



Salt Ash Sand Quarry

Annual Review 2023

Prepared for:

ATB Morton Pty Ltd

Janet Parade
Salt Ash, NSW
2318

March 2024

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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 2023
Annual Review end date	31 December 2023
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 2023 to 31 December 2023 and that I am authorised to make this statement on behalf of Redisand Pty Ltd. Note. <i>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.</i> <i>b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</i>	
Name of authorised Reporting Officer	Grant Stevenson
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	
Date	28/03/2024

1. STATEMENT OF COMPLIANCE

The statement of commitments for the 2023 reporting period for the Redisand Salt Ash Sand Quarry is listed in **Table 1**. The Department of Planning, and Environment (DPHI) 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: DPHI 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 2023. All non-administrative non-compliances are discussed in further detail in **Section 12**.

Table 3: Non-Compliances within the 2023 Reporting Period

Relevant Approval	Condition Number	Condition description	Compliance Status	Comment	Where addressed																			
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>Pollutant</th><th>Averaging period</th><th>Criterion</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>	Pollutant	Averaging 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} 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)	Annual average PM_{2.5} exceeded the criteria, recording 8.3 µg/m³. This was also a non-compliance in the 2022 period with site recording 8.9 µg/m³. This is above the annual average criteria of 8 µg/m³	Section 6.3.3
Pollutant	Averaging period	Criterion																						
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^d Deposited dust	Annual	^b 2 g/m ² /month ^{a, 4} g/m ² /month																						
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 depth to water, measured from the Monument Height (bTOM) Therefore, administrative non-compliance with Schedule 3, Condition 17(c). Additionally, Redisand failed to notify DPHI and EPA of arsenic levels above criteria levels in June and September monitoring reports. This issue will be rectified as of March 2024.	Section 7.4																			

Relevant Approval	Condition Number	Condition description	Compliance Status	Comment	Where addressed																								
PA 07_0094	Schedule 5, Condition 9	31 December 2013, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. This audit must: (a) be conducted by suitably qualified, experienced, and independent team of experts whose appointment has been endorsed by the Secretary; (b) include consultation with the relevant agencies; (c) assess the environmental performance of the Development and assess whether it is complying with the relevant requirements in this approval and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals); (d) review the adequacy of strategies, plans or programs required under the abovementioned consents, licences, or leases; (e) recommend measures or actions to improve the environmental performance of the Development, and/or any assessment, plan or program required under these approvals; and (f) be completed within 2 months of the approval of the audit team. Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Secretary	Non-Compliant (administrative)	Previous IEA occurred in October 2020, and would have been due in October 2023, As this audit did not occur within the time period, this is an administrative non-compliance. It is anticipated that an IEA will be completed by Q2 of 2024.	Section 11																								
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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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 (MOD 5) 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 2023 to 31 December 2023.

2.1. Contact Details

Quarry Manager

Grant Stevenson

Mob: 0422 016 870

Email: GrantStevenson@redisand.com.au



3. APPROVALS

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

Table 5: Approvals for Redisand

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

4. OPERATIONS SUMMARY

4.1. Mining Operations in 2023

4.2. Extraction Summary

Table 6 provides the extraction summary at Redisand for 2023.

Table 6: Production Summary

Material	Approved limit (Source PA 07_0094 Schedule2, Condition 8)	Previous reporting period (2022)	This reporting period (2023)	Next reporting period (forecast 2024)
Quartz sand	400,000t	204,207t	183,000t	190,000t

Quartz sand extraction was 183,000 tonnes in 2023, this is down from 2022 which produced 204,207 tonnes.

There were no exceedances in truck movements, but truck payloads increased resulting in a higher tonnage of extracted material. Copies of production are included within the Resources Regulators portal.

4.3. Exploration

There were no exploration activities undertaken during the 2023 reporting period.

4.4. Land Preparation

Land preparation activities included a pre-clearance survey for Stage 3 which was undertaken on 9 October 2023, with 52 potential habitat trees identified. On 1 November 2023, 20 previously identified potential habitat trees were soft felled under the supervision of two ecologists from Firebird ecoSultants. No fauna was found during the land clearing; therefore, no injuries or deaths to wildlife were recorded. This report is provided in **Appendix E**.

4.5. Construction Activities

No construction activities occurred in 2023.

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 within approval limits.

4.6.2. Rehabilitation

Redisand continues to do progressive rehabilitation as operations continue.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

5.1. Feedback on 2022 Annual Review

Redisand provided the 2022 Annual Review to the Department by the 31 March 2023.

The Department of Planning, Housing, and Infrastructure responded on the 11 August 2023:

"The department has reviewed the Annual Review and considers it to generally satisfy the reporting requirements of the approval and the department's Annual Review Guideline (October 2015)."

5.2. Actions from previous Annual Review (Redisand Proposed Actions)

Actions from the previous 2022 Annual Review that Redisand proposed to undertake in 2023 at detailed in **Table 7**.

Table 7: Action from 2022 Annual Review

Improvement	Activities	Redisand Comment	Where addressed
Improve compliance	Continue to improve environmental compliance across the site.	During the 2023 reporting period, Redisand has recorded fewer non-compliances than in the 2022 period	Section 1 This Report
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.	Ongoing	Section 7
Improve compliance with groundwater monitoring	Discuss with VGT to change groundwater monitoring from water depth to water level.	Ongoing	Section 7
Longer term trends	Continue collecting long-term data. In 2020 Redisand committed to collecting more complete data and present long-term trends in the Annual Reviews.	Ongoing. Redisand is continuing to collect yearly data to develop long-term trends	Section 6 Section 7

400000



637100

I:\01_Clients_GIS\ATB-Morton Group\ATB01_005 Redisands Annual Review 2021\ATB01_005_DisturbanceFootprint_01.mxd

LEGEND

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

0 15 30 45 60
Scale: 1:2,250

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

Redisand Annual Review 2023

6. ENVIRONMENTAL PERFORMANCE

6.1. Meteorological Monitoring

Meteorological data has been taken from the Bureau of Meteorology (BOM) RAAF Williamtown, NSW Weather Station (ID 061078). Monthly rainfall, wind, and temperature data for 2023 is provided in **Table 8**.

Table 8: Williamtown Meteorological Data 2023

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 – 23	14.6*	34.3	106.2*	21.4*	10	63*
Feb – 23	13.1	35.9	107.4	45.6	6	81*
Mar – 23	12.3	38.0	106.0	31.4	9	52*
Apr – 23	11	28.2	124.0	36.2	12	63*
May - 23	3.3	24.7*	86.6	45.8	5	78*
Jun – 23	0.9	23.4	8.8	3.6	3	72
Jul – 23	2.7	25.0	38.4	22.0	6*	89*
Aug – 23	3.1	26.1	47.6	12.6*	7*	76*
Sep – 23	4.3	34.1	16.6	4.4	4	61
Oct – 23	5.9	35.4	59.6	35.0	6	80
Nov – 23	11.2	33.0	65.4	19.4	8	69*
Dec - 23	13.8	41.7	61.4	15.4	9	69

* Incomplete data recorded at Williamtown.

During the 2023 reporting period, a total of 828mm of rain was recorded at the RAAF Williamtown weather station, this is down from 2022 where 1472mm was recorded. During 2020-2022 the East Coast of Australia was experiencing an active La Nina event, with above average rainfall recorded. Since 1942, Williamtown weather station has recorded an average of 1124mm.

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-by 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 daytime 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 9**.

Table 9: 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 measured 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 10**.

Table 10: Approved Noise Impact Assessment Criteria (Condition L3.1 of the EPL)

Receiver	L _{Aeq} (15 minute) dB(A)
JP1	40
JP2	43
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 2023 quarterly noise monitoring results are included as **Appendix A**.

6.2.3.1. Noise Monitoring Frequency

Quarterly attended noise monitoring was completed in 2023 on the following dates by Spectrum Acoustics Pty Limited (Spectrum Acoustics):

- 17 February 2023;
- 11 May 2023;
- 31 August 2023; and
- 24 November 2023.

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-by*”. A summary of 2023 noise monitoring results are detailed in **Table 11 and Table 12**. The site was compliant for noise monitoring criteria within the Annual Review period.

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 13**.

Table 11: Noise Compliance Assessment for Redisand (Spectrum Acoustics, 2023)

Monitoring Location	Quarrying Noise Criteria	Q1 February 2023		Q2 May 2023		Q3 August 2023		Q4 November 2023	
	L _{Aeq} (15 min)	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance
JP1	40	27	✓	Occasionally audible	✓	Inaudible	✓	30	✓
JP2	43	Occasionally audible	✓	Inaudible	✓	Inaudible	✓	32	✓
JP3	39	38 ¹	✓	35 ¹	✓	29 ¹	✓	32 ¹	✓
JP4	37	34 ¹	✓	27 ¹	✓	24 ¹	✓	25 ¹	✓
NB5	35	Inaudible	✓	Inaudible	✓	Inaudible	✓	Inaudible	✓

¹ Noise from trucks on Access Road

Table 12: Noise Monitoring Results – Truck Noise (Spectrum Acoustics, 2023)

Monitoring Location	Noise Criteria	Q1 February 2023			Q2 May 2023			Q3 August 2023			Q4 November 2023		
	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	Empty	34	✓	Empty	31	✓	Laden	25	✓	Empty	25	✓
		Empty	32	✓	Empty	29	✓	Empty	23	✓	Empty	27	✓
		Empty	32	✓	Empty	23	✓	Empty	24	✓	Empty	28	✓
		Total	38	✓	Total	35	✓	Total	29	✓	Total	32	✓
JP4	37	Full	29	✓	Empty	24	✓	Laden	19	✓	Empty	20	✓
		Empty	30	✓	Empty	22	✓	Empty	16	✓	Empty	20	✓
		Empty	28	✓	Laden	21	✓	Empty	21	✓	Laden	21	✓
		Total	34	✓	Total	27	✓	Total	24	✓	Total	25	✓

Table 13: Additional Noise Compliance Assessment – Nelson Bay Road (Spectrum Acoustics, 2023)

Monitoring Location	Quarrying Noise Criteria	Q1 February 2023		Q2 May 2023		Q3 August 2023		Q4 November 2023	
	L _{Aeq} (15 min)	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance	Quarry Noise Contribution	Compliance
1 (NB1)	36	Inaudible	✓	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 2023.

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

Redisand will continue to implement controls and programs as per the *Noise Management Plan*.

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 14**.

Table 14: Air Quality Criteria for Redisand

Pollutant	Average period	Criterion	
Particulate matter <10 _{µm} (PM ₁₀)	Annual	a, c 25 µg/m ³	
	24 hours	b 50 µg/m ³	
Particulate matter <2.5 _{µm} (PM _{2.5})	Annual	a, c 8µg/m ³	
	24 hours	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 03 January 2023. The results are recorded in **Table 15 and Table 16**. Long-term dust trends over the life are provided in **Appendix B**.

Table 15: 2023 Dust Monitoring (PM_{2.5} and PM₁₀ and TSP) at Redisand (VGT, 2023)

Date	HVAS Pollutant (µg/m ³)			Compliance
	PM _{2.5}	PM ₁₀	TSP	
03/01/2023	8	12	19	Compliant
09/01/2023	10	13	31	Compliant
15/01/2023	3	4	35	Compliant
21/01/2023	4	11	28	Compliant
27/01/2023	5	17	39	Compliant
02/02/2023	5	13	34	Compliant
08/02/2023	16	22	44	Compliant
14/02/2023	7	15	14	Compliant
20/02/2023	4	5	16	Compliant
26/02/2023	<2	7	23	Compliant
04/03/2023	<2	6	45	Compliant
10/03/2023	5	13	64	Compliant
16/03/2023	21	29	52	Compliant
22/03/2023	5	14	27	Compliant
28/03/2023	3	11	17	Compliant
03/04/2023	<2	6	19	Compliant
09/04/2023	7	6	14	Compliant
15/04/2023	3	7	28	Compliant
21/04/2023	3	10	14	Compliant
27/04/2023	3	6	24	Compliant
03/05/2023	9	11	45	Compliant
09/05/2023	16	20	35	Compliant
15/05/2023	8	12	16	Compliant

Date	HVAS Pollutant ($\mu\text{g}/\text{m}^3$)			Compliance
	PM _{2.5}	PM ₁₀	TSP	
21/05/2023	7	7	16	Compliant
27/05/2023	4	7	42	Compliant
02/06/2023	9	18	18	Compliant
08/06/2023	5	9	16	Compliant
14/06/2023	6	6	51	Compliant
20/06/2023	19	19	31	Compliant
26/06/2023	14	9	3	Compliant
02/07/2023	4	12	22	Compliant
08/07/2023	10	10	22	Compliant
14/07/2023	19	31	63	Compliant
20/07/2023	17	19	41	Compliant
26/07/2023	14	16	37	Compliant
01/08/2023	20	24	48	Compliant
07/08/2023	3	5	13	Compliant
13/08/2023	8	12	18	Compliant
19/08/2023	6	7	17	Compliant
25/08/2023	<2	<2	<2	Compliant
31/08/2023	5	8	23	Compliant
06/09/2023	19	23	47	Compliant
12/09/2023	20	26	57	Compliant
18/09/2023	19	28	47	Compliant
24/09/2023	20	7	17	Compliant
30/09/2023	8	12	26	Compliant
06/10/2023	12	16	39	Compliant

Date	HVAS Pollutant ($\mu\text{g}/\text{m}^3$)			Compliance
	PM _{2.5}	PM ₁₀	TSP	
12/10/2023	13	19	43	Compliant
18/10/2023	5	14	40	Compliant
24/10/2023	15	24	42	Compliant
30/10/2023	7	11	23	Compliant
05/11/2023	3	9	21	Compliant
11/11/2023	6	8	14	Compliant
17/11/2023	6	16	37	Compliant
23/11/2023	5	11	27	Compliant
29/11/2023	<2	6	13	Compliant
05/12/2023	4	9	20	Compliant
11/12/2023	10	20	37	Compliant
17/12/2023	9	22	40	Compliant
23/12/2023	<2	7	18	Compliant
29/12/2023	3	9	18	Compliant
Average	8.3	12.8	29.2	
Minimum	<2	<2	<2	
Maximum	21	29	64	
Compliant	Non - Compliant	Compliant	Compliant	

* Values of <2 were used as 2 for calculations.

The annual PM₁₀ average was 12.8 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 8.3 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 lower than 2022 where the annual average was 8.8 µg/m³. As there were no extraordinary events nominated by the DPHI, the site has called themselves non – compliant for the PM_{2.5} annual average.

Annual TSP average was 29.2 µg/m³ which was within the approved annual criteria of 90 µg/m³.

There were no missed monitoring events in the reporting period, with 61 valid sampling events. 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 2023. Results of the monitoring are provided in **Table 16**.

Table 16: 2023 Dust Monitoring (Depositional Dust) (VGT, 2023)

Month	Insoluble Solids (g / m ² / month)		
	D1 (Gate)	D2 (Wisely)	D3 (2930 Nelson Bay Road)
January 2023	1.5	3.0	0.6
February 2023	2.7	2.2	0.2
March 2023	2.3	0.9	0.5
April 2023	3.5	2.2	0.8
May 2023	2.1	0.9	0.6
June 2023	2.4	1.1	2.5
July 2023	2.2	0.4	3.8
August 2023	1.8	0.4	1.0
September 2023	5.1	0.2	1.0
October 2023	2.6	1.5	0.9
November 2023	2.5	0.8	0.4
December 2023	1.9	1	0.9
Annual Average	2.55	1.21	1.1
Results (Year to Date)	Compliant	Compliant	Compliant

In September 2023 site D1 recorded 5.1 g/m² which was highest recorded result through the reporting period. All three monitoring locations were below the annual criteria of 4g/m²/month for the total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources) and are therefore compliant.

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 2023 air quality monitoring results compared to previous years.

- The 2023 average PM_{2.5} levels were lower than the 2022 results. The 2023 annual average for PM_{2.5} was 8.3 µg/m³ compared to the 2022 annual average for PM_{2.5} of 8.9 µg/m³. There were no short-term exceedances recorded in 2023 as well as no missed monitoring dates. The highest PM_{2.5} average in the past four years was in 2019 with 15.0 µg/m³.
- 2023 PM₁₀ level were relatively close to the 2022 results with 12.8 µg/m³ in 2023 and 13.4 µg/m³ in 2022. 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.
- 2023 TSP annual average was 29.2 µg/m³ which was lower than the 2022 TSP annual average of 32.1 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 2023 are provided in **Appendix B**.

Long-term PM_{2.5} and PM₁₀ results from 2018 to 2023 are outlined in **Table 17** and depositional dust results from 2018 to 2023 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)					
	2018	2019	2020	2021	2022	2023
Average PM _{2.5}	-	15	7.6	9.8	8.9	8.3
Minimum PM _{2.5}	-	<2	<2	<2	<2	<2
Maximum PM _{2.5}	-	54	19	37	43	21
Average PM ₁₀	16.6	20.2	12.2	11.9	13.4	12.8
Minimum PM ₁₀	<2	<2	<2	<2	<2	<2
Maximum PM ₁₀	59	58	34	34	58	29

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)	Monitoring Results (g/m ² /month)					
		2018	2019	2020	2021	2022	2023
D1	Average	2.4	2.3	2.2	2.6	3.2	2.6
	Minimum	1.3	1.2	1.3	1.4	1.4	1.5
	Maximum	5.8	4.8	4.2	4.6	9.8	5.1
D2	Average	1.7	2.7	2.2	3.9	4.3	1.2
	Minimum	0.4	1.2	0.8	1.3	1.2	0.2
	Maximum	2.8	4.8	4.8	8.7	12.8	2.2
D3	Average	0.9	1.7	1.3	2.8	2.0	1.1
	Minimum	0.2	0.5	0.2	0.5	0.5	0.2
	Maximum	2.6	3.3	4.2	11.7	3.9	3.8

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

Long-term PM_{2.5} exceeded the annual criteria of 8 µg/m³ with an annual average of 8.3 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 DPHI in 2023.

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 2022 which continued in 2023. 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 2023, 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 2023 using data from the weighbridge log. There was a total of 4,811 truck movements, down from 5,586 in 2022 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**.

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 DPHI 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 (2023)

Prior to Stage 3 clearing, a pre-clearance survey was undertaken in October 2023. 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 was 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*. On 1 November, under the supervision of two Firebird ecoSultant ecologists, 20 potential habitat trees were soft felled. There was no fauna identified during the clearing of these trees.

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 15 September 2023 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, see **Appendix F**.

Table 19 and Table 20 provide a comparison from 2016 –2023. 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 - 2023

Cluster No	Number of Orchids							
	2016	2017	2018	2019	2020	2021	2022	2023
1	21	8	13	9	10	9	4	10
2	100	113	40	73	42	40	56	52
3	20	12	5	16	28	17	73	11
4	47	55	8	53	64	25	92	27
5	34	11	7	14	36	26	25	10
6	50	48	4	40	40	35	36	20
7	27	10	8	7	13	32	41	7
Total	299	257	85	212	233	184	327	137

Table 20: Comparison of 2016 – 2023 *D. arenaria* (Sand Doubletail) Survey Data

Cluster Number	Mean Stem Height (m)								Mean No. of Flowers							
	16	17	18	19	20	21	22	23	16	17	18	19	20	21	22	23
	0.31	0.29	0.29	0.29	0.26	0.46	0.35	0.38	4.9	3.1	3.0	4.1	4.3	4.2	4.5	3.2
2	0.30	0.29	0.29	0.26	0.23	0.48	0.46	0.39	4.0	3.9	4.0	3.8	3.7	4.1	3.5	3.5
3	0.30	0.21	0.27	0.22	0.26	0.56	0.39	0.36	4.0	3.2	3.0	3.1	4.1	5.0	3.5	3.4
4	0.29	0.26	0.25	0.21	0.27	0.42	0.37	0.42	4.1	3.5	3.0	3.5	4.3	3.7	3.2	3.9
5	0.28	0.33	0.32	0.28	0.29	0.52	0.39	0.41	3.6	3.5	4.0	3.6	4.3	4.5	2.5	3.1
6	0.28	0.31	0.25	0.26	0.26	0.45	0.42	0.34	3.8	3.9	3.0	3.7	4.4	4.2	3.4	4.3
7	0.30	0.39	0.25	0.26	0.28	0.54	0.38	0.41	5.0	4.8	3.0	4.3	4.1	5.2	3.0	2.7
Total	2.06	2.08	1.92	1.78	1.85	3.45	2.75	2.71	29.4	25.9	23	26.1	29.2	30.9	23.6	24.1

**Mean No. of flowers 2023 rounded to 1 decimal place*

Habitat Tree Removal for Clearing Activities

A walkover inspection was completed on 9 October 2023 by an ecologist from Firebird ecoSultants. This inspection looked for any trees that may be occupied by fauna or contain habitat features, see **Appendix E**. A total of 52 potential trees were identified.

