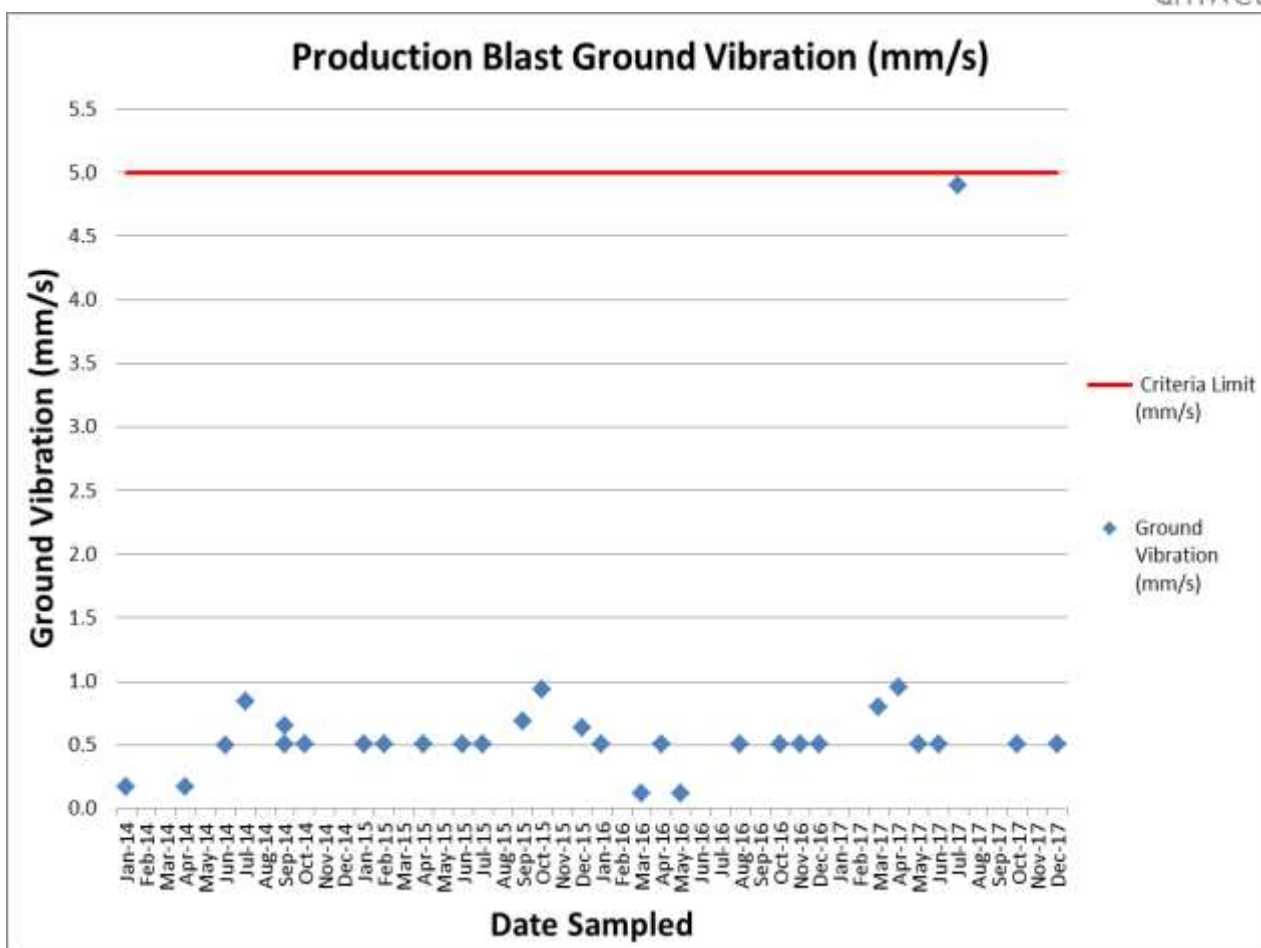
NSW Government (2015). Annual Review Guideline.

