



Salt Ash Sand Quarry

Annual Review 2022

Prepared for:

ATB Morton Pty Ltd

Janet Parade
Salt Ash, NSW
2318

March 2023

Version No: Draft v.1

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Name of operation	Salt Ash Sand Quarry
Name of operator	Redisand Pty Ltd
Development consent / project approval #	07/0094
Name of holder of development consent / project approval	ATB Morton Pty Ltd
Water licence No.	WAL36627
Name of holder of water licence	Redisand Pty Ltd
Annual Review start date	01 January 2022
Annual Review end date	31 December 2022

I, **Grant Stevenson**, certify that this audit report is a true and accurate record of the compliance status of Salt Ash Sand Quarry for the period **01 January 2022 to 31 December 2022** and that I am authorised to make this statement on behalf of **Redisand Pty Ltd**.

Note.

a) *The Annual Review is an 'environmental audit' for the purposes of section 9.39(2) of the Environmental Planning and Assessment Act 1979. Section 9.42 provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.*

b) *The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).*

Name of authorised Reporting Officer	Grant Stevenson
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	
Date	31 March 2023

1. STATEMENT OF COMPLIANCE

The statement of commitments for the 2022 reporting period for the Redisand Salt Ash Sand Quarry is listed in **Table 1**. The Department of Planning, and Environment (DPE) Compliance Status Key is provided as **Table 2**. Non compliances identified within the reporting period are detailed in **Table 3**.

Table 1– Statement of Commitments

Were all conditions of the relevant approval(s) complied with?	
Project Approval 07_0094	NO
EPL 13406	NO

Table 2- DPE Compliance Status Key

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence.
Medium	Non-compliant	Non-compliance with: - 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)

Table 3 summarises all the non-compliances at Redisand for 2022. All non-administrative non-compliances are discussed in further detail in **Section 12**.

Table 3– Non-Compliances within the 2022 Reporting Period

Relevant Approval	Condition Number	Condition description	Compliance Status	Comment	Where addressed in this Annual Review																			
PA 07_0094	Schedule 3, Condition 8	The proponent must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 3 at any residence on privately-owned land. <i>Table 3: Air quality criteria</i> <table><tr><th><i>Pollutant</i></th><th><i>Averaging period</i></th><th><i>Criterion</i></th></tr><tr><td rowspan="2">Particulate matter < 10 µm (PM₁₀)</td><td>Annual</td><td>^{a, c} 25 µg/m³</td></tr><tr><td>24 hour</td><td>^b 50 µg/m³</td></tr><tr><td rowspan="2">Particulate matter < 2.5 µm (PM_{2.5})</td><td>Annual</td><td>^{a, c} 8 µg/m³</td></tr><tr><td>24 hour</td><td>^b 25 µg/m³</td></tr><tr><td>Total suspended particulate (TSP) matter</td><td>Annual</td><td>^{a, c} 90 µg/m³</td></tr><tr><td>^d Deposited dust</td><td>Annual</td><td>^b 2 g/m²/month ^a 4 g/m²/month</td></tr></table>	<i>Pollutant</i>	<i>Averaging period</i>	<i>Criterion</i>	Particulate matter < 10 µm (PM ₁₀)	Annual	^{a, c} 25 µg/m ³	24 hour	^b 50 µg/m ³	Particulate matter < 2.5 µm (PM _{2.5})	Annual	^{a, c} 8 µg/m ³	24 hour	^b 25 µg/m ³	Total suspended particulate (TSP) matter	Annual	^{a, c} 90 µg/m ³	^d Deposited dust	Annual	^b 2 g/m ² /month ^a 4 g/m ² /month	Non-Compliant (Low)	PM_{2.5} exceeded the approved criteria of 25 µg/m³ on 26 May 2022 recording 34 µg/m³ and 43 µg/m³ on 18 August 2022. PM₁₀ exceeded the approved criteria on 18 August 2022 with 58 µg/m³. Missed monitoring on 13 February and 16 November 2022.	Section 6.3.3
<i>Pollutant</i>	<i>Averaging period</i>	<i>Criterion</i>																						
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	24 hour	^b 50 µg/m ³																						
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Total suspended particulate (TSP) matter	Annual	^{a, c} 90 µg/m ³																						
^d Deposited dust	Annual	^b 2 g/m ² /month ^a 4 g/m ² /month																						
PA 07_0094	Schedule 3, Condition 10	Air Quality Management Plan	Non-Compliant (Low)	See above.	Section 6.3.3																			
PA 07_0094	Schedule 3, Condition 17	Groundwater Monitoring Plan (a) detailed baseline data on groundwater levels and quality, based on statistical analysis; (b) groundwater impact assessment criteria; (c) a program to monitor ground water levels and quality; (d) a program to monitor ground water level effects on groundwater dependent vegetation, and (e) a protocol for the investigation, notification and mitigation of identified exceedances of the groundwater impact assessment criteria.	Non-Compliant (Administrative)	Monitoring does not include groundwater levels, but rather groundwater depth. Therefore, administrative non-compliance with Schedule 3, Condition 17(c).	Section 7.4																			

Relevant Approval	Condition Number	Condition description	Compliance Status	Comment	Where addressed in this Annual Review
PA 07_0094	Schedule 4, Condition 2	If the results of the monitoring required in schedule 3 identify that the impacts generated by the project on site are greater than the relevant impact assessment criteria, and there is no negotiated agreement in place to allow the impact, then within 2 weeks of obtaining the monitoring results the Proponent must: (a) notify the Secretary, the affected landowners and tenants (including tenants of quarry-owned properties) accordingly, and provide monitoring results to each of these parties until the results show that the project is complying with the relevant criteria in schedule 3; and (b) in the case of exceedances of the relevant air quality criteria, send the affected landowners and/or tenants a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time).	Non-Compliant (Administrative)	Redisand did not notify the landowners within the approved timeframe when exceedances occurred.	Section 6.3.3
PA 07_0094	Schedule 5, Condition 1	Environmental Management Strategy	Non-Compliant (Administrative)	Redisand did not report non-compliances to DPE as per the EMS, therefore non-compliant.	Section 12
PA 07_0094	Schedule 5, Condition 7	Non-Compliance Notification Within seven days of becoming aware of a non-compliance, the Proponent must notify the Department of the non-compliance. The notification must be in writing to compliance@planning.nsw.gov.au and identify the project (including the project approval number and name), set out the condition of this approval that the project is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. <i>Note: A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.</i>	Non-Compliant (administrative)	Redisand did not report non-compliances to DPE as per the EMS, therefore non-compliant.	Section 12
PA 07_0094	Statement of Commitments 5 – Air Quality	Monitoring of air quality is to occur in accordance with the licensing requirement imposed on the project.	Non-Compliant (Low)	Missed monitoring on 13 February and 16 November 2022.	Section 6.3.3

Relevant Approval	Condition Number	Condition description	Compliance Status	Comment	Where addressed in this Annual Review																								
EPL 13406	P1.2	The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point. <table><tr><th colspan="4">Water and land</th></tr><tr><th>EPA Identification no.</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description</th></tr><tr><td>4</td><td>Groundwater quality monitoring</td><td></td><td>Groundwater monitoring location (west of quarrying) labelled as "SB1/MW1" on Drawing titled "Approximate Monitoring Well Locations", Coffey Environments dated 5 June 2013. A copy of this Diagram is filed on EPA file EF13/4045 Doc16/421362.</td></tr><tr><td>5</td><td>Groundwater quality monitoring</td><td></td><td>Groundwater monitoring location (south of quarrying) labelled as "BH6" on Drawing titled "Approximate Monitoring Well Locations", Coffey Environments dated 5 June 2013. A copy of this Diagram is filed on EPA file EF13/4045 Doc16/421362.</td></tr><tr><td>6</td><td>Groundwater quality monitoring</td><td></td><td>Groundwater monitoring location (south-east of quarrying) labelled as "BH1" on Drawing titled "Approximate Monitoring Well Locations", Coffey Environments dated 5 June 2013. A copy of this Diagram is filed on EPA file EF13/4045 Doc16/421362.</td></tr><tr><td>7</td><td>Groundwater quality monitoring</td><td></td><td>Groundwater monitoring location (east of quarrying) labelled as "BH4" on Drawing titled "Approximate Monitoring Well Locations", Coffey Environments dated 5 June 2013. A copy of this Diagram is filed on EPA file EF13/4045 Doc16/421362.</td></tr></table>	Water and land				EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description	4	Groundwater quality monitoring		Groundwater monitoring location (west of quarrying) labelled as "SB1/MW1" on Drawing titled "Approximate Monitoring Well Locations", Coffey Environments dated 5 June 2013. A copy of this Diagram is filed on EPA file EF13/4045 Doc16/421362.	5	Groundwater quality monitoring		Groundwater monitoring location (south of quarrying) labelled as "BH6" on Drawing titled "Approximate Monitoring Well Locations", Coffey Environments dated 5 June 2013. A copy of this Diagram is filed on EPA file EF13/4045 Doc16/421362.	6	Groundwater quality monitoring		Groundwater monitoring location (south-east of quarrying) labelled as "BH1" on Drawing titled "Approximate Monitoring Well Locations", Coffey Environments dated 5 June 2013. A copy of this Diagram is filed on EPA file EF13/4045 Doc16/421362.	7	Groundwater quality monitoring		Groundwater monitoring location (east of quarrying) labelled as "BH4" on Drawing titled "Approximate Monitoring Well Locations", Coffey Environments dated 5 June 2013. A copy of this Diagram is filed on EPA file EF13/4045 Doc16/421362.	Non-Compliant (Administrative)	Monitoring does not include groundwater levels, but rather groundwater depth. Therefore, administrative non-compliance with Schedule 3, Condition 17(c).	Section 7.4
Water and land																													
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EPL 13406	M2.2	<i>Air Monitoring Requirements:</i> POINT 1 <table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Particulates - Deposited Matter</td><td>grams per square metre per month</td><td>Monthly</td><td>AM-19</td></tr><tr><td>PM10</td><td>micrograms per cubic metre</td><td>Every 6 days</td><td>AM-18</td></tr><tr><td>Total suspended particles</td><td>milligrams per cubic metre</td><td>Every 6 days</td><td>AM-15</td></tr></table>	Pollutant	Units of measure	Frequency	Sampling Method	Particulates - Deposited Matter	grams per square metre per month	Monthly	AM-19	PM10	micrograms per cubic metre	Every 6 days	AM-18	Total suspended particles	milligrams per cubic metre	Every 6 days	AM-15	Non-Complaint (Low)	Missed monitoring on 13 February and 16 November 2022.	Section 6.3.3								
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PM10	micrograms per cubic metre	Every 6 days	AM-18																										
Total suspended particles	milligrams per cubic metre	Every 6 days	AM-15																										

2. INTRODUCTION

Redisand Salt Ash Sand Quarry (Redisand) is owned by ATB Morton and operated under the proponent Redisand. The site was granted Project Approval MP 07_0094 on 28 October 2010 by the (then) NSW Minister for Planning for the construction and operation of a sand quarry in the Port Stephens Local Government Area, which is located approximately 20 km north-east of Newcastle. Extraction operations on site did not commence until February 2015. The Redisand Project Area is shown in **Figure 1**.

Extraction is scheduled to be undertaken in five stages to minimise the time surface materials are exposed and to expedite rehabilitation and revegetation of the disturbed areas. Currently the site is in Stage 2 of extraction activities with Stage 1 being rehabilitated.

The Project Approval has been modified five times with the most recent modification approved in August 2022. This was to rectify an on-going issue regarding truck movements and detailed in **Section 6.4.2**. The previous modification, MOD 4, was approved on 10 October 2018, allowing Redisand to increase their production transport to 400,000 tonnes per annum from 201,000 tonnes. Redisand also operates in accordance with the Environment Protection Licence (EPL) No. 13406 issued by the NSW Environment Protection Authority (EPA).

Under Schedule 5, Condition 3 of the Project Approval, Redisand is required to complete an Annual Review in accordance with the conditions outlined in **Table 4**.

Table 4– Annual Review Requirements

Condition	Section addressed in Annual Review
By the end of March each year, the Proponent must review the environmental performance of the project to the satisfaction of the Secretary. This review must:	
a) Describe the works (including rehabilitation) that were carried out in the previous calendar year, and the works that are proposed to be carried out over current calendar year;	Sections 4, 8 and 13
b) Include a comprehensive review of the monitoring results and complaints records of the project over the past 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 EA;	Sections 6, 7 and 10.2
c) Identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	Section 1 and 12
d) Identify any trends in the monitoring data over the life of the project;	Sections 6 and 7
e) Identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	Sections 6 and 7
f) Describe what measures will be implemented over the next year to improve the environmental performance of the project.	Section 6

This Annual Review has been prepared to meet the requirements of the *Annual Review Guideline: Post-approval Requirements for State Significant Mining Developments* (NSW Government, 2015). This report details the environmental performance of Redisand from 01 January 2022 to 31 December 2022.

2.1. Contact Details

Quarry Manager

Grant Stevenson

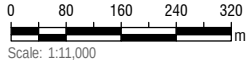
Mob: 0422 016 870

Email: GrantStevenson@redisand.com.au



LEGEND

- Indicative Project Boundary
- Disturbance Area
- Cadastre
- National Park



Source: GDA 1994 MGA Zone 56
21/02/2022

3. APPROVALS

The site operates under the following approvals listed in **Table 5**.

Table 5– Approvals for Redisand

Regulatory Authority	Approval
NSW DPE	Project Approval 07_0094
NSW EPA	EPL 13406
NRAR	Water Access Licence Reference No: WAL36627
NSW DPE	BioBanking agreement BA108 Bola Fogal, Tomalla

4. OPERATIONS SUMMARY

4.1. Mining Operations in 2022

4.2. Extraction Summary

Table 6 provides the extraction summary at Redisand for 2022.

Table 6– Production Summary

Material	Approved limit (Source PA 07_0094 Schedule2, Condition 8)	Previous reporting period (2020)	Previous reporting period (2021)	This reporting period (2022)	Next reporting period (forecast 2023)
Quartz sand	400,000t	198,473t	228,560t	204,207t	220,000t

Quartz sand extraction was 203,207 tonnes in 2022, this is down from 2021 which produced 228,560 tonnes.

There were no exceedances in truck movements, but truck payloads increased resulting in a higher tonnage of extracted material.

4.3. Exploration

Exploration activities during the reporting period included clearing for Stage 2.

4.4. Land Preparation

Land preparation activities included a pre-clearance survey for Stage 2 which was undertaken between 27 July to 3 August 2022 and habitat tree removal on 11 August by Firebird ecoSultants. This is further detailed in **Section 6.5.3**.

4.5. Construction Activities

No construction activities occurred in 2022.

4.6. Next Reporting Period – Mining Operations

4.6.1. Quarrying Operations

Operations for the next reporting period include continued Stage 2 operations. Extraction totals will be similar to 2022 at approximately 220,000t.

4.6.2. Rehabilitation

Redisand continues to do progressive rehabilitation as operations continue. As of March 2023, there has been 2.01 ha of rehabilitation completed with 1.17 ha under current rehabilitation.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

5.1. Feedback on 2021 Annual Review

On 15 November 2022, Redisand received a letter from DPE stating that the 2021 Annual Review generally satisfied the reporting requirements of the Project Approval and the Department's *Annual Review Guideline* (October, 2015).

However, DPE requested the 2022 Annual Review provide the following:

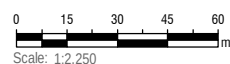
- Water take (**Section 7.8**) - Water take should report on water take in previous 'water year' (1 July – 30 June);
- Rehabilitation (**Section 8**) –
 - o The table in this section should report on key rehabilitation performance indicators for the period compared to the previous reporting period (actual) and next reporting period (forecast), as per Table 8 of the *Annual Review Guideline*; and
 - o Include the results of any rehabilitation inspections and/or monitoring conducted during the period, in accordance with the Landscape and Rehabilitation Management Plan and Response to Audit Actions appended to the Annual Review;
- Waste Management (**Section 9**) – Information on the amount of waste generated by the development, a comparison of results from the past year/s and measures implemented by ATB Morton Pty Ltd to minimise waste generation and proposed measures to improve performance.

These requirements have been addressed in their respective sections.



LEGEND

- Indicative Project Boundary
- Disturbance Area
- Rehabilitation
- Buffer Zone



Note: Data provided by Earth Surveying Pty Ltd (17.12.21)
 Basemap: Nearmap imagery (8.7.21)

Source: GDA 1994 MGA Zone 56
 21/02/2022

ATB01-005 Redisands Annual Review 2022

6. ENVIRONMENTAL PERFORMANCE

6.1. Meteorological Monitoring

Meteorological data has been taken from the Bureau of Meteorology (BOM) Williamtown, NSW Weather Station (ID 061078). Monthly rainfall, wind, and temperature data for 2022 is provided in **Table 7**.

Table 7– Williamtown Meteorological Data 2022

Month	Temperature		Rainfall			Wind
	Min Temp (°C)	Max Temp (°C)	Total (mm)	Max Daily (mm)	No. rain days >1 mm	Max Wind Gust (km/h)
Jan – 22	14.9	33.3	89.6	32	10	74
Feb – 22	13.3	35.1	161.4	39.4	15	70
Mar – 22	14.0	28.7	354.0	68.0	17	72*
Apr – 22	11	28.2	124.0	36.2	12	63*
May - 22	7.1	26.6	114.2	33	14	96
Jun – 22	2.4	20.9	28.6	18.4	4	91*
Jul – 22	2.9	21.8	327.4	59.8	15	17.8
Aug – 22	4.7	23.2	38.4	18.4	4	78
Sep – 22	5.4	24.6	74.4	28	9	70
Oct – 22	7.1	30	90.8	32.6	11	72
Nov – 22	8.2*	33.5*	50.0*	24.2*	5*	81*
Dec - 22	9.5	33	19.2	5.6	5	63

* Incomplete data recorded at Williamtown.

The minimum temperatures were similar to 2021 data, with maximum temperatures in 2022 being slightly cooler. Rainfall was comparative to the previous year with the exception of July, which saw an increase by 283.2 mm. The number of days that experienced less than 1 mm of rain decreased compared to 2021. The total rainfall for 2022 was 1,472 mm compared to 1,381.4 mm in 2021.

6.2. Noise

6.2.1. EA Predictions

Section 9.8.2 of the original EA (February 2010) predicted:

Noise emission levels are predicted to be below the relevant project specific noise criteria at all assessed residential locations on Nelson Bay Road. At the Janet Parade residences, noise emission levels are predicted to be up to 5 dBA above the project specific noise criteria. The predicted exceedance is due predominantly to the mobile extraction equipment and the road-truck pass-bys on the quarry access road.

The cumulative impact of the proposed development with existing industrial noise sources has been assessed in the determination of the acceptable amenity levels at surrounding potentially noise sensitive areas.

The MOD 4 EA (November 2017) predicted that:

Traffic noise on Janet Parade associated with Salt Ash sand quarry haul trucks was calculated using the loss of distance method taking into account the noise wall attenuation. The results of the assessment indicate that the quarry haul trucks should be limited to five pass-by events during the day time period and two pass-by events during the night-time period.

Review of this analysis indicates that noise levels would still comply with the noise criteria during the day and night periods and meet the major project conditions. The predicted noise levels from the Salt Ash sand quarry represent conservative assumptions, based on maximum number of trucks travelling on site. It is therefore considered that these calculated predictions represent the upper limit of expected noise levels.

6.2.2. Approved Criteria

In accordance with Schedule 3, Condition 2, *‘the Proponent must ensure that the operational noise generated by the project does not exceed the noise impact assessment criteria in the table at any residence on privately-owned land’*.

Noise criteria from the Project Approval are listed in **Table 8**.

Table 8– Approved Noise Impact Assessment Criteria for Redisand (PA 07_0094)

Receiver	Morning shoulder period 6:00am – 7:00am L _{Aeq} (15min) dB(A)	Day 7:00am – 6:00pm L _{Aeq} (15mins) dB(A)
JP1	35	40
JP2	35	43
JP3	35	39
JP4	35	37
NB1	35	36
All other receivers	35	35

Notes:

- a) Receiver locations are shown in Figure in Appendix 2 of PA07_0094; and
- b) Noise generated by the project is to be measure in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.

Noise criteria is also provided in Condition L3.1 of the EPL. This is outlined in **Table 9**.

Table 9– Approved Noise Impact Assessment Criteria for Redisand (Condition L3.1 of the EPL)

Receiver	L _{Aeq} (15 minute) dB(A)
JP1	40
JP2	Limit to be regulated by the consent authority under Development Consent MP07_0094, dated 29 October 2010
JP3	39
JP4	37
NB1	36
All other receivers	35

Note: Project Approval PA07_0094 required additional noise mitigation measures and land acquisition where certain noise criteria cannot be met.

6.2.3. Key Environmental Performance

In accordance with Schedule 3, Condition 7(b) of the Project Approval, Redisand must complete *‘quarterly attended noise monitoring on a day on which truck dispatches meet or exceed the daily average.’* A copy of 2022 quarterly noise monitoring results are included as **Appendix A**.

6.2.3.1. Noise Monitoring Frequency

Quarterly attended noise monitoring was completed in 2022 on the following dates by Spectrum Acoustics:

- 21 February 2022;
- 30 May 2022;
- 26 August 2022; and
- 30 November 2022.

6.2.3.2. Noise Monitoring Results

Condition M6.1 of EPL 13406 states that *“the licensee must undertake noise monitoring on a quarterly basis at noise monitoring locations JP1, JP2, JP3, JP4 and NB5. Monitoring must occur at a period of normal or peak operations and in the case of monitoring at locations JP3 and JP4 must include at least three (3) truck pass-bys”*. A summary of 2022 noise monitoring results are detailed in **Tables 10 and 11**.

Additional receivers (NB1-NB4) were originally not part of the quarterly reporting as noise was mostly dominated by traffic on Nelson Bay Road and the quarry was inaudible. As these sites are part of their 'noise receiver locations' identified in Appendix 2 of the Project Approval, monitoring began in 2021.

These additional receiver locations were often inaccessible, therefore locations that were acoustically similar, therefore representative of the quarry, were monitored. A summary of these additional monitoring results is shown in **Table 12**.

Table 10 – Noise Compliance Assessment for Redisand (Spectrum Acoustics, 2022)

Monitoring Location	Quarrying Noise Criteria	Q1 February 2022		Q2 May 2022		Q3 August 2022		Q4 November 2022	
	L _{Aeq} (15 min)	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance
JP1	40	Occasionally audible	✓	22	✓	Occasionally audible	✓	Occasionally audible	✓
JP2	43	Inaudible	✓	Faintly audible	✓	Inaudible	✓	Occasionally audible	✓
JP3	39	28 ¹	✓	31 ¹	✓	37 ¹	✓	35 ¹	✓
JP4	37	27 ¹	✓	30 ¹	✓	31 ¹	✓	32 ¹	✓
NB5	35	Inaudible	✓	Occasionally audible	✓	Occasionally audible	✓	Inaudible	✓

¹ Noise from trucks on Access Road

Table 11 – Noise Monitoring Results – Truck Noise (Spectrum Acoustics, 2022)

Monitoring Location	Noise Criteria	Q1 February 2022			Q2 May 2022			Q3 August 2022			Q4 November 2022		
	L _{Aeq} (15 min)	Truck Condition	L _{Aeq} (15 min)	Compliance	Truck Condition	L _{Aeq} (15 min)	Compliance	Truck Condition	L _{Aeq} (15 min)	Compliance	Truck Condition	L _{Aeq} (15 min)	Compliance
JP3	39	Laden	23	✓	Empty	26	✓	Empty	30	✓	Empty	27	✓
		Empty	22	✓	Empty	26	✓	Empty	34	✓	Empty	30.5	✓
		Empty	24	✓	Empty	27	✓	Empty	32	✓	Empty	31.5	✓
		Total	28	✓	Total	31	✓	Total	37	✓	Total	35	✓
JP4	37	Empty	24	✓	Empty	24	✓	Empty	27	✓	Empty	28	✓
		Empty	22	✓	Empty	25	✓	Empty	26	✓	Empty	28	✓
		Laden	19	✓	Empty	26	✓	Empty	25	✓	Empty	26	✓
		Total	27	✓	Total	30	✓	Total	31	✓	Total	31	✓

Table 12– Additional Noise Compliance Assessment – Nelson Bay Road (Spectrum Acoustics, 2022)

Monitoring Location	Quarrying Noise Criteria	Q1 February 2022		Q2 May 2022		Q3 August 2022		Q4 November 2022	
	L _{Aeq} (15 min)	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance
1 (NB1)	36	Barely audible ¹	✓	Inaudible	✓	Inaudible	✓	Inaudible	✓
2 (NB1)	35	Inaudible	✓	Inaudible	✓	Inaudible	✓	Inaudible	✓
3 (NB4)	35	Inaudible	✓	Inaudible	✓	Inaudible	✓	Inaudible	✓
¹ Noise from trucks on Access Road									

6.2.3.3. Long-term Trends

Noise monitoring criteria changed after the approval of MOD 4 in October 2018. Prior to 2020, noise monitoring was inconsistent and undertaken by three different companies, with numerous missed monitoring dates. As of 2020 monitoring has been more consistent. Noise levels remained below the approved criteria in 2022.

6.2.4. Management Measures

Key noise management controls include:

- Speed limits on the haul road;
- Designated operating hours;
- Noise fence;
- Equipment designed for noise mitigation and regularly maintained;
- Induction and training program; and
- Complaints management and investigation.

More detailed noise management strategies, procedures, controls and monitoring programs are detailed in the Redisand *Noise Management Plan*.

6.2.5. Proposed Improvements

A noise consultant has now locked in timings and methodology as per the *Noise Management Plan*. Monitoring of NB1-4 will continue unless Redisand receives approval to discontinue monitoring at these receivers.

6.3. Air Quality

6.3.1. EA Predictions

Section 9.9 of the original EA (February 2010) predicted:

The results of the AUSPLUME modelling indicate that operation of the development will result in incremental increases in particulate matter and dust deposition at surrounding residential receivers that will achieve the DECCW assessment criteria.

The contemporaneous assessment indicated that the development will result in up to two (2) additional exceedances per year of the 24-hour PM₁₀ criterion (daily concentrations). Advitech conclude that these exceedances can be attributed to elevated background concentrations rather than a significant incremental contribution from the proposed development.

The modelling makes the assumption that dust suppression measures will be implemented along the unsealed haul roads between the extraction 'face' and processing plant and also factors in the sealed access road from the processing plant and Janet Parade. As such dust suppression measures (water tanker) will be required to be implemented during the construction and operational phase of the project to ensure the development achieves compliance with the regulatory requirements for air emissions.

The MOD 4 EA (November 2017) update predicted:

The findings of the revised impact assessment are based on modelling the two worst-case scenarios for the proposed modification to the Redisand Salt Ash sand quarry to assess the potential particulate impacts to sensitive receivers. The results of the AUSPLUME modelling indicate that operation of the modified (400,000 tonnes of sand per year) Redisand sand extraction quarry will result in incremental increases in particulate matter and dust deposition at surrounding sensitive receivers. However, predicted dust concentrations and deposition rates will be below the NSW EPA assessment criteria.

A Level 2 contemporaneous assessment indicated that the Salt Ash Quarry operations will not have any additional exceedances of the 24-hour PM₁₀ and PM_{2.5} criterion as a result of cumulative impacts. Any exceedances that may occur will be likely attributed to elevated background concentrations rather than a significant incremental contribution from the proposed development.

6.3.2. Approved Criteria

Schedule 3, Condition 8 of the Development Consent requires that *'the Proponent must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in the table below at any residence on privately-owned land.'* The approved air quality criteria are outlined in **Table 13**.

Table 13 – Air Quality Criteria for Redisand

Pollutant	Average period	Criterion	
Particulate matter <10 _{µm} (PM ₁₀)	Annual	^{a, c} 25 µg/m ³	
	24 hour	^b 50 µg/m ³	
Particulate matter <2.5 _{µm} (PM _{2.5})	Annual	^{a, c} 8µg/m ³	
	24 hour	^b 25 µg/m ³	
Total suspended particulate (TSP) matter	Annual	^{a, c} 90 µg/m ³	
^d Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month

Notes:

- ^{a.} Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).
- ^{b.} Incremental impact (i.e. incremental increase in concentrations due to the development on its own).
- ^{c.} Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activities agreed by the Planning Secretary.
- ^{d.} Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods of Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Gravimetric Method.

6.3.3. Key Environmental Performance

6.3.3.1. PM_{2.5}, PM₁₀ and TSP Monitoring

Schedule 3, Condition 8 (PM_{2.5}, PM₁₀ and TSP)

High Volume Air Samplers (HVAS) have been installed near the entrance gate to collect particulates (TSP, PM₁₀ and PM_{2.5}) on a 24 hour, 6-day cycle. Monitoring results have been collected over a 12-month period starting on 02 January 2022. The results are recorded in **Table 14** and **Table 15**. Long-term dust trends over the life are provided in **Appendix B**.

Table 14 – 2022 Dust Monitoring (PM_{2.5} and PM₁₀) at Redisand (VGT, 2022)*

Sample Date	HVAS Pollutant (µg/m ³)	
	PM _{2.5}	PM ₁₀
02/01/2022	<2	4
08/01/2022	<2	7
14/01/2022	<2	6
20/01/2022	9	31
26/01/2022	<2	4
01/02/2022	13	18
07/02/2022	12	26
13/02/2022	<2	Missed
19/02/2022	<2	19
25/02/2022	<2	10
03/03/2022	<2	10
09/03/2022	<2	15
15/03/2022	16	18
21/03/2022	8	14
27/03/2022	<2	3
02/04/2022	<2	<2
08/04/2022	2	11
14/04/2022	18	18
20/04/2022	12	17
26/04/2022	7	18
02/05/2022	<2	13
08/05/2022	5	8
14/05/2022	3	9
20/05/2022	4	8
26/05/2022	34	28
01/06/2022	14	15
07/06/2022	9	8
13/06/2022	6	9
19/06/2022	4	8
25/06/2022	14	14
01/07/2022	7	12
07/07/2022	6	10
13/07/2022	11	11
19/07/2022	7	9
25/07/2022	22	23

Sample Date	HVAS Pollutant (µg/m ³)	
	PM _{2.5}	PM ₁₀
31/07/2022	4	4
06/08/2022	9	9
12/08/2022	3	6
18/08/2022	43	58
24/08/2022	17	20
30/08/2022	13	15
05/09/2022	3	10
11/09/2022	10	9
17/09/2022	9	8
23/09/2022	<2	5
29/09/2022	20	28
05/10/2022	<2	13
11/10/2022	18	17
17/10/2022	11	14
23/10/2022	<2	6
29/10/2022	16	12
04/11/2022	9	13
10/11/2022	12	18
16/11/2022	Missed	Missed
22/11/2022	12	17
28/11/2022	5	15
04/12/2022	<2	5
20/12/2022	8	16
16/12/2022	21	18
22/12/2022	12	13
28/12/2022	6	7
Average	8.9	13.4
Minimum	<2	<2
Maximum	43.0	58.0
Compliant	Non-Compliant	Non-Compliant

* Missed monitoring event for PM₁₀ on 13 February and PM_{2.5} and PM₁₀ on 16 November 2022.

Table 15 – 2022 Dust Monitoring (TSP) at Redisand (VGT, 2022)*

Sample Date	TSP (µg/m³)
02/01/2022	12
08/01/2022	14
14/01/2022	15
20/01/2022	55
26/01/2022	11
01/02/2022	35
07/02/2022	58
13/02/2022	Missed
19/02/2022	23
25/02/2022	17
03/03/2022	20
09/03/2022	36
15/03/2022	51
21/03/2022	34
27/03/2022	10
02/04/2022	9
08/04/2022	35
14/04/2022	61
20/04/2022	42
26/04/2022	73
02/05/2022	13
08/05/2022	23
14/05/2022	13
20/05/2022	18
26/05/2022	99
01/06/2022	23
07/06/2022	17
13/06/2022	18
19/06/2022	13
25/06/2022	29
01/07/2022	20
07/07/2022	20
13/07/2022	29
19/07/2022	18
25/07/2022	80
31/07/2022	15
06/08/2022	22
12/08/2022	16

Sample Date	TSP (µg/m³)
18/08/2022	80
24/08/2022	46
30/08/2022	27
05/09/2022	28
11/09/2022	20
17/09/2022	20
23/09/2022	16
29/09/2022	74
05/10/2022	32
11/10/2022	44
17/10/2022	43
23/10/2022	11
29/10/2022	33
04/11/2022	40
10/11/2022	40
16/11/2022	Missed
22/11/2022	36
28/11/2022	33
04/12/2022	15
10/12/2022	39
16/12/2022	44
22/12/2022	33
28/12/2022	16
Average	32.1
Minimum	9.0
Maximum	99.0
Annual Compliance Status	Non-Complaint*

* Missed monitoring event on 13 February and 16 November 2022.

There was one short-term exceedance of PM₁₀ results recording 58 µg/m³ on 18 August 2022. There were two occasions in 2022 where PM_{2.5} exceeded the Project Approval criteria, recording 34 µg/m³ on 26 May and 43 µg/m³ on 18 August. The elevated results were a result of dust along Janet Parade. Redisand is currently in process to get this maintenance issue resolved.

The annual PM₁₀ average was 13.4 µg/m³ which is within the approved annual criteria of 25 µg/m³ and is compliant with Schedule 3 Condition 8 of the Project Approval.

The PM_{2.5} annual average was 8.9 µg/m³ which exceeded the approved annual criteria of 8 µg/m³ and is non-compliant with Schedule 3 Condition 8 of the Project Approval. This average is down from 2021 where the annual average was 9.8 µg/m³.

Annual TSP average was 32.1 µg/m³ which was within the approved annual criteria of 90 µg/m³.

No air quality data was collected on 16 November 2022 making the site non-compliant with its monitoring requirements outlined in Condition M2.2 of EPL 13406. At least 60 valid sampling events occurred in this reporting period. Averages were calculated by removing < from the sample.

6.3.3.2. Depositional Dust Monitoring

Schedule 3, Condition 8 (Deposited Dust)

Depositional dust monitoring continued at three sites (D1, D2 and D3) along the perimeter of the operation during 2022. Results of the monitoring are provided in **Table 16**.

Table 16 – 2022 Dust Monitoring (Depositional Dust) (VGT, 2022)

Start Date	Insoluble Solids (g / m ² / month)		
	D1 (Gate)	D2 (Wisely)	D3 (2930 Nelson Bay Road)
17 January 2022	1.9	3.5	2.8
16 February 2022	3	2.5	1.3
16 March 2022	1.8	2.2	0.7
12 April 2022	9.8	1.9	0.5
9 May 2022	1.9	1.8	1.9
8 June 2022	2.8	2.1	3.9
5 July 2022	1.4	1.2	2.1
3 August 2022	1.6	2.1	3
31 August 2022	3.3	6.7	0.6
30 September 2022	3.6	12.8	1.2
21 October 2022	2.8	3.9	0.9
18 November 2022	2.7	3.6	1.7
21 December 2022	1.9	7.7	3.4
Annual Average	3.2	4.0	1.8
Results (Year to Date)	Compliant	Compliant	Compliant

Depositional dust results remained within the criteria for 2022. On 12 April 2022 site D1 recorded 9.8 g/m² which was higher than other monthly results at D1. Site D2 recorded three months with high depositional dust results with 6.7 g/m² on 31 August, 12.8 g/m² on 30 September and 7.7 g/m² on 21 December 2022. There has been an ongoing issue with the bottles consistently filling with vegetation and debris possibly contributing to these high depositional dust results. There were 13 monitoring events during 2022 with two events in August.

6.3.4. Long-Term Trends

Air quality monitoring criteria changed with the approval of MOD 4 in October 2018. One of the new changes was to install a new HVAS monitor (PM_{2.5}). The following summarises a comparison of 2022 air quality monitoring results compared to previous years.

- The 2022 average PM_{2.5} levels were lower than the 2021 results. The 2022 annual average for PM_{2.5} was 8.9 µg/m³ compared to the 9.8 µg/m³ in 2021. There were more short-term exceedances recorded in 2021. However, there were more missed monitoring dates in 2022. The highest PM_{2.5} average in the past four years was in 2019 with 15.0 µg/m³.
- 2022 PM₁₀ level were relatively close to the 2021 results with 13.4 µg/m³ in 2022 and 11.9 µg/m³ in 2021. This continues the trend of lower PM₁₀ levels since 2020. 2019 recorded the highest average of 20.2 µg/m³. This was likely a result from dry seasons and extreme bushfires.
- 2022 TSP annual average was 32.1 µg/m³ which was higher than the 2021 TSP annual average of 24.9 µg/m³. Again, over the past four years 2019 recorded the highest average at 36.9 µg/m³.

There have been numerous short-term exceedances of PM_{2.5} levels since 2019 which is reported in the respective Annual Reviews. The annual average PM₁₀ and TSP levels have consistently been below the approved criteria, even with the extraordinary bushfire seasons. Complete air quality monitoring results for 2022 are provided in **Appendix B**.

Long-term PM_{2.5} and PM₁₀ results from 2018 to 2022 are outlined in **Table 17** and depositional dust results from 2018 to 2022 are outlined in **Table 18**. Note, PM_{2.5} monitoring did not start until February 2019.

Table 17 – Long-term PM_{2.5} and PM₁₀ Results

Monitoring Summary for Annual Review Period	Monitoring Results (µg/m ³)	Monitoring Results (µg/m ³)	Monitoring Results (µg/m ³)	Monitoring Results (µg/m ³)	Monitoring Results (µg/m ³)
	2018	2019	2020	2021	2022
Average PM _{2.5}	-	15	7.6	9.8	8.9
Minimum PM _{2.5}	-	<2	<2	<2	<2
Maximum PM _{2.5}	-	54	19	37	43
Average PM ₁₀	16.6	20.2	12.2	11.9	13.4
Minimum PM ₁₀	<2	<2	<2	<2	<2
Maximum PM ₁₀	59	58	34	34	58

Note: Averages were calculated by removing < from the sample.

Table 18 - Long-term Depositional Dust Results

Dust Depositional Gauge	Monitoring Summary for Annual Review Period (Insoluble Solids)	2018 (g/m ² /month)	2019 (g/m ² /month)	2020 (g/m ² /month)	2021 (g/m ² /month)	2022 (g/m ² /month)
D1	Average	2.4	2.3	2.2	2.6	3.2
	Minimum	1.3	1.2	1.3	1.4	1.4
	Maximum	5.8	4.8	4.2	4.6	9.8
D2	Average	1.7	2.7	2.2	3.9	4.3
	Minimum	0.4	1.2	0.8	1.3	1.2
	Maximum	2.8	4.8	4.8	8.7	12.8
D3	Average	0.9	1.7	1.3	2.8	2.0
	Minimum	0.2	0.5	0.2	0.5	0.5
	Maximum	2.6	3.3	4.2	11.7	3.9

Note: 2019 and 2020 averages were calculated from 13 samples. 2018 averages were calculated from 9 samples. No monitoring results completed for May, July and October 2018.

6.3.4.1. Comparison to EA Predictions

There was one exceedance of PM₁₀ on 18 August 2022 with a result of 58 µg/m³. There were two exceedances of short-term PM_{2.5} level on 26 May and 18 August resulting in 34 µg/m³ and 43 µg/m³ respectively. Long-term PM_{2.5} exceeded the annual criteria of 8 µg/m³ with an annual average of 8.9 µg/m³. These exceedances are outside the EA predictions. The results are associated with dust along Janet Parade. There were no extraordinary event days reported by DPE in 2022.

6.3.5. Management Measures

Key air quality management procedures are detailed in the *Air Quality Management Plan* and include:

- Prompt rehabilitation of extinguished extraction areas;
- Damping down potential dust generating material;
- Wind breaks and bunds;
- Water down unsealed haul routes prior to use;
- Speed limit restricted to 30 km/h;
- Covering trucks when leaving premises with potential dust generating material; and
- Sprinkler system and reduction of activities during prolonged hot, dry, and windy periods.

6.3.6. Proposed Improvements

Redisand committed to improving air quality data collection in 2021 which continued in 2022. It is proposed that this will continue in the future.

6.4. Traffic Management

6.4.1. EA Predictions

The original 2010 EA estimated that during the peak hourly flow, the site would only have 6 vehicle trips per hour (including 'heavy' vehicles and passenger vehicles used by staff). The low level of traffic flow associated with the quarry would not have any adverse impacts on the existing road network. However, due to the use of heavy vehicles, there would likely be a requirement to upgrade the Janet Parade and Nelson Bay Road intersection.

A Traffic Impact Assessment completed by SECA Solution for the 2017 MOD 4 indicated that despite an increase in traffic due to expanding operations there would still be relatively low impact on the existing traffic conditions.

6.4.2. Approved Criteria

In MOD 5, Schedule 2, Conditions 7-7B provide specific truck movement requirements based on the condition of the intersection between Nelson Bay Road and Janet Parade. As of 2022, truck movements are to be in accordance with the following:

Schedule 2, Condition 7: *Until such time as the road upgrades required under either condition 29 or condition 29A of Schedule 3 are completed, the Applicant must not transport more than:*

- a) 30 laden trucks per day, Monday to Friday between 7:00 am and 5:00 pm; and
- b) 15 laden trucks per day on Saturdays between 8:00 am and 1:00 pm.

Truck movements can be increased as soon as the intersection of Nelson Bay Road and Janet Parade gets upgraded. Based on the intersection upgrade, truck movements will be in accordance with one of the following conditions:

- If the intersection is upgraded to a **Basic Right Turn (BAR)**, the following truck movements will be permissible under Schedule 3, Condition 29:
Schedule 2, Condition 7A: Following the completion of the road upgrades required under condition 29 of Schedule 3, the Applicant must not transport more than:
 - a) 36 laden trucks per day, Monday to Friday between 6:00 am and 6:00 pm; and
 - b) 15 laden trucks per day on Saturdays between 8:00 am and 1:00 pm.
- If the intersection is upgraded to a **Channelised Right Turn (CHR)** the following truck movements are permissible under Schedule 3, Condition 29A:
Schedule 2, Condition 7B: Following the completion of the road upgrades required under condition 29A of Schedule 3, the Applicant must not transport more than:
 - a) 4 laden trucks per hour;
 - b) 42 laden trucks per day, Monday to Friday between 6:00 am and 6:00 pm; and
 - c) 18 laden trucks per day on Saturdays between 8:00 am and 1:00 pm.

Trucks movements must also always comply with the following condition no matter the status of the intersection:

Schedule 3, Condition 31: The Proponent must ensure that:

- a) All vehicles do not exceed a speed of 40 km/h on the site;
- b) All loaded vehicles entering or leaving the site are covered; and
- c) All loaded vehicles leaving the site are cleaned of sand and other materials that may fall on the road, before they leave the site.

6.4.3. Key Environmental Performance

Truck monitoring was completed in 2022 using data from the weighbridge log. There was a total of 5,586 truck movements and all truck movements complied with the approved criteria provided in MOD 3 and after August 2022, MOD 5. A copy of the truck movements is recorded within **Appendix C** (Transport Summary).

There have been historical issues with truck movements being non-compliant as Redisand was operating with the criteria outlined in MOD 4 up until 2019. Upon noting that the MOD 4 criteria only applied after the intersection of Nelson Bay Road and Janet Parade was upgraded to a channelised right turn (CHR) type intersection, truck movements were corrected in 2020. This also triggered the development of MOD 5 which clarified truck movement numbers dependent on the condition of the intersection. The number of trucks has not been exceeded since. In 2021, truck sizes increased resulting increased production and a higher tonnage of material being extracted. An extraction summary is provided in **Section 4.2**.

6.4.4. Management Measures

Traffic and transport impacts are managed in accordance with specific strategies and procedures outlined in the Redisand *Traffic Management Plan*.

6.4.5. Proposed Improvements

Redisand will continue to comply with Schedule 2, Condition 7 of PA 07_0094 until a decision is made on what type of intersection will be constructed for Janet Parade and Nelson Bay Road.

6.5. Biodiversity

6.5.1. EA Predictions

The 2010 EA undertook a comprehensive Ecological Assessment to determine the nature and extent of environmental issues on the subject site. The assessment presented potential constraints presented by ecological issues under the *Threatened Species Conservation Act 1995 (TSC Act)* and matters of national

environmental significance under the *Environment Protection & Biodiversity Conservation Act (EPBC Act)*, including threatened migratory species.

The proposed activity will remove approximately 28 hectares of Supplementary Habitat for Koalas in the short term. A *Comprehensive Koala Plan of Management* (CKPoM) has been prepared to address this issue. However, it should be noted that as extraction activities will move along in stages, the Supplementary Habitat (mined area) will be rehabilitated, and koala movement corridors are not likely to be compromised.

6.5.2. Approved Criteria / Site Boundary Issue

Offset and buffer zone criteria is outlined in Schedule 3 Condition 19-21 of PA 07_0094. There have been historical non-compliances regarding buffer zone boundaries and since 2020, Redisand has been consulting with DPE to modify their original EA so that they can rectify these issues. This consultation is still ongoing. In the meantime, Redisand continues to maintain the area around the buffer zones and report the progress in the Annual Reviews.

6.5.3. Key Environmental Performance

Pre-Clearance Survey (2022)

Prior to Stage 2 clearing, a pre-clearance survey was undertaken between 27 July to 03 August 2022. This was to ensure that any threatened species recorded within the site was properly monitored and clearance was obtained before clearing any identified habitats or nesting sites. The pre-clearance survey looked for:

- any nests for threatened species
- evidence of nesting or roosting of Powerful Owls and Masked Owls
- roosting trees of microbats
- evidence of koala occupation
- roosting or nesting sites of Squirrel Gliders and Brush-tailed Phascogale
- any signs of threatened fauna species.

No threatened fauna species or nesting / roosting sites for threatened species were identified during the surveys. However, it is recommended that an experienced ecologist or wildlife carer is present during the clearance of hollow bearing trees to assist with any displaced fauna species and in accordance with the approved *Landscape Management Plan*. The Pre-Clearance Survey Report is attached as **Appendix E**.

Flora and Fauna Monitoring

Firebird ecoSultants were engaged by Redisand to undertake flora and fauna monitoring at the site in accordance with the current *Landscape Management Plan* and the BioBanking agreement. Monitoring included reporting on the *Diuris arenaria* (Sand Doubletail) population and the BioBanking agreement. Note, Redisand has since retired the 1,857 ecosystem credits in the Tomalla offset site as required under Schedule 3, Condition 19 of the project approval.

Diuris arenaria

A targeted *D. arenaria* (Sand Doubletail) survey within the easement of the site was undertaken on 29 September 2022 in compliance with the *Landscape and Rehabilitation Management Plan*. Plants have been grouped into seven 'clusters'. Data recorded within each cluster included the number of individual plants, stem heights for each individual plant, and number of flowers for each plant. Mean stem heights and mean number of flowers were calculated for each cluster. See Appendix A of the *D. arenaria* report by Firebird ecoSultants (**Appendix F**).

Table 19 and **Table 20** provide a comparison from 2016 –2022. The variation in *D. arenaria* patch numbers has been consistent over the years and has not been detrimentally impacted by quarrying operations.

Table 19– Number of *D. arenaria* (Sand Doubletail) from 2016 - 2022

Cluster No	Number of Orchids						
	16	17	18	19	20	21	22
1	21	8	13	9	10	9	4
2	100	113	40	73	42	40	56
3	20	12	5	16	28	17	73
4	47	55	8	53	64	25	92
5	34	11	7	14	36	26	25
6	50	48	4	40	40	35	36
7	27	10	8	7	13	32	41
Total	299	257	85	212	233	184	327

Table 20- Comparison of 2016 – 2022 *D. arenaria* (Sand Doubletail) Survey Data

Cluster Number	Mean Stem Height (m)							Mean No. of Flowers						
	16	17	18	19	20	21	22	16	17	18	19	20	21	22
1	0.31	0.29	0.29	0.29	0.26	0.46	0.35	4.9	3.1	3.0	4.1	4.3	4.2	4.5
2	0.30	0.29	0.29	0.26	0.23	0.48	0.46	4.0	3.9	4.0	3.8	3.7	4.1	3.5
3	0.30	0.21	0.27	0.22	0.26	0.56	0.39	4.0	3.2	3.0	3.1	4.1	5.0	3.5
4	0.29	0.26	0.25	0.21	0.27	0.42	0.37	4.1	3.5	3.0	3.5	4.3	3.7	3.2
5	0.28	0.33	0.32	0.28	0.29	0.52	0.39	3.6	3.5	4.0	3.6	4.3	4.5	2.5
6	0.28	0.31	0.25	0.26	0.26	0.45	0.42	3.8	3.9	3.0	3.7	4.4	4.2	3.4
7	0.30	0.39	0.25	0.26	0.28	0.54	0.38	5.0	4.8	3.0	4.3	4.1	5.2	3.0
Total	2.06	2.08	1.92	1.78	1.85	3.45	2.75	29.4	25.9	23	26.1	29.2	30.9	23.6

Habitat Tree Removal for Clearing Activities

A walkover inspection was completed on 16 June 2022 by an ecologist from Firebird ecoSultants. This inspection looked for any trees that may be occupied by fauna or contain habitat features. A total of eight potential trees were identified and were marked for removal.

Soft felling of the identified trees occurred on 11 August 2022 under the supervision of a qualified ecologist. One hollow was occupied by two squirrel gliders (*Petaurus norfolcensis*). Both individuals were unharmed and moved to adjoining vegetation. The Habitat Tree Removal letter from Firebird ecoSultants is provided in **Appendix F**.

Nest Box Monitoring

Nest box monitoring and reporting is required to be completed on a two-year basis for the life of the quarry and for five years after quarry closure. No nest box monitoring was completed in 2022 and the next monitoring event will be in 2023.

BioBanking Agreement - Tomalla Offset Site

The vertebrate pest surveys found evidence of European Hare and Common Wild Pig on site. These species were recorded at low densities; therefore, it was concluded vertebrate pest abundance is likely low. Results of the flora surveys indicated a higher abundance of weeds on site, likely due to the weather conditions and a higher rainfall. Natural regeneration appears to be occurring throughout the site.

Existing fence lines were observed to be in good physical condition.

The following recommendations were provided to ensure that management actions in Annexure C of the BioBanking agreement continue to be implemented:

- Continued control of weeds is required within the site along the site's access tracks, low lying areas and also a general sweep through the entire site; and
- Monitoring of the *Lepus europaeus* (European Hare) and *Sus scrofa* (Common wild pig), to ensure that the abundance of these species stays low within the site, or otherwise, an action plan be established to eradicate these pets from the site.

6.5.4. Management Measures

Biodiversity will continue to be managed in accordance with the strategies in the *Landscape and Rehabilitation Management Plan*. This will mainly include progressive rehabilitation, compliance with clearing protocols and weed management.

6.5.5. Proposed Improvements

The 2020 Independent Environmental Audit identified areas that required improvement regarding biodiversity monitoring and compliance. It acknowledged that the *Landscape and Rehabilitation Management Plan* was not being effectively implemented, including rehabilitation inspections. Proposed improvements included updating the *Landscape and Rehabilitation Management Plan* which is still in progress until DPE and Redisand can agree on buffer zone boundaries.

6.6. Heritage

6.6.1. EA Predictions

6.6.1.1. Aboriginal Archaeology

An Aboriginal Heritage Impact Assessment was carried out by AHMS for the original 2010 EA. The study assessed the Potential Archaeological Deposits (PAD) to identify and describe areas with potential sub-surface Aboriginal objects or sites. The assessment divided the study area into three landscapes based on their PAD levels, with PAD 1 being areas of high archaeological potential and PAD 3 being areas of low or no archaeological potential.

The *Aboriginal Cultural Heritage Management Plan* (ACHMP) prepared for MOD 4 will continue to be reviewed and updated, if necessary. A search of the Aboriginal Heritage Information Management System revealed 59 previously recorded sites in the area. The Aboriginal heritage assessment will be updated to include sites listed between then and now and the likelihood of the operations impacting the identified sites.

6.6.1.2. Historic Heritage

No known items of historic heritage occur within the Redisand project area.

6.6.2. Approved Criteria

There are no specific criteria relating to heritage for the quarry.

6.6.3. Key Environmental Performance

Ongoing consultation with the Registered Aboriginal Parties (RAPs) is evidenced through e-mail correspondence. All extracted material greater than 1mm is set aside for inspection by RAPs. Items salvaged by the RAPs are tagged, labelled and kept on site.

Murrooma Inc and Worimi LALC representatives were present during clearing activities on 11 August 2022. No items of significant value were discovered. A letter dated 16 August 2022 from Murrooma Inc. summarising the site investigation is attached as **Appendix D**.

The ACHMP was updated and resubmitted to DPE in 2021. This was approved in 2022 and is available on the Redisand website.

6.6.4. Management Measures

Heritage and Aboriginal archaeology will be managed in accordance with the strategies and programs detailed in the ACHMP. This includes:

- Employees and contractors undergoing Aboriginal Heritage Awareness Induction Training;
- Completing heritage surveys in line with Stage 2a monitoring. This includes monitoring areas of the site containing PAD 1 and PAD 2 and will continue into Stage 2b monitoring; and

- Storing recovered artefacts in a safe and secure location for one year. After one year, artefacts will be reburied at a keeping place located within the mine buffer.

6.6.5. Proposed Improvements

Continued consultation with the identified Aboriginal community stakeholder groups should continue throughout the life of the project. Any changes to current agreements will be updated in the ACHMP.

6.7. Summary of Environmental Performance

A summary of the performance of environmental management measures and sampling results for 2022 are summarised in **Table 21**.

Table 21 – Environmental Performance for Redisand in 2022

Aspect	Approval Criteria / EA Prediction	Performance during 2022 reporting period	Trend / key management implications	Implemented / proposed management actions
Noise	EA predictions are below the Development Consent criteria.	Compliant. Monitoring has occurred at all required receivers since 2021. Redisand will continue to commit to this improvement.	Noise monitoring at all receivers has been completed starting in 2021. It is recognised that monitoring at receivers NB1 – NB4 may eventually be able to stop as noise from the quarry is inaudible. Redisand will continue to monitor at these receivers until approval from DPE and the NSW EPA to omit these locations.	Consult with DPE and NSW EPA regarding monitoring at locations NB1 – NB4.
Air Quality	See Development Consent and EPL criteria.	Non-compliant. Missed monitoring events on 13 February and 16 November 2022. PM _{2.5} exceedances on 26 May (34 µg/m ³) and 18 August (43 µg/m ³). PM ₁₀ exceedance on 18 August 2022 (58 µg/m ³).	Depositional dust gauges have historically been known to fill with vegetation and debris resulting in high monitoring results.	Redisand is committed to improving data collection. Redisand will consult with DPE about any extraordinary days which could contribute to air quality exceedances.
Traffic Management	See Development Consent Criteria.	Compliant. There were no truck movement exceedances in 2022.	MOD 5 approved in August 2022 which clarified the number of permissible truck movements in relation to the status of the intersection between Nelson Bay Road and Janet Parade.	Notify DPE once a decision has been made as to what type of upgrade the intersection between Nelson Bay Road and Janet Parade will be.
Biodiversity	See commitments within the Landscape and Rehabilitation Management Plan.	Compliant for the reporting period. Biodiversity Pre-Clearance Survey undertaken by Firebird ecoSultants between 27 July and 03 August 2022.	Redisand continues to work with DPE regarding buffer zone issues. A pre-clearance survey and tree habitat inspection were undertaken prior to planned clearing works.	Continue consultation with DPE regarding buffer zone issues.

Aspect	Approval Criteria / EA Prediction	Performance during 2022 reporting period	Trend / key management implications	Implemented / proposed management actions
		Report outcomes are summarised in Section 6.5.3.		
Heritage	No proposed impacts. No Project Approval criteria.	Compliant. No issues identified.	Updated ACHMP approved in 2022 and is available on the Redisand website.	Continue to consult with Aboriginal RAPs and DPE and update the ACHMP as needed.

