

OBERON QUARRIES ANNUAL REVIEW

1 January – 31 December 2018

March 2019



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Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Oberon Quarries Pty Ltd

Project Director: Rod Williams
Project Manager: David Rankin
Report No. 1296/R81
Date: March 2019



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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	Rod Williams	26 March 2019	Neil Hargraves	26 March 2019

Annual Review Title Block

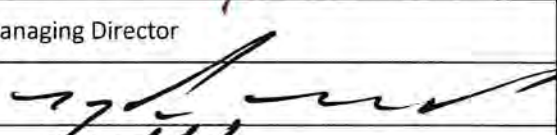
Name of operation:	Oberon Quarries
Name of operator:	Oberon Quarries Pty Limited
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Name of holder of development consent:	Oberon Quarries Pty Limited
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Name of holder of water licence:	Oberon Quarries Pty Limited
MOP or RMP start/end date:	N/A
Annual Review start date:	1 January 2018
Annual Review end date:	31 December 2018
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:	26/1/2019

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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) (See **Figure 2.1**).

This annual review has been prepared to provide a summary of the Quarry's performance over the period 1 January to 31 December 2018 (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 2017 reporting period. The IEA identified a total of 14 non-compliances. Most of these non-compliances were addressed in the 2017 Annual Review. The remaining outstanding non-compliances were addressed during 2018. Further details regarding IEA non-compliances and their status are provided in **Section 10.1**.

The non-compliances recorded during the reporting period have been ranked according to the risk matrix included in **Table 1.2**. A summary of each is provided in **Table 1.3**, with further details provided in **Section 11.0**.

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 (EPL) 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 reporting period

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment/Actions taken	Status	Addressed in Annual Review
SSD_6333	Schedule 3, Condition 10	Air Quality – sampling exposure for deposited dust	Non-compliant	Sample not collected within 30+/-2 days from the previous collection date. The Department of Planning (DPE) were notified of the issue and the actions undertaken by Oberon Quarries. No further action has been requested or undertaken.	Complete	Section 11.0
SSD_6333 EPL 4442	Schedule 3, Condition 10 and 12 M 2.2	Monthly sampling of deposited matter.	Non-Compliant	Dust gauge D2 (EPL Point 2) was damaged by cattle during the January 2018 monitoring round and as such, a sample was not able to be collected. DPE were notified of this issue and the actions undertaken by Oberon Quarries. No further action has been requested or undertaken.	Complete	Section 11.0
SSD_6333 EPL 4442	Schedule 3, Condition 9 L5.1	Blasting Overpressure	Non-compliant	Technical exceedance of the percentage of blasts greater than 115 dBL due to the low number of blast undertaken during the reporting period (i.e. five). DPE were notified of this issue and the actions undertaken by Oberon Quarries. No further action has been requested or undertaken.	Complete	Section 11.0

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment/Actions taken	Status	Addressed in Annual Review
Blast Management Plan	Schedule 3, Condition 9	Blast monitoring will be undertaken at the nearest private sensitive receiver location as displayed in Figure 3.1 of the Blast Management Plan for each blast event.	Non-compliant	Blast monitor was placed approximately 350m closer to the blast than the monitoring location identified in BMP for recording of blast event on 22 January 2018.	Complete	Section 11.0
Water Management Plan	Schedule 3, Condition 16	Sampling / monitoring of surface water quality.	Non-Compliant	January 2018 monthly surface water monitoring samples were not collected due to availability of personnel to undertake monitoring. DPE were notified of this issue and the actions undertaken by Oberon Quarries. No further action has been requested or undertaken	Complete	Section 11.0
Water Management Plan	Schedule 3, Condition 16	Water quality monitoring is required to be undertaken on a monthly basis at location GW1. Groundwater will be analysed for pH and conductivity.	Non-Compliant	January 2018 monthly groundwater monitoring samples were not collected due to availability of personnel to undertake monitoring. DPE were notified of this issue and the actions undertaken by Oberon Quarries. No further action has been requested or undertaken	Complete	Section 11.0

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status	Comment/Actions taken	Status	Addressed in Annual Review
SSD_6333	Schedule 3, Condition 26	Revision of the Rehabilitation Bond	Non-compliant	The revision of the rehabilitation bond was not completed within three months of the IEA. The revised calculation was submitted on 23 March 2018, and approved by DPE on 5 April 2018. The bond was provided to DPE in April 2018.	Complete	Section 11.0
SSD_6333	Schedule 3, Condition 24	The condition of residual vegetation within Oberon Quarry will be monitored to identify any deterioration or improvement in habitat quality during the life of the quarry as well as provide a comparison when assessing performance of rehabilitation sites.	Non-compliant	Residual vegetation monitoring plots were not established at Oberon Quarries during the reporting period.	Ongoing	Section 11.0

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 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 one hectare (ha) extension to the existing extraction area. This inclusion avoids the sterilisation of approximately 500,000 tonnes of high quality basalt resource. 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 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 2018 Report Period

Name	Title	Company	Contact No.
Neil Hargraves	Quarry Manager / Managing Director	Oberon Quarries Pty Ltd	(02) 6336 0259
John Fisher	Production Supervisor	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 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, Section 8.0 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 11.0
	(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

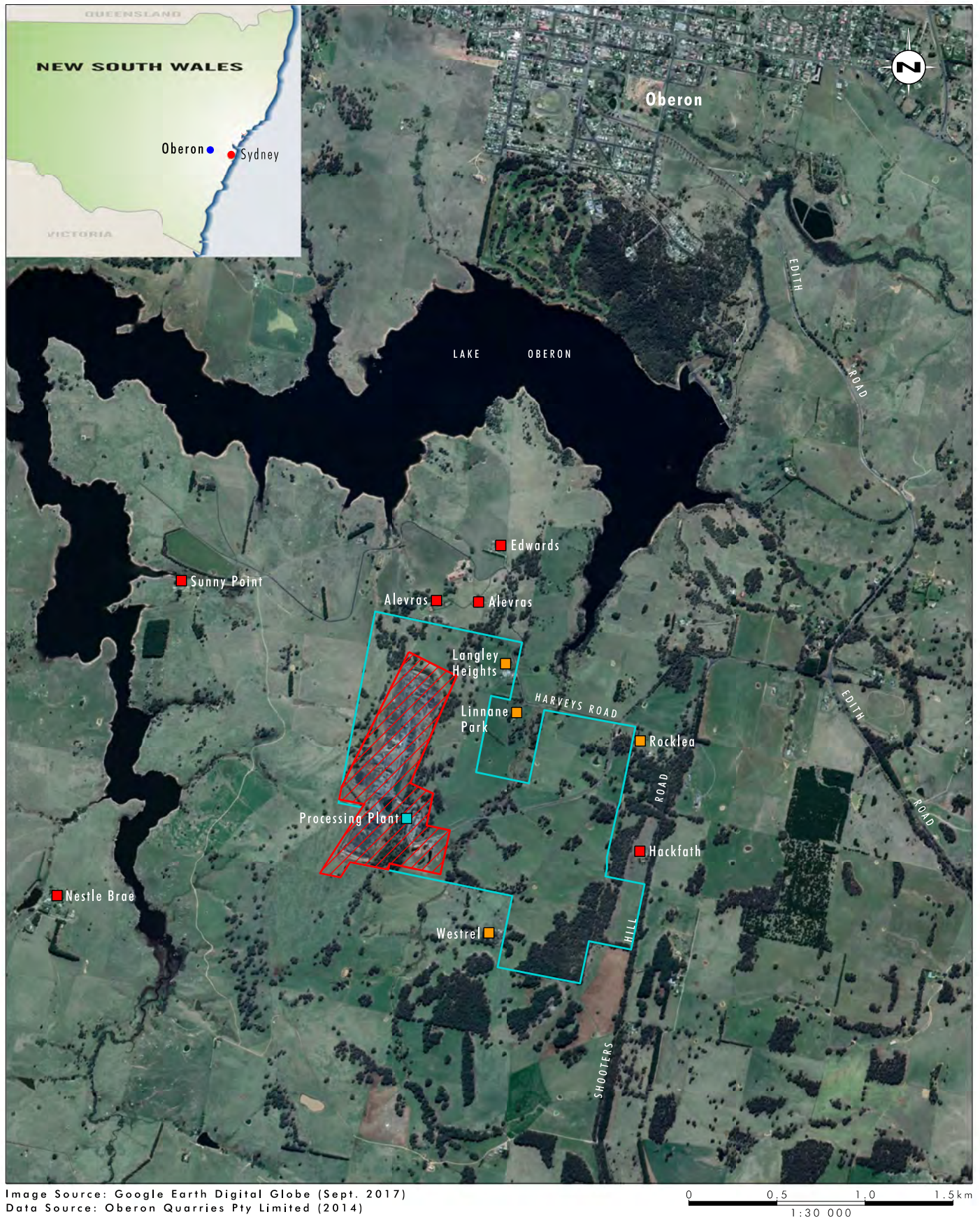


Image Source: Google Earth Digital Globe (Sept. 2017)
Data Source: Oberon Quarries Pty Limited (2014)

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	30 August 2045	Current	DPE
Environment Protection Licence (EPL) 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 SSD_6333, the Quarry is required to implement a range of environmental management plans as part of the Oberon Quarry Environmental Management Strategy (EMS) (Umwelt, 2018a). **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 SSD_6333 requirements, the plans were reviewed and updated where relevant during 2017. The updated plans were submitted to DPE for approval during August 2017. Approval was granted to the Environmental Management Strategy, Water Management Plan and Transport Management Plan on 22 February 2018. Further revisions to the Air Quality Management Plan, Noise Management Plan and Landscape and Rehabilitation Management Plan were requested by DPE following review. The revised plans were submitted to DPE on 22 May 2018, along with a revised Blast Management Plan containing an updated blasting agreement, as established with the nearest private receiver.

The current approval status of each management plan is shown in **Table 3.2**. The details of the established blast agreement are outlined in **Section 6.4**.

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	NA	February 2018	DPE
Noise Management Plan (NMP)	May 2018	NA	November 2018	DPE
Air Quality Management Plan (AQMP)	May 2018	NA	November 2018	DPE
Blast Management Plan (BMP)	May 2018	May 2018	Pending	DPE
Landscape and Rehabilitation Management Plan (LRMP)	May 2018	NA	November 2018	DPE
Water Management Plan (WMP)	August 2017	NA	February 2018	DPE
Transport Management Plan (TMP)	August 2017	NA	February 2018	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**) at multiple locations across the quarry in response to the natural variability in the basal resource. This multi extraction site approach is required to optimise the resource recovery whilst also meeting product supply specification as determined by the various customers.

As a result of this variability, extraction activities continued to target the resource at both the northern end and southern end of the Quarry during the reporting period. 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 4 years of basalt resource within the first bench.

A band of clay interburden material has been identified within the extraction area. This material is of sufficient quality that it is planned for use as a growth medium once an adequate area of pit floor has been exposed for rehabilitation to commence.

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 17 and has confirmed that extraction operations during 2018 occurred within the Extraction Boundary as submitted to DPE. All 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.

On comparing the as surveyed extraction boundary and the extraction boundary in the 2015 EIS as part of the Annual Review for 2017, Oberon Quarries noted they are not consistent. On further investigation it has been identified that:

- 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, and
- the existing approved quarry area as shown in the 2015 EIS was a non-geo rectified schematic that was sourced from the 1992 EIS.

To determine the operations compliance with the extraction area Oberon Quarries have used the surveyed and marked extraction boundary as submitted to DPE in accordance with Schedule 2 Condition 17 and has confirmed that extraction operations during 2018 occurred within the marked extraction boundary.

Oberon Quarries made a commitment in the 2017 Annual Review to consult with DPE in April 2018 regarding whether or not there is a need to reference the survey accurate boundary in the development consent. On further consideration of this issue, Oberon Quarries has concluded that its ongoing visual verification that operations are undertaken within the surveyed and pegged extraction boundary is

sufficient to ensure compliance with this approval condition is maintained. Oberon Quarries do not propose to undertake any correspondence with DPE on this issue.

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 was largely completed during 2018. The road surface is planned to be sealed in 2019.

4.2 Production Limits

During the reporting period, a total of 261,213 tonnes of Quarry product was transported from the Quarry. This is below the 400,000 tonnes per annum permitted under the SSD_6333. During the reporting period the maximum daily tonnage of material transported off site of 3,000 tonnes per day, and the maximum number of truck movements of four per hour, was not exceeded. **Table 4.1** provides the annual amount of product transported for the 2017 and 2018 reporting years and forecast for the 2019 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)	2017 Previous reporting period (actual)	2018 Current reporting period (actual)	Next 2019 reporting period (forecast)	Compliance with Criterion
Saleable Product	400,000 tonnes from the site in any calendar year.	304,659 tonnes	261,213 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 SSD_6333, refer to **Table 4.2**. Oberon Quarry has advised that it continued to operate within the operating hours specified by the SSD_6333 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 was largely completed in 2018. This consisted of the expansion of existing access road from the fuel bowzers and diesel storage area to light vehicle carpark and weighbridge. The construction is intended to improve traffic and dust management along the main road entry into the sales plant area. As a result of this expansion, water management drains between the processing area and dams were realigned. Works are scheduled for completion in 2019 with the final sealing of the road surface.

Oberon Quarries plan to install upgraded crusher screens during 2019. As discussed in the 2015 EIS, the new equipment will hold a lower position in the landscape and have a reduced sound power level which is expected to result in reduced noise impacts to the surrounding receivers.

Oberon Quarries also installed two 11 Kl water tanks during the reporting period. These tanks will provide additional water supply for dust suppression across the operation. Oberon Quarries also installed a demountable building / shed within the approved Project Area during the reporting period which is used for the storage of QA/QC samples.

In collaboration with Oberon Council's Technical Services Director, Oberon Quarries installed "Intersection Advance" (G1-207) warning signage on the eastbound approach to the intersection of Duckmaloi Road and Titania Road during the reporting period. The sign was installed on request of the Roads and Maritime Services (RMS), and a photo of the sign is provided in **Plate 4.1**.



Plate 4.1 Photo of Installed Intersection Warning Signage

© Umwelt, 2018

4.4 2019 Operations

Extraction is confined to the basalt plateau on the top of Racecourse Hill. Quarrying operations proposed for the 2019 reporting period will see the continuation of the extraction of basalt resource from the primarily the first bench and possibly extraction from the second bench, with a possibility of extraction from third bench in the west end of the quarry. Extraction within the third 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 m below the top of Racecourse Hill. The depth of the quarry floor will increase over time to approximately 20m below the top of Racecourse Hill following the extraction of quarry benches.