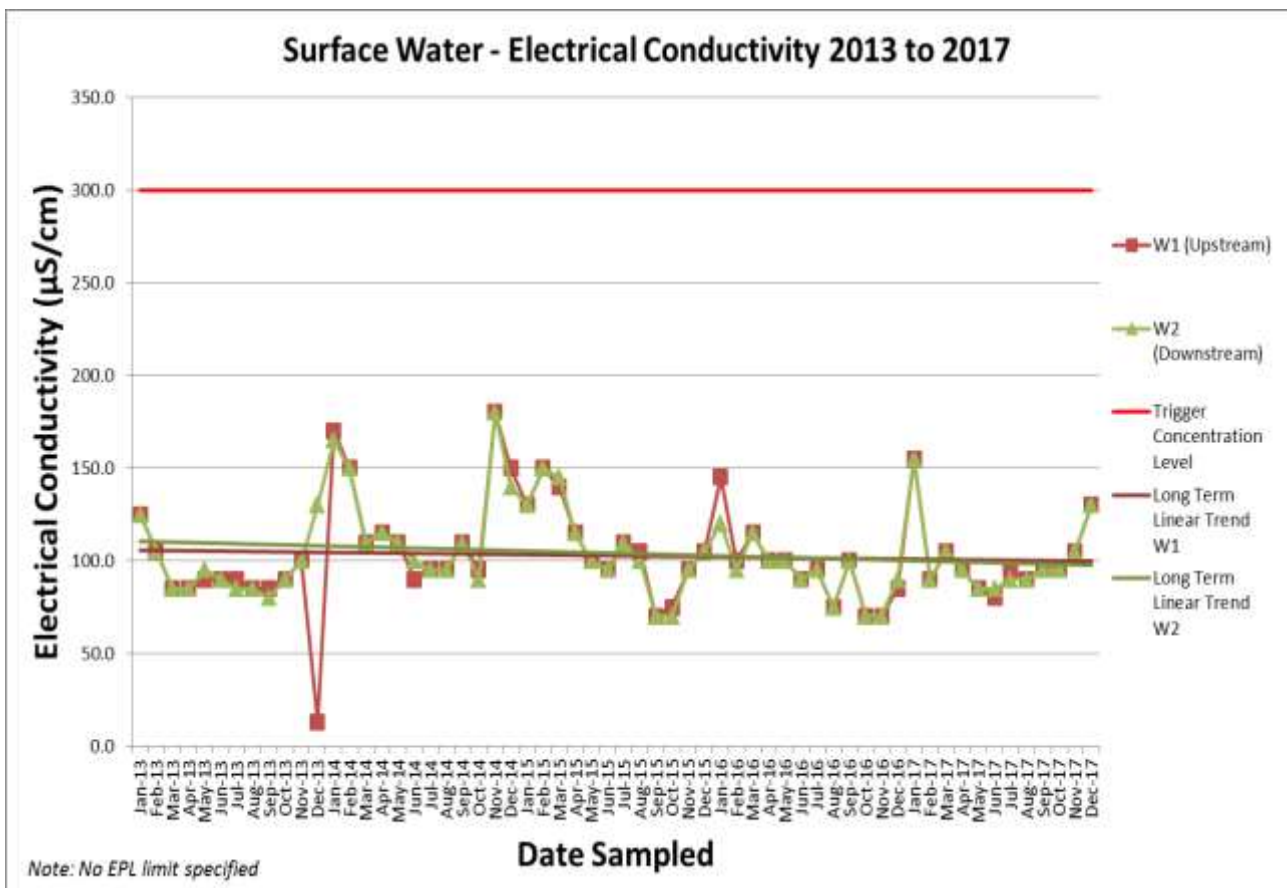