7. WATER AND SOIL MANAGEMENT

7.1. EA Predictions

7.1.1. Surface Water

There are no identified permanent or semi-permanent water bodies in the site area. As mentioned in the *Erosion and Sediment Control Management Plan*, surface stormwater is expected to runoff from the site and be infiltrated into the highly permeable subsurface. There are two dams on site, however these are used for groundwater storage.

7.1.2. Groundwater

The 2010 EA suggested that the aquifer underlying the site is likely part of the Tomago Sand Beds Aquifer which is used for potable water extraction and several private bores. The proposed extraction rate of 100kL per day for the site will not have any impacts on groundwater levels, and therefore would not result in salt intrusion or other adverse impacts to the aquifer. However, as a result of operations, groundwater geochemistry may see an increase in oxidation of iron and arsenic and therefore should be monitored during operations.

As of the 2017 MOD 4 EA, it has been identified the quarry contains extensive resources well above the water table that have been successfully extracted.

7.1.3. Acid Sulfate Soils

The 2010 EA determined that it was unlikely that Acid Sulphate Soils would be present in the soil units above the water table. Potential Acid Sulphate Soils were present below RL 2m AHD, and below the level of extraction. Provided appropriate management and monitoring occurs during operations, Acid Sulphate Soils are not considered a major constraint to the development.

7.2. Approved Criteria

There are no approved criteria for surface water quality under EPL 13406.

Under EPL 13406 Redisand is required to complete groundwater monitoring every six months from four access points. The required pollutant, unit of measure and sampling method are detailed in **Table 22**.

Table 22 – Groundwater Monitoring Requirements (Redisand EPL 13406)

POINT 4,5,6,7			
Pollutant	Units of measure	Frequency	Sampling Method
Arsenic	micrograms per litre	Every 6 months	Grab sample
Conductivity	millisiemens per centimetre	Every 6 months	Grab sample
Depth	metres	Every 6 months	Probe
Iron	milligrams per litre	Every 6 months	Grab sample
Manganese	milligrams per litre	Every 6 months	Grab sample
pH	pH	Every 6 months	Grab sample
Turbidity	nephelometric turbidity units	Every 6 months	Grab sample

As per the Statement of Commitments in the MOD 4 Project Approval:

No excavation is permitted to into the sand bed lower than 1 metre above the highest predicted groundwater table for the extraction area.

7.3. Water Usage and Storage

Sediment basins have been constructed in the processing plant area in accordance with Landcom's '*Managing Urban Stormwater – Soils and Construction*'. The primary use is to store pumped groundwater as most surface water will infiltrate the sand rather than report to the sediment retention basins.

7.4. Groundwater Results

Table 23 summarises the approved groundwater criteria based on the previously adopted *ANZECC (2000) Australian and New Zealand Water Quality Guidelines for Fresh and Marine Waters* and baseline data collected from 2011 to 2016. **Table 24** provides the groundwater monitoring requirements based on the Groundwater Monitoring Plan and EPL 13406.

Table 23 – Approved Groundwater Quality Criteria

Key Parameters	Water Quality Criteria
Arsenic	<0.001 – 1.5 mg/L
Total Iron	0.001 – 14 mg/L
pH	3.0 - 6.5
Water Level	3.0 m AHD (upper level) At or above existing levels (lower level)

Table 24 – Groundwater Sampling Requirements

Monitoring Wells	Required Under	Sampling Frequency	Sampling Requirements
BH1, BH3 – BH6 and MW1 – MW7	Groundwater Monitoring Program	Every six months	pH, EC, TDS, DO, Temperature, Redox, Sulphate, Chloride, Arsenic and Iron
BH1 and BH3 – BH6	Groundwater Monitoring Program	Daily	Water level
MW1, BH1, BH4, and BH6	EPL 13406	Every six months	Arsenic, conductivity, depth, Iron, Manganese, pH and turbidity

Groundwater monitoring results for operations in 2022 are summarised in **Table 25**. Complete water monitoring data is provided as **Appendix G**. It should be noted that Redisand has committed to improving their monitoring data. Since 2020, groundwater, surface water and acid sulphate soil monitoring has been more consistent compared to previous years. As the improved monitoring continues, Redisand will aim to collect data to provide information on long term data trends.

Table 25 – Groundwater Monitoring Results for 2022

Sampling Parameter	Units	Location														
		BH1 (EPA ID no. 6)			BH3			BH4 (EPA ID no. 7)			BH5			BH6 (EPA ID no. 5)*		
		Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Min
Depth to Water	m (bTOC)	2.66	2.87	3.05	18.04	18.44	18.93	12.6	12.65	13.07	5.66	6.04	6.13	20.63	20.3	19.9
Temperature	°C	16.9	18.9	20.8	18.5	19.5	20.4	18.4	19.3	20	17.5	18	18.4			
pH	pH Units	5.5	5.6	5.8	5.1	5.3	5.7	5.1	5.3	5.3	5.1	5.30	5.5			
Electrical Conductivity	µS/cm	74	97	126	308	356	407	464	612	723	202	276	335			
Total Dissolved Solids	mg/L	90	209	314	5.1	5.9	6.4	393	388	472	145	179	200			
Dissolved Oxygen	mg/L	4.7	5.4	6.3	192	223	242	3.8	4.2	4.7	4.1	4.4	5.8			
Oxidation Reduction	mV	205	280	333	3.5	113	360	231	278	343	227	272	372			
Turbidity	NTU	750	2,650	3,800	200	226	252	90	140	250	75	402	930			
Dissolved Metals																
Arsenic	mg/L	<0.001	0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
Iron		0.05	0.51	0.92	0.02	0.07	0.14	0.04	0.07	0.08	0.02	0.04	0.06			
Manganese		<0.005	0.006	0.006	0.006	0.015	0.029	0.014	0.02	0.029	<0.005	<0.005	<0.005			
Anions and Cations																
Chloride (Cl)	mg/L	13	19	24	66	88	100.0	97	132	180	47	64	82			
Sulphate (SO4)		2	5	7	16	16	17.0	24	50	110	8	12	16			

Sampling Parameter	Units	Location																				
		MW1 (EPA ID no. 4)			MW2			MW3			MW4			MW5			MW6			MW7		
		Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
Depth to Water	m (bTOC)	0.59	0.8	0.96				1.63	2.08	2.61	12.31	12.53	12.83	0.71	0.83	1.04	2.62	2.83	3.05	1.82	2.27	2.84
Temperature	°C	15.4	17.7	20.5				17.1	18.6	20.2	18	19.2	19.9	15.5	18.7	22.3	17.5	20.2	22.5	16.4	18.5	20.8
pH	pH Units	4	4.3	4.8				3.9	4.2	4.4	5.5	5.6	5.7	5	5.2	5.4	5.5	5.7	5.9	4.3	4.7	4.9
Electrical Conductivity	µS/cm	116	201	372				113	131	159	234	272	300	177	249	374	194	215	242	56	61	70
Total Dissolved Solids	mg/L	199	241	334				134	165	182	395	462	585	231	296	380	240	311	360	60	71	82
Dissolved Oxygen	mg/L	1.3	2.2	2.6				1.5	2.6	3.5	3	3.6	4.6	1.7	3.2	4.1	2.1	2.4	2.6	1.8	2.5	3.3
Oxidation Reduction	mV	61	106	148				81	141	206	-83	37	113	-14	76	136	-40	29	124	63	92	169
Turbidity	NTU	9	14.4	24				13	21	35	60	92	120	7.1	12.4	19	150	323	510	9.2	27	37
Dissolved Metals																						
Arsenic	mg/L	0.003	0.005	0.006				<0.001	<0.001	<0.001	0.008	0.009	0.011	0.001	0.0015	0.002	0.014	0.018	0.023	<0.001	<0.001	<0.001
Iron		0.46	0.77	1.5				0.56	0.73	0.95	0.84	1.1	1.4	0.43	0.56	0.67	3.7	4.4	5.3	0.12	0.15	0.21
Manganese		0.01	0.014	0.023				<0.005	<0.005	<0.005	0.005	0.035	0.065	<0.005	0.007	0.009	0.042	0.045	0.046	<0.005	<0.005	<0.005
Anions and Cations																						
Chloride (Cl)	mg/L	21	47	85				22	28	39	37	47	59	38	57	91	30	37	51	11	12	14
Sulphate (SO4)		<1	5	8				<1	1.5	2	<2	2	2	<1	<1	<1	<1	2	2	<1	2	2

No monitoring occurred at BH1 during Q1 as this well was lost due to quarrying operations, with a new bore being installed during Q2 of 2022. BH6 had insufficient water to sample and only collected water depth levels. MW2 could not be accessed due to previous mining on an adjacent property.

In terms of comparing results to adopted criteria, please see below:

- pH: No exceedances occurred during 2022. The overall average pH level was 5.12 which is within the approved criteria. 2021 pH levels were similar with an average of 5.2;
- Arsenic: No exceedances occurred during 2022;
- Total Iron: No exceedances occurred during 2022; and
- Water level: Water level is not measured in m AHD as per the approved criteria. However, water depth has been monitored. The minimum water depth was measured at 0.59 m (bTOC) at MW1 and the maximum depth was measured at 18.93 m (bTOC) at BH3. In 2021, MW1 also had the lowest recorded water level where MW1 measured a depth of 0.7m (bTOC). In 2022, BH3 had the highest water level instead of MW2, which had the highest water level in 2021.

The *Groundwater Monitoring Plan* was updated and approved following the 2021 Annual Review. Currently, Redisand undertakes groundwater monitoring quarterly, although their sampling frequency requirement is only once every six months. Water level will continue to be monitored daily in accordance with their current monitoring program.

7.5. Surface Water Results

Surface water is managed and monitored in accordance with the *Soil and Water Management Plan*. Two surface water ponds have been constructed at the site which are used as sediment dams for extracted groundwater. A drainage line from pre-quarry operations also exists along the haul road. This filters sediment that runs from the haul road to the highly saturated environment which runs along the haulage route.

Testing at the sediment dams and the drainage line is detailed in **Table 26**. As there are no criteria for surface water monitoring, adopted criteria has been based on the *ANZECC (2000) Australian and New Zealand Water Quality Guidelines for Fresh and Marine Waters* and baseline data collected from January 2016 to April 2018.

Table 26 – Surface Water Sampling Requirements

Surface Water Ponds	Years Since Commencement of Operations	Sampling Frequency	Sampling Requirements
Plant Sediment Dams	From 2019 onwards ^a	Every six months	pH, EC, TSS, TDS, DO, Temperature, Redox
Drainage Line ^b	From 2019 onwards ^a	Every six months	pH, EC, TSS, TDS, DO, Temperature, Redox

Notes:

EC = Electrical Conductivity

TSS = Total Suspended Solids

TDS = Total Dissolved Solids

DO = Dissolved Oxygen

^a Subject to agreement by DPE following the collection of comprehensive baseline data for two years.

^b Monitoring of the drainage line will be undertaken at the site boundary.

Surface water quality criteria is summarised in **Table 27**.

Table 27 – Adopted Surface Water Quality Criteria

Parameter	Adopted Criteria
pH	5.3 – 7.2
Dissolved Oxygen	90 – 110% saturation ¹

A summary of the 2022 surface water monitoring results is provided in **Table 28**.

Table 28 – Surface Water Monitoring Results (2022)

Sampling Requirements	Plant Sediment Dams (Groundwater Storage)						Drainage Line		
	Feed Pond			Settled Pond			Creek		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
pH	5.3	6.0	6.4	6.1	6.4	7.5	5.3	5.8	6.1
EC (µS/cm)	176.0	223.0	246.0	189.0	257.0	280.0	209.0	247.0	288.0
TSS (mg/L)	910.0	1749.0	3600.0	<5	10.0	27.0	<5	7.0	8.0
TDS (mg/L)	342.0	482.0	652.0	84.0	170.0	240.0	84.0	217.0	280.0
DO (mg/L)	3.9	8.0	10.3	3.1	5.0	8.9	1.4	2.0	3.1
Temperature (°C)	14.2	19.0	24.0	14.6	19.0	22.9	12.4	17.0	21.6
Redox (mV)	47.0	199.0	315.0	64.0	189.0	302.0	-279.0	79.0	201

The required monitoring frequency is every six months, however Redisand completes this every month. There were samples collected for all 12 months during 2022. Moving forward, Redisand will review the need to monitor every month and reduce their monitoring to be in accordance with their monitoring program.

The maximum recorded pH was 7.5 which is within the approved criteria. This is a decrease from 2021, which recorded a maximum pH of 8.8.

When compared to a conversion factor, the DO results in mg/L compared to % saturation did vary considerably. Some results were well below the adopted criteria and some results were just above the adopted criteria.

7.6. Acid Sulfate Soils Results

Acid Sulfate Soils are managed in accordance with the *Acid Sulfate Soil Management Plan*. Monitoring is required every 10,000 tonnes of extraction or once a year (whichever is more frequent). Regular acid sulfate testing is completed by VGT Laboratories with the 2022 results shown in **Table 29**.

There is no EPL criteria for Acid Sulfate Soils. However, action criteria for Acid Sulfate Soil assessments are based on the *Acid Sulfate Soils Assessment Guidelines (1998)*.

Table 29 – Acid Sulphate Soil Results for 2022

Date	Location	pH Oxidised	ASS Potential
20 Jan 2022	Redisand Sand	5.9	Highly Unlikely
22 Feb 2022	Redisand Sand	5.9	Highly Unlikely
18 Mar 2022	Redisand Sand	6.1	Highly Unlikely
11 Apr 2022	Redisand Sand	6.5	Highly Unlikely
11 May 2022	Redisand Sand	6.1	Highly Unlikely
10 Jun 2022	Redisand Sand	6.1	Highly Unlikely
8 Jul 2022	Redisand Sand	6.2	Highly Unlikely
5 Aug 2022	Redisand Sand	5.8	Highly Unlikely
2 Sep 2022	Redisand Sand	6.6	Highly Unlikely
5 Oct 2022	Redisand Sand	6	Highly Unlikely
26 Oct 2022	Redisand Sand	6.5	Highly Unlikely
19 Dec 2022	Redisand Sand	6.1	Highly Unlikely

No samples were taken in November 2022, but two samples were taken in October 2022. Overall, there was no evidence of Acid Sulfate Soils present at the site during 2022 operations. The ASSMP only requires monitoring to be done quarterly therefore this is not a compliance issue. Going forward, Redisand proposes to monitor quarterly in accordance with the ASSMP.

7.7. Long-Term Trends

7.7.1. Surface Water

As there are no discharge points on site, there are no EPL surface water criteria. However, Redisand was generally within the adopted pH levels since 2018. The pH levels from 2018 to 2022 are provided in **Table 30**.

Table 30 – Long-term Surface Water Results

Year	pH Levels								
	Feed Pond			Settled Pond			Creek		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
2022	5.3	6.0	6.4	6.1	6.4	7.5	5.3	5.8	6.1
2021	5.4	6.0	6.4	6.1	7.3	8.8	5.5	5.9	7.4
2020	5.5	5.9	6.4	5.8	6.9	7.5	5.4	5.8	6.0
2019	5.6	6.2	6.2	5.9	6.4	6.9	5.6	6.2	7.8
2018	5.5	6.1	7.2	5.5	6.1	7.2	5.5	6.2	7.2

Note: No monitoring results obtained for October 2018. 2019 results are based on six samples. Missed monitoring dates included March, September, October, November, and December 2019. April 2019 monitoring results provided; however, it was not in the correct format. February 2019 monitoring did not include the Creek.

7.7.2. Groundwater

Groundwater monitoring results have generally been below the adopted criteria. However, there is insufficient data for BH6 and BH6, which continues to be a trend.

BH1 was lost due to quarrying operations and therefore did not have any results for Q1. However, Redisand reinstalled this bore in Q2 which then provided sufficient data for the rest of the year. Redisand will also notify the NSW EPA at least 12 months prior to starting Stage 3 operations to review groundwater monitoring locations in accordance with Condition P1.2 of EPL 13406. Groundwater monitoring will continue in 2023 as the site aims for more consistent sampling and to develop longer term data.

7.7.3. Acid Sulfate Soils

Testing of Acid Sulfate Soils has been inconsistent over the previous years. However, results indicate that no Acid Sulfate Soils are present at the site.

7.8. Water Take

Redisand operates under Water Access Licence 36627. Water extraction limits for 2022 are outlined in **Table 31**.

Table 31– Water Take for 2022 (July 2021 – June 2022)

Water Licence Number	Water Sharing Plan, Source & Management Zone (as applicable)	Entitlement for Water Take	Water Take (ML)/Use
WAL36627	North Coast Coastal Sands Groundwater Sources, Stockton Groundwater Source, and Whole Water Source	10 units/ year	8.562 ML

8. REHABILITATION

8.1. Rehabilitation Performance during the Reporting Period

In accordance with the *Landscape and Rehabilitation Management Plan*, Redisand is required to progressively rehabilitate and stabilise areas disturbed by operations. Activities undertaken during the 2022 Annual Review reporting period is summarised in **Table 32**.

Table 32 - Rehabilitation Update for 2022

Guideline Requirement	Site Comment
Extent of the operations and rehabilitation at completion of the reporting period	The total mine area increased from 9.26 ha to 11.7 ha. Rehabilitation works continued in 2022, increasing the total rehabilitation area from 2.01 to 3.18 ha. The use of habitat trees and nest boxes continued at site.
Agreed post-rehabilitation land use	In accordance with the <i>Landscape and Rehabilitation Management Plan</i> rehabilitation of disturbed areas (Extraction Area and Plant Area) uses a seed mix consistent with some of the key flora species from the EA (Coastal Sands Blackbutt).
Key rehabilitation performance indicators	Key rehabilitation indicators are outlined within Section 4.6 of the <i>Landscape and Rehabilitation Management Plan</i> . Note there has not been any assessment against these criteria.
Renovation or removal of buildings	No building removal during the Annual Review period. None proposed.
Any other rehabilitation taken including: • Exploration activities; • Infrastructure; • Dams; and • the installation or maintenance of fences, bunds and any other works.	Progressive rehabilitation of Stage 2 works continued in 2022.
Any rehabilitation areas which have received formal sign off	No rehabilitation received signoff during the 2022 Annual Review period. No areas are ready for this.
Variations to activities undertaken to those proposed (including why there were variations and whether NSW Mining, Exploration and Geoscience (MEG) was notified).	No specific variations to the way rehabilitation are proposed under the <i>Landscape and Rehabilitation Management Plan</i> .
Outcomes of trials, research projects and other initiatives	No trials were conducted during the 2022 Annual Review period.
Key issues that may affect successful rehabilitation	There are several potential issues that can affect rehabilitation including availability of material, weeds and pests, seed stock, climatic events and rehabilitation methodology.

Table 33 summarises the rehabilitation status at the end of the reporting period for 2022. **Figure 3** shows disturbance and rehabilitation at the site as of 21 November 2022. Rehabilitation is proposed to continue in 2023.

Table 33 – Rehabilitation Status at the End of the Reporting Period

Mine Area Type	This Reporting Period (Actual) (2022)	This Reporting Period (Actual) (2022)	Next Reporting Period (Forecasted) (2023)
Total mine footprint (ha)	9.26	11.7	12.69
Disturbance* (ha)	7.25	8.49	9.48
Land Being Prepared for Rehabilitation	0	0	0
Land under Active Rehabilitation	0	1.17	1.17
Completed Rehabilitation	2.01	2.01	2.01

* Disturbance includes infrastructure and mining disturbance. It excludes the first section of the access road within the project boundary.



9. WASTE MANAGEMENT

9.1. Waste Management

Waste is collected and stored on site. It is then collected by the Port Stephens Shire Council every week.

Waste oil is taken off site to the ATB Morton workshop where it gets collected by a waste oil recycler.

There was one collection for 4.26 tonnes of scrap metal by Sims Metal in 2022.

There were no waste issues during 2022.

10. COMMUNITY

Redisand operates a Community Consultative Committee (CCC) in accordance with Schedule 5, Condition 5 under PA 07_0094. A CCC meeting was held on 3 August 2022 which resumed and finalised actions discussed at the July 2020 meeting. Due to COVID-19 restrictions, no meetings were held between 2020 and 2022. Details of the CCC meeting can be found on the Redisand website.

10.1. Community Engagement Activities

There were no community engagement activities in 2022.

10.2. Complaints

There were no complaints during 2022. The following table summarises the complaints Redisand has received since 2016. An up-to-date Complaints Register can be found on the Redisand website.

Table 34 – Redisand Complaints (2015 – 2022)

Date	Aspect	Summary	Actions Taken
31 March 2015	Noise	Excavating contractor had a reverse buzzer that echoed when on top of the ridge.	- Reversing buzzer was turned down; and - The complainant was called and happy with the response.
30 May 2016	Vibration	Easy-Mix semi-trailer went past Janet Parade causing a house to shake.	- Driver was advised to be mindful of speed along Janet Parade; - A new sign was made to advise truck drivers of speed along Janet Parade; - Loader operate communicates regularly with drivers; and - Quarry manager monitors Janet Parade usage.
19 July 2016	Speeding	Tipper reported he had a free run into Janet Parade from Nelson Bay Road and turned with momentum.	- Driver was spoken to; and - Ongoing monitoring and education on entering and exiting Redisand.
2017	No complaints received.		
2018	No complaints received.		
2019	No complaints received.		
2020	No complaints received.		
2021	No complaints received.		
2022	No complaints received.		

11. INDEPENDENT AUDIT

In accordance with Schedule 5, Condition 9 of PA 07_0094, Redisand is required to undertake an Independent Environmental Audit (IEA) by 31 December 2013 and every 3 years thereafter. The most recent IEA was completed in 2020 by IEMA and covered the period from 14 October 2017 to 13 October 2020.

Aside from non-compliances identified in **Sections 1** and **12**, Redisand has completed the required actions from the 2020 IEA Audit Action Plan. The compliance status is shown in Appendix A of the 2021 Annual Review. Outstanding actions which were completed in 2022 included replacing the groundwater logger at BH1 which re-started collected data in Q2, and updating the rehabilitation bond which was re-submitted in March 2022.

The next IEA will be commissioned in October 2023.

12. INCIDENTS AND NON-COMPLIANCES

12.1. Non-Compliance with Project Approval and Licence

Redisand is committed to improving its environmental compliance and has taken the steps to become more proactive in ensuring that non-compliances do not occur. Since 2020 there has been a significant reduction in non-compliances at Redisand. There were 35 non-administrative non-compliances in 2020 and only 4 in 2022. All non-compliances for 2022 are summarised in **Section 1**.

Non-compliances in 2022 were related to air quality monitoring. All non-compliances were considered 'low'. Further details of the air quality non-compliances are detailed in **Section 6.3.3**.

Table 35 shows the number of non-compliance from 2020 to 2022.

Table 35 – Comparison of Consent Requirements against Compliance Status

Consent	Number of Non-Compliances Conditions (2020)	Number of Non-Compliant Conditions (2021)	Number of Non-Compliant Conditions (2022)
Project Approval 07_0094	24	3	2
Statement of Commitments	4	1	1
EPL 13406	7	3	1

12.2. Non-Compliances, Exceedances and Incidents in the 2022 Reporting Period

PA07_0094 defines an incident as “*an occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance*”. During the 2022 Annual Review reporting period, no incidents occurred which meet this definition.

Two air quality exceedances during the 2022 Annual Review period. Refer to **Section 6.3.3**.

12.3. Summary of Agency Notices, Orders, Penalty Notices or Prosecutions

No penalties or notices were received during the reporting period.

13. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Staff at Redisand will undertake the following activities and improvement measures to ensure compliance with the Project Approval and EPL 13406. These actions are aimed to ensure that effective environmental management controls in place and operations are in accordance with the requirements and conditions of the Project Approval. A summary of the proposed activities is outlined in **Table 36**.

Table 36 – Improvement Actions for 2023

Improvement Measure	Activities
Improve compliance	Continue to improve environmental compliance across the site.
Water and ASS monitoring frequencies	Consider reducing monitoring frequency of groundwater, surface water and ASS to be in accordance with the relevant monitoring program. Currently Redisand monitors groundwater quarterly, and surface water and ASS monthly.
Improve compliance with groundwater monitoring	Discuss with VGT to change groundwater monitoring from water depth to water level.
Longer term trends in data	Continue collecting long-term data. In 2020 Redisand committed to collecting more complete data and present long-term trends in the Annual Reviews.

APPENDIX A

Noise Monitoring Results (2022)



21 February 2022

Ref: 12727/29666

Mr Grant Stevenson
Redisand
9 Old Punt Road
TOMAGO NSW 2322

RE: 18 FEBRUARY 2022 OPERATIONAL NOISE MONITORING RESULTS – REDISAND SALT ASH

This letter report presents the results of attended noise monitoring conducted for the Redisand sand quarry at Salt Ash (RSA) on Friday 18th February, 2022. Noise monitoring was carried out in accordance with the conditions of the SASM Project Approval (PA 07-0094) and Environment Protection Licence (EPL) No. 13406.

A Noise Monitoring Program (NMP) for RSA was approved by the Minister for Planning in 2011. The NMP forms part of the Project Approval and provides noise monitoring protocols and noise criteria for construction and operational phases of RSA. At the time of monitoring RSA was in its operational phase. The relevant noise criteria, taken from the PA, are shown in **Table 1**.

Table 1 Noise Impact Assessment Criteria	
Receiver Location	Noise Criterion Leq (15 min)
JP1	40
JP2	43
JP3	39
JP4	37
NB1	36
All other receivers	35

NOISE MONITORING CONDITIONS

Condition M7.2 of the EPL states “the licensee must undertake noise monitoring on a quarterly basis at noise monitoring locations JP1, JP2, JP3, JP4 and NB5. Monitoring must occur at a period of normal or peak operations and in the case of monitoring at locations JP3 and JP4 must include at least three truck passbys”.

The monitoring locations referred to within the EPL are shown in **Figure 1**.

Additional noise monitoring was also undertaken at the locations marked with circles on Figure 1 (and denoted “1”, “2” and “3”).

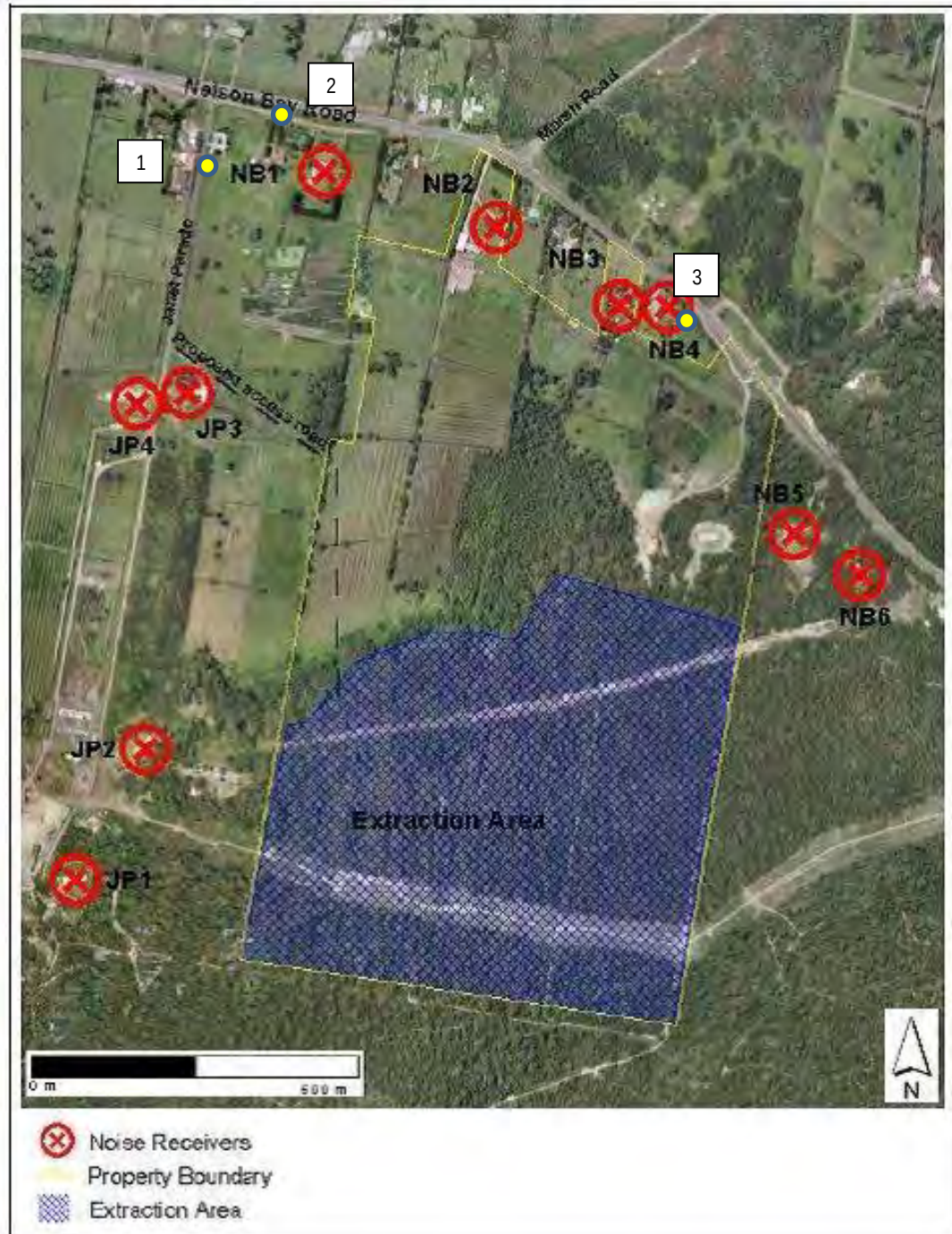


Figure 1 – Noise Monitoring Locations

NOISE MEASUREMENTS

Noise emission levels were measured with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements.

Meteorological data used in this report was obtained from the Bureau of Meteorology weather station at Williamstown and supplemented by a hand-held weather station with measurements made at approximately 2m above ground level.

The weather throughout the survey was warm to hot with clear skies and a light west to north westerly wind which persisted throughout the monitoring period.

RESULTS

The measured noise levels, over 1 second intervals, were analysed using Brüel & Kjær “*Evaluator*” software. The software enables the contributions of the quarry and other significant noise sources to the overall to be quantified. Noise levels were recorded for each of the L10, Leq(15 min), Lmax, L1, L90 and Lmin percentiles. As detailed in the EPL the noise criterion for RSA is based on an Leq(15 min) noise level.

The results shown in **Table 2** represent the total 15 minute Leq noise level for all noise sources at the compliance monitoring locations. Levels for the other percentiles are not shown as they have no compliance criteria for comparison but are available on request. Noise from RSA is shown in bold type. Where noise from RSA is listed as inaudible, this means the maximum levels from the operational activities were at least 10 dB below the ambient noise level during the measurement and, therefore, not audible or measurable.

Table 2 Redisand Salt Ash - Noise Monitoring Results – 18 February 2022				
Location	Time	dB(A) Leq (15 min)	Wind speed/ direction	Identified Noise Sources
JP1	9:10 am	46	2.0m/s NW	Birds & insects (46), traffic (34), RSA occasionally audible
JP2	8:50 am	40	2.5m/s W	Birds & insects (39), traffic (32), RSA inaudible
JP3	7:30 am	48	1.5m/s NW	Traffic (48), birds (30), RSA (28) ¹
JP4	7:47 am	49	1.5m/s NW	Traffic (47), birds (42), RSA (27) ¹
NB5	8:10 am	44	1.5m/s NW	Traffic (43), birds (36), RSA inaudible

1. Noise from trucks on access road.

The results shown in Table 2 show that, under the operational and atmospheric conditions at the time of monitoring, noise emissions from RSA were below the relevant criteria at all monitoring locations.

At location JP1 the noise from RSA was occasionally audible as engine revs. At the other monitoring locations, the operational noise from RSA was not audible.

At locations JP3 and JP4 the noise from RSA was attributable to emissions from trucks on the access road. Noise measurement results at JP3 and JP4 are summarised in **Table 3**. The EPL requires that the monitoring at these locations should include at least three truck pass-bys.

The results in Table 3 only include the results of a detailed analysis of individual truck pass-bys on the RSA access road and do not include extraneous noises which were filtered out of the measured signals. The analysis shows the condition of the truck (laden or empty) and the duration of each passing truck and the Leq (i.e. average) levels for that duration period. This is then averaged into a 15-minute assessment period. As more than one truck has been measured in a 15-minute period, their individual 15-minute levels are logarithmically added together to give total 15-minute levels for comparison with the noise criterion.

On the day of monitoring, truck movements to the site were sporadic. To ensure sufficient vehicle movements were made to satisfy the EPL condition an RSA truck was utilised to undertake a series of run throughs (x 4 of the truck movements in total).

Table 3 Redisand Salt Ash - Noise Monitoring Results – Truck Noise - 18 February 2022				
Location	Truck condition	Duration, seconds	L _{Aeq} (duration)	L _{Aeq} (15min)
JP 3 7:30 am	Laden	20	40	23
	Empty	15	40	22
	Empty	18	41	24
	TOTAL L _{Aeq} for 15 minute period			28
JP 4 7:47 am	Empty	22	38	24
	Empty	20	39	22
	Laden	20	36	19
	TOTAL L _{Aeq} for 15 minute period			27

The results shown in Table 3 show that the Leq (15 min) noise levels for truck movements were compliant at both monitoring locations.

The results of the additional noise monitoring, at the locations shown in Figure 1, are shown in **Table 4**.

Table 4 Redisand Salt Ash - Noise Monitoring Results – 18 February 2022				
Location	Time	dB(A) L _{eq} (15 min)	Wind speed/ direction	Identified Noise Sources
1/NB1	9:30 am	50	1.5m/s NW	Traffic (50), birds (35), RSA barely audible ¹
2/NB1	9:50 am	56	1.5m/s NW	Traffic (56), RSA inaudible
3/NB4	8:27 am	60	2.0m/s W	Traffic (60), birds (38), RSA inaudible

1. Truck passing along access road

Location 1 was chosen to be approximately the same distance from the extraction area as the rear of residence NB1, whilst also being a similar distance from the traffic on Nelson Bay Road. This measurement was dominated by traffic noise. RSA was not audible.

Location 2 was at the front (road side) of residence NB1. This measurement was dominated by traffic noise. RSA was not audible.

Location 3 was at the front (road side) of residence NB4. This measurement was dominated by traffic noise. RSA was not audible.

As the noise from RSA was not measured to be within 10dB of the relevant applicable criterion there is no requirement to analyse the measurements for modifying factor corrections as per procedures in the NPfl.

The results presented have shown that noise emissions from RSA were compliant with the relevant criterion at all locations and times throughout the noise monitoring survey.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 0412 023 455.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED



Ross Hodge MAAS
Acoustical Consultant



30 May 2022

Ref: 12727/29756

Mr Grant Stevenson
Redisand
9 Old Punt Road
TOMAGO NSW 2322

RE: 26 MAY 2022 OPERATIONAL NOISE MONITORING RESULTS – REDISAND SALT ASH

This letter report presents the results of attended noise monitoring conducted for the Redisand sand quarry at Salt Ash (RSA) on Thursday 26th May, 2022. Noise monitoring was carried out in accordance with the conditions of the SASM Project Approval (PA 07-0094) and Environment Protection Licence (EPL) No. 13406.

A Noise Monitoring Program (NMP) for RSA was approved by the Minister for Planning in 2011. The NMP forms part of the Project Approval and provides noise monitoring protocols and noise criteria for construction and operational phases of RSA. At the time of monitoring RSA was in its operational phase. The relevant noise criteria, taken from the PA, are shown in **Table 1**.

Table 1 Noise Impact Assessment Criteria	
Receiver Location	Noise Criterion Leq (15 min)
JP1	40
JP2	43
JP3	39
JP4	37
NB1	36
All other receivers	35

NOISE MONITORING CONDITIONS

Condition M7.2 of the EPL states “the licensee must undertake noise monitoring on a quarterly basis at noise monitoring locations JP1, JP2, JP3, JP4 and NB5. Monitoring must occur at a period of normal or peak operations and in the case of monitoring at locations JP3 and JP4 must include at least three truck passbys”.

The monitoring locations referred to within the EPL are shown in **Figure 1**.

Additional noise monitoring was also undertaken at the locations marked with circles on Figure 1 (and denoted “1”, “2” and “3”).

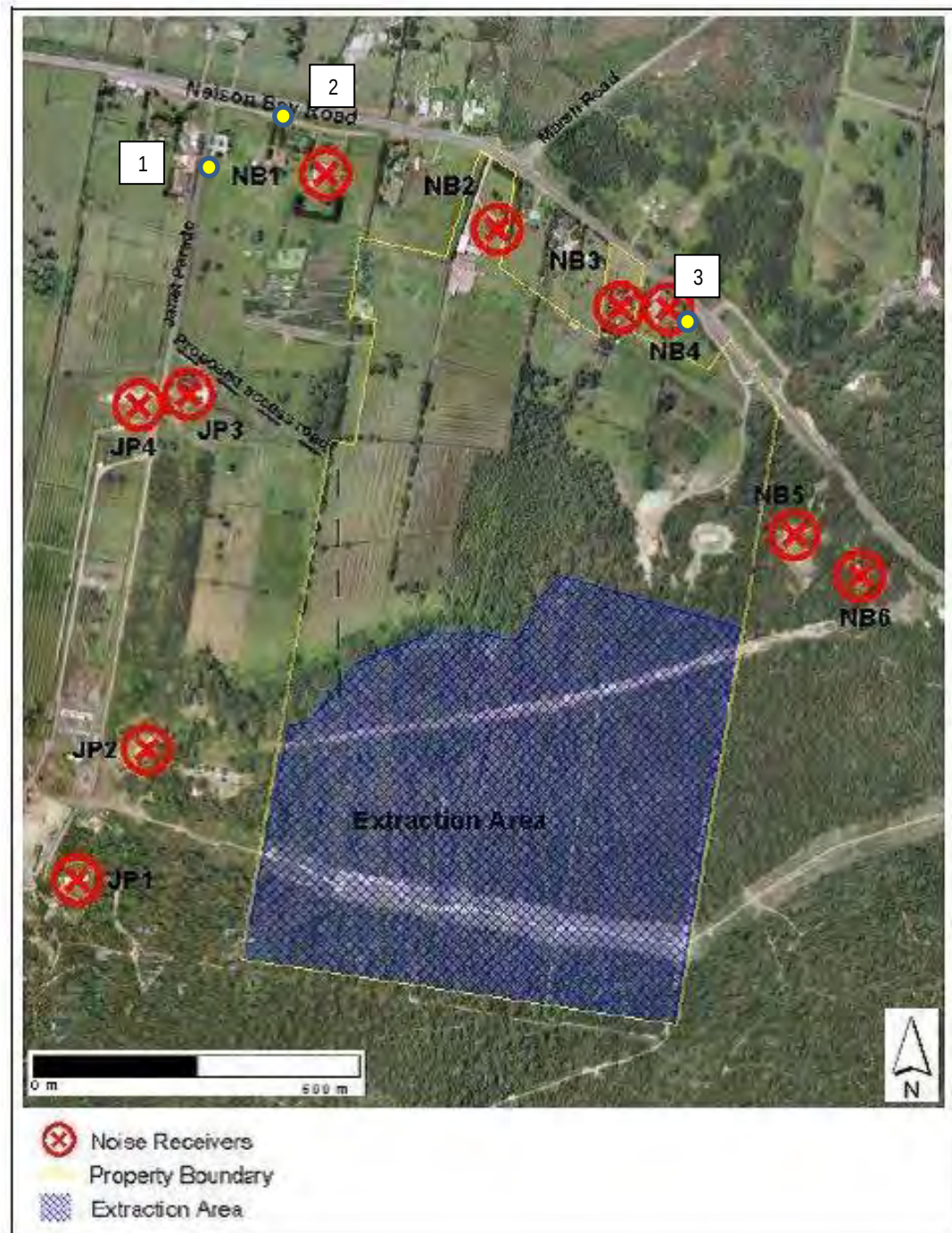


Figure 1 – Noise Monitoring Locations

NOISE MEASUREMENTS

Noise emission levels were measured with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements.

Meteorological data used in this report was obtained from the Bureau of Meteorology weather station at Williamstown and supplemented by a hand-held weather station with measurements made at approximately 2m above ground level.

The weather throughout the survey was mild with light west to north westerly winds which persisted throughout the monitoring period. A fog was present during the early parts of the monitoring and cleared at around 9.30am to clear skies.

RESULTS

The measured noise levels, over 1 second intervals, were analysed using Brüel & Kjær “*Evaluator*” software. The software enables the contributions of the quarry and other significant noise sources to the overall to be quantified. Noise levels were recorded for each of the L10, Leq(15 min), Lmax, L1, L90 and Lmin percentiles. As detailed in the EPL the noise criterion for RSA is based on an Leq(15 min) noise level.

The results shown in **Table 2** represent the total 15 minute Leq noise level for all noise sources at the compliance monitoring locations. Levels for the other percentiles are not shown as they have no compliance criteria for comparison but are available on request. Noise from RSA is shown in bold type. Where noise from RSA is listed as inaudible, this means the maximum levels from the operational activities were at least 10 dB below the ambient noise level during the measurement and, therefore, not audible or measurable.

Table 2 Redisand Salt Ash - Noise Monitoring Results – 26 May 2022				
Location	Time	dB(A) Leq (15 min)	Wind speed/ direction	Identified Noise Sources
JP1	9:02 am	43	1.0m/s W	Traffic (42), birds & insects (36), RSA (22)
JP2	9:22 am	44	1.0m/s NW	Traffic (42), birds & insects (38), farm noise (35), RSA faintly audible
JP3	8:25 am	51	1.0m/s W	Birds (49), traffic (46), RSA (31) ¹
JP4	8:41 am	44	1.0m/s W	Traffic (42), birds & frogs (40), RSA (30) ¹
NB5	9:42 am	44	1.5m/s NW	Traffic (42), birds & insects (40), RSA occasionally audible

1. Noise from trucks on access road.

The results shown in Table 2 show that, under the operational and atmospheric conditions at the time of monitoring, noise emissions from RSA were below the relevant criteria at all monitoring locations.

At location JP1 the noise from RSA was audible as a low level hum with occasional impact noises. At location JP2 the noise from RSA was a faint hum. Occasional impact noises were audible at Location NB5.

At locations JP3 and JP4 the noise from RSA was attributable to emissions from trucks on the access road. Noise measurement results at JP3 and JP4 are summarised in **Table 3**. The EPL requires that the monitoring at these locations should include at least three truck pass-bys.

The results in Table 3 only include the results of a detailed analysis of individual truck pass-bys on the RSA access road and do not include extraneous noises which were filtered out of the measured signals. The analysis shows the condition of the truck (laden or empty) and the duration of each passing truck and the Leq (i.e., average) levels for that duration period. This is then averaged into a 15-minute assessment period. As more than one truck has been measured in a 15-minute period, their individual 15-minute levels are logarithmically added together to give total 15-minute levels for comparison with the noise criterion.

On the day of monitoring, there were few planned truck movements. To ensure sufficient vehicle movements were made to satisfy the EPL condition an RSA truck was utilised to undertake the required number of run throughs.

Table 3 Redisand Salt Ash - Noise Monitoring Results – Truck Noise - 26 May 2022				
Location	Truck condition	Duration, seconds	L _{Aeq} (duration)	L _{Aeq} (15min)
JP 3 8:25 am	Empty	14	44	26
	Empty	15	44	26
	Empty	17	44	27
	TOTAL L _{Aeq} for 15 minute period			31
JP 4 8:41 am	Empty	15	42	24
	Empty	15	43	25
	Empty	19	45	26
	TOTAL L _{Aeq} for 15 minute period			30

The results shown in Table 3 show that the Leq (15 min) noise levels for truck movements were compliant at both monitoring locations.

The results of the additional noise monitoring, at the locations shown in Figure 1, are shown in **Table 4**.

Table 4 Redisand Salt Ash - Noise Monitoring Results – 26 May 2022				
Location	Time	dB(A) L _{eq} (15 min)	Wind speed/ direction	Identified Noise Sources
1/NB1	8:05 am	55	0.5m/s W	Traffic (55), birds (40), RSA inaudible
2/NB1	10:21 am	55	1.5m/s NW	Traffic (55), RSA inaudible
3/NB4	8:27 am	60	1.5m/s NW	Traffic (60), birds (30), RSA inaudible

Location 1 was chosen to be approximately the same distance from the extraction area as the rear of residence NB1, whilst also being a similar distance from the traffic on Nelson Bay Road. This measurement was dominated by traffic noise. RSA was not audible.

Location 2 was at the front (road side) of residence NB1. This measurement was dominated by traffic noise. RSA was not audible.

Location 3 was at the front (road side) of residence NB4. This measurement was dominated by traffic noise. RSA was not audible.

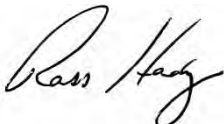
Data from those times where RSA operations were consistently audible were analysed using the “Evaluator” software. This analysis showed the noise did not contain any tonal or impulsive components as per definitions in the Noise Policy for Industry (NPfI).

As the noise from RSA was at least 7dB below the applicable criterion there is no requirement to analyse the data for the low frequency noise modifying factor correction in the NPfI.

The results presented have, therefore, shown that noise emissions from RSA were compliant with the relevant criterion at all locations and times throughout the noise monitoring survey.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 0412 023 455.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED



Ross Hodge MAAS
Acoustical Consultant



26 August 2022

Ref: 12727/29851

Mr Grant Stevenson
Redisand
9 Old Punt Road
TOMAGO NSW 2322

RE: 25 AUGUST 2022 OPERATIONAL NOISE MONITORING RESULTS – REDISAND SALT ASH

This letter report presents the results of attended noise monitoring conducted for the Redisand sand quarry at Salt Ash (RSA) on Thursday 25th August, 2022. Noise monitoring was carried out in accordance with the conditions of the SASM Project Approval (PA 07-0094) and Environment Protection Licence (EPL) No. 13406.

A Noise Monitoring Program (NMP) for RSA was approved by the Minister for Planning in 2011. The NMP forms part of the Project Approval and provides noise monitoring protocols and noise criteria for construction and operational phases of RSA. At the time of monitoring RSA was in its operational phase. The relevant noise criteria, taken from the PA, are shown in **Table 1**.

Table 1 Noise Impact Assessment Criteria	
Receiver Location	Noise Criterion Leq (15 min)
JP1	40
JP2	43
JP3	39
JP4	37
NB1	36
All other receivers	35

NOISE MONITORING CONDITIONS

Condition M7.2 of the EPL states “the licensee must undertake noise monitoring on a quarterly basis at noise monitoring locations JP1, JP2, JP3, JP4 and NB5. Monitoring must occur at a period of normal or peak operations and in the case of monitoring at locations JP3 and JP4 must include at least three truck passbys”.

The monitoring locations referred to within the EPL are shown in **Figure 1**.

Additional noise monitoring was also undertaken at the locations marked with circles on Figure 1 (and denoted “1”, “2” and “3”).

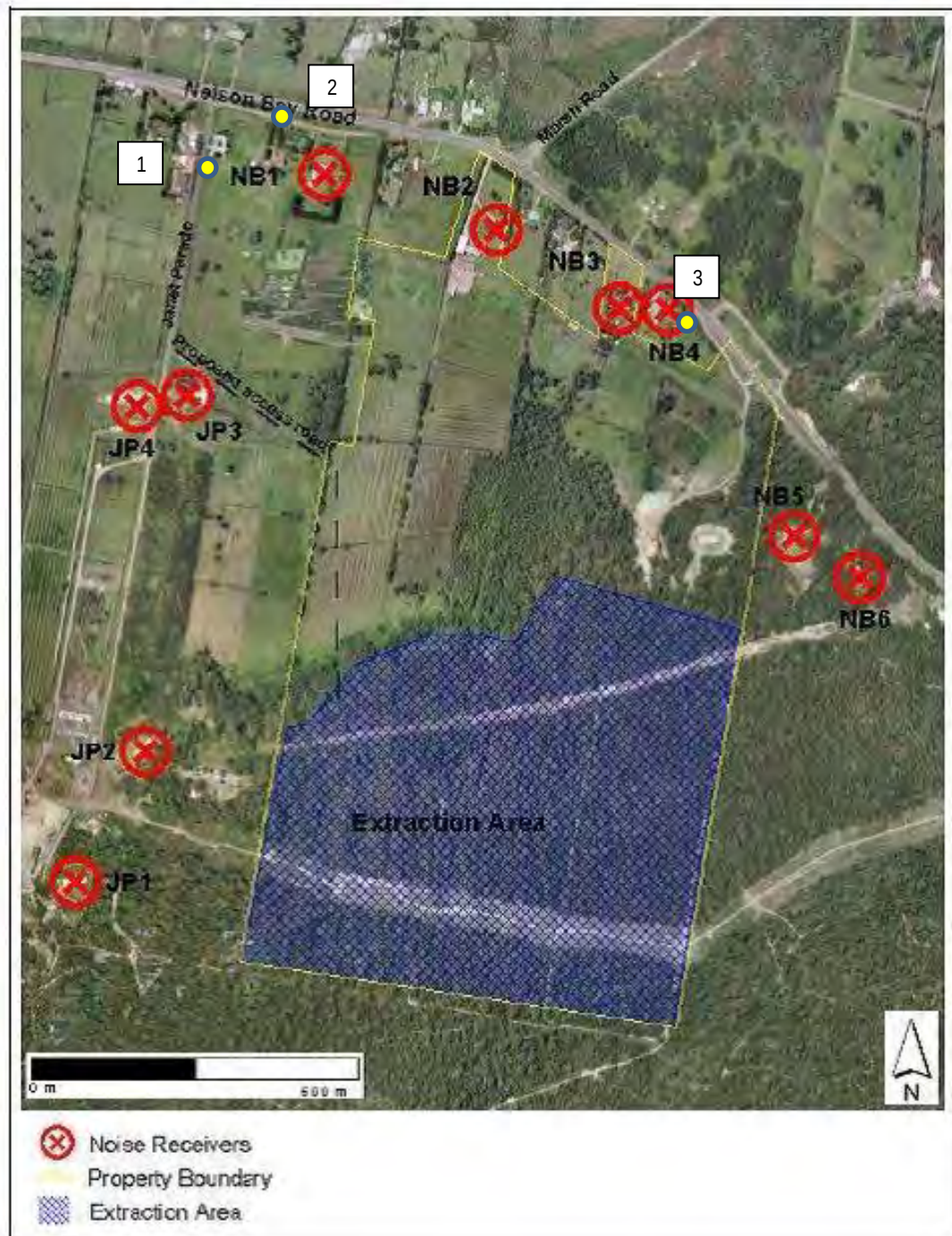


Figure 1 – Noise Monitoring Locations

NOISE MEASUREMENTS

Noise emission levels were measured with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements.

Meteorological data used in this report was obtained from the Bureau of Meteorology weather station at Nobbys Head and supplemented by a hand-held weather station with measurements made at approximately 2m above ground level.

During the morning of August 25th the winds were light generally from the north west. The wind picked up significantly at around 9am and the survey was suspended. In the early afternoon the wind speeds dropped and turned to the south. The remainder of the survey was completed at this time.

RESULTS

The measured noise levels, over 1 second intervals, were analysed using Brüel & Kjær “*Evaluator*” software. The software enables the contributions of the quarry and other significant noise sources to the overall to be quantified. Noise levels were recorded for each of the L10, Leq(15 min), Lmax, L1, L90 and Lmin percentiles. As detailed in the EPL the noise criterion for RSA is based on an Leq(15 min) noise level.

The results shown in **Table 2** represent the total 15 minute Leq noise level for all noise sources at the compliance monitoring locations. Levels for the other percentiles are not shown as they have no compliance criteria for comparison but are available on request. Noise from RSA is shown in bold type. Where noise from RSA is listed as inaudible, this means the maximum levels from the operational activities were at least 10 dB below the ambient noise level during the measurement and, therefore, not audible or measurable.

Table 2 Redisand Salt Ash - Noise Monitoring Results – 25 August 2022				
Location	Time	dB(A) Leq (15 min)	Wind speed/ direction	Identified Noise Sources
JP1	1:30 pm	42	1.0m/s S	Traffic (41), birds & frogs (35), RSA occasionally audible
JP2	1:50 pm	48	1.0m/s S	Birds & frogs (47), traffic (40), RSA inaudible
JP3	7:45 am	53	2.0m/s NW	Traffic (51), birds (47), RSA (37) ¹
JP4	8:02 am	53	2.0m/s NW	Traffic (51), birds & frogs (47), RSA (31) ¹
NB5	2:10 pm	44	1.5m/s S	Traffic (44), birds (40), RSA occasionally audible

1. Noise from trucks on access road.

The results shown in Table 2 show that, under the operational and atmospheric conditions at the time of monitoring, noise emissions from RSA were below the relevant criteria at all monitoring locations.

At location JP1 the noise from RSA was occasionally audible as a low level hum and some engine revs. Occasional impact noises were audible at Location NB5.

At locations JP3 and JP4 the noise from RSA was attributable to emissions from trucks on the access road. Noise measurement results at JP3 and JP4 are summarised in **Table 3**. The EPL requires that the monitoring at these locations should include at least three truck pass-bys.

The results in Table 3 only include the results of a detailed analysis of individual truck pass-bys on the RSA access road and do not include extraneous noises which were filtered out of the measured signals. The analysis shows the condition of the truck (laden or empty) and the duration of each passing truck and the Leq (i.e., average) levels for that duration period. This is then averaged into a 15-minute assessment period. As more than one truck has been measured in a 15-minute period, their individual 15-minute levels are logarithmically added together to give total 15-minute levels for comparison with the noise criterion.

On the day of monitoring, probable truck movements were very sporadic. To ensure sufficient vehicle movements were made to satisfy the EPL condition an RSA truck was utilised to undertake the required number of run throughs.

Table 3 Redisand Salt Ash - Noise Monitoring Results – Truck Noise - 25 August 2022				
Location	Truck condition	Duration, seconds	L _{Aeq} (duration)	L _{Aeq} (15min)
JP 3 7:45 am	Empty	20	47	30
	Empty	25	50	34
	Empty	22	48	32
	TOTAL L _{Aeq} for 15 minute period			37
JP 4 8:41 am	Empty	18	44	27
	Empty	20	43	26
	Empty	20	42	25
	TOTAL L _{Aeq} for 15 minute period			31

The results presented in Table 3 show that the Leq (15 min) noise levels for truck movements were compliant at both monitoring locations.

The results of the additional noise monitoring, at the locations shown in Figure 1, are shown in **Table 4**.

Table 4 Redisand Salt Ash - Noise Monitoring Results – 25 August 2022				
Location	Time	dB(A) L _{eq} (15 min)	Wind speed/ direction	Identified Noise Sources
1/NB1	7:20 am	55	2.0m/s NW	Traffic (55), birds & frogs (41), RSA inaudible
2/NB1	12:50 pm	48	1.0m/s S	Traffic (48), RSA inaudible
3/NB4	1:07 pm	50	1.0m/s S	Traffic (47), frogs (47), RSA inaudible

Location 1 was chosen to be approximately the same distance from the extraction area as the rear of residence NB1, whilst also being a similar distance from the traffic on Nelson Bay Road. This measurement was dominated by traffic noise. RSA was not audible.

Location 2 was at the front (road side) of residence NB1. This measurement was dominated by traffic noise. RSA was not audible.

Location 3 was near the front (road side) of residence NB4. This measurement was characterised by noise from traffic and frogs. RSA was not audible.

Data from those times where RSA operations were consistently audible were analysed using the “Evaluator” software. This analysis showed the noise did not contain any tonal or impulsive components as per definitions in the Noise Policy for Industry (NPfI).

As the general quarry noise from RSA was at least 10dB below the applicable criterion there is no requirement to analyse the data for the low frequency noise modifying factor correction in the NPfI.

At the time of the measurements the acoustic environment of the area was dominated by noise from traffic on Nelson Bay Road. This noise also dominated the low frequency component of the overall noise spectrum. The only noise from RSA was associated with the trucks on the haul road. This noise was present for a relatively brief duration throughout the 15 minute monitoring period at Locations JP 3 and JP4. This noise was not consistent enough to make any significant contribution to the overall low frequency noise levels in the area.