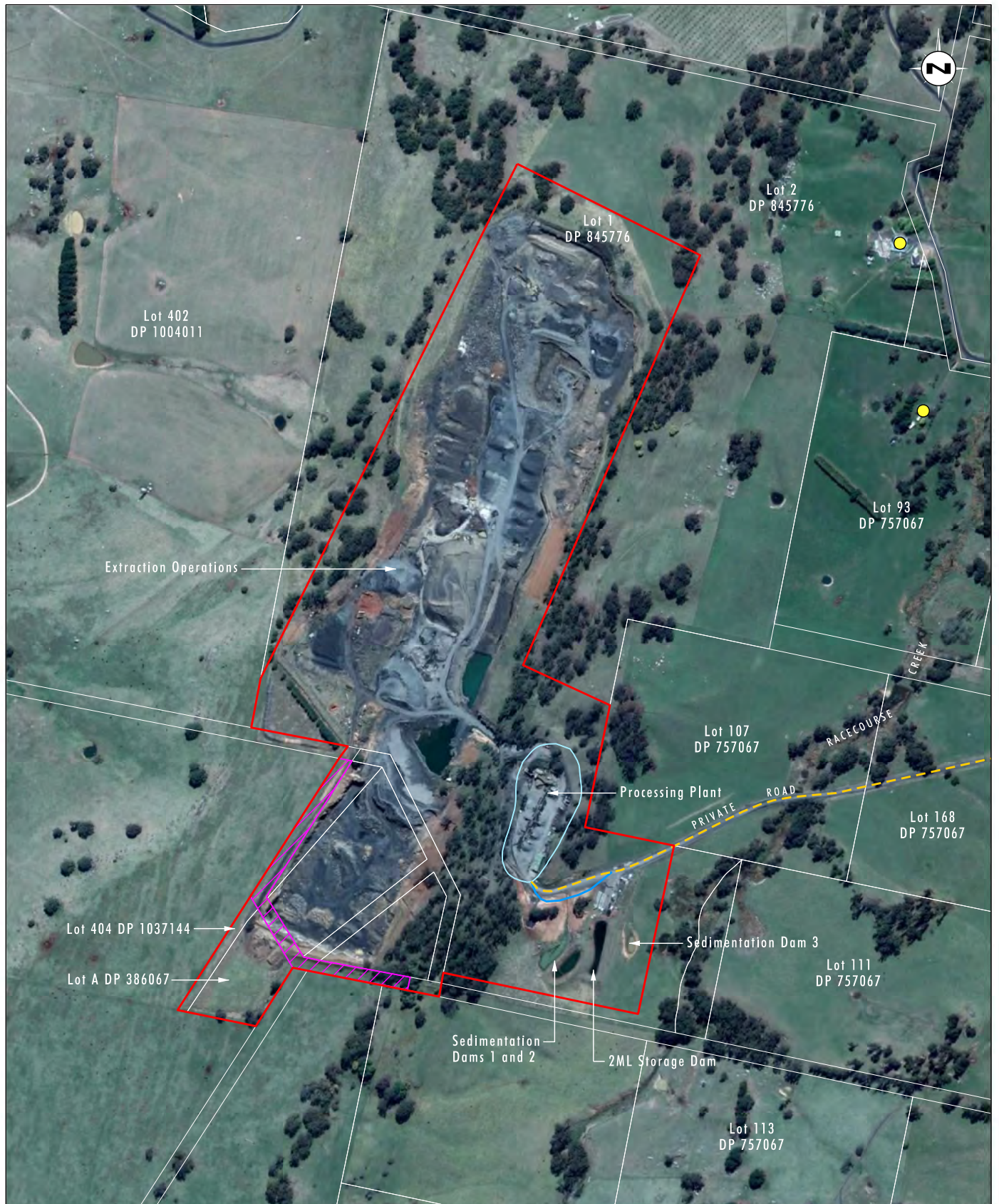


Image Source: Google Earth Digital Globe (Sept. 2017)
Data Source: Oberon Quarries Pty Limited (2014)

0 100 200 400 m
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Legend

- ▬ Project Area
- ▬ Crown Road Reserve
- ▬ Right of carriageway (12m Wide)
- ▬ Duplication of Internal haul Road
- Residence Location

FIGURE 4.1

Approved Project Area

5.0 Actions Required from 2017 Annual Review

Oberon Quarries committed to undertake various activities in the 2018 Annual Reporting period (see Section 12 of the Oberon Quarries 2017 Annual Review). **Table 5.1** provides a progress status update against each commitment during 2018. In addition to this, DPE also request updates to the 2017 Annual Review and resubmission for the Secretary's. While included within **Table 5.1**, these preliminary actions were addressed and submitted with the revised 2017 Annual Review in August 2018. No further comment has been received from DPE following the August 2018 resubmission.

Oberon Quarry notes that a number of actions for the 2017 reporting period were completed during the reporting period of 2018. These items are included within **Table 5.1**.

Table 5.1 Actions required from 2017 Annual Review

Activity to be Undertaken During the 2018 Report Period	Status as at 31 December 2018	Comment
Undertake quarrying operations as detailed in Section 4 of the 2017 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'	Complete	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.
Address non-compliances identified in the Independent Environmental Audit	Complete	See Table 10.1 of this document.
On request of RMS, install an Intersection Advanced Warning Sign on the corner of Duckmaloi Road and Titania Road in consultation with Oberon Council's Technical Services Director	Complete	See Section 4.3 of this document.
Lodge the Rehabilitation Bond in accordance with Condition 25 of Schedule 3 of the Development Consent.	Complete	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.
Undertake ecological monitoring during the reporting period.	Incomplete	See Section 6.8 and Section 11.0 of this document.

Activity to be Undertaken During the 2018 Report Period	Status as at 31 December 2018	Comment
Undertake monitoring of future rock popping event to validate overpressure and vibration site law.	Not Triggered	No rock popping events were undertaken during the reporting period. Validation of the site law will be undertaken when a future rock popping event occurs.
Update Oberon Quarries website, as required.	Complete	Refer to Oberon Quarries website - http://oberonquarries.com.au/
Preliminary action from DPE - Identify variations from proposed LRMP activities during the reporting period and reasons for these, and include key issues that may affect successful rehabilitation, in accordance with Section 8.0 of the Department's Annual Review Guideline (October 2015).	Complete	See Section 8.0 and Section 11.0 of this document.
Preliminary action from DPE - Include blasting days and times within the Annual Review.	Complete	See Section 6.4 of this document.
Preliminary action from DPE - Provide details of community contributions in accordance with Section 9.0 of the Department's Annual Review Guideline (October 2015).	Complete	See Section 9.0 of this document.
Preliminary action from DPE - Upload a copy of Oberon Quarries 2017 Independent Environmental Audit on the Company Website	Ongoing	Oberon Quarries has yet to receive approval of the 2017 Independent Environmental Audit report from DPE. As a result, the final document has not been published to the company website.

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 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. Predictions 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 NSW Industrial Noise Policy (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 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 approved 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.

6.1.5 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.

6.1.6 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.

6.1.7 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.

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)
- ▭ Processing Plant
- Private Residence
- Residence Owned by Oberon Quarries/Associated with Oberon Quarry
- Depositional Dust Gauge Location
- Surface Water Monitoring Location
- Groundwater Monitoring Location
- Noise Monitoring Location
- Blast Monitoring Location

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 to 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 was amended to reflect monitoring changes approved by the Secretary in March 2017. A subsequent amendment to the Noise Management Plan outlining the noise incident response process was submitted to DPE for approval in May 2018.	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	Oberon Quarries was compliant with the SSD_6333 Air Quality criteria and conformed to EIS Predictions during the reporting period. Refer to Section 6.3 .	Dust monitoring results across the four monitoring locations remained generally consistent with previous results. No complaints relating to air quality were received during the reporting period.	Oberon Quarries have: - provided additional awareness training to personnel regarding environmental management and monitoring commitments and - completed a review of site procedures and communication plans to ensure they are current and appropriate for the current operations.

Aspect	Approval Criteria/ EIS Prediction	Performance during the reporting period	Trend / key management implications	Proposed additional management actions
Blasting	Refer to Section 6.1.3	There was one blasting event which exceeded lower limit blast performance criteria during the reporting period. The event occurred on 22 January 2018. Refer to Section 6.4 .	See Section 6.4.4 for further detail.	Oberon Quarries established an agreement with the nearest residential receiver in accordance with the Development Consent during the reporting period. Further detail in the revisions made to blast management practices are detailed in Section 6.4.4 .
Heritage	Refer to Section 6.1.7	There were no activities in relation to heritage undertaken during the report period. Refer to Section 6.11 .	N/A	N/A
Water Quality	Refer to Section 6.1.4	Oberon Quarries were compliant with SSD_6333 surface water and groundwater quality criteria during the reporting period. Water quality monitoring results also confirmed to EIS predictions. Refer to Section 6.5 and 7.0 .	See Section 6.5 and Section 6.6 for further detail.	No additional mitigation measures or monitoring procedures are proposed to be implemented which are outside that detailed in the WMP (Umwelt, 2017c). EPL 4442 was modified in May 2018 to removed surface water monitoring locations W1 and W2 and add monitoring location W3 (EPL Monitoring location 7). Further details of this change are provided in Section 6.5 .
Rehabilitation	Refer to Section 6.1.5	No additional rehabilitation works undertaken during the reporting period. 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 LRMP (Umwelt, 2017d).

Aspect	Approval Criteria/ EIS Prediction	Performance during the reporting period	Trend / key management implications	Proposed additional management actions
Meteorological	Refer to Section 6.7	Compliant	Meteorological data was obtained from the Bureau of Meteorology's Meteorological Station (Albion Street) located approximately 10 km north of the Quarry. Note this Meteorological Station failed to record during July and August 2018. As a result, Oberon Quarries utilised the Bureau of Meteorology's Meteorological Station (Jenolan Caves Road), located approximately 10km south, during this period.	Oberon Quarries will continue to monitor meteorological conditions at the Bureau of Meteorology's Meteorological Station (Albion Street).

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 is conducted at four monitoring locations (NM1 to NM4) surrounding the Quarry (refer to **Table 6.2**) as required under the conditions of the noise agreement discussed in **Section 6.2.1**.

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

Noise monitoring was last undertaken on 10 February 2017 at the locations shown in **Table 6.2**. No noise monitoring has been undertaken at these locations since this time in accordance with the approved noise agreements with relevant landowners.

As discussed in **Section 4.0**, operations undertaken at Oberon Quarry have remained generally consistent with previous years. Extraction continued in both the northern and southern extents of the approved extraction boundary using the existing earthmoving equipment available on site. The extraction rate of the operation has also remained and within the limits outlined in SSD_6333. Oberon Quarry will resume noise monitoring in accordance with the NMP and the noise agreement following the receipt of noise related complaints received against Oberon Quarry or requests for increased frequency of noise monitoring made by surrounding landowners.

6.2.5 Trends in Data

No noise monitoring was undertaken by Oberon Quarry during the reporting period as it was not triggered by noise related complaints or a request for increased noise monitoring frequency as outlined in the noise monitoring agreement established with adjacent Landowners in accordance with Schedule 3, Condition 3 of the Development Consent.

Oberon Quarry has not received any complaints since 2010. A noise inquiry was made to Oberon Quarries during October 2018. Correspondence regarding the matter was provided to DPE. No further action has been requested or undertaken.

The noise impacts of Oberon Quarry are expected to be consistent with previous reporting periods.

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, 2017a) 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 6.4** 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 SSD_6333 are set out in **Table 6.4**.

Table 6.4 Air Quality Criteria

Pollutant	Averaging Period	Criterion	
Particulate matter < 10 µm (PM ₁₀)	Annual	^{a,d} 30 µg/m ³	
Particulate matter < 10 µm (PM ₁₀)	24 hour	^b 50 µg/m ³	
Total suspended 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 (4g/m²/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 g/m²/month at all gauges, assuming a background of 2 g/m²/month, which is considered to be typical of a rural location. There were no complaints received in relation to dust during the reporting period.

Oberon completed deposited dust monitoring on thirteen occasions due to exposure period anomalies. Comparison of results (i.e. twelve samples versus thirteen), did not identify a significant difference in the annual average for the number of samples.

The deposited dust monitoring results for the reporting period, including annual averages are shown in **Table 6.5**.

Table 6.5 2018 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
Criteria g/m ² /month Annual Average	4	4	4	4
January 2018	1.9	NS*	1.3	2.8
February 2018	3.4	3.6	1.8	2.0
March 2018	3.8	1.6	1.3	3.6
April 2018	2.4	2.0	1.1	1.2
May 2018	3.4	2.6	1.6	2.2

Sample Date	D1	D2	D3	D4
	g/m ² /month	g/m ² /month	g/m ² /month	g/m ² /month
June 2018	3.7	1.2	1.3	1.6
July 2018	3.3	1.7	3.8	1.2
August 2018	1.5	0.4	0.5	3.7
August 2018 [#]	3.5	2.0	1.2	3.9
September 2018	1.6	1.0	1.4	1.6
October 2018	1.1	1.1	0.7	1.6
November 2018	0.5	1.9	2.0	2.3
December 2018	3.1	1.2	1.3	3.5
Annual Average 2018	2.6	1.7	1.5	2.4
Compliance with Criterion	Yes	Yes	Yes	Yes

NS* Air quality sample for D2 during January 2018 was unavailable due to the monitoring location being damaged by livestock. Oberon Quarry reinstated the monitoring location prior to the February monitoring period.

[#] Two results recorded in calendar month due to successive exposure periods of less than 30 days.

6.3.4 Trends in Data

Table 6.6 shows the Annual average dust deposition levels for the 2013 to 2018 period. This information is also presented graphically in **Appendix 1**. The annual average dust deposition levels recorded at the Quarry during 2018 are within the range of results recorded in the previous five 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 6.6 Annual averages for dust deposition 2013 – 2018

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
2018	2.6	1.7	1.5	2.4

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, 2018b) which sets out the criteria, monitoring procedures and management measures for blasting (i.e. airblast overpressure and ground vibration).

Oberon Quarries established a blasting agreement with the nearest private receiver and notified the DPE of this on 17 April 2018. This agreement removes the requirement to monitor each blast and notify the affected receiver(s) and government departments within seven days of an exceedance of the blast criteria. While no longer required, blast monitoring has continued 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 114 dBL and a ground vibration of 1.7 mm/s at a distance of 400 m.

6.4.3 Performance Criteria

The blast impact assessment criteria specified in the EPL 4442 and SSD_6333 are set out in **Table 6.7**.