Soft felling of 20 of the identified trees occurred on 1 November 2023 under the supervision of two qualified ecologist. No fauna was identified within the hollows.

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.

Nest box monitoring was not conducted during the 2023 reporting period due to staff safety access. The nest boxes have been deemed unstable, and monitoring of the nest boxes is unsafe, see **Appendix H**.

BioBanking Agreement - Tomalla Offset Site – 2022 Results

The information below is from the 2022 Annual Review. Unfortunately, our ecologist has not completed the work on time despite being engaged well in advance. This report will be updated and resubmitted with the final information. The ecologist report will be updated in Appendix F.

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 DPHI 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.

During the 2023 reporting period, Redisand engaged Murrooma Incorporated (Murrooma) to conduct a site walk on 23 May and 20 December, to identify any cultural materials exposed during vegetation clearing. Results of the site walk over revealed that no cultural material was identified onsite during vegetation screening, however several cultural heritage materials were located in screened spoils and overburden. These were appropriately catalogued and stored in a locked room for future reburial. These reports are provided in **Appendix D**.

The ACHMP was approved again 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 2023 are summarised in **Table 21**.

Table 21: Environmental Performance for Redisand in 2023

Aspect	Approval Criteria / EA Prediction	Performance during 2023 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 undertake noise monitoring in 2024	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 DPHI and the NSW EPA to omit these locations.	Consult with DPHI and NSW EPA regarding monitoring at locations NB1 – NB4.
Air Quality	See Development Consent and EPL criteria.	Non-compliant. Annual average PM _{2.5} exceedance (8.3 µg/m ³)	HVAS recorded slightly lower annual averages when compared to 2022 reporting year. 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 DPHI 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 2023.	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 DPHI 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 in October 2023, with ecologist present for clearing on 1 November 2023. Report outcomes are summarised in Section 6.5.3 .	Redisand continues to work with DPHI regarding buffer zone issues. A pre-clearance survey and tree habitat inspection were undertaken prior to planned clearing works.	Continue consultation with DPHI regarding buffer zone issues.

Aspect	Approval Criteria / EA Prediction	Performance during 2023 reporting period	Trend / key management implications	Implemented / proposed management actions
Heritage	No proposed impacts. No Project Approval criteria.	Compliant. No issues identified.	Redisand continues to liaise with RAPs and engages Murrooma Incorporated to complete site walk overs when required.	Continue to consult with Aboriginal RAPs and DPHI 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 oxidisation 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 being SB1/MW1, BH6, BH1, and BH4. 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 µg/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 2023 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 2023

		BH1		BH3		BH4		BH5		BH6	
Date	Units	29-Jun	21-Sep	29-Jun	21-Sep	29-Jun	21-Sep	26-Jun	21-Sep	29-Jun	21-Sep
Sampling Parameter											
Depth to Water	m(bTOM)	3.6	3.78	18.91	19.11	13.2	13.38	6.75	6.92	20.62	20.82
Temperature	°C	18.6	19.9	18.6	20	19.1	20.7	18.1	18.2	DRY	DRY
pH	pH Units	5.1	5.6	5.3	5.3	5	5.3	4.9	5.2	DRY	DRY
Electrical Conductivity	µS/cm	220	249	334	256	421	448	197	249	DRY	DRY
Dissolved Oxygen	mg/L	3	3.7	4	4.5	2.1	2.5	1.3	2.3	DRY	DRY
Oxidation Reduction Potential	mV	207	169	175	209	236	256	198	193	DRY	DRY
Total Dissolved Solids	mg/L	240	220	200	170	240	330	150	200	DRY	DRY
Turbidity	NTU	770	1100	2	1.9	160	140	85	55	DRY	DRY
Metals - Dissolved											
Arsenic	ug/L	1	3	<1	<1	<1	<1	3	2	DRY	DRY
Iron	mg/L	0.46	1.4	0.07	0.07	0.1	0.17	0.1	0.09	DRY	DRY
Manganese		0.15	0.11	0.009	0.02	0.009	0.009	<0.005	0.006	DRY	DRY
Anions and Cations											
Chloride (Cl)	mg/L	45	46	83	62	91	97	52	64	DRY	DRY
Sulphate (SO4)		6	6	23	13	26	34	5	4	DRY	DRY

		MW1		MW3		MW4		MW5		MW6		MW7	
Date	Units	29-Jun	21-Sep	29-Jun	21-Sep	29-Jun	21-Sep	29-Jun	21-Sep	29-Jun	21-Sep	29-Jun	21-Sep
Sampling Parameter													
Depth to Water	m(bTOM)	1.45	1.66	2.76	2.96	12.93	13.12	1.31	1.51	3.32	3.48	3.03	3.23
Temperature	°C	14.6	16.3	17.7	17.9	18.6	20.2	13.8	15.6	17.6	17.7	17.6	17.1
pH	pH Units	4.1	4.5	4.2	4.4	5.5	5.7	5.2	5.2	5.4	5.5	4.6	4.8
Electrical Conductivity	µS/cm	299	21	152	131	255	248	195	203	173	279	101	59
Dissolved Oxygen	mg/L	1.9	2.3	1.9	2.5	2.9	3.8	1.5	2.5	2	2.8	2	2.8
Oxidation Reduction Potential	mV	236	135	160	146	147	93	197	127	156	139	146	131
Total Dissolved Solids	mg/L	270	270	140	180	390	440	280	270	260	290	49	88
Turbidity	NTU	16	5.2	16	23	60	75	9.2	4.4	100	140	37	15
Metals - Dissolved													
Arsenic	ug/L	3	4	<1	<1	5	6	1	<1	21	21	1	<1
Iron	mg/L	0.74	0.58	0.77	0.87	1.7	1.2	0.72	0.48	4.6	5.9	0.18	0.16
Manganese		0.008	0.006	<0.005	<0.008	0.015	0.006	0.01	0	0.044	0.053	<0.005	<0.005
Anions and Cations													
Chloride (Cl)	mg/L	81	72	36	35	44	40	58	42	34	66	15	11
Sulphate (SO4)		2	1	<1	1	3	2	<1	<1	<1	<1	<1	<1

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, see below:

- pH: No exceedances occurred during 2023. The overall average pH level was 5.04 which is within the approved criteria. This has become slightly more acidic since 2022, and 2021 recording an average pH of 5.12, and pH 5.2 respectively.
- Arsenic: MW6 recorded an exceedance over 20µg/L during both sampling periods. Additionally, BH5, MW1, and MW4 were exceeded during both sampling times.
- Total Iron: No exceedances occurred during 2023; 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 1.45m Top of Monument (bTOM) at MW1, and the maximum depth was measured at 20.82m (bTOM) at BH6. In 2021, MW1 recorded the lowest water level to a depth of 0.7m (bTOM).

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.

Redisand has recorded an administrative non-compliance for Schedule 3, Condition 17 (Groundwater Monitoring Program) as the current groundwater monitoring does not include groundwater levels (mAHD), but rather groundwater depth (bTOM). Additionally, Redisand also failed to notify DPHI and EPA of Arsenic levels above criteria levels in 2023. The arsenic was not reported, as the unit scale (from contractor) is provided in mg/L and site believed that arsenic was within criteria. This unit scale was only discovered during this annual report and has now been addressed.

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 DPHI 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 2023 surface water monitoring results is provided in **Table 28**.

Table 28: Surface Water Monitoring Results (2023)

Sampling Requirements	Plant Sediment Dams (Groundwater Storage)						Drainage Line		
	Feed Pond			Settled Pond			Creek		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
pH	5.4	5.8	6.1	6.1	6.4	6.6	5.8	6	6.3
EC (µS/cm)	207	247.1	275	267	285.8	306	221	240.3	270
TSS (mg/L)	440	1964.2	4780	7	94.8	230	<5	72.5	190
TDS (mg/L)	310	1958.3	10500	6	132.8	250	<5	108.3	230
DO ¹ (mg/L)	5.8	8	9.9	4.2	6.3	8.9	1.5	2.4	2.9
DO (%)	57	89	121	42	70	109	14	25	33
Temperature (°C)	14.5	20.8	45.4	15.3	20.7	25.5	12.4	18	21.2
Redox (mV)	106	230.3	299	120	210.8	311	57	177.4	277

Note¹- Dissolved Oxygen calculated off mg/L.

The required monitoring frequency is every six months, however Redisand completes this every month. There were 12 samples collected during 2023. 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 6.6 which is within the approved criteria. This is a decrease from 2021, which recorded a maximum pH of 7.5.

When compared to a conversion factor, the DO results in mg/L compared to % saturation did vary considerably. In general, the average DO at the Feed Pond was within the adopted criteria, Settled Pond recorded an average DO of 70%, and the Drainage Line Creek recording an average DO of 25%.

7.6. Acid Sulfate Soils Results

Acid Sulfate Soils are managed in accordance with the *Acid Sulfate Soil Management Plan*. Regular acid sulfate testing is completed by VGT Laboratories with the 2023 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 2023

Date	Location	pH Oxidised	ASS Potential
12 Jan 2023	Redisand Sand	6.1	Highly Unlikely
09 Feb 2023	Redisand Sand	6.1	Highly Unlikely
09 Mar 2023	Redisand Sand	5.8	Unlikely
06 Apr 2023	Redisand Sand	6.1	Highly Unlikely
04 May 2023	Redisand Sand	5.7	Unlikely
01 Jun 2023	Redisand Sand	5.9	Highly Unlikely
30 Jun 2023	Redisand Sand	6.0	Highly Unlikely
27 Jul 2023	Redisand Sand	5.2	Highly Unlikely
24 Aug 2023	Redisand Sand	6.1	Highly Unlikely
21 Sep 2023	Redisand Sand	5.7	Highly Unlikely
19 Oct 2023	Redisand Sand	6.8	Highly Unlikely
16 Nov 2023	Redisand Sand	6.4	Highly Unlikely
1 Dec 2023	Redisand Sand	6.3	Highly Unlikely

During the 2023 reporting period, there was a total of 13 soil samples conducted at Redisand, with no evidence of Acid Sulfate Soils present at the site. As detailed in Section 5.2 of the ASSMP, Redisand is only required to undertake quarterly sampling.

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 2023 are provided in **Table 30**.

Table 30: Long-term Surface Water Results

Year	pH Levels								
	Feed Pond (Groundwater Storage)			Settled Pond (Groundwater Storage)			Creek		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
2023	5.8	5.85	5.9	6.4	6.45	6.5	5.8	6.25	6.4
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, which continues to be a trend. Redisand will 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 2024 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 is only required quarterly, however Redisand have conducted monthly samples during 2023. The results indicate that no Acid Sulfate Soils are present at the site. Redisand will continue to monitor Acid Sulphate Soils as per the approved monitoring requirement in the ASSMP.

7.8. Water Take

Redisand operates under Water Access Licence 36627. Water extraction limits for 2023 are outlined in **Table 31**.

Table 31: Water Take for 2023 (July 2022 – June 2023)

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	7,936ML

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 2023 Annual Review reporting period is summarised in **Table 32**.

Table 32: Rehabilitation Update for 2023

Guideline Requirement	Site Comment
Extent of the operations and rehabilitation at completion of the reporting period	The total mine area is currently 11.7 ha. Rehabilitation works continued in 2023, 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 2023.
Any rehabilitation areas which have received formal sign off	No rehabilitation received signoff during the 2023 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 2023 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.

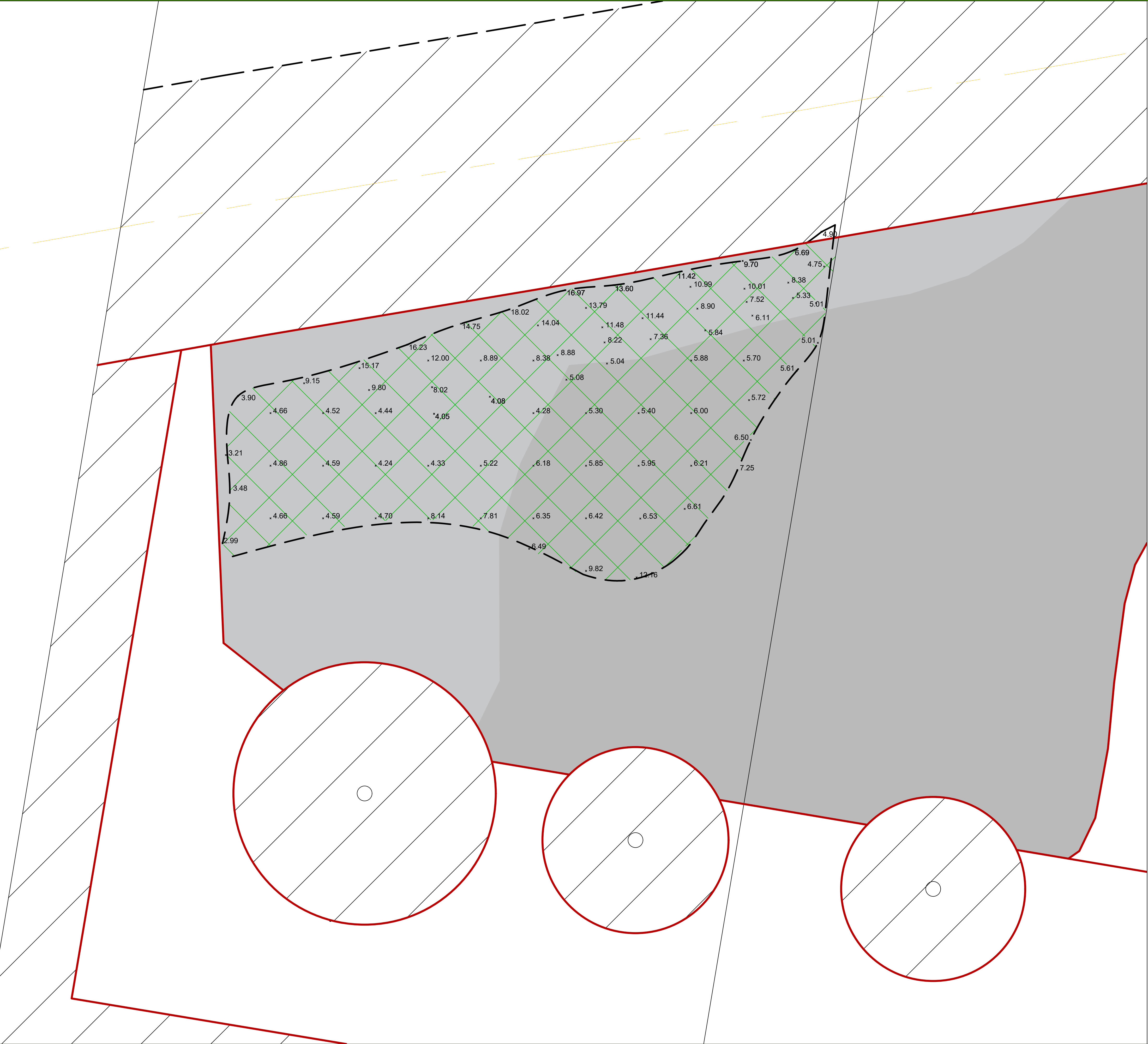
Table 33 summarises the rehabilitation status at the end of the reporting period for 2022. **Figure 3** shows disturbance and rehabilitation at the site as of 21 November 2022. Rehabilitation is proposed to continue in 2024.

Table 33: Rehabilitation Status at the End of the Reporting Period (Note to be Updated)

Mine Area Type	Last Reporting Period (Actual) (2022)	This Reporting Period (Actual) (2023)	Next Reporting Period (Forecasted) (2024)
Total mine footprint (ha)	11.7	TBD	TBD
Disturbance* (ha)	8.49	TBD	TBD
Land Being Prepared for Rehabilitation	0	0	0
Land under Active Rehabilitation	3.18	TBD	TBD
Completed Rehabilitation ¹	0	0	0

Unfortunately, the surveyor was away and has not completed the final survey pickup of disturbance and rehabilitation. This report will be updated with a new figure and table and relodged as soon as possible.

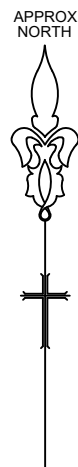
Note 1 – Site has updated table 33 and identified that no rehabilitation is complete (signed off by DPHI).



SKETCH

A.R. Nodab
.....SURVEYOR
REGISTERED UNDER THE SURVEYING ACT

DATE: 18.02.2021



x 13.72

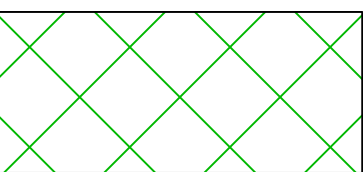
AHD LEVEL (METRES)
ORIGIN SCIMS
SSM 8289



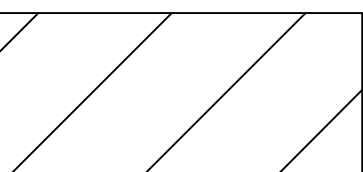
STAGE 1



STAGE 2



REHABILITATION AREA



BUFFER ZONE

L.G.A.: PORT STEPHENS Ratio: 1:750 (A1)
Parish: Datum:
Locality: SALT ASH Origin:
Client: ATB MORTON Drawn: AM
Date Surveyed: 8.10.2020
Date Printed: 18.02.2021
Reference: 50119
Drawing: 50119_30.dwg

STAGE 2 WORK AS EXECUTED
LOTS 632 & 633 DP609506, LOT 2 DP1172862
NELSON BAY ROAD, SALT ASH



EARTH SURVEYING
CONSULTING SURVEYORS
PO Box 4, NEWCASTLE NSW 2300
02 4929 1900 0405 223133
andrew@earthsurveying.com.au

9. WASTE MANAGEMENT

9.1. Waste Management

General waste is collected and stored on site, where it is then collected weekly by the Port Stephens Shire Council.

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

There was one collection of scrap metal by Sims Metal in 2023.

There were no waste issues during 2023.

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 2 November 2023. Due to COVID-19 restrictions, no meetings were held between 2020 and 2022. Key discussions of the CCC were:

- New approved Independent Chairperson;
- CCC meetings to occur annually; and
- Currently product produced on site is being supplied to the Golden Highway Project upgrade and a large residential waterfront development in Nelson Bay.

Details of the 2023 CCC meeting can be found on the Redisand website.

10.1. Community Engagement Activities

There were no community engagement activities in 2023.

10.2. Complaints

There were no complaints during 2023. **Table 34** summarises the complaints Redisand has received since 2015. An up-to-date Complaints Register can be found on the Redisand website.

Table 34: Redisand Complaints (2015 – 2023)

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 operates 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.		
2023	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.

Redisand was required to commission and seek endorsement for an Independent Auditor to undertake the IEA by October 2023. As Redisand was unable to meet this time frame, and no IEA was conducted during this period, a non-compliance has been recorded as per Schedule 5, Condition 9.

It is anticipated that an IEA will be completed by Q2 of 2024, with the findings of this report, along with an action list provided to the Secretary.

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-compliances in 2020 and four in 2023. All non-compliances for 2023 are summarised in **Section 1**.