The results presented have, therefore, shown that noise emissions from RSA were compliant with the relevant criterion at all locations and times throughout the noise monitoring survey.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 0412 023 455.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED



Ross Hodge MAAS
Acoustical Consultant



30 November 2022

Ref: 12727/29912

Mr Grant Stevenson
Redisand
9 Old Punt Road
TOMAGO NSW 2322

RE: 29 NOVEMBER 2022 OPERATIONAL NOISE MONITORING RESULTS – REDISAND SALT ASH

This letter report presents the results of attended noise monitoring conducted for the Redisand sand quarry at Salt Ash (RSA) on Tuesday 29th November, 2022. Noise monitoring was carried out in accordance with the conditions of the SASM Project Approval (PA 07-0094) and Environment Protection Licence (EPL) No. 13406.

A Noise Monitoring Program (NMP) for RSA was approved by the Minister for Planning in 2011. The NMP forms part of the Project Approval and provides noise monitoring protocols and noise criteria for construction and operational phases of RSA. At the time of monitoring RSA was in its operational phase. The relevant noise criteria, taken from the PA, are shown in **Table 1**.

Table 1 Noise Impact Assessment Criteria	
Receiver Location	Noise Criterion Leq (15 min)
JP1	40
JP2	43
JP3	39
JP4	37
NB1	36
All other receivers	35

NOISE MONITORING CONDITIONS

Condition M7.2 of the EPL states “the licensee must undertake noise monitoring on a quarterly basis at noise monitoring locations JP1, JP2, JP3, JP4 and NB5. Monitoring must occur at a period of normal or peak operations and in the case of monitoring at locations JP3 and JP4 must include at least three truck passbys”.

The monitoring locations referred to within the EPL are shown in **Figure 1**.

Additional noise monitoring was also undertaken at the locations marked with circles on Figure 1 (and denoted “1”, “2” and “3”).

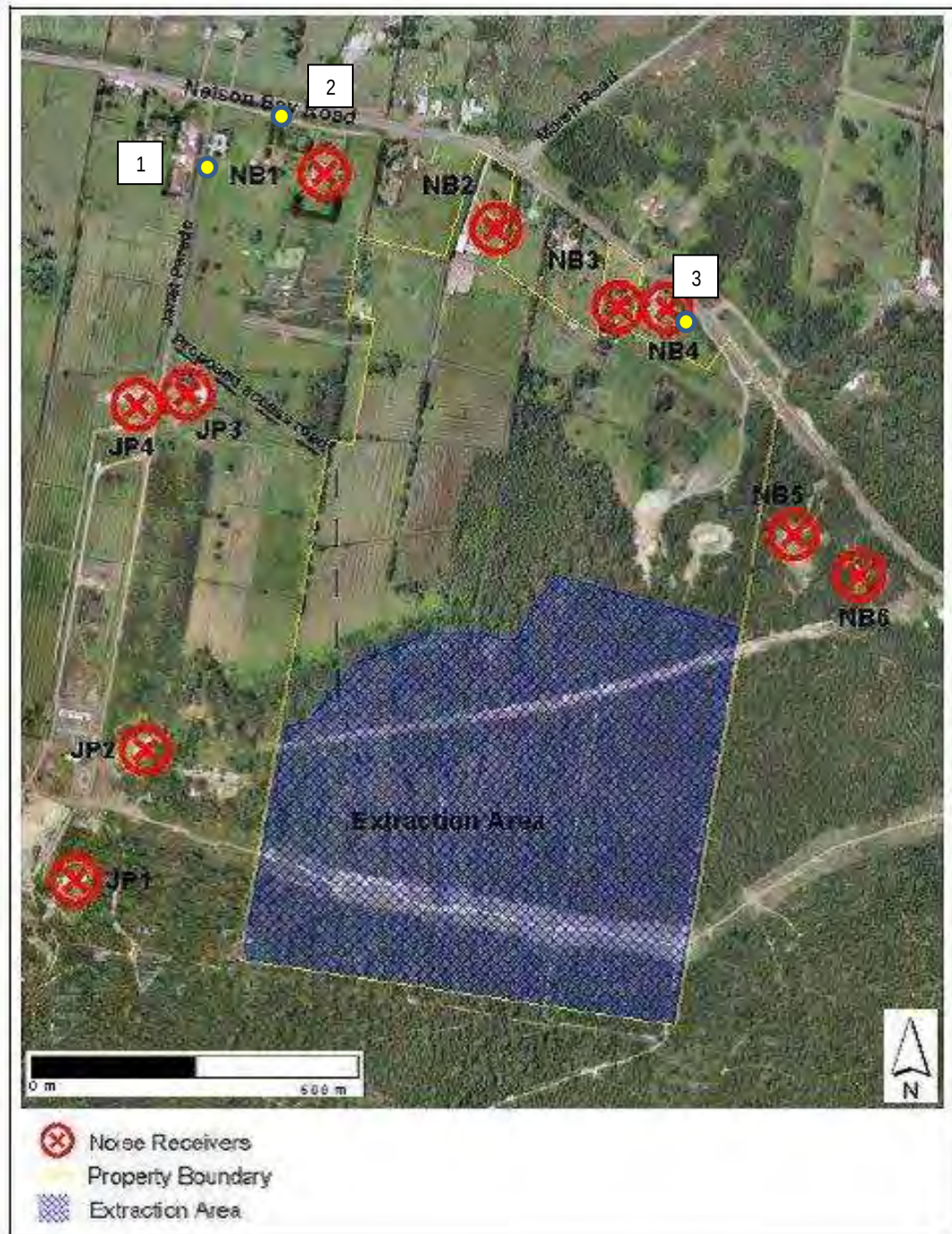


Figure 1 – Noise Monitoring Locations

NOISE MEASUREMENTS

Noise emission levels were measured with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements.

Meteorological data used in this report was obtained from the Bureau of Meteorology weather station at Nobbys Head and supplemented by a hand-held weather station with measurements made at approximately 2m above ground level.

During the morning of November 29th, the winds were light generally from the south to south west. The winds speed increased throughout the survey.

RESULTS

The measured noise levels, over 1 second intervals, were analysed using Brüel & Kjær “*Evaluator*” software. The software enables the contributions of the quarry and other significant noise sources to the overall to be quantified. Noise levels were recorded for each of the L10, Leq(15 min), Lmax, L1, L90 and Lmin percentiles. As detailed in the EPL the noise criterion for RSA is based on an Leq(15 min) noise level.

The results shown in **Table 2** represent the total 15 minute Leq noise level for all noise sources at the compliance monitoring locations. Levels for the other percentiles are not shown as they have no compliance criteria for comparison but are available on request. Noise from RSA is shown in bold type. Where noise from RSA is listed as inaudible, this means the maximum levels from the operational activities were at least 10 dB below the ambient noise level during the measurement and, therefore, not audible or measurable.

Table 2 Redisand Salt Ash - Noise Monitoring Results – 29 November 2022				
Location	Time	dB(A) Leq (15 min)	Wind speed/ direction	Identified Noise Sources
JP1	9:00 am	42	2.0m/s SW	Birds & insects (40), traffic (37), RSA occasionally audible
JP2	8:30 am	45	1.5m/s SW	Birds (44), traffic (39), RSA occasionally audible
JP3	7:23 am	45	1.0m/s SW	Traffic (44), birds (37), RSA (35) ¹
JP4	7:41 am	44	1.0m/s SW	Traffic (42), birds (40), RSA (32) ¹
NB5	7:57 am	41	1.5m/s SW	Traffic (39), birds (36), plane (28), RSA inaudible

1. Noise from trucks on access road.

The results shown in Table 2 show that, under the operational and atmospheric conditions at the time of monitoring, noise emissions from RSA were below the relevant criteria at all monitoring locations.

At location JP1 the noise from RSA was occasionally audible as a low level hum and some engine revs. Occasional impact noises were audible at Location JP2.

At locations JP3 and JP4 the noise from RSA was attributable to emissions from trucks on the access road. Noise measurement results at JP3 and JP4 are summarised in **Table 3**. The EPL requires that the monitoring at these locations should include at least three truck pass-bys.

The results in Table 3 only include the results of a detailed analysis of individual truck pass-bys on the RSA access road and do not include extraneous noises which were filtered out of the measured signals. The analysis shows the condition of the truck (laden or empty) and the duration of each passing truck and the Leq (i.e., average) levels for that duration period. This is then averaged into a 15-minute assessment period. As more than one truck has been measured in a 15-minute period, their individual 15-minute levels are logarithmically added together to give total 15-minute levels for comparison with the noise criterion.

On the day of monitoring, probable truck movements were very sporadic. To ensure sufficient vehicle movements were made to satisfy the EPL condition an RSA truck was utilised to undertake the required number of run throughs.

Table 3 Redisand Salt Ash - Noise Monitoring Results – Truck Noise - 29 November 2022				
Location	Truck condition	Duration, seconds	L _{Aeq} (duration)	L _{Aeq} (15min)
JP 3 7:23 am	Empty	15	45	27
	Empty	22	47	30.5
	Empty	13	50	31.5
	TOTAL L _{Aeq} for 15 minute period			35
JP 4 7:41 am	Empty	25	44	28
	Empty	15	46	28
	Empty	22	42	26
	TOTAL L _{Aeq} for 15 minute period			32

The results presented in Table 3 show that the Leq (15 min) noise levels for truck movements were compliant at both monitoring locations.

The results of the additional noise monitoring, at the locations shown in Figure 1, are shown in **Table 4**.

Table 4 Redisand Salt Ash - Noise Monitoring Results – 29 November 2022				
Location	Time	dB(A) L _{eq} (15 min)	Wind speed/ direction	Identified Noise Sources
1/NB1	7:08 am	55	1.0m/s SW	Traffic (55), birds (44), RSA inaudible
2/NB1	9:22 am	52	2.5m/s SW	Traffic (52), RSA inaudible
3/NB4	8:15 am	58	1.5m/s SW	Traffic (58), birds (40), RSA inaudible

Location 1 was chosen to be approximately the same distance from the extraction area as the rear of residence NB1, whilst also being a similar distance from the traffic on Nelson Bay Road. This measurement was dominated by traffic noise. RSA was not audible.

Location 2 was at the front (road side) of residence NB1. This measurement was dominated by traffic noise. RSA was not audible.

Location 3 was near the front (road side) of residence NB4. This measurement was characterised by noise from traffic and birds. RSA was not audible.

Data from those times where RSA operations were consistently audible were analysed using the “Evaluator” software. This analysis showed the noise did not contain any tonal or impulsive components as per definitions in the Noise Policy for Industry (NPI).

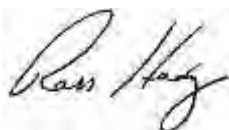
As the general quarry noise from RSA was at least 10dB below the applicable criterion there is no requirement to analyse the data for the low frequency noise modifying factor correction in the NPI.

At the time of the measurements the acoustic environment of the area was dominated by noise from traffic on Nelson Bay Road. This noise also dominated the low frequency component of the overall noise spectrum. The only noise from RSA was associated with the trucks on the haul road. This noise was present for a relatively brief duration throughout the 15 minute monitoring period at Locations JP 3 and JP4. This noise was not consistent enough to make any significant contribution to the overall low frequency noise levels in the area.

The results presented have, therefore, shown that noise emissions from RSA were compliant with the relevant criterion at all locations and times throughout the noise monitoring survey.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 0412 023 455.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED



Ross Hodge MAAS
Acoustical Consultant

APPENDIX B

Air Quality Monitoring Results (2022)

Report Number: 12158

Date Issued: 20/01/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 13/01/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	21/12/2021	12158/1	HVAS	16/12/2021	22/12/2021	50	9,966,987
PM 10	21/12/2021	12158/2	HVAS	16/12/2021	22/12/2021	50	9,966,988
PM 2.5	21/12/2021	12158/3	HVAS	16/12/2021	22/12/2021	50	9,966,989
TSP	27/12/2021	12158/4	HVAS	22/12/2021	29/12/2021	50	9,966,990
PM 10	27/12/2021	12158/5	HVAS	22/12/2021	29/12/2021	50	9,966,991
PM 2.5	27/12/2021	12158/6	HVAS	22/12/2021	29/12/2021	50	9,966,992
TSP	02/01/2022	12158/7	HVAS	29/12/2021	04/01/2022	51	9,965,923
PM 10	02/01/2022	12158/8	HVAS	29/12/2021	04/01/2022	51	9,965,924
PM 2.5	02/01/2022	12158/9	HVAS	29/12/2021	04/01/2022	51	9,965,925
TSP	08/01/2022	12158/10	HVAS	04/01/2022	10/01/2022	51	9,965,928
PM 10	08/01/2022	12158/11	HVAS	04/01/2022	10/01/2022	51	9,965,926
PM 2.5	08/01/2022	12158/12	HVAS	04/01/2022	10/01/2022	51	9,965,927

The Filter(s) have been tested as received and results relate specifically to the filters tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 12158

Date Issued: 20/01/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	12158/1 21/12/2021	12158/4 27/12/2021	12158/7 02/01/2022	12158/10 08/01/2022
Date Tested	--	--	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Particulates per filter	VGT-WI/44	µg/filter	76,700	62,500	18,400	20,800
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	51	42	12	14

HVAS - PM10 Date of Operation	Method	Units	12158/2 21/12/2021	12158/5 27/12/2021	12158/8 02/01/2022	12158/11 08/01/2022
Date Tested	--	--	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Particulates per filter	VGT-WI/44	µg/filter	42,600	34,100	6,300	10,200
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	28	23	4	7

HVAS - PM2.5 Date of Operation	Method	Units	12158/3 21/12/2021	12158/6 27/12/2021	12158/9 02/01/2022	12158/12 08/01/2022
Date Tested	--	--	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Particulates per filter	VGT-WI/44	µg/filter	26,700	10,400	<400	<400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	18	7	<2	<2

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

Accredited for compliance with ISO/IEC 17025 – Testing.

[NT]: Not tested

Sampling Report Number: 12158

Date Issued: 20/01/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
12158/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12158/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12158/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12158/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12158/5	PM 10		Unknown	1.12	1,440	20.0	101.3	1,502
12158/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12158/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12158/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12158/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12158/10	TSP		Unknown	1.12	1,440	20.0	101.3	1,502
12158/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12158/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 12318

Date Issued: 17/02/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 10/02/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	14/01/2022	12318/1	HVAS	10/01/2022	17/01/2022	51	9,965,929
PM 10	14/01/2022	12318/2	HVAS	10/01/2022	17/01/2022	51	9,965,930
PM 2.5	14/01/2022	12318/3	HVAS	10/01/2022	17/01/2022	51	9,965,931
TSP	20/01/2022	12318/4	HVAS	17/01/2022	24/01/2022	51	9,965,932
PM 10	20/01/2022	12318/5	HVAS	17/01/2022	24/01/2022	51	9,965,933
PM 2.5	20/01/2022	12318/6	HVAS	17/01/2022	24/01/2022	51	9,965,934
TSP	26/01/2022	12318/7	HVAS	24/01/2022	28/01/2022	51	9,965,935
PM 10	26/01/2022	12318/8	HVAS	24/01/2022	28/01/2022	51	9,965,936
PM 2.5	26/01/2022	12318/9	HVAS	24/01/2022	28/01/2022	51	9,965,937
TSP	01/02/2022	12318/10	HVAS	28/01/2022	02/02/2022	51	9,965,959
PM 10	01/02/2022	12318/11	HVAS	28/01/2022	02/02/2022	51	9,965,960
PM 2.5	01/02/2022	12318/12	HVAS	28/01/2022	02/02/2022	51	9,965,961
TSP	07/02/2022	12318/13	HVAS	02/02/2022	08/02/2022	51	9,965,962
PM 10	07/02/2022	12318/14	HVAS	02/02/2022	08/02/2022	51	9,965,963
PM 2.5	07/02/2022	12318/15	HVAS	02/02/2022	08/02/2022	51	9,965,965

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 12318

Date Issued: 17/02/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	12318/1 14/01/2022	12318/4 20/01/2022	12318/7 26/01/2022	12318/10 01/02/2022	12318/13 07/02/2022
Date Tested	--	--	17/02/2022	17/02/2022	17/02/2022	17/02/2022	17/02/2022
Particulates per filter	VGT-WI/44	µg/filter	23,000	82,900	16,500	52,000	87,500
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	15	55	11	35	58

HVAS - PM10 Date of Operation	Method	Units	12318/2 14/01/2022	12318/5 20/01/2022	12318/8 26/01/2022	12318/11 01/02/2022	12318/14 07/02/2022
Date Tested	--	--	17/02/2022	17/02/2022	17/02/2022	17/02/2022	17/02/2022
Particulates per filter	VGT-WI/44	µg/filter	8,700	46,400	5,900	27,300	38,800
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	6	31	4	18	26

HVAS - PM2.5 Date of Operation	Method	Units	12318/3 14/01/2022	12318/6 20/01/2022	12318/9 26/01/2022	12318/12 01/02/2022	12318/15 07/02/2022
Date Tested	--	--	17/02/2022	17/02/2022	17/02/2022	17/02/2022	17/02/2022
Particulates per filter	VGT-WI/44	µg/filter	1,000	14,000	<400	19,000	17,900
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	<2	9	<2	13	12

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 12318

Date Issued: 17/02/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
12318/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12318/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12318/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12318/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12318/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12318/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12318/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12318/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12318/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12318/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12318/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12318/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12318/13	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12318/14	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12318/15	PM 2.5		Unknown	1.12	1,438	20.0	101.3	1,500

Report Number: 12486

Date Issued: 23/03/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 10/03/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	Not supplied	12486/1	HVAS	Not supplied	Not supplied	[NT]	[NT]
PM 10	Not supplied	12486/2	HVAS	Not supplied	Not supplied	[NT]	[NT]
PM 2.5	13/02/2022	12486/3	HVAS	08/02/2022	14/02/2022	51	9,965,967
TSP	19/02/2022	12486/4	HVAS	08/02/2022	21/02/2022	51	9,965,968
PM 10	19/02/2022	12486/5	HVAS	08/02/2022	21/02/2022	51	9,965,966
PM 2.5	19/02/2022	12486/6	HVAS	14/02/2022	21/02/2022	51	9,965,971
TSP	25/02/2022	12486/7	HVAS	21/02/2022	28/02/2022	51	9,965,969
PM 10	25/02/2022	12486/8	HVAS	21/02/2022	28/02/2022	51	9,965,970
PM 2.5	25/02/2022	12486/9	HVAS	21/02/2022	28/02/2022	51	9,965,972
TSP	03/03/2022	12486/10	HVAS	28/02/2022	04/03/2022	51	9,965,973
PM 10	03/03/2022	12486/11	HVAS	28/02/2022	04/03/2022	51	9,965,974
PM 2.5	03/03/2022	12486/12	HVAS	28/02/2022	04/03/2022	52	A0011802
TSP	09/03/2022	12486/13	HVAS	04/03/2022	10/03/2022	52	A0011803
PM 10	09/03/2022	12486/14	HVAS	04/03/2022	10/03/2022	52	A0011804
PM 2.5	09/03/2022	12486/15	HVAS	04/03/2022	10/03/2022	52	A0011805

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 12486

Date Issued: 23/03/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	12486/1 Not supplied	12486/4 19/02/2022	12486/7 25/02/2022	12486/10 03/03/2022	12486/13 09/03/2022
Date Tested	--	--	[NT]	17/03/2022	17/03/2022	17/03/2022	17/03/2022
Particulates per filter	VGT-WI/44	µg/filter	[NT]	34,800	25,400	30,400	53,700
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	[NT]	23	17	20	36

HVAS - PM10 Date of Operation	Method	Units	12486/2 Not supplied	12486/5 19/02/2022	12486/8 25/02/2022	12486/11 03/03/2022	12486/14 09/03/2022
Date Tested	--	--	[NT]	17/03/2022	17/03/2022	17/03/2022	17/03/2022
Particulates per filter	VGT-WI/44	µg/filter	[NT]	28,500	15,300	15,100	22,200
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	[NT]	19	10	10	15

HVAS - PM2.5 Date of Operation	Method	Units	12486/3 13/02/2022	12486/6 19/02/2022	12486/9 25/02/2022	12486/12 03/03/2022	12486/15 09/03/2022
Date Tested	--	--	17/03/2022	17/03/2022	17/03/2022	17/03/2022	17/03/2022
Particulates per filter	VGT-WI/44	µg/filter	<400	<400	<400	<400	3,100
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	<2	<2	<2	<2	2

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 12486

Date Issued: 23/03/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
12486/1	TSP	13/02/2022 Power outage	Unknown	[NT]	[NT]	[NT]	[NT]	[NT]
12486/2	PM 10	13/02/2022 Power outage	Unknown	[NT]	[NT]	[NT]	[NT]	[NT]
12486/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12486/4	TSP	Papers left on due to power outage.	Unknown	1.12	1,439	20.0	101.3	1,501
12486/5	PM 10	Papers left on due to power outage.	Unknown	1.12	1,439	20.0	101.3	1,501
12486/6	PM 2.5		Unknown	1.12	1,394	20.0	101.3	1,454
12486/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12486/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12486/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12486/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12486/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12486/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12486/13	TSP		Unknown	1.12	1,436	20.0	101.3	1,498
12486/14	PM 10		Unknown	1.12	1,436	20.0	101.3	1,498
12486/15	PM 2.5		Unknown	1.12	1,435	20.0	101.3	1,497

Report Number: 12668

Date Issued: 19/04/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 7/04/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	15/03/2022	12668/1	HVAS	10/03/2022	16/03/2022	52	11,806
PM 10	15/03/2022	12668/2	HVAS	10/03/2022	16/03/2022	52	11,807
PM 2.5	15/03/2022	12668/3	HVAS	10/03/2022	16/03/2022	52	11,808
TSP	21/03/2022	12668/4	HVAS	16/03/2022	22/03/2022	52	11,809
PM 10	21/03/2022	12668/5	HVAS	16/03/2022	22/03/2022	52	11,810
PM 2.5	21/03/2022	12668/6	HVAS	16/03/2022	22/03/2022	52	11,811
TSP	27/03/2022	12668/7	HVAS	22/03/2022	29/03/2022	52	11,812
PM 10	27/03/2022	12668/8	HVAS	22/03/2022	29/03/2022	52	11,813
PM 2.5	27/03/2022	12668/9	HVAS	22/03/2022	29/03/2022	52	11,814
TSP	02/04/2022	12668/10	HVAS	29/03/2022	04/04/2022	52	11,815
PM 10	02/04/2022	12668/11	HVAS	29/03/2022	04/04/2022	52	11,816
PM 2.5	02/04/2022	12668/12	HVAS	29/03/2022	04/04/2022	52	11,845

The Filter(s) have been tested as received and results relate specifically to the filters tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 12668

Date Issued: 19/04/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	12668/1 15/03/2022	12668/4 21/03/2022	12668/7 27/03/2022	12668/10 02/04/2022
Date Tested	--	--	14/04/2022	14/04/2022	14/04/2022	14/04/2022
Particulates per filter	VGT-WI/44	µg/filter	76,900	51,300	15,100	14,200
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	51	34	10	9

HVAS - PM10 Date of Operation	Method	Units	12668/2 15/03/2022	12668/5 21/03/2022	12668/8 27/03/2022	12668/11 02/04/2022
Date Tested	--	--	14/04/2022	14/04/2022	14/04/2022	14/04/2022
Particulates per filter	VGT-WI/44	µg/filter	27,400	20,500	3,900	3,600
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	18	14	3	2

HVAS - PM2.5 Date of Operation	Method	Units	12668/3 15/03/2022	12668/6 21/03/2022	12668/9 27/03/2022	12668/12 02/04/2022
Date Tested	--	--	14/04/2022	14/04/2022	14/04/2022	14/04/2022
Particulates per filter	VGT-WI/44	µg/filter	24,500	12,700	<400	<400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	16	8	<2	<2

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 12668

Date Issued: 19/04/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
12668/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12668/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12668/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12668/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12668/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12668/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12668/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12668/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12668/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12668/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12668/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12668/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 12810

Date Issued: 10/05/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 5/05/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	08/04/2022	12810/1	HVAS	04/04/2022	11/04/2022	52	11,846
PM 10	08/04/2022	12810/2	HVAS	04/04/2022	11/04/2022	52	11,847
PM 2.5	08/04/2022	12810/3	HVAS	04/04/2022	11/04/2022	52	11,848
TSP	14/04/2022	12810/4	HVAS	11/04/2022	19/04/2022	52	11,849
PM 10	14/04/2022	12810/5	HVAS	11/04/2022	19/04/2022	52	11,850
PM 2.5	14/04/2022	12810/6	HVAS	11/04/2022	19/04/2022	52	11,851
TSP	20/04/2022	12810/7	HVAS	19/04/2022	21/04/2022	52	11,854
PM 10	20/04/2022	12810/8	HVAS	19/04/2022	21/04/2022	52	11,852
PM 2.5	20/04/2022	12810/9	HVAS	19/04/2022	21/04/2022	52	11,853
TSP	26/04/2022	12810/10	HVAS	21/04/2022	27/04/2022	52	11,855
PM 10	26/04/2022	12810/11	HVAS	21/04/2022	27/04/2022	52	11,856
PM 2.5	26/04/2022	12810/12	HVAS	21/04/2022	27/04/2022	52	11,857
TSP	02/05/2022	12810/13	HVAS	27/04/2022	03/05/2022	52	11,859
PM 10	02/05/2022	12810/14	HVAS	27/04/2022	03/05/2022	52	11,858
PM 2.5	02/05/2022	12810/15	HVAS	27/04/2022	03/05/2022	52	11,866

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 12810

Date Issued: 10/05/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	12810/1 08/04/2022	12810/4 14/04/2022	12810/7 20/04/2022	12810/10 26/04/2022	12810/13 02/05/2022
Date Tested	--	--	09/05/2022	09/05/2022	09/05/2022	09/05/2022	09/05/2022
Particulates per filter	VGT-WI/44	µg/filter	51,900	91,600	60,400	110,200	19,200
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	35	61	42	73	13

HVAS - PM10 Date of Operation	Method	Units	12810/2 08/04/2022	12810/5 14/04/2022	12810/8 20/04/2022	12810/11 26/04/2022	12810/14 02/05/2022
Date Tested	--	--	09/05/2022	09/05/2022	09/05/2022	09/05/2022	09/05/2022
Particulates per filter	VGT-WI/44	µg/filter	16,500	26,600	24,800	26,800	19,800
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	11	18	17	18	13

HVAS - PM2.5 Date of Operation	Method	Units	12810/3 08/04/2022	12810/6 14/04/2022	12810/9 20/04/2022	12810/12 26/04/2022	12810/15 02/05/2022
Date Tested	--	--	09/05/2022	09/05/2022	09/05/2022	09/05/2022	09/05/2022
Particulates per filter	VGT-WI/44	µg/filter	3,100	26,900	17,200	9,800	<400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	2	18	12	7	<2

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 12810

Date Issued: 10/05/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
12810/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12810/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12810/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12810/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12810/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12810/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12810/7	TSP		Unknown	1.12	1,384	20.0	101.3	1,444
12810/8	PM 10		Unknown	1.12	1,384	20.0	101.3	1,444
12810/9	PM 2.5		Unknown	1.12	1,384	20.0	101.3	1,444
12810/10	TSP		Unknown	1.12	1,440	20.0	101.3	1,502
12810/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12810/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12810/13	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12810/14	PM 10		Unknown	1.12	1,440	20.0	101.3	1,502
12810/15	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 12978

Date Issued: 8/06/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 2/06/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	08/05/2022	12978/1	HVAS	03/05/2022	09/05/2022	52	11,867
PM 10	08/05/2022	12978/2	HVAS	03/05/2022	09/05/2022	52	11,868
PM 2.5	08/05/2022	12978/3	HVAS	03/05/2022	09/05/2022	52	11,869
TSP	14/05/2022	12978/4	HVAS	13/05/2022	15/05/2022	53	80,425
PM 10	14/05/2022	12978/5	HVAS	13/05/2022	15/05/2022	53	80,426
PM2.5	14/05/2022	12978/6	HVAS	13/05/2022	15/05/2022	53	80,424
TSP	20/05/2022	12978/7	HVAS	19/05/2022	21/05/2022	52	11,896
PM 10	20/05/2022	12978/8	HVAS	19/05/2022	21/05/2022	52	11,897
PM 2.5	20/05/2022	12978/9	HVAS	19/05/2022	21/05/2022	52	11,898
TSP	26/05/2022	12978/10	HVAS	25/05/2022	27/05/2022	53	80,413
PM 10	26/05/2022	12978/11	HVAS	25/05/2022	27/05/2022	53	80,414
PM 2.5	26/05/2022	12978/12	HVAS	25/05/2022	27/05/2022	53	80,415
TSP	01/06/2022	12978/13	HVAS	31/05/2022	02/06/2022	53	80,421
PM 10	01/06/2022	12978/14	HVAS	31/05/2022	02/06/2022	53	80,442
PM 2.5	01/06/2022	12978/15	HVAS	31/05/2022	02/06/2022	53	80,444

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 12978

Date Issued: 8/06/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	12978/1 08/05/2022	12978/4 14/05/2022	12978/7 20/05/2022	12978/10 26/05/2022	12978/13 01/06/2022
Date Tested	--	--	10/05/2022	17/05/2022	24/05/2022	08/06/2022	08/06/2022
Particulates per filter	VGT-WI/44	µg/filter	34,100	19,400	27,000	148,700	35,200
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	23	13	18	99	23

HVAS - PM10 Date of Operation	Method	Units	12978/2 08/05/2022	12978/5 14/05/2022	12978/8 20/05/2022	12978/11 26/05/2022	12978/14 01/06/2022
Date Tested	--	--	10/05/2022	17/05/2022	24/05/2022	08/06/2022	08/06/2022
Particulates per filter	VGT-WI/44	µg/filter	11,800	13,700	12,700	42,400	23,100
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	8	9	8	28	15

HVAS - PM2.5 Date of Operation	Method	Units	12978/3 08/05/2022	12978/6 14/05/2022	12978/9 20/05/2022	12978/12 26/05/2022	12978/15 01/06/2022
Date Tested	--	--	10/05/2022	17/05/2022	24/05/2022	08/06/2022	08/06/2022
Particulates per filter	VGT-WI/44	µg/filter	7,500	3,900	5,600	51,500	21,300
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	5	3	4	34	14

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 12978

Date Issued: 8/06/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
12978/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12978/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12978/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12978/4	TSP		Unknown	1.12	1,440	20.0	101.3	1,502
12978/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12978/6	PM2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12978/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12978/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12978/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12978/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12978/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12978/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
12978/13	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
12978/14	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
12978/15	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 13117

Date Issued: 8/07/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 7/07/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	07/06/2022	13117/1	HVAS	06/06/2022	08/07/2022	53	80,448
PM 10	07/06/2022	13117/2	HVAS	06/06/2022	08/07/2022	53	80,449
PM 2.5	07/06/2022	13117/3	HVAS	06/06/2022	08/07/2022	53	80,450
TSP	13/06/2022	13117/4	HVAS	12/06/2022	14/06/2022	53	80,458
PM 10	13/06/2022	13117/5	HVAS	12/06/2022	14/06/2022	53	80,459
PM2.5	13/06/2022	13117/6	HVAS	12/06/2022	14/06/2022	53	80,457
TSP	19/06/2022	13117/7	HVAS	18/06/2022	20/06/2022	1,606	9,700,265
PM 10	19/06/2022	13117/8	HVAS	18/06/2022	20/06/2022	1,606	9,852,043
PM 2.5	19/06/2022	13117/9	HVAS	18/06/2022	20/06/2022	1,606	9,582,064
TSP	25/06/2022	13117/10	HVAS	24/06/2022	30/06/2022	1,606	9,589,622
PM 10	25/06/2022	13117/11	HVAS	24/06/2022	30/06/2022	1,606	9,589,643
PM 2.5	25/06/2022	13117/12	HVAS	24/06/2022	30/06/2022	1,606	9,701,001
TSP	01/07/2022	13117/13	HVAS	30/06/2022	04/07/2022	1,606	9,701,021
PM 10	01/07/2022	13117/14	HVAS	30/06/2022	04/07/2022	1,606	9,701,041
PM 2.5	01/07/2022	13117/15	HVAS	30/06/2022	04/07/2022	1,606	9,701,062

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 13117

Date Issued: 8/07/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	13117/1 07/06/2022	13117/4 13/06/2022	13117/7 19/06/2022	13117/10 25/06/2022	13117/13 01/07/2022
Date Tested	--	--	16/06/2022	16/06/2022	23/06/2022	07/07/2022	07/07/2022
Particulates per filter	VGT-WI/44	µg/filter	24,800	26,500	19,300	44,300	29,800
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	17	18	13	29	20

HVAS - PM10 Date of Operation	Method	Units	13117/2 07/06/2022	13117/5 13/06/2022	13117/8 19/06/2022	13117/11 25/06/2022	13117/14 01/07/2022
Date Tested	--	--	16/06/2022	16/06/2022	23/06/2022	07/07/2022	07/07/2022
Particulates per filter	VGT-WI/44	µg/filter	12,700	13,800	12,300	21,800	17,300
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	8	9	8	14	12

HVAS - PM2.5 Date of Operation	Method	Units	13117/3 07/06/2022	13117/6 13/06/2022	13117/9 19/06/2022	13117/12 25/06/2022	13117/15 01/07/2022
Date Tested	--	--	16/06/2022	16/06/2022	23/06/2022	07/07/2022	07/07/2022
Particulates per filter	VGT-WI/44	µg/filter	14,200	9,400	6,500	21,200	11,200
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	9	6	4	14	7

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 13117

Date Issued: 8/07/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
13117/1	TSP	Windy. Paper damaged due to wind when removed. Shouldnt affect mass.	Unknown	1.12	1,439	20.0	101.3	1,501
13117/2	PM 10	Windy	Unknown	1.12	1,439	20.0	101.3	1,501
13117/3	PM 2.5	Windy	Unknown	1.12	1,439	20.0	101.3	1,501
13117/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13117/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13117/6	PM2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13117/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13117/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13117/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13117/10	TSP	Windy	Unknown	1.12	1,440	20.0	101.3	1,502
13117/11	PM 10	Windy	Unknown	1.12	1,447	20.0	101.3	1,509
13117/12	PM 2.5	Windy	Unknown	1.12	1,439	20.0	101.3	1,501
13117/13	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13117/14	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13117/15	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 13314

Date Issued: 5/08/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 3/08/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	07/07/2022	13314/1	HVAS	04/07/2022	12/07/2022	507	9,588,643
PM 10	07/07/2022	13314/2	HVAS	04/07/2022	12/07/2022	507	9,588,664
PM 2.5	07/07/2022	13314/3	HVAS	04/07/2022	12/07/2022	507	9,710,522
TSP	13/07/2022	13314/4	HVAS	12/07/2022	14/07/2022	507	9,707,901
PM 10	13/07/2022	13314/5	HVAS	12/07/2022	14/07/2022	507	9,710,564
PM2.5	13/07/2022	13314/6	HVAS	12/07/2022	14/07/2022	507	9,710,585
TSP	19/07/2022	13314/7	HVAS	18/07/2022	20/07/2022	507	9,722,222
PM 10	19/07/2022	13314/8	HVAS	18/07/2022	20/07/2022	507	9,722,243
PM 2.5	19/07/2022	13314/9	HVAS	18/07/2022	20/07/2022	1,606	9,700,722
TSP	25/07/2022	13314/10	HVAS	20/07/2022	26/07/2022	1,907	9,930,523
PM 10	25/07/2022	13314/11	HVAS	20/07/2022	26/07/2022	1,907	9,930,544
PM 2.5	25/07/2022	13314/12	HVAS	20/07/2022	26/07/2022	1,907	9,930,565
TSP	31/07/2022	13314/13	HVAS	26/07/2022	01/08/2022	1,907	9,930,586
PM 10	31/07/2022	13314/14	HVAS	26/07/2022	01/08/2022	1,907	9,825,301
PM 2.5	31/07/2022	13314/15	HVAS	26/07/2022	01/08/2022	1,907	9,825,323

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 13314

Date Issued: 5/08/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	13314/1 07/07/2022	13314/4 13/07/2022	13314/7 19/07/2022	13314/10 25/07/2022	13314/13 31/07/2022
Date Tested	--	--	22/07/2022	22/07/2022	04/08/2022	04/08/2022	04/08/2022
Particulates per filter	VGT-WI/44	µg/filter	61,300	42,800	26,900	120,600	22,600
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	20	29	18	80	15

HVAS - PM10 Date of Operation	Method	Units	13314/2 07/07/2022	13314/5 13/07/2022	13314/8 19/07/2022	13314/11 25/07/2022	13314/14 31/07/2022
Date Tested	--	--	22/07/2022	22/07/2022	04/08/2022	04/08/2022	04/08/2022
Particulates per filter	VGT-WI/44	µg/filter	28,800	16,300	13,100	34,800	6,700
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	10	11	9	23	4

HVAS - PM2.5 Date of Operation	Method	Units	13314/3 07/07/2022	13314/6 13/07/2022	13314/9 19/07/2022	13314/12 25/07/2022	13314/15 31/07/2022
Date Tested	--	--	22/07/2022	22/07/2022	04/08/2022	04/08/2022	04/08/2022
Particulates per filter	VGT-WI/44	µg/filter	16,600	16,700	11,000	32,400	5,400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	6	11	7	22	4

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 13314

Date Issued: 5/08/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
13314/1	TSP		Unknown	1.12	2,878	20.0	101.3	3,002
13314/2	PM 10		Unknown	1.12	2,878	20.0	101.3	3,002
13314/3	PM 2.5		Unknown	1.12	2,878	20.0	101.3	3,002
13314/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13314/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13314/6	PM2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13314/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13314/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13314/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13314/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13314/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13314/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13314/13	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13314/14	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13314/15	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 13545

Date Issued: 27/09/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 22/09/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	05/09/2022	13545/1	HVAS	31/08/2022	07/09/2022	54	81,566
PM 10	05/09/2022	13545/2	HVAS	31/08/2022	07/09/2022	54	81,567
PM 2.5	05/09/2022	13545/3	HVAS	31/08/2022	07/09/2022	54	81,568
TSP	11/09/2022	13545/4	HVAS	07/09/2022	12/09/2022	54	81,569
PM 10	11/09/2022	13545/5	HVAS	07/09/2022	12/09/2022	54	81,570
PM 2.5	11/09/2022	13545/6	HVAS	07/09/2022	12/09/2022	54	81,571
TSP	17/09/2022	13545/7	HVAS	12/09/2022	19/09/2022	54	81,572
PM 10	17/09/2022	13545/8	HVAS	12/09/2022	19/09/2022	54	81,573
PM 2.5	17/09/2022	13545/9	HVAS	12/09/2022	19/09/2022	54	81,574

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 13545

Date Issued: 27/09/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	13545/1 05/09/2022	13545/4 11/09/2022	13545/7 17/09/2022
Date Tested	--	--	27/09/2022	27/09/2022	27/09/2022
Particulates per filter	VGT-WI/44	µg/filter	42,000	30,400	29,300
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	28	20	20

HVAS - PM10 Date of Operation	Method	Units	13545/2 05/09/2022	13545/5 11/09/2022	13545/8 17/09/2022
Date Tested	--	--	27/09/2022	27/09/2022	27/09/2022
Particulates per filter	VGT-WI/44	µg/filter	14,700	13,800	11,500
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	10	9	8

HVAS - PM2.5 Date of Operation	Method	Units	13545/3 05/09/2022	13545/6 11/09/2022	13545/9 17/09/2022
Date Tested	--	--	27/09/2022	27/09/2022	27/09/2022
Particulates per filter	VGT-WI/44	µg/filter	4,700	14,600	12,900
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	3	10	9

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 13545

Date Issued: 27/09/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
13545/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13545/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13545/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13545/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13545/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13545/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13545/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13545/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13545/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 13743

Date Issued: 26/10/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 20/10/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	23/09/2022	13743/1	HVAS	19/09/2022	26/09/2022	54	81,575
PM 10	23/09/2022	13743/2	HVAS	19/09/2022	26/09/2022	54	81,576
PM 2.5	23/09/2022	13743/3	HVAS	19/09/2022	26/09/2022	54	81,577
TSP	29/09/2022	13743/4	HVAS	26/09/2022	04/10/2022	55	81,802
PM 10	29/09/2022	13743/5	HVAS	26/09/2022	04/10/2022	55	81,803
PM 2.5	29/09/2022	13743/6	HVAS	26/09/2022	04/10/2022	55	81,804
TSP	05/10/2022	13743/7	HVAS	04/10/2022	07/10/2022	55	81,805
PM 10	05/10/2022	13743/8	HVAS	04/10/2022	07/10/2022	55	81,806
PM 2.5	05/10/2022	13743/9	HVAS	04/10/2022	07/10/2022	55	81,807
TSP	11/10/2022	13743/10	HVAS	07/10/2022	12/10/2022	55	81,808
PM 10	11/10/2022	13743/11	HVAS	07/10/2022	12/10/2022	55	81,809
PM 2.5	11/10/2022	13743/12	HVAS	07/10/2022	12/10/2022	55	81,810
TSP	17/10/2022	13743/13	HVAS	12/10/2022	18/10/2022	55	81,811
PM 10	17/10/2022	13743/14	HVAS	12/10/2022	18/10/2022	55	81,812
PM 2.5	17/10/2022	13743/15	HVAS	12/10/2022	18/10/2022	55	81,813

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 13743

Date Issued: 26/10/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	13743/1 23/09/2022	13743/4 29/09/2022	13743/7 05/10/2022	13743/10 11/10/2022	13743/13 17/10/2022
Date Tested	--	--	26/10/2022	26/10/2022	26/10/2022	26/10/2022	26/10/2022
Particulates per filter	VGT-WI/44	µg/filter	23,700	111,400	48,200	66,200	64,900
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	16	74	32	44	43

HVAS - PM10 Date of Operation	Method	Units	13743/2 23/09/2022	13743/5 29/09/2022	13743/8 05/10/2022	13743/11 11/10/2022	13743/14 17/10/2022
Date Tested	--	--	26/10/2022	26/10/2022	26/10/2022	26/10/2022	26/10/2022
Particulates per filter	VGT-WI/44	µg/filter	7,800	42,500	19,300	25,800	20,900
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	5	28	13	17	14

HVAS - PM2.5 Date of Operation	Method	Units	13743/3 23/09/2022	13743/6 29/09/2022	13743/9 05/10/2022	13743/12 11/10/2022	13743/15 17/10/2022
Date Tested	--	--	26/10/2022	26/10/2022	26/10/2022	26/10/2022	26/10/2022
Particulates per filter	VGT-WI/44	µg/filter	600	29,300	2,900	26,400	16,100
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	<2	20	<2	18	11

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 13743

Date Issued: 26/10/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
13743/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13743/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13743/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13743/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13743/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13743/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13743/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13743/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13743/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13743/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13743/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13743/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13743/13	TSP		Unknown	1.12	1,440	20.0	101.3	1,502
13743/14	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13743/15	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 13892

Date Issued: 25/11/2022

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 17/11/2022

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	23/10/2022	13892/1	HVAS	18/10/2022	24/10/2022	55	81,814
PM 10	23/10/2022	13892/2	HVAS	18/10/2022	24/10/2022	55	81,815
PM 2.5	23/10/2022	13892/3	HVAS	18/10/2022	24/10/2022	55	81,816
TSP	29/10/2022	13892/4	HVAS	24/10/2022	31/10/2022	55	81,847
PM 10	29/10/2022	13892/5	HVAS	24/10/2022	31/10/2022	55	81,848
PM 2.5	29/10/2022	13892/6	HVAS	24/10/2022	31/10/2022	55	81,849
TSP	04/11/2022	13892/7	HVAS	31/10/2022	07/11/2022	55	81,850
PM 10	04/11/2022	13892/8	HVAS	31/10/2022	07/11/2022	55	81,851
PM 2.5	04/11/2022	13892/9	HVAS	31/10/2022	07/11/2022	55	81,852
TSP	10/11/2022	13892/10	HVAS	07/11/2022	17/11/2022	55	81,853
PM 10	10/11/2022	13892/11	HVAS	07/11/2022	17/11/2022	55	81,854
PM 2.5	10/11/2022	13892/12	HVAS	07/11/2022	17/11/2022	55	81,855

The Filter(s) have been tested as received and results relate specifically to the filters tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 13892

Date Issued: 25/11/2022

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	13892/1 23/10/2022	13892/4 29/10/2022	13892/7 04/11/2022	13892/10 10/11/2022
Date Tested	--	--	25/11/2022	25/11/2022	25/11/2022	25/11/2022
Particulates per filter	VGT-WI/44	µg/filter	16,700	49,700	60,500	120,900
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	11	33	40	40

HVAS - PM10 Date of Operation	Method	Units	13892/2 23/10/2022	13892/5 29/10/2022	13892/8 04/11/2022	13892/11 10/11/2022
Date Tested	--	--	25/11/2022	25/11/2022	25/11/2022	25/11/2022
Particulates per filter	VGT-WI/44	µg/filter	9,600	17,700	19,100	54,900
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	6	12	13	18

HVAS - PM2.5 Date of Operation	Method	Units	13892/3 23/10/2022	13892/6 29/10/2022	13892/9 04/11/2022	13892/12 10/11/2022
Date Tested	--	--	25/11/2022	25/11/2022	25/11/2022	25/11/2022
Particulates per filter	VGT-WI/44	µg/filter	1,300	23,300	13,600	35,000
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	<2	16	9	12

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 13892

Date Issued: 25/11/2022

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
13892/1	TSP		Unknown	1.12	1,445	20.0	101.3	1,507
13892/2	PM 10		Unknown	1.12	1,445	20.0	101.3	1,507
13892/3	PM 2.5		Unknown	1.12	1,445	20.0	101.3	1,507
13892/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13892/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13892/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13892/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
13892/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
13892/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
13892/10	TSP	Ran Twice	Unknown	1.12	2,878	20.0	101.3	3,002
13892/11	PM 10	Ran Twice	Unknown	1.12	2,878	20.0	101.3	3,002
13892/12	PM 2.5	Ran Twice	Unknown	1.12	2,878	20.0	101.3	3,002

Report Number: 14107

Date Issued: 18/01/2023

Revision Number: 00

Site/Job: Redisand HVAS

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following HVAS Filter(s) were received on 12/01/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	16/12/2022	14107/1	HVAS	12/12/2022	19/12/2022	56	81,403
PM 10	16/12/2022	14107/2	HVAS	12/12/2022	19/12/2022	56	81,404
PM 2.5	16/12/2022	14107/3	HVAS	12/12/2022	19/12/2022	56	81,405
TSP	22/12/2022	14107/4	HVAS	19/12/2022	23/12/2022	56	81,406
PM 10	22/12/2022	14107/5	HVAS	19/12/2022	23/12/2022	56	81,407
PM 2.5	22/12/2022	14107/6	HVAS	19/12/2022	23/12/2022	56	81,408
TSP	28/12/2022	14107/7	HVAS	23/12/2022	30/12/2022	56	81,410
PM 10	28/12/2022	14107/8	HVAS	23/12/2022	30/12/2022	56	81,409
PM 2.5	28/12/2022	14107/9	HVAS	23/12/2022	30/12/2022	56	81,411
TSP	03/01/2023	14107/10	HVAS	30/12/2022	04/01/2023	56	81,431
PM 10	03/01/2023	14107/11	HVAS	30/12/2022	04/01/2023	56	81,432
PM 2.5	03/01/2023	14107/12	HVAS	30/12/2022	04/01/2023	56	81,433
TSP	09/01/2023	14107/13	HVAS	04/01/2023	10/01/2023	56	81,436
PM 10	09/01/2023	14107/14	HVAS	04/01/2023	10/01/2023	56	81,434
PM 2.5	09/01/2023	14107/15	HVAS	04/01/2023	10/01/2023	56	81,435

The Filter(s) have been tested as received and results relate specifically to the filters tested.

The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Sampling Report: Information supplied by client
- Chain of Custody (if available)

Test Report Number: 14107

Date Issued: 18/01/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	14107/1 16/12/2022	14107/4 22/12/2022	14107/7 28/12/2022	14107/10 03/01/2023	14107/13 09/01/2023
Date Tested	--	--	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Particulates per filter	VGT-WI/44	µg/filter	67,300	49,000	23,500	29,200	46,700
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	44	33	16	19	31

HVAS - PM10 Date of Operation	Method	Units	14107/2 16/12/2022	14107/5 22/12/2022	14107/8 28/12/2022	14107/11 03/01/2023	14107/14 09/01/2023
Date Tested	--	--	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Particulates per filter	VGT-WI/44	µg/filter	27,100	19,700	10,200	17,700	19,100
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	18	13	7	12	13

HVAS - PM2.5 Date of Operation	Method	Units	14107/3 16/12/2022	14107/6 22/12/2022	14107/9 28/12/2022	14107/12 03/01/2023	14107/15 09/01/2023
Date Tested	--	--	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Particulates per filter	VGT-WI/44	µg/filter	31,200	17,700	9,000	12,400	14,400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	21	12	6	8	10

Report Comments:

~ NATA accreditation does not cover the performance of these tests as they rely on client sampling.

Weather and flow rates used for calculation purposes supplied by client

[NT]: Not tested

Sampling Report Number: 14107

Date Issued: 18/01/2023

Revision No: 00

Sampling procedures supplied by client

Lab ID	Description	Comments	Method of Sampling	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3
14107/1	TSP		Unknown	1.12	1,451	20.0	101.3	1,513
14107/2	PM 10		Unknown	1.12	1,448	20.0	101.3	1,510
14107/3	PM 2.5		Unknown	1.12	1,445	20.0	101.3	1,507
14107/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14107/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14107/6	PM 2.5		Unknown	1.12	1,440	20.0	101.3	1,502
14107/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14107/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14107/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14107/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14107/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14107/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14107/13	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14107/14	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14107/15	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 12096

Date Issued: 20/01/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 13/01/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	16/12/2021 10:29	13/01/2022 09:05	12096/1	Dust	
D2 Wisely	16/12/2021 10:48	13/01/2022 09:21	12096/2	Dust	
D3 2930 Nelson Bay Rd	16/12/2021 10:21	13/01/2022 08:57	12096/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Approved by:

Results have been approved and report finalised on 20/01/2022.

Test Report Number: 12096

Date Issued: 20/01/2022

Revision No: 00

Results

Deposited Matter	Method	Units	12096/1 D1 Gate 13/01/2022	12096/2 D2 Wisely 13/01/2022	12096/3 D3 2930 Nelson Bay Rd 13/01/2022
Date Tested	--	--	17/01/2022	17/01/2022	17/01/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.9	3.5	2.8
Ash	AS 3580.10.1	g/m2/mth	1.5	1.5	1.4
Combustible Matter	AS 3580.10.1	g/m2/mth	0.4	2.0	1.4
Calculated Rain	AS 3580.10.1	mm	49	47	59

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12096

Date Issued: 20/01/2022

Revision No: 00

Sampling Conditions: Sunny 23°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12096/1	D1 Gate	13406-1	T.Walker	13/01/2022 09:05	AS3580.10.1	CuSO4
12096/2	D2 Wisely	13406-2	T.Walker	13/01/2022 09:21	AS3580.10.1	CuSO4
12096/3	D3 2930 Nelson Bay Rd	13406-3	T.Walker	13/01/2022 08:57	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12096/1	D1 Gate	0399631	6371312	
12096/2	D2 Wisely	0399795	6370861	Minor insects, minor algae
12096/3	D3 2930 Nelson Bay Rd	0400324	6371296	Minor algae

Sampling procedures have been approved and report finalised on 20/01/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12236

Date Issued: 17/02/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 10/02/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	13/01/2022 09:05	10/02/2022 09:39	12236/1	Dust	
D2 Wisely	13/01/2022 09:21	10/02/2022 10:16	12236/2	Dust	
D3 2930 Nelson Bay Rd	13/01/2022 08:57	10/02/2022 09:26	12236/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Approved by:

Results have been approved and report finalised on 17/02/2022.

Test Report Number: 12236

Date Issued: 17/02/2022

Revision No: 00

Results

Deposited Matter	Method	Units	12236/1 D1 Gate 10/02/2022	12236/2 D2 Wisely 10/02/2022	12236/3 D3 2930 Nelson Bay Rd 10/02/2022
Date Tested	--	--	16/02/2022	16/02/2022	16/02/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	3.0	2.5	1.3
Ash	AS 3580.10.1	g/m2/mth	2.2	1.8	0.5
Combustible Matter	AS 3580.10.1	g/m2/mth	0.8	0.7	0.8
Calculated Rain	AS 3580.10.1	mm	101	102	103

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12236

Date Issued: 17/02/2022

Revision No: 00

Sampling Conditions: Fine 25°-27°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12236/1	D1 Gate	13406-1	T.Walker	10/02/2022 09:39	AS3580.10.1	CuSO4
12236/2	D2 Wisely	13406-2	T.Walker	10/02/2022 10:16	AS3580.10.1	CuSO4
12236/3	D3 2930 Nelson Bay Rd	13406-3	T.Walker	10/02/2022 09:26	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12236/1	D1 Gate	0399631	6371312	
12236/2	D2 Wisely	0399795	6370861	Minor insects, algae.
12236/3	D3 2930 Nelson Bay Rd	0400324	6371296	

Sampling procedures have been approved and report finalised on 17/02/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12410

Date Issued: 18/03/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 10/03/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	10/02/2022 09:39	10/03/2022 09:16	12410/1	Dust	
D2 Wisely	10/02/2022 10:16	10/03/2022 09:44	12410/2	Dust	
D3 2930 Nelson Bay Rd	10/02/2022 09:26	10/03/2022 09:06	12410/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 18/03/2022.

Test Report Number: 12410

Date Issued: 18/03/2022

Revision No: 00

Results

Deposited Matter	Method	Units	12410/1 D1 Gate 10/03/2022	12410/2 D2 Wisely 10/03/2022	12410/3 D3 2930 Nelson Bay Rd 10/03/2022
Date Tested	--	--	16/03/2022	16/03/2022	16/03/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.8	2.2	0.7
Ash	AS 3580.10.1	g/m2/mth	1.5	0.7	0.5
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	1.5	0.2
Calculated Rain	AS 3580.10.1	mm	116	116	115

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12410

Date Issued: 18/03/2022

Revision No: 00

Sampling Conditions: Fine, recent heavy rain, 21°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12410/1	D1 Gate	13406-1	T.Walker	10/03/2022 09:16	AS3580.10.1	CuSO4
12410/2	D2 Wisely	13406-2	T.Walker	10/03/2022 09:44	AS3580.10.1	CuSO4
12410/3	D3 2930 Nelson Bay Rd	13406-3	T.Walker	10/03/2022 09:06	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12410/1	D1 Gate	0399631	6371312	Full, minor algae, minor sand
12410/2	D2 Wisely	0399795	6370861	Full, insects
12410/3	D3 2930 Nelson Bay Rd	0400324	6371296	Full

Sampling procedures have been approved and report finalised on 18/03/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12607

Date Issued: 14/04/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 7/04/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	10/03/2022 09:16	07/04/2022 09:25	12607/1	Dust	
D2 Wisely	10/03/2022 09:44	07/04/2022 09:57	12607/2	Dust	
D3 2930 Nelson Bay Rd	10/03/2022 09:06	07/04/2022 09:14	12607/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 14/04/2022.