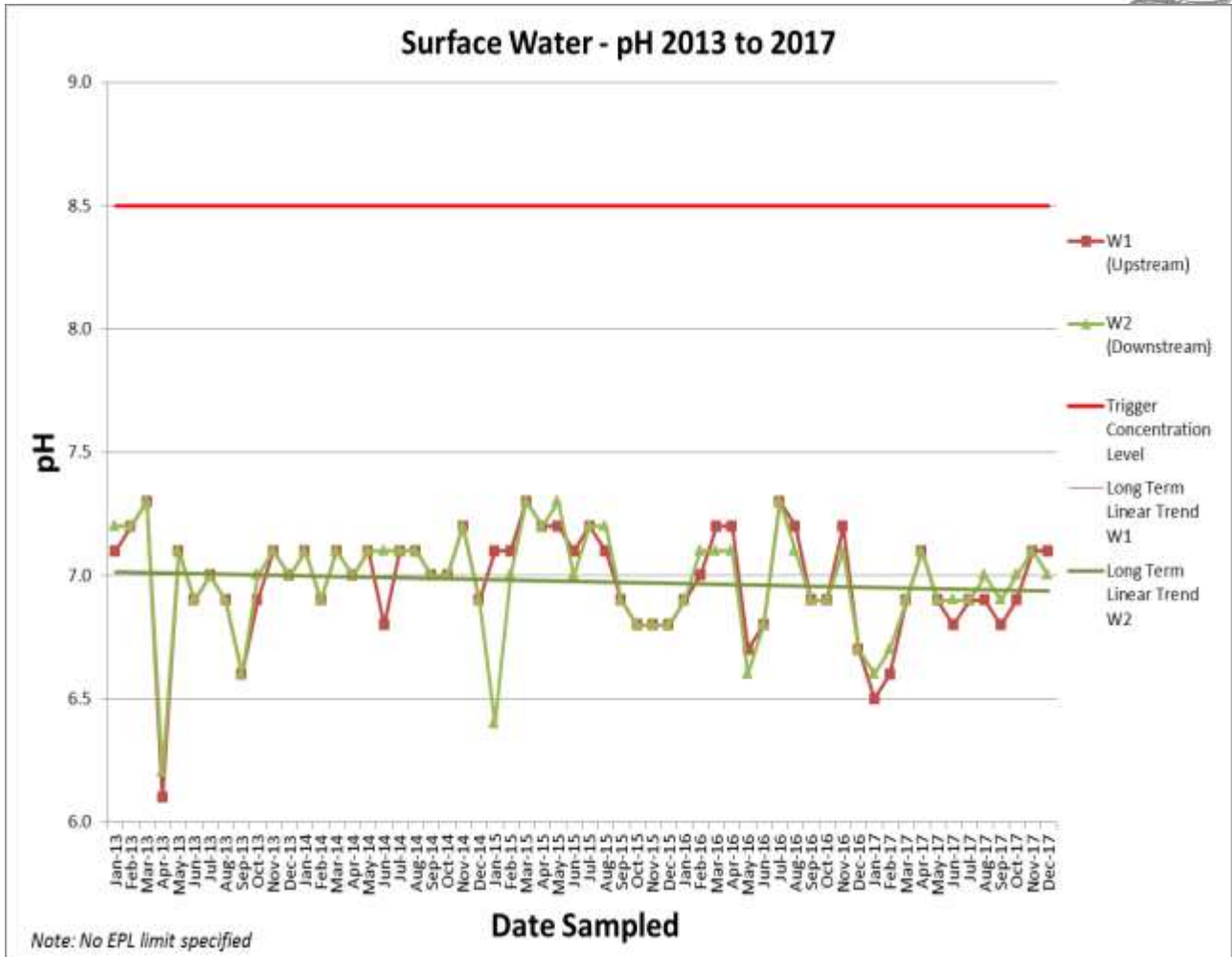