The low non-compliances in 2023 was related to air quality monitoring. Additional “administrative” non compliances were related to failing to report or undertake an Independent Environmental Audit. Further details of the air quality non-compliances are detailed in **Section 6.3.3**.

12.2. Non-Compliances, Exceedances, and Incidents in the 2023 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 2023 Annual Review reporting period, no incidents occurred which meet this definition.

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

On 27 November 2023, Redisand received a Warning Letter from the (then) Department of Planning and Environment relating to a breach of Section 4.2(1) of the Environmental Planning and Assessment Act 1976.

This warning letter was for breaches of Schedule 4 Condition 2 and Schedule 5 Condition 7 for failing to notify the Secretary, affected landowners and tenants of dust exceedances in May 2022 and August 2022.

During the 2023 reporting period, there was no short-term dust exceedances.

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** .

Table 35: Improvement Actions for 2024

Improvement Measure	Activities
Improve compliance	Continue to improve environmental compliance across the site.
Water and ASS monitoring frequencies	Complete monitoring as per the Water Management Plan. This includes reducing the frequency of surface water monitoring as per the approved Water Management Plan.
Improve compliance with groundwater monitoring	Redisand will survey groundwater monitoring locations so that groundwater monitoring can report in AHD as per the approved Water Management Plan. Discuss with Groundwater Contractor to ways to change groundwater monitoring from water depth to water level m(AHD).
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. This will continue in 2024.
Nest box/Salvaged Hollows	Proposed approach is salvaged hollows as preferred nests. There are some nest boxes across the site, however these are within close proximity to available salvage hollows and are not beneficial. Monitoring to occur when deemed safe and stable for staff.
IEA	Redisands have already received endorsement for experts to undertake the IEA. To occur Q2 in 2024.

Appendix A

Noise Monitoring Results (2023)



6 March 2023

Ref: 12727/30002

Mr Grant Stevenson
Redisand
9 Old Punt Road
TOMAGO NSW 2322

RE: 17 FEBRUARY 2023 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 17th February, 2023. 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”).

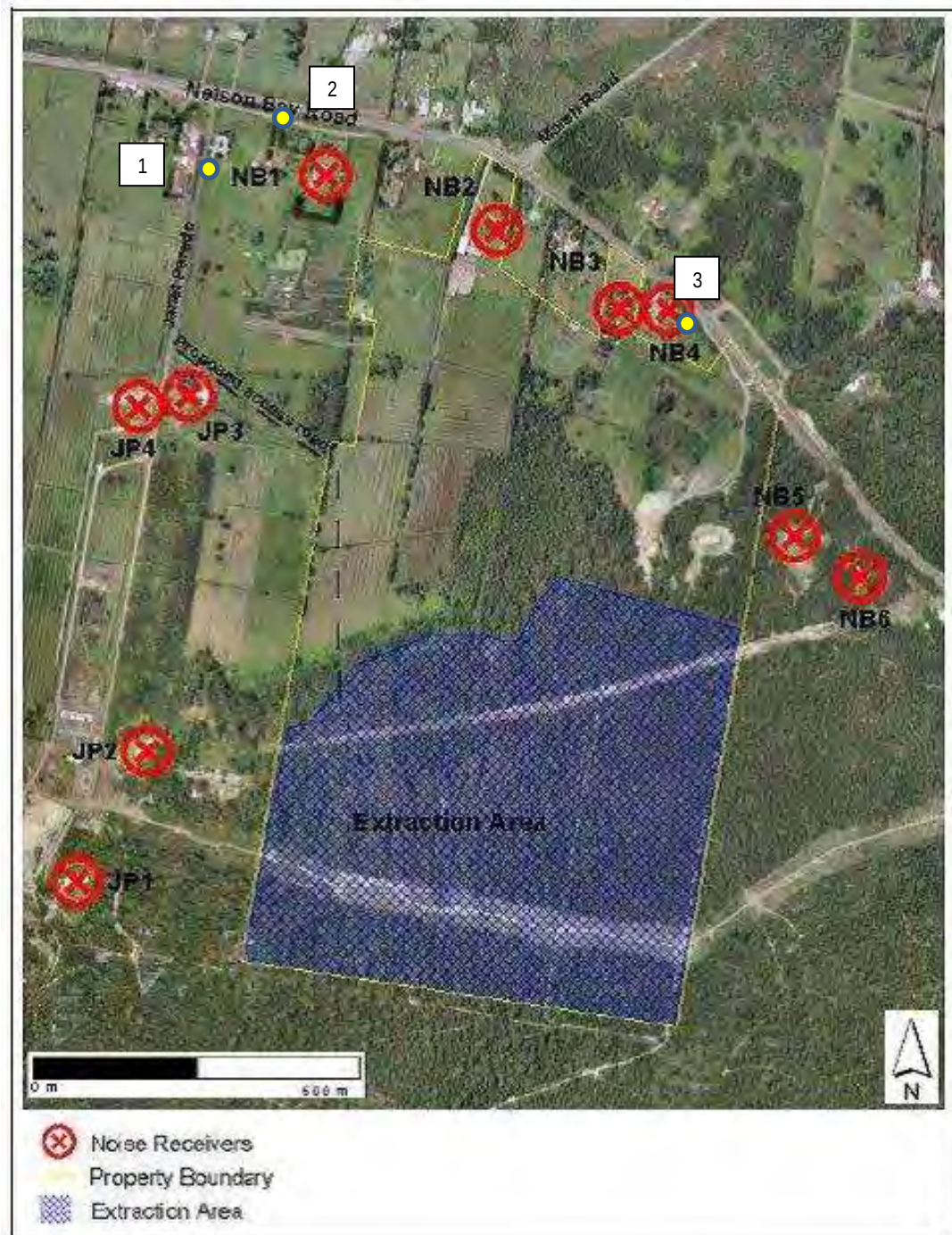


Figure 1 – Noise Monitoring Locations

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 February 17th, the winds were light generally from the north (ranging from north west to north east). The winds speed increased slightly 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 – 17 February 2023				
Location	Time	dB(A) Leq (15 min)	Wind speed/ direction	Identified Noise Sources
JP1	8:28 am	46	1.5m/s NW	Birds & insects (46), traffic (30), RSA (27)
JP2	8:48 am	42	1.0m/s N	Birds (42), traffic (32), RSA occasionally audible
JP3	7:50 am	44	1.5m/s N	Traffic (40), birds (40), RSA (38) ¹
JP4	8:07 am	44	1.5m/s N	Traffic (42), birds (38), RSA (34) ¹
NB5	9:25 am	50	1.5m/s NE	Insects (49), traffic (42), birds (35), 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 an irregular hum with occasional engine revs and impact noises. Occasional engine revs and 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 – 17 February 2023				
Location	Truck condition	Duration, seconds	L _{Aeq} (duration)	L _{Aeq} (15min)
JP 3 7:50 am	Empty	40	48	34
	Empty	35	46	32
	Empty	40	46	32
	TOTAL L _{Aeq} for 15 minute period			38
JP 4 8:07 am	Full	30	44	29
	Empty	30	45	30
	Empty	35	42	28
	TOTAL L _{Aeq} for 15 minute period			34

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 – 17 February 2023				
Location	Time	dB(A) L _{eq} (15 min)	Wind speed/ direction	Identified Noise Sources
1/NB1	9:05 am	51	1.0m/s N	Traffic (50), birds (45), RSA inaudible
2/NB1	10:00 am	56	2.0m/s NE	Traffic (56), RSA inaudible
3/NB4	9:42 am	59	1.5m/s NE	Traffic (58), insects (50), 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 insects. 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).

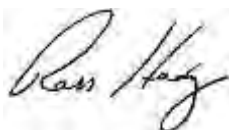
As the general quarry noise from RSA was at least 10dB below the applicable criterion there is no requirement to analyse the data for the low frequency noise modifying factor correction in the NPfI.

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



11 May 2023

Ref: 12727/29666

Mr Grant Stevenson
Redisand
9 Old Punt Road
TOMAGO NSW 2322

RE: 11 MAY 2023 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 11th May, 2023. 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”).

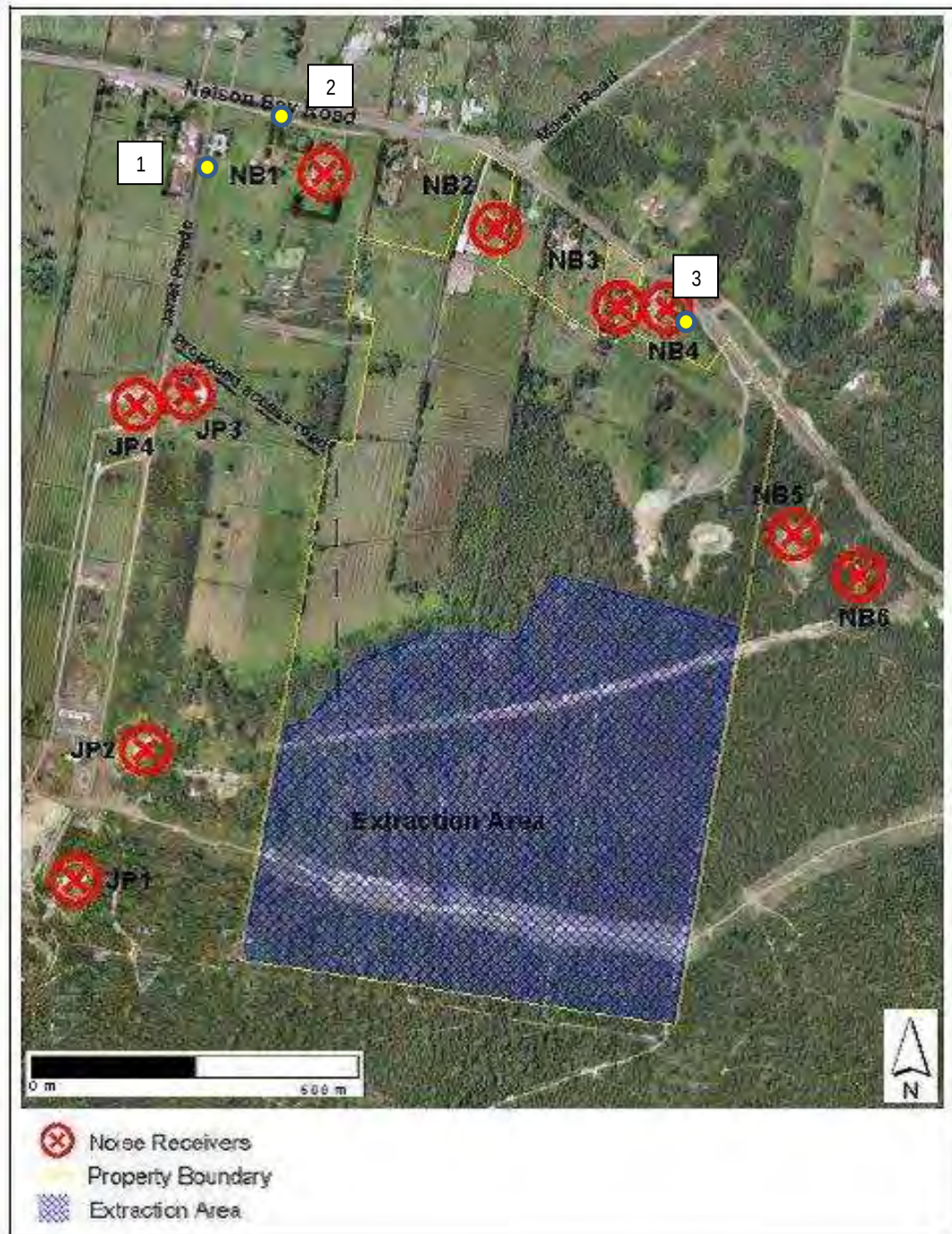


Figure 1 – Noise Monitoring Locations

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.

The weather throughout the survey was cool to mild 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 – 11 May 2023				
Location	Time	dB(A) Leq (15 min)	Wind speed/ direction	Identified Noise Sources
JP1	9:17 am	48	2.0m/s NW	Surf (45), planes (44), birds (40), traffic (30), RSA occasionally audible
JP2	9:36 am	43	2.0m/s NW	Birds (40), surf (40), traffic (32), RSA inaudible
JP3	7:55 am	48	1.0m/s NW	Traffic (47), birds (40), RSA (35) ¹
JP4	8:14 am	46	1.5m/s NW	Traffic (46), birds (32), RSA (27) ¹
NB5	8:35 am	47	2.0m/s NW	Surf (45), birds (42), traffic (35), 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 impacts which were audible for less than one minute. 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 - 11 May 2023				
Location	Truck condition	Duration, seconds	L _{Aeq} (duration)	L _{Aeq} (15min)
JP 3 7:55 am	Empty	17	48	31
	Empty	17	46	29
	Empty	20	40	23
	TOTAL L _{Aeq} for 15 minute period			35
JP 4 8:14 am	Empty	25	40	24
	Empty	22	38	22
	Laden	25	37	21
	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 – 11 May 2023				
Location	Time	dB(A) L _{eq} (15 min)	Wind speed/ direction	Identified Noise Sources
1/NB1	10:05 am	56	1.5m/s NW	Traffic (56), birds (38), planes (30), RSA inaudible ¹
2/NB1	9:56 am	62	2.0m/s NW	Traffic (62), RSA inaudible
3/NB4	8:55 am	64	2.0m/s NW	Traffic (64), 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 (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.

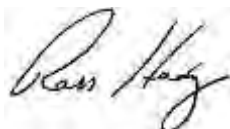
At the time of the measurements the acoustic environment of most of the monitoring sites was dominated by noise from traffic on Nelson Bay Road. At Locations JP1, JP2 and NB5 the measurements were also significantly influenced by noise from rough surf conditions impacting on the coast. Both of these noise sources 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 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



4 September 2023

Ref: 12727/30112

Mr Grant Stevenson
Redisand
9 Old Punt Road
TOMAGO NSW 2322

RE: 31 AUGUST 2023 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 31st August, 2023. 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
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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”).

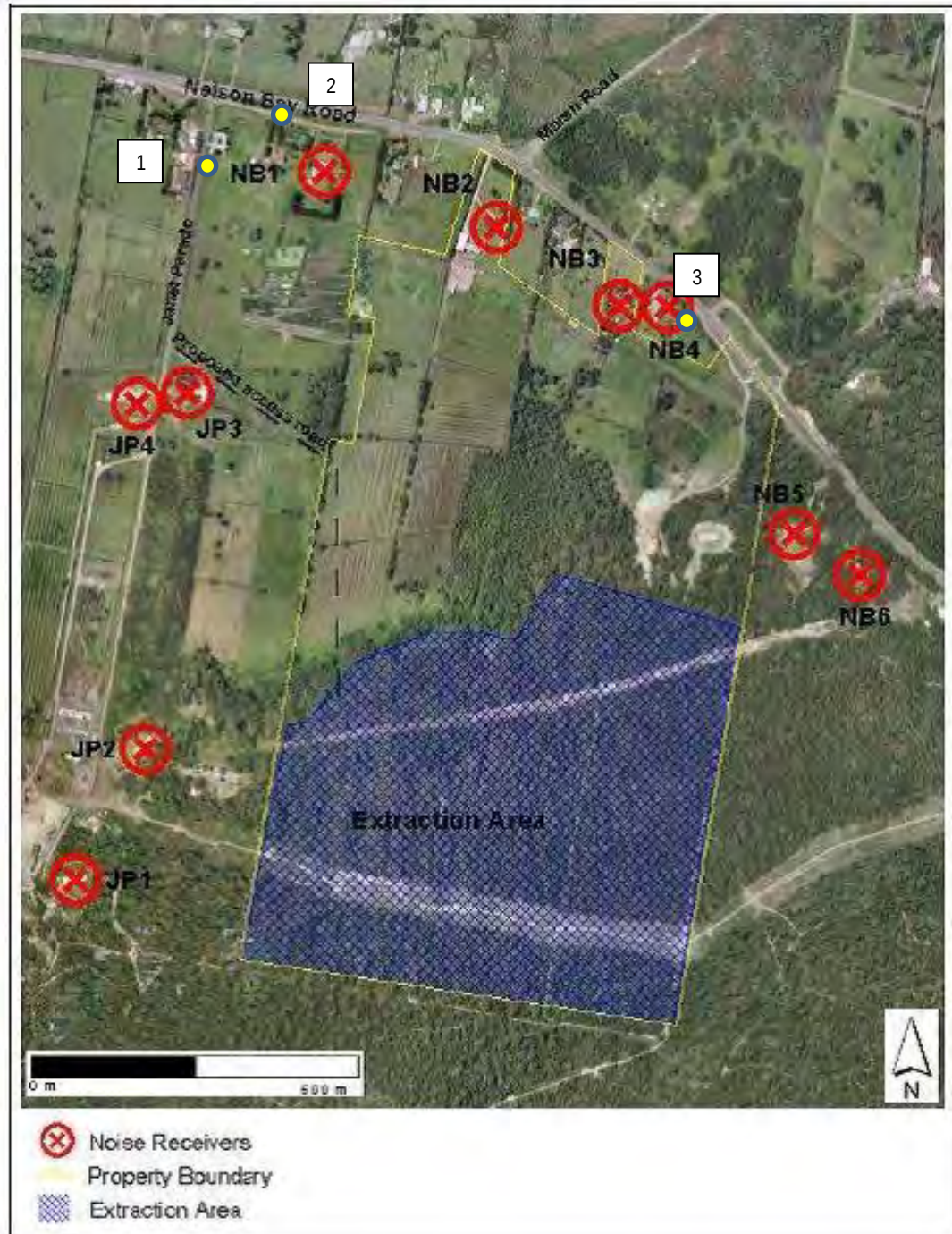


Figure 1 – Noise Monitoring Locations

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.

The weather throughout the survey was warm with clear skies and a light west to north westerly wind throughout the beginning of the monitoring period. The wind swung around to the south west during the latter part of the survey 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 – 31 August 2023				
Location	Time	dB(A) Leq (15 min)	Wind speed/ direction	Identified Noise Sources
JP1	9:25 am	51	1.5m/s SW	Planes (49), birds (45), traffic (41), RSA inaudible
JP2	9:45 am	48	2.0m/s SW	Birds (45), planes (43), traffic (40), RSA inaudible
JP3	7:35 am	52	1.5m/s NW	Traffic (51), birds (45), RSA (29) ¹
JP4	8:22 am	46	2.5m/s NW	Traffic (48), birds (48), RSA (24) ¹
NB5	8:45 am	46	2.0m/s NW	Traffic (45), birds (40), 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.

With the exception of the noise from trucks on the haul road, the operational noise from RSA was not audible at any of the monitoring locations.

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 L_{eq} (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 3 of the truck movements in total).

Table 3 Redisand Salt Ash - Noise Monitoring Results – Truck Noise – 31 August 2023				
Location	Truck condition	Duration, seconds	$L_{Aeq}(\text{duration})$	$L_{Aeq}(15\text{min})$
JP 3 7:35 am	Laden	12	45	25
	Empty	17	40	23
	Empty	16	42	24
	TOTAL L_{Aeq} for 15 minute period			29
JP 4 8:22 am	Laden	20	36	19
	Empty	22	32	16
	Empty	20	38	21
	TOTAL L_{Aeq} for 15 minute period			24

The results shown in Table 3 show that the L_{eq} (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 – 31 August 2023				
Location	Time	dB(A) L_{eq} (15 min)	Wind speed/ direction	Identified Noise Sources
1/NB1	10:05 am	56	1.5m/s NW	Traffic (56), birds (38), planes (30), RSA inaudible ¹
2/NB1	9:56 am	62	2.0m/s NW	Traffic (62), RSA inaudible
3/NB4	8:55 am	64	2.0m/s NW	Traffic (64), 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 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 most of the monitoring sites was dominated by noise from traffic on Nelson Bay Road. At Locations JP1 and JP2 the measurements were also influenced by noise from military aircraft. This noise source is relatively broad band and also contributes significantly to 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 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 2023

Ref: 12727/10141

Mr Grant Stevenson

Redisand
9 Old Punt Road
TOMAGO NSW 2322

RE: 24 NOVEMBER 2023 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 24th November, 2023. 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”).