Test Report Number: 12607

Date Issued: 14/04/2022

Revision No: 00

Results

Deposited Matter	Method	Units	12607/1 D1 Gate 7/04/2022	12607/2 D2 Wisely 7/04/2022	12607/3 D3 2930 Nelson Bay Rd 7/04/2022
Date Tested	--	--	12/04/2022	12/04/2022	12/04/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	9.8	1.9	0.5
Ash	AS 3580.10.1	g/m2/mth	9.3	0.9	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.5	1.0	0.3
Calculated Rain	AS 3580.10.1	mm	115	116	116

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12607

Date Issued: 14/04/2022

Revision No: 00

Sampling Conditions: 100% cloudcover, 21°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12607/1	D1 Gate	13406-1	T.Walker	07/04/2022 09:25	AS3580.10.1	CuSO4
12607/2	D2 Wisely	13406-2	T.Walker	07/04/2022 09:57	AS3580.10.1	CuSO4
12607/3	D3 2930 Nelson Bay Rd	13406-3	T.Walker	07/04/2022 09:14	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12607/1	D1 Gate	0399631	6371312	Full, sand
12607/2	D2 Wisely	0399795	6370861	Full, minor insects
12607/3	D3 2930 Nelson Bay Rd	0400324	6371296	Full

Sampling procedures have been approved and report finalised on 14/04/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12769

Date Issued: 11/05/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 5/05/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	07/04/2022 09:25	05/05/2022 09:24	12769/1	Dust	
D2 Wisely	07/04/2022 09:57	05/05/2022 09:58	12769/2	Dust	
D3 2930 Nelson Bay Rd	07/04/2022 09:14	05/05/2022 09:14	12769/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 11/05/2022.

Test Report Number: 12769

Date Issued: 11/05/2022

Revision No: 00

Results

Deposited Matter	Method	Units	12769/1 D1 Gate 5/05/2022	12769/2 D2 Wisely 5/05/2022	12769/3 D3 2930 Nelson Bay Rd 5/05/2022
<i>Date Tested</i>	--	--	09/05/2022	09/05/2022	09/05/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.9	1.8	1.9
Ash	AS 3580.10.1	g/m2/mth	1.6	1.0	1.4
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	0.8	0.5
Calculated Rain	AS 3580.10.1	mm	116	114	116

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12769

Date Issued: 11/05/2022

Revision No: 00

Sampling Conditions: Showers 18°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12769/1	D1 Gate	13406-1	T.Walker	05/05/2022 09:24	AS3580.10.1	CuSO4
12769/2	D2 Wisely	13406-2	T.Walker	05/05/2022 09:58	AS3580.10.1	CuSO4
12769/3	D3 2930 Nelson Bay Rd	13406-3	T.Walker	05/05/2022 09:14	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12769/1	D1 Gate	0399631	6371312	Full, minor dusts
12769/2	D2 Wisely	0399795	6370861	Full, minor insects
12769/3	D3 2930 Nelson Bay Rd	0400324	6371296	Full

Sampling procedures have been approved and report finalised on 11/05/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12866

Date Issued: 10/06/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 2/06/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	05/05/2022 09:24	02/06/2022 09:41	12866/1	Dust	
D2 Wisely	05/05/2022 09:58	02/06/2022 10:40	12866/2	Dust	
D3 2930 Nelson Bay Rd	05/05/2022 09:14	02/06/2022 09:01	12866/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 10/06/2022.

Test Report Number: 12866

Date Issued: 10/06/2022

Revision No: 00

Results

Deposited Matter	Method	Units	12866/1 D1 Gate 2/06/2022	12866/2 D2 Wisely 2/06/2022	12866/3 D3 2930 Nelson Bay Rd 2/06/2022
Date Tested	--	--	8/06/2022	8/06/2022	8/06/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	2.8	2.1	3.9
Ash	AS 3580.10.1	g/m2/mth	2.4	1.2	1.6
Combustible Matter	AS 3580.10.1	g/m2/mth	0.4	0.9	2.3
Calculated Rain	AS 3580.10.1	mm	115	116	115

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12866

Date Issued: 10/06/2022

Revision No: 00

Sampling Conditions: Windy 10°-13°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12866/1	D1 Gate	13406-1	T.Walker	02/06/2022 09:41	AS3580.10.1	CuSO4
12866/2	D2 Wisely	13406-2	T.Walker	02/06/2022 10:40	AS3580.10.1	CuSO4
12866/3	D3 2930 Nelson Bay Rd	13406-3	T.Walker	02/06/2022 09:01	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12866/1	D1 Gate	0399631	6371312	Full, minor insects, algae, dust
12866/2	D2 Wisely	0399795	6370861	Full, minor insects
12866/3	D3 2930 Nelson Bay Rd	0400324	6371296	Full, bird droppings, algae

Sampling procedures have been approved and report finalised on 10/06/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13000

Date Issued: 8/07/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 30/06/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	02/06/2022 09:41	30/06/2022 11:25	13000/1	Dust	
D2 Wisely	02/06/2022 10:40	30/06/2022 10:06	13000/2	Dust	
D3 2930 Nelson Bay Rd	02/06/2022 09:01	30/06/2022 09:22	13000/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 8/07/2022.

Test Report Number: 13000

Date Issued: 8/07/2022

Revision No: 00

Results

Deposited Matter	Method	Units	13000/1 D1 Gate 30/06/2022	13000/2 D2 Wisely 30/06/2022	13000/3 D3 2930 Nelson Bay Rd 30/06/2022
<i>Date Tested</i>	--	--	5/07/2022	5/07/2022	5/07/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.4	1.2	2.1
Ash	AS 3580.10.1	g/m2/mth	1.2	0.7	1.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.2	0.5	0.9
Calculated Rain	AS 3580.10.1	mm	58	62	62

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13000

Date Issued: 8/07/2022

Revision No: 00

Sampling Conditions: 11-16°C , Cloudy

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13000/1	D1 Gate	13406-1	D.Walker	30/06/2022 11:25	AS3580.10.1	CuSO4
13000/2	D2 Wisely	13406-2	D.Walker	30/06/2022 10:06	AS3580.10.1	CuSO4
13000/3	D3 2930 Nelson Bay Rd	13406-3	D.Walker	30/06/2022 09:22	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13000/1	D1 Gate	0399631	6371312	Minor sand
13000/2	D2 Wisely	0399795	6370861	Spider
13000/3	D3 2930 Nelson Bay Rd	0400324	6371296	Bird droppings in funnel, Algae.

Sampling procedures have been approved and report finalised on 8/07/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13178

Date Issued: 5/08/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 28/07/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	30/06/2022 11:25	28/07/2022 09:52	13178/1	Dust	
D2 Wisely	30/06/2022 10:06	28/07/2022 10:41	13178/2	Dust	
D3 2930 Nelson Bay Rd	30/06/2022 09:22	28/07/2022 09:43	13178/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 5/08/2022.

Test Report Number: 13178

Date Issued: 5/08/2022

Revision No: 00

Results

Deposited Matter	Method	Units	13178/1 D1 Gate 28/07/2022	13178/2 D2 Wisely 28/07/2022	13178/3 D3 2930 Nelson Bay Rd 28/07/2022
Date Tested	--	--	3/08/2022	3/08/2022	3/08/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.6	2.1	3.0
Ash	AS 3580.10.1	g/m2/mth	1.1	1.1	2.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.5	1.0	0.8
Calculated Rain	AS 3580.10.1	mm	115	115	116

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13178

Date Issued: 5/08/2022

Revision No: 00

Sampling Conditions: Fine 13°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13178/1	D1 Gate	13406-1	D.Walker	28/07/2022 09:52	AS3580.10.1	CuSO4
13178/2	D2 Wisely	13406-2	D.Walker	28/07/2022 10:41	AS3580.10.1	CuSO4
13178/3	D3 2930 Nelson Bay Rd	13406-3	D.Walker	28/07/2022 09:43	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13178/1	D1 Gate	0399631	6371312	Full
13178/2	D2 Wisely	0399795	6370861	Full. Minor sand.
13178/3	D3 2930 Nelson Bay Rd	0400324	6371296	Full. Minor sand.

Sampling procedures have been approved and report finalised on 5/08/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13323

Date Issued: 2/09/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 25/08/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	28/07/2022 09:52	25/08/2022 10:02	13323/1	Dust	
D2 Wisely	28/07/2022 10:41	25/08/2022 10:13	13323/2	Dust	
D3 2930 Nelson Bay Rd	28/07/2022 09:43	25/08/2022 09:53	13323/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 2/09/2022.

Test Report Number: 13323

Date Issued: 2/09/2022

Revision No: 00

Results

Deposited Matter	Method	Units	13323/1 D1 Gate 25/08/2022	13323/2 D2 Wisely 25/08/2022	13323/3 D3 2930 Nelson Bay Rd 25/08/2022
Date Tested	--	--	31/08/2022	31/08/2022	31/08/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	3.3	6.7	0.6
Ash	AS 3580.10.1	g/m2/mth	2.3	4.4	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	1.0	2.3	0.3
Calculated Rain	AS 3580.10.1	mm	110	116	115

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13323

Date Issued: 2/09/2022

Revision No: 00

Sampling Conditions: Fine, 14C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13323/1	D1 Gate	13406-1	D.Walker	25/08/2022 10:02	AS3580.10.1	CuSO4
13323/2	D2 Wisely	13406-2	D.Walker	25/08/2022 10:13	AS3580.10.1	CuSO4
13323/3	D3 2930 Nelson Bay Rd	13406-3	D.Walker	25/08/2022 09:53	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13323/1	D1 Gate	0399631	6371312	Full, minor sand.
13323/2	D2 Wisely	0399795	6370861	Full, minor sand, minor insects, minor algae.
13323/3	D3 2930 Nelson Bay Rd	0400324	6371296	Full.

Sampling procedures have been approved and report finalised on 2/09/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13467

Date Issued: 4/10/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 22/09/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	25/08/2022 10:02	22/09/2022 09:36	13467/1	Dust	
D2 Wisely	25/08/2022 10:13	22/09/2022 11:01	13467/2	Dust	
D3 2930 Nelson Bay Rd	25/08/2022 09:53	22/09/2022 09:02	13467/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 4/10/2022.

Test Report Number: 13467

Date Issued: 4/10/2022

Revision No: 00

Results

Deposited Matter		Lab ID Sample Date Sample ID	13467/1 22/09/2022 D1 Gate	13467/2 22/09/2022 D2 Wisely	13467/3 22/09/2022 D3 2930 Nelson Bay Rd
	Method	Units			
Date Tested	--	--	30/09/2022	30/09/2022	30/09/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	3.6	12.8	1.2
Ash	AS 3580.10.1	g/m2/mth	2.9	9.3	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.7	3.5	1.0
Calculated Rain	AS 3580.10.1	mm	100	115	104

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13467

Date Issued: 4/10/2022

Revision No: 00

Sampling Conditions: 17°C, raining

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13467/1	D1 Gate	13406-1	D.Walker	22/09/2022 09:36	AS3580.10.1	CuSO4
13467/2	D2 Wisely	13406-2	D.Walker	22/09/2022 11:01	AS3580.10.1	CuSO4
13467/3	D3 2930 Nelson Bay Rd	13406-3	D.Walker	22/09/2022 09:02	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13467/1	D1 Gate	0399631	6371312	Minor insects
13467/2	D2 Wisely	0399795	6370861	Full, insects, algae
13467/3	D3 2930 Nelson Bay Rd	0400324	6371296	Minor insects

Sampling procedures have been approved and report finalised on 4/10/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13651

Date Issued: 25/10/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 20/10/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	22/09/2022 09:36	20/10/2022 09:28	13651/1	Dust	
D2 Wisely	22/09/2022 11:01	20/10/2022 10:00	13651/2	Dust	
D3 2930 Nelson Bay Rd	22/09/2022 09:02	20/10/2022 09:17	13651/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 25/10/2022.

Test Report Number: 13651

Date Issued: 25/10/2022

Revision No: 00

Results

Deposited Matter		Lab ID Sample Date Sample ID	13651/1 20/10/2022 D1 Gate	13651/2 20/10/2022 D2 Wisely	13651/3 20/10/2022 D3 2930 Nelson Bay Rd
	Method	Units			
Date Tested	--	--	21/10/2022	21/10/2022	21/10/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	2.8	3.9	0.9
Ash	AS 3580.10.1	g/m2/mth	2.4	2.5	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.4	1.4	0.6
Calculated Rain	AS 3580.10.1	mm	110	115	106

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13651

Date Issued: 25/10/2022

Revision No: 00

Sampling Conditions: 22 °C, raining

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13651/1	D1 Gate	13406-1	D.Walker	20/10/2022 09:28	AS3580.10.1	CuSO4
13651/2	D2 Wisely	13406-2	D.Walker	20/10/2022 10:00	AS3580.10.1	CuSO4
13651/3	D3 2930 Nelson Bay Rd	13406-3	D.Walker	20/10/2022 09:17	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13651/1	D1 Gate	0399631	6371312	
13651/2	D2 Wisely	0399795	6370861	Minor vegetation, minor sand.
13651/3	D3 2930 Nelson Bay Rd	0400324	6371296	Minor vegetation.

Sampling procedures have been approved and report finalised on 25/10/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13809

Date Issued: 23/11/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 17/11/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	20/10/2022 09:28	17/11/2022 09:26	13809/1	Dust	
D2 Wisely	20/10/2022 10:00	17/11/2022 10:08	13809/2	Dust	
D3 2930 Nelson Bay Rd	20/10/2022 09:17	17/11/2022 09:14	13809/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 23/11/2022.

Test Report Number: 13809

Date Issued: 23/11/2022

Revision No: 00

Results

Deposited Matter		Lab ID Sample Date Sample ID	13809/1 17/11/2022 D1 Gate	13809/2 17/11/2022 D2 Wisely	13809/3 17/11/2022 D3 2930 Nelson Bay Rd
	Method	Units			
Date Tested	--	--	18/11/2022	18/11/2022	18/11/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	2.7	3.6	1.7
Ash	AS 3580.10.1	g/m2/mth	2.0	2.1	0.8
Combustible Matter	AS 3580.10.1	g/m2/mth	0.7	1.5	0.9
Calculated Rain	AS 3580.10.1	mm	73	82	81

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13809

Date Issued: 23/11/2022

Revision No: 00

Sampling Conditions: Fine, 17°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13809/1	D1 Gate	13406-1	T.Walker	17/11/2022 09:26	AS3580.10.1	CuSO4
13809/2	D2 Wisely	13406-2	T.Walker	17/11/2022 10:08	AS3580.10.1	CuSO4
13809/3	D3 2930 Nelson Bay Rd	13406-3	T.Walker	17/11/2022 09:14	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13809/1	D1 Gate	0399631	6371312	
13809/2	D2 Wisely	0399795	6370861	Insects, algae.
13809/3	D3 2930 Nelson Bay Rd	0400324	6371296	Minor isnects.

Sampling procedures have been approved and report finalised on 23/11/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13946

Date Issued: 22/12/2022

Revision Number: 00

Site/Job: Redisand Dusts

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following Dust Deposition sample(s) were received on 15/12/2022

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D1 Gate	17/11/2022 09:26	15/12/2022 09:35	13946/1	Dust	
D2 Wisely	17/11/2022 10:08	15/12/2022 11:30	13946/2	Dust	
D3 2930 Nelson Bay Rd	17/11/2022 09:14	15/12/2022 09:15	13946/3	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 22/12/2022.

Test Report Number: 13946

Date Issued: 22/12/2022

Revision No: 00

Results

Deposited Matter		Lab ID Sample Date Sample ID	13946/1 15/12/2022 D1 Gate	13946/2 15/12/2022 D2 Wisely	13946/3 15/12/2022 D3 2930 Nelson Bay Rd
	Method	Units			
Date Tested	--	--	21/12/2022	21/12/2022	21/12/2022
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.9	7.7	3.4
Ash	AS 3580.10.1	g/m2/mth	1.5	6.0	1.6
Combustible Matter	AS 3580.10.1	g/m2/mth	0.4	1.7	1.8
Calculated Rain	AS 3580.10.1	mm	27	23	27

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13946

Date Issued: 22/12/2022

Revision No: 00

Sampling Conditions: 19-21°C, Fine

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13946/1	D1 Gate	13406-1	D.Walker/Y.Peter	15/12/2022 09:35	AS3580.10.1	CuSO4
13946/2	D2 Wisely	13406-2	D.Walker/Y.Peter	15/12/2022 11:30	AS3580.10.1	CuSO4
13946/3	D3 2930 Nelson Bay Rd	13406-3	D.Walker/Y.Peter	15/12/2022 09:15	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13946/1	D1 Gate	0399631	6371312	
13946/2	D2 Wisely	0399795	6370861	Insects, algae, sand.
13946/3	D3 2930 Nelson Bay Rd	0400324	6371296	Vegetation, algae, paddock slashed.

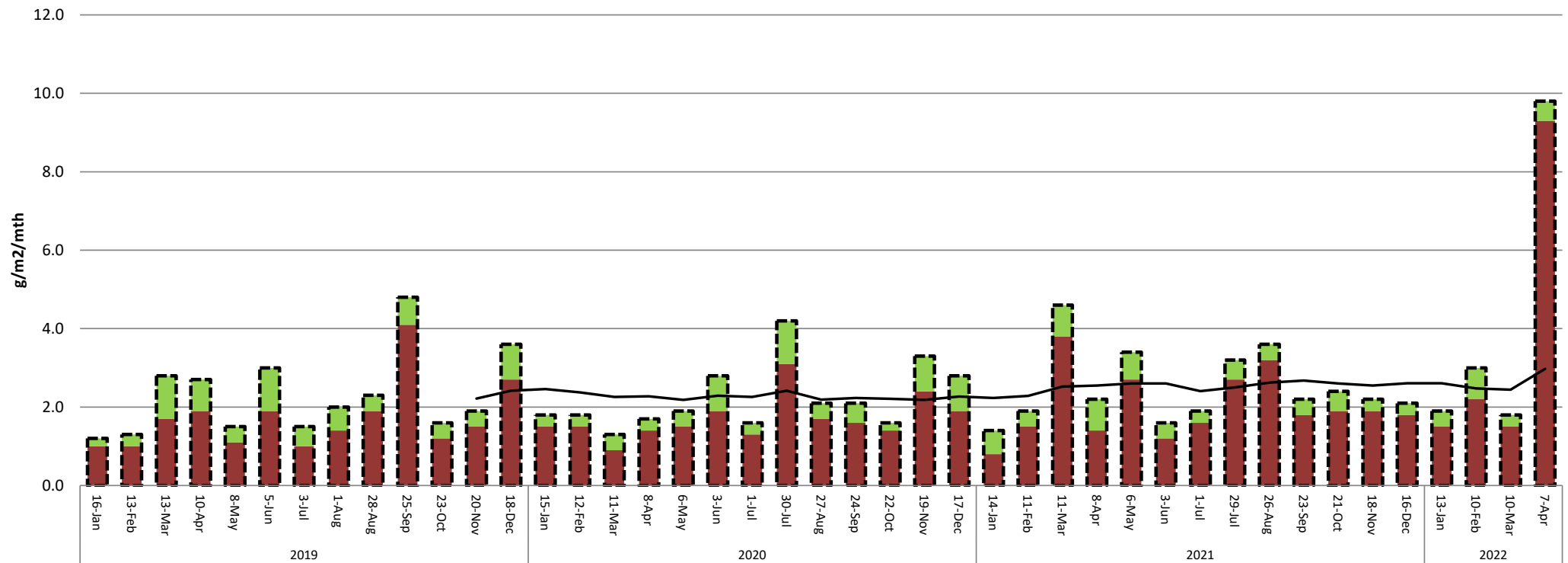
Sampling procedures have been approved and report finalised on 22/12/2022.

Where method is "unknown" sampling procedures are not endorsed

Insoluble Solids (NSWEPA recommends <4g/m²/month Annual Average)

Combustible Matter
 Ash
 Insoluble Solids
 12 Month Average Insoluble Solids

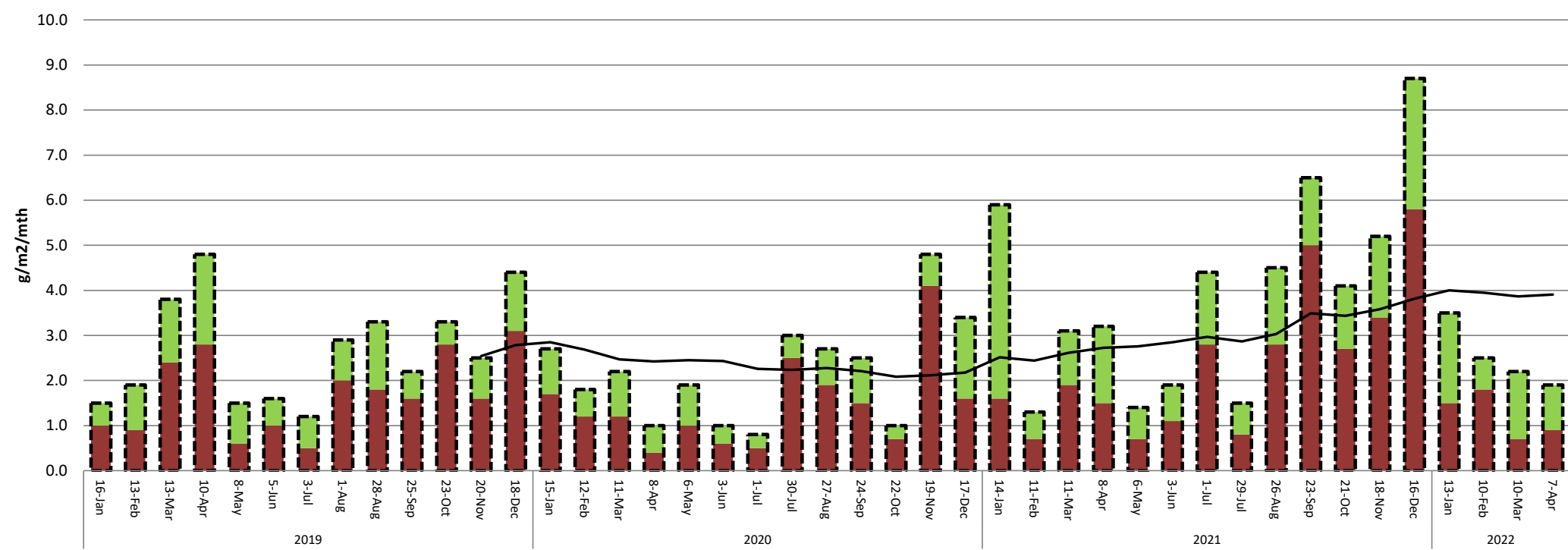
D1 Gate



Insoluble Solids (NSWEPA recommends <4g/m2/month Annual Average)

Combustible Matter
 Ash
 Insoluble Solids
 12 Month Average Insoluble Solids

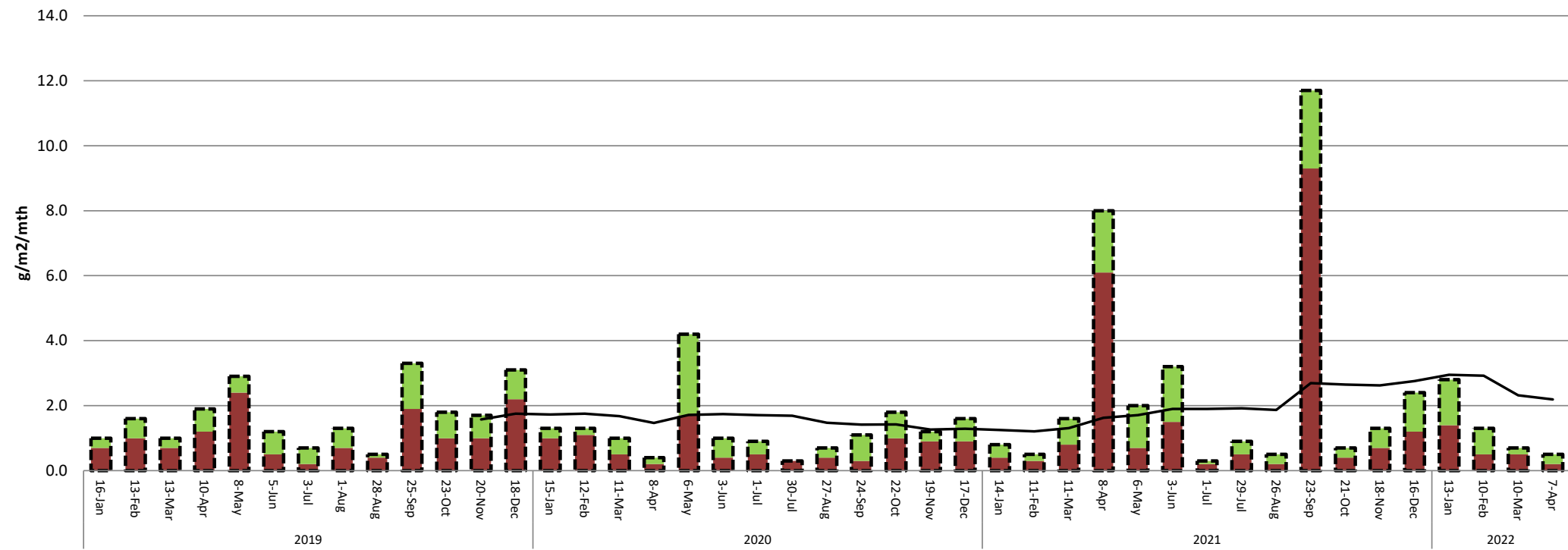
D2 Wisely



Insoluble Solids (NSWEPA recommends <4g/m2/month Annual Average)

Combustible Matter
 Ash
 Insoluble Solids
 12 Month Average Insoluble Solids

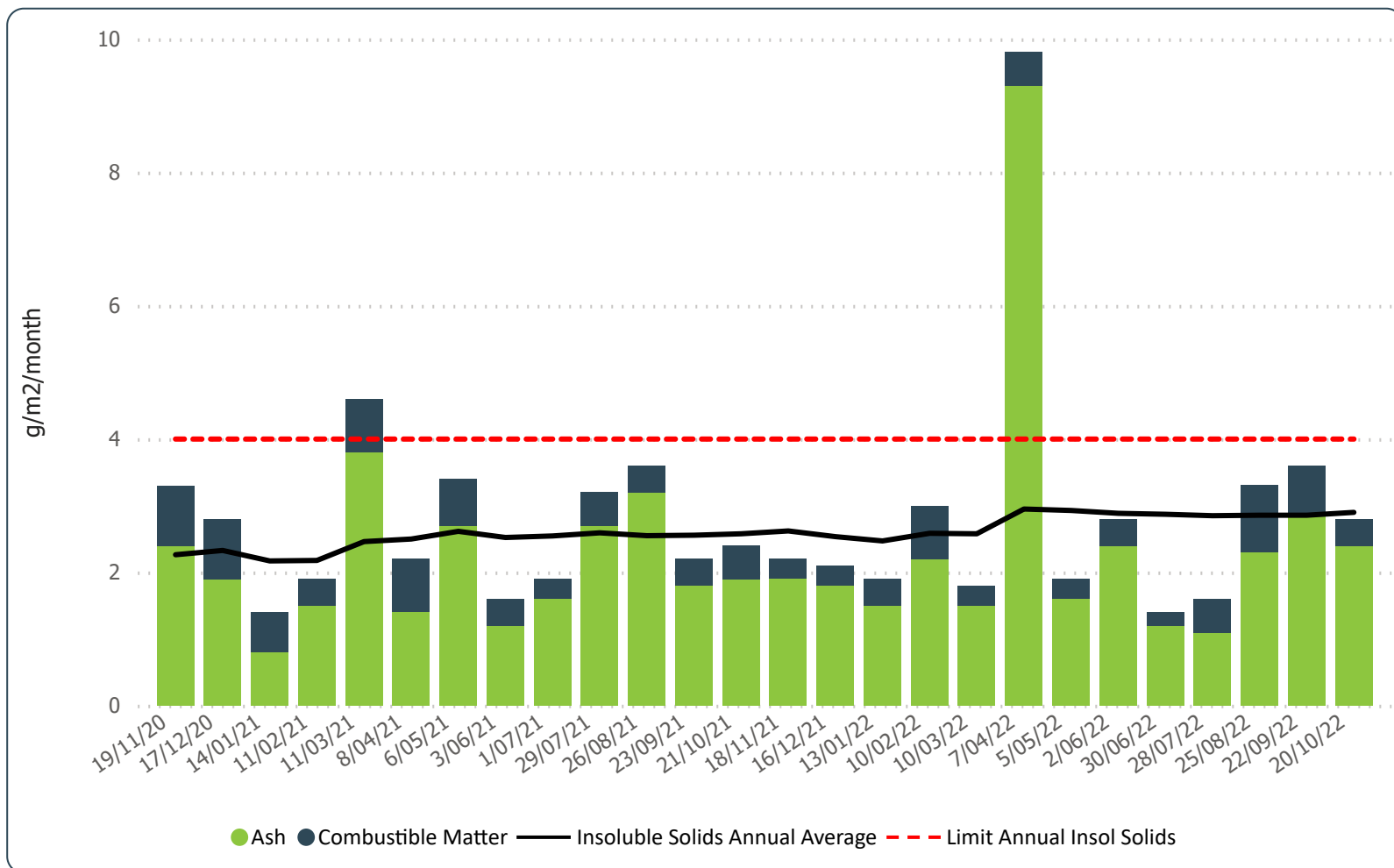
D3 2930 Nelson Bay Rd





3.0

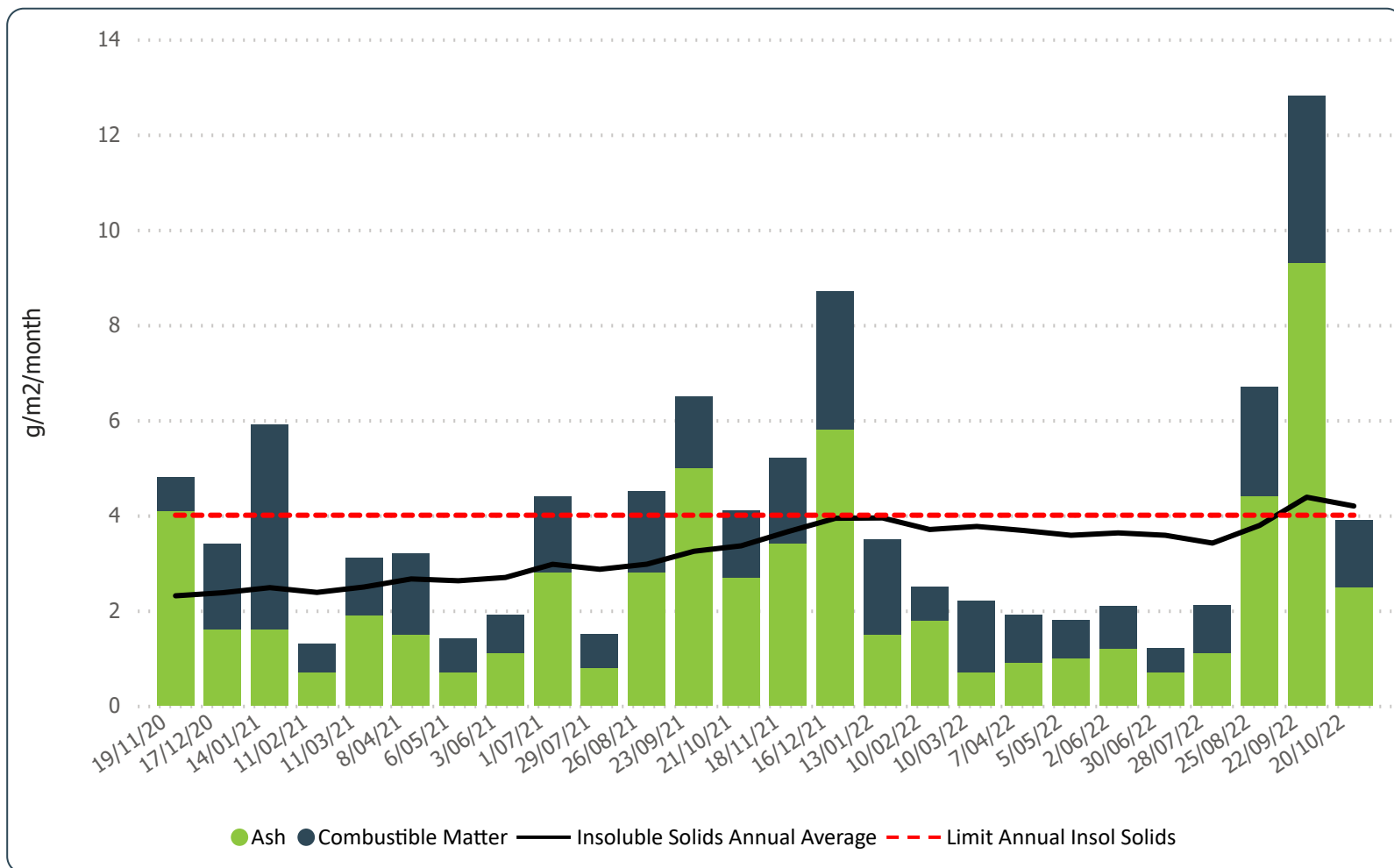
Insoluble Solids Annual Average



Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
18/11/21	Bird droppings, algae	16/12/21	2.1	2.5	1.8	0.3	112
16/12/21		13/01/22	1.9	2.5	1.5	0.4	49
13/01/22		10/02/22	3.0	2.6	2.2	0.8	101
10/02/22	Full, minor algae, minor sand	10/03/22	1.8	2.6	1.5	0.3	116
10/03/22	Full, sand	7/04/22	9.8	3.0	9.3	0.5	115
7/04/22	Full, minor dusts	5/05/22	1.9	2.9	1.6	0.3	116
5/05/22	Full, minor insects, algae, dust	2/06/22	2.8	2.9	2.4	0.4	115
2/06/22	minor sand	30/06/22	1.4	2.9	1.2	0.2	58
30/06/22	Full	28/07/22	1.6	2.9	1.1	0.5	115
28/07/22	Full, minor sand.	25/08/22	3.3	2.9	2.3	1.0	110
25/08/22	Minor insects	22/09/22	3.6	2.9	2.9	0.7	100
22/09/22		20/10/22	2.8	2.9	2.4	0.4	110

4.2

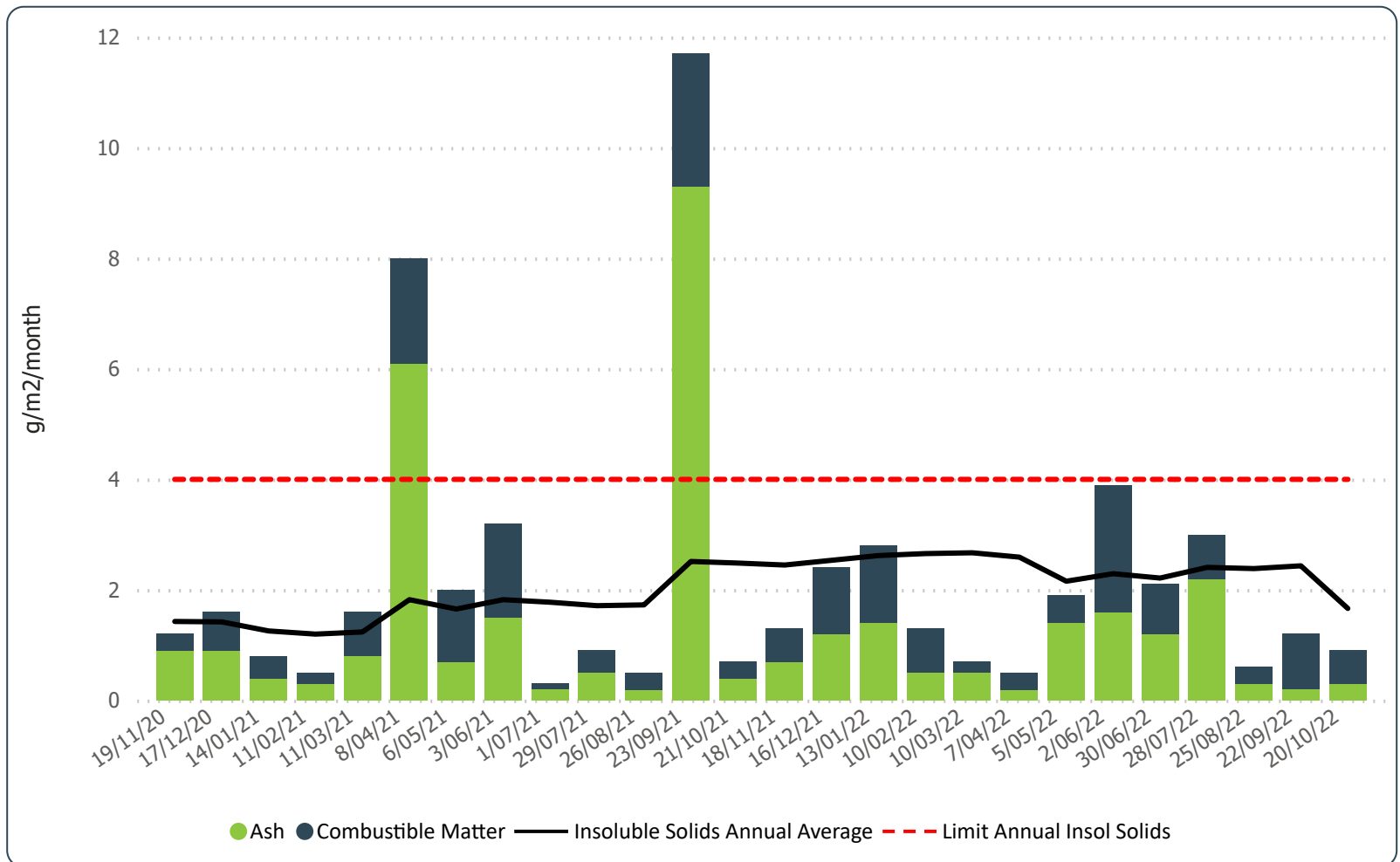
Insoluble Solids Annual Average



Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
18/11/21	Full, insects, vegetation, algae	16/12/21	8.7	3.9	5.8	2.9	114
16/12/21	Minor insects, minor algae	13/01/22	3.5	3.9	1.5	2.0	47
13/01/22	Minor insects, algae.	10/02/22	2.5	3.7	1.8	0.7	102
10/02/22	Full, Insects	10/03/22	2.2	3.8	0.7	1.5	116
10/03/22	Full, minor insects	7/04/22	1.9	3.7	0.9	1.0	116
7/04/22	Full, minor insects	5/05/22	1.8	3.6	1.0	0.8	114
5/05/22	Full, minor insects	2/06/22	2.1	3.6	1.2	0.9	116
2/06/22	Spider	30/06/22	1.2	3.6	0.7	0.5	62
30/06/22	Full. Minor sand.	28/07/22	2.1	3.4	1.1	1.0	115
28/07/22	Full, minor sand, minor insects, minor algae.	25/08/22	6.7	3.8	4.4	2.3	116
25/08/22	Full, insects, algae	22/09/22	12.8	4.4	9.3	3.5	115
22/09/22	Minor vegetation, minor sand.	20/10/22	3.9	4.2	2.5	1.4	115

1.8

Insoluble Solids Annual Average

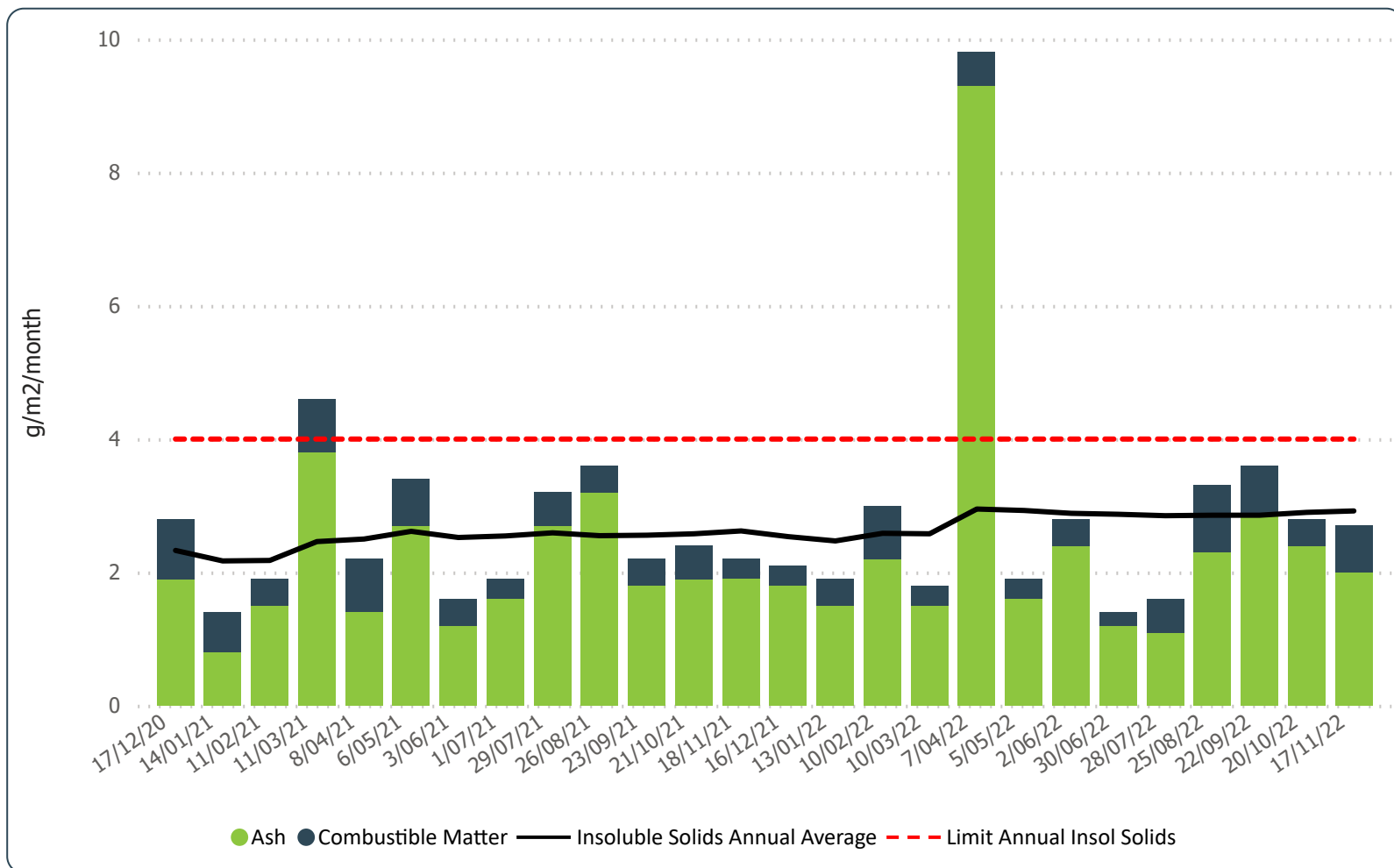


Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
18/11/21	Algae	16/12/21	2.4	2.5	1.2	1.2	111
16/12/21	Minor algae	13/01/22	2.8	2.6	1.4	1.4	59
13/01/22		10/02/22	1.3	2.7	0.5	0.8	103
10/02/22	Full	10/03/22	0.7	2.7	0.5	0.2	115
10/03/22	Full	7/04/22	0.5	2.6	0.2	0.3	116
7/04/22	Full	5/05/22	1.9	2.2	1.4	0.5	116
5/05/22	Full, bird droppings, algae	2/06/22	3.9	2.3	1.6	2.3	115
2/06/22	Bird droppings in funnel, Algae.	30/06/22	2.1	2.2	1.2	0.9	62
30/06/22	Full. Minor sand.	28/07/22	3.0	2.4	2.2	0.8	116
28/07/22	Full.	25/08/22	0.6	2.4	0.3	0.3	115
25/08/22	Minor insects	22/09/22	1.2	2.4	0.2	1.0	104
22/09/22	Minor vegetation.	20/10/22	0.9	1.7	0.3	0.6	106



3.0

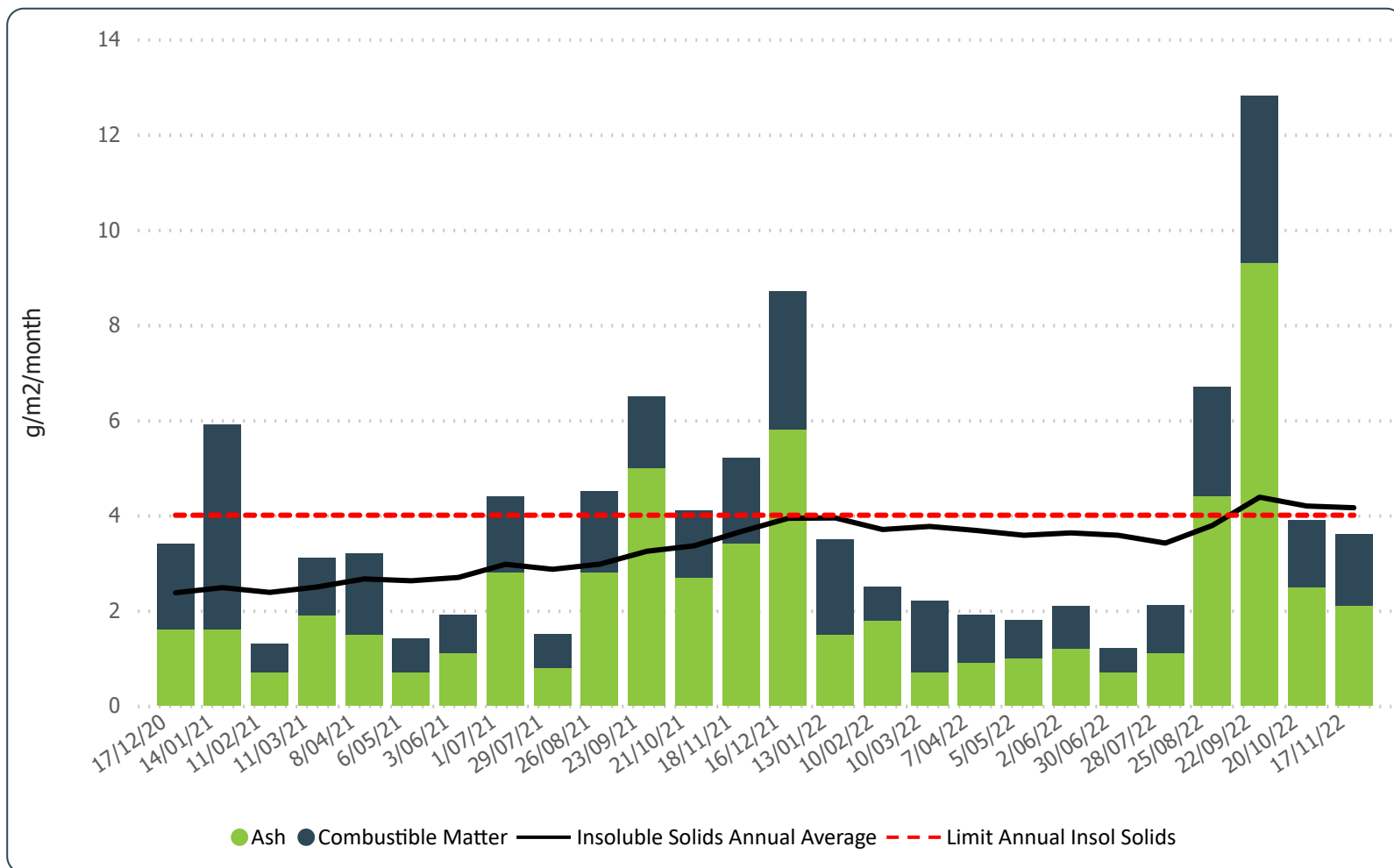
Insoluble Solids Annual Average



Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
16/12/21		13/01/22	1.9	2.5	1.5	0.4	49
13/01/22		10/02/22	3.0	2.6	2.2	0.8	101
10/02/22	Full, minor algae, minor sand	10/03/22	1.8	2.6	1.5	0.3	116
10/03/22	Full, sand	7/04/22	9.8	3.0	9.3	0.5	115
7/04/22	Full, minor dusts	5/05/22	1.9	2.9	1.6	0.3	116
5/05/22	Full, minor insects, algae, dust	2/06/22	2.8	2.9	2.4	0.4	115
2/06/22	minor sand	30/06/22	1.4	2.9	1.2	0.2	58
30/06/22	Full	28/07/22	1.6	2.9	1.1	0.5	115
28/07/22	Full, minor sand.	25/08/22	3.3	2.9	2.3	1.0	110
25/08/22	Minor insects	22/09/22	3.6	2.9	2.9	0.7	100
22/09/22		20/10/22	2.8	2.9	2.4	0.4	110
20/10/22		17/11/22	2.7	2.9	2.0	0.7	73

4.1

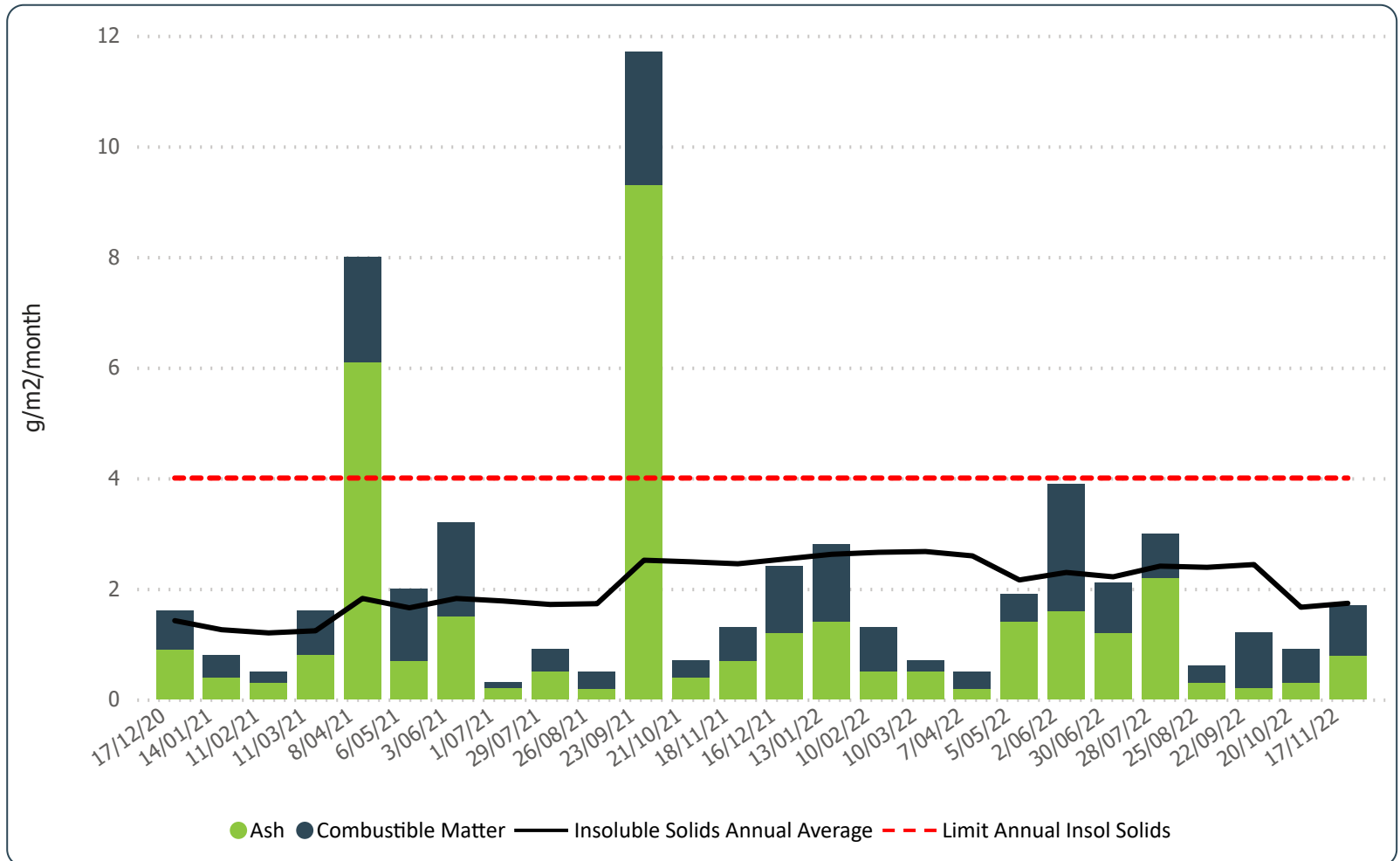
Insoluble Solids Annual Average



Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
16/12/21	Minor insects, minor algae	13/01/22	3.5	3.9	1.5	2.0	47
13/01/22	Minor insects, algae.	10/02/22	2.5	3.7	1.8	0.7	102
10/02/22	Full, Insects	10/03/22	2.2	3.8	0.7	1.5	116
10/03/22	Full, minor insects	7/04/22	1.9	3.7	0.9	1.0	116
7/04/22	Full, minor insects	5/05/22	1.8	3.6	1.0	0.8	114
5/05/22	Full, minor insects	2/06/22	2.1	3.6	1.2	0.9	116
2/06/22	Spider	30/06/22	1.2	3.6	0.7	0.5	62
30/06/22	Full. Minor sand.	28/07/22	2.1	3.4	1.1	1.0	115
28/07/22	Full, minor sand, minor insects, minor algae.	25/08/22	6.7	3.8	4.4	2.3	116
25/08/22	Full, insects, algae	22/09/22	12.8	4.4	9.3	3.5	115
22/09/22	Minor vegetation, minor sand.	20/10/22	3.9	4.2	2.5	1.4	115
20/10/22	Insects, algae.	17/11/22	3.6	4.2	2.1	1.5	82

1.8

Insoluble Solids Annual Average

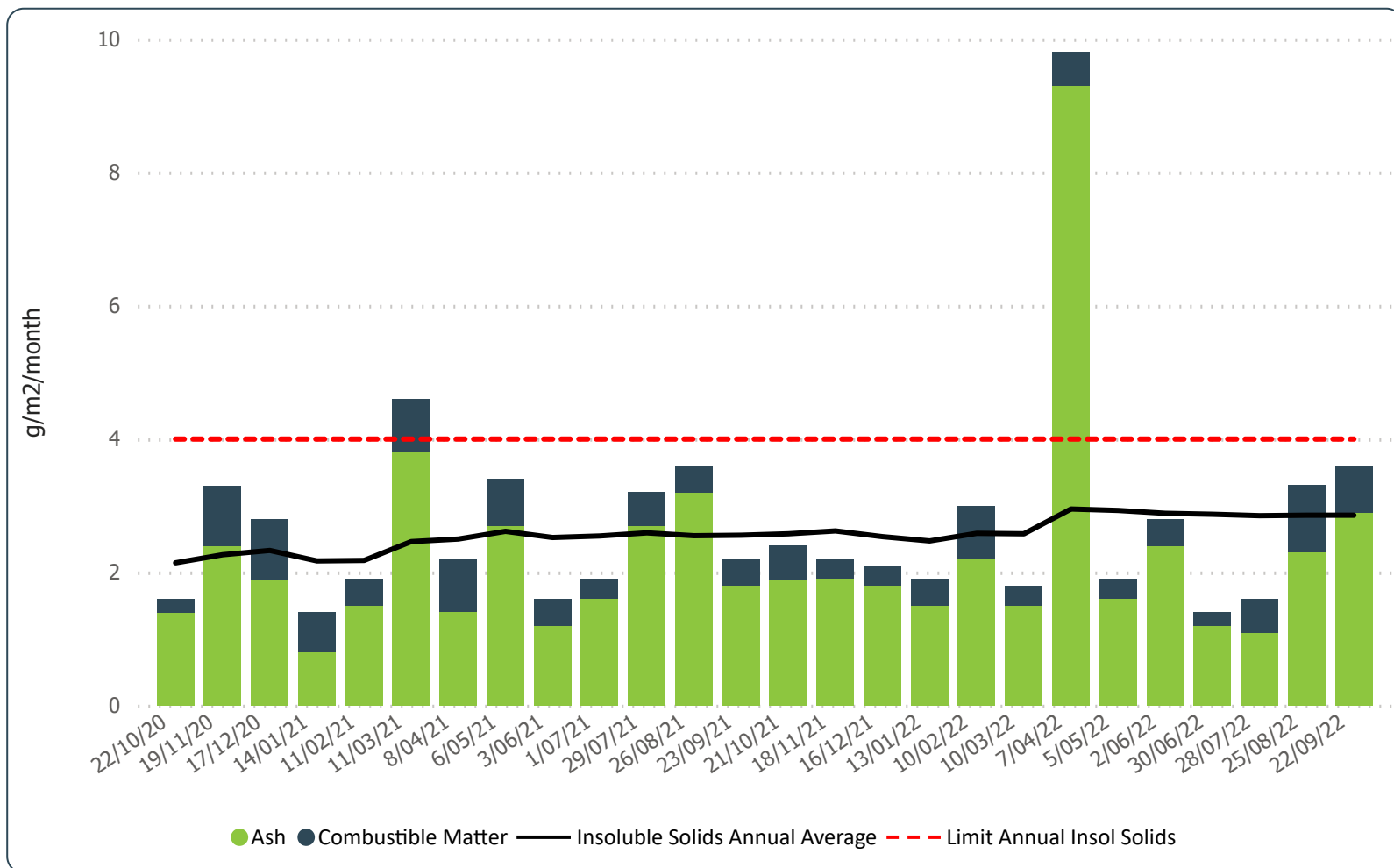


Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
16/12/21	Minor algae	13/01/22	2.8	2.6	1.4	1.4	59
13/01/22		10/02/22	1.3	2.7	0.5	0.8	103
10/02/22	Full	10/03/22	0.7	2.7	0.5	0.2	115
10/03/22	Full	7/04/22	0.5	2.6	0.2	0.3	116
7/04/22	Full	5/05/22	1.9	2.2	1.4	0.5	116
5/05/22	Full, bird droppings, algae	2/06/22	3.9	2.3	1.6	2.3	115
2/06/22	Bird droppings in funnel, Algae.	30/06/22	2.1	2.2	1.2	0.9	62
30/06/22	Full. Minor sand.	28/07/22	3.0	2.4	2.2	0.8	116
28/07/22	Full.	25/08/22	0.6	2.4	0.3	0.3	115
25/08/22	Minor insects	22/09/22	1.2	2.4	0.2	1.0	104
22/09/22	Minor vegetation.	20/10/22	0.9	1.7	0.3	0.6	106
20/10/22	Minor isnects.	17/11/22	1.7	1.7	0.8	0.9	81



