GROUNDWORK plus

CORAKI QUARRY

2016 ANNUAL REVIEW

10 OCTOBER 2016 TO 31 DECEMBER 2016

Prepared for:
Quarry Solutions Pty Ltd

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March 2017

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Executive Summary

Groundwork Plus has been engaged by Quarry Solutions Pty Ltd (Quarry Solutions) to undertake an annual review for the Coraki Quarry for the period of 10 October 2016 to 31 December 2016. The purpose of this annual review was to assess compliance with Development Consent SSD_7036 modified by the Land and Environment Court on 18 April 2016. Work commenced under the modified Development Consent on 10 October 2016.

A site inspection was conducted by Megan Davis of Groundwork Plus on 22 November 2016. Quarry Solutions Pty Ltd employees Bob Boss (Quarry Manager) and Paul Van Den Boom (Quarry Administration) assisted in confirming compliance with certain conditions.

The review finds that the site is operating generally in accordance with the conditions of modified Development Consent. Based on the results of the review, it is recommended that dust monitoring results continue to be reviewed monthly to ensure they are within the limits of the Development Consent. Should elevated dust levels continue to be observed at dust monitoring location PDG3 it is recommended that a dust audit be undertaken to review site practices, identify sources of dust on site and ensure that all reasonable and practicable dust mitigation measures are employed to reduce deposited dust level. In addition, as airblast overpressure was recorded at the limit of 115 dBL on one occasion at the Monitor 1 location, blast management practices should be monitored closely to ensure airblast overpressure does not exceed the licensed limit.

1. Introduction

Quarry Solutions Pty Ltd (Quarry Solutions) operate the Coraki Quarry, a hard rock quarry located at Seelems Road, Coraki, New South Wales, properly described as Lot 401 DP633427, Lots 402 and 403 DP 802985, Lot 408 DP 1166287, Lot A DP397946, Lot A DP389418, Lot 3 DP701197, Lot 2 DP954593, Lot 1 DP954592, Lot 1 DP310756 and Lot 1 DP1165893 (the site).

A modified Development Consent (SSD_7036) for the Coraki Quarry was granted by the New South Wales Minister for Planning on 18 April 2016. In addition, an Environment Protection Licence (EPL) No. 3397 was issued on 22 June 2016 for both Coraki and Petersons Quarries.

Quarry Solutions commenced operations under the modified Development Consent on 10 October 2016.

1.1 Methodology

This review has been prepared in accordance with Schedule 5, Condition 9 of the modified Development Consent for the period of 10 October 2016 (when the use commenced under the Development Consent) to 31 December 2016.

Schedule 5, Condition 9 states:

> *Annual Review*
>
> *By the end of March each year, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:*
>
> *(a) describe the development (including 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;*
>
> *(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;*
> - *the monitoring results of previous years; and*
> - *the relevant predictions in the documents listed in condition 2 of Schedule 2;*
>
> *(c) identify any noncompliance over the last year, and describe what actions were (or are being) taken to ensure compliance;*
>
> *(d) identify any trends in the monitoring data over the life of the development;*
>
> *(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and*
>
> *(f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.*

The methodology used to carry out this annual review was to:

- Carry out a site inspection to verify performance of the quarry, including inspection of facilities, records, observations of activities, and interviews with staff.
- Review all monitoring data required in accordance with the conditions of the modified Development Consent approved by the Land and Environment Court of NSW on 10 October 2016.

1.2 Site Activities

Development activities undertaken at the Coraki Quarry in 2016 included:

- Bunding for noise management purposes.
- Installation of stormwater controls.
- Stabilisation and vegetation of bunds.
- Overburden removal.

Production volumes for the 2016 calendar year were 151,303.91 tonne.

Extraction undertaken during 2016 and the proposed development of the quarry pit in 2017 is shown on Figure 1 – Extraction Area Plan. Extraction is proposed to be undertaken to a design depth of 18m AHD, developing to the north and west, during the upcoming 12 month period.

1.3 Rehabilitation

No rehabilitation has been undertaken during the annual period due to the recent commencement of operations. No rehabilitation is anticipated to occur in 2017.

2. Statement of Compliance

A site inspection was conducted by Groundwork Plus on 22 November 2016. Quarry Solutions employees Bob Boss and Paul Van Den Boom assisted in confirming compliance with certain conditions.

All conditions of the modified Development Consent SSD_7036 were complied with during the assessment period.