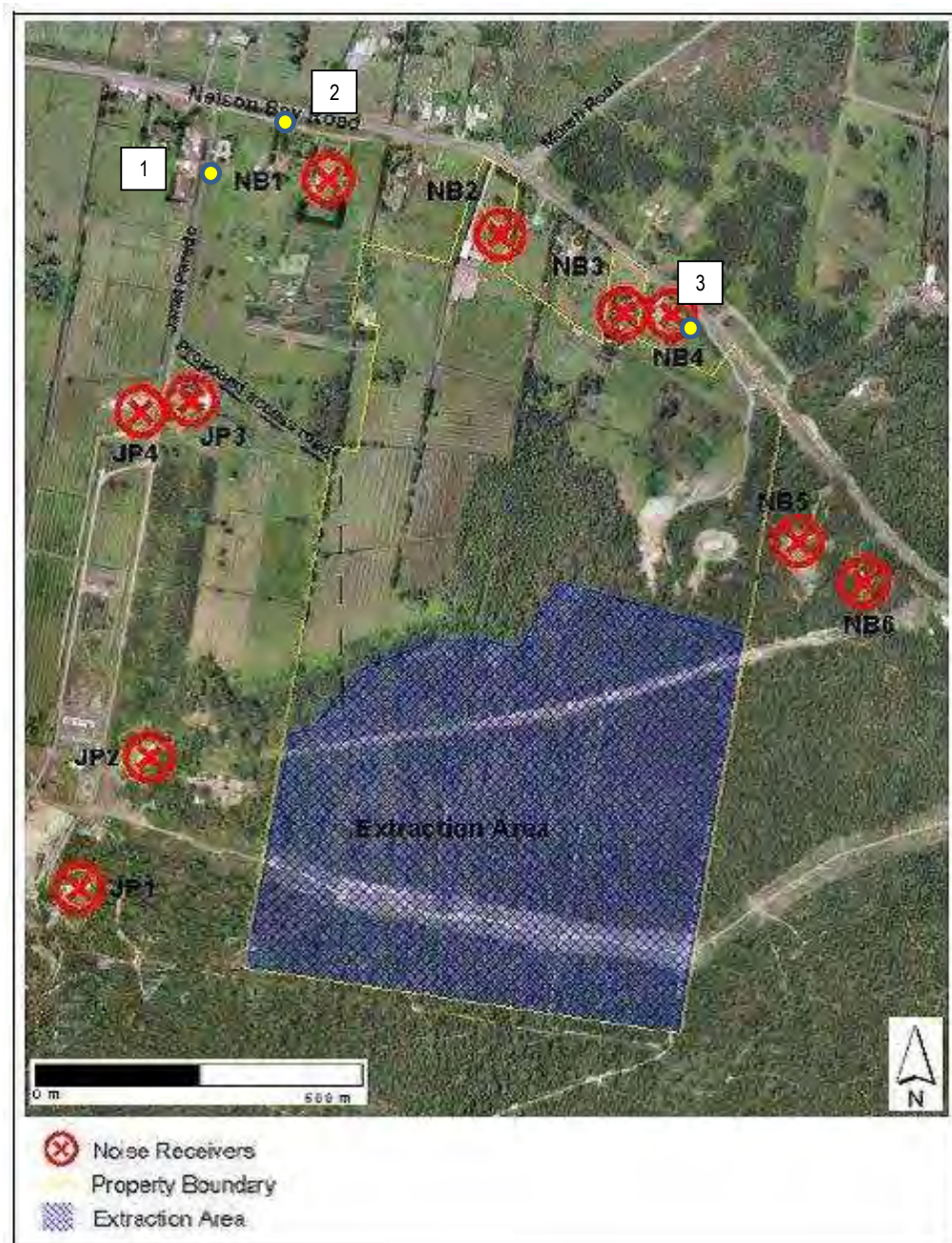


Figure 1 – Noise Monitoring Locations

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.

The weather throughout the survey was warm with mostly cloudy skies and a moderate easterly wind throughout the beginning of the monitoring period. The wind swung around to the south east during the latter part of the survey 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 – 24 November 2023					
Location	Time	dB(A) Leq (15 min)	Criterion dB(A) Leq (15 min)	Wind speed/ direction	Identified Noise Sources
JP1	8:24am	55	40	3.0m/s ENE	Birds & insects (55), traffic (41), tractor (36), RSA (30)
JP2	8:49am	57	43	2.5m/s ENE	Tractor (56), planes (46), birds & insects (42), RSA (32) , traffic (31)
JP3	7:45am	55	39	2.5m/s E	Birds (52), traffic (52), RSA (32) ¹
JP4	8:02am	48	37	2.5m/s E	Traffic (47), birds (40), RSA (25) ¹
NB5	9:18am	52	36	3.0m/s ENE	Dog (52), birds (41), traffic (35), 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.

With the exception of the noise from trucks on the haul road, the operational noise from RSA was not audible at any of the monitoring locations.

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 3 of the truck movements in total).

Table 3 Redisand Salt Ash - Noise Monitoring Results – Truck Noise – 24 November 2023				
Location	Truck condition	Duration, seconds	L _{Aeq} (duration)	L _{Aeq} (15min)
JP 3 7:45 am	Empty	19	42	25
	Empty	27	42	27
	Empty	26	43	28
	TOTAL L _{Aeq} for 15 minute period			32
JP 4 8:02 am	Empty	18	37	20
	Empty	26	35	20
	Laden	24	36	21
	TOTAL L _{Aeq} for 15 minute period			25

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 – 24 November 2023					
Location	Time	dB(A) L _{eq} (15 min)	Criterion dB(A) L _{eq} (15 min)	Wind speed/ direction	Identified Noise Sources
1/NB1	10:20am	55	35	4.0m/s SE	Traffic (55), birds (42), RSA inaudible
2/NB1	10:02am	67	35	2.5m/s ENE	Traffic (67), RSA inaudible
3/NB4	9:39am	73	35	3.0m/s ENE	Traffic (73), 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 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 most of the monitoring sites was dominated by noise from traffic on Nelson Bay Road. At Locations JP1 and JP2 the measurements were also influenced by noise from the use of a tractor by a resident in a nearby property, and by military aircraft at Location JP2. These noise sources are relatively broad band and also contribute significantly to the low frequency component of the overall noise spectrum.

Noise from RSA was associated with the trucks on the haul road and operational noise. Truck noise was present for a relatively brief duration throughout the 15 minute monitoring period at Locations JP3 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 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 (02) 4954 2276.

Yours faithfully,

SPECTRUM ACOUSTICS PTY LIMITED



Neil Pennington MAIP, MAAS, MASA

B. Sc., B.Math. (Hons)

Principal / Director

Appendix B

Air Quality Monitoring Results (2023)

Report Number: 14224

Date Issued: 14/02/2023

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 9/02/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	15/01/2023	14224/1	HVAS	10/01/2023	16/01/2023	56	81,437
PM 10	15/01/2023	14224/2	HVAS	10/01/2023	16/01/2023	56	81,438
PM 2.5	15/01/2023	14224/3	HVAS	10/01/2023	16/01/2023	56	81,439
TSP	21/01/2023	14224/4	HVAS	16/01/2023	24/01/2023	56	81,465
PM 10	21/01/2023	14224/5	HVAS	16/01/2023	24/01/2023	56	81,466
PM 2.5	21/01/2023	14224/6	HVAS	16/01/2023	24/01/2023	56	81,467
TSP	27/01/2023	14224/7	HVAS	24/01/2023	30/01/2023	56	81,468
PM 10	27/01/2023	14224/8	HVAS	24/01/2023	30/01/2023	56	81,469
PM 2.5	27/01/2023	14224/9	HVAS	24/01/2023	30/01/2023	56	81,470
TSP	02/02/2023	14224/10	HVAS	30/01/2023	06/02/2023	56	81,471
PM 10	02/02/2023	14224/11	HVAS	30/01/2023	06/02/2023	56	81,472
PM 2.5	02/02/2023	14224/12	HVAS	30/01/2023	06/02/2023	56	81,473
TSP	08/02/2023	14224/13	HVAS	06/02/2023	09/02/2023	56	81,474
PM 10	08/02/2023	14224/14	HVAS	06/02/2023	09/02/2023	56	81,475
PM 2.5	08/02/2023	14224/15	HVAS	06/02/2023	09/02/2023	56	81,476

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: 14224

Date Issued: 14/02/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	14224/1 15/01/2023	14224/4 21/01/2023	14224/7 27/01/2023	14224/10 02/02/2023	14224/13 08/02/2023
Date Tested	--	--	13/02/2023	13/02/2023	13/02/2023	13/02/2023	13/02/2023
Particulates per filter	VGT-WI/44	µg/filter	52,500	41,400	59,200	50,300	65,400
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	35	28	39	34	44

HVAS - PM10 Date of Operation	Method	Units	14224/2 15/01/2023	14224/5 21/01/2023	14224/8 27/01/2023	14224/11 02/02/2023	14224/14 08/02/2023
Date Tested	--	--	13/02/2023	13/02/2023	13/02/2023	13/02/2023	13/02/2023
Particulates per filter	VGT-WI/44	µg/filter	6,300	16,100	24,800	18,900	32,500
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	4	11	17	13	22

HVAS - PM2.5 Date of Operation	Method	Units	14224/3 15/01/2023	14224/6 21/01/2023	14224/9 27/01/2023	14224/12 02/02/2023	14224/15 08/02/2023
Date Tested	--	--	13/02/2023	13/02/2023	13/02/2023	13/02/2023	13/02/2023
Particulates per filter	VGT-WI/44	µg/filter	3,800	5,600	7,000	8,200	23,300
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	3	4	5	5	16

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: 14224

Date Issued: 14/02/2023

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
14224/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14224/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14224/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14224/4	TSP		Unknown	1.12	1,440	20.0	101.3	1,502
14224/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14224/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14224/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14224/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14224/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14224/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14224/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14224/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14224/13	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14224/14	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14224/15	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 14357

Date Issued: 15/03/2023

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 10/03/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	14/02/2023	14357/1	HVAS	09/02/2023	16/02/2023	56	81,477
PM 10	14/02/2023	14357/2	HVAS	09/02/2023	16/02/2023	56	81,478
PM 2.5	14/02/2023	14357/3	HVAS	09/02/2023	16/02/2023	56	81,479
TSP	20/02/2023	14357/4	HVAS	16/02/2023	21/02/2023	56	81,489
PM 10	20/02/2023	14357/5	HVAS	16/02/2023	21/02/2023	56	81,490
PM 2.5	20/02/2023	14357/6	HVAS	16/02/2023	21/02/2023	56	81,491
TSP	26/02/2023	14357/7	HVAS	21/02/2023	27/02/2023	56	81,494
PM 10	26/02/2023	14357/8	HVAS	21/02/2023	27/02/2023	56	81,492
PM 2.5	26/02/2023	14357/9	HVAS	21/02/2023	27/02/2023	56	81,493
TSP	04/03/2023	14357/10	HVAS	27/02/2023	06/03/2023	56	81,495
PM 10	04/03/2023	14357/11	HVAS	27/02/2023	06/03/2023	56	81,496
PM 2.5	04/03/2023	14357/12	HVAS	27/02/2023	06/03/2023	56	81,497

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: 14357

Date Issued: 15/03/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	14357/1 14/02/2023	14357/4 20/02/2023	14357/7 26/02/2023	14357/10 04/03/2023
Date Tested	--	--	14/03/2023	14/03/2023	14/03/2023	14/03/2023
Particulates per filter	VGT-WI/44	µg/filter	54,400	20,800	23,300	34,200
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	36	14	16	23

HVAS - PM10 Date of Operation	Method	Units	14357/2 14/02/2023	14357/5 20/02/2023	14357/8 26/02/2023	14357/11 04/03/2023
Date Tested	--	--	14/03/2023	14/03/2023	14/03/2023	14/03/2023
Particulates per filter	VGT-WI/44	µg/filter	22,300	6,800	10,300	9,100
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	15	5	7	6

HVAS - PM2.5 Date of Operation	Method	Units	14357/3 14/02/2023	14357/6 20/02/2023	14357/9 26/02/2023	14357/12 04/02/2023
Date Tested	--	--	14/03/2023	14/03/2023	14/03/2023	14/03/2023
Particulates per filter	VGT-WI/44	µg/filter	10,100	5,600	2,900	1,800
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	7	4	<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: 14357

Date Issued: 15/03/2023

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
14357/1	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14357/2	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14357/3	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14357/4	TSP		Unknown	1.12	1,436	20.0	101.3	1,498
14357/5	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14357/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14357/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14357/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14357/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14357/10	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14357/11	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14357/12	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 14498

Date Issued: 14/04/2023

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 11/04/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	10/03/2023	14498/1	HVAS	06/03/2023	13/03/2023	56	81,498
PM 10	10/03/2023	14498/2	HVAS	06/03/2023	13/03/2023	56	81,499
PM 2.5	10/03/2023	14498/3	HVAS	06/03/2023	13/03/2023	56	81,500
TSP	16/03/2023	14498/4	HVAS	13/03/2023	17/03/2023	57	107,229
PM 10	16/03/2023	14498/5	HVAS	13/03/2023	17/03/2023	57	107,230
PM 2.5	16/03/2023	14498/6	HVAS	13/03/2023	17/03/2023	57	107,231
TSP	22/03/2023	14498/7	HVAS	17/03/2023	23/03/2023	57	107,232
PM 10	22/03/2023	14498/8	HVAS	17/03/2023	23/03/2023	57	107,233
PM 2.5	22/03/2023	14498/9	HVAS	17/03/2023	23/03/2023	57	107,234
TSP	28/03/2023	14498/10	HVAS	23/03/2023	29/03/2023	57	107,235
PM 10	28/03/2023	14498/11	HVAS	23/03/2023	29/03/2023	57	107,236
PM 2.5	28/03/2023	14498/12	HVAS	23/03/2023	29/03/2023	57	107,237
TSP	03/04/2023	14498/13	HVAS	29/03/2023	04/04/2023	57	107,238
PM 10	03/04/2023	14498/14	HVAS	29/03/2023	04/04/2023	57	107,239
PM 2.5	03/04/2023	14498/15	HVAS	29/03/2023	04/04/2023	57	107,240

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: 14498

Date Issued: 14/04/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	14498/1 10/03/2023	14498/4 16/03/2023	14498/7 22/03/2023	14498/10 28/03/2023	14498/13 03/04/2023
Date Tested	--	--	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023
Particulates per filter	VGT-WI/44	µg/filter	64,500	96,800	78,000	37,600	25,600
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	45	64	52	27	17

HVAS - PM10 Date of Operation	Method	Units	14498/2 10/03/2023	14498/5 16/03/2023	14498/8 22/03/2023	14498/11 28/03/2023	14498/14 03/04/2023
Date Tested	--	--	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023
Particulates per filter	VGT-WI/44	µg/filter	18,200	40,600	21,400	15,600	8,400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	13	29	14	11	6

HVAS - PM2.5 Date of Operation	Method	Units	14498/3 10/03/2023	14498/6 16/03/2023	14498/9 22/03/2023	14498/12 28/03/2023	14498/15 03/04/2023
Date Tested	--	--	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023
Particulates per filter	VGT-WI/44	µg/filter	6,500	31,300	8,100	4,200	<400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	5	21	5	3	<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: 14498

Date Issued: 14/04/2023

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
14498/1	TSP		Unknown	1.12	1,385	20.0	101.3	1,445
14498/2	PM 10		Unknown	1.12	1,387	20.0	101.3	1,447
14498/3	PM 2.5		Unknown	1.12	1,376	20.0	101.3	1,435
14498/4	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14498/5	PM 10		Unknown	1.12	1,339	20.0	101.3	1,397
14498/6	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14498/7	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14498/8	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14498/9	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501
14498/10	TSP		Unknown	1.12	1,355	20.0	101.3	1,413
14498/11	PM 10		Unknown	1.12	1,355	20.0	101.3	1,413
14498/12	PM 2.5		Unknown	1.12	1,353	20.0	101.3	1,411
14498/13	TSP		Unknown	1.12	1,439	20.0	101.3	1,501
14498/14	PM 10		Unknown	1.12	1,439	20.0	101.3	1,501
14498/15	PM 2.5		Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 14625

Date Issued: 11/05/2023

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 4/05/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	09/04/2023	14625/1	HVAS	04/04/2023	11/04/2023	57	107,246
PM 10	09/04/2023	14625/2	HVAS	04/04/2023	11/04/2023	57	107,247
PM 2.5	09/04/2023	14625/3	HVAS	04/04/2023	11/04/2023	57	107,248
TSP	15/04/2023	14625/4	HVAS	11/04/2023	17/04/2023	57	107,281
PM 10	15/04/2023	14625/5	HVAS	11/04/2023	17/04/2023	57	107,282
PM 2.5	15/04/2023	14625/6	HVAS	11/04/2023	17/04/2023	57	107,283
TSP	21/04/2023	14625/7	HVAS	17/04/2023	24/04/2023	57	107,284
PM 10	21/04/2023	14625/8	HVAS	17/04/2023	24/04/2023	57	107,286
PM 2.5	21/04/2023	14625/9	HVAS	17/04/2023	24/04/2023	57	107,287
TSP	27/04/2023	14625/10	HVAS	24/04/2023	01/05/2023	57	107,288
PM 10	27/04/2023	14625/11	HVAS	24/04/2023	01/05/2023	57	107,289
PM 2.5	27/04/2023	14625/12	HVAS	24/04/2023	01/05/2023	57	107,290
TSP	03/05/2023	14625/13	HVAS	01/05/2023	04/05/2023	57	107,291
PM 10	03/05/2023	14625/14	HVAS	01/05/2023	04/05/2023	57	107,292
PM 2.5	03/05/2023	14625/15	HVAS	01/05/2023	04/05/2023	57	107,293

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: 14625

Date Issued: 11/05/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	14625/1 09/04/2023	14625/4 15/04/2023	14625/7 21/04/2023	14625/10 27/04/2023	14625/13 03/05/2023
Date Tested	--	--	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023
Particulates per filter	VGT-WI/44	µg/filter	27,900	20,400	41,400	21,500	35,900
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	19	14	28	14	24

HVAS - PM10 Date of Operation	Method	Units	14625/2 09/04/2023	14625/5 15/04/2023	14625/8 21/04/2023	14625/11 27/04/2023	14625/14 03/05/2023
Date Tested	--	--	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023
Particulates per filter	VGT-WI/44	µg/filter	9,600	10,500	14,300	8,300	17,100
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	6	7	10	6	11

HVAS - PM2.5 Date of Operation	Method	Units	14625/3 09/04/2023	14625/6 15/04/2023	14625/9 21/04/2023	14625/12 27/04/2023	14625/15 03/05/2023
Date Tested	--	--	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023
Particulates per filter	VGT-WI/44	µg/filter	11,000	4,100	4,400	4,400	12,800
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	7	3	3	3	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: 14625

Date Issued: 11/05/2023

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
14625/1	TSP	Run time reset	Unknown	1.12	1,439	20.0	101.3	1,501
14625/2	PM 10	Run time reset	Unknown	1.12	1,439	20.0	101.3	1,501
14625/3	PM 2.5	Run time reset	Unknown	1.12	1,439	20.0	101.3	1,501
14625/4	TSP	No truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/5	PM 10	No truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/6	PM 2.5	No truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/7	TSP	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/8	PM 10	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/9	PM 2.5	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/10	TSP	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/11	PM 10	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/12	PM 2.5	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/13	TSP	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/14	PM 10	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501
14625/15	PM 2.5	Truck movements	Unknown	1.12	1,439	20.0	101.3	1,501

Report Number: 14768

Date Issued: 8/06/2023

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 1/06/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	09/05/2023	14768/1	HVAS	04/05/2023 07:00	10/05/2023 07:00	57	107,296
PM 10	09/05/2023	14768/2	HVAS	04/05/2023 07:00	10/05/2023 07:00	57	107,294
PM 2.5	09/05/2023	14768/3	HVAS	04/05/2023 07:00	10/05/2023 07:00	57	107,295
TSP	15/05/2023	14768/4	HVAS	10/05/2023 07:00	16/05/2023 07:30	58	107,819
PM 10	15/05/2023	14768/5	HVAS	10/05/2023 07:00	16/05/2023 07:30	58	107,817
PM 2.5	15/05/2023	14768/6	HVAS	10/05/2023 07:00	16/05/2023 07:30	58	107,818
TSP	21/05/2023	14768/7	HVAS	16/05/2023 07:30	22/05/2023 08:00	58	107,820
PM 10	21/05/2023	14768/8	HVAS	16/05/2023 07:30	22/05/2023 08:00	58	107,821
PM 2.5	21/05/2023	14768/9	HVAS	16/05/2023 07:30	22/05/2023 08:00	58	107,823
TSP	27/05/2023	14768/10	HVAS	22/05/2023 08:00	29/05/2023 07:00	58	107,824
PM 10	27/05/2023	14768/11	HVAS	22/05/2023 08:00	29/05/2023 07:00	58	107,825
PM 2.5	27/05/2023	14768/12	HVAS	22/05/2023 08:00	29/05/2023 07:00	58	107,826

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: 14768

Date Issued: 8/06/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	14768/1 09/05/2023	14768/4 15/05/2023	14768/7 21/05/2023	14768/10 27/05/2023
Date Tested	--	--	07/06/2023	07/06/2023	07/06/2023	07/06/2023
Particulates per filter	VGT-WI/44	µg/filter	70,100	53,300	25,000	24,800
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	45	35	16	16

HVAS - PM10 Date of Operation	Method	Units	14768/2 09/05/2023	14768/5 15/05/2023	14768/8 21/05/2023	14768/11 27/05/2023
Date Tested	--	--	07/06/2023	07/06/2023	07/06/2023	07/06/2023
Particulates per filter	VGT-WI/44	µg/filter	31,200	19,200	11,000	10,400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	20	12	7	7

HVAS - PM2.5 Date of Operation	Method	Units	14768/3 09/05/2023	14768/6 15/05/2023	14768/9 21/05/2023	14768/12 27/05/2023
Date Tested	--	--	07/06/2023	07/06/2023	07/06/2023	07/06/2023
Particulates per filter	VGT-WI/44	µg/filter	23,800	12,500	11,300	6,500
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	16	8	7	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: 14768

Date Issued: 8/06/2023

Revision No: 00

Sampling procedures supplied by client.