3.0

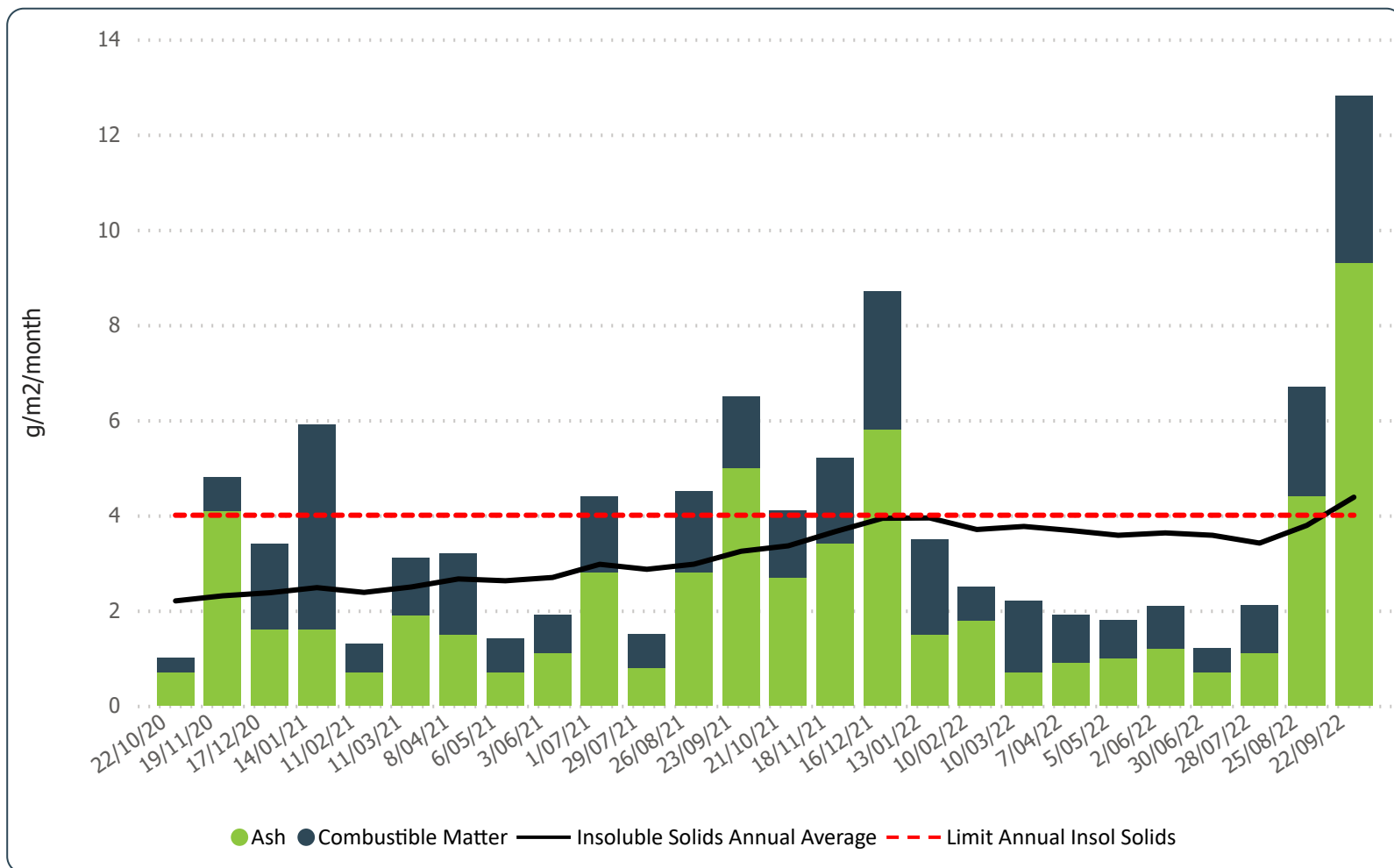
Insoluble Solids Annual Average



Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
21/10/21	minor sand	18/11/21	2.2	2.6	1.9	0.3	103
18/11/21	Bird droppings, algae	16/12/21	2.1	2.5	1.8	0.3	112
16/12/21		13/01/22	1.9	2.5	1.5	0.4	49
13/01/22		10/02/22	3.0	2.6	2.2	0.8	101
10/02/22	Full, minor algae, minor sand	10/03/22	1.8	2.6	1.5	0.3	116
10/03/22	Full, sand	7/04/22	9.8	3.0	9.3	0.5	115
7/04/22	Full, minor dusts	5/05/22	1.9	2.9	1.6	0.3	116
5/05/22	Full, minor insects, algae, dust	2/06/22	2.8	2.9	2.4	0.4	115
2/06/22	minor sand	30/06/22	1.4	2.9	1.2	0.2	58
30/06/22	Full	28/07/22	1.6	2.9	1.1	0.5	115
28/07/22	Full, minor sand.	25/08/22	3.3	2.9	2.3	1.0	110
25/08/22	Minor insects	22/09/22	3.6	2.9	2.9	0.7	100

4.2

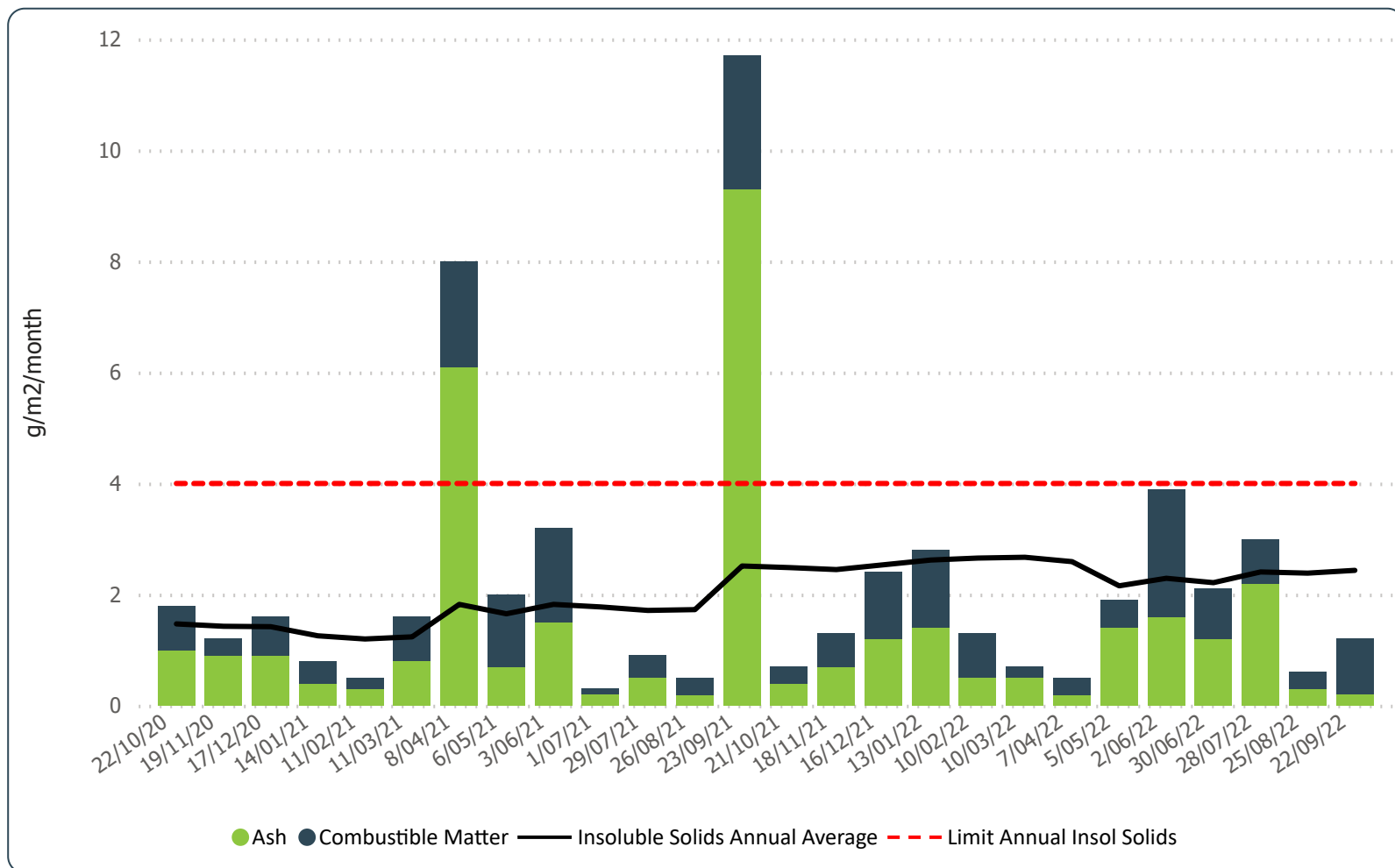
Insoluble Solids Annual Average



Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
21/10/21	Insects, algae, minor sand, full	18/11/21	5.2	3.7	3.4	1.8	116
18/11/21	Full, insects, vegetation, algae	16/12/21	8.7	3.9	5.8	2.9	114
16/12/21	Minor insects, minor algae	13/01/22	3.5	3.9	1.5	2.0	47
13/01/22	Minor insects, algae.	10/02/22	2.5	3.7	1.8	0.7	102
10/02/22	Full, Insects	10/03/22	2.2	3.8	0.7	1.5	116
10/03/22	Full, minor insects	7/04/22	1.9	3.7	0.9	1.0	116
7/04/22	Full, minor insects	5/05/22	1.8	3.6	1.0	0.8	114
5/05/22	Full, minor insects	2/06/22	2.1	3.6	1.2	0.9	116
2/06/22	Spider	30/06/22	1.2	3.6	0.7	0.5	62
30/06/22	Full. Minor sand.	28/07/22	2.1	3.4	1.1	1.0	115
28/07/22	Full, minor sand, minor insects, minor algae.	25/08/22	6.7	3.8	4.4	2.3	116
25/08/22	Full, insects, algae	22/09/22	12.8	4.4	9.3	3.5	115

1.8

Insoluble Solids Annual Average



Date On	Sampling Comments	Date Sampled	Insoluble Solids	Insoluble Solids Annual Average g/m2/month	Ash	Combustible Matter	Calculated Rain
21/10/21	Minor insects, algae	18/11/21	1.3	2.5	0.7	0.6	104
18/11/21	Algae	16/12/21	2.4	2.5	1.2	1.2	111
16/12/21	Minor algae	13/01/22	2.8	2.6	1.4	1.4	59
13/01/22		10/02/22	1.3	2.7	0.5	0.8	103
10/02/22	Full	10/03/22	0.7	2.7	0.5	0.2	115
10/03/22	Full	7/04/22	0.5	2.6	0.2	0.3	116
7/04/22	Full	5/05/22	1.9	2.2	1.4	0.5	116
5/05/22	Full, bird droppings, algae	2/06/22	3.9	2.3	1.6	2.3	115
2/06/22	Bird droppings in funnel, Algae.	30/06/22	2.1	2.2	1.2	0.9	62
30/06/22	Full. Minor sand.	28/07/22	3.0	2.4	2.2	0.8	116
28/07/22	Full.	25/08/22	0.6	2.4	0.3	0.3	115
25/08/22	Minor insects	22/09/22	1.2	2.4	0.2	1.0	104

APPENDIX C

Traffic Movements and Production Summary

Date	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	Truck Movements
4/01/2022	2		1	1	2	2	1	1	1	2		13
5/01/2022	1	1			1	2		2	2			9
6/01/2022	2					2	2	2	2	1		11
7/01/2022	1	1	2	1	4	2	1	2	2	1		17
8/01/2022		3		1								4
10/01/2022		1		1	2	2	3	4	4	1		18
11/01/2022	1	1			1	4	4	2	2	1		16
12/01/2022	2	1	1	1	4	2	3	4	4	2		24
13/01/2022		1	1	1	2	4	2	2	3	2	1	19
14/01/2022	2		1	2	1	5	2	3	4	2		22
15/01/2022		2	1	3	2							8
17/01/2022	3		1	1	4	2	5	4		3		23
18/01/2022	1	1	1	2	2	2	4	3	1	2		19
19/01/2022		1	1	1	3	3	1	4	2	1		17
20/01/2022					3	2	1	6	4	1		17
21/01/2022	2		1	2	1	2	1	3	2	6		20
22/01/2022			3	3								6
24/01/2022	1	2	2	1		5	6	2	3	2		24
25/01/2022	2	1	1		3	2		3	5	4		21
27/01/2022	2	1	4		2	2	6	4	5	2		28
28/01/2022		1	2		1	3	3	5	4	2		21
29/01/2022		2	2	1	1							6
31/01/2022		2			2	5	3	4	2	2		20
1/02/2022	1	2	1	2	2	1	8	4	3	1		25
2/02/2022	1		1	1	4	2	5	1	2	2		19
3/02/2022	1	1	1		3	4	4	3	1			18
4/02/2022	2	2	1	1		4	5	3	3	2		23
5/02/2022			1									1
7/02/2022		1	1		2	3	4	4	3	2		20
8/02/2022		1		1	2	1	1	8	2	2		18
9/02/2022	1	3	2		1	4	1	3	7	3		25
10/02/2022		1		3	5	7	4	2	1	2		25
11/02/2022			4	2	4	3	3	5	3	1		25
12/02/2022		1	2	1								4
14/02/2022	1	2	1	1	1	6	5	7	4	2		30
15/02/2022		4	3	2	2	4	1	4	5	2		27
16/02/2022	1	3	1	1	2	2	5	8	2	4		29
17/02/2022	1		1	2	2	3	3	6	5	3		26
18/02/2022	3	1	2	4	1	1	4	2	5	7		30
19/02/2022			1	2								3
21/02/2022	2	3			3	4	2	7	2	1		24
22/02/2022	1	2	2			2	2	4	6	4		23
23/02/2022		1		1	3	5	3	1	3	3		20
24/02/2022	2	2		2	1	2	2	1	1	2		15
25/02/2022		1	3	1	1	6		2	5	3		22
26/02/2022				1								1
28/02/2022	2	2	2	1	1	3	1	4	3	2		21
1/03/2022	1	1	1	1	2	4	2	2	1	1		16
2/03/2022			2	1	3			1	1	1		9
3/03/2022		2	1		1	1	1	2	1	1		10
4/03/2022	2	1	1		1		1		2			8
5/03/2022				1								1
7/03/2022	3		2	2	2	3	2		1			15
8/03/2022	2	1	1	1	2	2	1		1	1		12
9/03/2022	4		2	1	2	1		2	1	3		16
10/03/2022	3	2	1		2	1	2	3	3	2		19
11/03/2022	2	1	2	1	3	3	3	3	3	4		25
12/03/2022			1	2								3
14/03/2022		3	1	1	2	3	2	3	7	4		26
15/03/2022	2	1	1	3	1	4		4	4	4		24
16/03/2022	1	2		1		4	1	4	2	8	1	24
17/03/2022			1			1	4	6	4	5	1	22
18/03/2022	1	2	3		2	4	3	5	5	5		30
19/03/2022		1	1									2
21/03/2022	1	2		1	1	2	3	5	6	2		23
22/03/2022	3	2	2		1	1	5	3	6			23
23/03/2022	2	2		1			2	5	7	1		20
24/03/2022		1		2	1	2	7	3		2		18
25/03/2022			3		2			4	6			15
26/03/2022		1		1								2

Date	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	Truck Movements
28/03/2022	2	1	2	1	2	3	2	2	2	3		20
29/03/2022	3	2	1	1	1	2	2	1	4	2		19
30/03/2022	1	2	1	2	4	1	2	3	2			18
31/03/2022	2	3	4	1	3	1	2	1	2	4		23
1/04/2022	1	1		1	3	3	2	1	4	1		17
2/04/2022		1		3								4
4/04/2022	1	2	2			1	4	5	6	3		24
5/04/2022	2	2	2		3	1	2	4	6	4		26
6/04/2022	2	2			4		2	1	5	3		19
7/04/2022	3	2		1	1	2	4	5	2	2		22
8/04/2022	1	2	1	2	1	2	1	2	3	4		19
9/04/2022			1									1
11/04/2022	2	1	1	1		2	1	4	5	4		21
12/04/2022	1		4			3	3	1	5	5		22
13/04/2022	1			1	3	1	2	6	2	3		19
14/04/2022	1	2	1	3			3	2	4	3		19
16/04/2022		1										1
19/04/2022		1	3		1	2	3	4	2	5		21
20/04/2022				1	1		1	4	4	3		14
21/04/2022	3		1	3	2	2	1	3	3	3		21
22/04/2022	1	1			3	2		3	2	5		19
23/04/2022		2	2	3								7
26/04/2022	3	2			1		2	4	7	2		21
27/04/2022	1		1	1	1	2	3	1	5	4		19
28/04/2022			1	2	1	3		4	5	3		19
29/04/2022	4	2	1	3	3	3		5	3	3		27
30/04/2022		1	3	2								6
2/05/2022	1	3	2	2	1	4	3	2	4	5		27
3/05/2022		3	1	1	2	1	1	5	4	6		24
4/05/2022	3	2	1		3	3	2	6	4	3		27
5/05/2022	3	2	1	3		2	4	5	4	5		29
6/05/2022		2	1	3	1	2	5	2	4	3		23
7/05/2022		1	4	3								8
9/05/2022	2	1	3	2	2	2	2	2	3	7		26
10/05/2022	1		1	1	2	2	3	6	5	1		22
11/05/2022	3	1	2		5	1	5	5	3	1		26
12/05/2022				1		3	2	5	2	2		15
13/05/2022	1	2	3	1	2	3	1	2	2		1	18
14/05/2022		2	1	2	1							6
16/05/2022		1	3	1	4		3	2	3	2		19
17/05/2022	1	2		2	3	3		3	5	7		26
18/05/2022	2	1	2	1	1	2	2	3	5	4		23
19/05/2022		2			3	1		4	2	6		18
20/05/2022	2		1	2	2	3	1	3	2	4		20
21/05/2022			1	2								3
23/05/2022	1	1		2	1	2	4	3	3			17
24/05/2022	1				2	2	2	4	1	4		16
25/05/2022		5	1	2	1	1	1	4	6	1		22
26/05/2022	1		2	2		1	1	3	5	6		21
27/05/2022	1	1	1	1	1	2	1	3	5	3		19
28/05/2022		1	1	3	1							6
30/05/2022		3	1	1	1	4	3	2	7	2		24
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4/06/2022		3	1	1	4							9
6/06/2022		1		1	1	1	1	6	4	6		21
7/06/2022	2		1			1	1	2	4	7		18
8/06/2022	1	3	1	2	1	2	3	5	5	4		27
9/06/2022	1	2	1		2	1	4	4	3	4		22
10/06/2022			1	4	1	3	2	3	5	2		21
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20/06/2022	1	2	2	2	2	3	4	2	4	5		27
21/06/2022	2		1	2	1		1	3	7	5	2	24

Date	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	Truck Movements
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29/06/2022			1		2	3	2	5	2	6		21
30/06/2022	1	2			3	2	1	2	4	7		22
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8/09/2022	3	2		3	3	1	2	4	6	1		25
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Date	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	Truck Movements
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17/09/2022		2										2
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24/09/2022		3	1	2								6
26/09/2022	1	2		1		4	3	4	5	6		26
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5/10/2022	1	3		2	1	1	1	3	6	2		20
6/10/2022	3			1	2	3	2	2	4	3		21
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8/10/2022		2	1	2								5
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15/10/2022		2	1	1								4
17/10/2022	2	2	3	1	1		4	4	3			20
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19/10/2022			2			1	1	7	5	4		20
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25/10/2022		1	1	1		1	2	3	3	1		13
26/10/2022	1	3	1		3	2	3	3	2	4	1	23
27/10/2022	1	1	1	1	4		2	6	7	2		25
28/10/2022	1	1		2	4	3	3	2	3	7		26
29/10/2022		1	3	1								5
31/10/2022		3	1	3	1	4	1	3	6	1		23
1/11/2022	1	2	2	2		1	3	3	4	2		20
2/11/2022	2	3	1	2	4	1	1	4	3	3		24
3/11/2022	1	1	1	1	1	1	3	2	5	4		20
4/11/2022	1		2	3	1	1	1	3	4	1		17
5/11/2022			3	1								4
7/11/2022	2	1	1		1	2	3	4	5	1	1	21
8/11/2022		2	2			1	1	2	3	6		17
9/11/2022	2	3	1	2			3	4	3	7		25
10/11/2022	3		3		1	1	1	2	3	6		20
11/11/2022	3		2	1	3	3	1	7	2	1		23
12/11/2022			1	2								3
14/11/2022	2	1	2	1	1		1	2	8	4		22
15/11/2022	1	1	3		2	3	4	5	5	4		28
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17/11/2022	1		1	2	3		4	3	4	3		21
18/11/2022	3		1	2	1	1	2	5	2	5		22
19/11/2022			2	1								3
21/11/2022	1	3	2	2	2	1	2	3	6	3		25
22/11/2022	1	2		4	1	1		5	7	7		28
23/11/2022		1	1	1	1	4	3	2	5	4		22
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25/11/2022			1	1	1	5	2	2	4	3		19
26/11/2022		1	3	1								5
28/11/2022	2	1	4	2	2	2	2	4	4	3		26
29/11/2022	1		2	3	1	3	3	3	6	2		24
30/11/2022	2	1		2	2		3	5	4	4		23
1/12/2022	1	1	2		5	1		5	3	5		23
2/12/2022	2	2	1	1	1	1	1	5	3	3		20
3/12/2022		2	2	2								6

Date	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	Truck Movements
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7/12/2022	3	1	2	1	1	4	2	7	6	2		29
8/12/2022	2		1		3	2	3	2	8	3		24
9/12/2022	2	1	1	1	1	3	4	4	6	5		28
10/12/2022		2	3	3	1							9
12/12/2022		2		1	1		4	6	3	4		21
13/12/2022	2	2	2	1	1	1		3	5	2		20
14/12/2022	3	4	1	1	3	2	1	2	4	6		27
15/12/2022			1	4	1	1	2	6	2	4		21
16/12/2022	2	1	1	2		3	4	3	1	1		18
17/12/2022		1	3	2							23	6
19/12/2022	3	1	2	1		3	3	3	7	2		25
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21/12/2022	2	1	3	1	2	2	3	1	4	4		23
22/12/2022	4	4	2		2	2	4	7	1			26
23/12/2022	1	3	1									5
Grand Total	361	404	374	373	420	528	570	857	918	758	23	5586

APPENDIX D

Heritage Letter (16 August 2022)

MURROOMA



INCORPORATED

Tuesday 16th of August 2022

9 Vardon Road Fern Bay 2295 NSW

0421078695

0402827482

Murroomainc1@gmail.com

ABN: 97 807 719 484

Redisand Pty Ltd

Att: Grant Stevenson

RE: Cultural Heritage Report –Onsite Inspection

On Thursday 11th of August 2022, Murrooma Inc and Worimi LALC representatives- Bec Young and Jamie Merrick completed an Aboriginal site investigation to identify any cultural material exposed during vegetation clearing of the next stage and we examined all large eucalypts for cultural scars and root balls of these for cultural material as requested by Redisand as per CHMP.

We also completed a walk over of the site which has been cleared of vegetation and remediation has begun including investigation of the overburden where cultural material may be identified in the remnant soils.

This process is being completed to follow current plans in place and to ensure protection of local Aboriginal Sites and collection of cultural material for further education and reburial of Worimi Aboriginal Objects. This inspection was completed by site officers' walking in transects over the area.



Results:

No cultural material was identified onsite during vegetation clearing or within the remnant/overburden soils.

Recommendations:

All groups were satisfied with the opportunity to view the areas for cultural material. We have discussed ongoing and future proposed works with Grant at Redisand and management plans to ensure the protection of Worimi Aboriginal Cultural Heritage. Grant will contact our groups in the near future to discuss coming to view the overburden section and spoil pile size and if relevant in size we will complete another spoil inspection. It will be important that we get an opportunity to return to view the screens of this ridgeline we have investigated to ensure no cultural material is evident.

Yours Truly

Report completed by - Bec Young- Murrooma Sites Officer and Operations Manager- 0421078695

In agreement with:

Jamie Merrick- Worimi LALC Sites Officer

APPENDIX E

Pre-Clearance Survey (2022)



PRE-CLEARING SURVEY REPORT

FOR
STAGE TWO OF
REDISAND SAND QUARRY
AT
9 JANET PDE,
SALT ASH NSW 2318

Prepared by:

Firebird ecoSultants Pty Ltd

ABN – 16 105 985 993

PO Box 354

Newcastle NSW 2300

Mob: 0414 465 990

Ph: 02 4910 3939

Fax: 02 4929 2727

Email: sarah@firebirdeco.com.au



Site Details	9 Janet Pde, Salt Ash NSW 2318
Prepared by	Sarah Jones B.Env.Sc., G.Dip.DBPA (Design in Bushfire Prone Areas) Firebird ecoSultants Pty Ltd ABN – 16 105 985 993 PO Box 354, Newcastle NSW 2300 M: 0414 465 990 Email: sarah@firebirdeco.com.au T: 02 4910 3939 Fax: 02 4929 2727
Prepared for	ATB Morton Pty Ltd
Reference No.	Salt Ash – ATB Morton Pty Ltd
Document Status & Date	22 Nov 2022

Executive Summary

A pre-clearance survey for Stage Two of the Salt Ash Sand Quarry Project was undertaken between 27/07/2022 to the 3/08/2022 to address the Statement of Commitments, specifically Point 2 in Table 5.1 2 Pre-Clearing Surveys in Appendix 3 of the Project Approval and Section 3.3.3 of the approved Landscape Management Plan (Orogen, 2011) and the Landscape Management Plan / Rehabilitation Management Plan (SLR, July 2017).

The pre-clearance survey was conducted to identify:

- any nests for threatened species;
- evidence of nesting or roosting of Powerful Owls and Masked Owls;
- roosting trees of microbats;
- evidence of Koala occupation;
- roosting / nesting sites of Squirrel Gliders and Brush-tailed Phascogale; and
- any signs of threatened fauna species.

The purpose of these surveys was to ensure that any threatened species recorded within the site was properly monitored and clearance obtained prior to commencement of clearing in identified habitat / nesting sites.

One threatened fauna species was identified within the site during the pre-clearing surveys that included searches for threatened fauna species or signs of these species, Elliott trapping program, Stag-watching and Anabat Surveys.

In conclusion, targeted surveys for known and potential threatened fauna species have been undertaken in accordance with the approval (07_0094) for the sand Quarry and Section 3.3.3 of the Landscape Management Plan (Orogen, 2011) within the approved plant area. One threatened fauna species was detected within these targeted surveys and as such an experienced ecologist is to be present during removal of any hollow bearing tree within this area as per Section 3.4 of the approved Landscape Management Plan (Orogen, 2011).



Sarah Jones
Ecologist / Bushfire Planner
B.Env.Sc., G.Dip.DBPA (Design for Bushfire Prone Areas)



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I INTRODUCTION

1.1 Background

A project approval was granted on 28 October 2010 for Salt Ash Sand Project (Project Application 07_0094). Refer to Figure 1-1 for site locality. These Pre-Clearing surveys have been undertaken for the proposed removal of vegetation within the approved plant area (part of Stage 2) in order to satisfy the Statement of Commitments specifically point 2 in Table 5.1 2 “Pre-Clearing Surveys” in Appendix 3 of the project approval and in accordance with the approved Landscape Management Plan/Rehabilitation Management Plan (SLR, 2017). Refer to Appendix 1 for Landscape Management Plan/Rehabilitation Management.

The targeted surveys included searches for threatened fauna species or signs of these species, Elliott trapping program, Stag-watching and Anabat Surveys. This report details the results and the methods used in the surveys undertaken for the plant area and is to be submitted to the Office of Environment and Heritage (OEH) prior to vegetation clearing operations.

1.2 Site Particulars

Locality:	9 Janet Parade, Salt Ash NSW 2318
LGA:	Port Stephens Shire Council (PSC)
Title(s):	Lot 4042 DP 1090633 and Lot 632 DP 609506

Refer to Figure 1-1 for location of the site.





2 DETAILED SURVEY METHODS

Various surveys were undertaken over the site from the 27/07/2022 to the 3/08/2022. These surveys included searches for Threatened fauna species or signs of these species, an Elliott trapping program, Spotlight, Stag watching and Anabat Surveys. Survey Site, Trapline, Stagwatch and anabat locations are depicted on Figure 2-1.

The purpose of these surveys was to ensure that any threatened species previously recorded within the site was properly monitored and clearance obtained prior to commencement of clearing in identified habitat / nesting sites.

2.1 Terrestrial & Arboreal Elliott Trapping

Trapping for terrestrial mammals was undertaken using Type A (8x 10x 33 centimetre) Elliott traps. In most cases, attempts were made to place traps on the side of habitat features (logs, tree bases) to minimise the overheating of captured animals. All traps were baited with a standard mixture consisting of rolled oats and peanut butter.

Arboreal trapping was used to target threatened fauna including Squirrel Glider and the Brush Tailed Phascogale Type A traps were using along each trap line. Traps were mounted on wooden platforms approximately 2 metres above the ground. In general, were possible large hollow bearing trees that represented potential den locations or trees adjoining habitat trees were selected. Traps were baited with the standard peanut butter mixture and the trunk of each tree was sprayed with a 50:50 honey/water solution to act as an attractant. Traps were checked daily and the honey mixture was re-applied to trees throughout the survey period.

Table 2-1: Date, Location & Quantity of Arboreal Tree Traps used at each Trapline

Site	Date	Arboreal Traps
Trapline 1	27 th July 2022 to the 3 rd of August 2022	7 Nights
Total Trap Nights		164



Figure 2-1: Survey Locations

2.2 Stag Watch Surveys

Stag watch surveys were undertaken in areas that represented potential den and roost sites for hollow-dependent fauna. Each stag watch location was surveyed for minimum of 30 minutes prior to the dusk period (1920 hours) and a minimum 45 minutes after. Constant supervision was applied to all potential hollows in the immediate area. A total of 6 hollow-bearing trees were surveyed using this method. A 50-watt spotlight was used to illuminate areas when animals were suspected of being within existing hollows. Refer to Table 2-2 and Figure 2-1 for locations.

The purpose of this stag survey was to identify potential Microchiropteran bat roost trees and potential den trees for Squirrel Gliders and Brush-tailed Phascogales, as the Squirrel Glider and Microchiropteran bat species had previously been recorded within the study area and therefore important to monitor these species prior to vegetation clearing works.

Table 2-2: Stag Watch Surveys for Hollow Dependent Fauna

Stag Watch Location	Time	Species Detected.
S1	1830 - 2030	Nothing observed coming out of hollows, however, microbats recorded by the anabat
S2	1830 - 2030	Nothing observed coming out of hollows, however, microbats recorded by the anabat
S3	1830 - 2030	Nothing observed coming out of hollows, however, microbats recorded by the anabat
S4	1830 - 2030	Nothing observed coming out of hollows, however, microbats recorded by the anabat

2.3 Ultrasonic Bat Detection

Ultrasonic (Anabat SD1 – Titley Electronics) Microchiropteran bat surveys were conducted at the three stag watch locations (refer to Figure 2-2). Detection was undertaken a minimum 30min prior to dusk and for an hour after dusk. Over 8 hrs were spent using this method and all recordings were sent to a qualified analyst (Anna McConville) for analysis (refer to Appendix B for Bat Analysis Report). The purpose of this was to identify potential Microchiropteran bat roost trees.



Table 2-3: Date, Location & Survey Effort of Ultrasonic Bat Detection at each Trapline

Site	Survey Effort
S1	2 hr
S2	2 hr
S3	2 hr
S4	2 hr
Total Survey Effort	8 hrs

2.4 Other Targeted Threatened Species Surveys

Opportunistic searches were undertaken over the site to locate evidence of threatened fauna species. This method is particularly advantageous for detecting fauna not recorded by other sampling methods. These searches included:

- Searches for nests of threatened raptors;
- Searches for whitewash or other signs of roosting or nesting by Powerful Owls and Masked Owls; and
- Scat searches and visual inspection for recent Koala occupation of all trees proposed for felling.

3 SURVEY RESULTS

3.1 Weather Conditions

Table 3-1: Details the Temperature During the Survey Period from 27/07/2022 – 3/08/2022.

Date	Minimum Temperature °C	Maximum Temperature °C
Wednesday 27/07/2022	8.5	17.6
Thursday 28/07/2022	6.6	18.3
Friday 29/07/2022	8.2	16.4
Saturday 30/07/2022	5.9	16.6
Sunday 31/07/2022	3.4	18.8
Monday 1/08/2022	7.8	19.1
Tuesday 2/08/2022	4.9	19.4
Wednesday 3/08/2022	6.9	22.3

3.2 Results of Targeted Surveys for Threatened Species

3.2.1 Ground & Arboreal Elliott Trapping

No threatened fauna species were recorded during the targeted Elliott trapping survey. Squirrel Gliders was previously trapped within the Study Area in the Broad-leaved Swamp Mahogany Forest. The Squirrel Glider was recorded foraging within the site during the spotlighting survey.

3.2.2 Stag Watch Surveys

No threatened fauna species were detected exiting any of the 8 hollow bearing trees surveyed.

3.2.3 Ultrasonic Bat Detection

No microbats were observed exiting any of the hollows of the habitat trees surveyed. However, microbats were recorded during the anabat survey.



Species recorded confidently within the site include:

- o *Chalinolobus gouldii* (Gould's Wattled-bat)
- o *Chalinolobus morio* (Chocolate Wattled-bat)
- o *Miniopterus australis* (Little Bentwing-bat)

Additional bat species that are known to exist within the locality of the site, but could not be confidently identified to species (those classified as possible or as a species group), include:

- *Scotorepens orion* (Eastern Broad-nosed Bat)
- *Vespadelus vulturnus* (Little Forest Bat)
- *Mormopterus norfolkensis* (East Coast Free-tail Bat)
- *Mormopterus (Ozimops) ridei* (Ride's Free-tail Bat)
- *Nyctophilus sp.*

The Little Bent wing bat, Eastern Free-tailed Bat are listed as a Threatened species under the BC Act.

3.3 Other Targeted Threatened Fauna Species

The entire site was searched for evidence of usage for known and potential threatened fauna species, these surveys detected the following:

- No Koala scratches or scats were observed at any of the surveyed trees and no Koalas were observed during the 7-day period.
- No evidence of targeted threatened forest owls, including whitewash on trees or pellets under trees was detected.

Species recorded during the surveys included:

- One Common Brush-tailed Possum (*Trichosurus vulpecula*)
- Two Lace Monitor (*Varanus varius*)
- *Scotorepens orion* (Eastern Broad-nosed Bat)
- *Vespadelus vulturnus* (Little Forest Bat)
- *Mormopterus norfolkensis* (East Coast Free-tail Bat)
- *Mormopterus (Ozimops) ridei* (Ride's Free-tail Bat)
- *Nyctophilus sp.*
- *Chalinolobus gouldii* (Gould's Wattled-bat)
- *Chalinolobus morio* (Chocolate Wattled-bat)
- *Miniopterus australis* (Little Bentwing-bat)

The *Miniopterus australis* (Little Bentwing-bat) was detected onsite and is listed as threatened in New South Wales. Therefore, it is recommended that an experienced ecologist or wildlife carer be present during clearing of hollow bearing trees within the site, to assist any displaced or injured fauna species.



4 CONCLUSION & RECOMMENDATIONS

A pre-clearance survey of the proposed plant area of Salt Ash Sand Quarry Project was undertaken between 27th July 2022 to the 3rd August 2022 to address the Statement of Commitments, specifically Point 2 in Table 5.1 2 Pre-Clearing Surveys in Appendix 3 of the Project Approval and Section 3.3.3 of the approved Landscape Management Plan (Orogen, 2011).

The pre-clearance survey was conducted to identify:

- any nests for threatened species;
- evidence of nesting or roosting of Powerful Owls and Masked Owls;
- roosting trees of microbats;
- evidence of Koala occupation;
- roosting / nesting sites of Squirrel Gliders and Brush-tailed Phascogale; and
- any signs of threatened fauna species.

The purpose of these surveys was to ensure that any threatened species recorded within the site was properly monitored and clearance obtained prior to commencement of clearing in identified habitat / nesting sites.

No threatened fauna species or nesting / roosting sites for threatened species were identified within the site during the pre-clearing surveys that included searches for threatened fauna species or signs of these species, Elliott trapping program, Stag-watching and Anabat Surveys.

In conclusion, targeted surveys for known and potential threatened fauna species have been undertaken in accordance with the approval (07_0094) for the sand Quarry and Section 3.3.3 of the Landscape Management Plan (Orogen, 2011) within the approved plant area. No threatened species were identified during the survey period. however, it is recommended that an experienced ecologist or wildlife carer be present during clearing of hollow bearing trees within the site, to assist any displaced or injured fauna species as per Section 3.4 of the approved Landscape Management Plan (Orogen, 2011).

Sarah Jones
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APPENDIX A – Approved Landscape Management Plan/Rehabilitation Management (SLR, 2017)

Appendix G
Proposed Sand Extraction Quarry Salt Ash NSW
Landscape Management Plan/Rehabilitation Management Plan

Report Number 630.11213

July 2017

Version: 2017 Update

DOCUMENT CONTROL

Reference	Status	Date	Prepared
630.11213.00000	July 2017 Update	July 2017	Chris Jones (SLR) and ATB
630.11213.00000	March 2017 Update	March 2017	Chris Jones (SLR) and ATB
630.11213.00000	September2016 Update	October 2016	Chris Jones (SLR) and ATB
630.11213.00000	September2016 Update	September 2016	Chris Jones (SLR) and ATB
630.11213.00000	July 2016 Update	15 July 2016	Chris Jones (SLR) and ATB
630.11213.00000	July 2016 Update	15 July 2016	Tracey Ball (SLR) and ATB
630.11213.00000	April 2016 Update	April 2016	Tracey Ball (SLR) and ATB
630.11213.00000	December 2015 Update	December 2015	Christopher Jones (SLR) and ATB
Original Management Plan	Original Approved Document	July 2011	Orogen

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1 INTRODUCTION

1.1 Background

Orogen Pty Ltd completed the original management plan in July 2011. SLR Consulting Australia Pty Limited (SLR) completed a review of this Management Plan and other management plans following the Independent Environmental Audit in 2014.

1.2 Update Following Independent Environmental Audit

An Independent Environmental Audit was completed by SLR covering pre commencement of the operations and was submitted to the DP&E in November 2014. A letter was received by DP&E on 13 January 2015, stating DP&E were satisfied that the site generally met the requirements of Schedule 5 Condition 8 of the Project Approval.

All management plans for the Salt Ash Sand Quarry are required to be updated following the Independent Environmental Audit. The audit focussed on rehabilitation during the construction period only, but did make recommendations relating to the operational phase of the site. With construction only recently finishing there has been no rehabilitation at the time of the update to this management plan. There were several recommendations relating to rehabilitation and land management from the audit. These included:

- There should be additional detail regarding completion criteria and monitoring during the next review of the Rehabilitation Management Plan;
- The review should include relevant rehabilitation and closure aspects from the DRE Mining Operations Plan Guidelines (ESG3, September 2013); and
- The closure criteria section should be updated during the Landscape Management Plan.

The report was updated based on these recommendations. There were also updates to rehabilitation monitoring commitments and soil sampling recommendations.

1.3 Statutory Requirements

Conditions 23 – 25 detailed in Schedule 3 of the Project Approval require the preparation of a Landscape Management Plan (LMP) as follows:

Table 1 Statutory Requirements

Condition Number	Condition	Comment
Schedule 3 Condition 23 Landscape Management Plan	23. <i>The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Secretary. This plan must:</i>	This document. Original document prepared in consultation with council.
	a) <i>be prepared:</i> • <i>by suitably qualified person(s), approved by the Secretary; and</i> • <i>in consultation with Council;</i>	
	b) <i>be submitted to the Secretary for approval prior to commencing quarrying operations; and</i>	Original document approved. This updated document has been sent to Department of Planning and Environment (DP&E).
	c) <i>include:</i> • <i>a Rehabilitation Management Plan; and</i> • <i>a Long Term Management Strategy.</i>	Section 4 and 5
Schedule 3	24. <i>The Rehabilitation Management Plan must include:</i>	Section 4.2

Condition Number	Condition	Comment
Condition 24 Rehabilitation Management Plan	(a) the rehabilitation objectives for the site;	
	(b) a description of the measures that would be implemented to: - rehabilitate and stabilise the site; - minimise the removal of mature trees; and - manage the remnant vegetation and habitat on the site.	Section 4
	(c) detailed performance and completion criteria for the rehabilitation and stabilisation of the site;	Section 4.6
	(d) a detailed description of how the performance of the rehabilitation of the quarry would be monitored over time to achieve the stated objectives;	Section 4.5
	(e) a detailed description of what measures would be implemented to rehabilitate and manage the landscape of the site, including the procedures to be implemented for: - progressively rehabilitating and stabilising areas disturbed by quarrying; - implementing revegetation and regeneration within the disturbance areas; - protecting areas outside the disturbance areas, including groundwater dependent ecosystems; - vegetation clearing protocols, including a protocol for clearing any trees containing hollows and the relocation of hollows from felled trees; - managing impacts on fauna; - controlling terrestrial and aquatic weeds and pests; - controlling access; - bushfire management; and - reducing the visual impacts of the project;	Section 3 – biodiversity management Section 4 – rehabilitation management
	(f) a description of the potential risks to successful rehabilitation, and a description of the contingency measures that would be implemented to mitigate these risks; and	Section 4.10
	(g) details of who is responsible for monitoring, reviewing, and implementing the plan.	Section 4.11
Schedule Condition 25	3 The Long Term Management Strategy must:	Section 5
	a) define the objectives and criteria for quarry closure and post-extraction management;	
	b) investigate and/or describe options for the future use of the site;	Section 5.4
	c) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and	Section 5.5
	d) describe how the performance of these measures would be monitored over time.	Section 5.6
Schedule Condition 2	5 ENVIRONMENTAL MANAGEMENT Management Plan Requirements; The Proponent shall ensure that the Management Plans required under this approval are prepared in accordance with any relevant guidelines, and include:	No baseline rehabilitation data. Baseline ecological monitoring was undertaken for the EIS, with this to be used for seed selection.

Condition Number	Condition	Comment
	a) detailed baseline data;	
	b) a description of: - The relevant statutory requirements (including any relevant approval, licence or lease conditions); - Any relevant limits or performance measures/criteria; and - The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures	This Section
	c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria	This Section
	d) a program to monitor and report on the: - impacts and environmental performance of the project; and - effectiveness of any management measures (see (c) above)	Section 4.12
	e) a contingency plan to manage any unpredicted impacts and their consequences.	See Section 4.10
	f) a program to investigate and implement ways to improve the environmental performance of the project over time.	Covered in EMS Main document
	g) a protocol for managing and reporting any: - Incidents; - Complaints; - Non-compliances with statutory requirements; and - Exceedances of the impact assessment criteria and/or performance criteria; and	Covered in EMS Main document
	h) a protocol for periodic review of the plan.	To be reviewed every three years.

1.4 Description of the Operation

A brief summary description of the sand extraction operation is provided below.

Following vegetation removal and topsoil stripping and stockpiling, sand is to be extracted from the site in five (5) stages over an (approximate) 18 — 20 year period using conventional plant machinery. Quarried sand would be loaded onto trucks and delivered to a screening plant onsite to undergo screening and washing.

Groundwater (licenses have been obtained) is to be extracted for use as process washwater with process wastewater returned to the dune aquifer via infiltration. It is understood that the quarry would be excavated into the existing natural profile, with extraction boundaries battered towards the quarry pit with a 3H:1V slope. Boundary batters would be planted out with dune vegetation following staged extraction to assist in stabilisation and habitat restoration. The quarry pit would also be subject to staged rehabilitation with post mine hydrology and hydrochemistry governing quarry pit rehabilitation methodology.

2 ENVIRONMENTAL SETTING

2.1 Site Location

The sand extraction site is located approximately 9 km to the east of the Williamtown airport on the Stockton Sandbeds within the Port Stephens Council LGA on the lower North Coast of NSW. The site lies within the North Coast IBRA Bioregion (Thackway and Cresswell, 1995) and the NSW North Coast Botanical Subdivision of Anderson (1961).

2.2 Topography

The extraction area occurs on moderately undulating sand dunes with elevations generally ranging between 10 — 30 m AHD (local relief about 20 m), with two beach ridges (one ridge on site that rises to the south-west and one just offsite) separated by a relatively level sand plain (at 10 m AHD) in the south-eastern portion of the site.

The dunal southern half of the site grades into a relatively level, low lying floodplain in the northern portion of the site (local relief = 0 — 2 m).

2.3 Geology and Soils

The site is situated at the boundary of two Holocene-age depositional units. The uncleared (southern) portion of the site is located on a Holocene-age stabilised transgressive sand sheet composed of marine sand. The northern cleared portion of the site is located on an infilled Holocene-age saline swamp comprising organic mud, peat, clay, silt, marine sand and fluvial sand (Troedson and Hashimoto, 2008).

Soils on the transgressive dune depositional unit are comprised of deep (> 300 cm), well- drained, weakly developed Podzols of the 'Boyces Track' soil landscape group (Matthei, 1995). The sand is typified by clean, permeable, fine to coarse quartzose sand, 10m to 40 m thick (Coffey 2009). Soils formed on the swamp unit are comprised of deep (> 300 cm) very poorly drained, Humic Gleys of the 'Bobs Farm' soil landscape group (Matthei, 1995).

Given that the lower extraction limit (4m AHD) is above the standing water level, Coffey (2009) notes that there is a low likelihood of encountering Acid Sulphate Soils (ASS) during quarry activity.

2.4 Drainage and Groundwater

There are no defined watercourses on the site. Both the extraction area and northern floodplain are expected to drain (via infiltration to groundwater) northward to a series of canals near Janet Parade, ultimately emptying into Tiligerry Creek.

A review of the Geotechnical Study for the project carried out by Coffey (2009) indicated a standing water level in the range of 2 — 2.5 m AHD on the site. The final extraction landform of RL 4m AHD would therefore be about 1 — 2 metres above the water table.

2.5 Vegetation

The extraction area is dominated by a Smooth barked Apple (*Angophora costata*) – Coastal Blackbutt (*Eucalyptus pilularis*) Dry Sclerophyll Open Forest (Coastal Dune Forest). A small area of Paperbark (*Melaleuca quinquenervia*) – Swamp Mahogany (*Eucalyptus robusta*) Swamp Sclerophyll Forest was recorded in a low lying dune swale fringing the northern electricity easement at the middle and western lot boundary intersection.

3 BIODIVERSITY AND CLEARING MANAGEMENT

This section outlines the management of biodiversity at the site during the clearing process along with providing details of threatened species management. This section covers key components of Schedule 3 Condition 24 e) of the Project Approval.

3.1 Fauna Management

3.1.1 Nest Box Program

A total of two hundred and twelve (212) hollow bearing trees will require removal as part of the development. This equates to approximately 40 hollow bearing trees for each staged extraction. To help compensate for their loss, it is proposed to compensate for loss of hollows for each staged clearing event. Initially, suitably-sized compensatory nest boxes should be installed in suitable habitat at least 2—3 weeks prior to the commencement of staged clearing operations to ensure that no loss of hollow attributes occurs on site or in the immediate locality. Nest boxes shall be installed at a 1:1 ratio.

Nest boxes should have swivel mounts and be fitted with screw lids to prevent damage from brushtail possums. Nest boxes shall be placed in retained habitats onsite and in adjoining OEH Estate (subject to negotiations with local OEH estate management), onto host trees that do not already support hollows. Nest box height, orientation, timing of erection and maintenance would be as per re-erected hollows will be advised by an ecologist.

Nest box installation shall be supervised by a suitably experienced ecologist. Nest boxes shall be subject to 2-yearly maintenance for the life of the quarry and for 5 years beyond quarry closure by a suitably qualified and experienced fauna ecologist. Feral bees found to colonise the nest boxes shall be eradicated by a specialist pest contractor. Damaged nest boxes would be repaired (where possible) or replaced.

Following clearing operations, any hollows that are salvageable shall be re-erected onto suitable host trees within 12 weeks of clearing operations. Any hollows which are not suitable to be re-erected within the Project Approval area will be stockpiled and used in future rehabilitation.

3.1.2 Salvage and Relocation of Terrestrial Habitat Structures

It is proposed to relocate logs and other suitable ground debris salvaged from the staged clearing operations (including unsalvageable hollows) within retained habitats onsite and in adjoining OEH Estate (subject to negotiations with local OEH estate management). The provision of ground debris within retained habitats onsite would be expected to provide shelter and nesting habitat for small terrestrial mammals and additional foraging habitat for the Brush tailed Phascogale and Squirrel Glider.

A small number of cleared trees that support trunk hollows (> 30 cm diameter hollows) would, where possible, be removed into adjoining retained forested habitats (either on site or in adjoining OEH Estate) as these would provide suitable den sites for quolls.

All relocation works shall be supervised by a suitably experienced ecologist and shall be undertaken within 12 weeks from completion of staged clearing operations.

3.1.3 Pre Clearing Surveys

Where possible, each staged clearing activity will be timed so as to avoid the following breeding periods (defined as giving birth and raising young to dependence) for hollow dependant fauna:

- October – February (microbats); and
- June – August (large forest owls and microbats in torpor).

Arboreals such as the Squirrel Glider have been shown to breed essentially throughout the year and thus no timeframe is optimal to avoid their breeding.

If, however, restricting the clearing to these limited times is not found to be practical, then ecological pre-clearing surveys would be undertaken within two weeks prior to the commencement of the clearing. These surveys will target Threatened species known or potentially occurring in the locality and will attempt to identify critical habitat sites for these species. If critical habitat sites are located, appropriate impact mitigation measures (including capture and release in retained bushland habitats) will be undertaken according to the type of habitat feature (eg. nest and den sites) and species concerned. The surveys proposed include searches for Threatened fauna species or signs of these species, an Elliott trapping program, Stagwatching and Anabat survey.

Components of the pre clearing surveys proposed are described below.

3.1.4 Threatened Fauna Searches

Within one week prior to commencement of clearing of each staged extraction area, searches for signs of Threatened species occurrence within the extraction area will be undertaken. These searches would include but not be limited to;

- Searches for nests of threatened raptors; and
- Searches for whitewash or other signs of roosting or nesting Powerful and Masked Owls.

If a Threatened raptor or owl nest site is recorded within the subject site during the surveys, clearing activity will not take place in the vicinity of the nest (within 50 m) until the nest is vacated by the affected species (including fledglings). Recorded nest sites would be subject to a monitoring program to ensure that no clearing activity is undertaken until the nest sites are vacated.

3.1.5 Small Mammal Trapping

Elliott trapping surveys will be undertaken within one week prior to commencement of clearing of each staged extraction area over a 4 night period, targeting the Brush-tailed Phascogale (*Phascogale tapoatafa*) and Squirrel Glider (*Petaurus norfolcensis*). A total of 4 trap lines (equating to 160 arboreal Elliott trap nights and 400 terrestrial Elliott trap nights) will be established for each staged clearing.

Fauna captured would be held in captivity until the completion of the clearing operations for that day. Individuals would be released in an appropriate nest box erected in retained forested habitats within the subject site or in the adjoining Worimi National Park (subject to negotiations with local OEH estate management).

Lactating females of the Brush-tailed Phascogale or Squirrel Glider captured during the pre-clearing surveys will be fitted with transmitters, released on the morning of capture and radio-tracked in an effort to locate den trees (which would most likely have young). Den trees that are suspected of supporting a breeding pair would be marked for retention until the completion of the breeding period (May – August). Any large trees within felling distance to the den tree should also be retained for the duration of the breeding period to avoid damage to the den tree and potential injury to its occupants (unless it can be safely felled away from the den tree).

3.1.6 Stag Watching and Anabat Survey

A combined Stag Watching and Anabat survey would be conducted within each staged extraction area over a 4 night period in an attempt to identify potential Microchiropteran bat roost trees. If a roost tree is located and suspected to be a maternity colony, further investigations of the roost tree would be undertaken using an Infra-red lipstick camera and video system in an attempt to confirm the species present and whether breeding activity is taking place. Should further investigations reveal the presence of a maternity colony, no clearing would be undertaken until after the completion of the breeding period (mid Oct – mid February inclusive). The lipstick camera would be used to confirm that breeding has ceased (ie. young are independent).

3.1.7 Reporting

A report detailing the methods and results of the pre-clearing surveys will be prepared and submitted to OEH immediately prior to the commencement of the clearing operations for each stage. This report will detail the surveys undertaken and the fauna species recorded during these surveys. If the Brush-tailed Phascogale (*Phascogale tapoatafa*) and Squirrel Glider (*Petaurus norfolcensis*) are captured and subsequently radio-tracked, the report would detail information on the animals studied and the results of the radio-tracking program.

3.2 Ecological Clearing Supervision

The removal of any hollow bearing trees must be undertaken with the presence of a qualified and suitably experienced fauna ecologist and the cavities of any hollow bearing trees will need to be checked for inhabiting fauna upon felling. Any injured fauna should be captured where possible and taken to the local wildlife carer. Once final rehabilitation of injured fauna has been achieved (if possible), the individual will be released into habitats adjoining the capture site, and if required, into shelter sites appropriate for that species (ie. nest boxes).

The relevance of the marked hollow bearing trees and requirements for ecological clearing supervision must be communicated to the clearing contractor as part of a site induction program.