3. Monitoring Results

Surface water, noise and blast monitoring was undertaken at the site during the assessment period. The following sections present the results of this monitoring.

3.1 Water Monitoring

Schedule 3, Condition 19 of the Development Consent states:

> *The Applicant must comply with the discharge limits in any relevant EPL, or with section 120 of the POEO Act.*

Appendix 1, Statement of Commitment, Commitment 20 states:

> *The project will be operated in accordance with the conditions of the EPL for the project once it is issued by the EPA*.

EPL conditions relating to water quality are conditions L1.1, and L2.1 to L2.9 and state:

> *L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.*
>
> *L2.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.*

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

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

L2.4 Water and/or Land Concentration Limits

Point 1,2,3,4

Pollutant	*Units*	*50 Percentile concentration limit*	*90 Percentile concentration limit*	*3DGM concentration limit*	*100 Percentile concentration limit*
Oil and Grease	*Visible*				*Nil*
pH	*pH*				*6.5-8.5*
Total Suspended Solids	*mg/L*				*50*

L2.5 The concentration limits in the above table do not apply to any discharge from the sediment basin (Water Release Points 3 and 4) solely arising from rainfall measured at the premises exceeding 60.2 mm in total falling over any consecutive five day period.

L2.6 If the licensee uses turbidity (NTU) in place of TSS to determine compliance with Condition L2.4, the licensee must develop a statistical correlation which identifies the relationship between NTU and TSS for water quality in the sediment basin/s in order to determine the NTU equivalent of 50 mg/L TSS before its use.

L2.7 The licensee must provide the EPA with a copy of the statistical correlation assessment methodology and results before using NTU in place of TSS.

L2.8 The licensee must develop and implement a method to enable the ongoing verification of the relationship between NTU and TSS.

L2.9 The licensee must provide the EPA with any amendments the licensee makes to the statistical correlation as a result of the ongoing verification required by Condition L2.8 before using the revised statistical correlation

Quarry Solutions have advised that the site has not released since the use commenced under the Development Consent from 10 October 2016 to 31 December 2016. Quarry Solutions have also advised that groundwater has not been intersected during the extraction activities to date.

3.2 Blast Monitoring

Schedule 3, Condition 8 of the Development Consent relates to blast monitoring criteria and states:

The Applicant must ensure that blasting associated with the development does not cause any exceedance of the criteria in Table 4.

Development Consent Table 4: Blasting criteria

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

However, these criteria do not apply if the Applicant has a written agreement with the relevant owner to exceed the limits in Table 4, and the Applicant has advised the Department in writing of the terms of this agreement.

Blasting within the assessment period occurred on 10 October, 21 November, 9 December and 16 December 2016. Blast monitoring was undertaken at three (3) locations, refer to Figure 2 – Blast Monitoring Locations. All blasts complied with the blasting criteria.

Results from the monitoring are summarised below in Table 1 – Airblast Overpressure Results and Table 2 – Ground Vibration Results.

Table 1 – Airblast Overpressure Results

Date	Monitor 1	Monitor 2	Monitor 3
10 October 2016	114.2 dB(L)	111.5	<88 dB(L)
21 November 2016	<88 dB(L)	No trigger	No trigger
9 December 2016	115 dB(L)	114 dB(L)	97.5 dB(L)
16 December 2016	109.3 dB(L)	109.9 dB(L)	96.88 dB(L)

Table 2 – Ground Vibration Results

Date	Monitor 1	Monitor 2	Monitor 3
10 October 2016	1.656mm/s	1.308mm/s	0.542mm/s
21 November 2016	2.189mm/s	No trigger	No trigger
9 December 2016	2.3mm/s	1.024mm/s	0.813mm/s
16 December 2016	0.999mm/s	0.839mm/s	0.762mm/s

Quarry Solutions have employed a professional drill and blast contractor to undertake and monitor blasts on their behalf to ensure implementation of best practice and to ensure compliance with condition 8 of the Development Consent. A blast management plan has been developed and is being implemented on the site.

3.3 Noise Monitoring

Schedule 3, Condition 4 of the Development Consent relating to noise impact assessment criteria states:

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

Development Consent Table 3: Noise criteria dB(A)

Receiver	*Day dB(A) (LAeq(15 min))*	*Evening dB(A) (LAeq(15 min))*	*Night dB(A) (LAeq(15 min))*
All privately-owned residences	*35*	*35*	*35*

Note: Receiver locations are shown on the figure in Appendix 3.