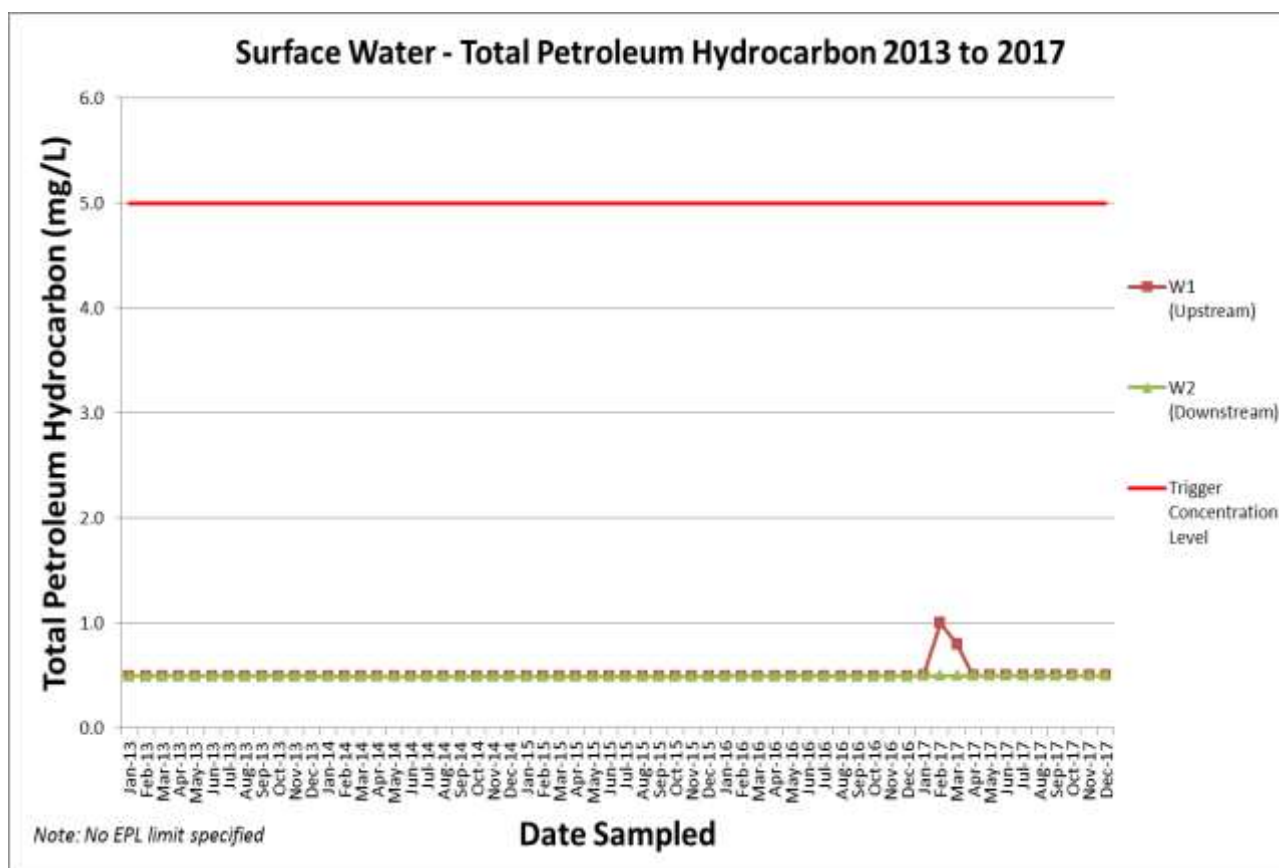
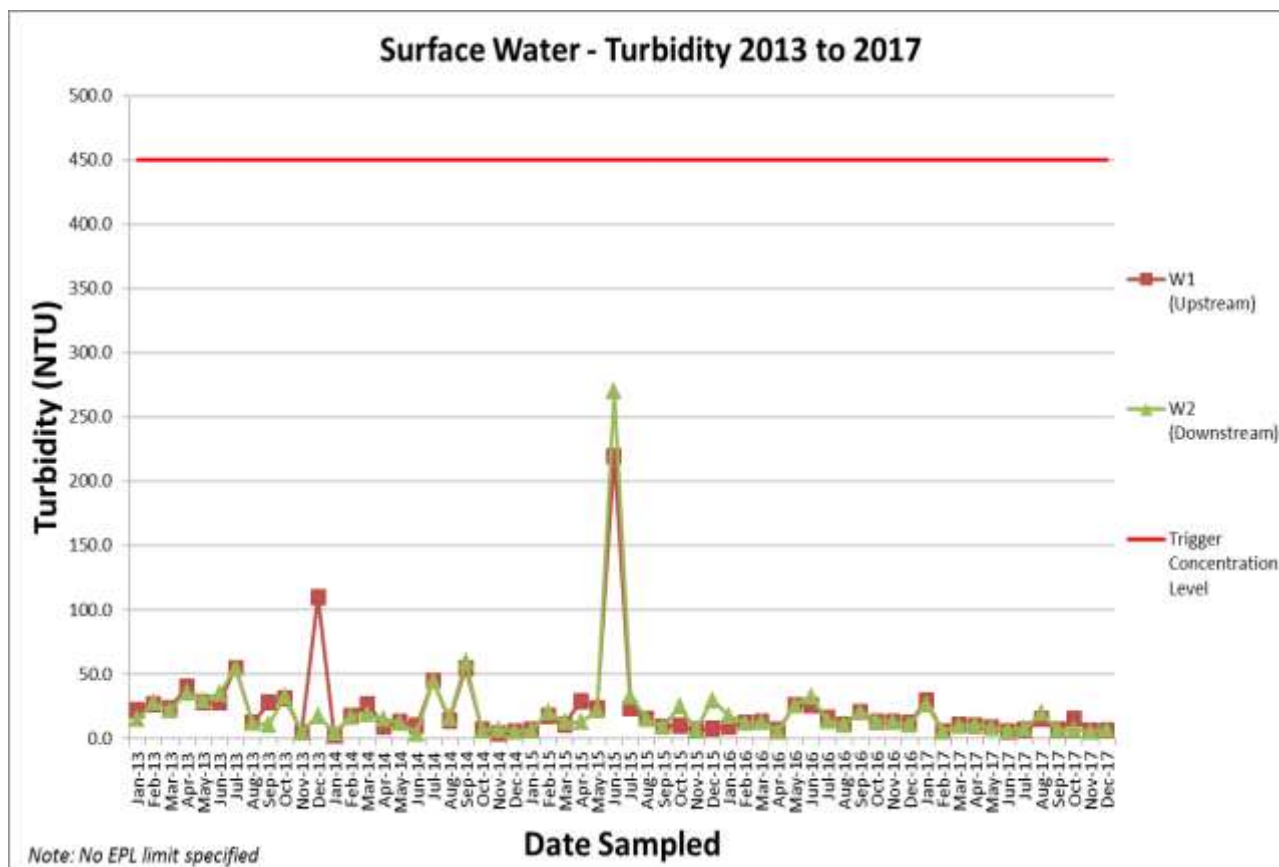
APPENDIX 1