3.3 Vegetation Clearing Management

3.3.1 Site Survey and Exclusion Fencing

Given that the operation involves a staged extraction process, only portions of the site would be cleared at any one time. As a result, there will be a need to delineate the extraction/forest interfaces (ie. future stages and permanent boundary buffers). In order to achieve this, individual staged extraction boundaries shall be surveyed and pegged by a Registered Surveyor prior to the conduct of clearing operations. Plastic mesh fencing or star pickets and flagging tape shall be installed along the extraction area boundary for use as exclusion fencing. The fencing would function as a clearly marked 'exclusion' boundary for the machinery operators during clearing operations to ensure that no clearing occurs outside the individual extraction area.

3.4 Clearing Protocol

The following protocol would be undertaken as part of the clearing activity on the subject site:

1. All contractors conducting clearing, earth works or construction activities within the subject site must be informed of the restrictions to the clearing of vegetation outside the 'exclusion fencing'. A construction protocol would be prepared requiring all earthworks, machinery and personnel be strictly controlled and be restricted to the extraction footprint. No storage of materials, vehicle parking or other disturbance would be undertaken outside the exclusion fencing. Contractors would be supplied with the construction protocol regarding the clearing restrictions through a work site induction program;
2. Trees would be felled away from the retained bushland on the subject site back into the extraction areas; and
3. Domestic fauna (ie. dogs) would be prohibited from entering the subject site with Contractors.

3.5 Threatened Orchid Management

3.5.1 Population Monitoring

Annual monitoring of the Endangered *Diuris arenaria* population on site is proposed by a suitably qualified and experienced botanist. Monitoring is proposed for the following periods: plant emergence, peak flowering and seed-set generally coinciding with mid - September (flowering) to mid - October (seeding). Data collected will include a count of the number of individuals, flowering and seed-set, plant dimensions (leaf and stem measurements) and condition (including predation) and associated native and exotic species. Pollinator baiting trials may also be conducted to aid identification of the pollinator and its habitat requirements. Annual monitoring would be completed for the first two years of quarrying. If no evidence of the Endangered *Diuris arenaria* population is found, then monitoring will be scaled back to every three years.

3.5.2 Maintenance Slashing

Annual slashing of the northern powerline corridor (it is understood this is not a formal easement) conducted by Ausgrid helps to maintain favourable conditions for the ongoing survival of the Threatened *Diuris arenaria* population. Should the northern powerline corridor be decommissioned during the life of the quarry, the quarry operator shall assume the annual maintenance slashing responsibility (until quarry closure). Maintenance slashing periods shall be between the months of December-May to avoid impacts to the life cycle requirements of the Threatened orchid population.

3.6 Buffer Zones

3.6.1 Diuris arenaria Population in 'Old' Easement

A fifty (50) m wide buffer zone shall be established on both sides of the 'old' northern powerline easement, creating a 130 m wide Orchid Conservation Zone on the site (inclusive of the 30 m wide 'old' easement proper). The vegetated buffer zone shall assist in protecting the *Diuris arenaria* population and its pollinators through minimising edge effects and retention of pollinator nesting habitat. Buffer zones shall be surveyed prior to commencement of staged clearing operations.

3.6.2 OEH Estate Buffer

A 50 m wide buffer zone shall be established along the site's boundary with the OEH Estate to minimise the potential for edge effects from the extraction footprint into Worimi National Park. The edge of the buffer zone would be surveyed and pegged by a Registered Surveyor prior to clearing operations. Metal star pickets and flagging tape (or plastic mesh) would be used to establish exclusion fencing for the clearing contractor along the extraction footprint/buffer zone edge.

3.6.3 Swamp Forest Buffer

A 50 m wide vegetated buffer zone is proposed between the northern edge of the quarry face and the retained Dry Sclerophyll and Swamp Sclerophyll habitats on the site. The buffer would similarly minimise the potential for edge effects from the quarry operations into the retained swamp forested habitats and would also provide a noise buffer for the residence on the eastern lot. The edge of the buffer zone would be surveyed and pegged by a Registered Surveyor prior to clearing for Stage 1. Metal star pickets and flagging tape (or plastic mesh) would similarly be used to establish exclusion fencing for the clearing contractor along this quarry/buffer zone edge.

The assistance of a qualified botanist would be used to initially mark the Swamp Forest EEC southern and eastern boundary edges from which the buffer zone would subsequently be surveyed.

3.6.4 Other Buffer Zones

A 30 m wide buffer zone shall be established along extraction boundaries with non OEH Estate lands (unless the relevant landowners agree to a reduced buffer distance), in accordance with Conditions 21(d) and (e). These buffers shall be surveyed and pegged to ensure that they remain undisturbed.

3.6.5 Bushfire Management

Controls to manage bushfire risks at the site include:

- Managing fuel loads;
- Consultation with the rural fire service;
- Minimal chemicals stored at site; and
- Water trucks.

3.7 Weed Management

Key controls to manage weeds onsite include:

- Weed growth will be monitored and subsequently controlled if necessary;
- Completion of weed spraying program; and
- Weeds shall be removed from the stripped topsoil volume when identified to limit future weed regrowth.

4 REHABILITATION MANAGMENT

4.1 Closure Domains

This section describes the primary and secondary rehabilitation domains which have been included in the 2015 review of the Landscape Management Plan. Primary and secondary domains were selected to be consistent with the Division of Resources and Energy (DRE) Mining Operations Plan (MOP Guidelines) (October 2013). These guidelines are the current best practice guidelines for rehabilitation planning in the mining and quarrying industries.

Primary domains are land management units within the site with unique operational and functional purpose and similar geophysical characteristics. Primary domains outline the current land use at the site.

Secondary domains are land management units characterised by a similar post mining land use objective (final land use).

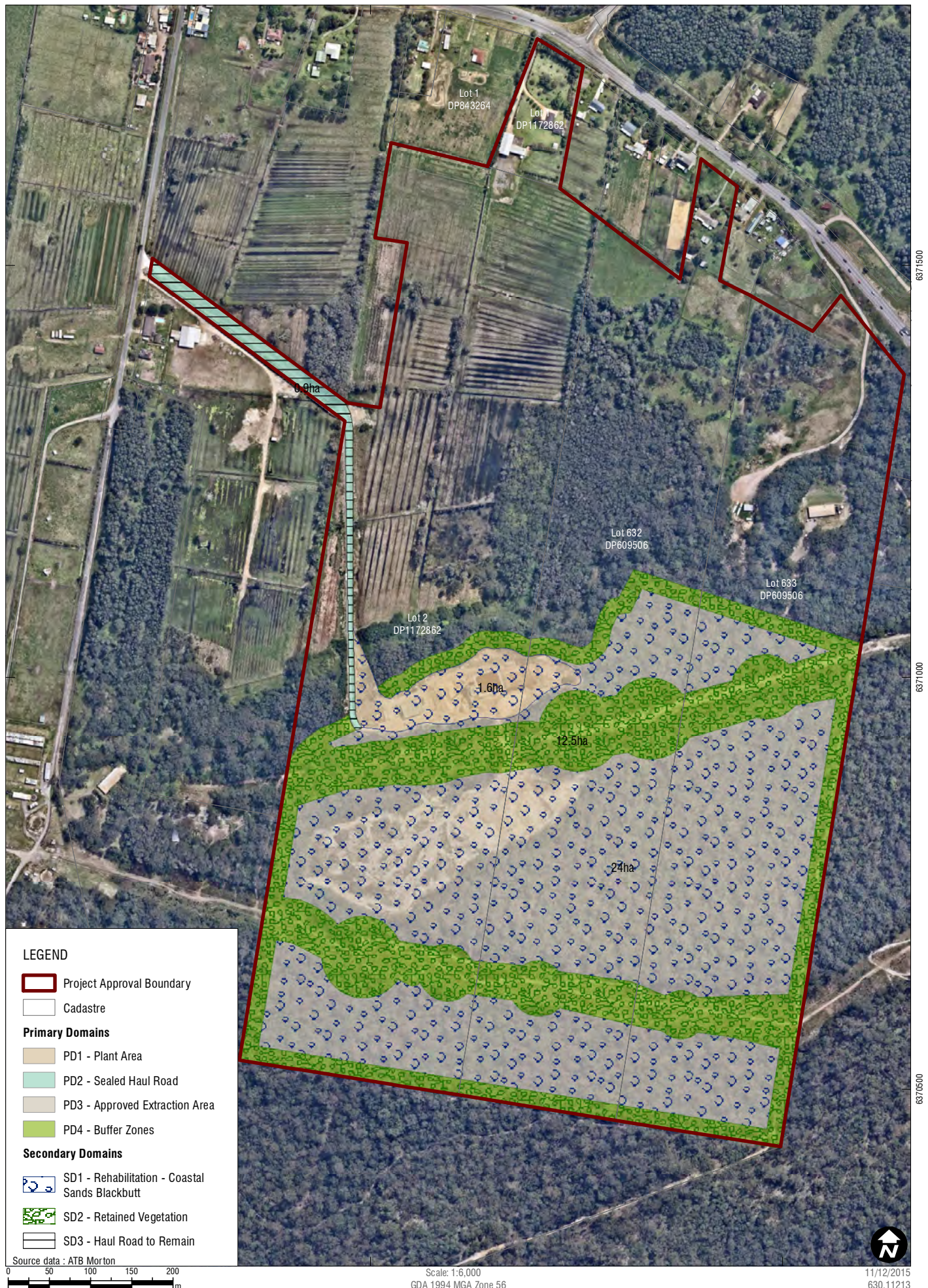
Final closure is outlined in **Table 2**. Rehabilitation domains are outlined in **Figure 1**.

Table 2 Primary and Secondary Rehabilitation Domains

Domain	Description	Code
Primary Domains		
Domain 1 – Plant Area	This includes the screening facility, workshop, offices, weighbridge, stockpile and sediment dam.	1
Domain 2 – Sealed Haul Road	This includes the sealed haul road from Nelson Bay Road to the Plant Area.	2
Domain 3 – Extraction Area	The marked out 'Extraction Area'.	3
Domain 4 Buffer Zones	Buffer zones have been marked out, with these located within the 'Extraction Area' around the powerline easements.	4
Secondary Domains		
Rehabilitation – Coastal Sands Blackbutt	Rehabilitation of disturbed areas (Extraction Area and Plant Area) using a seed mix consistent with some of the key flora species from the EIS (Coastal Sands Blackbutt).	A
Haul Road to Remain	Road to remain at closure. This will enable future access to the site for bushfire management/other land uses.	B
Retained Vegetation	Large sections within the 'Extraction Area' are marked as buffer zones, with this vegetation to remain at closure.	C

400000

400500



4.2 Objectives

The purpose of this *Rehabilitation Management Plan* component is to outline methods for stabilising and revegetating the quarry extraction areas following completion of each stage of quarrying. The desired outcome at this early stage in the project is to commit the proponent to re-establishing, native vegetation and fauna habitat within the future disturbed areas. The desired outcome will assist in reducing adverse aesthetic impacts and contribute to local biodiversity through establishment of either:

- All infrastructure not required at closure removed;
- Rehabilitation consistent with Coastal Sands Blackbutt vegetation community;
- Minimise visual Impact of final landforms as far as is reasonable and feasible;
- Safe, stable and non-polluting;
- Constructed landforms drain to the natural environment; and
- Key criteria relating to rehabilitation objectives are outlined in **Section 4.6**.

4.3 Rehabilitation Phases

The rehabilitation and closure objective for the site is to create stable, non-polluting post closure landforms that allow the achievement of the post closure land use. Any rehabilitation at the site will be completed through a series of conceptual stages which are described as:

- Stage 1: Decommissioning – removal of hard stand areas, buildings, contaminated materials, hazardous materials;
- Stage 2: Landform Establishment – incorporates gradient, slope, aspect, drainage, substrate material characterisation and morphology;
- Stage 3: Growth Medium Development – incorporates physical, chemical and biological components of the growing media and ameliorants that are used to optimise the potential of the media in terms of the preferred vegetative cover;
- Stage 4: Ecosystem and Land Use Establishment – incorporates revegetated lands and habitat augmentation; species selection, species presence and growth together with weed and pest animal control /management and establishment of flora;
- Stage 5: Ecosystem and Land Use Sustainability – incorporates components of floristic structure, nutrient cycling recruitment and recovery, community structure and function which are the key elements of a sustainable landscape; and
- Stage 6: Rehabilitated Land – lands that have met the required rehabilitation and closure requirements to allow for the return of the rehabilitation bond by the DP&E.

These phases are outlined in the Mining Operations Plan guidelines (December 2013). The status of rehabilitation in comparison to rehabilitation phases will be outlined in the rehabilitation monitoring report.

4.4 Progressive Rehabilitation

Rehabilitation of extraction boundary batters and the quarry pit would be subject to staged or progressive rehabilitation over the 20 year period of the quarry with rehabilitation monitoring and adaptive management continuing until the rehabilitation bond has been returned to ATB Morton. This would demonstrate the site has met the rehabilitation criteria in **Table 3**.

4.5 Rehabilitation Inspections and Rehabilitation Monitoring

4.5.1 Rehabilitation Inspections

Rehabilitation inspections are to be completed as per the following frequency:

- Monthly – general review of rehabilitation quality during monthly environmental inspection;
- Six monthly for the first two years – following the commencement of rehabilitation; and
- Every year after two years of the commencement of rehabilitation.

The inspection form includes reviewing key features such as:

- Ground cover;
- Erosion;
- Overstorey, mid storey and lower storey;
- Nutrient cycling;
- Presence of mortality or die back; and
- Presence of weeds.

Permanent photographic monitoring locations are to be established in rehabilitation areas. At each of these locations, four photographs are to be taken, looking north, south, east and west. Photographs are to include longer shots of rehabilitation areas. The rehabilitation inspection form will be completed annually along with the review of photo monitoring locations and a comparison of the inspection form from previous years.

Six monthly (first two years of site rehabilitation) and then annual rehabilitation inspections are to be completed by an independent specialist consultant. Details of the inspection are to be included in the Annual Review. A separate rehabilitation monitoring form is to be completed and photo monitoring locations established for each of the five extraction areas (hence five rehabilitation areas).

4.5.2 Rehabilitation Monitoring

Detailed rehabilitation monitoring will be undertaken closer to closure of the quarry. Monitoring is to commence within five years of closure and continue until five years after closure or until lease relinquishment.

4.6 Performance Completion Criteria

Performance/completion criteria nominated for the quarry revegetation areas and habitat management works and proposed monitoring are detailed in **Table 3**.

Table 3 Proposed Rehabilitation Success Criteria by Phase

Rehabilitation Element	Rehabilitation Success Criteria
Decommissioning	• Remove nominated infrastructure (excluding haul road to remain); • Remove all remaining rubbish and debris; • Removal of all mobile machinery from the site; • Removal of all petroleum, chemicals and explosive products from the site; and • Access to members of the public and livestock is restricted as appropriate to site conditions.
Landform Establishment	• Create a stable land form; • Final landform is consistent with surrounding landforms; and • Establish drainage systems as part of batter formation to ensure stability.
Growth Medium Development	• Respread topsoil/topdressing media at a depth of at least 15 cm. Where topsoil is not available other soil ameliorates may be used; • Shaped areas direct seeded with a mix of native tree and shrub species which is blended with an appropriate application of fertiliser or other ameliorant as determined by soil testing; • Benchmark soil structure and nutrient status to establish target soil condition; • Samples taken from the stockpiled sites shall be tested for a range of major and trace elements, including: Total Exchange Capacity (TEC); pH; EC (conductivity); Organic Matter; Nitrogen; Sulphur; Phosphorus; Exchangeable Cations – Calcium, Magnesium, Potassium, Sodium and Trace Elements - Boron, Iron, Manganese, Copper and Zinc. • Key soil results compare to pre commencement results. • Determine soil characterisation of the topdressing material and treat as necessary with soil conditioners and fertilisers; • Topsoil stockpiles will be less than 1 m high, 4 m wide at the base, and of a length governed by the amount of topsoil generated; and • Undertake follow-up soil testing as considered necessary.

Rehabilitation Element	Rehabilitation Success Criteria
Ecosystem and Land Use Establishment	• Less than 5% cover declared noxious weeds across all areas at any time. • The introduction and spread of weeds and pests should be prevented and an active program in place to minimise their presence; • Installation of nest boxes as per EIS commitments (1 nest box for every hollow removed); and • Undertake rehabilitation inspections and monitoring as required to determine target community and structure and floristics.
Ecosystem and Land Use Sustainability	• More than 75% of trees are healthy and growing as indicated by rehabilitation monitoring. • Evidence of active use of habitat provided during rehabilitation such as logs and signs of natural generation of shelter sources including leaf litter; • Evidence of native fauna using nest boxes; • Presence of representatives of a broad range of functional indicator groups involved in different ecological processes; • Typical food and water sources required by the majority of vertebrate and invertebrate inhabitants of that ecosystem type are present; • Water quality of the receiving waters is not affected by surface water runoff from the site; • Nutrient cycling and recycling processes are occurring as evidenced by the presence of a litter layer, mycorrhizae and/or other microsymbionts; • Representation of a range of species characteristics from each fauna assemblage (eg. reptiles, birds, mammals) based on analogue rehabilitation monitoring reference sites; • Continue monitoring until self-sustaining levels are confirmed; and • Undertake maintenance work as required – including soil treatment, erosion control, weed spraying and re-sowing.

Rehabilitation Element	Rehabilitation Success Criteria
Relinquishment	• All other criteria within this table has been satisfied; • Establishment of a self-sustaining vegetation community compatible with the chosen land use; and • The quality of water leaving the site should be such as not to cause no significant deterioration of water quality to the downstream beneficial use(s) or water quality objectives of the receiving waters declared under the Section 73 of the water Act (1992).

4.7 Topsoil Management

Topsoil would be stripped from the extraction area to aid in quarry rehabilitation. Topsoil would be stripped to a depth of 400 mm as this layer contains valuable seed, organic matter, minerals and microbes essential for plant growth.

Topsoil would be stockpiled as mounds with a maximum 2H:1V slope and would be sown with native grass species including fast growing spinifex grass immediately following emplacement to assist in long term stabilisation. Topsoil mound heights shall be restricted to 1 m to maintain aerobic activity. Standard erosion and sediment controls (eg. hay bales and silt fences) shall be constructed downslope of the mounds to prevent sediment being deposited in the site swales until suitable vegetation cover has established on the stockpiled soil. Soil testing is to be undertaken at a scale which is reflective of the size of the area.

Prior to topsoil resspreading in areas completed by sand extraction, it is recommended that stockpiled topsoil be tested to determine the need for soil additives and inoculants in order to increase the chance of a successful native plant establishment. Minerals, microbes and soil structure have all been shown to deteriorate when stockpiled for long periods of time. Samples taken from the stockpiled site shall be tested for a range of major and trace elements, including: Total Exchange Capacity (TEC); pH; EC (conductivity); Organic Matter; Nitrogen; Sulphur; Phosphorus; Exchangeable Cations – Calcium, Magnesium, Potassium, Sodium and Trace Elements - Boron, Iron, Manganese, Copper and Zinc. Test results would be reviewed by a suitably qualified and soil specialists to assist in determining the need for soil additives and inoculants.

4.8 Extraction Boundary Batters

Immediately following construction of extraction boundary batters, stockpiled topsoil shall be spread over the batter surface. The batters will then be hydromulched where seed, organic fertiliser, mulch and a binder are combined with water in a truck mounted hydromulch tank to form a slurry. The slurry is then sprayed under pressure onto the soil surface using a hose or cannon. Soil additives may also be incorporated into the hydromulch where required based on results from topsoil soil testing proposed for the site. Compost and other wetting agents may also be added to the slurry mix to increase the soil moisture content of the freely- draining sands. The hydromulch provides a wood fibre interlocking mat that retains moisture for seed germination and is dyed green with a non-toxic chemical to help identify areas requiring ongoing treatment. The dye usually bleaches out of the fibre as growth of the seed cover crop establishes. Once applied to the soil, the material enhances initial growth by providing a micro- environment beneficial to seed germination.

The hydromulch would include commercial pasture grass seed to allow for a quick growing initial cover crop (sterile) to be established across the batters to assist in soil stabilisation.

The cover crop would be established within approximately 12 weeks from the hydromulch spray date, depending on the soil moisture content of the sands (soil moisture level will be the major governor of growth and establishment of vegetation). The hydromulch coupled with natural rainfall would be expected to provide a soil moisture content that would trigger seed germination and plant growth (establishment and ongoing phases). Construction of the batters would be timed, where possible, so that their completion coincides with optimal hydromulch periods, these being the beginning of the growing season (ie. spring) or the latter part (autumn). These seasonal periods are generally associated with good natural rainfall and minimal evaporation. Once the cover crop establishes, the mulch begins to break down and slowly releases organic material into the soil for further enrichment.

A native seed mix dominated by nitrogen fixing peas and wattles would also be used in (and added to) the hydromulch slurry to supplement the topsoil (native) seedbank. Over time, the dry dune forest taxa would gradually replace the initial short lived pasture cover crop on the extraction boundary batters as favourable conditions for native species germination occur (generally within 12—18 months). Native seed would be sourced from a recognised native seed supplier and would include dry dune forest associated taxa dominated by pioneering nitrogen fixers such as *Acacia ulicifolia*, *Acacia suaveolens*, *Acacia myrtifolia*, *Acacia longifolia*, *Bossieae rhombifolia subsp rhombifolia*, *Bossieae heterophylla*, *Aotus ericoides*, *Dillwynia glaberrima* and *Dillwynia retorta*. The high proportion of leguminous, nitrogenous fixers (peas and wattles) act to imitate the processes of succession and increase the biological activity and nutrient cycling of the soil profile.

Natural recruitment from the surrounding dry dune forests would also be expected to supplement the topsoil seedbank and hydromulch in establishing a dune forest/dune shrubland community on the boundary batters.

As reticulated water is not available on the site, a water tanker/cart will be used to provide water for hydromulching operations.

Hydromulching should be undertaken by a suitably qualified and experienced hydromulch contractor (eg. Spraygrass, Vineyard NSW).

4.9 Quarry Pit

Following the completion of each staged extraction, stockpiled topsoil would be respread over the bare soil in the quarry pit (floor) (400 mm depth) to provide a native seedbank for regeneration, assist in organics and mineral enrichment of the bare sands and facilitate podzolisation. A mulch comprising tubgrindings of Smooth barked Apple (*Angophora costata*) sourced from the extraction area (ie. cleared vegetation) would be spread over the topsoil (depth 150 mm) to assist in the podzolisation process and retention of minerals and organics in the respread topsoil.

Following each staged extraction, the quarry pit would be subject to an initial 24 month inspection program to assess the degree of natural recruitment (% cover and species composition), soil moisture content as well as general surface hydrological behaviour (eg. frequency and duration of any inundation/ponding). Results from the plant recruitment and soil moisture monitoring coupled with a review of surface and groundwater monitoring results (including geochemistry) would guide subsequent rehabilitation methodologies for the quarry pit (which is difficult to detail at this stage). It is thought that the final landform of RL 4m AHD being 1.5 – 2 m above groundwater may ultimately support a Scribbly Gum (*Eucalyptus racemosa var. racemosa* syn. *signata*)-Apple (*Angophora costata*)-Bloodwood (*Corymbia gummiifera*) Dry Sclerophyll Forest (where Blackbutt and possibly Apple and Bloodwoods to some degree are replaced by a high water table-tolerant Scribbly Gum) or alternatively a Paperbark (*Melaleuca quinquenervia*)-Swamp Mahogany (*Eucalyptus robusta*) Swamp Sclerophyll Forest based on depth to groundwater data for Tomago coastal plain ecosystems noted in Bell (2006). Both these 2 vegetation communities are widespread on the Stockton (and nearby Tomago) Sandbeds and would be expected to form a source of recruitment for the quarry.

The rehabilitation inspection/monitoring would assist in confirming those native ecosystems most appropriate for quarry pit rehabilitation and any supplementary methodologies needed for their establishment. The rehabilitation inspection/monitoring may show that the initial strategy of respreading stockpiled topsoil coupled with the overlying tubgrindings emplacement (as well as natural recruitment from surrounding dune forests) may yield adequate native recruitment without the need for additional rehabilitation strategies (eg. seeding; brush mulching). Additional seeding of the rehabilitation area will be undertaken to increase the likelihood of rehabilitation success and reduce the spread of weeds within the rehabilitation areas.

The site overall Landscape Management Plan would be revised accordingly to include supplementary quarry pit rehabilitation and monitoring methods following the end of the initial 24 inspection period (for each staged extraction area) by a suitably qualified and experienced restoration ecologist and would include medium term (5—10 year performance criteria).

4.10 Risk Management and Contingencies

The following risks and contingencies associated with quarry revegetation works are detailed in Table 4.

Table 4 Risk and Contingencies

Risk	Response
Marked decline in structure, minerals and microbes of stockpiled topsoil following soil testing.	Soil amelioration and/or supplementation with imported topsoil.
Poor availability of commercial native seed stocks from local nurseries.	Seed collection program from offset sites and surrounds to be undertaken as soon as possible following approval to commence operations on the site.
Poor germination of initial cover crop and leguminous pioneers from hydromulching.	Monitor for soil moisture content, weed invasion and undertake supplementary hydromulch or seeding if completion criteria not met.
Pest, disease and weed introduction to on-growing vegetation.	Detection by annual vegetation monitoring program for pests, diseases, noxious weeds, % vegetation cover, reproductive status and overall health and vigour with remedial action as required.
Rehabilitation not meeting final rehabilitation goal. Not being able to achieve lease relinquishment.	Additional landform design and rehabilitation investigations. Additional rehabilitation monitoring. Use of additional ameliorants. Possible future rehabilitation trials.
There are numerous weeds in the surrounding bushland. Weeds may be an issue throughout operations and closure.	Weed spraying program.

4.11 Landscape Management Plan Responsibilities

The overall Landscape Management Plan shall be reviewed every three years and replaced by a more detailed Closure Plan five years prior to closure.

ATB Morton's environmental representative shall be responsible for overseeing the implementation of the Landscape Management Plan (eg. co-ordination and supervision of Contractors, validation inspections, etc.).

4.12 Reporting

The rehabilitation status at the quarry will be reported in the Annual Review. The Annual Review will include details of any rehabilitation completed as well as any results of rehabilitation inspections/monitoring.

5 LONG TERM MANAGEMENT STRATEGY

5.1 Statutory Requirements

This section of the report addresses specific requirements of Schedule 3 Condition 25 that relate to preparation of a Long Term Management Strategy for the project as follows:

25. *The Long Term Management Strategy must:*

- a) define the objectives and criteria for quarry closure and post-extraction management;*
- b) investigate and/or describe options for the future use of the site;*
- c) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and*
- d) describe how the performance of these measures would be monitored over time.*

5.2 Objectives

In terms of final closure, the fundamental objectives for the quarry is that it be left in a condition that is stable, does not present a hazard to wildlife or people and does not present an adverse visual impact on the environment.

The Strategic Framework for Mine Closure (ANZMEC 2000) is structured around a set of objectives and principles grouped under six key areas (stakeholder involvement; planning; financial provision; management; standards; and relinquishment). These principles and objectives are taken into account as far as is possible, considering that rehabilitation of latter stages and quarry closure planning can only proceed in more defined terms at a time much closer to the end of the projected 20 year period for the quarry operations. As such, the uncertainty around long term outcomes limits specific quarry closure planning aspects at present. Overall rehabilitation objectives are outlined in **Section 4.2**.

5.3 Quarry Closure Criteria

Closure criteria for the operation are outlined in **Section 4.6**. Those criteria apply to the long term management of the site, including post closure.

The Quarry Operator assumes responsibility for post closure works.

5.4 Options for Future Use of Site

Section 4.1 outlines rehabilitation domains for the Salt Ash Quarry. The proposed land use at closure includes:

- Rehabilitation – Coastal Sands Blackbutt - Rehabilitation of disturbed areas (Extraction Area and Plant Area) using a seed mix consistent with some of the key flora species from the EIS (Coastal Sands Blackbutt);
- Haul Road to Remain - This will enable future access to the site for bushfire management; and
- Retained Vegetation - Large sections within the 'Extraction Area' are marked as buffer zones, with this vegetation to remain at closure.

With most of the disturbance within the coastal dune area, there are minimal opportunities for other closure options – post closure apart from the rehabilitation of the site.

5.5 Management of Ongoing Environmental Effects

Following quarry closure, ongoing management would include quarry rehabilitation monitoring, periodic inspections of exclusion fencing and monitoring of any visual screening for five years after closure. Such issues would be detailed in the Final Long Term Management Strategy which would be prepared at the commencement of the final staged extraction event (about 5 years out from quarry closure).

5.6 Monitoring of Performance Measures

The monitoring of rehabilitation will be undertaken through:

- Monthly site environmental inspections – including rehabilitation component; and
- Rehabilitation monitoring program closer to the date of closure.

Results of rehabilitation inspections/monitoring will be recorded in the Annual Review.

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APPENDIX F
Firebird ecoSultant
Biodiversity Monitoring Reports



Firebird ecoSultants Pty Ltd

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12 August 2022

Redisand Pty Ltd
7 Janet Parade,
Salt Ash NSW 2318

ATTENTION: GRANT STEVENSON

RE: REMOVAL OF VEGETATION AT STAGES 2 OF THE REDISAND SAND MINE AT 7 JANET PARADE, SALT ASH IN ACCORDANCE WITH THE 'LANDSCAPE AND REHABILITATION MANAGEMENT PLAN, MAY 2019'

Please find herewith a response in relation to the removal of vegetation at Stage 2 of the Redisand Sand Mine at 7 Janet Parade, Salt Ash hereafter referred to as 'the site'.

Ollie Broun (Ecologist) from Firebird ecoSultants Pty Ltd walked the entire site on the 16 June 2022 to inspect all trees for fauna occupation and habitat features. A total of 8 potential habitat trees were identified. All habitat trees were inspected for fauna habitation by 'tapping' the base of each tree with a large mallet; however, no signs of fauna usage were noted at this time. These trees were marked with pink spray paint and the contractor was notified that an ecologist had to be present for removal of these trees.

Trees previously identified as potential habitat trees were soft felled on the 11th August 2022 under the supervision of ecologist Stephanie Sheehy in accordance with section 3.2 of the '*Landscape and Rehabilitation Management Plan, May 2019*'. Only one hollow was occupied by fauna, being two *Petaurus norfolcensis* (Squirrel glider). Both individuals were unharmed and moved on to adjoining vegetation.

If you need clarification on this matter, please do not hesitate to contact the writer.

Yours faithfully

Firebird EcoSultants Pty Ltd

Sarah Jones

B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas)

BAAS18020 Accredited Assessor

Ecologist / Bushfire Planner



**MONITORING REPORT
FOR
BIODIVERSITY BANKING AGREEMENT
108
REGARDING
POLA FOGAL, TOMALLA
LOT 2 DP 707938
2021**

Prepared by:

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I INTRODUCTION

I.1 Background and Purpose

Firebird ecoSultants Pty Ltd has been engaged by ATB Morton Pty Ltd to prepare a monitoring report for BioBanking Agreement BA 108 (hereafter referred to as 'the Biobanking Agreement'), regarding Pola Fogal, Tomalla (Lot 2 DP 707938) (hereafter referred to as 'the site'). This report forms part of the annual monitoring requirements (set out in Annexure D of the Biobanking Agreement), to assess the implementation of the site's Property Management Plan (PMP) in Annexure C of the Biobanking Agreement.

I.2 Site Description

The site totals an area of approximately 309.3 ha, forming the majority of Lot 2 DP 707938. It is situated on the Tomalla Plateau, approximately 40 km north-west of the Township of Barrington, in the Gloucester Local Government Area. It is connected to Barrington Tops State Forest in the south and is otherwise surrounded by private properties containing a mix of forested areas and grazing country. The area is characterised by steep, rocky and sometimes inaccessible terrain.

The site is almost entirely forested and is dominated by Silver Stringybark – Broad-leaved Apple Dry Open Forest. It also contains vegetation consistent with White-topped Box Open Forest (patches in north-western and south-western areas of the site), Fig – Whalebone Tree – Stinging Tree Dry Rainforest (south-western corner) and derived grasslands (small patches along the northern boundary) (GHD, 2013). A ridge running through the central portion of the site separates two perennial watercourses (the Pigna Barney River and Tomalla Creek, and their tributaries). Areas to the south of the ridge drain to Tomalla Creek and areas north of the ridge drain to the Pigna Barney River. The site has been divided into the following four management zones, based on vegetation types and vegetation condition:

- Management Zone (MZ) 1 – these areas contain intact remnant Silvertop Stringybark – Broad-leaved Apple Dry Open Forest.
- MZ 2 – these areas contain derived grasslands in the process of naturally regenerating into Silvertop Stringybark – Broad-leaved Apple Dry Open Forest.
- MZ 3 – these areas contain intact remnant White-topped Box Open Forest.
- MZ 4 – these areas contain intact remnant Fig – Whalebone Tree – Stinging Tree Dry Rainforest.

See Appendix A for the Site Location map, Appendix B for the Vegetation Types Map and Appendix C for the Management Zone Plan Map.

2 METHODOLOGY

Field survey methods were designed to address the monitoring requirements prescribed in both Annexure C and D of the Biobanking Agreement. Table 2-1 provides a summary of the field survey methods, including the specific requirements in the Biobanking Agreement that they are designed to address.

Note: Due to accessibility issues, Photo Reference Point H (at the southern edge of the site) was unable to be inspected. These accessibility issues included a locked gate at the usual point of access and debris across tracks (at alternative points of access, in areas external to the site). Due to the steep terrain and safety issues, the decision was made not to attempt to cross these areas.

Table 2-1: Summary of Survey Methods

Field Survey		Method / Survey Effort	Purpose
Photo Reference Points		Photographs were taken at each of the photo reference points identified in Item 1.2 of Annexure D. The date, time and direction in which photos were taken, were recorded. See Appendix D for the locations of photo reference points.	Photo reference point photographs are provided to satisfy Items 1.1 and 1.2 of Annexure D.
Vertebrate Pest Animal Surveys	Nocturnal spotlighting survey for vertebrate pest animals	Methods were designed to be as close as possible with the spotlighting methods prescribed in the Mitchell and Balogh's (2007a), <i>Monitoring Techniques for Vertebrate Pests: Rabbits</i>. The following methods were employed: • Survey commenced 30 minutes after sunset. • A total distance of 500 m was walked by two observers, along the site's access track, for a period of 2 hours. See Figure 2-1 for the areas walked. • A tally of any animals sighted was kept, in order to calculate a simple index of abundance.	The spotlighting survey was carried out to satisfy the monitoring requirements in Section 4 of Annexure C, and essentially to: • Assess the abundance of any vertebrate pest animals on the site (including for instance, <i>Felis catus</i> (Cat), <i>Vulpes vulpes</i> (Fox), <i>Oryctolagus cuniculus</i> (European Rabbit) and <i>Sus scrofa</i> (Pig)).
	Rabbit abundance and impact assessment	Methods were designed in accordance with the Cooke et al. (2008) Rapid Assessment Technique (RAT) (see Appendix E). The following methods were applied: • Four 30 minute random meander walks were conducted (one in each of MZ 1, MZ 2, MZ 3 and MZ 4); See Figure 2-1 for an approximate location of the areas walked. • The abundance of rabbit faecal pellets, seedling abundance scores and rabbit damage scores were measured, using the standardised scores in Step 1, 2 and 3 of Cooke et al. (2008). • Data was analysed using the 'corrected regeneration score' in Step 4 of Cooke et al. (2008). Overall rabbit impact was assessed in accordance with Step 5 of Cooke et al. (2008).	This assessment was carried out to satisfy the monitoring requirements in Section 4 of Annexure C, and essentially to: • Assess the abundance and impact of <i>O. cuniculus</i> (European Rabbit) on the site.

Field Survey		Method / Survey Effort	Purpose
	Fox and Cat Faecal Counts	Methods were designed to be as close as possible with the 'passive scat count' technique described in the Mitchell and Balogh's (2007b), <i>Monitoring Techniques for Vertebrate Pests: Foxes</i>. The following methods were employed: - Four 30 minute random meander walks were conducted (one in each of MZ 1, MZ 2, MZ 3 and MZ 4); See Figure 2-1 for an approximate location of the areas walked. Note that these walks were conducted in tandem with the rabbit abundance and impact assessment walks above. - Any <i>V. vulpes</i> (Fox) or <i>F. catus</i> (Cat) scats were counted, in order to calculate scat density.	This assessment was carried out to satisfy the monitoring requirements in Section 4 of Annexure C, and essentially to: Assess the abundance of <i>V. vulpes</i> (Fox) and <i>F. catus</i> (Cat) on the site.
Flora Survey		Methods were designed, where possible, in accordance with the relevant survey guidelines (e.g. Department of Environment and Conservation, 2004) The following methods were employed: - A total of four transects and four quadrats (one transect and quadrat in each of MZ 1, MZ 2, MZ 3 and MZ 4); see Figure 2-1 for their locations on the site. - Transects were 50 m long. Quadrats were 20 m x 20 m. - Two observers. - Within each transect / quadrat, the cover-abundance of each observed flora species was recorded for each stratum. The Braun-Blanquet system of cover-abundance classes (see Appendix F) was used to visually estimate the crown cover (for woody plants) or projected foliage cover (for understorey plants).	Transect / quadrat surveys were carried out to satisfy the monitoring requirements in Section 3 of Annexure C, and essentially to: - Assess the condition of the site's vegetation. - Compare the abundance and diversity of weeds and native species.
General Site Inspection.		A general inspection of the site was conducted as follows: - Fence lines were inspected where possible (i.e. in accessible areas of the site). - The points identified in the Property Actions Plan map (see Appendix G), were inspected to assess whether required new	The general inspection was carried out to assess whether aspects of the standard management actions, in Section 1 of Annexure C, are being implemented and also to satisfy monitoring requirements in Item 1.3 of Annexure C. and essentially to: Identify any evidence of disturbance on the site (e.g. livestock

Field Survey	Method / Survey Effort	Purpose
	signage, gates, cattle grid and fencing has been installed. Any evidence of disturbance (e.g. livestock grazing or human disturbance) was recorded.	grazing or human disturbance). - Assess the condition of site's fencing. - Assess the status of works prescribed (such as new fencing and signage) in relation to the Property Actions Plan map (see Appendix G).
Incidental Observations	Any incidental and significant general observations were recorded. Such observations may include, for instance, any significant weed infestations, any evidence of die back or natural regeneration, and any incidental fauna observations (such as tracks and scats of vertebrate pests, or evidence of small birds utilising <i>Lantana camara</i> (Lantana) infestations).	General observations were designed to satisfy all Sections of Annexure C and D, where relevant.

Figure 2-1: Field Survey Locations



3 RESULTS

3.1 Photo Reference Points

Table 3-1 provides the locations and directions in which Photos 1-8 were taken. As mentioned in Section 2, due to accessibility issues, a photograph at Photo Reference Point H was unable to be provided.

Table 3-1: Photo Reference Points

Photo Number in this Document	Photo Reference Point	Easting	Northing	Direction of Photo (magnetic degrees)
1	F_S	361933.372	6483033.974	180 ⁰
2	G_E	363284.891	6481829.461	90 ⁰
3	I_N	361800.719	6482482.119	0 ⁰
4	J_E	362247.818	6481976.268	90 ⁰
5	K_S	362244.32	6481793.38	180 ⁰
6	L_E	361984.98	6481952.22	90 ⁰

Photo 1: Photo Reference Point F_S



Photo 2: Photo Reference Point G_E



Photo 3: Photo Reference Point I_N



Photo 4: Photo Reference Point J_E



Photo 5: Photo Reference Point K_S



Photo 6: Photo Reference Point L_E



3.2 Vertebrate Pest Surveys

3.2.1 Nocturnal Spotlighting Survey

Lepus europaeus (European Hare) were observed during the nocturnal spotlighting survey.

3.2.2 Fox and Cat Faecal Counts

A couple of scats from *Sus scrofa* (Common Wild Pig) were observed walking through the site. No *Vulpes vulpes* (Fox) or *Felis catus* (Cat) scats were observed during the faecal count surveys. There were no incidental observations of *V. vulpes* (Fox) or *F. catus* (Cat) scats during other surveys. It is to be noted on the drive into the site two wild dogs were observed on the adjoining property.

3.2.3 Rabbit Abundance and Impact Assessment

The rabbit abundance and impact survey recorded no evidence of the presence of *O. cuniculus* (Rabbit) on the site. No faecal pellets were recorded, seedlings were common. There were no incidental observations of *O. cuniculus* (Rabbit) on the site during other surveys. However, *Lepus europaeus* (European Hare) were observed during the nocturnal spotlighting survey. Table 3-2 details the results of the RAT for rabbit abundance and impact (see Appendix E for details on scoring methods for Table 3-2).

Table 3-2: Rabbit Abundance and Impact Scores

Location	Rabbit Abundance Score	Seedling Abundance Score	Rabbit Damage Score	Corrected Regeneration Score	Overall Rabbit Impact
Rabbit Transect 1	0	3 (common)	0	3	Acceptable
Rabbit Transect 2	0	3 (common)	0	3	Acceptable
Rabbit Transect 3	0	3 (common)	0	3	Acceptable
Rabbit Transect 4	0	3 (common)	0	3	Acceptable

Note: See Appendix E for details on scoring methods.

3.3 Flora Survey

Results of the flora survey were slightly different to previous surveys with some infestations of weeds throughout the site including *Bidens pilosa* (Cobbler's Pegs), *Verbena bonariensis* (Purletop), *Conyza sumatrensis* (Tall Fleabane) and *A. adenophora* (Crofton Weed), *Gomphocarpus physocarpus* (Balloon Cotton Bush) *Ageratina adenophora* (Crofton Weed) was recorded throughout the site, with higher densities along the access tracks and higher densities in general than the previous year. It was noted that a couple of *Opuntia* (Prickly Pear) occurred in the area as displayed on the Weed Map.

Table 3-3: Flora Survey Results

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
TRANSECT 1 (MZ 1)			
Upper Stratum	20-25 m / 20-40%	<i>Allocasuarina torulosa</i> (Forest Oak)	1
		<i>Angophora floribunda</i> (Rough-barked Apple)	1
		<i>A. subvelutina</i> (Broad-leaved Apple)	3
		<i>Eucalyptus laevopinea</i> (Silvertop Stringybark)	3
		<i>E. tereticornis</i> (Forest Red Gum)	3
		<i>E. saligna</i> (Sydney Blue Gum)	1
Mid Stratum 1	3-8m / 10-30%	<i>Acacia irrorata</i> (Green Wattle)	3
		<i>A. torulosa</i> (Forest Oak)	3
		Emergent <i>Eucalyptus</i>	2
		<i>Pittosporum undulatum</i> (Sweet Pittosporum)	3
		<i>Streblus brunonianus</i> (Whalebone Tree)	1
Mid Stratum 2	1-3m / 10%	<i>A. torulosa</i> (Forest Oak) emergent	2
		<i>A. longissimi</i> (Long-leaf Wattle)	3
		<i>Exocarpos cupressiformis</i> (Native Cherry)	2
		<i>Jacksonia scoparia</i> (Dogwood)	2
		<i>Pandorea pandorana</i> ssp. <i>pandorana</i> (Wonga Wonga Vine)	2
		<i>Pittosporum undulatum</i> (Sweet Pittosporum)	2
		<i>S. brunonianus</i>	1

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>Xanthorrhoea</i> sp. (Grass Tree)	2
		Emergent <i>Eucalyptus</i>	3
Lower Stratum	<1 m / 10-20%	<i>Ageratina adenophora</i> (Crofton Weed)*	2
		<i>Adiantum aethiopicum</i> (Common Maidenhair Fern)	2
		<i>Cissus antarctica</i> (Kangaroo Grape)	2
		<i>Clematis aristida</i> (Old Man's Beard)	2
		<i>Dianella caerulea</i> (Blue Flax-lily)	2
		<i>Dichondra repens</i> (Kidney Weed)	2
		<i>Doodia aspera</i> (Rasp Fern)	2
		<i>Echinopogon ovatus</i> (Forest Hedgehog Grass)	1
		<i>Eustrephus latifolius</i> (Wombat Berry)	1
		<i>Geitonoplesium cymosum</i> (Scrambling Lily)	1
		<i>Geranium homeanum</i> (Native Geranium)	1
		<i>Glycine</i> (Variable Glycine)	1
		<i>Imperata cylindrica</i> (Blady Grass)	2
		<i>Lomandra longifolia</i> (Spiny-headed Mat-rush)	3
		<i>Oplismenus aemulus</i> (Australian Basket Grass)	3
		<i>Pandorana pandorana</i> ssp. <i>pandorana</i> (Wonga Wonga Vine)	1
		<i>Poa sieberiana</i> spp. <i>sieberiana</i> (Grey Tussock Grass)	3
		<i>Plantago lanceolata</i> (Lamb's Tongues)*	2
		<i>Pteridium esculentum</i> (Common Bracken Fern)	2

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>Pyrrosia rupestris</i> (Rock Felt Fern)	2
		<i>Rubus parvifolius</i> (Native Raspberry)	2
		<i>Themeda triandra</i> (Kangaroo Grass)	3
		<i>Verbena bonariensis</i> (Purpletop)*	2
QUADTRAT 1 (MZ 1)			
Upper Stratum	20-25 m / 20-40%	<i>A. torulosa</i> (Forest Oak)	3
		<i>A. floribunda</i> (Rough-barked Apple)	1
		<i>A. subvelutina</i> (Broad-leaved Apple)	1
		<i>E. laevopinea</i> (Silvertop Stringybark)	1
		<i>E. tereticornis</i> (Forest Red Gum)	3
		<i>E. saligna</i> (Sydney Blue Gum)	1
		<i>E. quadrangulata</i> (White-topped Box)	1
Mid Stratum 1	3-8 m / 10-20%	<i>A. torulosa</i> (Forest Oak)	3
		Emergent <i>Eucalyptus</i>	2
		<i>P. undulatum</i> (Sweet Pittosporum)	2
Mid Stratum 2	1-3 m / <5%	<i>A. irrorata</i> (Green Wattle)	2
		<i>A. longissimi</i> (Long-leaf Wattle)	1
		<i>Cassinia longifolia</i>	2
		Emergent <i>Eucalyptus</i>	3
		<i>J. scoparia</i> (Dogwood)	1
		<i>P. pandorana ssp. pandorana</i> (Wonga Wonga Vine)	1

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>P. undulatum</i> (Sweet Pittosporum)	2
		<i>S. brunonianus</i> (Whalebone Tree)	1
		<i>Xanthorrhoea</i> sp. (Grass Tree)	1
Lower Stratum	<1 m / 10-30%	<i>A. aethiopicum</i> (Common Maidenhair Fern)	1
		<i>A. adenophora</i> (Crofton Weed)*	2
		<i>Billardiera scandens</i> (Hairy Apple Berry)	1
		<i>C. aristida</i> (Old Man's Beard)	1
		<i>C. refractus</i> (Barbed Wire Grass)	2
		<i>D. caerulea</i> (Blue Flax-lily)	2
		<i>D. micrantha</i> (Shorthair Plumegrass)	3
		<i>D. repens</i> (Kidney Weed)	2
		<i>D. aspera</i> (Rasp Fern)	1
		<i>E. ovatus</i> (Forest Hedgehog Grass)	1
		<i>G. cymosum</i> (Scrambling Lily)	2
		<i>G. homeanum</i> (Native Geranium)	1
		<i>Hardenbergia violacea</i> (False Sarsaparilla)	2
		<i>L. longifolia</i> (Spiny-headed Mat-rush)	3
		<i>Oxalis perennans</i> (Yellow Wood Sorrel)	1
		<i>P. pandorana</i> ssp. <i>pandorana</i> (Wonga Wonga Vine)	1
		<i>P. sieberiana</i> spp. <i>sieberiana</i> (Grey Tussock Grass)	3
		<i>P. esculentum</i> (Common Bracken Fern)	2

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>R. parvifolius</i> (Native Raspberry)	2
		<i>T. triandra</i> (Kangaroo Grass)	3
TRANSECT 2 (MZ 2)			
Upper Stratum	25-30 m / <5%-10%	<i>E. laevopinea</i> (Silvertop Stringybark)	1
		<i>E. tereticornis</i> (Forest Red Gum)	6
		<i>E. quadrangulata</i> (White-topped Box)	1
Mid Stratum 1	3-8 m / <5%-10%	<i>A. maidenii</i> (Maiden's Wattle)	3
		<i>E. tereticornis</i> (Forest Red Gum)	3
Mid Stratum 2	1-3 m / <5%	<i>Bursaria spinosa</i> (Native Blackthorn)	4
		<i>C. longifolia</i>	1
		<i>E. tereticornis</i> (Forest Red Gum) (emergent)	1
		<i>J. scoparia</i> (Dogwood)	1
		<i>Gomphocarpus fruticosus</i> (Narrow-leaved Cotton Bush)*	2
Lower Stratum	<1 m / 50-60%	<i>A. maidenii</i> (Maiden's Wattle)	2
		<i>C. longifolia</i> (emergent)	1
		<i>Cheilanthes sieberi</i> ssp. <i>sieberi</i> (Mulga Fern)	1
		<i>Elymus scaber</i>	1
		<i>E. laevopinea</i> (Silvertop Stringybark)	1
		<i>E. tereticornis</i> (Forest Red Gum) (emergent)	1
		<i>G. cymosum</i> (Scrambling Lily)	1
		<i>P. lanceolata</i> (Lamb's Tongues)*	1

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>P. sieberiana</i> spp. <i>sieberiana</i> (Grey Tussock Grass)	3
		<i>T. triandra</i> (kangaroo Grass)	4
QUADRAT 2 (MZ 2)			
Upper Stratum	25-30 m / <5%-10%	<i>E. tereticornis</i> (Forest Red Gum)	5
Mid Stratum 1	3-8 m / <5%-10%	<i>A. maidenii</i> (Maiden's Wattle)	3
		<i>E. tereticornis</i> (Forest Red Gum) (emergent)	3
Mid Stratum 2	1-3 m / 10%-30%	<i>A. maidenii</i> (Maiden's Wattle)	3
		<i>B. spinosa</i> (Native Blackthorn)	3
		<i>C. longifolia</i>	1
		<i>J. scoparia</i> (Dogwood)	1
		<i>G. fruticosus</i> (Narrow-leaved Cotton Bush)*	2
		<i>E. tereticornis</i> (Forest Red Gum)	3
Lower Stratum	<1 m / 30-80%	<i>A. maidenii</i> (Maiden's Wattle) (emergent)	1
		<i>C. longifolia</i> (emergent)	1
		<i>C. sieberi</i> ssp. <i>sieberi</i> (Mulga Fern)	1
		<i>Chloris ventricose</i> (Tall Windmill Grass)	2
		<i>D. repens</i> (Kidney Weed)	1
		<i>E. ovatus</i> (Forest Hedgehog Grass)	2
		<i>E. laevopinea</i> (Silvertop Stringybark) (emergent)	1
		<i>E. tereticornis</i> (Forest Red Gum)	2
		<i>E. scaber</i>	1

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>J. scoparia</i> (Dogwood) (emergent)	1
		<i>P. dilatatum</i> (Common Paspalum)*	1
		<i>P. lanceolata</i> (Lamb's Tongues)*	1
		<i>P. sieberiana</i> spp. <i>sieberiana</i> (Grey Tussock Grass)	3
		<i>T. triandra</i> (Kangaroo Grass)	4
TRANSECT 3 (MZ 3)			
Upper Stratum	20-25 m / 10-30%	<i>E. laevopinea</i> (Silvertop Stringybark)	4
		<i>E. saligna</i> (Sydney Blue Gum)	1
		<i>E. tereticornis</i> (Forest Red Gum)	1
		<i>E. quadrangulata</i> (White-topped Box)	3
Mid Stratum 1	3-8 m / <5%	<i>A. torulosa</i> (Forest Oak)	2
		Emergent <i>Eucalyptus</i>	1
Mid Stratum 2	1-3 m / <5%	<i>A. irrorata</i> (Green Wattle)	1
		<i>A. longissimi</i> (Long-leaf Wattle)	1
		<i>B. spinosa</i> (Native Blackthorn)	1
		<i>C. longifolia</i>	1
		Emergent <i>Eucalyptus</i>	2
		<i>Maytenus silvestris</i> (Narrow-leaved Orangebark)	1
		<i>Persoonia mollis</i> spp. <i>nectans</i>	1
Lower Stratum	<1 m / 20-60%	<i>A. irrorata</i> (Green Wattle) (emergent)	1
		<i>A. torulosa</i> (Forest Oak) (emergent)	1

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>B. spinosa</i> (Native Blackthorn) (emergent)	1
		<i>C. sieberi ssp. sieberi</i> (Mulga Fern)	1
		<i>C. refractus</i> (Barbed Wire Grass)	3
		<i>D. caerulea</i> (Blue Flax-lily)	1
		<i>D. micrantha</i> (Shorthair Plume Grass)	1
		<i>D. repens</i> (Kidney Weed)	2
		<i>E. ovatus</i> (Forest Hedgehog Grass)	2
		Emergent <i>Eucalyptus</i>	2
		<i>Glycine clandestina</i> (Love Creeper)	1
		<i>G. tabacina</i> (Love Creeper)	1
		<i>H. violacea</i> (False Sarsaparilla)	2
		<i>L. longifolia</i> (Spiny-headed Mat-rush)	3
		<i>P. sieberiana spp. sieberiana</i> (Grey Tussock Grass)	3
		<i>Pratia purpurascens</i> (Whiteroot)	1
		<i>T. triandra</i> (Kangaroo Grass)	3
QUADRAT 3 (MZ 3)			
Upper Stratum	20-25 m / 10-20%	<i>E. laevopinea</i> (Silvertop Stringybark)	5
		<i>E. quadrangulata</i> (White-topped Box)	3
		<i>E. saligna</i> (Sydney Blue Gum)	2
Mid Stratum 1	3-8 m / <5%	Emergent <i>Eucalyptus</i>	1
Mid Stratum 2	1-3 m / <5%	<i>A. irrorata</i> (Green Wattle) (emergent)	1

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>A. longissimi</i> (Long-leaf Wattle)	1
		<i>B. spinosa</i> (Native Blackthorn)	2
		<i>C. longifolia</i>	1
Lower Stratum	<1 m / 10-40%	<i>A. irrorata</i> (Green Wattle)	1
		<i>A. longissimi</i> (Long-leaf Wattle) (emergent)	1
		<i>A. torulosa</i> (Forest Oak) (emergent)	1
		<i>B. spinosa</i> (Native Blackthorn)	2
		<i>C. sieberi ssp. sieberi</i> (Mulga Fern)	1
		<i>C. refractus</i> (Barbed Wire Grass)	3
		<i>D. caerulea</i> (Blue Flax-lily)	2
		<i>D. micrantha</i> (Shorthair Plume Grass)	1
		<i>D. repens</i> (Kidney Weed)	2
		<i>E. ovatus</i> (Forest Hedgehog Grass)	1
		Emergent <i>Eucalyptus</i>	1
		<i>G. tabacina</i> (Love Creeper)	1
		<i>H. violacea</i> (False Sarsaparilla)	2
		<i>L. longifolia</i> (Spiny-headed Mat-rush)	3
		<i>T. triandra</i> (Kangaroo Grass)	3
TRANSECT 4 (MZ 4)			
Upper Stratum	25-30 m / <5-20%	<i>E. quadrangulata</i> (White-topped Box)	3
Mid Stratum 1	4-15 m / 70%	<i>Alectryon subcinereus</i> (Native Quince)	1

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>A. torulosa</i> (Forest Oak)	2
		<i>Backhousia myrtifolia</i> (Grey Myrtle)	5
		<i>Diospyros australis</i> (Black Plum)	1
		<i>S. brunonianus</i> (Whalebone Tree)	1
Mid Stratum 2	1-4 m / 20-80%	<i>A. irrorata</i> (Green Wattle)	3
		<i>A. subcinereus</i> (Native Quince)	1
		<i>B. myrtifolia</i> (Grey Myrtle)	3
		<i>Cayratia clematidea</i> (Native Grape)	2
		<i>C. antarctica</i> (Kangaroo Grape)	3
		<i>Diospyros australis</i> (Black Plum)	1
		<i>Hymenanthera dentata</i> (Tree Violet)	1
		<i>J. scoparia</i> (Dogwood)	1
		<i>M. silvestris</i> (Narrow-leaved Orangebark)	1
		<i>Myrsine variabilis</i>	1
		<i>P. pandorana</i> ssp. <i>pandorana</i> (Wonga Wonga Vine)	3
		<i>Pittosporum spinescens</i> (Wallaby Apple)	1
		<i>P. undulatum</i> (Sweet Pittosporum)	2
		<i>Rubus moluccanus</i> (Broad-leaved Bramble)	1
		<i>S. brunonianus</i> (Whalebone Tree)	3
Lower Stratum	<1 m / <5%-20%	<i>Adiantum aethiopicum</i> (Common Maidenhair)	2
		<i>Adiantum formosum</i> (Giant Maidenhair)	2

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>A. adenophora</i> (Crofton Weed)*	2
		<i>B. myrtifolia</i> (Grey Myrtle) (emergent)	2
		<i>C. antarctica</i> (Kangaroo Grape)	1
		<i>Dioscorea transversa</i> (Native Yam)	1
		<i>D. aspera</i> (Rasp Fern)	2
		<i>D. australis</i> (Black Plum) (emergent)	1
		<i>E. marginata</i> (Bordered Panic)	3
		<i>Gahnia melanocarpa</i> (Black-fruit Saw-sedge)	2
		<i>G. cymosum</i> (Scrambling Lily)	2
		<i>Oplismenus aemulus</i> (Australian Basket Grass)	3
		<i>Oxalis perennans</i> (Yellow Wood Sorrell)	2
		<i>P. pandorana</i> ssp. <i>pandorana</i> (Wonga Wonga Vine)	1
		<i>P. dilatatum</i> (Common Paspalum)	1
		<i>Pellaea paradoxa</i>	1
		<i>Plectranthus parviflorus</i> (Cockspur Flower)	1
		<i>Pyrrosia rupestris</i> (Felt Rock Fern)	2
QUADRAT 4 (MZ 4)			
Upper Stratum	25-30 m / <5%	<i>E. quadrangulata</i> (White-topped Box)	1
Mid Stratum 1	4-15 m / 50%-60%	<i>A. subcinereus</i> (Native Quince)	3
		<i>B. myrtifolia</i> (Grey Myrtle)	3
		<i>D. australis</i> (Black Plum)	3

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>S. brunonianus</i> (Whalebone Tree)	3
Mid Stratum 2	1-4 m / 30-80%	<i>A. irrorata</i> (Green Wattle)	1
		<i>A. subcinereus</i> (Native Quince)	3
		<i>B. myrtifolia</i> (Grey Myrtle)	4
		<i>C. clematidea</i> (Native Grape)	3
		<i>C. antarctica</i> (Kangaroo Grape)	3
		<i>D. australis</i> (Black Plum)	3
		<i>H. dentata</i> (Tree Violet)	2
		<i>M. silvestris</i> (Narrow-leaved Orangebark)	1
		<i>M. variabilis</i>	1
		<i>P. pandorana ssp. pandorana</i> (Wonga Wonga Vine)	3
		<i>P. undulatum</i> (Sweet Pittosporum)	2
		<i>S. brunonianus</i> (Whalebone Tree)	1
Lower Stratum	<1 m / <5%-10%	<i>A. aethiopicum</i> (Common Maidenhair)	2
		<i>A. formosum</i> (Giant Maidenhair)	2
		<i>B. myrtifolia</i> (Grey Myrtle) (emergent)	1
		<i>Dioscorea transversa</i> (Native Yam)	1
		<i>D. aspera</i> (Rasp Fern)	2
		<i>E. marginata</i> (Bordered Panic)	3
		<i>Gahnia melanocarpa</i> (Black-fruit Saw-sedge)	2
		<i>G. cymosum</i> (Scrambling Lily)	1

Stratum	Height / Projected Foliage Cover	Species	Cover Abundance
		<i>O. aemulus</i> (Australian Basket Grass)	3
		<i>P. pandorana</i> ssp. <i>pandorana</i> (Wonga Wonga Vine)	2
		<i>P. paradoxa</i>	1
		<i>P. rupestris</i> (Felt Rock Fern)	2

* Denotes introduced / non-endemic species.