A Noise Compliance Review was undertaken on 2 December 2016 in accordance Condition 7 of the Development Consent and the Noise Management Plan. Noise monitoring was undertaken at seven (7) locations, refer to Figure 3 – Noise Monitoring Locations. The Noise Compliance Review report stated that quarry noise was assessed to be compliant with the noise limit specified in Condition 4 of the Development Consent Schedule 3 and Condition L4 of the EPL at residences R1, R2, R3, R6 and R7 considering the 5 dB(A) exceedance allowed for within agreements with the relevant landowners.

3.4 Dust Monitoring

Schedule 3, Condition 20 of the Development Consent states:

The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 5 at any residence on privately-owned land.

Development Consent Table 5: Air quality criteria

Pollutant	*Averaging Period*	*Criterion*	
Particulate matter < 10 µm (PM_{10})	*Annual*	*[a,d] 30 µg/m³*	
Particulate matter < 10 µm (PM_{10})	*24 hour*	*[b] 50 µg/m³*	
Total suspended particulates (TSP)	*Annual*	*[a,d] 90 µg/m³*	
[c] Deposited dust	*Annual*	*[b] 2 g/m²/month*	*[a,d] 4 g/m²/month*

Notes tor Table 5:
a. Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).
b. Incremental impact (ie incremental increase in concentrations due to the development 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 to by the Secretary.
e. "Reasonable and feasible avoidance and mitigation measures" includes, but is not limited to, the operational requirements in conditions 14 and 15 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.

Dust deposition monitoring has been undertaken at four (4) locations, refer to Figure 4 **–** Dust Monitoring Locations. Dust monitoring was undertaken from September 2016 to December 2016.

Results are summarised below in Table 3 **–** Dust Deposition Monitoring Results and have been graphically presented in Attachment 1 **–** Dust Deposition Graphs.

Table 3 **–** Dust Deposition Monitoring Results

Analyte	Units	Month			Annual Average
		6 September to 10 October 2016	11 October to 10 November 2016	10 November to 16 December 2016	
PDG1					
Ash Content	g/m²/month	1.1	2.1	1.4	1.533
Combustible Matter	g/m²/month	0.1	0.5	0.5	0.366
Total Insoluble Matter	g/m²/month	1.2	2.6	1.9	1.9
PDG2					
Ash Content	g/m²/month	0.8	1.0	0.8	0.9
Combustible Matter	g/m²/month	0.1	1.0	0.7	0.6
Total Insoluble Matter	g/m²/month	0.9	2.0	1.5	1.466
PDG3					
Ash Content	g/m²/month	3.0	4.9	0.6	2.833
Combustible Matter	g/m²/month	1.0	0.7	0.4	0.7
Total Insoluble Matter	g/m²/month	4.0	5.6	1.0	3.533
PDG4					
Ash Content	g/m²/month	0.8	1.5	0.9	1.066

Analyte	Units	Month			Annual Average
		6 September to 10 October 2016	11 October to 10 November 2016	10 November to 16 December 2016	
Combustible Matter	g/m²/month	0.1	0.4	0.6	0.366
Total Insoluble Matter	g/m²/month	0.9	1.9	1.5	1.433

Note: Total Insoluble Matter = total particulates not soluble in water
Ash Content = represents sand and mineral soil
Combustible Matter = typical non-quarry related dust sources (e.g. organic soil matter, pollen, grass, leaves, insects and animal faeces), value calculated by subtracting the Ash Content from Total Insoluble Matter for the sample.

Dust deposition monitoring recorded high monthly levels of Total Insoluble Matter and Ash Content at PDG3 during two (2) months including 6 September to 10 October, and 11 October to 10 November 2016, however, deposited dust criterion limits are an annual average therefore these results must be averaged over the 12 months of operation. The results average over the three months indicate that Total Insoluble Matter was 3.533 g/m²/month.

As the site has not been in operation for 12 months, there has been no exceedance for deposited dust, however, if the high monthly dust results continue, it is likely that an exceedance of the annual cumulative limit (4g/m²/month) for deposited dust will occur in 2017.

The weather station was installed on site on 29 September 2016 and indicated that the wind recorded between September and December 2016 was predominately from the west to north east, refer to Attachment 2 – Wind Roses. Dust monitor PDG3 is to the east, south east predominately downwind of the extractive activities which indicates that the dust monitored was likely to be coming from the increased extraction activity on the site. The wind roses also show that the wind has become more variable from September to December, which is typical of summer months. The dust monitored at PDG3 in December was considerably less than the previous months.