Lab ID	Description	Sampled By	Method of Sampling	Comments
14768/1	TSP	Paul Perry	Unknown	Truck movements
14768/2	PM 10	Paul Perry	Unknown	Truck movements
14768/3	PM 2.5	Paul Perry	Unknown	Truck movements
14768/4	TSP	Paul Perry	Unknown	Truck movements
14768/5	PM 10	Paul Perry	Unknown	Truck movements
14768/6	PM 2.5	Paul Perry	Unknown	Truck movements
14768/7	TSP	Paul Perry	Unknown	No truck movements
14768/8	PM 10	Paul Perry	Unknown	No truck movements
14768/9	PM 2.5	Paul Perry	Unknown	No truck movements
14768/10	TSP	Paul Perry	Unknown	Truck movements 07:00am - Midday
14768/11	PM 10	Paul Perry	Unknown	Truck movements 07:00am - Midday
14768/12	PM 2.5	Paul Perry	Unknown	Truck movements 07:00am - Midday

Lab ID	Description	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3	Weather
14768/1	TSP	1.12	1,439	13.5	101.3	1,542	Fine
14768/2	PM 10	1.12	1,439	13.5	101.3	1,542	Fine
14768/3	PM 2.5	1.12	1,439	13.5	101.3	1,535	Fine
14768/4	TSP	1.12	1,439	14.0	101.3	1,539	Fine
14768/5	PM 10	1.13	1,439	14.0	101.3	1,546	Fine
14768/6	PM 2.5	1.12	1,439	14.0	101.3	1,539	Fine
14768/7	TSP	1.12	1,439	14.0	101.3	1,539	Overcast
14768/8	PM 10	1.12	1,439	14.0	101.3	1,539	Overcast
14768/9	PM 2.5	1.12	1,439	14.0	101.3	1,539	Overcast
14768/10	TSP	1.12	1,439	12.5	101.3	1,547	Fine, windy
14768/11	PM 10	1.12	1,439	12.5	101.3	1,547	Fine, windy
14768/12	PM 2.5	1.12	1,439	12.5	101.3	1,547	Fine, windy

Report Number: 14837

Date Issued: 7/07/2023

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 30/06/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	02/06/2023	14837/1	HVAS	29/05/2023 07:00	05/06/2023 07:00	58	107,827
PM 10	02/06/2023	14837/2	HVAS	29/05/2023 07:00	05/06/2023 07:00	58	107,828
PM 2.5	02/06/2023	14837/3	HVAS	29/05/2023 07:00	05/06/2023 07:00	58	107,829
TSP	08/06/2023	14837/4	HVAS	05/06/2023 07:00	13/06/2023 07:00	58	107,830
PM 10	08/06/2023	14837/5	HVAS	05/06/2023 07:00	13/06/2023 07:00	58	107,831
PM 2.5	08/06/2023	14837/6	HVAS	05/06/2023 07:00	13/06/2023 07:00	58	107,832
TSP	14/06/2023	14837/7	HVAS	13/06/2023 07:00	15/06/2023 07:00	58	107,867
PM 10	14/06/2023	14837/8	HVAS	13/06/2023 07:00	15/06/2023 07:00	58	107,866
PM 2.5	14/06/2023	14837/9	HVAS	13/06/2023 07:00	15/06/2023 07:00	58	107,865
TSP	20/06/2023	14837/10	HVAS	15/06/2023 07:00	21/06/2023 07:30	58	107,870
PM 10	20/06/2023	14837/11	HVAS	15/06/2023 07:00	21/06/2023 07:30	58	107,868
PM 2.5	20/06/2023	14837/12	HVAS	15/06/2023 07:00	21/06/2023 07:30	58	107,869

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: 14837

Date Issued: 7/07/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	14837/1 02/06/2023	14837/4 08/06/2023	14837/7 14/06/2023	14837/10 20/06/2023
Date Tested	--	--	07/07/2023	07/07/2023	07/07/2023	07/07/2023
Particulates per filter	VGT-WI/44	µg/filter	65,400	27,500	25,600	79,200
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	42	18	16	51

HVAS - PM10 Date of Operation	Method	Units	14837/2 02/06/2023	14837/5 08/06/2023	14837/8 14/06/2023	14837/11 20/06/2023
Date Tested	--	--	07/07/2023	07/07/2023	07/07/2023	07/07/2023
Particulates per filter	VGT-WI/44	µg/filter	28,200	13,200	9,700	29,700
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	18	9	6	19

HVAS - PM2.5 Date of Operation	Method	Units	14837/3 02/06/2023	14837/6 08/06/2023	14837/9 14/06/2023	14837/12 20/06/2023
Date Tested	--	--	07/07/2023	07/07/2023	07/07/2023	07/07/2023
Particulates per filter	VGT-WI/44	µg/filter	13,500	7,700	9,800	29,300
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	9	5	6	19

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: 14837

Date Issued: 7/07/2023

Revision No: 00

Sampling procedures supplied by client.

Lab ID	Description	Sampled By	Method of Sampling	Comments
14837/1	TSP	Paul Perry	Unknown	Truck movements
14837/2	PM 10	Paul Perry	Unknown	Truck movements
14837/3	PM 2.5	Paul Perry	Unknown	Truck movements
14837/4	TSP	Paul Perry	Unknown	Truck movements
14837/5	PM 10	Paul Perry	Unknown	Truck movements
14837/6	PM 2.5	Paul Perry	Unknown	Truck movements
14837/7	TSP	Paul Perry	Unknown	Truck movements
14837/8	PM 10	Paul Perry	Unknown	Truck movements
14837/9	PM 2.5	Paul Perry	Unknown	Truck movements
14837/10	TSP	Paul Perry	Unknown	Truck movements
14837/11	PM 10	Paul Perry	Unknown	Truck movements
14837/12	PM 2.5	Paul Perry	Unknown	Truck movements

Lab ID	Description	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3	Weather
14837/1	TSP	1.13	1,439	12.5	101.3	1,554	Fine
14837/2	PM 10	1.13	1,442	12.5	101.3	1,557	Fine
14837/3	PM 2.5	1.13	1,439	12.5	101.3	1,554	Fine
14837/4	TSP	1.13	1,439	12.5	101.3	1,554	Fine
14837/5	PM 10	1.13	1,436	12.5	101.3	1,551	Fine
14837/6	PM 2.5	1.13	1,439	12.5	101.3	1,554	Fine
14837/7	TSP	1.13	1,439	12.0	101.3	1,557	Fine
14837/8	PM 10	1.13	1,439	12.0	101.3	1,557	Fine
14837/9	PM 2.5	1.13	1,439	12.0	101.3	1,557	Fine
14837/10	TSP	1.13	1,439	11.0	101.3	1,562	Fine
14837/11	PM 10	1.13	1,439	11.0	101.3	1,562	Fine
14837/12	PM 2.5	1.13	1,439	11.0	101.3	1,562	Fine

Report Number: 14943

Date Issued: 3/08/2023

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 27/07/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	26/06/2023	14943/1	HVAS	21/06/2023 07:30	01/07/2023	58	107,873
PM 10	26/06/2023	14943/2	HVAS	21/06/2023 07:30	01/07/2023	58	107,872
PM 2.5	26/06/2023	14943/3	HVAS	21/06/2023 07:30	01/07/2023	58	107,871
TSP	02/07/2023	14943/4	HVAS	01/07/2023	03/07/2023 07:00	58	107,874
PM 10	02/07/2023	14943/5	HVAS	01/07/2023	03/07/2023 07:00	58	107,875
PM 2.5	02/07/2023	14943/6	HVAS	01/07/2023	03/07/2023 07:00	58	107,876
TSP	08/07/2023	14943/7	HVAS	03/07/2023 07:00	10/07/2023 07:00	58	107,878
PM 10	08/07/2023	14943/8	HVAS	03/07/2023 07:00	10/07/2023 07:00	58	107,877
PM 2.5	08/07/2023	14943/9	HVAS	03/07/2023 07:00	10/07/2023 07:00	58	107,879
TSP	14/07/2023	14943/10	HVAS	10/07/2023 07:00	17/07/2023 07:00	58	107,900
PM 10	14/07/2023	14943/11	HVAS	10/07/2023 07:00	17/07/2023 07:00	59	208,602
PM 2.5	14/07/2023	14943/12	HVAS	10/07/2023 07:00	17/07/2023 07:00	59	208,603
TSP	20/07/2023	14943/13	HVAS	17/07/2023 07:00	24/07/2023 07:00	59	208,604
PM 10	20/07/2023	14943/14	HVAS	17/07/2023 07:00	24/07/2023 07:00	59	208,605
PM 2.5	20/07/2023	14943/15	HVAS	17/07/2023 07:00	24/07/2023 07:00	59	208,606

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: 14943

Date Issued: 3/08/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	14943/1 26/06/2023	14943/4 02/07/2023	14943/7 08/07/2023	14943/10 14/07/2023	14943/13 20/07/2023
Date Tested	--	--	02/08/2023	02/08/2023	02/08/2023	02/08/2023	02/08/2023
Particulates per filter	VGT-WI/44	µg/filter	48,400	34,600	34,000	98,100	64,500
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	31	22	22	63	41

HVAS - PM10 Date of Operation	Method	Units	14943/2 26/06/2023	14943/5 02/07/2023	14943/8 08/07/2023	14943/11 14/07/2023	14943/14 20/07/2023
Date Tested	--	--	02/08/2023	02/08/2023	02/08/2023	02/08/2023	02/08/2023
Particulates per filter	VGT-WI/44	µg/filter	13,900	18,700	15,000	48,400	30,400
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	9	12	10	31	19

HVAS - PM2.5 Date of Operation	Method	Units	14943/3 26/06/2023	14943/6 02/07/2023	14943/9 08/07/2023	14943/12 14/07/2023	14943/15 20/07/2023
Date Tested	--	--	02/08/2023	02/08/2023	02/08/2023	02/08/2023	02/08/2023
Particulates per filter	VGT-WI/44	µg/filter	21,600	6,900	15,400	29,100	25,900
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	14	4	10	19	17

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: 14943

Date Issued: 3/08/2023

Revision No: 00

Sampling procedures supplied by client.

Lab ID	Description	Sampled By	Method of Sampling	Comments
14943/1	TSP	Paul Perry	Unknown	Truck movements
14943/2	PM 10	Paul Perry	Unknown	Truck movements
14943/3	PM 2.5	Paul Perry	Unknown	Truck movements
14943/4	TSP	Z.Chancellor	Unknown	None, Mine closed
14943/5	PM 10	Z.Chancellor	Unknown	None, Mine closed
14943/6	PM 2.5	Z.Chancellor	Unknown	None, Mine closed
14943/7	TSP	Paul Perry	Unknown	No truck movements, very windy
14943/8	PM 10	Paul Perry	Unknown	No truck movements, very windy
14943/9	PM 2.5	Paul Perry	Unknown	No truck movements, very windy
14943/10	TSP	Paul Perry	Unknown	Truck movements
14943/11	PM 10	Paul Perry	Unknown	Truck movements
14943/12	PM 2.5	Paul Perry	Unknown	Truck movements
14943/13	TSP	Paul Perry	Unknown	Truck movements
14943/14	PM 10	Paul Perry	Unknown	Truck movements
14943/15	PM 2.5	Paul Perry	Unknown	Truck movements

Lab ID	Description	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3	Weather
14943/1	TSP	1.13	1,439	10.5	101.3	1,565	Fine
14943/2	PM 10	1.13	1,439	10.5	101.3	1,565	Fine
14943/3	PM 2.5	1.13	1,439	10.5	101.3	1,565	Fine
14943/4	TSP	1.13	1,439	10.5	101.3	1,565	Windy
14943/5	PM 10	1.13	1,439	10.5	101.3	1,565	Windy
14943/6	PM 2.5	1.13	1,439	10.5	101.3	1,565	Windy
14943/7	TSP	1.12	1,439	10.0	101.3	1,561	Fine
14943/8	PM 10	1.12	1,439	10.0	101.3	1,561	Fine
14943/9	PM 2.5	1.12	1,439	10.0	101.3	1,561	Fine
14943/10	TSP	1.12	1,439	11.0	101.3	1,555	Windy
14943/11	PM 10	1.12	1,439	11.0	101.3	1,555	Windy
14943/12	PM 2.5	1.12	1,439	11.0	101.3	1,555	Windy
14943/13	TSP	1.13	1,439	11.0	101.3	1,562	Raining
14943/14	PM 10	1.13	1,439	11.0	101.3	1,562	Raining
14943/15	PM 2.5	1.13	1,439	11.0	101.3	1,562	Raining

Report Number: 15054

Date Issued: 4/09/2023

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 24/08/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	26/07/2023	15054/1	HVAS	24/07/2023 07:00	31/07/2023 08:00	59	208,609
PM 10	26/07/2023	15054/2	HVAS	24/07/2023 07:00	31/07/2023 08:00	59	208,608
PM 2.5	26/07/2023	15054/3	HVAS	24/07/2023 07:00	31/07/2023 08:00	59	208,607
TSP	01/08/2023	15054/4	HVAS	31/07/2023 08:00	02/08/2023 07:00	60	208,637
PM 10	01/08/2023	15054/5	HVAS	31/07/2023 08:00	02/08/2023 07:00	60	208,638
PM 2.5	01/08/2023	15054/6	HVAS	31/07/2023 08:00	02/08/2023 07:00	60	208,639
TSP	07/08/2023	15054/7	HVAS	02/08/2023 07:00	08/08/2023	60	208,640
PM 10	07/08/2023	15054/8	HVAS	02/08/2023 07:00	08/08/2023	60	208,641
PM 2.5	07/08/2023	15054/9	HVAS	02/08/2023 07:00	08/08/2023	60	208,642
TSP	13/08/2023	15054/10	HVAS	08/08/2023 07:00	14/08/2023 07:00	60	208,644
PM 10	13/08/2023	15054/11	HVAS	08/08/2023 07:00	14/08/2023 07:00	60	208,645
PM 2.5	13/08/2023	15054/12	HVAS	08/08/2023 07:00	14/08/2023 07:00	60	208,646
TSP	19/08/2023	15054/13	HVAS	14/08/2023 07:00	21/08/2023 07:00	60	208,649
PM 10	19/08/2023	15054/14	HVAS	14/08/2023 07:00	21/08/2023 07:00	60	208,647
PM 2.5	19/08/2023	15054/15	HVAS	14/08/2023 07:00	21/08/2023 07:00	60	208,648

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: 15054

Date Issued: 4/09/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	15054/1 26/07/2023	15054/4 01/08/2023	15054/7 07/08/2023	15054/10 13/08/2023	15054/13 19/08/2023
Date Tested	--	--	01/09/2023	01/09/2023	01/09/2023	01/09/2023	01/09/2023
Particulates per filter	VGT-WI/44	µg/filter	57,700	74,400	19,900	28,000	27,200
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	37	48	13	18	17

HVAS - PM10 Date of Operation	Method	Units	15054/2 26/07/2023	15054/5 01/08/2023	15054/8 07/08/2023	15054/11 13/08/2023	15054/14 19/08/2023
Date Tested	--	--	01/09/2023	01/09/2023	01/09/2023	01/09/2023	01/09/2023
Particulates per filter	VGT-WI/44	µg/filter	24,800	37,900	8,300	19,100	10,900
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	16	24	5	12	7

HVAS - PM2.5 Date of Operation	Method	Units	15054/3 26/07/2023	15054/6 01/08/2023	15054/9 07/08/2023	15054/12 13/08/2023	15054/15 19/08/2023
Date Tested	--	--	01/09/2023	01/09/2023	01/09/2023	01/09/2023	01/09/2023
Particulates per filter	VGT-WI/44	µg/filter	21,900	30,700	4,700	12,000	8,800
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	14	20	3	8	6

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: 15054

Date Issued: 4/09/2023

Revision No: 00

Sampling procedures supplied by client.