Monitoring results for previous years

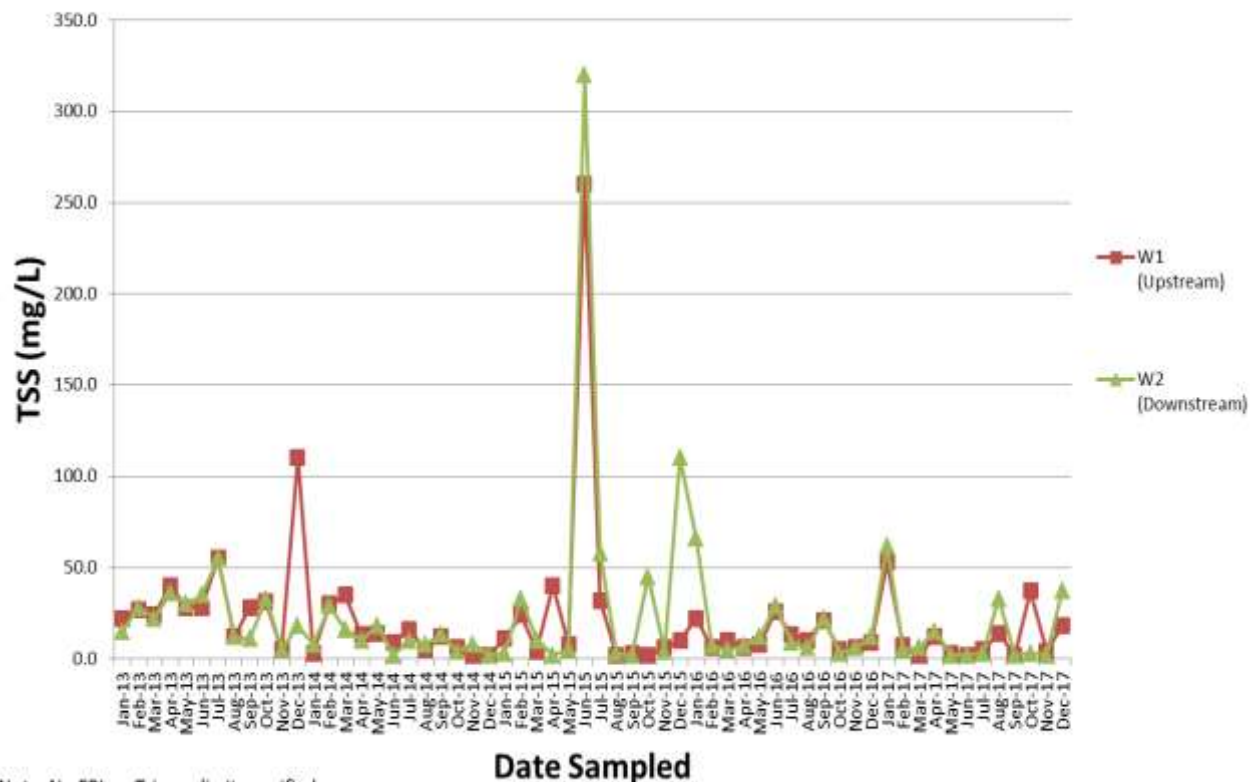