To assess the incremental impact of deposited dust, it is likely that the dust monitored at PD4 would be considered background as it was predominately upwind of the site during September to December 2016 refer to Attachment 2 – Wind Roses. The results of the background (PDG4) Total Insoluble Matter have been subtracted from the Total Insoluble Matter results recorded downwind (PDG3) which are presented in Table 4 – Incremental Dust Deposition Monitoring Results (PDG3 – PDG4). Whilst this shows elevated results for the 6 September to 10 October 2016 period and the 11 October to 10 November 2016 period, the average of the three months recorded to date is only slightly above the limit of 2g/m²/month.

As the site has not been in operation for 12 months, there has been no exceedance for deposited dust, however, if the high monthly dust results continue, it is likely that an exceedance of the annual incremental limit (2g/m²/month) for deposited dust will occur in 2017.

Table 4 – Incremental Dust Deposition Monitoring Results (PDG3 – PDG4)

Analyte	*Units*	*PDG3 (downwind monitor) – PDG4 (upwind monitor)*			
		6 September to 10 October 2016	11 October to 10 November 2016	10 November to 16 December 2016	Annual Average
Total Insoluble Matter	g/m²/month	3.1	3.7	-0.5	2.1

3.5 Meteorological Station

Schedule 3, Condition 16 of the Development Consent relates to meteorological monitoring and states:

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

A Davis Meteorological station was installed on the site on 29 September 2016.

4. Complaints Summary

There have been no complaints recorded in relation to pollution i.e. air quality, water, noise or blasting, received during the 2016 calendar year for the Coraki Quarry.

5. Predicted and Actual Impacts

Dust modelling was undertaken as part of the Environment Impact Statement.

MWA Environmental undertook detailed computer dust dispersion modelling of the proposed quarrying activities which demonstrated that compliance with the relevant air quality objectives can be achieved at surrounding sensitive receptors with appropriate dust management controls. The dust control measures recommended for the quarry to achieve compliance with the regulatory guidelines were:

- Watering of all haul roads and access roads at a rate of at least 2 litres/m^2/hour at times when dust emissions are visible from vehicle movements.
- Sealing (e.g. asphalt) 200 metres of the access road off Seelems Road.
- Enclosure and/or use of effective water sprays to crushers and screens within the permanent processing plant;
- Effective water misting sprays to permanent processing plant at transfer points including load-out points from elevated storage bins if utilised.
- Rock drill to have an appropriate dust extraction system with collector fitted to rig and/or wet drilling via water sprays.
- Management of dust emissions from stockpiles during high wind speed conditions through appropriate use of sprinklers and/or chemical suppressant products as required.

In summary, the noise and dust impact assessment concluded that, with appropriate management measures and physical emission controls, the proposed quarrying activities can comply with the relevant noise amenity criteria and air quality objectives at the surrounding sensitive land uses.

The observed deposited dust levels indicate a higher level than that predicted at the nearby sensitive receivers.

6. Conclusion and Recommendations

Overall the site's environmental management and awareness is satisfactory and in accordance with the conditions of the modified Development Consent. Based on the results of this review recommendations are presented in Table 5 – Recommendations.

Table 5 – Recommendations

Action		Priority
1	It is recommended that dust monitoring results continue to be reviewed monthly to ensure they are within the limits of the Development Consent. Should elevated dust levels continue to be observed at dust monitoring location PDG3 it is recommended that a dust audit be undertaken to review site practices, identify sources of dust on site and ensure that all reasonable and practicable dust mitigation measures are employed to reduce deposited dust level.	*Medium*
2	Airblast overpressure was recorded at the limit of 115 on one (1) occasion at the Monitor 1 location. Blast management practices should be monitored closely to ensure airblast overpressure does not exceed the licensed limit.	*Medium*

figures

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CREATED: 7 March 2017

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Data Sources:
Photography: UAV Survey 2016-05-05; Google. Image date: 2014-12-18
Topography:
Cadastre:
Ecosystem:
Other:

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Legend:
- Site Boundary
- Cadastral Boundary
- 2016 Extraction Area
- 2017 Extraction Area

N

PROJECT: Coraki Quarry

CLIENT: Quarry Solutions Pty Ltd

TITLE: Figure 1 - Extraction Area Plan

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JOB SUB #:
CREATED: 8 February 2017

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Data Sources:
Photography: Google. Image date: 2016-06-06
Topography:
Cadastre:
Ecosystem:
Other:

Legend:
- Site Boundary
- Cadastral Boundary
- Blast Monitoring Location
- Distance from Site

N

PROJECT: Coraki Quarry

CLIENT: Quarry Solutions Pty Ltd

TITLE: Figure 2 - Blast Monitoring Locations

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DATE:	8 February 2017	DRAWN:	JS
PRINTED:	10 February 2017	CHECKED:	MD

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REVISION:
DATUM: HORIZONTAL / VERTICAL / ZONE — MGA / AHD / 56

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Topography:
Cadastre:
Ecosystem:
Other:

Legend:
- Site Boundary
- Cadastral Boundary
- Noise Monitoring Location
- Distance from Site

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PROJECT: Coraki Quarry

CLIENT: Quarry Solutions Pty Ltd

TITLE: Figure 3 - Noise Monitoring Locations

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SCALE: 1:8,000 When Printed On A3 — 0 160m

DATE: 8 February 2017 | DRAWN: JS
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REVISION:
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Topography:
Cadastre:
Ecosystem:
Other:

Legend:
- Site Boundary
- Cadastral Boundary
- Dust Monitoring Location
- Distance from Site

PROJECT: Coraki Quarry

CLIENT: Quarry Solutions Pty Ltd

TITLE: Figure 4 - Dust Monitoring Locations

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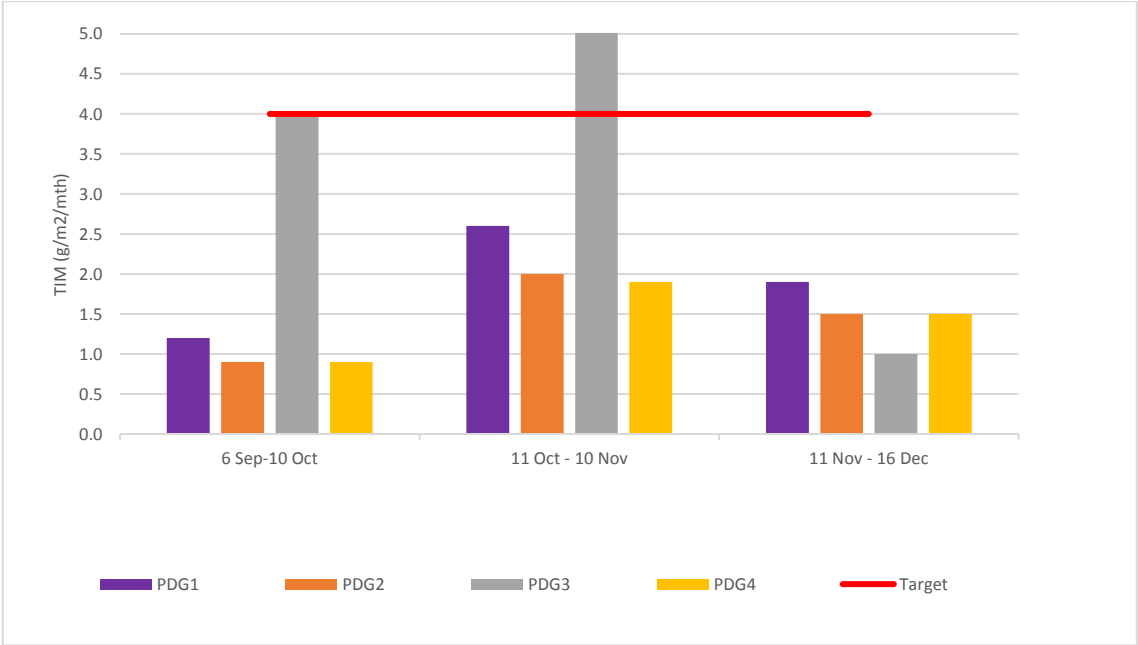
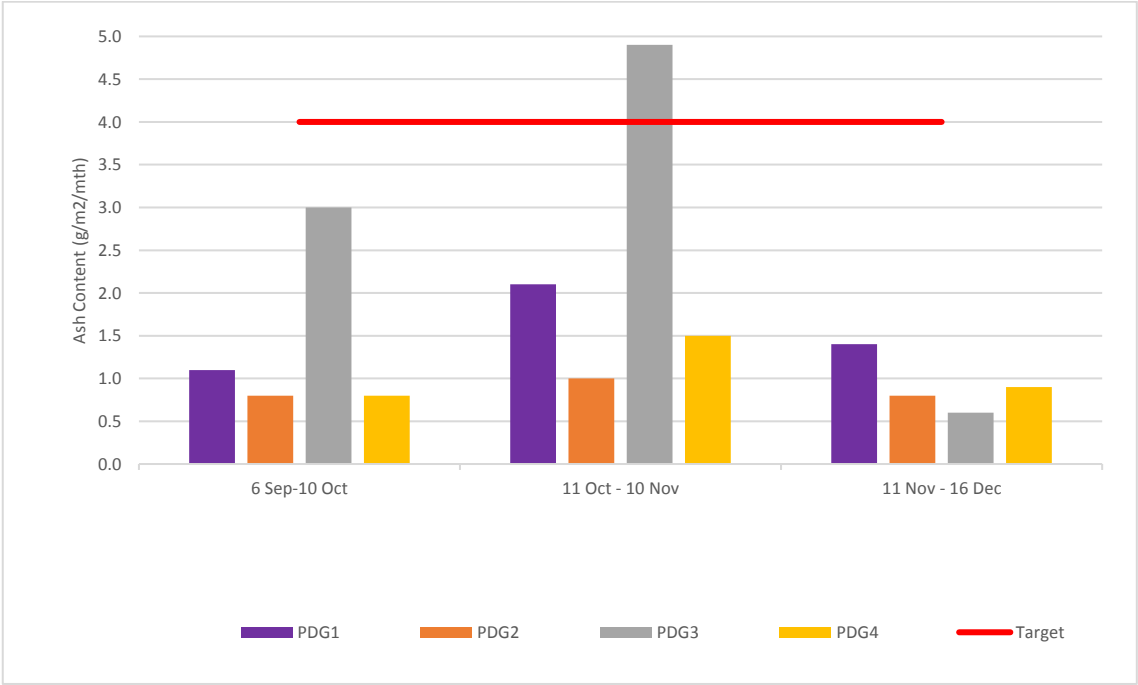
attachments