Please note, as discussed in **Section 6.4.1**, Oberon Quarries has established a blast agreement with the nearest private receiver and is no longer formally required to monitor each blast event.

Table 6.7 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 five production blasts were undertaken during the reporting period. The blast monitoring results for the reporting period are presented in **Table 6.8**.

During the reporting period, one exceedance of the overpressure lower limit of 115 dBL was recorded (i.e. the blast undertaken on the 22 January 2018). Due to the small number of blasts undertaken by the Quarry during the calendar year, this resulted in an exceedance of the 5% allowance for the number of blasts above 115 dBL.

Oberon Quarries received no complaints as a result of blasting during the reporting period.

The private landholder was also notified of the exceedance in accordance with Schedule 4, Condition 1 of the consent. Oberon Quarries established a blast agreement with the nearest residential receiver during 2018 in accordance with the Development Consent.

Table 6.8 Blast Monitoring Results for Oberon Quarry

Date / time	Air Blast Overpressure (dB (Linear Peak))	Ground Vibration (mm/s)	Complied with Blasting Criteria
22 January 2018 / 12:28	117.90	3.26	Yes
20 February 2018 / 12:44	110.20	1.15	Yes
9 April 2018 / 12:39	107.00	0.76	Yes
16 July 2018 / 15:10	108.00	0.81	Yes
21 October 2018 / 12:27	107.50	0.65	Yes

6.4.5 Trends in Data

Appendix 1 shows the production blast monitoring results for the 2014 to 2018 period. During the period 2014 to 2018, only one blast has been recorded above the upper criteria limit (i.e. 19 July 2017) and one blast has been recorded above the lower criteria limit (i.e. 22 January 2018) for peak overpressure (dBL) set out in **Table 6.7**. The vibration levels for all blasts during the 2014 to 2018 period were typically well below the specified criteria limit.

6.4.6 Proposed Improvements

No additional management or mitigation measures are proposed to be implemented which are outside the approved BMP. Oberon Quarry continues to reiterate to Orica (i.e. the blasting contractor) the importance of designing, managing and monitoring its blasting activities in accordance with the BMP.

6.5 Surface Water

6.5.1 Environmental Management Measures

Surface water management is undertaken in accordance with the approved WMP (Umwelt, 2017c) and Environment Protection Licence (EPL 4442). The WMP sets out water quality trigger concentrations levels for monitoring points W1 (formerly EPL Monitoring Point 5) and W2 (formerly EPL Monitoring Point 6), mitigation measures and monitoring procedures for the management of surface water and groundwater. Water quality trigger concentration levels for surface water monitoring point W3 (EPL Monitoring Point 7) are defined in EPL 4442.

EPL 4442 was varied on 2 May 2018 to include the addition of Monitoring Point 7 (W3) and associated monitoring requirements. W3 is located on the Oberon Quarries Sediment Dam 3.

Monitoring Points 5 and 6 and associated monitoring requirements were removed as part of this EPL variation on 2 May 2018. However, these locations will continue to be monitored (as W1 and W2, respectively) in accordance with the approved WMP.

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 SSD_6333 requirements. The approved WMP outlines trigger concentration levels for surface water monitoring locations W1 (Upstream) and W2 (downstream) on Racecourse Creek. Trigger limits for W3 were established in the variation to EPL 4442 in May 2018. **Table 6.9** presents the trigger concentration limits specified in the WMP and EPL.

Table 6.9 Water Management Plan and EPL Surface Water Trigger Concentration Levels

WMP Monitoring Points W1 and W2	
Pollutant	Trigger Concentration Level
pH	>8.5
Conductivity	>300 µS/cm
Turbidity	>450 NTU
Total suspended solids – monitored as non-filterable residue (NFR)	N/A*
Total nitrogen (TKN)	>4.5 mg/L
Total Phosphorus (TP)	>0.8 mg/L
Oil & Grease (monitored as TPH)	>5 mg/L
W3 (EPL Monitoring Point 7)	
Pollutant	Trigger Concentration Level
pH	6.5 – 8.5
Oil & Grease (monitored as TPH)	>10 mg/L
Total suspended solids – monitored as non-filterable residue (NFR)	>50 mg/L

Note: No concentration limit has been defined for total suspended solids under the approved WMP (Umwelt, 2017c). In accordance with the approved WMP, exceedance of trigger levels at W1 or W2 on two consecutive occasions will initiate an investigation into the changes in water quality.

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).

In accordance with Condition L2.1, surface water monitoring at W3 is only required during a licenced discharge event. There were no discharge events at Oberon Quarry during the reporting period and therefore no samples collected from W3.

Oberon completed surface water quality monitoring at W1 and W2 on thirteen occasions during the reporting period as two sampling events were completed in August during 2018. Comparison of results did not identify a significant difference in the annual average regardless of including twelve samples versus thirteen.

A summary of water quality monitoring results for the reporting period are provided in **Table 6.10**.

Table 6.10 Water Quality Monitoring Results during 2018

Sampling date	pH	Conductivity	Turbidity	TSS	TKN	TP	TPH
Trigger Concentration Level	>8.5	>300 uS/cm	>450 NTU	N/A	>4.5 mg/L	>0.8 mg/L	>5 mg/L
W1 – Upstream (EPL point 5)							
January 2018 [#]	-	-	-	-	-	-	-
February 2018	7.1	135	5.9	13	0.6	<0.1	<0.5

Sampling date	pH	Conductivity	Turbidity	TSS	TKN	TP	TPH
February 2018*	6.9	150	4.0	60	0.4	<0.1	<0.5
March 2018	7.0	150	9.9	12	0.3	<0.1	<0.5
April 2018	7.1	120	3.9	<2	0.6	<0.1	<0.5
May 2018	7.3	125	7.4	4	0.4	<0.1	<0.5
June 2018	7.3	115	30.0	7	1.3	<0.1	<0.5
July 2018	7.2	100	27.0	8	0.5	<0.1	<0.5
August 2018	7.1	110	6.2	4	0.5	<0.1	<0.5
August 2018*	7.2	155	28.0	43	0.6	0.1	<0.5
September 2018	7.1	95	9.7	5	0.6	0.1	<0.5
October 2018	6.9	120	13.0	16	0.6	0.1	<0.5
November 2018	6.7	85	24.0	16	1.7	0.1	<0.5
December 2018	7.1	170	6.8	7	1.1	0.1	<0.5
Compliance with Trigger Concentration Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes
W2 – Downstream (EPL point 6)							
January 2018 [#]	-	-	-	-	-	-	-
February 2018	7.1	135	6.5	15	0.6	0.1	<0.5
February 2018*	6.9	150	7.8	23	0.5	0.2	<0.5
March 2018	7.0	150	5.7	8	<0.1	<0.1	<0.5
April 2018	7.0	120	5.0	10	0.4	0.1	<0.5
May 2018	7.5	125	21.0	37	0.3	<0.1	<0.5
June 2018	7.2	125	31.0	10	1.2	<0.1	<0.5
July 2018	7.1	100	27.0	16	0.6	<0.1	<0.5
August 2018	7.2	110	6.8	16	0.5	<0.1	<0.5
August 2018*	7.2	155	14.0	21	1.2	<0.1	<0.5
September 2018	7.0	95	9.6	5	0.8	0.1	<0.5
October 2018	7.0	120	9.1	16	0.6	0.2	<0.5
November 2018	6.9	85	29.0	10	2.2	0.2	<0.5
December 2018	6.4	160	6.4	6	1.3	<0.1	<0.5
Compliance with Trigger Concentration Level	Yes	Yes	Yes	NA	Yes	Yes	Yes

Note: < denotes monitoring results are below detection limit.

No sample collected during January 2018.

*Multiple samples collected during the calendar month

6.5.4 Trends in Data

Water quality results for the period 2013 to 2018 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 6.10**. 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 generally 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 2017 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). With the exception of a spike in July, 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 - 2017 years. The long term linear trend shows a slight increase in surface water conductivity (see **Appendix 1**).

Turbidity

Turbidity results for the reporting period ranged between 4.0 NTU and 30 NTU at monitoring point W1 and 5.0 NTU and 29 NTU at monitoring point W2. The results recorded during the reporting period are within the range of results for the previous five 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 60 mg/L at monitoring point W1 and 5 mg/L to 37 mg/L at monitoring point W2.

A higher than typical baseline result was recorded in February, with the upstream result being higher than downstream, 60 and 23 mg/L respectively. Both sites remained within the range of results for the previous four years.

The monitoring result recorded at W2 (37 mg/L) was also higher than the upstream result (4 mg/L) and the typical baseline during May. However this remained within the range of results for the previous four years. Oberon Quarries did not discharge any water from site during the May sampling period which may have influenced the downstream TSS value relative to the upstream TSS value. Furthermore, it is understood that no other activities such as ground disturbance were undertaken by Oberon Quarry to influence surface water quality values at this time.

One result at W1 was 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 - 2017 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 0.3 mg/L to 1.7 mg/L at monitoring point W1 and 0.3 mg/L and 2.2 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 0.13 mg/L at monitoring point W1 and 0.1 mg/L to 0.15 mg/L at monitoring point W2. All but eight 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 five years, are well below the trigger level of 5 mg/L and are consistent with the long term trend (see **Appendix 1**).

TPH

The reported TPH levels at the upstream (W1) and downstream (W2) monitoring locations were less than the limit of detection (i.e. <0.5mg/L) for the entire reporting period. These levels are below the trigger level of 5mg/L. The results recorded during the reporting period 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, 2017c).

6.6 Groundwater

6.6.1 Environmental Management Measures

Groundwater monitoring is undertaken in accordance with the approved WMP (Umwelt, 2017c) 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 the Quarry's operations and its proximity to potential groundwater sources, the quantity of groundwater has not been directly monitored. Groundwater quantity is 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 SSD_6333 or EPL 4442. Groundwater monitoring results are reviewed against historic monitoring results to detect any trends in data. The Oberon Quarry WMP (Umwelt, 2017c) 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, 2017c). These concentration limits are provided in **Table 6.11**.

Table 6.11 Groundwater Trigger Concentration Levels

Pollutant	Concentration limit
pH	> 9.2
Conductivity	> 450 μ S/cm

6.6.3 Groundwater Monitoring Outcomes

During the reporting period, groundwater quality monitoring was conducted on thirteen occasions. These results are presented in **Table 6.12**. A discussion of the 2018 groundwater monitoring results and long term trends is included in **Section 6.4.5**.

Oberon completed groundwater quality monitoring at GW1 on thirteen occasions during the reporting period. As two sampling events were completed in August during 2018, comparison of results did not identify a significant difference in the annual average regardless of including twelve samples versus thirteen.

Table 6.12 Groundwater Quality Monitoring Results during 2018

Sampling Date	pH	Conductivity (μ S/cm)
January 2018 [#]	-	-
February 2018 [*]	7.1	280
February 2018	7.0	300
March 2018	7.0	280
April 2018	7.2	270
May 2018	7.0	270
June 2018	7.3	240
July 2018	7.0	210
August 2018	7.2	230
August 2018 [*]	7.4	215
September 2018	7.2	190
October 2018	7.0	200
November 2018	7.5	200
December 2018	7.1	150
Compliance with Trigger Concentration Level	Yes	Yes

[#] No sample collected during January 2018. ^{*} Multiple samples collected during the calendar month

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 maximum monitoring result of 300 $\mu\text{S}/\text{cm}$ in February 2018 was within the range of maximum conductivity results for the previous five years and reflects the annual trend of the maximum conductivity result occurring during the summer period.

Oberon Quarries has undertaken groundwater quality monitoring since 1996. The results for the period 2013 - 2018 are presented graphically in **Appendix 1**.

The 2018 pH and conductivity trends are generally consistent with the 2013 to 2017 trends.

The long term pH trend is of a progressive increase in value throughout the reporting period, reaching a peak late in the calendar year (i.e. between September and December). The 2018 peak pH of 7.5 recorded in November was however lower than the maximums recorded during the same period for the previous four years, where maximums between pH 8 – 9 were recorded. Outside of this annual peak, the pH level ranges between approximately 6.75 and 7.5 and generally showed an alternating sequence of high and low results between successive months. 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. During 2018, the results show a general decline from a maximum in February of 280 $\mu\text{S}/\text{cm}$ to a minimum of 150 $\mu\text{S}/\text{cm}$ in December 2018. The long term linear trend shows a slight increase in groundwater conductivity. Conductivity and pH levels during 2018 were below trigger concentration levels. Groundwater monitoring in 2019 will continue to be undertaken in accordance with the water 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, 2017c).

6.7 Meteorological Monitoring

Meteorological data was obtained from the Bureau of Meteorology's (BOM) Oberon (Albion Street) Weather Station located in the vicinity of the Quarry. A summary of the monthly meteorological monitoring results are presented in **Table 6.13**.

6.7.1 Rainfall

The Quarry received approximately 599.6 mm of rainfall over 144 rain days during the report period. The highest total monthly rainfall occurred during November 2018 (128.6 mm) while March had the lowest total monthly rainfall recording of 5 mm.

Results were not recorded at the Albion street weather station between 16 July and 29 August 2018 due to an unidentified failure of the BOM operated weather station. Rainfall received at the nearby, BOM operated Jenolan Caves Road weather station totalled 47 mm during this period.

A summary of total monthly rainfall data is provided in **Table 6.13**.

6.7.2 Temperature

The mean maximum temperature recorded during the reporting period occurred during January (27.7 °C) and the lowest mean temperature occurred in July (-1.1°C). Monthly mean temperatures are provided in **Table 6.13**. Rainfall is relatively evenly spread throughout the year, at approximately 70mm ±10 mm per month.

Table 6.13 Oberon Quarry Summary of Meteorological Data

Month	Total Rainfall (mm)	No of rain days	Air temp (°C)	
			Mean Minimum	Mean Maximum
January 2018	54.8	13	12.8	27.7
February 2018	50	9	10.7	24.8
March 2018	29	5	10.2	23.3
April 2018	7.4	9	7.7	21.6
May 2018	33.3	15	2.1	14.3
June 2018	66.4	22	1.8	9.6
July 2018*	6	3	-1.1	9.7
August 2018*	41	9	1.8	12.6
September 2018	58.3	15	2.4	14.7
October 2018	53.2	19	6	18.4
November 2018	128.6	17	7.7	20.4
December 2018	71.6	8	10.7	25.2
Total	599.6*	144*	-	-

Source: Bureau of Meteorology Oberon (Albion Street) Meteorological Station.

(http://www.bom.gov.au/climate/averages/tables/cw_063063.shtml)

*Rainfall data sourced from Bureau of Meteorology Oberon (Jenolan Caves Road) Meteorological Station during July and August as no data collected at the Oberon (Albion Street) Meteorological Station for the period 16 July – 29 August 2018.