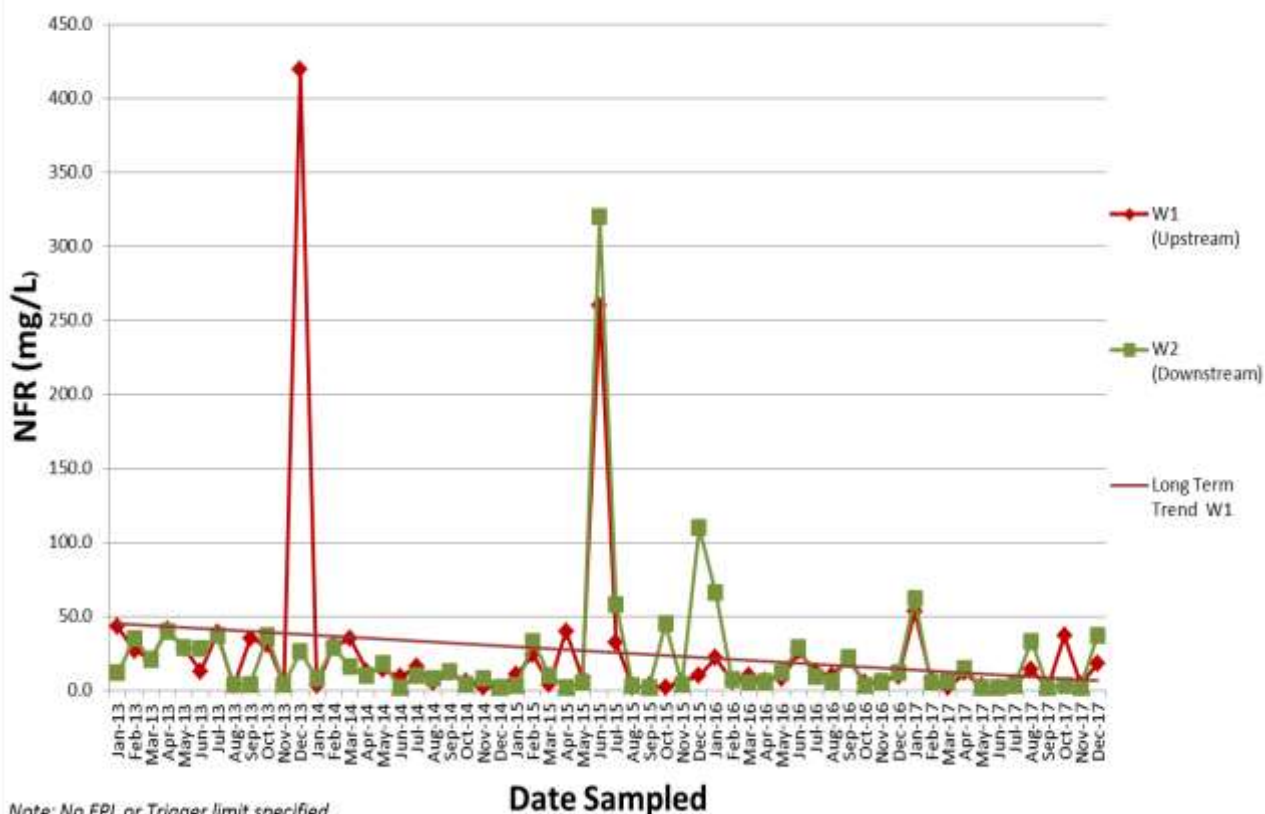


Surface Water - Total Suspended Solids 2013 to 2017