Attachment 1

Dust Deposition Graphs



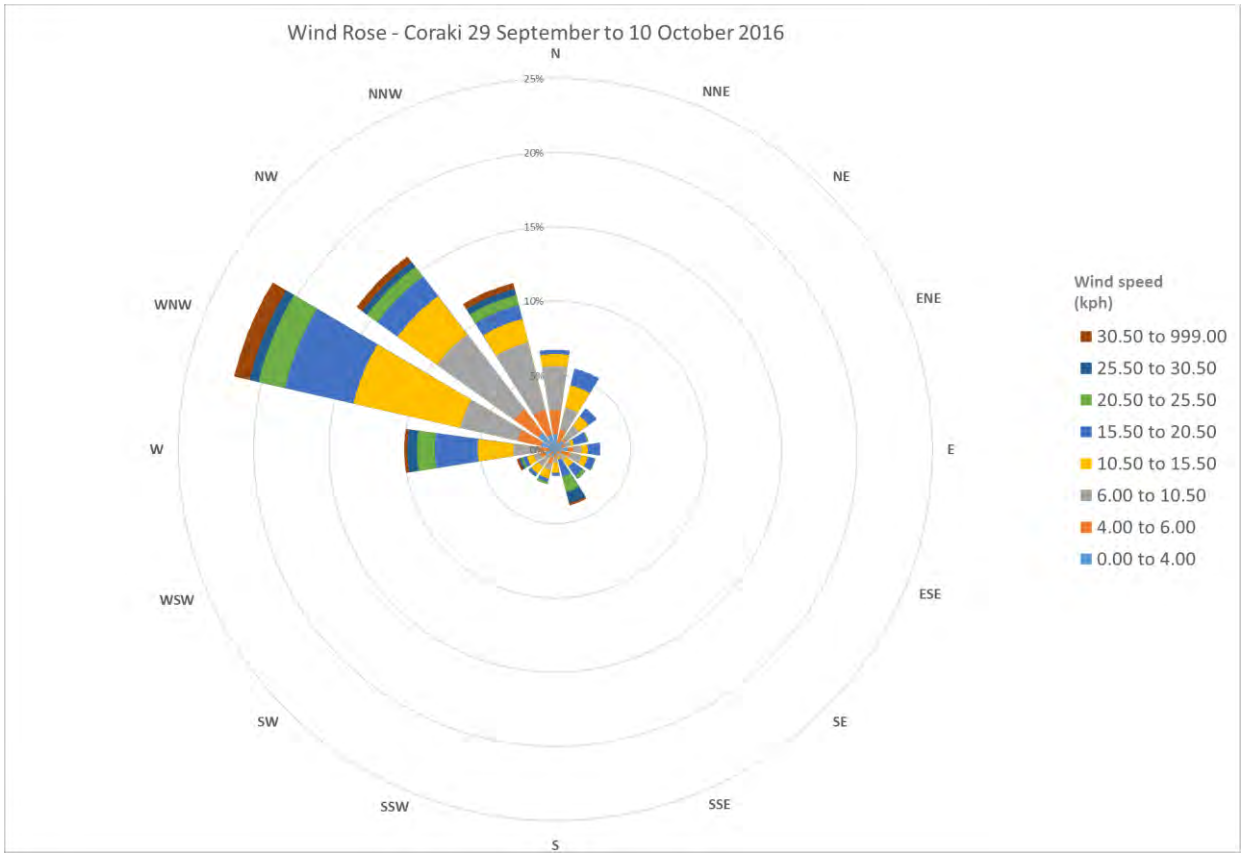
Graph 1 – Total Insoluble Matter October 2016 – December 2016