6.8 Ecology

Ecological and rehabilitation monitoring will be undertaken in accordance with the approved LRMP (Umwelt, 2017d) which sets out management measures and monitoring procedures for the management ecology and rehabilitation.

Residual vegetation monitoring plots (analogue sites) were not established during the reporting period in accordance with Section 7.1 of the LRMP and 2017 Annual Return commitment. These analogue sites

would be used to identify any deterioration or improvement in habitat quality during the life of the operation as well as provide a comparison when assessing the performance of rehabilitation sites.

6.8.1 Proposed Improvements

Following consultation with Oberon Quarries' ecology consultant, it is proposed that the trigger for commencing this monitoring should be linked to the commencement of rehabilitation works. As such, Oberon Quarries will establish the analogue references sites between three and five years prior to the commencement of rehabilitation. This timeframe will allow some seasonal and natural variability to be recorded and considered when determining the rehabilitation completion goals.

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.

6.10 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; and
- 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.

6.11 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, 2017c). 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 8,150 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 1,600 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 8,150 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. As discussed in **Section 4.3**, Oberon Quarries have also installed two 11 KL water tanks to provide contingency water supply for dust suppression as holdings in the existing sediment dams has become limited by prolonged dry weather. Storage Dam 3 remained dry throughout most of the reporting period and did not discharge any water to the environment.

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 2 ML 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.

Erosion and sediment control structures adjacent the Oberon Quarry access road were realigned to accommodate the duplication of the internal haul road during the reporting period. The capacity and design principles applied to these structures were not modified as they were only shifted a short distance to capture runoff from the additional road width and alignment.

No de-silting of erosion and sediment control structures was required during the reporting period as deposition was limited by a lack of rainfall. Oberon Quarries continued to monitor the condition of erosion and sediment control structures during the reporting period in anticipation of potential rainfall events.

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**. Temporary seeding was undertaken on the topsoil bund opportunistically to establish or enhance ground cover and reduce the potential for loss of soil substrate. Material from the bund is planned for use in the final rehabilitation of the site following the completion of quarrying operations.

Oberon Quarry is currently extracting basalt from above the band of clay interburden material. This clay interburden will be utilised as a growth medium on the pit floor once extraction is complete across a sufficient area. With consideration of current extraction rates, it is envisaged that rehabilitation of the bench and extraction area will commence in approximately 9 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 2018

Mine Area Type	Previous reporting period (actual) 2017 (ha)	This reporting period (actual) 2018 (ha)	Next reporting period (forecast) 2019 (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

The total active disturbance footprint of the operation remained unchanged during the reporting period as operations progressed within the established first bench. As a result, the total quarry footprint '2017 previous reporting period' area in **Table 8.1** will remain unchanged. Furthermore, it is forecast that there will be no additional ground disturbance undertaken during the 2019 reporting period.

Oberon Quarries undertook weed spraying activities during the reporting period in order to limit the spread and colonisation of weeds. The weed control program is undertaken in accordance with the approved LRMP (Umwelt, 2017d) and includes regular inspections of the Quarry area to confirm potential weed

infestations, implementation of weed management measures and the subsequent inspections of infested areas to assess weed control effectiveness.

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 LRMP (Umwelt, 2017d). It is envisaged that rehabilitation will commence in approximately 9 years. During the intervening period, extraction will continue with the same environmental controls as have been utilised over the past 24 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 LRMP (Umwelt, 2017d).

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 LRMP (Umwelt, 2017d). There has been no renovation or removals of buildings and no new rehabilitation areas established during the 2018 reporting period.

8.4 Rehabilitation Actions for the 2019 Reporting Period

During 2019, rehabilitation works will involve:

- temporary rehabilitation works including seeding bund walls;
- continued implementation of an environmental checklist to assist in environmental management; and
- weed spraying and pest management as required.

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 made donations and sponsorship to the following local organizations during the reporting period:

- Oberon Tigers Rugby League Club
- Oberon Agricultural Show.

9.2 Complaints

No community complaints have been received by Oberon Quarry since 2010. Oberon Quarry received a noise enquiry via DPE during 2018. Correspondence regarding the matter was provided to DPE. Oberon Quarry maintains a complaints register to record and respond to complaints received from the community.

Oberon Quarries has an EMS (Umwelt, 2018a) which details complaints handling and dispute resolution procedures. The EMS was approved by the DPE in February 2018. 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 Independent Environmental Audit (IEA) was conducted during the 2017 reporting period to address the requirements of Schedule 5, Condition 10 of the Development Consent. 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 and the majority addressed during the 2017 reporting period. The status of each remaining action during 2018 is detailed in **Table 10.1** below.

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

Table 10.1 Outstanding IEA actions completed during 2018

Relevant Approval	Condition No.	Condition Description (Summary)	Compliance Status (at time of IEA)	Comment/Actions taken	Status at End of 2018 Reporting Period	Addressed in Annual Review
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	The rehabilitation bond calculation was submitted on 23 March 2018, and approved by DPE on 5 April 2018. The rehabilitation bond was lodged with DPE in April 2018.	Complete	Section 8.0 and Section 11.0
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	Non-compliant	"Intersection Advance" (G1-207) warning signage had not been installed on the eastbound approach to the intersection of Duckmaloi and Titania Roads prior to the IEA. Signage was subsequently installed in April 2018.	Complete	Section 4.3
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	There was one blasting event which exceeded blast performance criteria during the reporting period. The event occurred on 19 July 2017. – No further action required. A blast agreement was established between Oberon Quarries and the nearest sensitive receiver during the reporting period.	Complete	Section 6.4

11.0 Incidents and Non-compliances during the Report Period

There were 19 non-compliances at Oberon Quarries during the 2018 report period (see **Section 1.0**). The majority relate to a failure to undertake routine environmental monitoring at the appropriate interval during January, February and April 2018. The Quarry included details of actions implemented to address this monitoring issue in notification to DPE provided following the event.

Following the IEA undertaken in 2017, a series of administrative non-compliances were identified at the Quarry. During 2018, the Quarry addressed all remaining issues identified during the audit and have completed rectification works.

Oberon Quarries' did not activate its Pollution Incident Response Management Plan (Umwelt, 2018d) during the reporting period.

A description of each environmental incident is summarised in **Table 1.1** and detailed below. A summary of outstanding IEA Actions is included in **Table 10.1**.

Air Quality

The sampling period for the January, February and April 2018 deposited dust monitoring rounds were not undertaken in accordance with the 30 ± 2 days exposure period, being 42, 18 and 22 days respectively, due to availability of personnel to undertake monitoring. This is outside the 30 ± 2 days exposure period specified in the *AS/NZS 3580.10.2003 : Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method* and Schedule 3, Condition 10 of SSD_6333.

A review of the January, February and April 2018 dust monitoring results show they are below the 4 g/m²/month criteria at all four monitoring locations. Oberon Quarries also note that no complaints were received during this period.

The incident was investigated and reported to DPE upon identification. Oberon Quarries has since provided additional training to monitoring personnel and updated procedural and communication processes related to air monitoring. Oberon Quarries have also obtained and stored additional monitoring equipment at the Quarry which can be utilised to ensure exposure periods for dust gauges are in accordance with relevant standards.

The deposited dust sample for gauge D2 was unavailable during January 2018 due to the monitoring location being damaged by livestock. Monitoring results were therefore not produced at this monitoring location in January. This monitor was reinstated prior to the February monitoring period.

Blasting

During the reporting period, one exceedance of the overpressure lower limit criteria of 115 dBL was recorded (i.e. the blast undertaken on the 22 January 2018). As there were only five blasts undertaken during the reporting period, this one exceedance by default resulted in an exceedance of the 5% allowance for the number of blasts above 115 dBL as detailed in Schedule 3 Condition 6 of SSD_6333.

In recognition of the proximity of this blast to the approved monitoring location (i.e. nearest private residential receiver), Oberon Quarries had modified its typical blast design to minimise the potential blast impacts by reducing the volume of explosives used and reducing the depth of each blast hole.

Investigation of the matter revealed the blast monitor was placed approximately 340 metres closer to the Quarry than the approved monitoring location described in the BMP. This would have likely contributed to the elevated overpressure level recorded. This failure to monitor at the prescribed monitoring location is also captured as a non-compliance in **Table 1.3**.

There were no complaints received or reports of physical impact to private property as a result of the 22 January 2018 blast. The EPA and DPE were notified of the matter in a letter dated 2 May 2018, in anticipation of the likely non-compliance with Schedule 3 Condition 6 of the SSD_6333 due to the low number of blasts typically undertaken at Oberon Quarry each year.

Oberon Quarries completed a review of procedural and communications systems, provided additional training to relevant personnel regarding the appropriate monitoring location and blast impact criteria. Oberon established a blast agreement with the nearest residential receiver in accordance with SSD_6333 and notified DPE in April 2018. This agreement removes the requirement to comply with the overpressure and ground vibration criteria levels specified in Schedule 3, Condition 6 of SSD_6333. This agreement also removes the formal requirement to monitor each blast and any associated incident reporting required by Schedule 5, Condition 7 of SSD_6333, should the blasting criteria be exceeded.

A revised Blast Management Plan was provided on 22 May 2018, which reflects the above. DPE however has not confirmed the Secretary's satisfaction with the revised plan.

Surface Water

During 2018, Oberon Quarries was non-compliant with the monthly sampling of surface water at locations W1 (Upstream) and W2 (downstream). The first surface water sample was collected on 1 February 2018. No surface water samples were collected in January. However two sampling events were undertaken in February 2018.

Sampling was not undertaken during January due to availability of trained personnel to undertake surface water monitoring. Oberon Quarries notes that no community complaints relating to surface water quality were received during the period December 2017 to February 2018.

The incident was investigated and reported to DPE upon identification. Oberon Quarry has since provided additional training to monitoring personnel, updated procedural and communication processes related to surface water monitoring and holds additional monitoring equipment as contingency should the environmental monitoring contractor be unavailable.

Groundwater

The groundwater monitoring sample at location GW1 was not collected during January 2018 in accordance with the monthly sampling frequency required in Section 5.2 of the Oberon Quarry WMP, as the environmental monitoring contractor was not available. The first groundwater sample was collected on 1 February 2018. This resulted in no sampling events in January and two sampling events being undertaken in February.

The results for samples collected in December and February were below the trigger levels described in Section 5.3 of the WMP and also within the range of previous results.

The incident was investigated once identified and reported to DPE. Oberon Quarry has since provided additional training to monitoring personnel, updated procedural and communications process related to groundwater monitoring and stockpiled additional monitoring equipment as contingency to future unavailability of monitoring personnel. No further action has been requested or undertaken.

Rehabilitation

In accordance with Condition 26 Schedule 3 of SSD_6333, lodgement of a rehabilitation bond is required within 3 months of each IEA. Oberon Quarries completed an IEA in January 2017 and the report was provided to Oberon Quarries on 17 July 2017. This therefore necessitated the review and lodgement of the rehabilitation bond to DPE by 17 October 2017.

Due to unforeseen circumstances, the approval of a qualified expert was delayed until 16 January 2017. A revised rehabilitation bond calculation lodgement due date of 23 March 2018 was agreed with DPE and lodgement of the rehabilitation bond calculation made to the Department on this date.

The Oberon Quarry rehabilitation bond calculation was approved by DPE on 5 April 2018 and rehabilitation bond lodged in April 2018. The next review of the LRMP will be triggered following completion of the 2018 Annual Review in accordance with Condition 5 Schedule 5 of SSD_6333. Should any revisions be made to the LRMP, revision of the rehabilitation bond will be undertaken within 6 months of its approval by DPE.

Residual vegetation monitoring plots (analogue sites) were not established during the reporting period. In accordance with Section 7.1 of the LRMP, Oberon Quarries will use analogue sites to identify any deterioration or improvement in habitat quality during the life of the operation as well as provide a comparison when assessing the performance of rehabilitation sites.

Following consultation with Oberon Quarries' ecology consultant it is proposed that the trigger for commencing this monitoring should be linked to the commencement of rehabilitation works. As such, Oberon Quarries will establish the analogue references sites between three and five years prior to the commencement of rehabilitation. This timeframe will allow some seasonal and natural variability to be recorded and considered when determining the rehabilitation completion goals.

12.0 Activities to be completed in the Next Period

Oberon Quarries proposes to undertake the following activities during the 2019 report period:

- ongoing extraction of primarily the first bench and extraction from the second bench at the northern and southern ends of the Quarry;
- possibly commencing extraction of the third bench in the west end of the Quarry;
- Update LRMP with revised timeline for commencement of ecological monitoring program;
- publish the Noise, Air Quality and Landscape and Rehabilitation Management Plans approved by DPE under letter dated 8 November 2018;
- confirm DPE satisfaction with the updated Blast Management Plan
- 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 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.); and
- complete installation of new screens in the crushing plant.

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 (2018a). Oberon Quarry Environmental Management Strategy. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2018b). Oberon Quarry Blast Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2018c). Oberon Quarry Transport Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2018d). Oberon Quarry Pollution Incident Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2017a). Oberon Quarry Air Quality Management Plan. Prepared for Oberon Quarries Pty Limited.