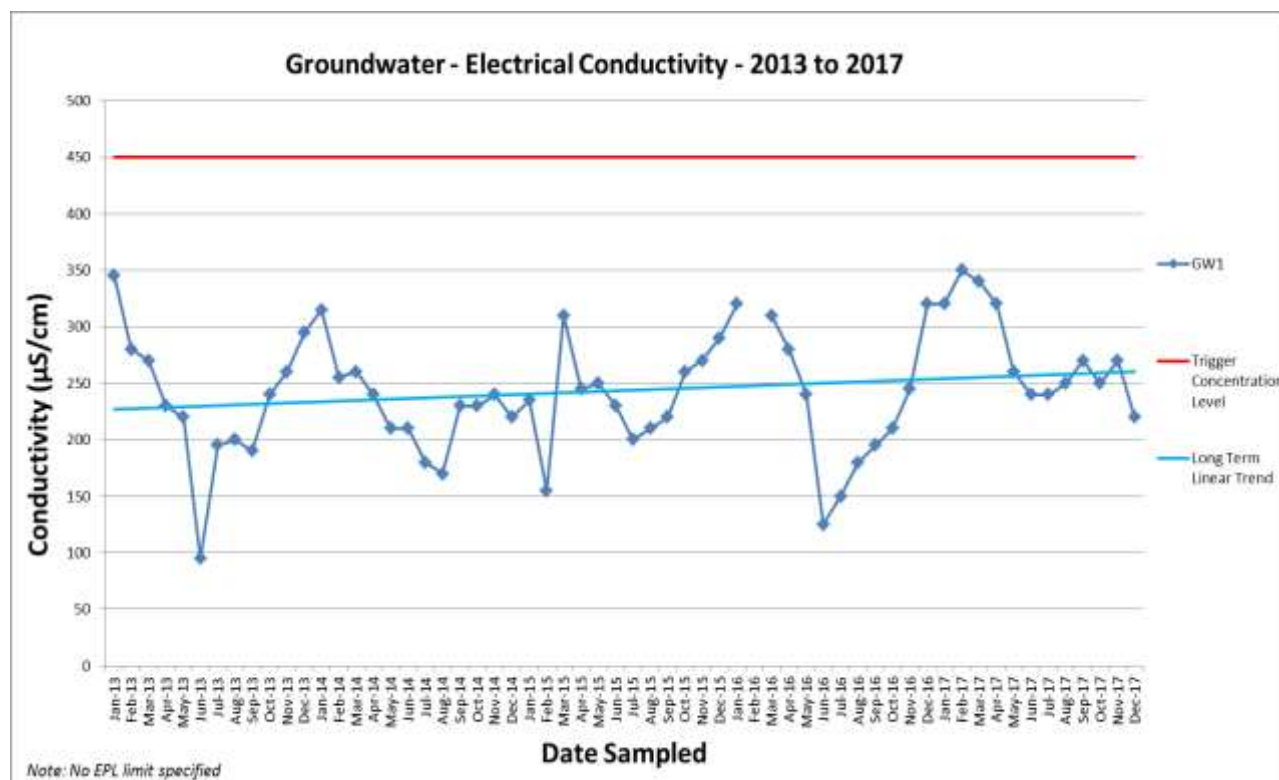
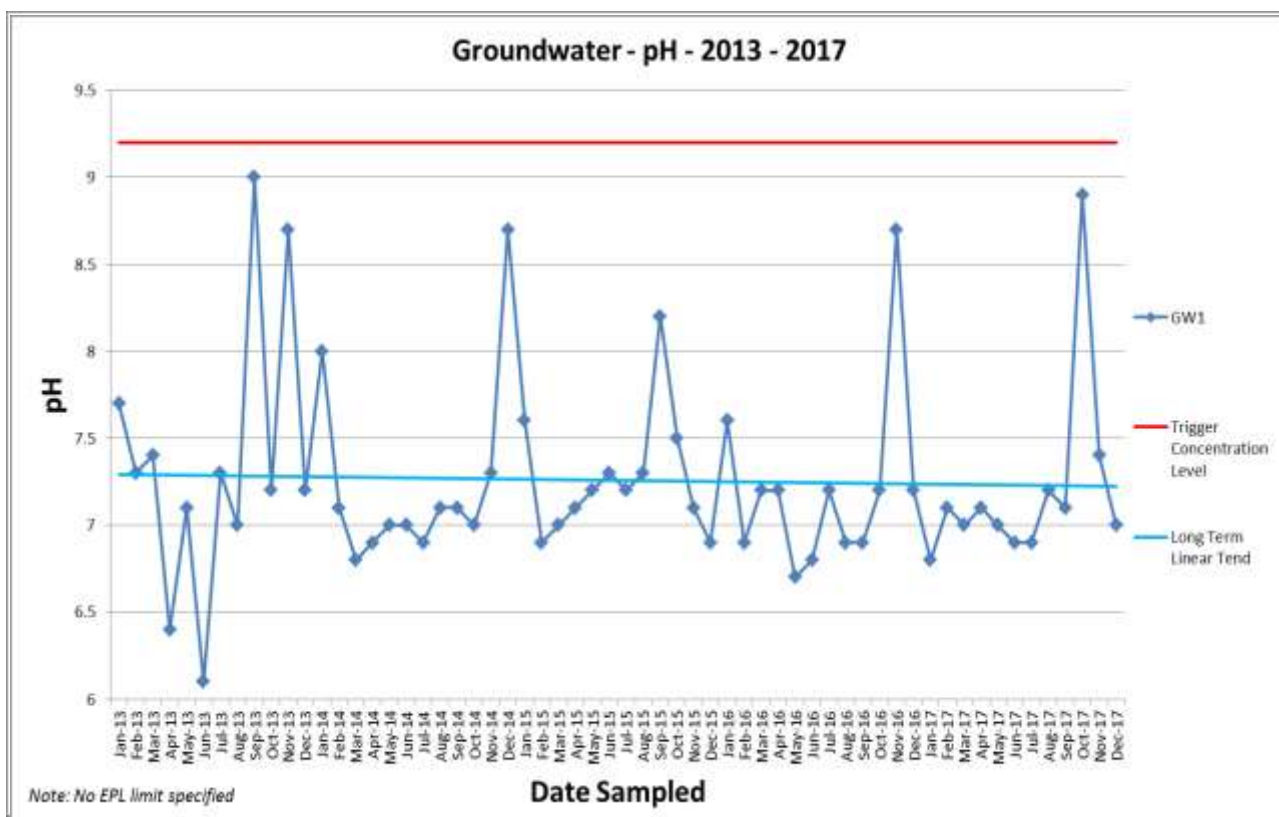