3.4 General Site Inspection

Existing fence lines were observed to be in good physical condition. Due to the weather conditions with higher rainfall has resulted in weed infestations within some areas of the site, this is particularly evident adjacent to access tracks. The site was walked with the land owner to discuss the weeds within the site. Spraying has occurred with evidence of die back of the weeds, however, due to the nature of the site, the site still has evidence of weeds throughout.

There was no evidence of erosion, waste or dieback on the site. There was however, evidence of *Lepus europaeus* (European Hare) which was observed during the nocturnal spotlighting survey, however this species was recorded at a low abundance. No scats of *Sus scrofa* (Common Wild Pig) or evidence of this species were noted during the survey.

4 CONCLUSION & RECOMMENDATIONS

The vertebrate pest surveys found evidence of European Hare and Common Wild Pig vertebrate pests on the site. These species were recorded at low densities. It was concluded that vertebrate pest abundance is likely to be low. Results of the flora surveys have indicated a higher abundance of weeds on the site, this is likely to the weather conditions with a higher rainfall. Natural regeneration appears to occurring throughout the site.

Existing fence lines were observed to be in good physical condition.

See Appendix I for the completed 'Biobanking Site Annual Report'. The following recommendations are provided to ensure that the management actions in Annexure C of the Biobanking agreement continue to be implemented:

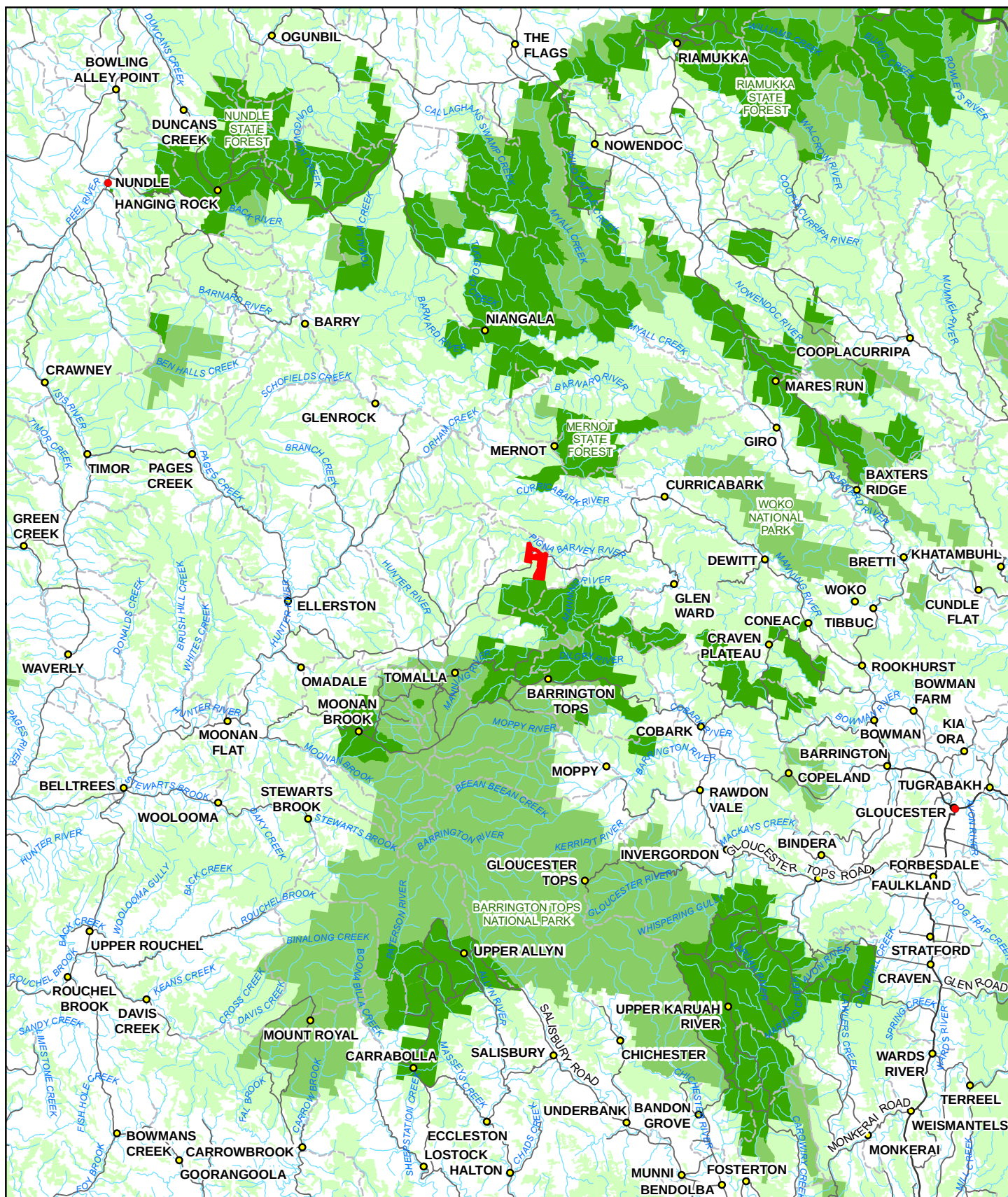
- Continued control of weeds is required within the site along the site's access tracks, low lying areas and also a general sweep through the entire site; and
- Monitoring of the *Lepus europaeus* (European Hare) a, to ensure that the abundance of these species within the site stays low or otherwise, an action plan to be established to eradicate these pests from the site.

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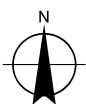
APPENDIX A SITE LOCATION MAP



LEGEND

- | | | | |
|--------------------|------------------|-------------------------------|-------------------------|
| ● Populated Places | — Secondary Road | ■ Built Up Area | ■ Forest Or Shrub |
| ○ Place Names | — Minor Road | ■ Nature Conservation Reserve | ■ Biobank Site Boundary |
| — Watercourse | — Track | ■ State Forest | |
| — Principal Road | | | |

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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Job Number 22-16240
Revision 0
Date 12 Feb 2013

Site Location

Figure 1

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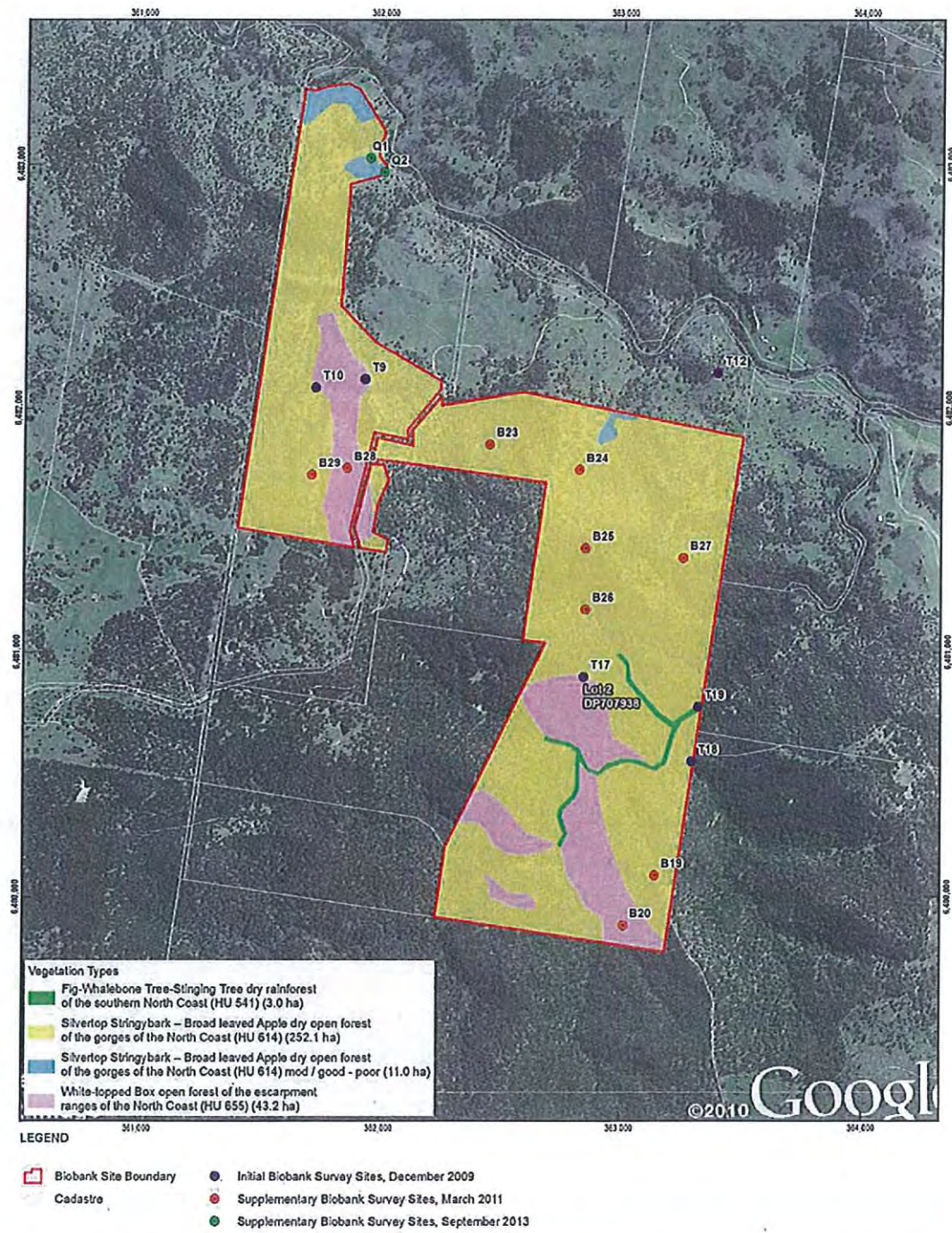
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntmil@ghd.com W www.ghd.com.au

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Data source: Commonwealth of Australia (Geoscience Australia): 250K Topographic Data Series 3, 2006. Created by:fmackay

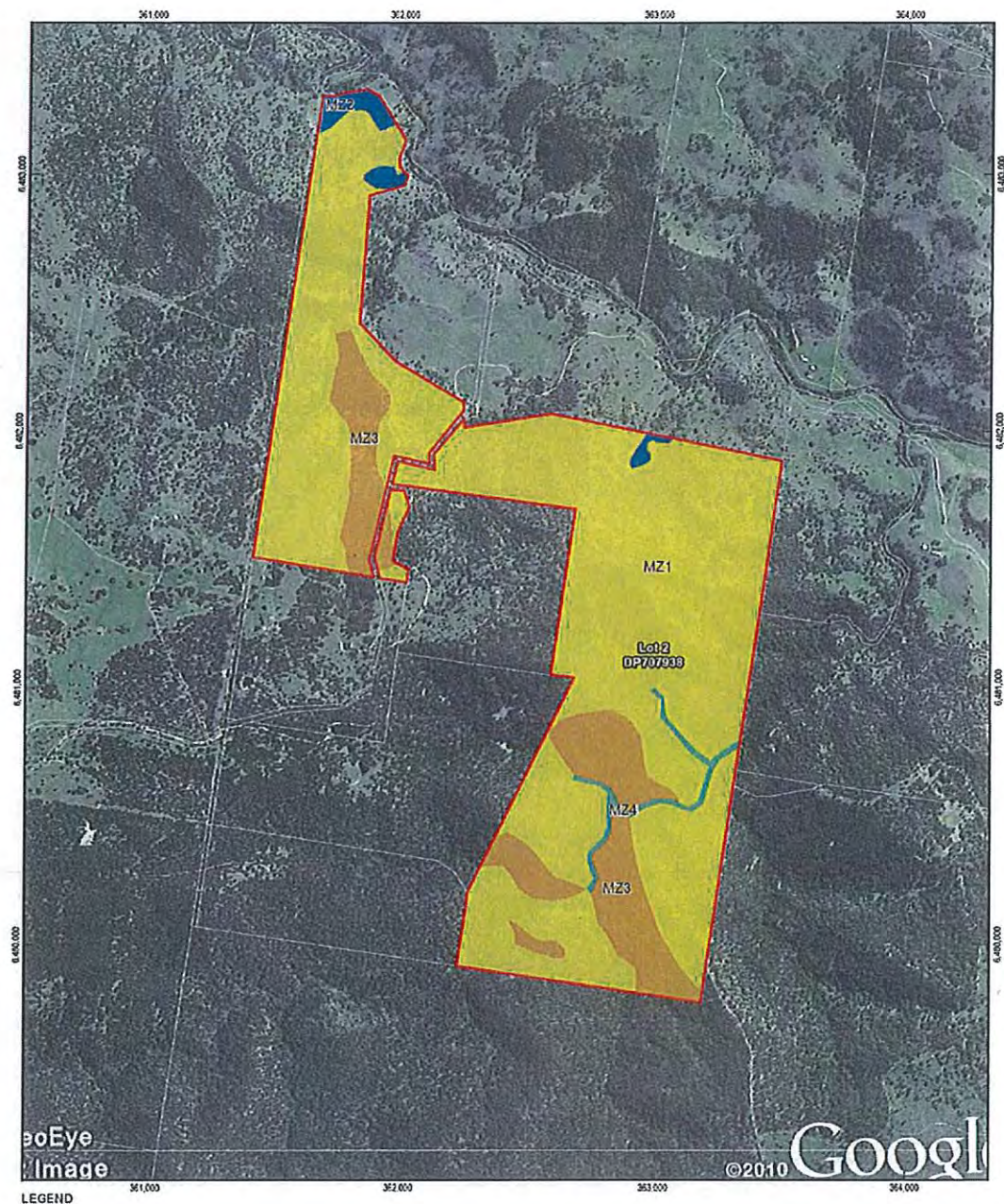
APPENDIX B VEGETATION TYPES MAP

Vegetation Types map (17 March 2014)



APPENDIX C MANAGEMENT ZONES MAP

Management Zone Plan map (10 November 2014)



- LEGEND
- Biobank Site Boundary
 - Cadastre
 - MZ1, Natural Regeneration
 - MZ2, Natural Regeneration
 - MZ3, Natural Regeneration
 - MZ4, Natural Regeneration

Paper Size A4
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Metres
Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 56



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Biobanking Review - Tomalla

Job Number 22-16240
Revision 1
Date 10 Nov 2014

Management Zone Plan

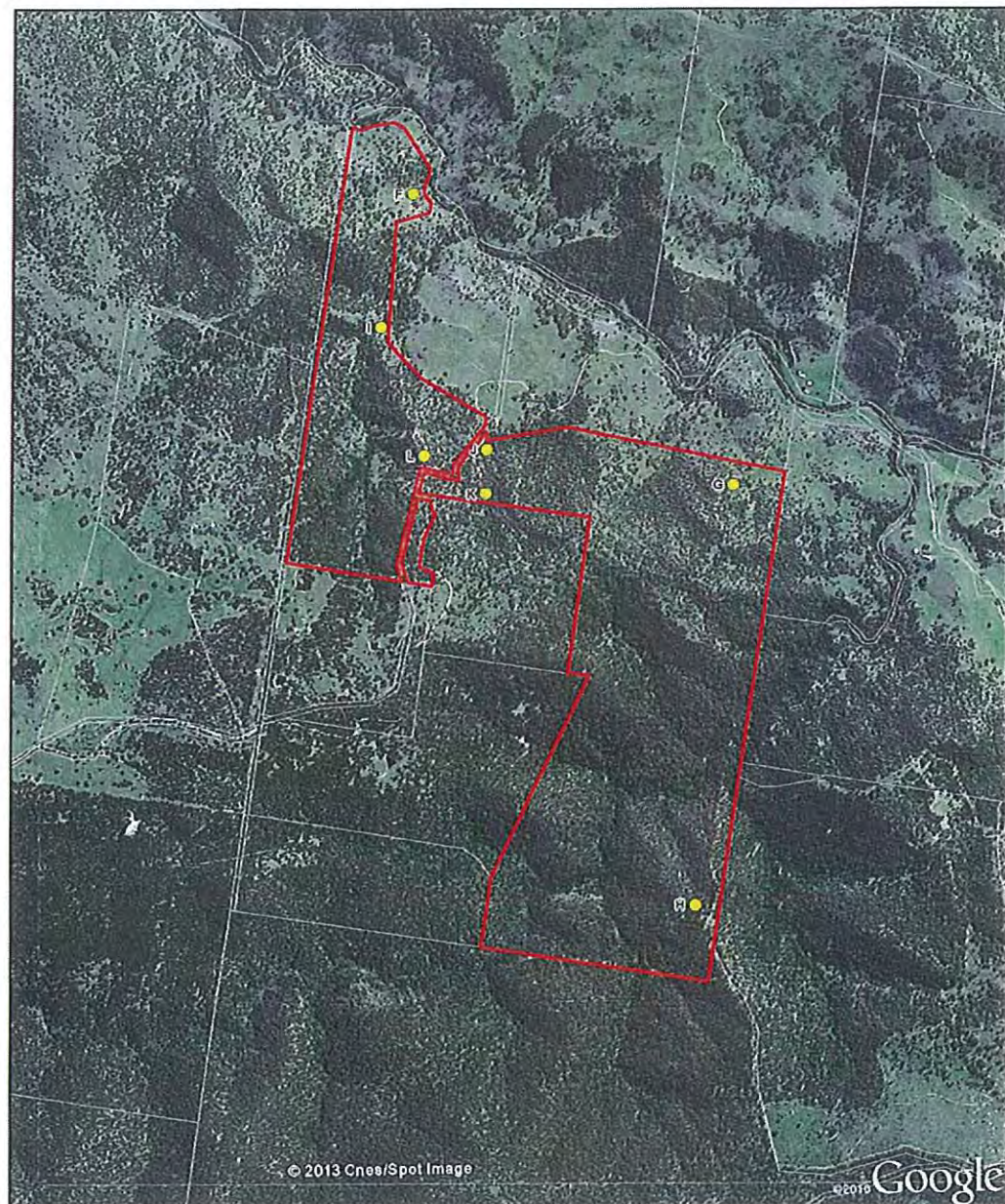
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Data source: LPMA, DCCS 2011, Oregon Vegetation Survey, 2012, Google Earth Aerial 2012. Created by: timackay, timorton

APPENDIX D PHOTO REFERENCE POINTS MAP

Photo Point Locations map (27 March 2014)



LEGEND

- Photo Point
- ▬ Biobank Site Boundary
- ▬ Cadastral

Paper Size A4
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Biobanking Review - Tomalla

Job Number 22-16240
Revision 2
Date 27 Mar 2014

Photo Point Locations

Level 3, GHD Tower, 24 Moneyville Drive, Newcastle NSW 2300 T 61 2 4979 6555 F 61 2 4979 6558 E ndm@ghd.com W www.ghd.com.au
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Data source: LPLMA: DCDG 2011; Google Earth: Aerial 2012. Created by: tmorton

APPENDIX E RAPID ASSESSMENT TECHNIQUE



Rabbits:

A threat to conservation & natural resource management

**How to rapidly assess a rabbit
problem and take action**



The problem

It takes less than one rabbit per hectare to prevent the successful regeneration of many of our common native trees and shrubs. This means that many rabbit-infested patches of remnant native vegetation can't sustain themselves naturally and are in slow decline - but unfortunately this often goes unnoticed. Whether you are a land-owner who conserves some uncleared woodland on the farm or belong to a Landcare group managing vegetation along a roadside, this quick assessment method will help you decide if rabbits are a problem and what action you need to take. National Park managers will also find this a useful tool for alerting them to problems.

How to monitor

Take 15 – 20 minutes to walk through the patch of native vegetation of interest. You should cover about 2 – 3 hectares in this time. Observe carefully but don't stop too long at any given point.

Use this guide to help you fill in the data sheet on pages 14-15.

STEP 1:

Rabbit abundance score

Record evidence of rabbits as you walk; it will help form an 'average' picture of the whole area in your mind. Rabbit warrens may be present as well as scratches and 'buck-heaps' or latrines but the abundance of rabbit pellets (faeces) is the best measure to use (see **Figure 1**). Score these as follows:

0 - none found in the 15 minute search

1 - isolated pellets and small clumps of 5 - 10 pellets 10 metres or more apart

2 - scattered pellets and clumps less than 10 metres apart

3 - common, pellets in larger clumps and occasional buck-heaps on about half the areas you scan closely during the search

4 - abundant, pellets often in large clumps and buck-heaps obvious but not present across whole area

5 - very abundant, pellets and buck-heaps always apparent



FIGURE 1: Typical small clump of rabbit pellets (faeces) in grassland.

Rabbit ‘score’ and population density

The score for rabbits (0 – 5 scale) is not a direct measure of rabbit abundance or population density. However, an approximate conversion is as follows:

Rabbit abundance score	Approximate density (adult rabbits/hectare)
0	0
1	0.5
2	1
3	2
4	5
5	10 or more

STEP 2:

Seedling abundance score

Once you are beginning to get the picture on rabbit abundance, look around to see if there are seedlings of the common native trees and shrubs present in the area. They can be ‘scored’ in a similar way to the rabbits:

0 - none found during 15 minute search

1 - very few, only 1 - 5 individual seedlings encountered

2 - uncommon, 6 - 20 seedlings encountered

3 - common, 20 - 100 seedlings encountered

4 - abundant, 100 - 200 seedlings encountered

5 - very abundant, many hundreds of seedlings encountered

The presence of seedlings is a measure of the health of the vegetation community and a mix of seedlings of different tree or shrub species indicates broad community health.



Common trees and shrubs damaged by rabbits

These can be useful ‘indicators’ of rabbit browsing but you will find many other examples.

- Acacia (Wattles):
Acacia ligulata, *A. oswaldii*
- Bursaria (Sweet Bursaria):
Bursaria spinosa
- Casuarina (Sheokes and Bulokes):
Allocasuarina verticillata
- Callitris (Native Pines):
Callitris glaucophylla and *C. gracilis*
- Dodonea (Turpentine):
Dodonea viscosa
- Hakea (Needlebush):
Hakea leucomera
- Myoporum (Boobialas):
Myoporum insulare

STEP 3:

Rabbit damage score

Closely inspect smaller seedlings, less than 0.5 metres high, for evidence of rabbit damage. Oblique 45° ‘secateurs-like’ cuts through smaller stems, defoliation and gnawing of bark are tell-tale signs (see **Figure 2**). Another sign can be twigs cut from seedlings and then discarded without being eaten – and again look for the ‘secateurs-like’ cut to confirm that rabbits were responsible. The severity of rabbit damage should be ranked as follows:

- 0 - no evidence of rabbit damage
- 1 - slight damage to some seedlings
- 2 - obvious damage but confined to some seedlings
- 3 - many seedlings moderately damaged
- 4 - heavy general damage, some seedlings retain foliage
- 5 - foliage, twigs and bark stripped from all seedlings



FIGURE 2: Rabbit damage showing stripping of bark and 45° ‘secateurs-like’ cuts through twigs.

In some instances rabbits may have eaten all of the seedlings but the severity of grazing can still be ranked at '5' from the presence of a distinct 'browse-line' 500 millimetres above the ground on older saplings or mature shrubs with lower foliage within reach of the rabbits (see **Figure 3**).



FIGURE 3: Absence of small seedlings and a distinct 'browse-line' 500 millimetres above the ground on older saplings indicates severe rabbit impact (Damage score = 5).



FIGURE 4: Native pines with: (a) little damage (score 1); or (b) complete defoliation (score 5).

STEP 4:

Corrected regeneration score

Use the **Table** below to work out a ‘corrected regeneration score’ from the seedling abundance and rabbit damage scores you have obtained.

Two examples are provided:

- Example 1: Seedlings were abundant (score 4) and very little rabbit damage was noted (score 1); the corrected regeneration score is 2.
- Example 2: Seedlings were again abundant (score 4) but rabbit damage was very heavy (score 5); the corrected regeneration score is 0.7 (which can be rounded up to 1).

	Seedling abundance					
Rabbit damage	0	1	2	3	4	5
0	0.20	1.00	2.00	3.00	4.00	5.00
1	0.20	0.50	1.00	1.50	2.00	2.50
2	0.20	0.34	0.70	1.00	1.30	1.70
3	0.20	0.28	0.50	0.80	1.00	1.30
4	0.20	0.20	0.40	0.60	0.80	1.00
5	0.20	0.20	0.30	0.50	0.70	0.80

Use the corrected regeneration score obtained from the **Table** for the next Step.

STEP 5:

Assessing overall rabbit impact

Where does the site you have assessed fit on **Figure 5** below? Use your corrected regeneration score and the score you obtained for rabbit abundance to do this.

Again, two examples are given:

- Example 1: Corrected regeneration score about 3 and rabbit abundance score 1.
- Example 2: Corrected regeneration score about 1 and rabbit abundance score 4.

Most assessments should fall roughly around the *dotted black line* which is based on observations from over 200 sites assessed in south-eastern Australia.

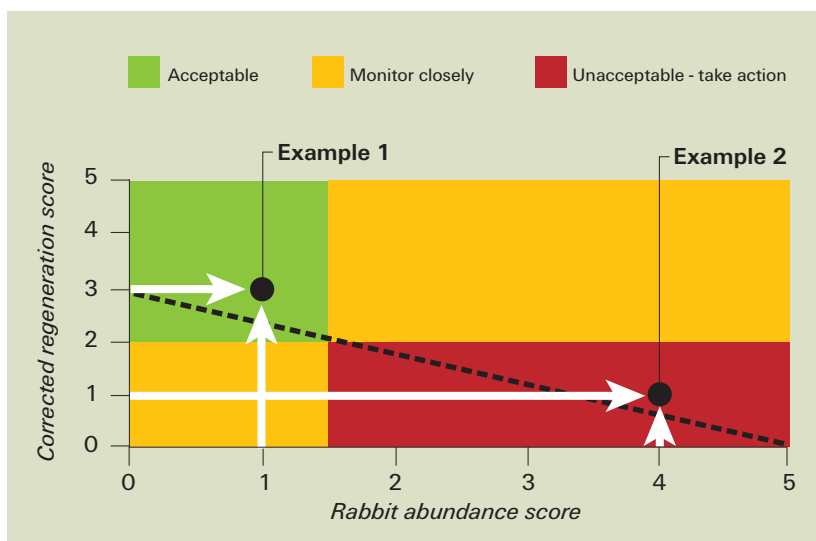


FIGURE 5: Assessing overall rabbit impact.

If your assessment falls within the green zone, rabbits are not having a significant impact on native vegetation regeneration. The yellow zones indicate where rabbits should be watched more closely and the red zone indicates that rabbits must be controlled to avoid serious biodiversity losses.

Removing rabbits

Where rabbits are damaging vegetation, and action to reduce their impact is needed, it is important to remember that the *'cure should not be worse than the disease'*. Where rabbits are living amongst thick remnant native vegetation, the control methods chosen should not irreparably damage trees, shrubs and native herbage.

Several different methods of control often need to be combined to achieve the best results among roadside vegetation:

- poison in summer or autumn to eliminate most rabbits;
- destroy readily accessible warrens by ripping with a suitable small tractor or back-hoe, preferably while soil remains dry;
- fumigate inaccessible rabbit holes and any that re-open after ripping.

This combination of techniques means more work and initial expense, but the low costs of keeping rabbits down in subsequent years quickly brings accumulated costs below those of repeated annual treatments. Treating re-opened rabbit holes by fumigation 'on the spot' during annual inspections will keep costs down and ensure that rabbits do not regain damaging numbers. Ask your local Natural Resource Management Board, Catchment

Management Authority or Rural Lands Protection Board for advice on availability and use of poisons and fumigation equipment.

More information on rabbit management is available at:
www.feral.org.au

Measuring achievement

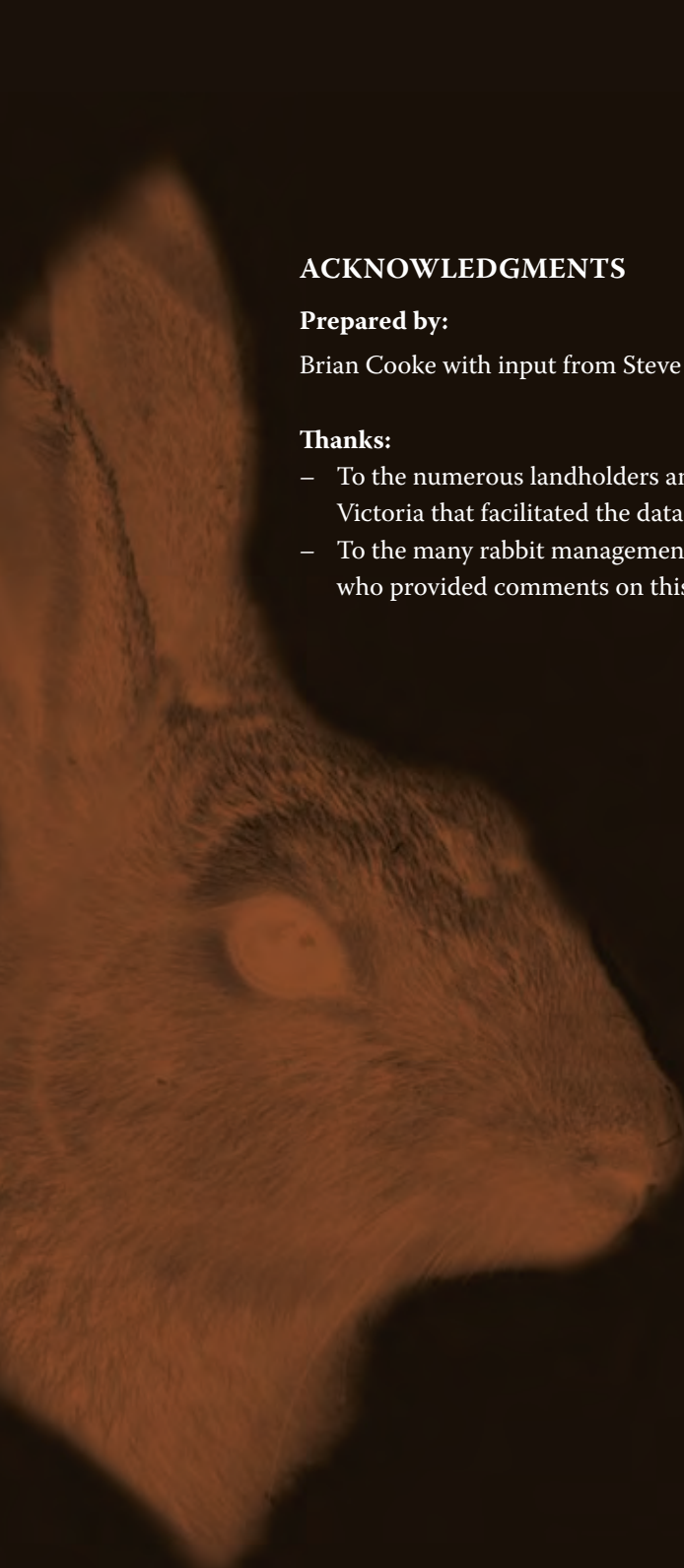
This simple method of assessing rabbits can be useful for measuring progress in rabbit control. Note the results in your diary so that you can measure progress by repeating the assessment again a year from now. Success should not be measured in terms of reduced rabbit numbers alone. The health of the native vegetation — measured in terms of its ability to regenerate — is the main aim.



Rabbit and vegetation data sheet

Site name or reference: <i>(e.g. local name, owner's name details)</i>			
Name of assessor:			
Date:		Inspection time:	am/pm
Location: <i>(e.g. nearest town)</i>			
Latitude: <i>(from GPS)</i>		° S	Longitude: ° E
Altitude: <i>(from GPS)</i>		metres	
Approximate area inspected:		ha.	
Total area of land if known:		ha.	
Land use(s): <i>(e.g. grazing, cropping, rail reserve)</i>			

General description of site: <i>(e.g. remnant native vegetation adjacent to cropland)</i>	
Rabbit Abundance	Score
0 = none found in 15 minute search; 1 = small, isolated clumps >10m apart; 2 = clumps <10 m apart; 3 = common; 4 = abundant, still patchy; 5 = very abundant, faeces always apparent.	
Seedling Abundance	Score
0 = none; 1 = very few; 2 = uncommon; 3 = common; 4 = abundant; 5 = very abundant.	
Rabbit Damage	Score
0 = no damage; 1 = slight damage; 2 = obvious damage confined to some seedlings; 3 = many seedlings moderately damaged; 4 = heavy general damage; 5 = foliage and small twigs and bark stripped from almost all seedlings. If there are no seedlings and there is a browse-line on low foliage, score as 5.	
Corrected Damage Score	Score
Final decision on rabbit control:	



ACKNOWLEDGMENTS

Prepared by:

Brian Cooke with input from Steve McPhee and Quentin Hart

Thanks:

- To the numerous landholders and government agencies in Victoria that facilitated the data collection to develop this model.
- To the many rabbit management experts from around Australia who provided comments on this booklet.



Australian Government

Bureau of Rural Sciences

• **australian wool**
innovation
• limited



mla
MEAT & LIVESTOCK AUSTRALIA

APPENDIX F BRAUN-BLANQUET COVER ABUNDANCE RATINGS

Modified form of the Braun-Blanquet system of cover-abundance classes

Rating	Cover-abundance
1	< 5% cover, few individuals or sparse occurrence
2	< 5% cover, many individuals
3	5-25% cover
4	25-50% cover
5	50-75% cover
6	75-100% cover

Source: Murray, M., Bell, S. and Hoyer, G. (2002). *Flora and Fauna Survey Guidelines: Lower Hunter Central Coast Region 2002*. Lower Hunter & Central Coast Regional Environmental Management Strategy.

APPENDIX G PROPERTY ACTIONS PLAN MAP

Property Actions Plan map (17 March 2014)



LEGEND

- New Gate
- Existing Gate
- New Signage
- New Cattle Grid
- Existing Stock Proof Fence
- Existing Stock Proof Fence - Repair as Required
- New Fence
- Tomalla Road
- Existing track to maintain
- Biobank Site

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 Grid: GDA 1994 UTM Zone 56



ATB Morton Pty Ltd
 Biobanking Review - Tomalla

Job Number 22-16240
 Revision 2
 Date 17 Mar 2014

Property Actions Plan

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 Data source: LPLA-DCOB 2011; Cogen Vegetation Survey, 2012; Google Earth Aerial 2012. Created by: gmd/damid

APPENDIX H RECORDED SPECIES LIST

FLORA

CLASS MAGNOLIOPSIDA (Flowering Plants)

APOCYNACEAE

**Gomphocarpus fruticosus*

Narrow-leaved Cotton Bush

ASTERACEAE

**Ageratina adenophora*

Crofton Weed

**Bidens pilosa*

Cobbler's Pegs

**Conyza bonariensis*

Flaxleaf Fleabane

**Conyza sumatrensis*

Tall Fleabane

**Onopordum acanthium*

Scotch Thistle

**Senecio madagascariensis*

Fireweed

**Xanthium spinosum*

Bathurst Burr

BIGNONIACEAE

Pandorea pandorana ssp. *Pandorana*

Wonga Wonga Vine

CASUARINACEAE

Allocasuarina torulosa

Forest Oak

CELASTACEAE

Denhamia silvestris

Narrow-leaved Orangebark

CONVULVILACEAE

Dichondra repens

Kidney Weed

CUNONIACEAE

Schizomeria ovata

Crabapple

CYPERACEAE

Gahnia melanocarpa

Black-fruited Saw-sedge

DIOSCOREACEAE

Dioscorea transversa

Native Yam

EBENACEAE

Diospyros australis

Black Plum

ELAEocarpaceae

Elaeocarpus obovatus

Blueberry Ash

FABACEAE (FABOIDEAE)

Glycine clandestina

Small-leaf Glycine

Glycine microphylla

Glycine tabacina

Hardenbergia violacea

Purple Coral Pea

Jacksonia scoparia

Dogwood

FABACEAE (MIMOSOIDEAE)

Acacia irrorata

Green Wattle

Acacia longissimi

Long-leaf Wattle

Acacia maidenii

Maiden's Wattle

LAMIACEAE

<i>Plectranthus parviflorus</i>	Cockspur Flower
LOMANDRACEAE	
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
LUZURIAGACEAE	
<i>Eustrephus latifolius</i>	Wombat Berry
<i>Geitonoplesium cymosum</i>	Scrambling Lily
MORACEAE	
<i>Streblus brunonianus</i>	Whalebone Tree
MYRSINACEAE	
<i>Myrsine variabilis</i>	
MYRTACEAE	
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Angophora subvelutina</i>	Broad-leaved apple
<i>Backhousia myrtifolia</i>	Grey Myrtle
<i>Eucalyptus caliginosa</i>	Broad-leaved Stringybark
<i>Eucalyptus globoidea</i>	White Stringybark
<i>Eucalyptus laevopinea</i>	Silvertop Stringybark
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus quadrangulata</i>	White-topped Box
<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Eucalyptus tereticornis</i>	Forest Red Gum
OLEACEAE	
<i>Notelaea longifolia</i>	Large-leaved Olive
OXALIDACEAE	
<i>Oxalis corniculata</i>	Yellow Wood Sorrell
PHORMIACEAE	
<i>Dianella caerulea</i>	Blue Flax-lily
PITTOSPORACEAE	
<i>Billardiera scandens</i>	Hairy Apple Berry
<i>Bursaria spinosa</i>	Blackthorn
<i>Pittosporum spinescens</i>	Wallaby Apple
<i>Pittosporum undulatum</i>	Sweet Pittosporum
PHYLLANTHACEAE	
<i>Breynia oblongifolia</i>	Coffee bush
POACEAE	
<i>Brachyachne convergens</i>	Common Couch
<i>*Cenchrus clandestinus</i>	Kikuyu Grass
<i>Cymbopogon refractus</i>	Barbed Wire Grass
<i>Dichelachne micrantha</i>	Shorthair Plumegrass
<i>Echinopogon ovatus</i>	Forest Hedgehog Grass
<i>Elymus scaber</i>	
<i>Oplismenus aemulus</i>	Australian Basket Grass
<i>*Paspalum dilatatum</i>	Common Paspalum
<i>Poa sieberiana</i> spp. <i>Sieberiana</i>	Grey Tussock Grass
<i>Rytidosperma racemosum</i>	

<i>Themeda triandra</i>	Kangaroo Grass
PRIMULACEAE	
<i>Myrsine variabilis</i>	
PTERIDACEAE	
<i>Cheilanthes sieberi</i> spp. <i>Sieberi</i>	Poison Rock Fern
RANUNCULACEAE	
<i>Clematis aristata</i>	Old Man's Beard
ROSACEAE	
<i>Rubus moluccanus</i>	Broad-leaved Bramble
SAPINDACEAE	
<i>Alectryon subcinereus</i>	Native Quince
SCROPHULARIACEAE	
* <i>Verbascum thapsus</i> spp. <i>Thapsus</i>	Great Mullein
SOLOACEAE	
<i>Solanum aviculare</i>	Kangaroo Apple
VERBENACEAE	
* <i>Verbena bonariensis</i>	Purpletop
VIOLACEAE	
<i>Hymenanthera dentata</i>	Tree Violet
VITACEAE	
<i>Cayratia clematidea</i>	Native Grape
<i>Cissus Antarctica</i>	Kangaroo Vine
XANTHORRHOACEAE	
<i>Xanthorrhoea</i> sp.	Grass Tree

CLASS PTERIDOPSIDA (Ferns)

BLECHNACEAE	
<i>Doodia aspera</i>	Prickly rasp fern
DENNSTAEDTIACEAE	
<i>Pteridium esculentum</i>	Common Bracken Fern
LOMARIOPSIDACEAE	
<i>Nephrolepis cordifolia</i>	Fishbone Fern
PTERIDACEAE	
<i>Adiantum aethiopicum</i>	Common maidenhair
<i>Adiantum formosum</i> (	Giant Maidenhair
<i>Cheilanthes sieberi</i> spp. <i>Sieberi</i>	Poison rock fern
<i>Pellaea paradoxa</i>	
POLYPODIACEAE	
<i>Pyrrosia rupestris</i>	Rock Felt Fern

* Denotes non-endemic / introduced species

FAUNA

CLASS AVES

ARTAMIDAE

Cracticus tibicen

Australian Magpie

CIMACTERIDAE

Cormobates leucophaea

White-throated Treecreeper

COLUMBIDAE

Macropygia phasianella

Brown Cuckoo Dove

CUCULIDAE

Centropus phasianinus

Pheasant Coucal

MALURIDAE

Malurus cyaneus

Superb Fairy-wren

MELAPHIGIDAE

Manorina melanophrys

Bell Miner

MONARCHIDAE

Grallina cyanoleuca

Magpie-lark

RHIPIDURIDAE

Rhipidura leucophrys

Willie Wagtail

CLASS MAMMALIA

MACROPIDIDAE

Macropus giganteus

Eastern Grey Kangaroo

Macropus rufogriseus

Red-necked Wallaby

VOMBATIDAE

Vombatus ursinus

APPENDIX I BIOBANK SITE ANNUAL REPORT

Biobank site annual report					
Location details					
Biobanking agreement ID: 108			Name of Landowner/s: ATB Morton Property address: Pola Fogal, Tomalla NSW		
Records of management actions undertaken					
Management action	Required completion time and frequency	Action completed (Yes/No)	Actual Completion date/s	Description of actions undertaken (including where undertaken (including reference to management zones), any variations and the reasons for variation)	Visual observations and other comments (including reasons for non completion)
1. Management of grazing for conservation	Ongoing from commencement date.	No	On date of commencement.	The installation of new fencing prescribed in the Property Actions Plan map is still required to be completed; however, the site inspection found the existing fencing to be in very good condition. A new cattle grid has been installed just to the north of the site.	The fencing with the site is well maintained. No evidence of livestock was recorded within the site.
2. Weed control	Ongoing from first date of payment.	Yes	N/A	The site inspection observed areas of weed infestations of <i>Bidens pilosa</i> (Cobbler's Pegs), <i>Verbena bonariensis</i> (Purletop), <i>Conyza sumatrensis</i> (Tall	Continued control of weeds is required along the site's access tracks and a general sweep of the

				Fleabane) and <i>A. adenophora</i> (Crofton Weed)), <i>Gomphocarpus physocarpus</i> (Balloon Cotton Bush).	site.
3. Management of fire conservation	Ongoing from first date of payment.	Not required at this stage.	N/A	N/A	N/A
4. Management of human disturbance	Ongoing from commencement date.	Yes	On date of commencement.	New signage has been installed, in accordance with the Property Actions Plan map.	-
5. Retention of native vegetation	Ongoing from commencement date.	Yes	On date of commencement.	The site inspection found the site's native vegetation to be intact, with no evidence of vegetation removal or burning. Further, any cleared areas appear to be regenerating well.	-
6. Retention of dead timber	Ongoing from commencement date.	Yes	On date of commencement.	The site inspection found no evidence of the removal of dead timber on the site. The site contained abundant, undisturbed dead timber.	-
7. Erosion control	Commencing from first payment date.	Not required at this stage. The site inspection found no signs of erosion on the site.	N/A	N/A	N/A
8. Retention of rocks	Ongoing from commencement date.	Yes	On date of commencement.	The site inspection found no evidence of the removal of rocks on the site. The site contained abundant, undisturbed rocky areas.	-

9. Control of feral and over abundant native herbivores	Ongoing from first payment date.	Not required at this stage. The site inspection found no signs of over abundant native herbivores.	N/A	N/A	N/A
10. Vertebrate pest management	Ongoing from first payment date.	Not required at this stage. The site inspection found evidence of Hare and Common Wild Pig within the site. These pests were recorded at a low density.	N/A	Control methods will need to be coordinated with adjoining neighbours as multiple control methods are more successful.	
11. Nutrient control	Ongoing from commencement date.	Yes	On date of commencement.	The site inspection found no evidence of the application of fertilisers, pesticides or herbicides on the site.	-
12. Maintenance or reintroduction of natural flow regimes	Ongoing from commencement date.	Yes	On date of commencement.	The site inspection found no evidence of any artificial structures such as dams and levees banks that impede natural flow regimes. All watercourses / drainage lines on the site appeared to be in a natural state.	-
Incident or event that has adverse effect on biodiversity values on biobank site					
Incident or event including adverse impacts (e.g natural events)			Action taken and proposed recommendation actions		
N/A			N/A		

Records submitted with this report	
✓	Photographs taken at the photo points set in the biobanking agreement
✓	Results of the inspections required to be conducted in item 1.2 of Annexure D to the biobanking agreement.
✓	Results of any monitoring, inspections and surveys required in Annexures C and D to the biobanking agreement.

Signature and Certification	
I hereby declare that the information supplied in this report is accurate and complies with the reporting requirements under item 2 of the Annexure D to the Biobanking agreement Note: if the land that forms the biobank site is owned by multiple persons, each landholder must sign the annual report.	
Signed:	Signed:
Date:	Date:
Signed:	Signed:
Date:	Date:

APPENDIX G

Water Monitoring Results (2022)

Report Number: 12528

Date Issued: 12/04/2022

Revision Number: 00

Site/Job: Redisand Groundwater

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following groundwater sample(s) were received on 25/03/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	25/03/2022	12528/1	Water	Not tested
BH3	25/03/2022	12528/2	Water	
BH4	25/03/2022	12528/3	Water	
BH5	25/03/2022	12528/4	Water	
BH6	25/03/2022	12528/5	Water	Not sampled
MW1	25/03/2022	12528/6	Water	
MW2	25/03/2022	12528/7	Water	Not tested
MW3	25/03/2022	12528/8	Water	
MW4	25/03/2022	12528/9	Water	
MW5	25/03/2022	12528/10	Water	
MW6	25/03/2022	12528/11	Water	
MW7	25/03/2022	12528/12	Water	
FD(BH3)	25/03/2022	12528/13	Water	

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Lisa Thomson
Signatory

Authorised by:



Anthony Crane
Laboratory Manager

Results have been approved and report finalised on 12/04/2022.

Test Report Number: 12528

Date Issued: 12/04/2022

Revision No: 00

Results

Field Analysis	Method	Units	12528/1 BH1 25/03/2022	12528/2 BH3 25/03/2022	12528/3 BH4 25/03/2022	12528/4 BH5 25/03/2022	12528/5 BH6 25/03/2022
Date Tested	--	--	25/03/2022	25/03/2022	25/03/2022	25/03/2022	25/03/2022
Depth to Water	AS5667.11	m(bTOC)	[NT]	18.93	13.07	6.30	20.63
Temperature	Temp	°C	[NT]	20.1	19.4		
pH	APHA 4500-H B	pH Units	[NT]	5.1	5.3		
Electrical Conductivity	APHA 2510 B	µS/cm	[NT]	371	679		
Dissolved Oxygen	APHA 4500-O G	mg/L	[NT]	5.9	4.7		
Oxidation Reduction Potential#	APHA 2580-B	mV	[NT]	192	243		
Turbidity	APHA 2130 B	NTU	[NT]	3.5	120		

Field Analysis	Method	Units	12528/6 MW1 25/03/2022	12528/7 MW2 25/03/2022	12528/8 MW3 25/03/2022	12528/9 MW4 25/03/2022	12528/10 MW5 25/03/2022
Date Tested	--	--	25/03/2022	25/03/2022	25/03/2022	25/03/2022	25/03/2022
Depth to Water	AS5667.11	m(bTOC)	0.96	[NT]	2.61	12.83	0.79
Temperature	Temp	°C	20.5	[NT]	20.2	19.9	22.3
pH	APHA 4500-H B	pH Units	4.0	[NT]	4.4	5.7	5.4
Electrical Conductivity	APHA 2510 B	µS/cm	372	[NT]	159	234	238
Dissolved Oxygen	APHA 4500-O G	mg/L	2.3	[NT]	3.1	3.7	4.1
Oxidation Reduction Potential#	APHA 2580-B	mV	61	[NT]	81	-83	-14
Turbidity	APHA 2130 B	NTU	15	[NT]	35	76	15

Field Analysis	Method	Units	12528/11 MW6 25/03/2022	12528/12 MW7 25/03/2022	12528/13 FD(BH3) 25/03/2022
Date Tested	--	--	25/03/2022	25/03/2022	25/03/2022
Depth to Water	AS5667.11	m(bTOC)	3.05	2.84	
Temperature	Temp	°C	22.5	20.8	20.2
pH	APHA 4500-H B	pH Units	5.9	4.8	5.1
Electrical Conductivity	APHA 2510 B	µS/cm	194	70.0	370
Dissolved Oxygen	APHA 4500-O G	mg/L	2.6	3.3	5.7
Oxidation Reduction Potential#	APHA 2580-B	mV	-40	63	201
Turbidity	APHA 2130 B	NTU	320	35	3.5

Solids	Method	Units	12528/2 BH3 25/03/2022	12528/3 BH4 25/03/2022	12528/6 MW1 25/03/2022	12528/8 MW3 25/03/2022	12528/9 MW4 25/03/2022
Date Tested	--	--	31/03/2022	12/04/2022	12/04/2022	12/04/2022	31/03/2022
Total Dissolved Solids	AS3550.4	mg/L	252	472	334	182	395



Solids	Method	Units	12528/10 MW5 25/03/2022	12528/11 MW6 25/03/2022	12528/12 MW7 25/03/2022	12528/13 FD(BH3) 25/03/2022
<i>Date Tested</i>	--	--	31/03/2022	31/03/2022	31/03/2022	01/04/2022
Total Dissolved Solids	AS3550.4	mg/L	308	360	74	240

Metals - Dissolved	Method	Units	12528/2 BH3 25/03/2022	12528/3 BH4 25/03/2022	12528/6 MW1 25/03/2022	12528/8 MW3 25/03/2022	12528/9 MW4 25/03/2022
Arsenic	EXT	mg/L	<0.001	<0.001	0.005	<0.001	0.008
Iron	EXT	mg/L	0.14	0.04	1.5	0.68	1.0
Manganese	EXT	mg/L	0.013	0.014	0.023	<0.005	0.005

Metals - Dissolved	Method	Units	12528/10 MW5 25/03/2022	12528/11 MW6 25/03/2022	12528/12 MW7 25/03/2022	12528/13 FD(BH3) 25/03/2022
Arsenic	EXT	mg/L	0.001	0.023	<0.001	<0.001
Iron	EXT	mg/L	0.62	3.7	0.21	0.1
Manganese	EXT	mg/L	0.006	0.046	<0.005	0.012

Anions and Cations	Method	Units	12528/2 BH3 25/03/2022	12528/3 BH4 25/03/2022	12528/6 MW1 25/03/2022	12528/8 MW3 25/03/2022	12528/9 MW4 25/03/2022
Chloride, Cl	EXT	mg/L	100	130	85	39	37
Sulphate, SO ₄	EXT	mg/L	17	110	8	<1	<1

Anions and Cations	Method	Units	12528/10 MW5 25/03/2022	12528/11 MW6 25/03/2022	12528/12 MW7 25/03/2022	12528/13 FD(BH3) 25/03/2022
Chloride, Cl	EXT	mg/L	55	30	14	92
Sulphate, SO ₄	EXT	mg/L	<1	2	2	17

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

EXT : tests by Envirolab NATA Acc 2901 Report No. 292108

Some TDS results may be high due to fine solids passing through the filter.

Sampling Report Number: 12528

Date Issued: 12/04/2022

Revision No: 00

Sampling Conditions: Cloudy, 19°- 24°C. Recent heavy rain.