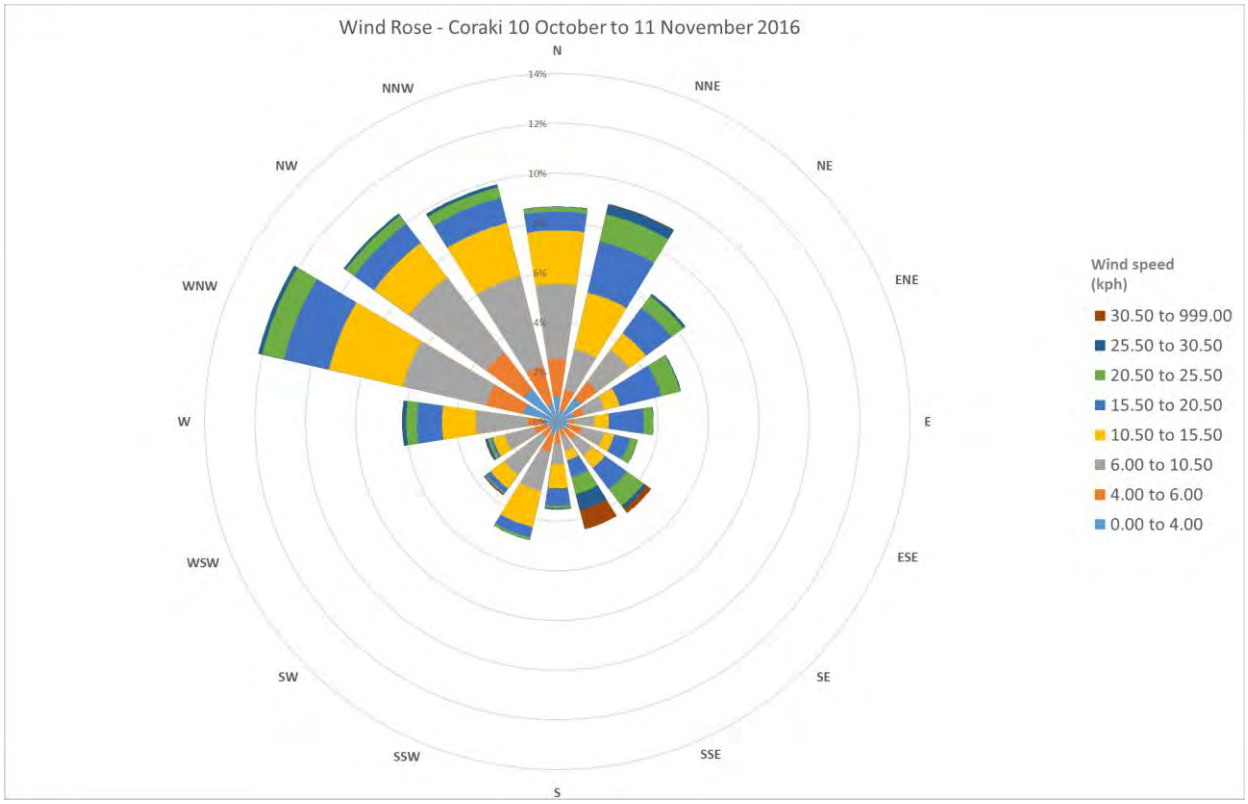


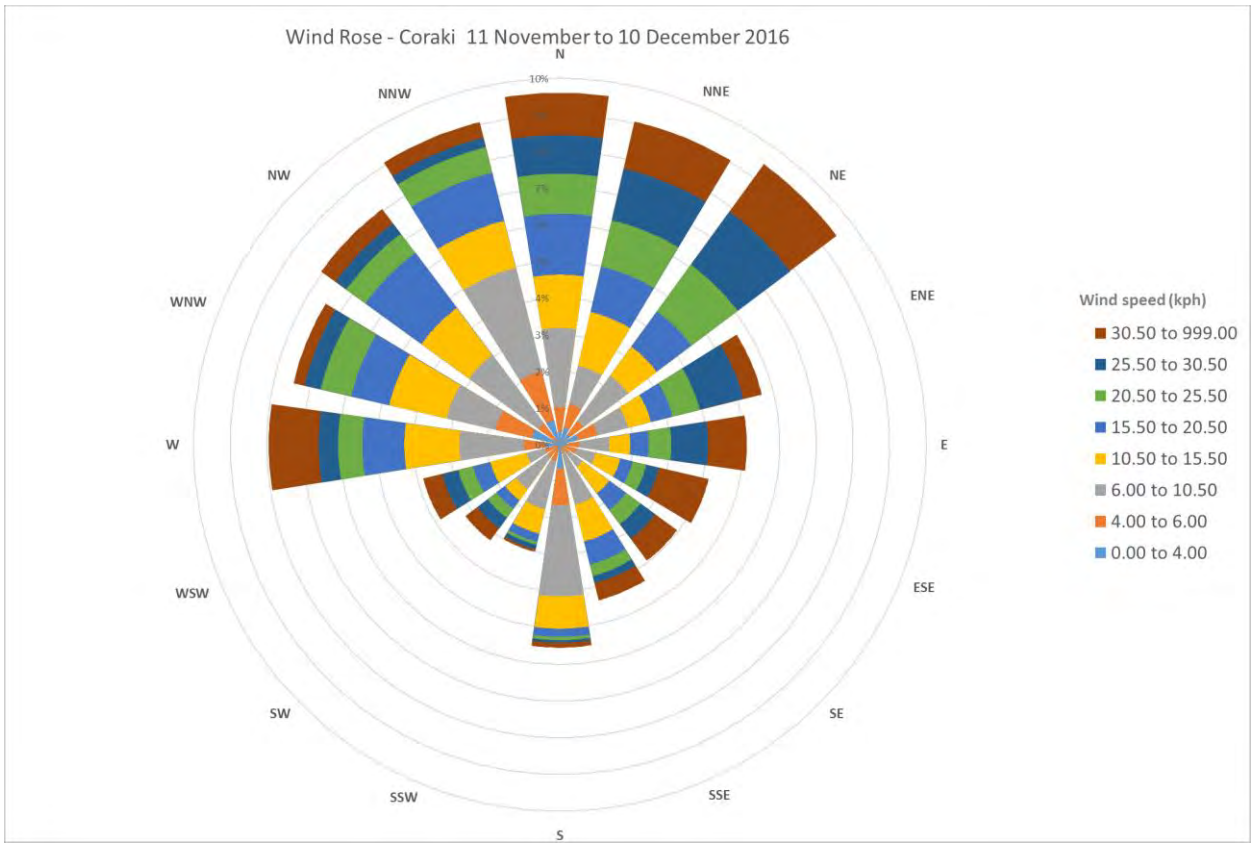
Graph 2 – Ash Content October 2016 – December 2016

Attachment 2

Wind Roses


Wind Rose - Coraki 29 September to 10 October 2016
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
25%
20%
15%
10%
Wind speed (kph)
30.50 to 999.00
25.50 to 30.50
20.50 to 25.50
15.50 to 20.50
10.50 to 15.50
6.00 to 10.50
4.00 to 6.00
0.00 to 4.00


Wind Rose - Coraki 10 October to 11 November 2016
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
14%
12%
10%
Wind speed (kph)
30.50 to 999.00
25.50 to 30.50
20.50 to 25.50
15.50 to 20.50
10.50 to 15.50
6.00 to 10.50
4.00 to 6.00
0.00 to 4.00


Wind Rose - Coraki 11 November to 10 December 2016
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
10%
Wind speed (kph)
30.50 to 999.00
25.50 to 30.50
20.50 to 25.50
15.50 to 20.50
10.50 to 15.50
6.00 to 10.50
4.00 to 6.00
0.00 to 4.00