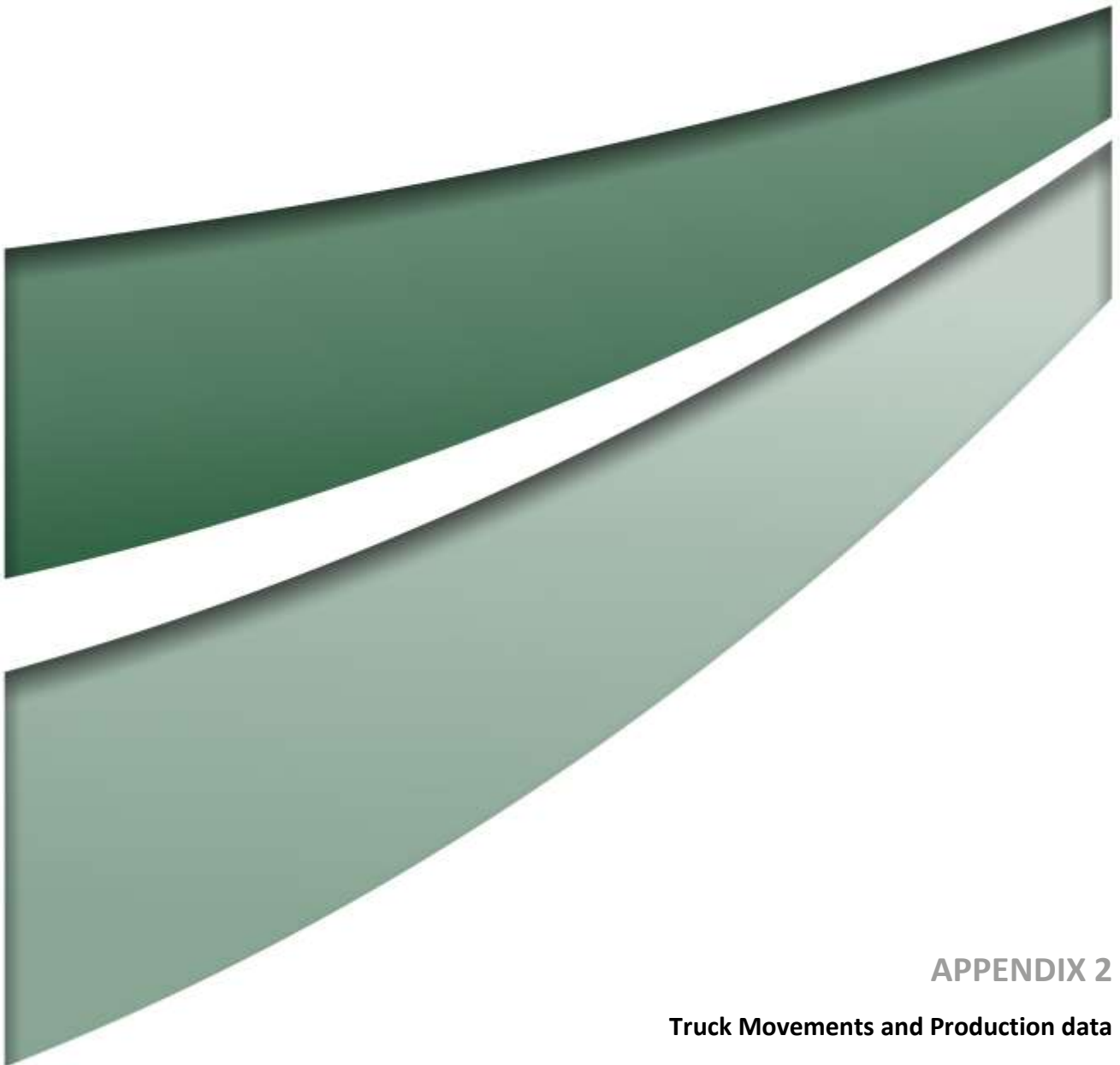
Note: No EPL or Trigger limit specified

Surface Water - Non Filterable Residue 2013 to 2017



Note: No EPL or Trigger limit specified





APPENDIX 2

Truck Movements and Production data



JANUARY 2017 – DECEMBER 2017

This summary is to satisfy Condition 17 of Development Consent SSD_6333.

During the period starting from January 2017 through to December 2017 Oberon Quarries recorded the following information:

2017

January 2017	There were 706 truck movements for the month and a total of 18,640.37 tonnes of material that left the quarry.
February 2017	There were 1,020 truck movements for the month and a total of 26,752.54 tonnes of material that left the quarry.
March 2017	There were 946 truck movements for the month and a total of 24,483.68 tonnes of material that left the quarry.
April 2017	There were 862 truck movements for the month and a total of 21,993.00 tonnes of material that left the quarry.
May 2017	There were 1,429 truck movements for the month and a total of 36,668.79 tonnes of material that left the quarry.
June 2017	There were 1,233 truck movements for the month and a total of 30,922.55 tonnes of material that left the quarry.
July 2017	There were 1,200 truck movements for the month and a total of 30,210.33 tonnes of material that left the quarry.
August 2017	There were 977 truck movements for the month and a total of 24,284.24 tonnes of material that left the quarry.
September 2017	There were 841 truck movements for the month and a total of 21,300.00 tonnes of material that left the quarry.
October 2017	There were 800 truck movements for the month and a total of 21,863.68 tonnes of material that left the quarry.
November 2017	There were 1,007 truck movements for the month and a total of 26,890.70 tonnes of material that left the quarry.
December 2017	There were 797 truck movements for the month and a total of 20,649.68 tonnes of material that left the quarry.

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