Lab ID	Description	Sampled By	Method of Sampling	Comments
15054/1	TSP	P.Perry	Unknown	Truck movements
15054/2	PM 10	P.Perry	Unknown	Truck movements
15054/3	PM 2.5	P.Perry	Unknown	Truck movements
15054/4	TSP	P.Perry	Unknown	Truck movements
15054/5	PM 10	P.Perry	Unknown	Truck movements
15054/6	PM 2.5	P.Perry	Unknown	Truck movements
15054/7	TSP	P.Perry	Unknown	Truck movements
15054/8	PM 10	P.Perry	Unknown	Truck movements
15054/9	PM 2.5	P.Perry	Unknown	Truck movements
15054/10	TSP	P.Perry	Unknown	Truck movements
15054/11	PM 10	P.Perry	Unknown	Truck movements
15054/12	PM 2.5	P.Perry	Unknown	Truck movements
15054/13	TSP	P.Perry	Unknown	Truck movements
15054/14	PM 10	P.Perry	Unknown	Truck movements
15054/15	PM 2.5	P.Perry	Unknown	Truck movements

Lab ID	Description	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3	Weather
15054/1	TSP	1.13	1,439	11.0	101.3	1,562	Rainy
15054/2	PM 10	1.13	1,439	11.0	101.3	1,562	Rainy
15054/3	PM 2.5	1.13	1,439	11.0	101.3	1,562	Rainy
15054/4	TSP	1.13	1,439	11.0	101.3	1,562	Fine
15054/5	PM 10	1.13	1,439	11.0	101.3	1,562	Fine
15054/6	PM 2.5	1.13	1,440	11.0	101.3	1,563	Fine
15054/7	TSP	1.13	1,439	10.0	101.3	1,568	Fine
15054/8	PM 10	1.13	1,439	10.0	101.3	1,568	Fine
15054/9	PM 2.5	1.13	1,439	10.0	101.3	1,568	Fine
15054/10	TSP	1.13	1,439	10.0	101.3	1,568	Rainy
15054/11	PM 10	1.13	1,439	10.0	101.3	1,568	Rainy
15054/12	PM 2.5	1.13	1,439	10.0	101.3	1,568	Rainy
15054/13	TSP	1.13	1,439	10.0	101.3	1,568	Rainy
15054/14	PM 10	1.13	1,439	10.0	101.3	1,568	Rainy
15054/15	PM 2.5	1.13	1,439	10.0	101.3	1,568	Rainy

Report Number: 15177

Date Issued: 29/09/2023

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 21/09/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	25/08/2023	15177/1	HVAS	21/08/2023 07:00	28/08/2023	60	208,652
PM 10	25/08/2023	15177/2	HVAS	21/08/2023 07:00	28/08/2023	60	208,651
PM 2.5	25/08/2023	15177/3	HVAS	21/08/2023 07:00	28/08/2023	60	208,650
TSP	31/08/2023	15177/4	HVAS	28/08/2023 07:00	01/09/2023 07:00	60	208,678
PM 10	31/08/2023	15177/5	HVAS	28/08/2023 07:00	01/09/2023 07:00	60	208,679
PM 2.5	31/08/2023	15177/6	HVAS	28/08/2023 07:00	01/09/2023 07:00	60	208,680
TSP	06/09/2023	15177/7	HVAS	01/09/2023 07:00	07/09/2023 07:00	60	208,681
PM 10	06/09/2023	15177/8	HVAS	01/09/2023 07:00	07/09/2023 07:00	60	208,682
PM 2.5	06/09/2023	15177/9	HVAS	01/09/2023 07:00	07/09/2023 07:00	60	208,683
TSP	12/09/2023	15177/10	HVAS	07/09/2023 07:00	14/09/2023 07:00	60	208,684
PM 10	12/09/2023	15177/11	HVAS	07/09/2023 07:00	14/09/2023 07:00	60	208,686
PM 2.5	12/09/2023	15177/12	HVAS	07/09/2023 07:00	14/09/2023 07:00	60	208,687
TSP	18/09/2023	15177/13	HVAS	14/09/2023 07:00	19/09/2023 07:00	60	208,688
PM 10	18/09/2023	15177/14	HVAS	14/09/2023 07:00	19/09/2023 07:00	60	208,689
PM 2.5	18/09/2023	15177/15	HVAS	14/09/2023 07:00	19/09/2023 07:00	60	208,690

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: 15177

Date Issued: 29/09/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	15177/1 25/08/2023	15177/4 31/08/2023	15177/7 06/09/2023	15177/10 12/09/2023	15177/13 18/09/2023
Date Tested	--	--	28/09/2023	28/09/2023	28/09/2023	28/09/2023	28/09/2023
Particulates per filter	VGT-WI/44	µg/filter	<400	36,500	72,800	90,100	73,700
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	<2	23	47	57	47

HVAS - PM10 Date of Operation	Method	Units	15177/2 25/08/2023	15177/5 31/08/2023	15177/8 06/09/2023	15177/11 12/09/2023	15177/14 18/09/2023
Date Tested	--	--	28/09/2023	28/09/2023	28/09/2023	28/09/2023	28/09/2023
Particulates per filter	VGT-WI/44	µg/filter	<400	11,900	35,300	41,300	44,100
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	<2	8	23	26	28

HVAS - PM2.5 Date of Operation	Method	Units	15177/3 25/08/2023	15177/6 31/08/2023	15177/9 06/09/2023	15177/12 12/09/2023	15177/15 18/09/2023
Date Tested	--	--	28/09/2023	28/09/2023	28/09/2023	28/09/2023	28/09/2023
Particulates per filter	VGT-WI/44	µg/filter	<400	7,100	28,900	31,500	29,800
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	<2	5	19	20	19

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: 15177

Date Issued: 29/09/2023

Revision No: 00

Sampling procedures supplied by client.

Lab ID	Description	Sampled By	Method of Sampling	Comments
15177/1	TSP	P.Perry	Unknown	Paper didn't run. Envelope contained paper 0208652. Truck movements
15177/2	PM 10	P.Perry	Unknown	Paper didn't run. Truck movements
15177/3	PM 2.5	P.Perry	Unknown	Paper didn't run. Envelope contained paper 0208650. Truck movements
15177/4	TSP	P.Perry	Unknown	Truck movements
15177/5	PM 10	P.Perry	Unknown	Truck movements
15177/6	PM 2.5	P.Perry	Unknown	Truck movements
15177/7	TSP	P.Perry	Unknown	Truck movements
15177/8	PM 10	P.Perry	Unknown	Truck movements
15177/9	PM 2.5	P.Perry	Unknown	Truck movements
15177/10	TSP	P.Perry	Unknown	Truck movements
15177/11	PM 10	P.Perry	Unknown	Truck movements
15177/12	PM 2.5	P.Perry	Unknown	Truck movements
15177/13	TSP	P.Perry	Unknown	Truck movements
15177/14	PM 10	P.Perry	Unknown	Truck movements
15177/15	PM 2.5	P.Perry	Unknown	Truck movements

Lab ID	Description	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3	Weather
15177/1	TSP	1.13	5	9.0	101.3	5	Fine
15177/2	PM 10	1.13	0	9.0	101.3	0	Fine
15177/3	PM 2.5	1.13	0	9.0	101.3	0	Fine
15177/4	TSP	1.13	1,439	10.5	101.3	1,565	Fine
15177/5	PM 10	1.13	1,439	10.5	101.3	1,565	Fine
15177/6	PM 2.5	1.13	1,439	10.5	101.3	1,565	Fine
15177/7	TSP	1.13	1,439	11.5	101.3	1,560	Fine
15177/8	PM 10	1.13	1,439	11.5	101.3	1,560	Fine
15177/9	PM 2.5	1.13	1,439	11.5	101.3	1,560	Fine
15177/10	TSP	1.13	1,439	10.0	101.3	1,568	Fine
15177/11	PM 10	1.13	1,439	10.0	101.3	1,568	Fine
15177/12	PM 2.5	1.13	1,439	10.0	101.3	1,568	Fine
15177/13	TSP	1.13	1,439	9.0	101.3	1,573	Fine
15177/14	PM 10	1.13	1,439	9.0	101.3	1,573	Fine
15177/15	PM 2.5	1.13	1,439	9.0	101.3	1,573	Fine



Report Number: 15257

Date Issued: 24/10/2023

Revision Number: 00

Site/Job: Redisand HVAS

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

The following 15 HVAS Filter(s) were received on 19/10/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	24/09/2023	15257/1	HVAS	19/09/2023 07:00	25/09/2023 08:00	60	208,691
PM 10	24/09/2023	15257/2	HVAS	19/09/2023 07:00	25/09/2023 08:00	60	208,692
PM 2.5	24/09/2023	15257/3	HVAS	19/09/2023 07:00	25/09/2023 08:00	60	208,993
TSP	30/09/2023	15257/4	HVAS	25/09/2023 08:00	03/10/2023 07:00	61	208,721
PM 10	30/09/2023	15257/5	HVAS	25/09/2023 08:00	03/10/2023 07:00	61	208,723
PM 2.5	30/09/2023	15257/6	HVAS	25/09/2023 08:00	03/10/2023 07:00	61	208,724
TSP	06/10/2023	15257/7	HVAS	03/10/2023 07:00	09/10/2023 07:00	61	208,727
PM 10	06/10/2023	15257/8	HVAS	03/10/2023 07:00	09/10/2023 07:00	61	208,726
PM 2.5	06/10/2023	15257/9	HVAS	03/10/2023 07:00	09/10/2023 07:00	61	208,725
TSP	12/10/2023	15257/10	HVAS	09/10/2023 07:00	16/10/2023 11:00	61	208,728
PM 10	12/10/2023	15257/11	HVAS	09/10/2023 07:00	16/10/2023 11:00	61	208,729
PM 2.5	12/10/2023	15257/12	HVAS	09/10/2023 07:00	16/10/2023 11:00	61	208,730
TSP	18/10/2023	15257/13	HVAS	16/10/2023 11:00	19/10/2023 07:00	61	208,734
PM 10	18/10/2023	15257/14	HVAS	16/10/2023 11:00	19/10/2023 07:00	61	208,735
PM 2.5	18/10/2023	15257/15	HVAS	16/10/2023 11:00	19/10/2023 07:00	61	208,736

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: 15257

Date Issued: 24/10/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	15257/1 24/09/2023	15257/4 30/09/2023	15257/7 06/10/2023	15257/10 12/10/2023	15257/13 18/10/2023
Date Tested	VGT-WI/44	--	23/10/2023	23/10/2023	23/10/2023	23/10/2023	23/10/2023
Particulates per filter	VGT-WI/44	µg/filter	27,400	40,800	60,600	65,900	61,700
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	17	26	39	43	40

HVAS - PM10 Date of Operation	Method	Units	15257/2 24/09/2023	15257/5 30/09/2023	15257/8 06/10/2023	15257/11 12/10/2023	15257/14 18/10/2023
Date Tested	VGT-WI/44	--	23/10/2023	23/10/2023	23/10/2023	23/10/2023	23/10/2023
Particulates per filter	VGT-WI/44	µg/filter	10,500	19,100	25,200	29,600	20,800
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	7	12	16	19	14

HVAS - PM2.5 Date of Operation	Method	Units	15257/3 24/09/2023	15257/6 30/09/2023	15257/9 06/10/2023	15257/12 12/10/2023	15257/15 18/10/2023
Date Tested	VGT-WI/44	--	23/10/2023	23/10/2023	23/10/2023	23/10/2023	23/10/2023
Particulates per filter	VGT-WI/44	µg/filter	31,600	13,200	19,100	19,500	8,300
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	20	8	12	13	5

Report Comments:

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

[NT]: Not tested

Weather and flow rates used for calculation purposes supplied by client.

Sampling Report Number: 15257

Date Issued: 24/10/2023

Revision No: 00

Sampling procedures/data supplied by client.

Lab ID	Description	Sampled By	Method of Sampling	Comments
15257/1	TSP	P.Perry	Unknown	Truck movements
15257/2	PM 10	P.Perry	Unknown	Truck movements
15257/3	PM 2.5	P.Perry	Unknown	Truck movements
15257/4	TSP	P.Perry	Unknown	None
15257/5	PM 10	P.Perry	Unknown	None
15257/6	PM 2.5	P.Perry	Unknown	None
15257/7	TSP	P.Perry	Unknown	Truck movements
15257/8	PM 10	P.Perry	Unknown	Truck movements
15257/9	PM 2.5	P.Perry	Unknown	Truck movements
15257/10	TSP	P.Perry	Unknown	Truck movements
15257/11	PM 10	P.Perry	Unknown	Truck movements
15257/12	PM 2.5	P.Perry	Unknown	Truck movements
15257/13	TSP	P.Perry	Unknown	Truck movements
15257/14	PM 10	P.Perry	Unknown	Truck movements
15257/15	PM 2.5	P.Perry	Unknown	Truck movements

Lab ID	Description	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3	Weather
15257/1	TSP	1.13	1,439	10.0	101.3	1,568	Fine
15257/2	PM 10	1.13	1,439	10.0	101.3	1,568	Fine
15257/3	PM 2.5	1.13	1,439	10.0	101.3	1,568	Fine
15257/4	TSP	1.13	1,439	10.0	101.3	1,568	Fine
15257/5	PM 10	1.13	1,439	10.0	101.3	1,568	Fine
15257/6	PM 2.5	1.13	1,439	10.0	101.3	1,568	Fine
15257/7	TSP	1.13	1,439	9.5	101.3	1,571	Fine
15257/8	PM 10	1.13	1,439	9.5	101.3	1,571	Fine
15257/9	PM 2.5	1.13	1,439	9.5	101.3	1,571	Fine
15257/10	TSP	1.13	1,439	14.5	101.3	1,543	Fine
15257/11	PM 10	1.13	1,439	14.5	101.3	1,543	Fine
15257/12	PM 2.5	1.13	1,439	14.5	101.3	1,543	Fine
15257/13	TSP	1.13	1,439	17.0	101.3	1,530	Fine
15257/14	PM 10	1.13	1,439	17.0	101.3	1,530	Fine
15257/15	PM 2.5	1.13	1,439	17.0	101.3	1,530	Fine

Report Number: 15422

Date Issued: 21/11/2023

Revision Number: 00

Site/Job: Redisand HVAS

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

The following 12 HVAS Filter(s) were received on 16/11/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	24/10/2023	15422/1	HVAS	19/10/2023 07:00	25/10/2023 6:00	61	208,733
PM 10	24/10/2023	15422/2	HVAS	19/10/2023 07:00	25/10/2023 6:00	61	208,731
PM 2.5	24/10/2023	15422/3	HVAS	19/10/2023 07:00	25/10/2023 6:00	61	208,732
TSP	30/10/2023	15422/4	HVAS	25/10/2023 6:00	31/10/2023 07:00	61	208,770
PM 10	30/10/2023	15422/5	HVAS	25/10/2023 6:00	31/10/2023 07:00	61	208,771
PM 2.5	30/10/2023	15422/6	HVAS	25/10/2023 6:00	31/10/2023 07:00	61	208,772
TSP	05/11/2023	15422/7	HVAS	31/10/2023 07:00	06/11/2023 07:00	61	208,776
PM 10	05/11/2023	15422/8	HVAS	31/10/2023 07:00	06/11/2023 07:00	61	208,773
PM 2.5	05/11/2023	15422/9	HVAS	31/10/2023 07:00	06/11/2023 07:00	61	208,774
TSP	11/11/2023	15422/10	HVAS	06/11/2023 07:00	13/11/2023 07:00	61	208,775
PM 10	11/11/2023	15422/11	HVAS	06/11/2023 07:00	13/11/2023 07:00	61	208,777
PM 2.5	11/11/2023	15422/12	HVAS	06/11/2023 07:00	13/11/2023 07:00	61	208,778

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: 15422

Date Issued: 21/11/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	15422/1 24/10/2023	15422/4 30/10/2023	15422/7 05/11/2023	15422/10 11/11/2023
Date Tested	VGT-WI/44	--	20/11/2023	20/11/2023	20/11/2023	20/11/2023
Particulates per filter	VGT-WI/44	µg/filter	64,000	34,500	32,000	21,900
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	42	23	21	14

HVAS - PM10 Date of Operation	Method	Units	15422/2 24/10/2023	15422/5 30/10/2023	15422/8 05/11/2023	15422/11 11/11/2023
Date Tested	VGT-WI/44	--	20/11/2023	20/11/2023	20/11/2023	20/11/2023
Particulates per filter	VGT-WI/44	µg/filter	37,300	16,600	14,600	11,700
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	24	11	9	8

HVAS - PM2.5 Date of Operation	Method	Units	15422/3 24/10/2023	15422/6 30/10/2023	15422/9 05/11/2023	15422/12 11/11/2023
Date Tested	VGT-WI/44	--	20/11/2023	20/11/2023	20/11/2023	20/11/2023
Particulates per filter	VGT-WI/44	µg/filter	23,300	10,000	4,000	9,700
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	15	7	3	6

Report Comments:

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

[NT]: Not tested

Weather and flow rates used for calculation purposes supplied by client.

Sampling Report Number: 15422

Date Issued: 21/11/2023

Revision No: 00

Sampling procedures/data supplied by client.

Lab ID	Description	Sampled By	Method of Sampling	Comments
15422/1	TSP	P.Perry	Unknown	Truck movements
15422/2	PM 10	P.Perry	Unknown	Truck movements
15422/3	PM 2.5	P.Perry	Unknown	Truck movements
15422/4	TSP	Zac Chancellor	Unknown	Truck movements
15422/5	PM 10	Zac Chancellor	Unknown	Truck movements
15422/6	PM 2.5	Zac Chancellor	Unknown	Truck movements
15422/7	TSP	P.Perry	Unknown	No truck movements
15422/8	PM 10	P.Perry	Unknown	No truck movements
15422/9	PM 2.5	P.Perry	Unknown	No truck movements
15422/10	TSP	P.Perry	Unknown	No truck movements
15422/11	PM 10	P.Perry	Unknown	No truck movements
15422/12	PM 2.5	P.Perry	Unknown	No truck movements

Lab ID	Description	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3	Weather
15422/1	TSP	1.12	1,439	15.0	101.3	1,527	Warm
15422/2	PM 10	1.12	1,439	15.0	101.3	1,527	Warm
15422/3	PM 2.5	1.12	1,439	15.0	101.3	1,527	WArm
15422/4	TSP	1.12	1,439	15.5	101.3	1,524	Fine
15422/5	PM 10	1.12	1,439	15.5	101.3	1,524	Fine
15422/6	PM 2.5	1.12	1,439	15.5	101.3	1,524	Fine
15422/7	TSP	1.12	1,445	12.5	101.3	1,547	Fine
15422/8	PM 10	1.12	1,439	12.5	101.3	1,540	Fine
15422/9	PM 2.5	1.12	1,439	12.5	101.3	1,540	Fine
15422/10	TSP	1.12	1,433	12.5	101.3	1,534	Rainy
15422/11	PM 10	1.12	1,439	12.5	101.3	1,540	Rainy
15422/12	PM 2.5	1.12	1,439	12.5	101.3	1,540	Rainy

Report Number: 15520

Date Issued: 21/12/2023

Revision Number: 00

Site/Job: Redisand HVAS

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

The following 15 HVAS Filter(s) were received on 14/12/2023

HVAS Size Selective Inlet	Date of Operation	Lab ID	Matrix	Date On	Date Off	Box Number	Filter Paper Number
TSP	17/11/2023	15520/1	HVAS	13/11/2023 07:00	20/11/2023 07:00	61	208,781
PM 10	17/11/2023	15520/2	HVAS	13/11/2023 07:00	20/11/2023 07:00	61	208,779
PM 2.5	17/11/2023	15520/3	HVAS	13/11/2023 07:00	20/11/2023 07:00	61	208,780
TSP	23/11/2023	15520/4	HVAS	20/11/2023 07:00	27/11/2023	61	208,782
PM 10	23/11/2023	15520/5	HVAS	20/11/2023 07:00	27/11/2023	61	208,783
PM 2.5	23/11/2023	15520/6	HVAS	20/11/2023 07:00	27/11/2023	61	208,784
TSP	29/11/2023	15520/7	HVAS	27/11/2023 07:00	30/11/2023 07:00	61	278,938
PM 10	29/11/2023	15520/8	HVAS	27/11/2023 07:00	30/11/2023 07:00	62	278,939
PM 2.5	29/11/2023	15520/9	HVAS	27/11/2023 07:00	30/11/2023 07:00	62	278,940
TSP	05/12/2023	15520/10	HVAS	30/11/2023 07:00	07/12/2023 07:00	62	278,941
PM 10	05/12/2023	15520/11	HVAS	30/11/2023 07:00	07/12/2023 07:00	62	278,942
PM 2.5	05/12/2023	15520/12	HVAS	30/11/2023 07:00	07/12/2023 07:00	62	278,944
TSP	11/12/2023	15520/13	HVAS	07/12/2023 07:00	13/12/2023 07:00	62	278,947
TSP	11/12/2023	15520/14	HVAS	07/12/2023 07:00	13/12/2023 07:00	62	278,945
TSP	11/12/2023	15520/15	HVAS	07/12/2023 07:00	13/12/2023 07:00	62	278,946

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: 15520

Date Issued: 21/12/2023

Revision No: 00

Results

HVAS - TSP Date of Operation	Method	Units	15520/1 17/11/2023	15520/4 23/11/2023	15520/7 29/11/2023	15520/10 05/12/2023	15520/13 11/12/2023
Date Tested	VGT-WI/44	--	21/12/2023	21/12/2023	21/12/2023	21/12/2023	21/12/2023
Particulates per filter	VGT-WI/44	µg/filter	56,800	41,800	20,500	30,700	56,500
~ Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	37	27	13	20	37

HVAS - PM10 Date of Operation	Method	Units	15520/2 17/11/2023	15520/5 23/11/2023	15520/8 29/11/2023	15520/11 05/12/2023	15520/14 11/12/2023
Date Tested	VGT-WI/44	--	21/12/2023	21/12/2023	21/12/2023	21/12/2023	21/12/2023
Particulates per filter	VGT-WI/44	µg/filter	24,500	17,600	9,300	13,500	30,200
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	16	11	6	9	20

HVAS - PM2.5 Date of Operation	Method	Units	15520/3 17/11/2023	15520/6 23/11/2023	15520/9 29/11/2023	15520/12 05/12/2023	15520/15 11/12/2023
Date Tested	VGT-WI/44	--	21/12/2023	21/12/2023	21/12/2023	21/12/2023	21/12/2023
Particulates per filter	VGT-WI/44	µg/filter	9,600	7,100	3,500	5,900	15,000
~Particulates @ 0°C, 101.3kPa	VGT-WI/44	µg/m3	6	5	2	4	10

Report Comments:

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

[NT]: Not tested

Weather and flow rates used for calculation purposes supplied by client.