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12528/1	BH1	13406-6	T & D.Walker	25/03/2022	Unknown	AS5667.1
12528/2	BH3		T & D.Walker	25/03/2022 10:48 AM	AS5667.11, Pump	AS5667.1
12528/3	BH4	13406-7	T & D.Walker	25/03/2022 11:07 AM	AS5667.11, Bail	AS5667.1
12528/4	BH5		T & D.Walker	25/03/2022 12:14 PM	Depth only	
12528/5	BH6	13406-5	T & D.Walker	25/03/2022 12:21 PM	Depth only	
12528/6	MW1	13406-4	T & D.Walker	25/03/2022 12:40 PM	AS5667.11, Bail	AS5667.1
12528/7	MW2		T & D.Walker	25/03/2022	AS5667.11, Pump	AS5667.1
12528/8	MW3		T & D.Walker	25/03/2022 11:38 AM	AS5667.11, Bail	AS5667.1
12528/9	MW4		T & D.Walker	25/03/2022 10:20 AM	AS5667.11, Bail	AS5667.1
12528/10	MW5		T & D.Walker	25/03/2022 1:10 PM	AS5667.11, Bail	AS5667.1
12528/11	MW6		T & D.Walker	25/03/2022 9:36 AM	AS5667.11, Bail	AS5667.1
12528/12	MW7		T & D.Walker	25/03/2022 11:58 AM	AS5667.11, Bail	AS5667.1
12528/13	FD(BH3)		T & D.Walker	25/03/2022 10:56 AM	AS5667.11, Pump	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
12528/1	BH1	Borehole lost to mining
12528/2	BH3	
12528/3	BH4	
12528/4	BH5	Dry - depth measured to bottom
12528/5	BH6	Insufficient water to sample
12528/6	MW1	
12528/7	MW2	No access due to previous mining on adjacent property
12528/8	MW3	
12528/9	MW4	
12528/10	MW5	
12528/11	MW6	
12528/12	MW7	
12528/13	FD(BH3)	

Sampling procedures have been approved and report finalised on 12/04/2022.

Where method is "unknown" sampling procedures are not endorsed

Well Parameters:

Client: Redisand NSW

Site/Job: Redisand Groundwater

Well ID	GPS-Easting	GPS-Northing	Survey Date	Surveyed AHD (m)	Depth to Screen (m)
BH1	0400163	6370799			
BH3	0400389	6370976			
BH4	0400564	6371030	8/04/2011	14.620	13
BH5	0400245	6370629	8/04/2011	8.773	6.3
BH6	0399989	6370680	8/04/2011	23.013	20.25
MW1	0399809	6370746	8/04/2011	3.573	1.5
MW2	0400494	6371070	8/04/2011	28.067	26.700
MW3	0400546	6370751	8/04/2011	4.581	2.670
MW4	0400251	6370991	8/04/2011	15.056	13.390
MW5	0399803	6370869	8/04/2011	2.860	1.900
MW6	0400032	6370982	8/04/2011	7.737	4.820
MW7	0400517	6370612	8/04/2011	5.052	2.5
FD(BH3)					

Well ID	Date Well Measured	Case Height (monument) (m)	Depth to bottom m(bTOC)	Recharge Rate	Approximate Volume (L)
BH1					
BH3	24/09/2019		21.40	Good 75%	4
BH4	24/09/2019		14.63	Good 75%	1.6
BH5	16/12/2021		6.28	NA	0
BH6	16/12/2021		20.84	OK	<1
MW1	24/09/2019		4.41	Good 75%	5
MW2	24/09/2019		28.49	Good 75%	3
MW3	24/09/2019		5.68	Good 75%	4.5
MW4	24/09/2019		15.58	Good 75%	4.5
MW5	24/09/2019		4.72	Good 75%	6.5
MW6	24/09/2019		4.48	Good 75%	3
MW7	24/09/2019		5.72	Good 75%	4
FD(BH3)					

Note: NATA accreditation does not cover information provided in this section

*Where indicated AHD from ground level (m) estimated based on handheld GPS

Report Number: 12868

Date Issued: 14/06/2022

Revision Number: 00

Site/Job: Redisand Groundwater

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following groundwater sample(s) were received on 2/06/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	2/06/2022	12868/1	Water	
BH3	2/06/2022	12868/2	Water	
BH4	2/06/2022	12868/3	Water	
BH5	2/06/2022	12868/4	Water	
BH6	2/06/2022	12868/5	Water	
MW1	2/06/2022	12868/6	Water	
MW2	2/06/2022	12868/7	Water	Not Tested
MW3	2/06/2022	12868/8	Water	
MW4	2/06/2022	12868/9	Water	
MW5	2/06/2022	12868/10	Water	
MW6	2/06/2022	12868/11	Water	
MW7	2/06/2022	12868/12	Water	
FD(MW1)	2/06/2022	12868/13	Water	

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 14/06/2022.

Test Report Number: 12868

Date Issued: 14/06/2022

Revision No: 00

Results

Field Analysis	Method	Units	12868/1 BH1 2/06/2022	12868/2 BH3 2/06/2022	12868/3 BH4 2/06/2022	12868/4 BH5 2/06/2022	12868/5 BH6 2/06/2022
Date Tested	--	--	02/06/2022	02/06/2022	02/06/2022	02/06/2022	02/06/2022
Depth to Water	AS5667.11	m(bTOC)	2.89	18.51	12.66	6.13	20.27
Temperature	Temp	°C	19.0	18.5	18.4	18.1	[NT]
pH	APHA 4500-H B	pH Units	5.5	5.3	5.3	5.5	[NT]
Electrical Conductivity	APHA 2510 B	µS/cm	126	407	723	202	[NT]
Dissolved Oxygen	APHA 4500-O G	mg/L	5.3	5.1	4.2	5.8	[NT]
Oxidation Reduction Potential _#	APHA 2580-B	mV	301	242	293	262	[NT]
Turbidity	APHA 2130 B	NTU	3,800	13	100	200	[NT]

Field Analysis	Method	Units	12868/6 MW1 2/06/2022	12868/8 MW3 2/06/2022	12868/9 MW4 2/06/2022	12868/10 MW5 2/06/2022	12868/11 MW6 2/06/2022
Date Tested	--	--	02/06/2022	02/06/2022	02/06/2022	02/06/2022	02/06/2022
Depth to Water	AS5667.11	m(bTOC)	0.75	2.09	12.56	0.77	2.75
Temperature	Temp	°C	15.5	18.2	18.0	16.2	18.5
pH	APHA 4500-H B	pH Units	4.2	4.1	5.6	5.2	5.7
Electrical Conductivity	APHA 2510 B	µS/cm	146	129	255	177	242
Dissolved Oxygen	APHA 4500-O G	mg/L	2.5	3.5	3.2	3.7	2.6
Oxidation Reduction Potential _#	APHA 2580-B	mV	98	171	61	106	38
Turbidity	APHA 2130 B	NTU	24	19	110	7.1	310

Field Analysis	Method	Units	12868/12 MW7 2/06/2022	12868/13 FD(MW1) 2/06/2022
Date Tested	--	--	02/06/2022	02/06/2022
Depth to Water	AS5667.11	m(bTOC)	2.33	[NT]
Temperature	Temp	°C	17.8	15.3
pH	APHA 4500-H B	pH Units	4.9	4.2
Electrical Conductivity	APHA 2510 B	µS/cm	58.0	139
Dissolved Oxygen	APHA 4500-O G	mg/L	2.9	2.7
Oxidation Reduction Potential _#	APHA 2580-B	mV	69	103
Turbidity	APHA 2130 B	NTU	25	25

Solids	Method	Units	12868/1 BH1 2/06/2022	12868/2 BH3 2/06/2022	12868/3 BH4 2/06/2022	12868/4 BH5 2/06/2022	12868/6 MW1 2/06/2022
Date Tested	--	--	07/06/2022	07/06/2022	07/06/2022	07/06/2022	07/06/2022
Total Dissolved Solids	AS3550.4	mg/L	314	246	408	145	232



Solids	Method	Units	12868/8 MW3 2/06/2022	12868/9 MW4 2/06/2022	12868/10 MW5 2/06/2022	12868/11 MW6 2/06/2022	12868/12 MW7 2/06/2022
Date Tested	--	--	07/06/2022	13/06/2022	13/06/2022	13/06/2022	13/06/2022
Total Dissolved Solids	AS3550.4	mg/L	134	448	231	344	82

Solids	Method	Units	12868/13 FD(MW1) 2/06/2022
Date Tested	--	--	13/06/2022
Total Dissolved Solids	AS3550.4	mg/L	231

Metals - Dissolved	Method	Units	12868/1 BH1 2/06/2022	12868/2 BH3 2/06/2022	12868/3 BH4 2/06/2022	12868/4 BH5 2/06/2022	12868/6 MW1 2/06/2022
Arsenic	EXT	mg/L	0.002	<0.001	<0.001	<0.001	0.003
Iron	EXT	mg/L	0.92	0.06	0.06	0.06	0.47
Manganese	EXT	mg/L	0.006	0.006	0.020	<0.005	0.012

Metals - Dissolved	Method	Units	12868/8 MW3 2/06/2022	12868/9 MW4 2/06/2022	12868/10 MW5 2/06/2022	12868/11 MW6 2/06/2022	12868/12 MW7 2/06/2022
Arsenic	EXT	mg/L	<0.001	0.009	<0.001	0.014	<0.001
Iron	EXT	mg/L	0.95	0.84	0.43	3.6	0.16
Manganese	EXT	mg/L	<0.005	0.059	<0.005	0.044	<0.005

Metals - Dissolved	Method	Units	12868/13 FD(MW1) 2/06/2022
Arsenic	EXT	mg/L	0.003
Iron	EXT	mg/L	0.48
Manganese	EXT	mg/L	0.013

Anions and Cations	Method	Units	12868/1 BH1 2/06/2022	12868/2 BH3 2/06/2022	12868/3 BH4 2/06/2022	12868/4 BH5 2/06/2022	12868/6 MW1 2/06/2022
Chloride, Cl	EXT	mg/L	24	100	180	47	44
Sulphate, SO ₄	EXT	mg/L	7	17	37	8	2

Anions and Cations	Method	Units	12868/8 MW3 2/06/2022	12868/9 MW4 2/06/2022	12868/10 MW5 2/06/2022	12868/11 MW6 2/06/2022	12868/12 MW7 2/06/2022
Chloride, Cl	EXT	mg/L	28	46	38	51	12
Sulphate, SO ₄	EXT	mg/L	2	<1	<1	2	<1

Anions and Cations	Method	Units	12868/13 FD(MW1) 2/06/2022
Chloride, Cl	EXT	mg/L	29
Sulphate, SO ₄	EXT	mg/L	2

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

EXT : tests by Envirolab NATA Acc 2901 Report No. 297239

Sampling Report Number: 12868

Date Issued: 14/06/2022

Revision No: 00

Sampling Conditions: Cloudy, 10°- 15°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12868/1	BH1	13406-6	T.Walker	2/06/2022 11:23 AM	AS5667.11, Bail	AS5667.1
12868/2	BH3		T.Walker	2/06/2022 12:41 PM	AS5667.11, Pump	AS5667.1
12868/3	BH4	13406-7	T.Walker	2/06/2022 1:04 PM	AS5667.11, Bail	AS5667.1
12868/4	BH5		T.Walker	2/06/2022 2:13 PM	AS5667.11, Bail	AS5667.1
12868/5	BH6	13406-5	T.Walker	2/06/2022 2:41 PM	Depth only	
12868/6	MW1	13406-4	T.Walker	2/06/2022 10:02 AM	AS5667.11, Bail	AS5667.1
12868/7	MW2		T.Walker	2/06/2022		
12868/8	MW3		T.Walker	2/06/2022 1:39 PM	AS5667.11, Bail	AS5667.1
12868/9	MW4		T.Walker	2/06/2022 12:16 PM	AS5667.11, Bail	AS5667.1
12868/10	MW5		T.Walker	2/06/2022 10:42 AM	AS5667.11, Bail	AS5667.1
12868/11	MW6		T.Walker	2/06/2022 11:04 AM	AS5667.11, Bail	AS5667.1
12868/12	MW7		T.Walker	2/06/2022 1:58 PM	AS5667.11, Bail	AS5667.1
12868/13	FD(MW1)		T.Walker	2/06/2022 10:17 AM	AS5667.11, Bail	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
12868/1	BH1	5.95m to bottom, fast recharge, 6 wells bailed, very turbid
12868/2	BH3	
12868/3	BH4	
12868/4	BH5	9.40 bottom depth. 6 well volumes purged.
12868/5	BH6	Insufficient water to sample, no recharge
12868/6	MW1	Logger had broken off string, sitting 4.43m on bottom
12868/7	MW2	No Access
12868/8	MW3	
12868/9	MW4	
12868/10	MW5	
12868/11	MW6	
12868/12	MW7	
12868/13	FD(MW1)	

Sampling procedures have been approved and report finalised on 14/06/2022.

Where method is "unknown" sampling procedures are not endorsed

Well Parameters:

Client: Redisand NSW

Site/Job: Redisand Groundwater

Well ID	GPS-Easting	GPS-Northing	Survey Date	Surveyed AHD (m)	Depth to Screen (m)
BH1	0400163	6370799			
BH3	0400389	6370976			
BH4	0400564	6371030	8/04/2011	14.620	13
BH5	0400245	6370629	8/04/2011	8.773	6.3
BH6	0399989	6370680	8/04/2011	23.013	20.25
MW1	0399809	6370746	8/04/2011	3.573	1.5
MW2	0400494	6371070	8/04/2011	28.067	26.700
MW3	0400546	6370751	8/04/2011	4.581	2.670
MW4	0400251	6370991	8/04/2011	15.056	13.390
MW5	0399803	6370869	8/04/2011	2.860	1.900
MW6	0400032	6370982	8/04/2011	7.737	4.820
MW7	0400517	6370612	8/04/2011	5.052	2.5
FD(MW1)					

Well ID	Date Well Measured	Case Height (TOC) (m)	Depth to bottom m(bTOC)	Recharge Rate	Approximate Volume (L)
BH1	2/06/2022		5.95	Fast	6
BH3	24/09/2019		21.40	Good 75%	4
BH4	24/09/2019		14.63	Good 75%	1.6
BH5	2/06/2022		9.40		6
BH6	16/12/2021		20.84	NA	<1
MW1	24/09/2019		4.41	Good 75%	5
MW2	24/09/2019		28.49	Good 75%	3
MW3	24/09/2019		5.68	Good 75%	4.5
MW4	24/09/2019		15.58	Good 75%	4.5
MW5	24/09/2019		4.72	Good 75%	6.5
MW6	24/09/2019		4.48	Good 75%	3
MW7	24/09/2019		5.72	Good 75%	4
FD(MW1)					

Note: NATA accreditation does not cover information provided in this section

*Where indicated AHD from ground level (m) estimated based on handheld GPS

Report Number: 13470

Date Issued: 6/10/2022

Revision Number: 00

Site/Job: Redisand Groundwater

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following groundwater sample(s) were received on 22/09/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	22/09/2022	13470/1	Water	
BH3	22/09/2022	13470/2	Water	
BH4	22/09/2022	13470/3	Water	
BH5	22/09/2022	13470/4	Water	
BH6	22/09/2022	13470/5	Water	
MW1	22/09/2022	13470/6	Water	
MW2	22/09/2022	13470/7	Water	Not Tested
MW3	22/09/2022	13470/8	Water	
MW4	22/09/2022	13470/9	Water	
MW5	22/09/2022	13470/10	Water	
MW6	22/09/2022	13470/11	Water	
MW7	22/09/2022	13470/12	Water	
FD(MW1)	22/09/2022	13470/13	Water	

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 6/10/2022.

Test Report Number: 13470

Date Issued: 6/10/2022

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	13470/1 22/09/2022 BH1	13470/2 22/09/2022 BH3	13470/3 22/09/2022 BH4	13470/4 22/09/2022 BH5	13470/5 22/09/2022 BH6
Date Tested	--	--	22/09/2022	22/09/2022	22/09/2022	22/09/2022	22/09/2022
Depth to Water	AS5667.11	m(bTOC)	2.66	18.04	12.28	5.66	19.90
Temperature	Temp	°C	16.9	19.1	19.2	17.5	[NT]
pH	APHA 4500-H B	pH Units	5.8	5.7	5.3	5.2	[NT]
Electrical Conductivity	APHA 2510 B	µS/cm	91.0	308	581	292	[NT]
Dissolved Oxygen	APHA 4500-O G	mg/L	6.3	6.4	3.8	3.4	[NT]
Oxidation Reduction Potential _#	APHA 2580-B	mV	205	147	231	227	[NT]
Turbidity	APHA 2130 B	NTU	750	75	90	75	[NT]

Field Analysis		Lab ID Sample Date Sample ID Units	13470/6 22/09/2022 MW1	13470/8 22/09/2022 MW3	13470/9 22/09/2022 MW4	13470/10 22/09/2022 MW5	13470/11 22/09/2022 MW6
Date Tested	--	--	22/09/2022	22/09/2022	22/09/2022	22/09/2022	22/09/2022
Depth to Water	AS5667.11	m(bTOC)	0.59	1.63	12.31	0.71	2.62
Temperature	Temp	°C	15.4	17.1	18.9	15.5	17.5
pH	APHA 4500-H B	pH Units	4.8	4.3	5.7	5.2	5.8
Electrical Conductivity	APHA 2510 B	µS/cm	116	113	298	206	221
Dissolved Oxygen	APHA 4500-O G	mg/L	2.6	2.1	4.6	3.4	2.4
Oxidation Reduction Potential _#	APHA 2580-B	mV	116	107	57	73	-7
Turbidity	APHA 2130 B	NTU	9.0	13	120	8.5	150

Field Analysis		Lab ID Sample Date Sample ID Units	13470/12 22/09/2022 MW7	13470/13 22/09/2022 FD(MW1)
Date Tested	--	--	22/09/2022	22/09/2022
Depth to Water	AS5667.11	m(bTOC)	1.82	[NT]
Temperature	Temp	°C	16.4	15.7
pH	APHA 4500-H B	pH Units	4.9	4.8
Electrical Conductivity	APHA 2510 B	µS/cm	56.0	116
Dissolved Oxygen	APHA 4500-O G	mg/L	1.9	2.5
Oxidation Reduction Potential _#	APHA 2580-B	mV	67	112
Turbidity	APHA 2130 B	NTU	9.2	8.6

Solids		Lab ID Sample Date Sample ID Units	13470/1 22/09/2022 BH1	13470/2 22/09/2022 BH3	13470/3 22/09/2022 BH4	13470/4 22/09/2022 BH5	13470/6 22/09/2022 MW1
Date Tested	--	--	29/09/2022	29/09/2022	29/09/2022	29/09/2022	29/09/2022
Total Dissolved Solids	AS3550.4	mg/L	223	204	393	192	199



Solids		Lab ID Sample Date Sample ID Units	13470/8 22/09/2022 MW3	13470/9 22/09/2022 MW4	13470/10 22/09/2022 MW5	13470/11 22/09/2022 MW6	13470/12 22/09/2022 MW7
Date Tested	--	--	29/09/2022	29/09/2022	29/09/2022	29/09/2022	29/09/2022
Total Dissolved Solids	AS3550.4	mg/L	172	585	266	298	67

Solids		Lab ID Sample Date Sample ID Units	13470/13 22/09/2022 FD(MW1)
Date Tested	--	--	29/09/2022
Total Dissolved Solids	AS3550.4	mg/L	211

Metals - Dissolved		Lab ID Sample Date Sample ID Units	13470/1 22/09/2022 BH1	13470/2 22/09/2022 BH3	13470/3 22/09/2022 BH4	13470/4 22/09/2022 BH5	13470/6 22/09/2022 MW1
Arsenic	EXT	mg/L	0.002	<0.001	<0.001	<0.001	0.004
Iron	EXT	mg/L	0.56	0.05	0.08	0.04	0.46
Manganese	EXT	mg/L	<0.005	0.029	0.029	<0.005	0.011

Metals - Dissolved		Lab ID Sample Date Sample ID Units	13470/8 22/09/2022 MW3	13470/9 22/09/2022 MW4	13470/10 22/09/2022 MW5	13470/11 22/09/2022 MW6	13470/12 22/09/2022 MW7
Arsenic	EXT	mg/L	<0.001	0.011	<0.001	0.017	<0.001
Iron	EXT	mg/L	0.72	1.4	0.51	5.1	0.12
Manganese	EXT	mg/L	<0.005	0.065	0.006	0.046	<0.005

Metals - Dissolved		Lab ID Sample Date Sample ID Units	13470/13 22/09/2022 FD(MW1)
Arsenic	EXT	mg/L	0.003
Iron	EXT	mg/L	0.44
Manganese	EXT	mg/L	0.010

Anions and Cations		Lab ID Sample Date Sample ID Units	13470/1 22/09/2022 BH1	13470/2 22/09/2022 BH3	13470/3 22/09/2022 BH4	13470/4 22/09/2022 BH5	13470/6 22/09/2022 MW1
Chloride, Cl	EXT	mg/L	19	66	120	63	21
Sulphate, SO ₄	EXT	mg/L	5	14	24	11	<1

Anions and Cations		Lab ID Sample Date Sample ID Units	13470/8 22/09/2022 MW3	13470/9 22/09/2022 MW4	13470/10 22/09/2022 MW5	13470/11 22/09/2022 MW6	13470/12 22/09/2022 MW7
Chloride, Cl	EXT	mg/L	22	45	44	32	11
Sulphate, SO ₄	EXT	mg/L	1	2	<1	<1	<1

Anions and Cations	Method	Lab ID	13470/13
		Sample Date	22/09/2022
		Sample ID	FD(MW1)
		Units	
Chloride, Cl	EXT	mg/L	20
Sulphate, SO ₄	EXT	mg/L	<1

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

EXT : tests by Envirolab NATA Acc 2901 Report No. 306655

Sampling Report Number: 13470

Date Issued: 6/10/2022

Revision No: 00

Sampling Conditions: Showers, 16°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13470/1	BH1	13406-6	T & D.Walker	22/09/2022 12:08 PM	AS5667.11, Bail	AS5667.1
13470/2	BH3		T & D.Walker	22/09/2022 1:04 PM	AS5667.11, Bail	AS5667.1
13470/3	BH4	13406-7	T & D.Walker	22/09/2022 1:24 PM	AS5667.11, Bail	AS5667.1
13470/4	BH5		T & D.Walker	22/09/2022 2:23 PM	AS5667.11, Bail	
13470/5	BH6	13406-5	T & D.Walker	22/09/2022 2:36 PM	Depth only	
13470/6	MW1	13406-4	T & D.Walker	22/09/2022 10:23 AM	AS5667.11, Bail	AS5667.1
13470/7	MW2		T & D.Walker	22/09/2022		
13470/8	MW3		T & D.Walker	22/09/2022 1:41 PM	AS5667.11, Bail	AS5667.1
13470/9	MW4		T & D.Walker	22/09/2022 12:43 PM	AS5667.11, Bail	AS5667.1
13470/10	MW5		T & D.Walker	22/09/2022 10:57 AM	AS5667.11, Bail	AS5667.1
13470/11	MW6		T & D.Walker	22/09/2022 11:38 AM	AS5667.11, Bail	AS5667.1
13470/12	MW7		T & D.Walker	22/09/2022 2:03 PM	AS5667.11, Bail	AS5667.1
13470/13	FD(MW1)		T & D.Walker	22/09/2022 10:33 AM	AS5667.11, Bail	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
13470/1	BH1	
13470/2	BH3	
13470/3	BH4	
13470/4	BH5	
13470/5	BH6	Insufficient water for sample, no recharge
13470/6	MW1	
13470/7	MW2	No Access
13470/8	MW3	
13470/9	MW4	
13470/10	MW5	
13470/11	MW6	
13470/12	MW7	
13470/13	FD(MW1)	

Sampling procedures have been approved and report finalised on 6/10/2022.

Where method is "unknown" sampling procedures are not endorsed

Well Parameters:

Client: Redisand NSW

Site/Job: Redisand Groundwater

Well ID	GPS-Easting	GPS-Northing	Survey Date	Surveyed AHD (m)	Depth to Screen (m)
BH1	0400163	6370799			
BH3	0400389	6370976			
BH4	0400564	6371030	8/04/2011	14.620	13
BH5	0400245	6370629	8/04/2011	8.773	6.3
BH6	0399989	6370680	8/04/2011	23.013	20.25
MW1	0399809	6370746	8/04/2011	3.573	1.5
MW2	0400494	6371070	8/04/2011	28.067	26.700
MW3	0400546	6370751	8/04/2011	4.581	2.670
MW4	0400251	6370991	8/04/2011	15.056	13.390
MW5	0399803	6370869	8/04/2011	2.860	1.900
MW6	0400032	6370982	8/04/2011	7.737	4.820
MW7	0400517	6370612	8/04/2011	5.052	2.5
FD(MW1)					

Well ID	Date Well Measured	Case Height (TOC) (m)	Depth to bottom m(bTOC)	Recharge Rate	Approximate Volume (L)
BH1	2/06/2022		5.95	Fast	6
BH3	24/09/2019		21.40	Good 75%	4
BH4	24/09/2019		14.63	Good 75%	1.6
BH5	2/06/2022		9.40		6
BH6	16/12/2021		20.84	NA	<1
MW1	24/09/2019		4.41	Good 75%	5
MW2	24/09/2019		28.49	Good 75%	3
MW3	24/09/2019		5.68	Good 75%	4.5
MW4	24/09/2019		15.58	Good 75%	4.5
MW5	24/09/2019		4.72	Good 75%	6.5
MW6	24/09/2019		4.48	Good 75%	3
MW7	24/09/2019		5.72	Good 75%	4
FD(MW1)					

Note: NATA accreditation does not cover information provided in this section

*Where indicated AHD from ground level (m) estimated based on handheld GPS

Report Number: 13947

Date Issued: 19/12/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 19/12/2022 12:48

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	15/12/2022	13947/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 19/12/2022.

Test Report Number: 13947

Date Issued: 19/12/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Lab ID	13947/1
		Sample Date Sample ID Units	15/12/2022 Sand
pH(f)	(QASSIT) 2004	pH units	6.3
pH(fox)	(QASSIT) 2004	pH units	6.1
pH Difference	(QASSIT) 2004	pH units	0.2
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 12097

Date Issued: 20/01/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 13/01/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	13/01/2022	12097/1	Water	White
Settled Pond	13/01/2022	12097/2	Water	Black
Creek	13/01/2022	12097/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Approved by:

Results have been approved and report finalised on 20/01/2022.

Test Report Number: 12097

Date Issued: 20/01/2022

Revision No: 00

Results

Field Analysis	Method	Units	12097/1 Feed Pond 13/01/2022	12097/2 Settled Pond 13/01/2022	12097/3 Creek 13/01/2022
Date Tested	--	--	13/01/2022	13/01/2022	13/01/2022
Temperature	Temp	°C	24.0	22.9	21.6
pH	APHA 4500-H B	pH Units	5.8	6.2	6.0
Electrical Conductivity	APHA 2510 B	µS/cm	232	258	268
Dissolved Oxygen	APHA 4500-O G	mg/L	7.8	3.5	1.5
Oxidation Reduction Potential#	APHA 2580-B	mV	191	249	103

Solids	Method	Units	12097/1 Feed Pond 13/01/2022	12097/2 Settled Pond 13/01/2022	12097/3 Creek 13/01/2022
Date Tested	--	--	17/01/2022	17/01/2022	17/01/2022
Total Dissolved Solids	AS3550.4	mg/L	342	84	84
Date Tested	--	--	13/01/2022	13/01/2022	13/01/2022
Total Suspended Solids	AS3550.4	mg/L	2,200	<5	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Accredited for compliance with ISO/IEC 17025 – Testing.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12097

Date Issued: 20/01/2022

Revision No: 00

Sampling Conditions: 24-25°C, Sunny

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12097/1	Feed Pond		D.Walker	13/01/2022 11:08 AM	AS5667.4 Lake, Grab	AS5667.1
12097/2	Settled Pond		D.Walker	13/01/2022 11:21 AM	AS5667.4 Lake, Grab	AS5667.1
12097/3	Creek		D.Walker	13/01/2022 10:48 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12097/1	Feed Pond	400167	6370993	
12097/2	Settled Pond	400167	6371005	
12097/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 20/01/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12238

Date Issued: 17/02/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 10/02/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	10/02/2022	12238/1	Water	White
Settled Pond	10/02/2022	12238/2	Water	Black
Creek	10/02/2022	12238/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Approved by:

Results have been approved and report finalised on 17/02/2022.

Test Report Number: 12238

Date Issued: 17/02/2022

Revision No: 00

Results

Field Analysis	Method	Units	12238/1 Feed Pond 10/02/2022	12238/2 Settled Pond 10/02/2022	12238/3 Creek 10/02/2022
Date Tested	--	--	10/02/2022	10/02/2022	10/02/2022
Temperature	Temp	°C	22.8	22.6	20.2
pH	APHA 4500-H B	pH Units	6.4	6.3	6.1
Electrical Conductivity	APHA 2510 B	µS/cm	241	267	284
Dissolved Oxygen	APHA 4500-O G	mg/L	7.6	4.4	2.5
Oxidation Reduction Potential#	APHA 2580-B	mV	211	203	47

Solids	Method	Units	12238/1 Feed Pond 10/02/2022	12238/2 Settled Pond 10/02/2022	12238/3 Creek 10/02/2022
Date Tested	--	--	16/02/2022	16/02/2022	16/02/2022
Total Dissolved Solids	AS3550.4	mg/L	412	168	201
Date Tested	--	--	10/02/2022	10/02/2022	10/02/2022
Total Suspended Solids	AS3550.4	mg/L	1,000	<5	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12238

Date Issued: 17/02/2022

Revision No: 00

Sampling Conditions: Fine, 27°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12238/1	Feed Pond		T.Walker	10/02/2022 10:34 AM	AS5667.4 Lake, Grab	AS5667.1
12238/2	Settled Pond		T.Walker	10/02/2022 10:50 AM	AS5667.4 Lake, Grab	AS5667.1
12238/3	Creek		T.Walker	10/02/2022 9:52 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12238/1	Feed Pond	400167	6370993	No Visible Oil and Grease
12238/2	Settled Pond	400167	6371005	No Visible Oil and Grease
12238/3	Creek	399964	6371336	No Visible Oil and Grease

Sampling procedures have been approved and report finalised on 17/02/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12529

Date Issued: 30/03/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 25/03/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	25/03/2022	12529/1	Water	White
Settled Pond	25/03/2022	12529/2	Water	Black
Creek	25/03/2022	12529/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 30/03/2022.

Test Report Number: 12529

Date Issued: 30/03/2022

Revision No: 00

Results

Field Analysis	Method	Units	12529/1 Feed Pond 25/03/2022	12529/2 Settled Pond 25/03/2022	12529/3 Creek 25/03/2022
Date Tested	--	--	25/03/2022	25/03/2022	25/03/2022
Temperature	Temp	°C	22.0	22.8	19.6
pH	APHA 4500-H B	pH Units	6.4	6.7	5.9
Electrical Conductivity	APHA 2510 B	µS/cm	176	228	210
Dissolved Oxygen	APHA 4500-O G	mg/L	7.5	6.6	3.1
Oxidation Reduction Potential#	APHA 2580-B	mV	145	147	-279

Solids	Method	Units	12529/1 Feed Pond 25/03/2022	12529/2 Settled Pond 25/03/2022	12529/3 Creek 25/03/2022
Date Tested	--	--	29/03/2022	29/03/2022	29/03/2022
Total Dissolved Solids	AS3550.4	mg/L	402	131	187
Date Tested	--	--	28/03/2022	28/03/2022	28/03/2022
Total Suspended Solids	AS3550.4	mg/L	1,000	6	8

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12529

Date Issued: 30/03/2022

Revision No: 00

Sampling Conditions: Cloudy, 19° - 24°C. Recent heavy rain.

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12529/1	Feed Pond		T & D.Walker	25/03/2022 10:08 AM	AS5667.4 Lake, Grab	AS5667.1
12529/2	Settled Pond		T & D.Walker	25/03/2022 9:58 AM	AS5667.4 Lake, Grab	AS5667.1
12529/3	Creek		T & D.Walker	25/03/2022 9:18 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12529/1	Feed Pond	400167	6370993	No Visible Oil and Grease
12529/2	Settled Pond	400167	6371005	No Visible Oil and Grease
12529/3	Creek	399964	6371336	No Visible Oil and Grease, creeks full

Sampling procedures have been approved and report finalised on 30/03/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12609

Date Issued: 19/04/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 7/04/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	7/04/2022	12609/1	Water	White
Settled Pond	7/04/2022	12609/2	Water	Black
Creek	7/04/2022	12609/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 19/04/2022.

Test Report Number: 12609

Date Issued: 19/04/2022

Revision No: 00

Results

Field Analysis	Method	Units	12609/1 Feed Pond 7/04/2022	12609/2 Settled Pond 7/04/2022	12609/3 Creek 7/04/2022
Date Tested	--	--	07/04/2022	07/04/2022	07/04/2022
Temperature	Temp	°C	20.8	21.9	19.1
pH	APHA 4500-H B	pH Units	5.8	7.5	5.7
Electrical Conductivity	APHA 2510 B	µS/cm	234	189	257
Dissolved Oxygen	APHA 4500-O G	mg/L	8.8	8.9	2.5
Oxidation Reduction Potential#	APHA 2580-B	mV	225	201	64

Solids	Method	Units	12609/1 Feed Pond 7/04/2022	12609/2 Settled Pond 7/04/2022	12609/3 Creek 7/04/2022
Date Tested	--	--	13/04/2022	13/04/2022	13/04/2022
Total Dissolved Solids	AS3550.4	mg/L	652	127	279
Date Tested	--	--	07/04/2022	07/04/2022	07/04/2022
Total Suspended Solids	AS3550.4	mg/L	2,100	6	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12609

Date Issued: 19/04/2022

Revision No: 00

Sampling Conditions: 100° Cloudcover, 21°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12609/1	Feed Pond		T.Walker	7/04/2022 10:24 AM	AS5667.4 Lake, Grab	AS5667.1
12609/2	Settled Pond		T.Walker	7/04/2022 10:38 AM	AS5667.4 Lake, Grab	AS5667.1
12609/3	Creek		T.Walker	7/04/2022 9:32 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12609/1	Feed Pond	400167	6370993	No Visible Oil and Grease
12609/2	Settled Pond	400167	6371005	No Visible Oil and Grease
12609/3	Creek	399964	6371336	No Visible Oil and Grease

Sampling procedures have been approved and report finalised on 19/04/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12771

Date Issued: 12/05/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 5/05/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	5/05/2022	12771/1	Water	White
Settled Pond	5/05/2022	12771/2	Water	Black
Creek	5/05/2022	12771/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 12/05/2022.

Test Report Number: 12771

Date Issued: 12/05/2022

Revision No: 00

Results

Field Analysis	Method	Units	12771/1 Feed Pond 5/05/2022	12771/2 Settled Pond 5/05/2022	12771/3 Creek 5/05/2022
Date Tested	--	--	05/05/2022	05/05/2022	05/05/2022
Temperature	Temp	°C	19.4	19.4	17.9
pH	APHA 4500-H B	pH Units	6.0	6.3	6.0
Electrical Conductivity	APHA 2510 B	µS/cm	219	256	288
Dissolved Oxygen	APHA 4500-O G	mg/L	8.5	4.6	2.3
Oxidation Reduction Potential#	APHA 2580-B	mV	47	64	104

Solids	Method	Units	12771/1 Feed Pond 5/05/2022	12771/2 Settled Pond 5/05/2022	12771/3 Creek 5/05/2022
Date Tested	--	--	10/05/2022	10/05/2022	10/05/2022
Total Dissolved Solids	AS3550.4	mg/L	518	176	243
Date Tested	--	--	05/05/2022	05/05/2022	05/05/2022
Total Suspended Solids	AS3550.4	mg/L	1,500	8	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12771

Date Issued: 12/05/2022

Revision No: 00

Sampling Conditions: Showers, 20°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12771/1	Feed Pond		T.Walker	5/05/2022 10:08 AM	AS5667.4 Lake, Grab	AS5667.1
12771/2	Settled Pond		T.Walker	5/05/2022 10:22 AM	AS5667.4 Lake, Grab	AS5667.1
12771/3	Creek		T.Walker	5/05/2022 9:32 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12771/1	Feed Pond	400167	6370993	No Visible Oil and Grease
12771/2	Settled Pond	400167	6371005	No Visible Oil and Grease
12771/3	Creek	399964	6371336	No Visible Oil and Grease

Sampling procedures have been approved and report finalised on 12/05/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12867

Date Issued: 10/06/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 2/06/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	2/06/2022	12867/1	Water	White
Settled Pond	2/06/2022	12867/2	Water	Black
Creek	2/06/2022	12867/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 10/06/2022.

Test Report Number: 12867

Date Issued: 10/06/2022

Revision No: 00

Results

Field Analysis	Method	Units	12867/1 Feed Pond 2/06/2022	12867/2 Settled Pond 2/06/2022	12867/3 Creek 2/06/2022
Date Tested	--	--	02/06/2022	02/06/2022	02/06/2022
Temperature	Temp	°C	14.2	14.9	12.5
pH	APHA 4500-H B	pH Units	6.0	6.5	5.6
Electrical Conductivity	APHA 2510 B	µS/cm	205	255	226
Dissolved Oxygen	APHA 4500-O G	mg/L	9.6	5.4	2.9
Oxidation Reduction Potential _#	APHA 2580-B	mV	221	213	161

Solids	Method	Units	12867/1 Feed Pond 2/06/2022	12867/2 Settled Pond 2/06/2022	12867/3 Creek 2/06/2022
Date Tested	--	--	07/06/2022	07/06/2022	07/06/2022
Total Dissolved Solids	AS3550.4	mg/L	510	171	226
Date Tested	--	--	03/06/2022	03/06/2022	03/06/2022
Total Suspended Solids	AS3550.4	mg/L	3,600	<5	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 12867

Date Issued: 10/06/2022

Revision No: 00

Sampling Conditions: Cloudy, 10°- 15°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
12867/1	Feed Pond		T.Walker	2/06/2022 12:01 PM	AS5667.4 Lake, Grab	AS5667.1
12867/2	Settled Pond		T.Walker	2/06/2022 11:56 AM	AS5667.4 Lake, Grab	AS5667.1
12867/3	Creek		T.Walker	2/06/2022 9:20 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
12867/1	Feed Pond	400167	6370993	No Visible Oil and Grease
12867/2	Settled Pond	400167	6371005	No Visible Oil and Grease
12867/3	Creek	399964	6371336	No Visible Oil and Grease

Sampling procedures have been approved and report finalised on 10/06/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13001

Date Issued: 8/07/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 30/06/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	30/06/2022	13001/1	Water	White
Settled Pond	30/06/2022	13001/2	Water	Black
Creek	30/06/2022	13001/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 8/07/2022.

Test Report Number: 13001

Date Issued: 8/07/2022

Revision No: 00

Results

Field Analysis	Method	Units	13001/1 Feed Pond 30/06/2022	13001/2 Settled Pond 30/06/2022	13001/3 Creek 30/06/2022
Date Tested	--	--	30/06/2022	30/06/2022	30/06/2022
Temperature	Temp	°C	14.5	15.9	12.7
pH	APHA 4500-H B	pH Units	5.3	6.1	5.6
Electrical Conductivity	APHA 2510 B	µS/cm	210	255	255
Dissolved Oxygen	APHA 4500-O G	mg/L	8.8	3.2	1.7
Oxidation Reduction Potential _#	APHA 2580-B	mV	283	267	157

Solids	Method	Units	13001/1 Feed Pond 30/06/2022	13001/2 Settled Pond 30/06/2022	13001/3 Creek 30/06/2022
Date Tested	--	--	05/07/2022	05/07/2022	05/07/2022
Total Dissolved Solids	AS3550.4	mg/L	578	174	240
Date Tested	--	--	30/06/2022	30/06/2022	30/06/2022
Total Suspended Solids	AS3550.4	mg/L	1,600	6	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13001

Date Issued: 8/07/2022

Revision No: 00

Sampling Conditions: 13°C, cloudy

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13001/1	Feed Pond		D.Walker	30/06/2022 9:51 AM	AS5667.4 Lake, Grab	AS5667.1
13001/2	Settled Pond		D.Walker	30/06/2022 9:40 AM	AS5667.4 Lake, Grab	AS5667.1
13001/3	Creek		D.Walker	30/06/2022 10:16 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13001/1	Feed Pond	400167	6370993	
13001/2	Settled Pond	400167	6371005	
13001/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 8/07/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13179

Date Issued: 5/08/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 28/07/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	28/07/2022	13179/1	Water	White
Settled Pond	28/07/2022	13179/2	Water	Black
Creek	28/07/2022	13179/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 5/08/2022.

Test Report Number: 13179

Date Issued: 5/08/2022

Revision No: 00

Results

Field Analysis	Method	Units	13179/1 Feed Pond 28/07/2022	13179/2 Settled Pond 28/07/2022	13179/3 Creek 28/07/2022
Date Tested	--	--	28/06/2022	28/06/2022	28/06/2022
Temperature	Temp	°C	14.6	14.6	12.4
pH	APHA 4500-H B	pH Units	6.4	6.3	5.8
Electrical Conductivity	APHA 2510 B	µS/cm	230	280	236
Dissolved Oxygen	APHA 4500-O G	mg/L	10.3	5.7	1.4
Oxidation Reduction Potential _#	APHA 2580-B	mV	210	181	165

Solids	Method	Units	13179/1 Feed Pond 28/07/2022	13179/2 Settled Pond 28/07/2022	13179/3 Creek 28/07/2022
Date Tested	--	--	3/08/2022	3/08/2022	3/08/2022
Total Dissolved Solids	AS3550.4	mg/L	376	178	234
Date Tested	--	--	28/07/2022	28/07/2022	28/07/2022
Total Suspended Solids	AS3550.4	mg/L	910	<5	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13179

Date Issued: 5/08/2022

Revision No: 00

Sampling Conditions: 13°-14°C, fine

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13179/1	Feed Pond		D.Walker	28/07/2022 10:23 AM	AS5667.4 Lake, Grab	AS5667.1
13179/2	Settled Pond		D.Walker	28/07/2022 10:14 AM	AS5667.4 Lake, Grab	AS5667.1
13179/3	Creek		D.Walker	28/07/2022 9:58 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13179/1	Feed Pond	400167	6370993	
13179/2	Settled Pond	400167	6371005	
13179/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 5/08/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13324

Date Issued: 1/09/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 25/08/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	25/08/2022	13324/1	Water	White
Settled Pond	25/08/2022	13324/2	Water	Black
Creek	25/08/2022	13324/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 1/09/2022.

Test Report Number: 13324

Date Issued: 1/09/2022

Revision No: 00

Results

Field Analysis	Method	Units	13324/1 Feed Pond 25/08/2022	13324/2 Settled Pond 25/08/2022	13324/3 Creek 25/08/2022
Date Tested	--	--	25/08/2022	25/08/2022	25/08/2022
Temperature	Temp	°C	16.0	16.2	12.6
pH	APHA 4500-H B	pH Units	5.3	6.3	5.3
Electrical Conductivity	APHA 2510 B	µS/cm	222	276	209
Dissolved Oxygen	APHA 4500-O G	mg/L	9.2	6.8	1.9
Oxidation Reduction Potential _#	APHA 2580-B	mV	315	232	201

Solids	Method	Units	13324/1 Feed Pond 25/08/2022	13324/2 Settled Pond 25/08/2022	13324/3 Creek 25/08/2022
Date Tested	--	--	30/08/2022	30/08/2022	30/08/2022
Total Dissolved Solids	AS3550.4	mg/L	554	178	200
Date Tested	--	--	25/08/2022	25/08/2022	25/08/2022
Total Suspended Solids	AS3550.4	mg/L	2,300	<5	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13324

Date Issued: 1/09/2022

Revision No: 00

Sampling Conditions:

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13324/1	Feed Pond		D.Walker	25/08/2022 12:02 PM	AS5667.4 Lake, Grab	AS5667.1
13324/2	Settled Pond		D.Walker	25/08/2022 11:44 AM	AS5667.4 Lake, Grab	AS5667.1
13324/3	Creek		D.Walker	25/08/2022 11:25 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13324/1	Feed Pond	400167	6370993	
13324/2	Settled Pond	400167	6371005	
13324/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 1/09/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13469

Date Issued: 29/09/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 23/09/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	22/09/2022	13469/1	Water	White
Settled Pond	22/09/2022	13469/2	Water	Black
Creek	22/09/2022	13469/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 29/09/2022.

Test Report Number: 13469

Date Issued: 29/09/2022

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	13469/1 22/09/2022 Feed Pond	13469/2 22/09/2022 Settled Pond	13469/3 22/09/2022 Creek
Date Tested	--	--	22/09/2022	22/09/2022	22/09/2022
Temperature	Temp	°C	18.1	18.9	16.9
pH	APHA 4500-H B	pH Units	6.0	6.5	5.9
Electrical Conductivity	APHA 2510 B	µS/cm	221	264	238
Dissolved Oxygen	APHA 4500-O G	mg/L	3.9	5.9	2.8
Oxidation Reduction Potential _#	APHA 2580-B	mV	156	77	123

Solids		Lab ID Sample Date Sample ID Units	13469/1 22/09/2022 Feed Pond	13469/2 22/09/2022 Settled Pond	13469/3 22/09/2022 Creek
Date Tested	--	--	26/09/2022	26/09/2022	26/09/2022
Total Dissolved Solids	AS3550.4	mg/L	570	192	214
Date Tested	--	--	23/09/2022	23/09/2022	23/09/2022
Total Suspended Solids	AS3550.4	mg/L	1,600	5	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13469

Date Issued: 29/09/2022

Revision No: 00

Sampling Conditions: Showers, 16°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13469/1	Feed Pond		T & D.Walker	22/09/2022 11:12 AM	AS5667.4 Lake, Grab	AS5667.1
13469/2	Settled Pond		T & D.Walker	22/09/2022 11:24 AM	AS5667.4 Lake, Grab	AS5667.1
13469/3	Creek		T & D.Walker	22/09/2022 9:38 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13469/1	Feed Pond	400167	6370993	No Visible Oil and Grease
13469/2	Settled Pond	400167	6371005	No Visible Oil and Grease
13469/3	Creek	399964	6371336	No Visible Oil and Grease

Sampling procedures have been approved and report finalised on 29/09/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13652

Date Issued: 26/10/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 20/10/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	20/10/2022	13652/1	Water	White
Settled Pond	20/10/2022	13652/2	Water	Black
Creek	20/10/2022	13652/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 26/10/2022.

Test Report Number: 13652

Date Issued: 26/10/2022

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	13652/1 20/10/2022 Feed Pond	13652/2 20/10/2022 Settled Pond	13652/3 20/10/2022 Creek
Date Tested	--	--	20/10/2022	20/10/2022	20/10/2022
Temperature	Temp	°C	20.8	20.6	19.6
pH	APHA 4500-H B	pH Units	6.4	6.2	5.7
Electrical Conductivity	APHA 2510 B	µS/cm	239	275	257
Dissolved Oxygen	APHA 4500-O G	mg/L	8.0	3.1	1.4
Oxidation Reduction Potential _#	APHA 2580 B	mV	276	302	85

Solids		Lab ID Sample Date Sample ID Units	13652/1 20/10/2022 Feed Pond	13652/2 20/10/2022 Settled Pond	13652/3 20/10/2022 Creek
Date Tested	--	--	24/10/2022	24/10/2022	24/10/2022
Total Dissolved Solids	AS3550.4	mg/L	420	240	280
Date Tested	--	--	20/10/2022	20/10/2022	20/10/2022
Total Suspended Solids	AS3550.4	mg/L	1,020	<5	<5

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13652

Date Issued: 26/10/2022

Revision No: 00

Sampling Conditions: 22 °C, raining

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13652/1	Feed Pond		D.Walker	20/10/2022 10:13 AM	AS5667.4 Lake, Grab	AS5667.1
13652/2	Settled Pond		D.Walker	20/10/2022 10:01 AM	AS5667.4 Lake, Grab	AS5667.1
13652/3	Creek		D.Walker	20/10/2022 10:28 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13652/1	Feed Pond	400167	6370993	
13652/2	Settled Pond	400167	6371005	
13652/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 26/10/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 13811

Date Issued: 23/11/2022

Revision Number: 00

Site/Job: Redisand Surface Waters

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following water sample(s) were received on 17/11/2022

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	17/11/2022	13811/1	Water	White
Settled Pond	17/11/2022	13811/2	Water	Black
Creek	17/11/2022	13811/3	Water	D/S from plant

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 23/11/2022.

Test Report Number: 13811

Date Issued: 23/11/2022

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	13811/1 17/11/2022 Feed Pond	13811/2 17/11/2022 Settled Pond	13811/3 17/11/2022 Creek
Date Tested	--	--	17/11/2022	17/11/2022	17/11/2022
Temperature	Temp	°C	19.3	20.8	16.9
pH	APHA 4500-H B	pH Units	6.3	6.4	5.8
Electrical Conductivity	APHA 2510 B	µS/cm	246	276	234
Dissolved Oxygen	APHA 4500-O G	mg/L	8.7	6.7	2.1
Oxidation Reduction Potential _#	APHA 2580 B	mV	112	133	22

Solids		Lab ID Sample Date Sample ID Units	13811/1 17/11/2022 Feed Pond	13811/2 17/11/2022 Settled Pond	13811/3 17/11/2022 Creek
Date Tested	--	--	21/11/2022	21/11/2022	21/11/2022
Total Dissolved Solids	AS3550.4	mg/L	450	220	220
Date Tested	--	--	18/11/2022	18/11/2022	18/11/2022
Total Suspended Solids	AS3550.4	mg/L	2,160	27	6

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

Sampling Report Number: 13811

Date Issued: 23/11/2022

Revision No: 00

Sampling Conditions: Fine, 17°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
13811/1	Feed Pond		T.Walker	17/11/2022 10:28 AM	AS5667.4 Lake, Grab	AS5667.1
13811/2	Settled Pond		T.Walker	17/11/2022 10:42 AM	AS5667.4 Lake, Grab	AS5667.1
13811/3	Creek		T.Walker	17/11/2022 9:36 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
13811/1	Feed Pond	400167	6370993	No Visible Oil and Grease
13811/2	Settled Pond	400167	6371005	No Visible Oil and Grease
13811/3	Creek	399964	6371336	No Visible Oil and Grease

Sampling procedures have been approved and report finalised on 23/11/2022.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 12098

Date Issued: 20/01/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 13/01/2022 14:42

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	13/01/2022	12098/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Approved by:

Results have been approved and report finalised on 20/01/2022.

Test Report Number: 12098

Date Issued: 20/01/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	12098/1 Sand 13/01/2022
pH(f)	(QASSIT) 2004	pH units	6.0
pH(fox)	(QASSIT) 2004	pH units	5.9
pH Difference	(QASSIT) 2004	pH units	0.0
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 12237

Date Issued: 22/02/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 10/02/2022 13:53

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	10/02/2022	12237/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Approved by:

Results have been approved and report finalised on 22/02/2022.

Test Report Number: 12237

Date Issued: 22/02/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	12237/1 Sand 10/02/2022
pH(f)	(QASSIT) 2004	pH units	6.0
pH(fox)	(QASSIT) 2004	pH units	5.9
pH Difference	(QASSIT) 2004	pH units	0.1
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 12441

Date Issued: 18/03/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 10/03/2022 13:22

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	10/03/2022	12441/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 18/03/2022.

Test Report Number: 12441

Date Issued: 18/03/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	12441/1 Sand 10/03/2022
pH(f)	(QASSIT) 2004	pH units	5.9
pH(fox)	(QASSIT) 2004	pH units	6.1
pH Difference	(QASSIT) 2004	pH units	-0.2
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 12608

Date Issued: 11/04/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 7/04/2022 09:00

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	7/04/2022	12608/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Lisa Thomson
Signatory

Authorised by:

Results have been approved and report finalised on 11/04/2022.

Test Report Number: 12608

Date Issued: 11/04/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	12608/1 Sand 7/04/2022
pH(f)	(QASSIT) 2004	pH units	6.1
pH(fox)	(QASSIT) 2004	pH units	6.5
pH Difference	(QASSIT) 2004	pH units	-0.4
Reaction Rating pH(fox)	(QASSIT) 2004		L - Low reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 12770

Date Issued: 11/05/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 5/05/2022 14:13

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	5/05/2022	12770/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 11/05/2022.

Test Report Number: 12770

Date Issued: 11/05/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	12770/1 Sand 5/05/2022
pH(f)	(QASSIT) 2004	pH units	6.0
pH(fox)	(QASSIT) 2004	pH units	6.1
pH Difference	(QASSIT) 2004	pH units	-0.1
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 12952

Date Issued: 10/06/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 2/06/2022 15:51

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	2/06/2022	12952/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 10/06/2022.

Test Report Number: 12952

Date Issued: 10/06/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	12952/1 Sand 2/06/2022
pH(f)	(QASSIT) 2004	pH units	6.0
pH(fox)	(QASSIT) 2004	pH units	6.1
pH Difference	(QASSIT) 2004	pH units	-0.1
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 13002

Date Issued: 8/07/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 30/06/2022 14:14

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	30/06/2022	13002/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 8/07/2022.

Test Report Number: 13002

Date Issued: 8/07/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	13002/1 Sand 30/06/2022
pH(f)	(QASSIT) 2004	pH units	6.4
pH(fox)	(QASSIT) 2004	pH units	6.2
pH Difference	(QASSIT) 2004	pH units	0.1
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 13256

Date Issued: 5/08/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 28/07/2022 08:49

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	28/07/2022	13256/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 5/08/2022.

Test Report Number: 13256

Date Issued: 5/08/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	13256/1 Sand 28/07/2022
pH(f)	(QASSIT) 2004	pH units	5.9
pH(fox)	(QASSIT) 2004	pH units	5.8
pH Difference	(QASSIT) 2004	pH units	0.0
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 13325

Date Issued: 2/09/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 25/08/2022 14:54

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	25/08/2022	13325/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 2/09/2022.

Test Report Number: 13325

Date Issued: 2/09/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Units	13325/1 Sand 25/08/2022
pH(f)	(QASSIT) 2004	pH units	6.6
pH(fox)	(QASSIT) 2004	pH units	6.6
pH Difference	(QASSIT) 2004	pH units	-0.1
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 13468

Date Issued: 5/10/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 4/10/2022 15:30

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	22/09/2022	13468/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 5/10/2022.

Test Report Number: 13468

Date Issued: 5/10/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Lab ID	13468/1
		Sample Date Sample ID Units	22/09/2022 Sand
pH(f)	(QASSIT) 2004	pH units	6.0
pH(fox)	(QASSIT) 2004	pH units	6.0
pH Difference	(QASSIT) 2004	pH units	0.0
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 13653

Date Issued: 26/10/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 20/10/2022 14:26

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	20/10/2022	13653/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 26/10/2022.

Test Report Number: 13653

Date Issued: 26/10/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Lab ID	13653/1
		Sample Date Sample ID Units	20/10/2022 Sand
pH(f)	(QASSIT) 2004	pH units	6.4
pH(fox)	(QASSIT) 2004	pH units	6.5
pH Difference	(QASSIT) 2004	pH units	-0.1
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

Report Number: 13947

Date Issued: 19/12/2022

Revision Number: 00

Site/Job: Redisand Sand

Client: Redisand NSW
Address: PO Box 186
HRMC NSW 2310
Contact: Grant Stevenson

The following sample(s) were received on 19/12/2022 12:48

Client Sample Reference	Date Sampled	Lab ID	Matrix	Client Comments
Sand	15/12/2022	13947/1	Soil	Sampled by Client

The sample(s) have been tested as received and results relate specifically to the samples tested.
The following reports are included:

- Test Report: Results apply to the sample(s) as submitted.
- Chain of Custody (if available)



Anthony Crane
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 19/12/2022.

Test Report Number: 13947

Date Issued: 19/12/2022

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Lab ID	13947/1
		Sample Date Sample ID Units	15/12/2022 Sand
pH(f)	(QASSIT) 2004	pH units	6.3
pH(fox)	(QASSIT) 2004	pH units	6.1
pH Difference	(QASSIT) 2004	pH units	0.2
Reaction Rating pH(fox)	(QASSIT) 2004		No reaction
Fizz Test for Carbonates	(QASSIT) 2004		N - non-calcareous
Potential ASS?	(QASSIT) 2004		Highly Unlikely

Report Comments:

Where present, indicates NATA accreditation does not cover the performance of this service.
Results in **bold** indicate an exceedance of the relevant guideline.
When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.
<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.