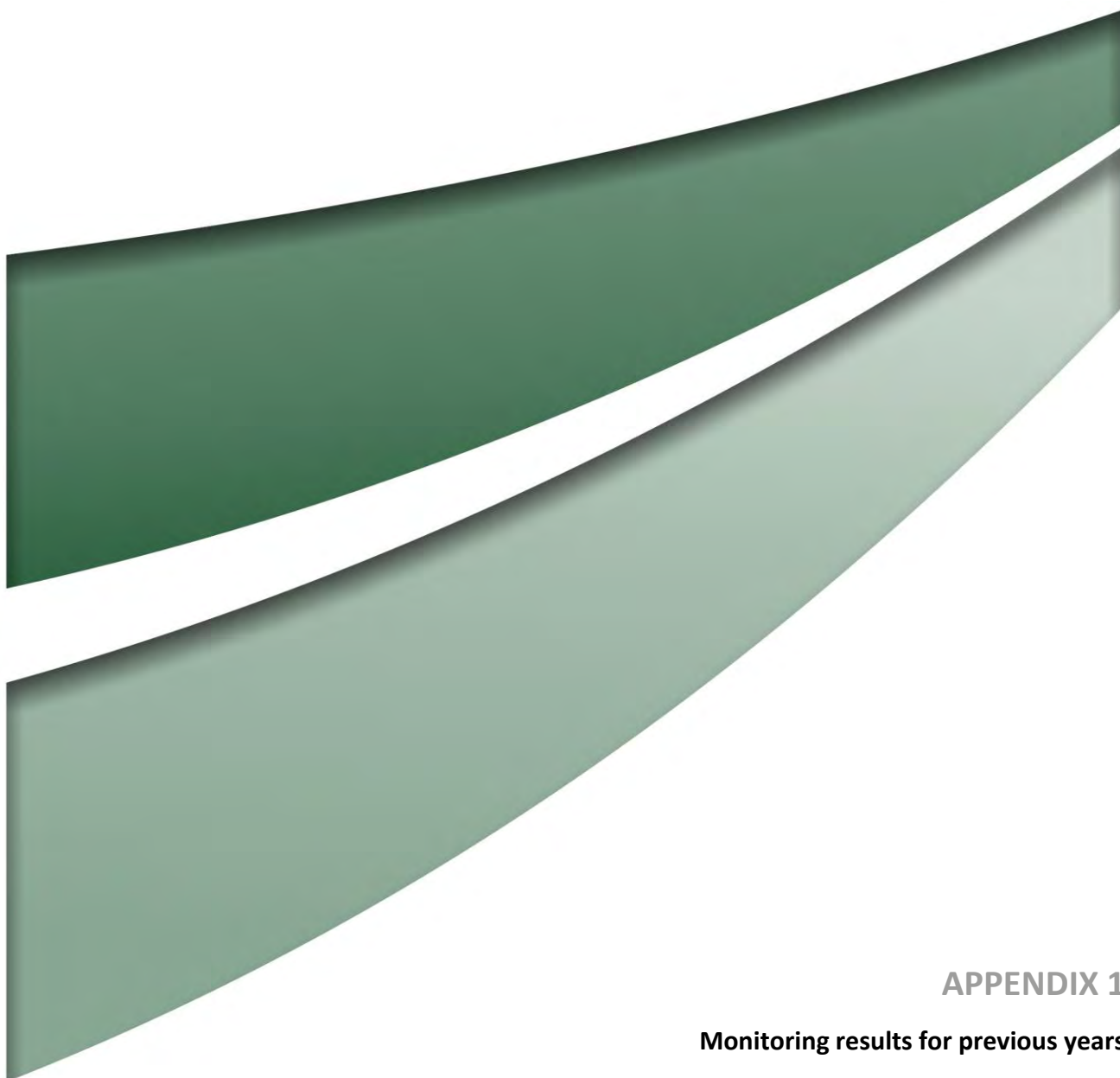
Umwelt (Australia) Pty Limited (2017b). Oberon Quarry Noise Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2017c). Oberon Quarry Water Management Plan. Prepared for Oberon Quarries Pty Limited.

Umwelt (Australia) Pty Limited (2017d). Oberon Quarry Landscape and Rehabilitation Management Plan. Prepared for Oberon Quarries Pty Limited.

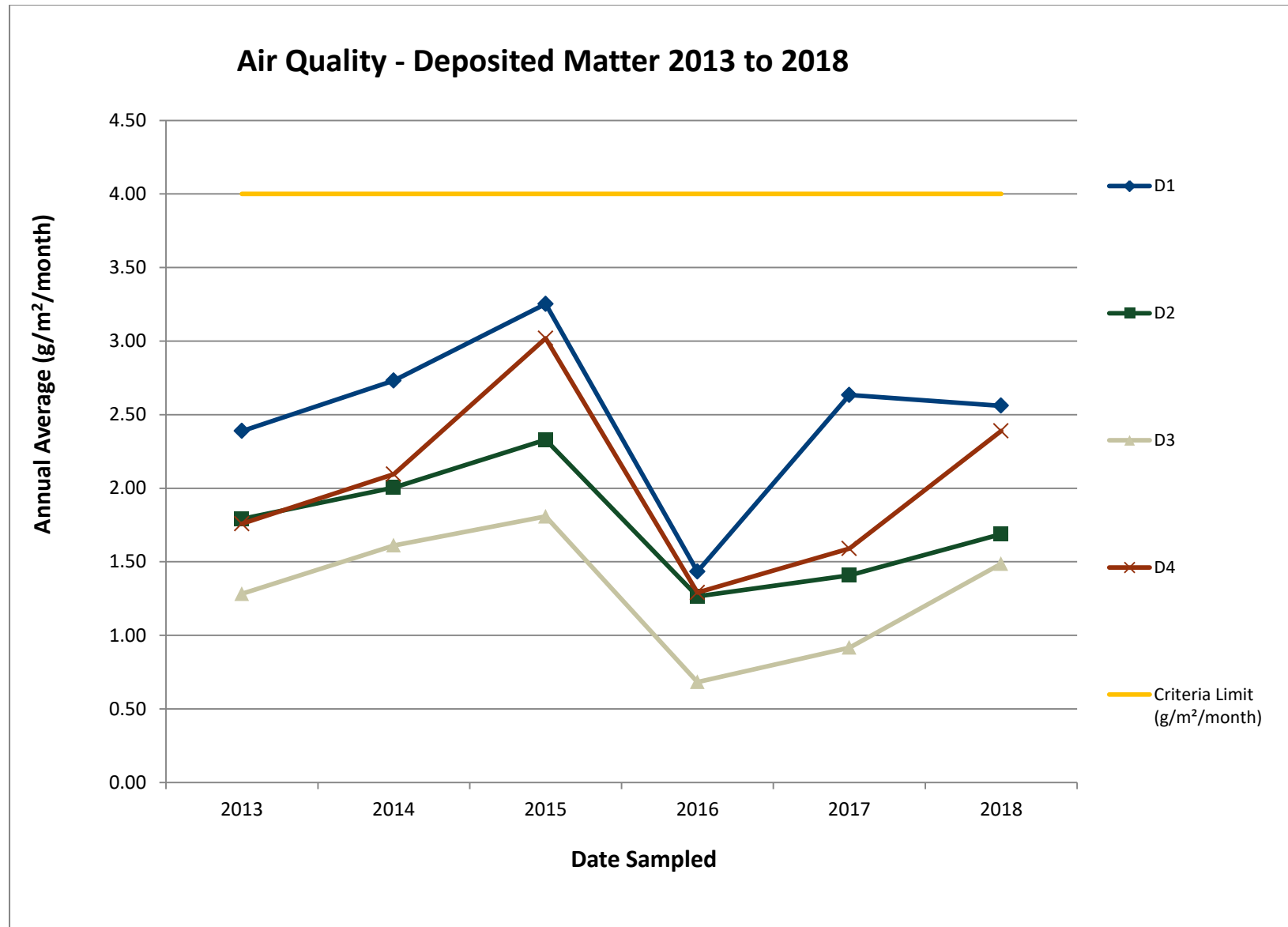
NSW Government (2015). Annual Review Guideline.

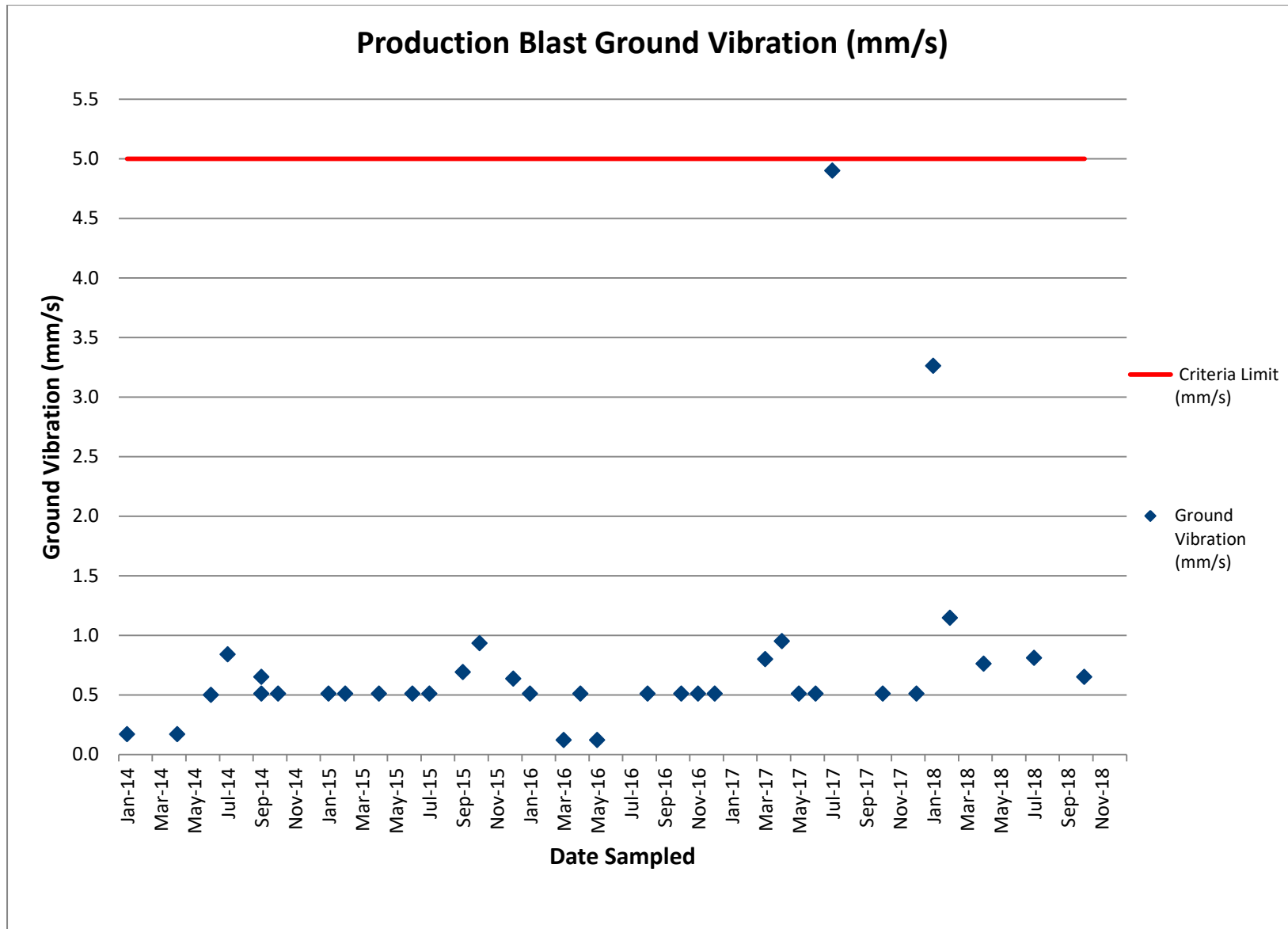
NSW Environmental Protection Authority (2000). Industrial Noise Policy.