Sampling Report Number: 15520

Date Issued: 21/12/2023

Revision No: 00

Sampling procedures/data supplied by client.

Lab ID	Description	Sampled By	Method of Sampling	Comments
15520/1	TSP	P.Perry	Unknown	Truck movements
15520/2	PM 10	P.Perry	Unknown	Truck movements
15520/3	PM 2.5	P.Perry	Unknown	Truck movements
15520/4	TSP	P.Perry	Unknown	Truck movements
15520/5	PM 10	P.Perry	Unknown	Truck movements
15520/6	PM 2.5	P.Perry	Unknown	Truck movements
15520/7	TSP	P.Perry	Unknown	Truck movements
15520/8	PM 10	P.Perry	Unknown	Truck movements
15520/9	PM 2.5	P.Perry	Unknown	Truck movements
15520/10	TSP	P.Perry	Unknown	Truck movements. Fires, smokey
15520/11	PM 10	P.Perry	Unknown	Truck movements. Fires, smokey
15520/12	PM 2.5	P.Perry	Unknown	Truck movements. Fires, smokey
15520/13	TSP	P.Perry	Unknown	Truck movements
15520/14	TSP	P.Perry	Unknown	Truck movements
15520/15	TSP	P.Perry	Unknown	Truck movements

Lab ID	Description	Average Flow Rate m3/min	Total Run time min	Est Mean Temperature °C	Est Mean Pressure kPa	Volume Air sampled m3	Weather
15520/1	TSP	1.13	1,439	16.0	101.3	1,535	Fine
15520/2	PM 10	1.13	1,439	16.0	101.3	1,535	Fine
15520/3	PM 2.5	1.13	1,439	16.0	101.3	1,535	Fine
15520/4	TSP	1.13	1,439	16.5	101.3	1,533	Overcast
15520/5	PM 10	1.13	1,439	16.5	101.3	1,533	Overcast
15520/6	PM 2.5	1.13	1,439	16.5	101.3	1,533	Overcast
15520/7	TSP	1.13	1,439	15.5	101.3	1,538	Fine
15520/8	PM 10	1.13	1,439	15.5	101.3	1,538	Fine
15520/9	PM 2.5	1.13	1,439	15.5	101.3	1,538	Fine
15520/10	TSP	1.13	1,439	17.5	101.3	1,527	Fine
15520/11	PM 10	1.13	1,439	17.5	101.3	1,527	Fine
15520/12	PM 2.5	1.13	1,439	17.5	101.3	1,527	Fine
15520/13	TSP	1.13	1,439	20.5	101.3	1,512	Hot, smokey, fires
15520/14	TSP	1.13	1,439	20.5	101.3	1,512	Hot, smokey, fires
15520/15	TSP	1.13	1,440	20.5	101.3	1,513	Hot, smokey, fires

Appendix C

Traffic Movements (2023)

2022		Income Values															
Event of Disaster	Event ID	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022	4/01/2022
4/01/2022	1																
4/01/2022	2																
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4/01/2022	5																
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4/01/2022	131																
4/01/2022	132																
4/01/2022	133																

[illegible]

Appendix D

Cultural Heritage (2023)

MURROOMA



INCORPORATED

Tuesday 23rd of May 2023

Redisand Pty Ltd

Att: Grant Stevenson

RE: Cultural Heritage Report –Onsite Inspection

On Friday 19th of May, Murrooma Inc, Nurrungee and Worimi LALC representatives- Bec Young, Luke Knight and David Kirk 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 walkover of the overburden and screen spoil material that has been re-spread.

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 - we did identify several cultural heritage materials in the screened spoils. These were mined from within the PAD 1 area onsite.



Stone Artefacts;

- 8- Nobbys Tuff- Flake Pieces
- 2- Nobby's Tuff - Cores
- 1-Silcrete Flake



Shell Midden Material;

- 6- Pippi
- 5- Cockle



Large Stone Artefacts:- Off of screen

- 3 -Rhyolite grinding stones
- 1-Large broken plate

Recommendations: All groups were satisfied with the opportunity to view the areas for cultural material. All artefacts were photographed and will stay onsite in locked room for future reburial.

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 again as we have asked this to be spread for better visibility.

Yours Truly

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

In agreement with:

David Kirk- Worimi LALC Sites Officer

Luke Knight- Nurrungee Sites Officer

MURROOMA



INCORPORATED

9 Vardon Road Fern Bay 2295 NSW
0421078695
0402827482
Murroomainc1@gmail.com

ABN: 97 807 719 484

Wednesday 20th of December 2023

Redisand Pty Ltd

Att: Grant Stevenson

RE: Cultural Heritage Report –Onsite Inspection

On Friday 1st of December, Murrooma Inc, Nurrungee and Worimi LALC representatives- Bec Young, Luke Knight and Joel Henderson 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 walkover of the overburden and screen spoil material that has been re-spread.

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 where the vegetation clearing was located - we did identify several cultural heritage materials in the screened spoils and had been placed back on site with the overburden.



Stone Artefacts;

9x- Nobbys Tuff- Flakes

1-Axe head- Rhyolite



Shell Midden Material;

2x Pippi

1 x Mudwhelk



Many Debitage Pieces – Nobby's
Tuff Resource

Recommendations: All groups were satisfied with the opportunity to view the areas for cultural material. All artefacts were photographed and will stay onsite in locked room for future reburial.

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 again as we have asked this to be spread for better visibility. I have advised Grant that we are contacting Heritage NSW to get the artefacts re-buried and possibly added to the current registered site in the garden.

Yours Truly

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

In agreement with:

Joel Henderson- Worimi LALC Sites Officer

Luke Knight- Nurrungee Sites Officer

Appendix E

Pre-Clearance Survey (2023)



PRE-CLEARING SURVEY REPORT

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

Prepared by:

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Prepared for	ATB Morton Pty Ltd
Reference No.	Salt Ash – ATB Morton Pty Ltd
Document Status & Date	1 st November 2023



Executive Summary

A pre-clearance survey for Stage Three of the Salt Ash Sand Quarry Project was undertaken between 26/10/2023 to the 1/11/2023 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.

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 3) 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.

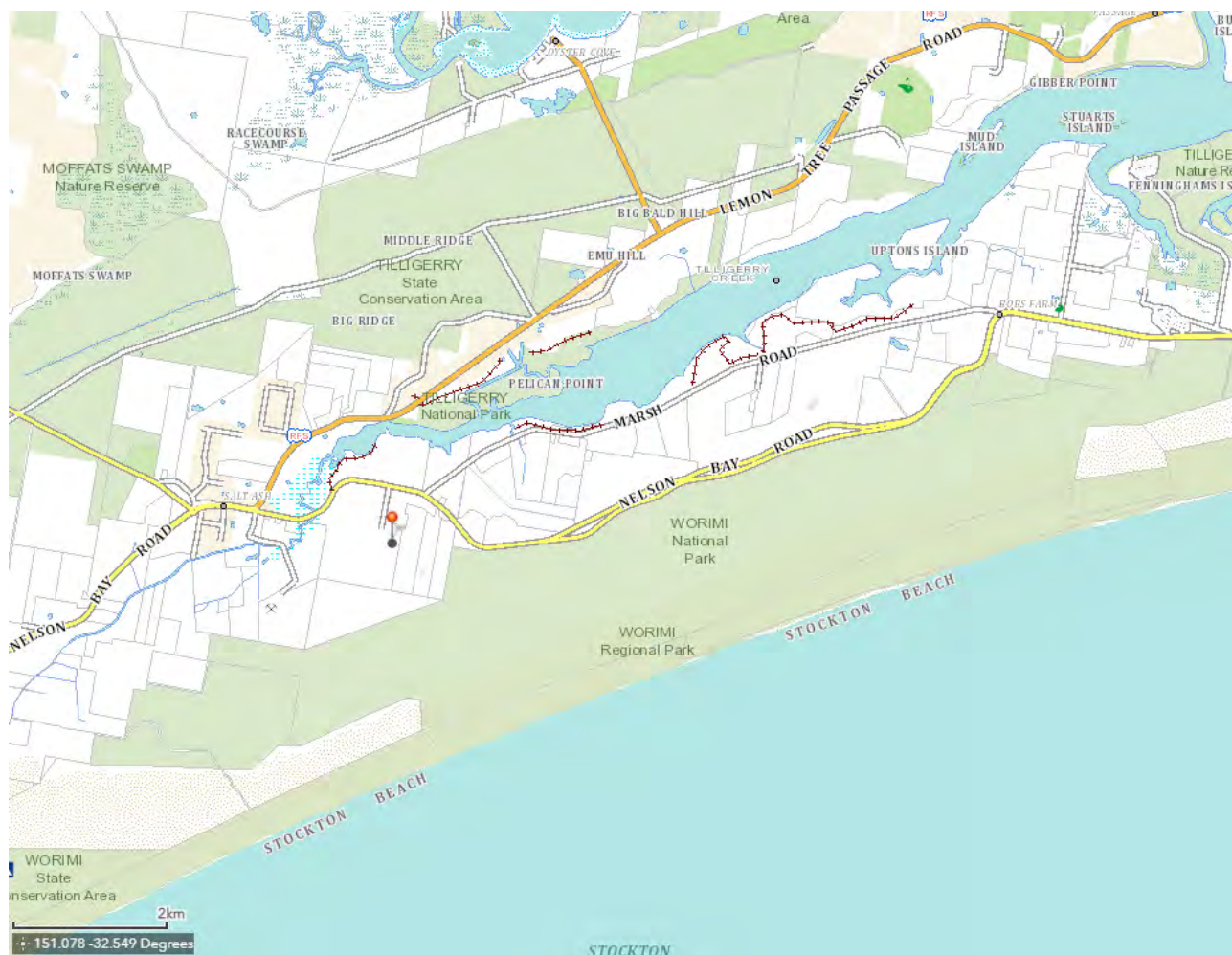
The targeted surveys included searches for threatened fauna species or signs of these species, Elliott trapping program, Stag-watching, and Anabat Surveys. This report details the results and the methods used in the surveys undertaken for the plant area and is to be submitted to the Office of Environment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

Figure 1-1: Site Location





2 DETAILED SURVEY METHODS

Various surveys were undertaken over the site from the 26/11/2023 to the 1/11/2023. 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 were 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.

In total 34 Elliot traps were used over the five trapping nights.

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

Site	Date	Arboreal Traps
Trapline 1	26 th October 2023 to the 1st of November 2023	5 Nights
Total Trap Nights		175

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. Detection was undertaken a minimum 30min prior to dusk and for an hour after dusk. Over 8 hrs were spent using this method, this data was then sent to Amy Rowles (Corymbia Ecology). However, FirebirdEcosultants was notified that the two ANABT detectors placed had had critical failures due to hardware issues and as such no bat data was recorded over the survey period. Due to this we have assumed the presence of species that have previously been recorded on site such as; *Chalinolobus gouldii* (Gould's Wattled-bat), *Chalinolobus morio* (Chocolate Wattled-bat) and *Miniopterus australis* (Little Bentwing-bat).



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 26/10/2023 – 1/11/2023.

Date	Minimum Temperature °C	Maximum Temperature °C
Thursday 26/10/23	13.6	16.8
Friday 27/10/23	13.1	20
Monday 30/10/23	10.6	33.9
Tuesday 31/10/23	17	32.7
Wednesday 1/11/23	12.9	22.8

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 20 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, as per 3.2 Microbats previously recorded have been assumed present on site.



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 5-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:

- Common Brush-tailed Possum (*Trichosurus vulpecula*)
- Lace Monitor (*Varanus varius*)
- Antechinus (*Antechinus stuartii*)

Bat Species Assumed present on-site during survey period:

- *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 assumed present 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 26th October 2023 to the 1st November 2023 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.

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. 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.

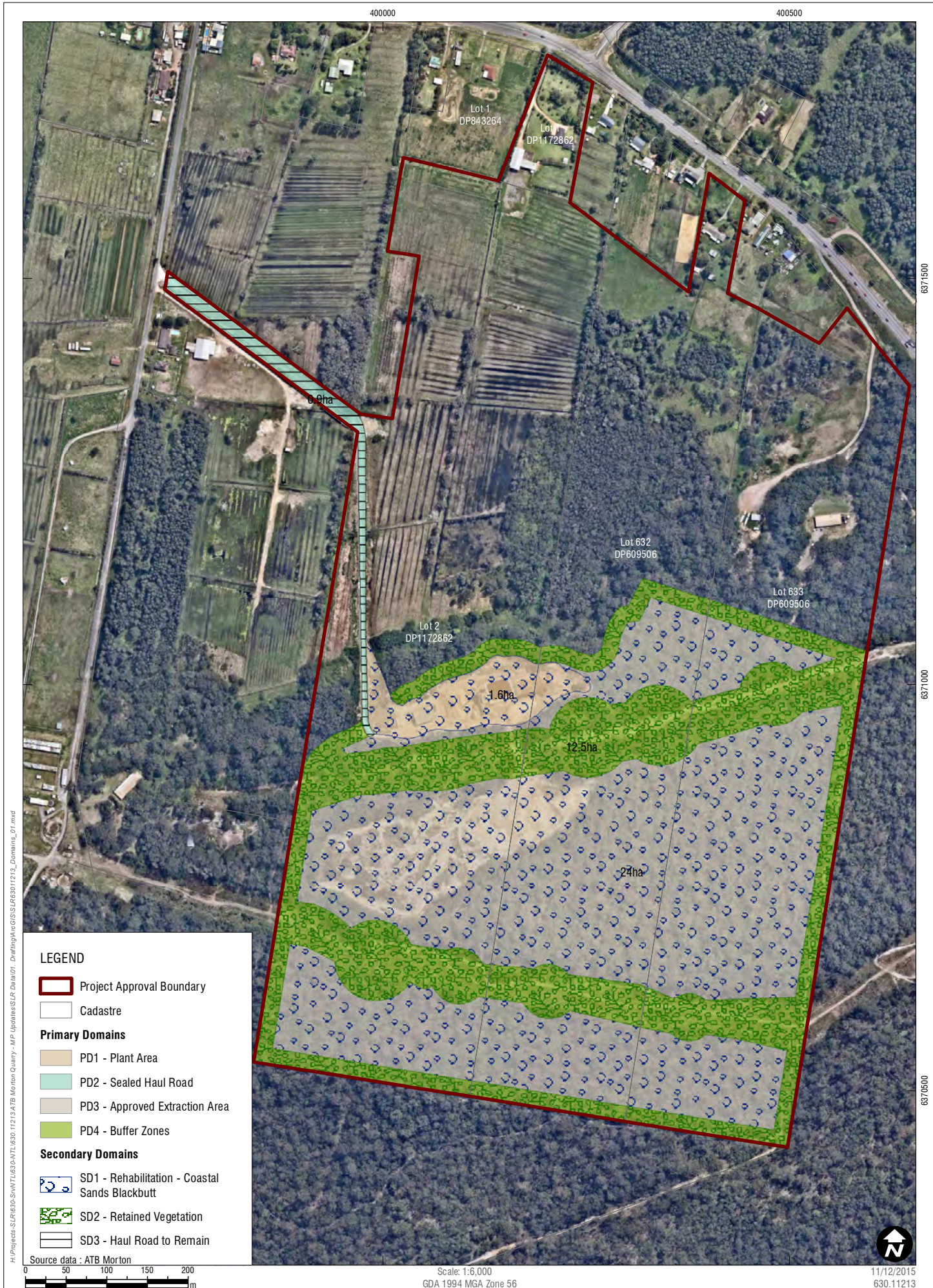
Primary domains are land management units within the site with unique operational and functional purpose and similar geophysical characteristics. Primary domains outline the current land use at the site.

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



**Salt Ash Quarry -
Domains**

FIGURE 1

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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10th November 2023

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 3 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 9th October 2023 to inspect all trees for fauna occupation and habitat features. A total of 52 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.

20 Trees previously identified as potential habitat trees were soft felled on the 1st November 2023 under the supervision of two ecologists Kurtis Mumford and Ollie Broun in accordance with section 3.2 of the '*Landscape and Rehabilitation Management Plan, May 2019*'. No fauna we identified as present within hollows. See attachment one for clearing location undertaken on the 2nd November 2023.

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



Firebird ecoSultants Pty Ltd
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Attachment 1: Recent Clearing

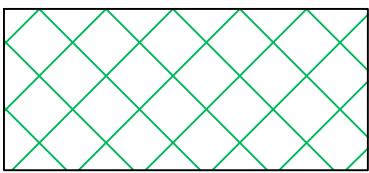
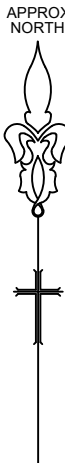


SKETCH

A.R. Nodah

SURVEYOR
REGISTERED UNDER THE SURVEYING ACT

DATE: 29.02.2024



- RECENTLY CLEARED AREA



STAGE 1



STAGE 2

Appendix F
Firebird ecoSultant Biodiversity Reports (2023)



Firebird ecoSultants Pty Ltd
ABN-16 105 985 993

18th September 2023

REDISAND
7 Janet Parade
Salt Ash NSW 2318

ATTENTION: GRANT STEVENSON

RE: POPULATION MONITORING OF *DIURIS ARENARIA* (SAND DOUBLETAIL), AT 7 JANET PARADE, SALT ASH

Firebird ecoSultants has undertaken a population monitoring survey of *D. arenaria* (Sand Doubletail) on the Redisand Pty Ltd site at 7 Janet Parade, Salt Ash ('the site'). This survey was undertaken to satisfy the requirements of Condition 3.6.1 of the Orogen (2011) *Landscape Management Plan* for the site. Condition 3.6.1 states:

3.6.1 Population Monitoring

Annual monitoring of the Endangered Diuris arenaria population on site is proposed by a suitably qualified and experienced botanist once initial quarry operations commence on the site. 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. Monitoring would continue for the life of the quarry and 10 years beyond the completion of the last staged rehabilitation event.

Firebird ecoSultants ecologist's, Kurtis Mumford and Sandeep Kaur Thind, conducted a targeted *D. arenaria* (Sand Doubletail) survey on 15 September 2023, within the easement at the site (see Attachment A for the survey location). The survey and subsequent analyses were designed to repeat the methodology used for previous surveys conducted by Firebird ecoSultants'. Plants have been grouped into seven 'clusters' (see Attachment A for the cluster locations). Data recorded within each plot included a number of individual plants, stem heights for each individual plant and numbers of flowers for each individual plant. Mean stem heights and mean number of flowers were then calculated for each cluster.