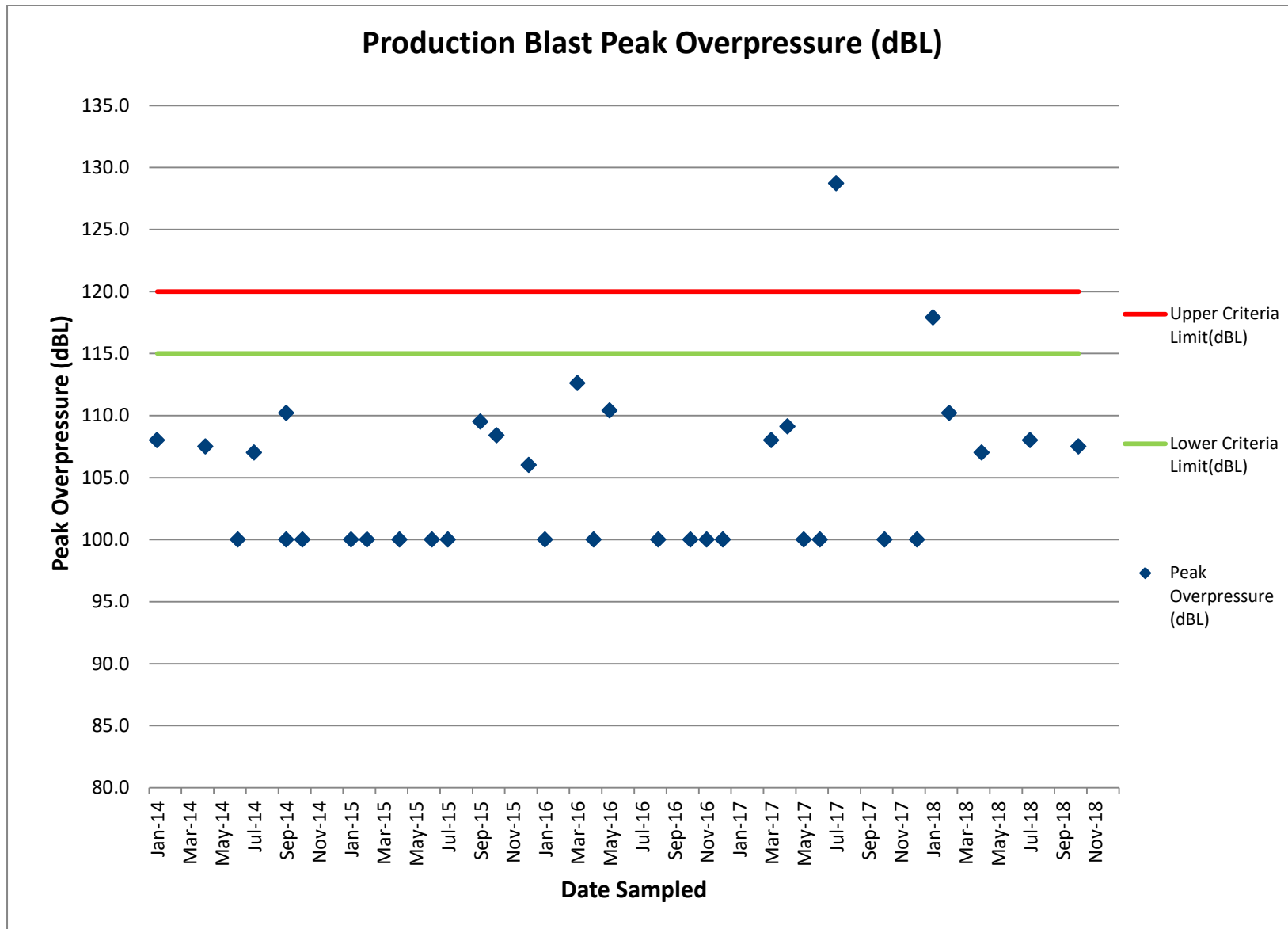


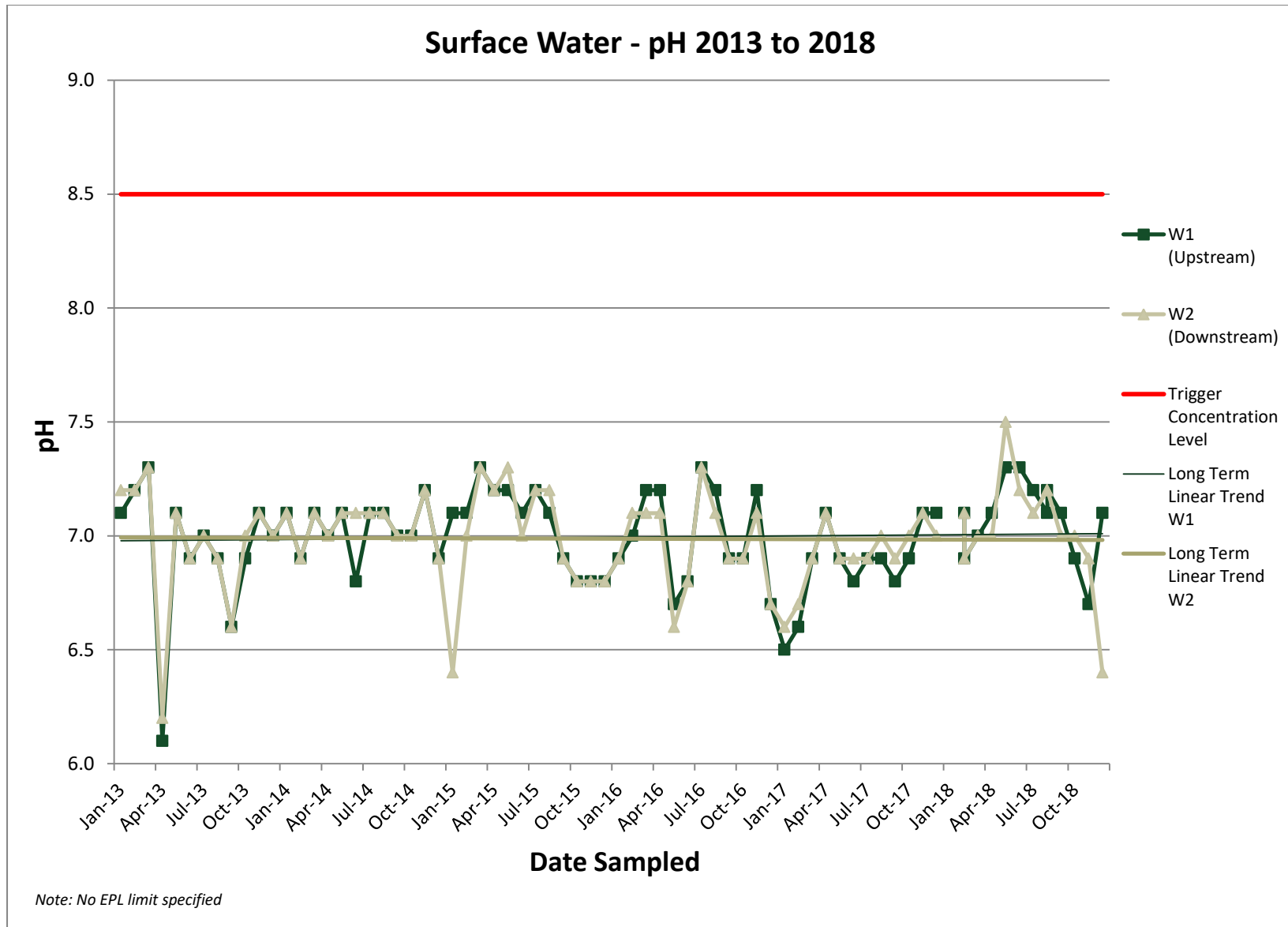
APPENDIX 1

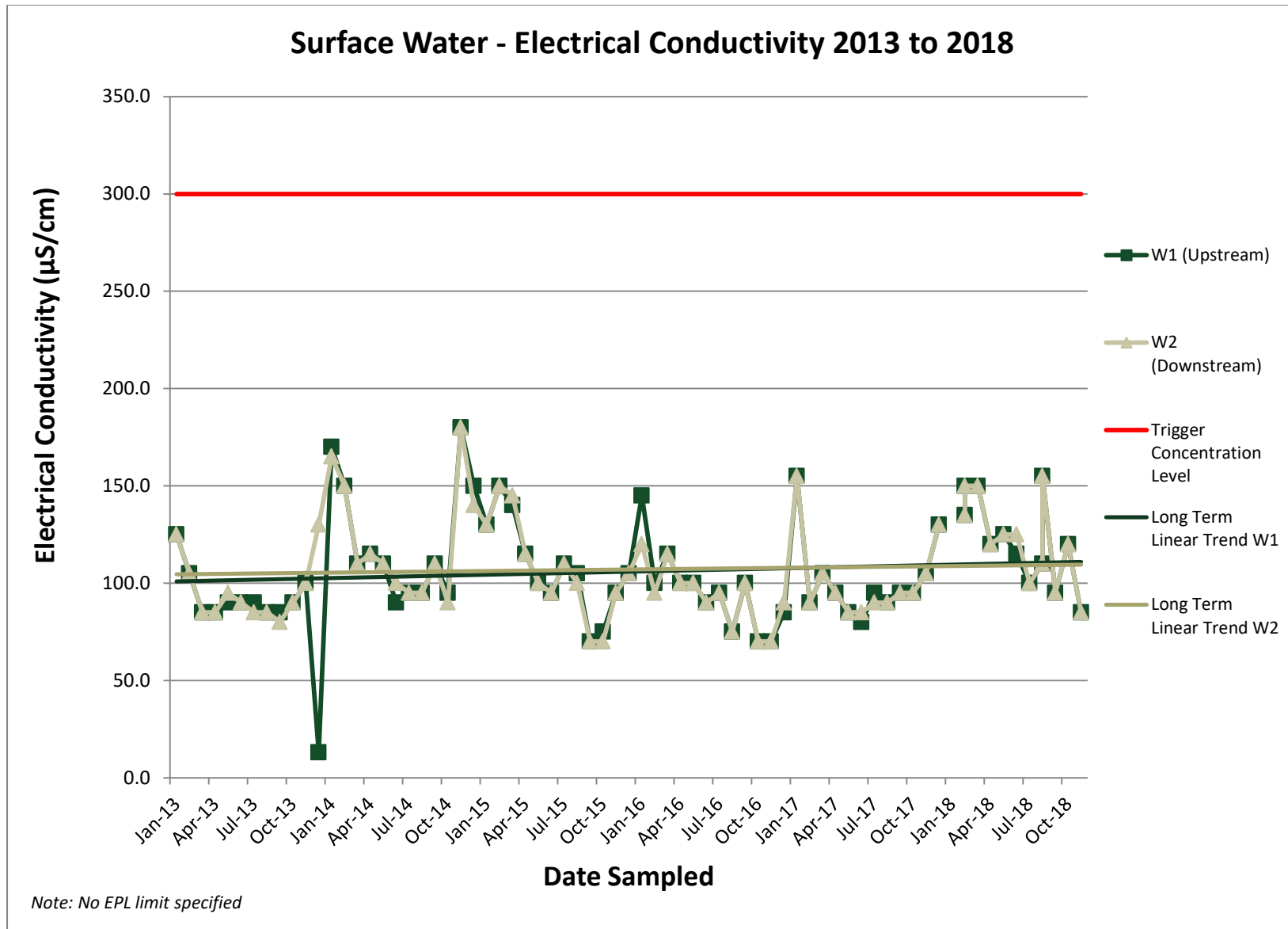
Monitoring results for previous years

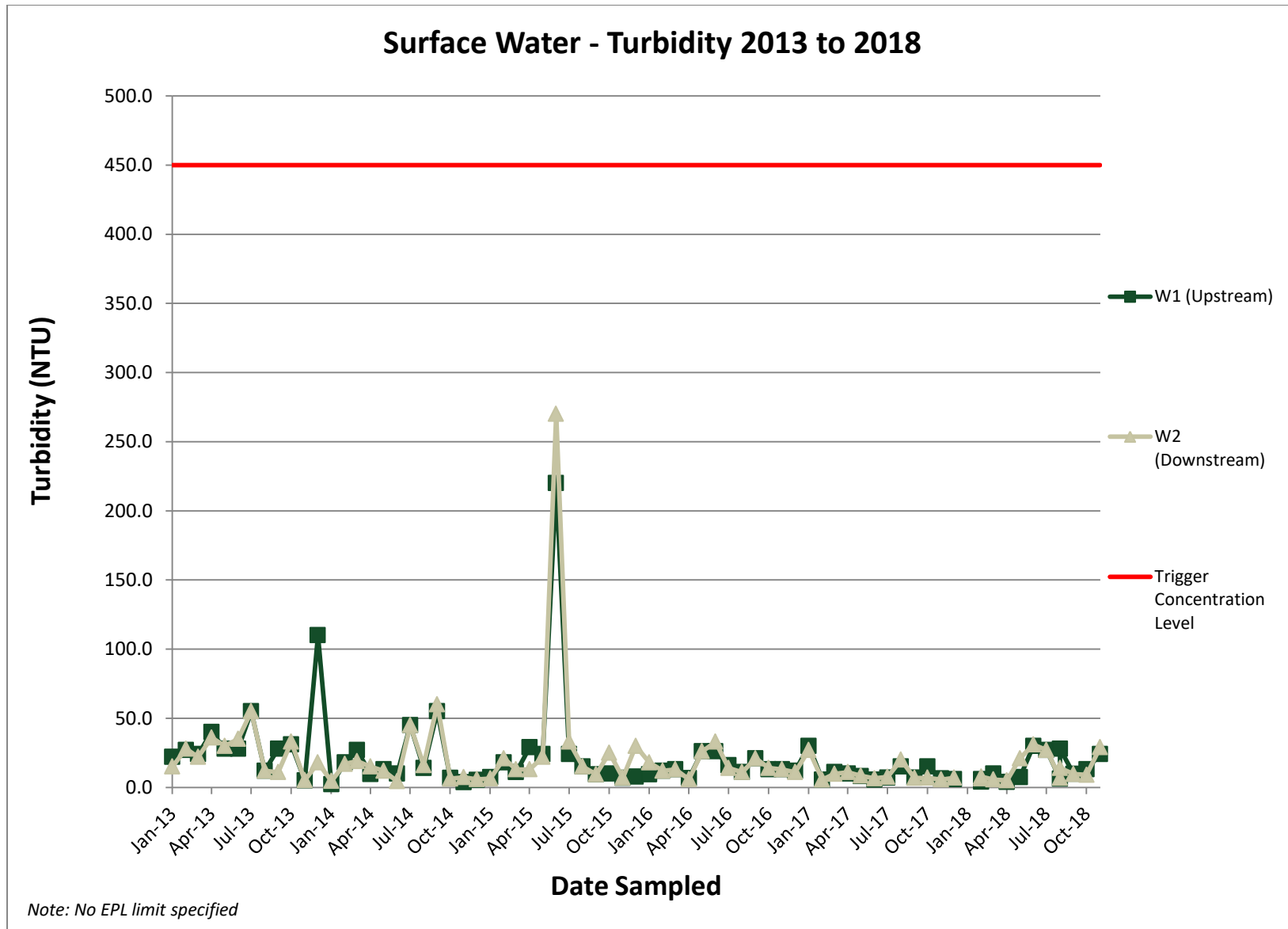


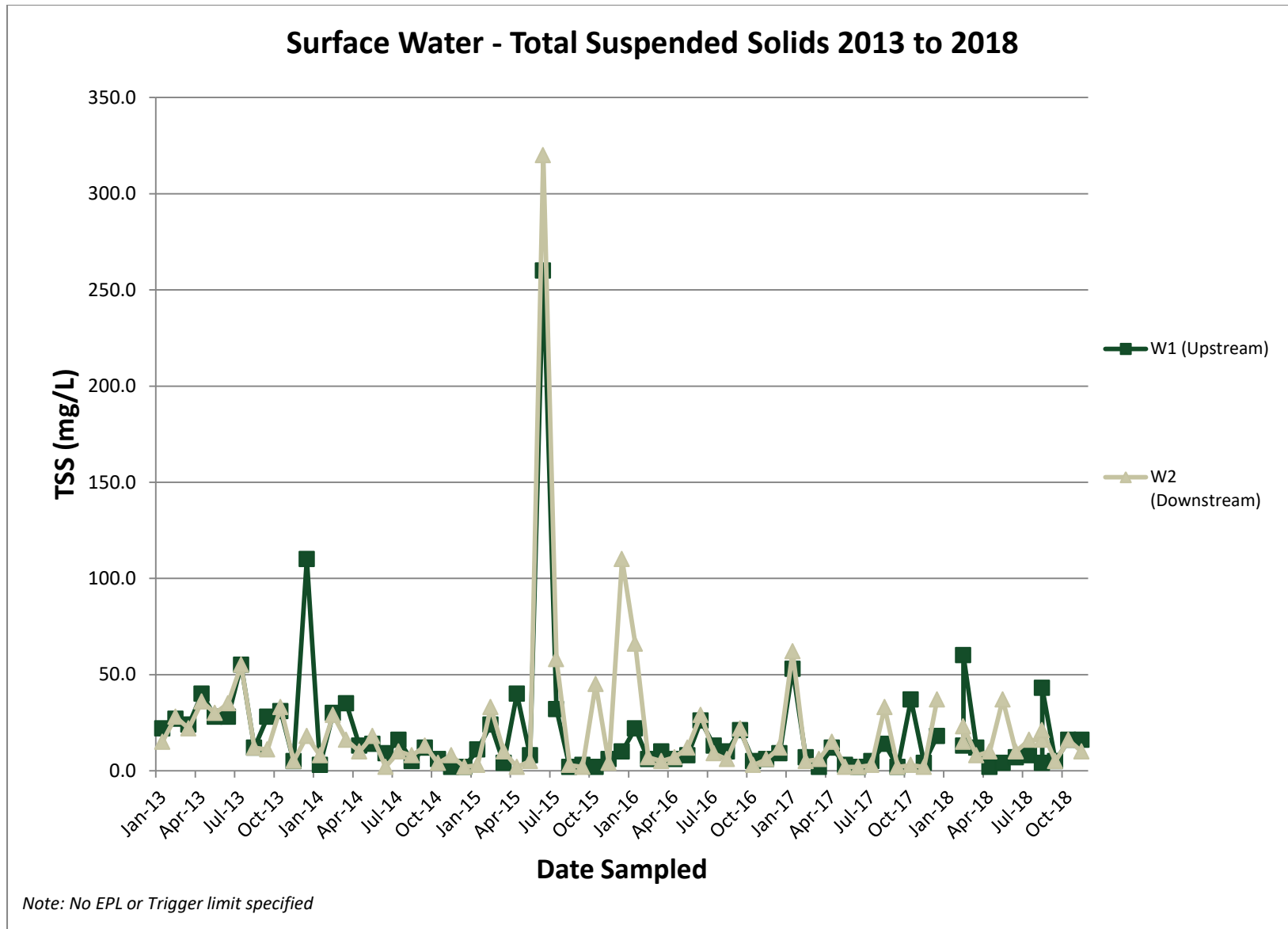


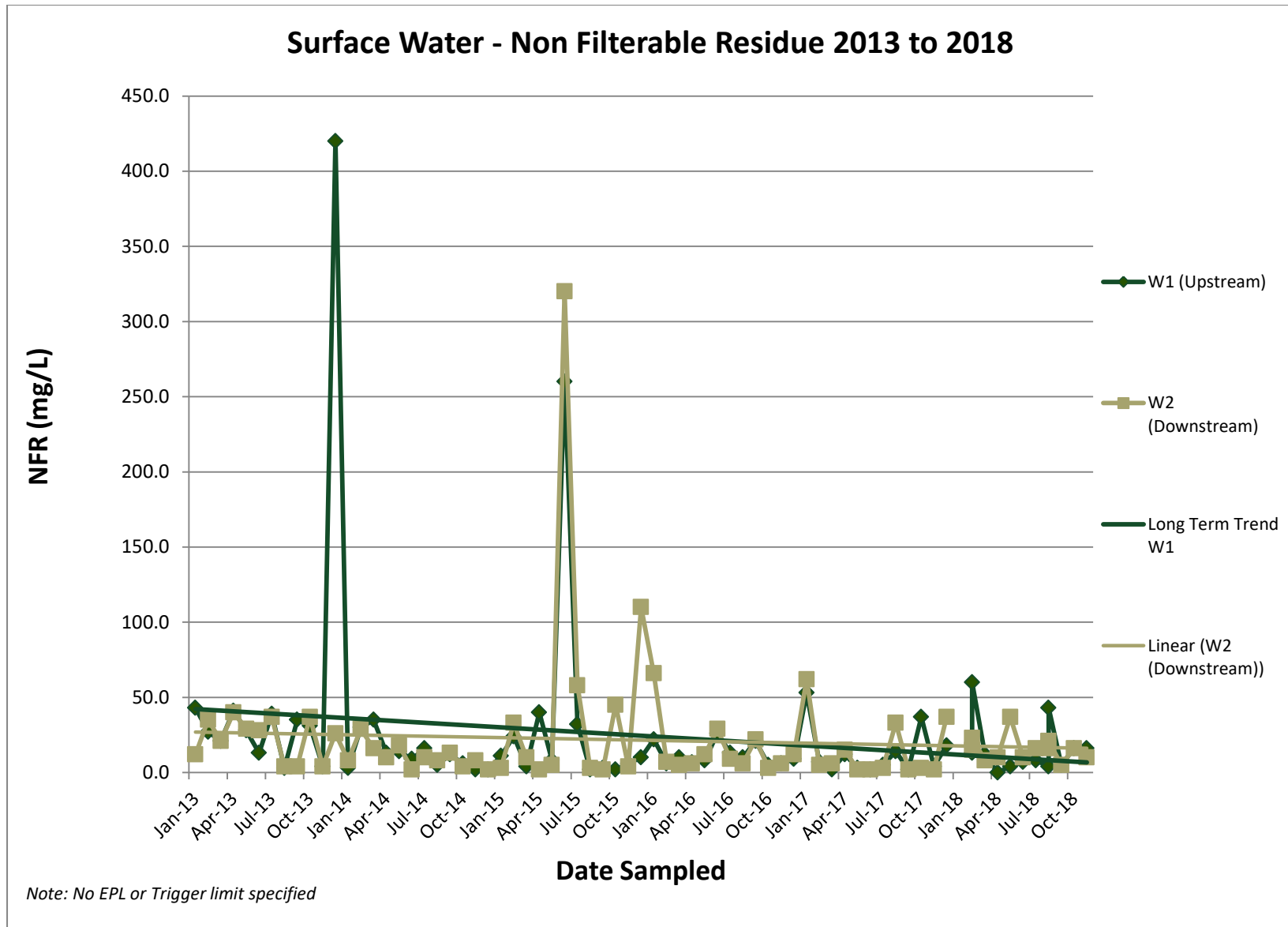


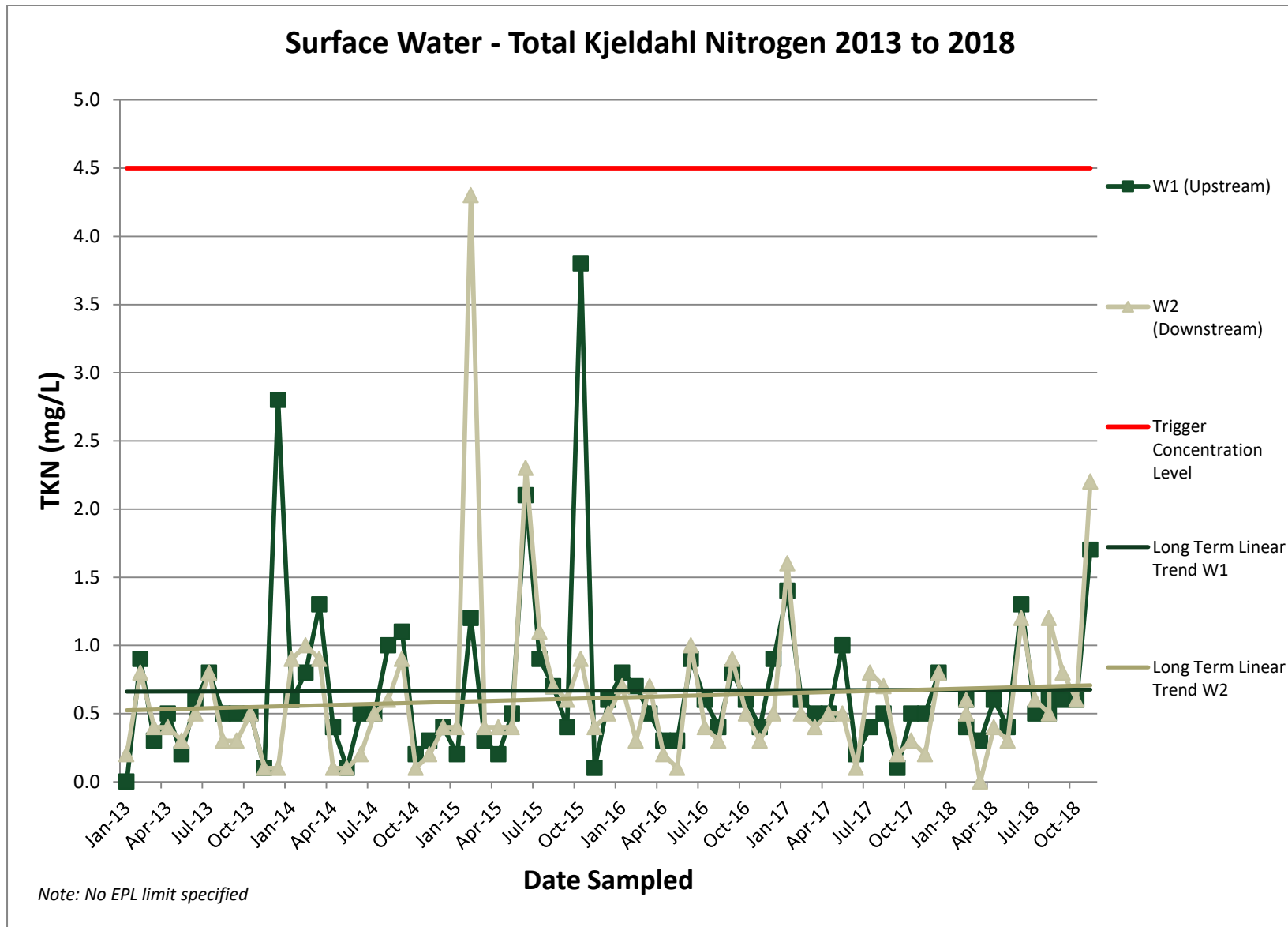


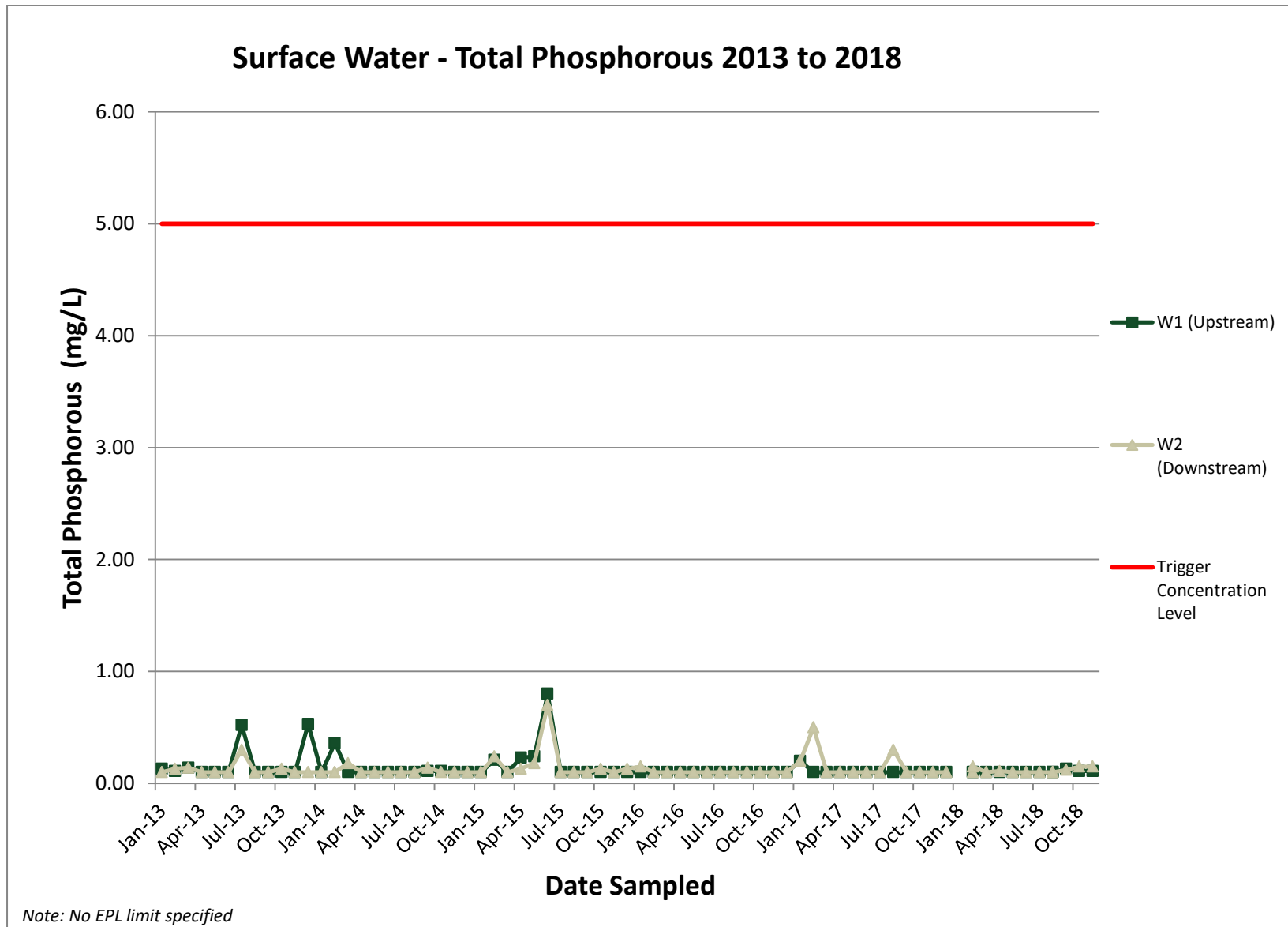


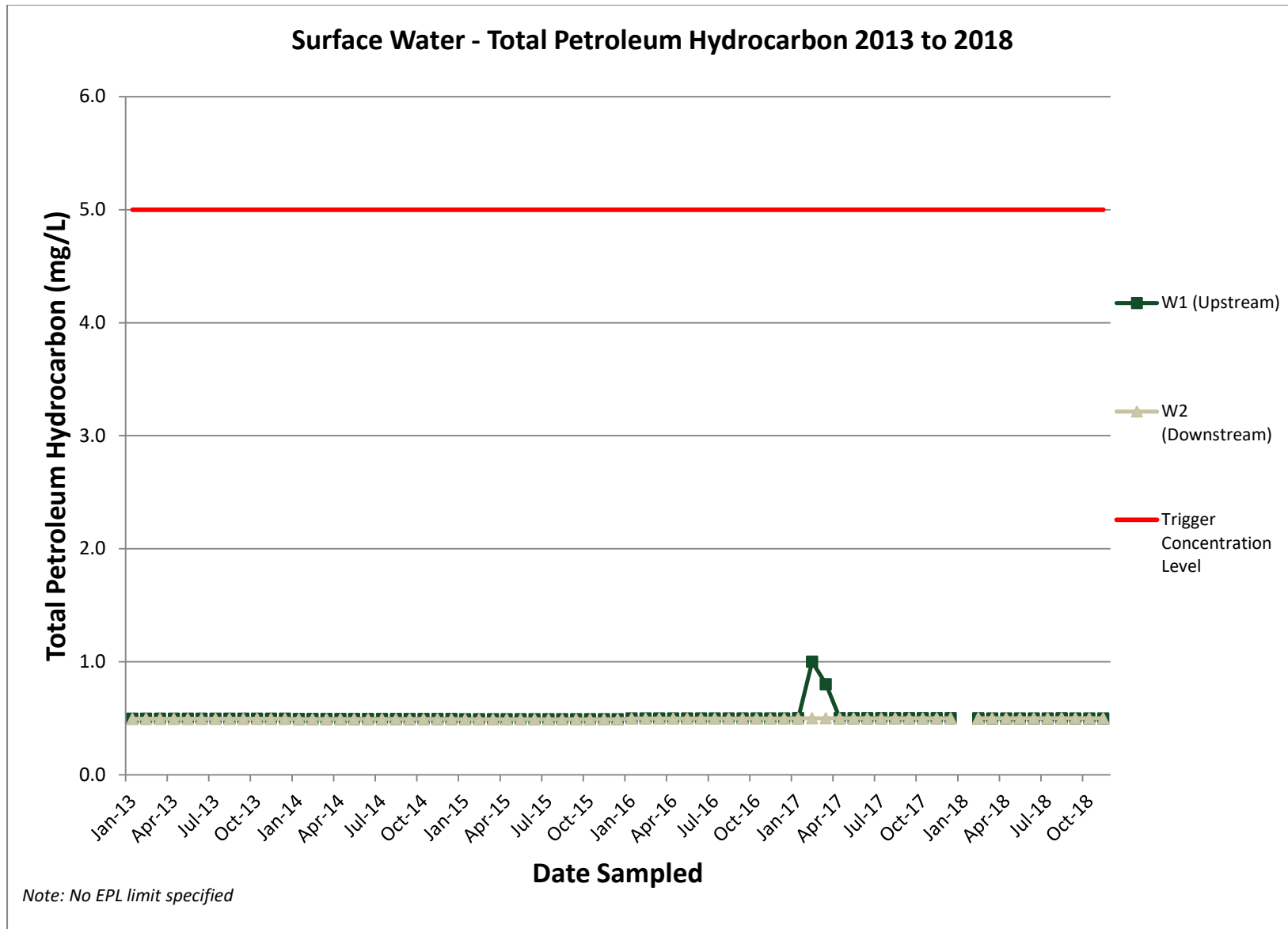


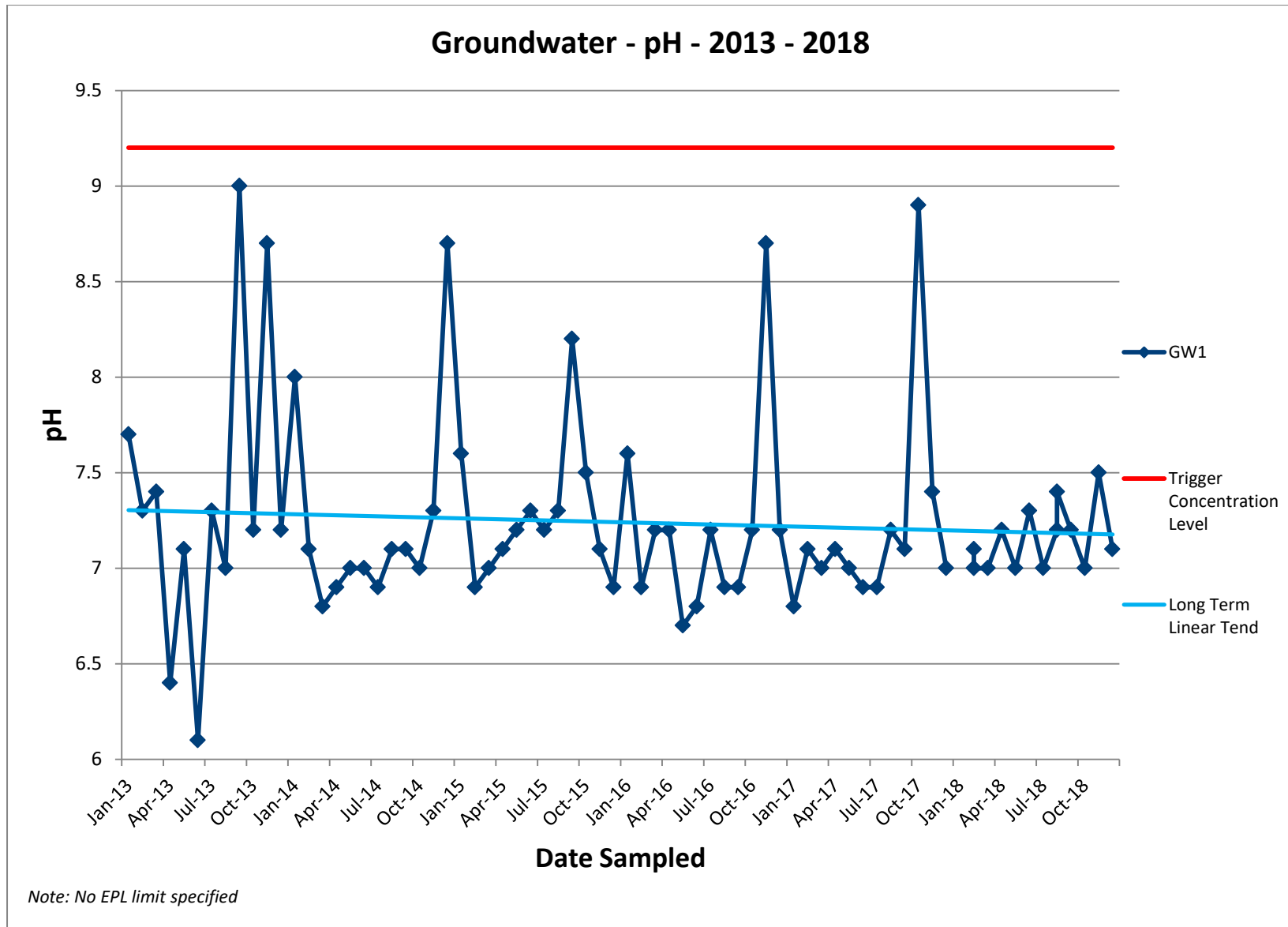


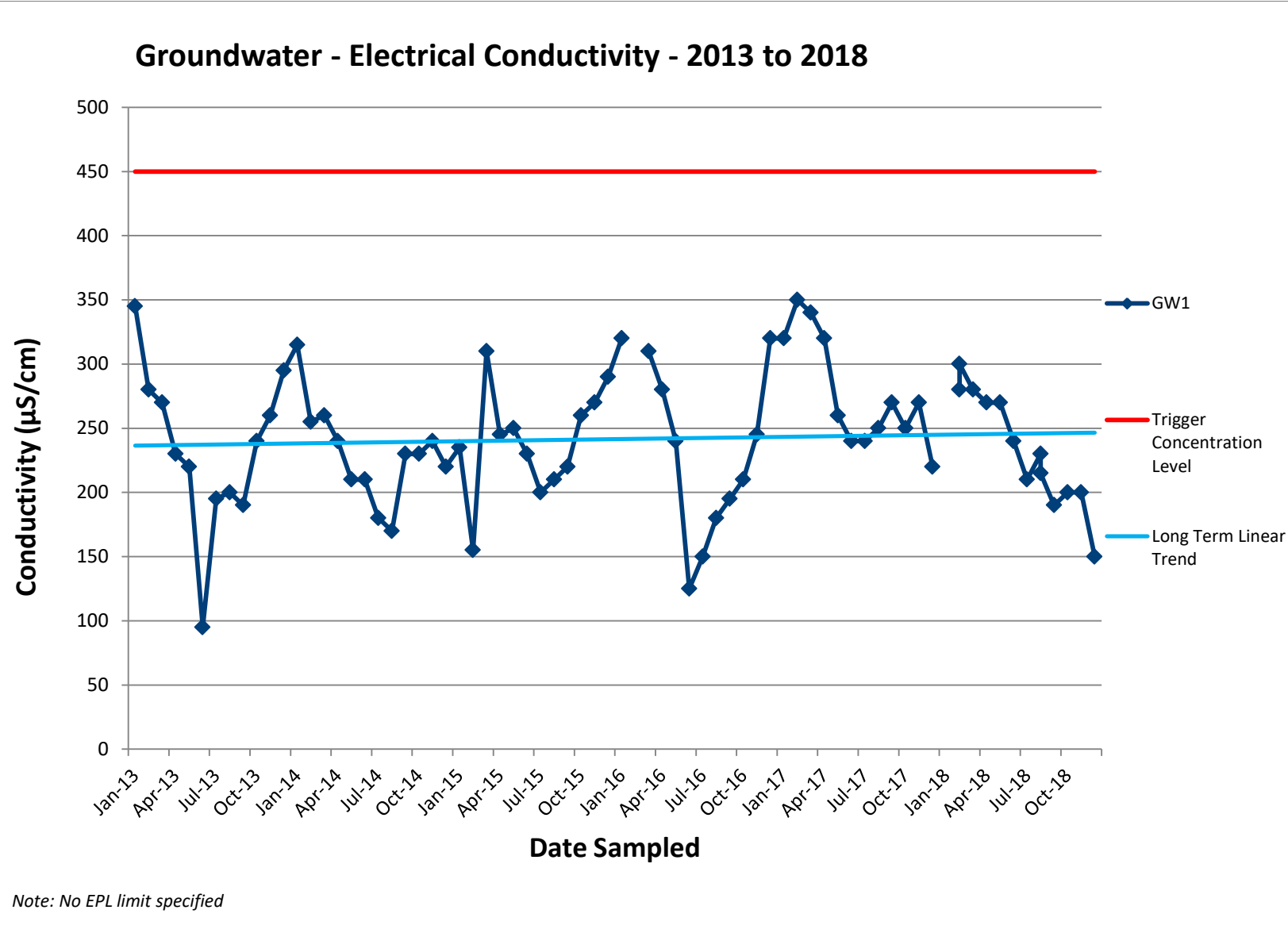


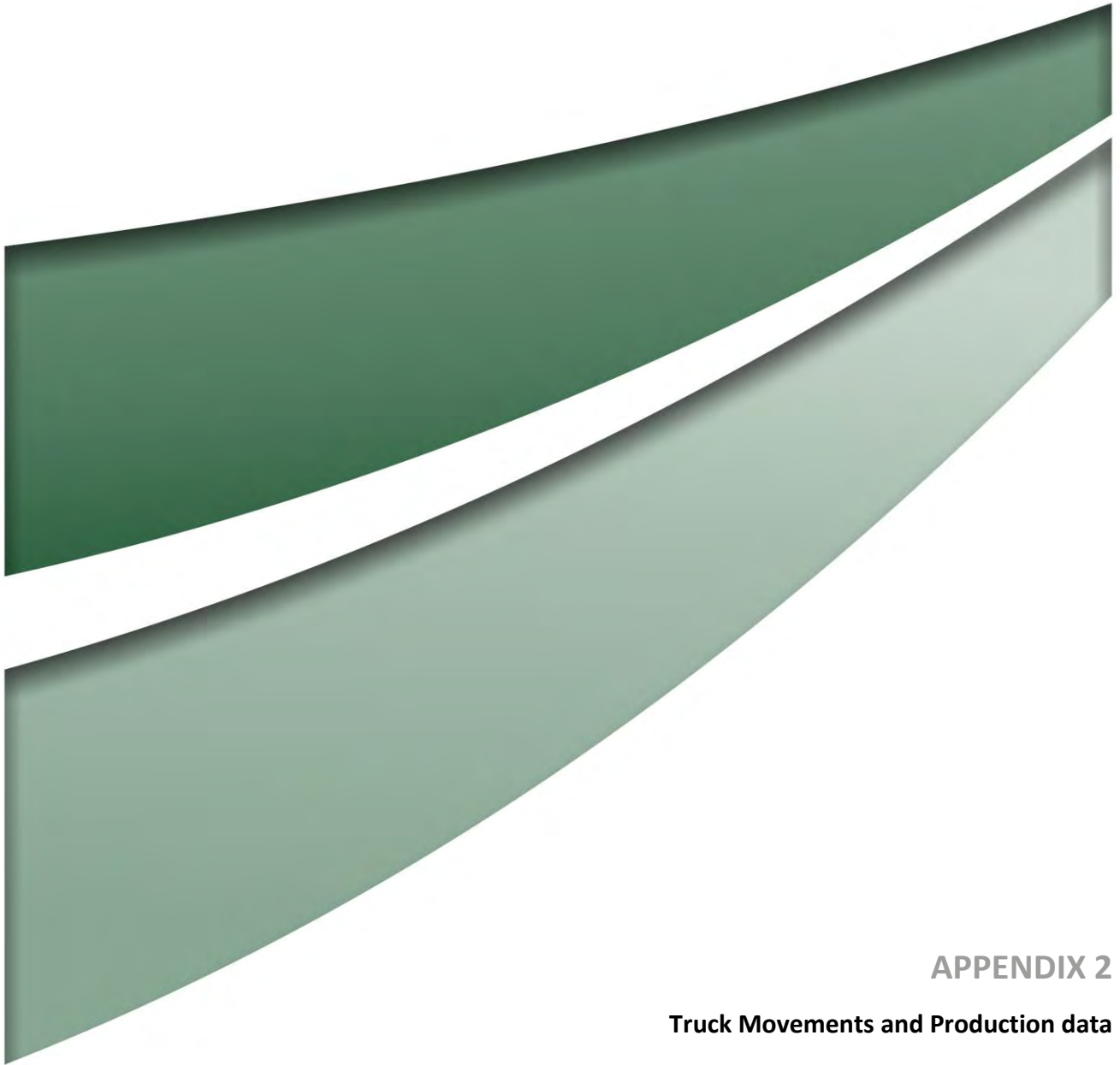












APPENDIX 2

Truck Movements and Production data



OBERON QUARRIES

JANUARY 2018 – DECEMBER 2018

This summary is to satisfy Condition 17 of Development Consent SSD_6333. The summary provides a record of all truck movements to and from the Quarry and is updated every 6 months.

During the period starting from January 2018 through to December 2018 Oberon Quarries recorded the following information:

2018

January 2018	There were 657 truck movements for the month and a total of 17,244.00 tonnes of material that left the quarry.
February 2018	There were 752 truck movements for the month and a total of 19,462.45 tonnes of material that left the quarry.
March 2018	There were 865 truck movements for the month and a total of 23,149.80 tonnes of material that left the quarry.
April 2018	There were 1,042 truck movements for the month and a total of 25,926.50 tonnes of material that left the quarry.
May 2018	There were 1,474 truck movements for the month and a total of 36,149.38 tonnes of material that left the quarry.
June 2018	There were 988 truck movements for the month and a total of 22,545.70 tonnes of material that left the quarry.
July 2018	There were 705 truck movements for the month and a total of 18,426.40 tonnes of material that left the quarry.
August 2018	There were 754 truck movements for the month and a total of 18,686.28 tonnes of material that left the quarry.
September 2018	There were 671 truck movements for the month and a total of 17,804.00 tonnes of material that left the quarry.
October 2018	There were 758 truck movements for the month and a total of 18,857.27 tonnes of material that left the quarry.
November 2018	There were 985 truck movements for the month and a total of 25,333.63 tonnes of material that left the quarry.
December 2018	There were 691 truck movements for the month and a total of 17,448.09 tonnes of material that left the quarry.

No trucks were loaded before 6.00am and no trucks entered the quarry premise before 5.30am and no trucks were loaded or left the quarry premise after 10.00pm.

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