Table 1 provides a summary of data for each cluster. Additionally, see Attachment B for a comparison of survey results from 2016 to 2023 and Attachment C for photos.



Firebird ecoSultants Pty Ltd
ABN-16 105 985 993

Table 1: *Diuris arenaria* (Sand Doubletail) Survey Data (15 September 2023)

Cluster No.	No. of Orchids	Mean Stem Height (m)	Mean No. of Flowers
1	10	0.38	3.2
2	52	0.39	3.46
3	11	0.36	3.36
4	27	0.42	3.85
5	10	0.41	3.1
6	20	0.34	4.25
7	7	0.41	2.71
TOTAL	137		

If you require any further details, please do not hesitate to contact the undersigned.

Yours sincerely

Firebird ecoSultants

Sarah Jones
B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas)
BAAS18020 Accredited Assessor
Ecologist / Bushfire Planner

Bibliography:

Orogen (2011). *Landscape Management Plan*. Prepared for Redisand Pty Ltd, July 2011.



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ABN-16 105 985 993

ATTACHMENT A: Site Map / Orchid Cluster Locations

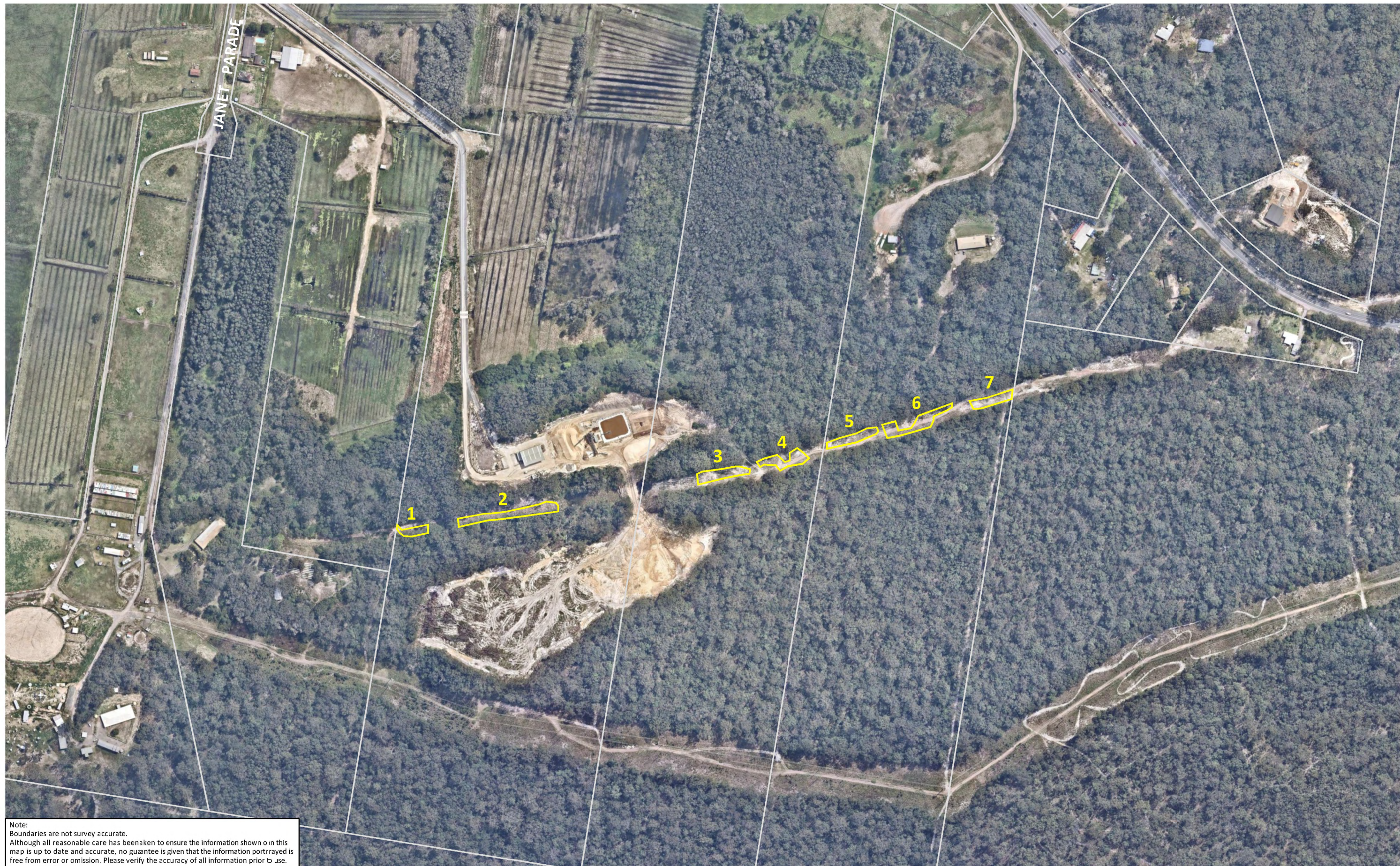


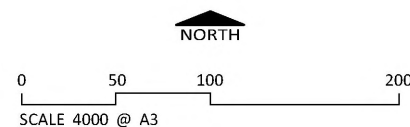
FIGURE 1-1: ORCHID MAPPING

CLIENT
SITE DETAILS
DATE

Client
Janet Parade Salt Ash
20 October 2015

Legend

Orchid Patches



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ATTACHMENT B: Comparison of Orchid Survey Data from 2016 to 2023

Table: Comparison of *Diuris arenaria* (Sand Doubletail) Survey Data from 2016 to 2023*

Cluster No.	No. of Orchids								Mean Stem Height (m)								Mean No. of Flowers							
	2016	2017	2018	2019	2020	2021	2022	2023	2016	2017	2018	2019	2020	2021	2022	2023	2016	2017	2018	2019	2020	2021	2022	2023
1	21	8	13	9	10	9	4	10	0.31	0.29	0.29	0.29	0.26	0.46	0.34	0.38	4.9	3.1	3	4.1	4.3	4.2	4.5	3.2
2	100	113	40	73	42	40	56	52	0.30	0.29	0.29	0.26	0.23	0.48	0.46	0.39	4.0	3.9	4	3.8	3.7	4.1	3.5	3.46
3	20	12	5	16	28	17	73	11	0.30	0.21	0.27	0.22	0.26	0.56	0.39	0.36	4.0	3.2	3	3.1	4.1	5.0	3.5	3.36
4	47	55	8	53	64	25	92	27	0.29	0.26	0.25	0.21	0.27	0.42	0.37	0.42	4.1	3.5	3	3.5	4.3	3.7	3.2	3.85
5	34	11	7	14	36	26	25	10	0.28	0.33	0.32	0.28	0.29	0.52	0.39	0.41	3.6	3.5	4	3.6	4.3	4.5	2.5	3.1
6	50	48	4	40	40	35	36	20	0.28	0.31	0.25	0.26	0.26	0.45	0.42	0.34	3.8	3.9	3	3.7	4.4	4.2	3.4	4.25
7	27	10	8	7	13	32	41	7	0.30	0.39	0.25	0.26	0.28	0.54	0.38	0.41	5.0	4.8	3	4.3	4.1	5.2	3.0	2.71
TOTAL	299	257	85	212	233	184	327	137	2.06	2.08	1.92	1.78	1.85	3.45	2.75	2.71	29.4	25.9	23	26.1	29.2	30.9	23.6	23.93

*Data collected by Firebird ecoSultants on 30 September 2016, 21 September 2017, 28 September 2018, 23 September 2019 and 17 September 2020, 17 September 2021, 17 September 2022 and 15 September 2023 at 7 Janet Parade, Salt Ash.



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ATTACHMENT C: Photos

Photos: *Diuris arenaria* (Sand Doubletail) at 7 Janet Parade, Salt Ash – photos taken on 15th September 2023.

Plot 1





Firebird ecoSultants Pty Ltd
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**MONITORING REPORT
FOR
BIODIVERSITY BANKING AGREEMENT
108
REGARDING
POLA FOGAL, TOMALLA
LOT 2 DP 707938
2021**

Prepared by:

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Reference No.	Tomalla – ATB Morton
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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.

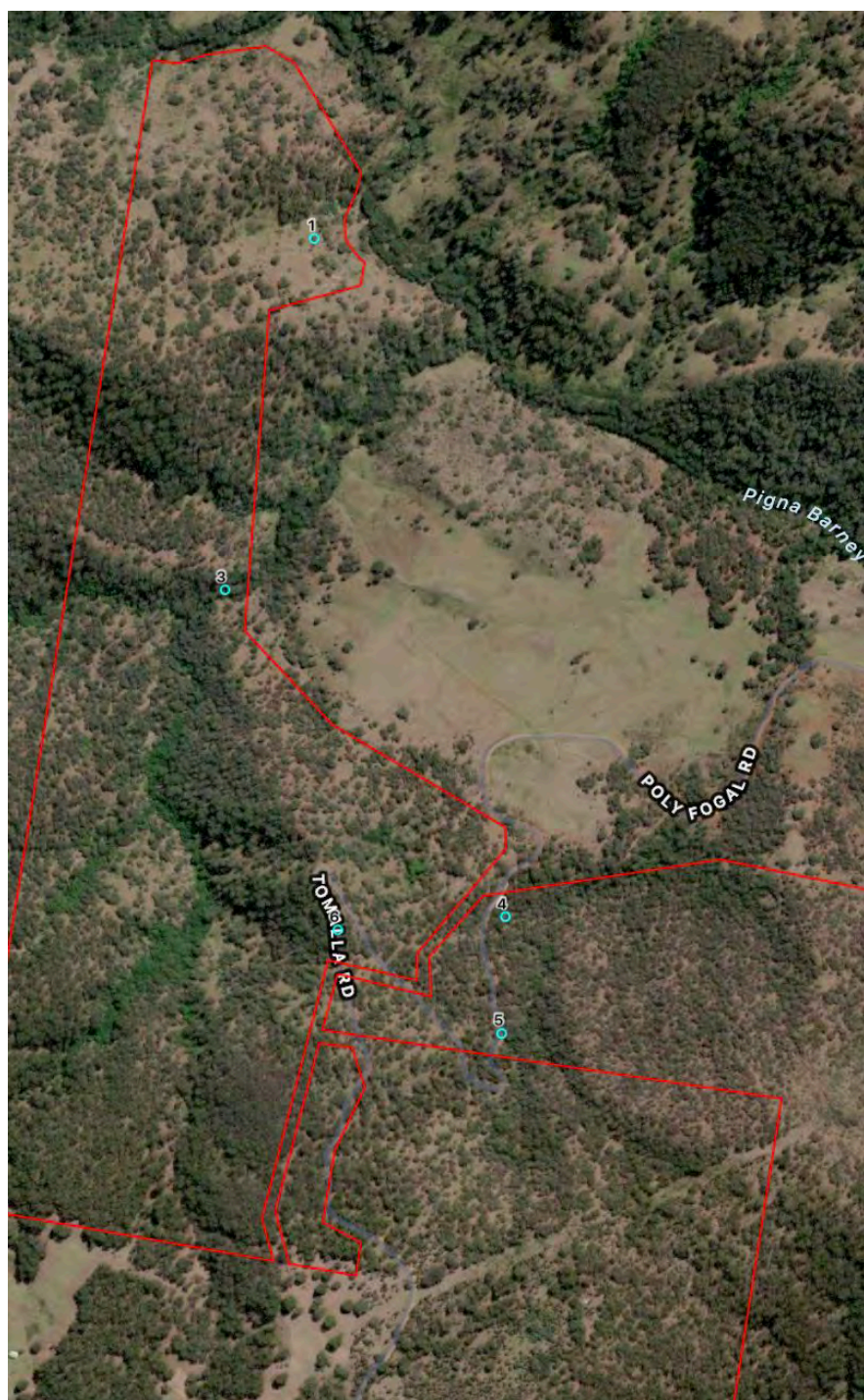
Table 2-1: Summary of Survey Methods

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:

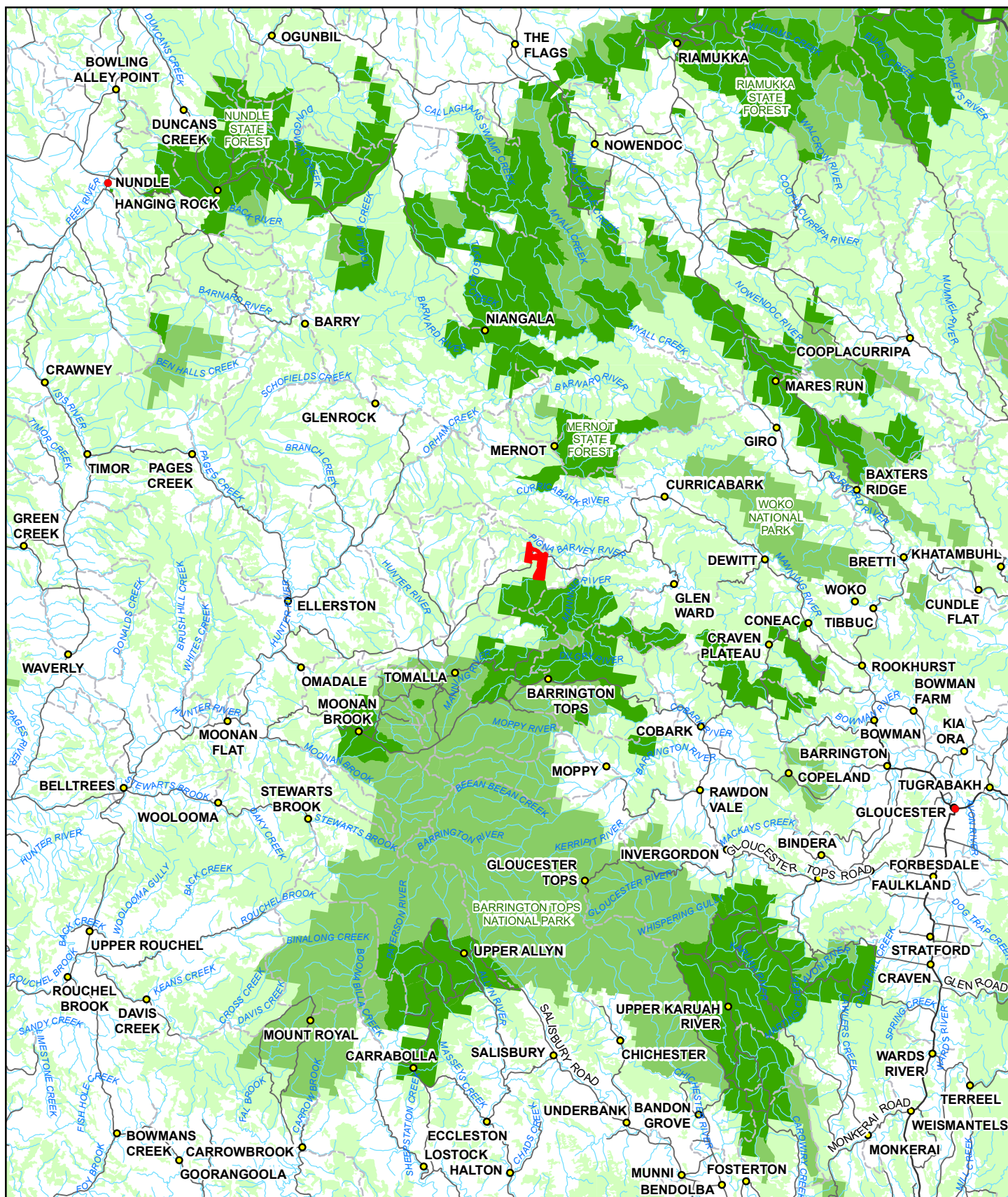
- Continued control of weeds is required within the site along the site's access tracks, low lying areas and also a general sweep through the entire site; and
- Monitoring of the *Lepus europaeus* (European Hare) a, to ensure that the abundance of these species within the site stays low or otherwise,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

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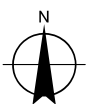
APPENDIX A SITE LOCATION MAP



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 | | | |

Paper Size A4
0 1,750 5,000 7,000 10,500 14,000
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 0
Date 12 Feb 2013

Site Location

Figure 1

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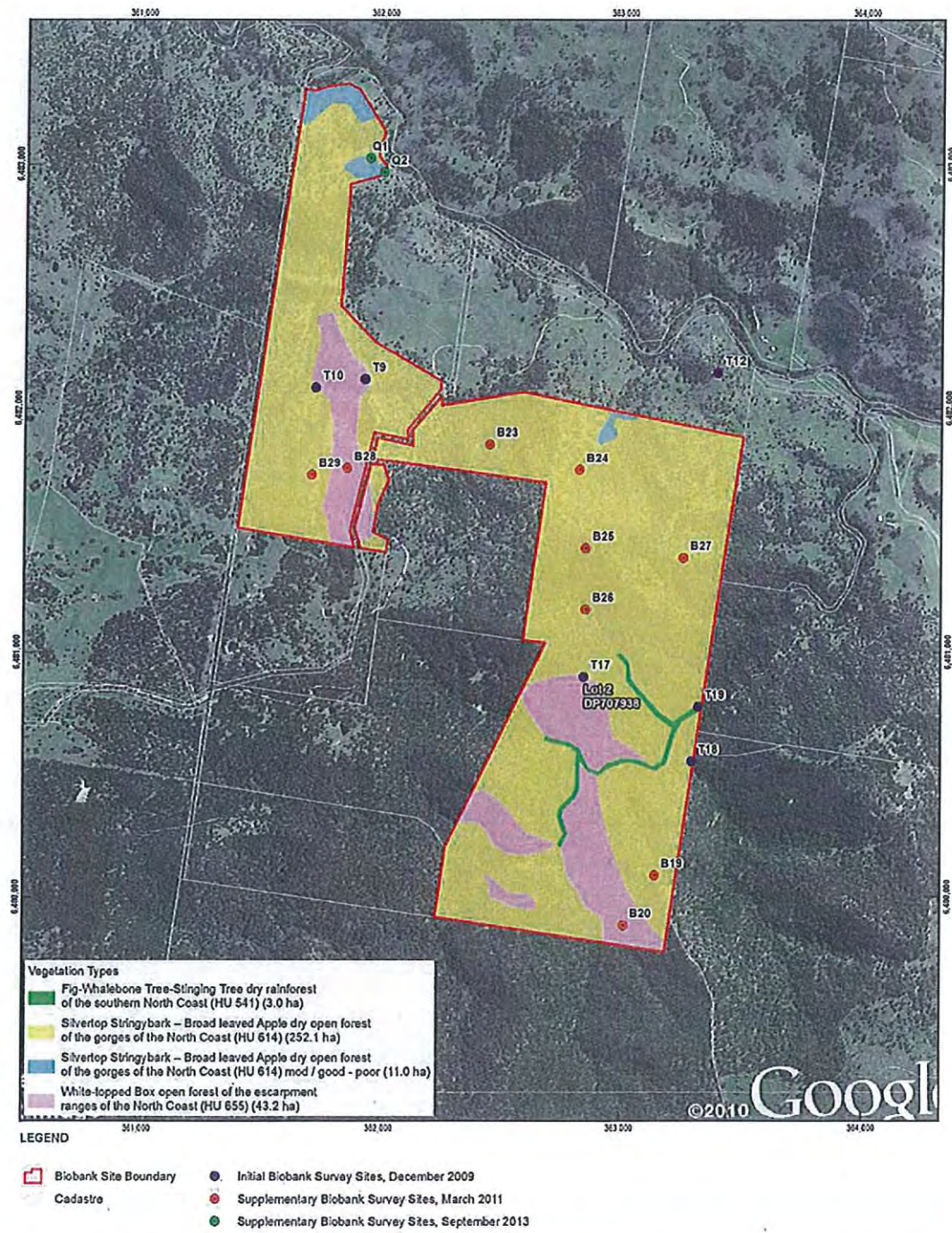
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Data source: Commonwealth of Australia (Geoscience Australia): 250K Topographic Data Series 3, 2006. Created by:fmackay

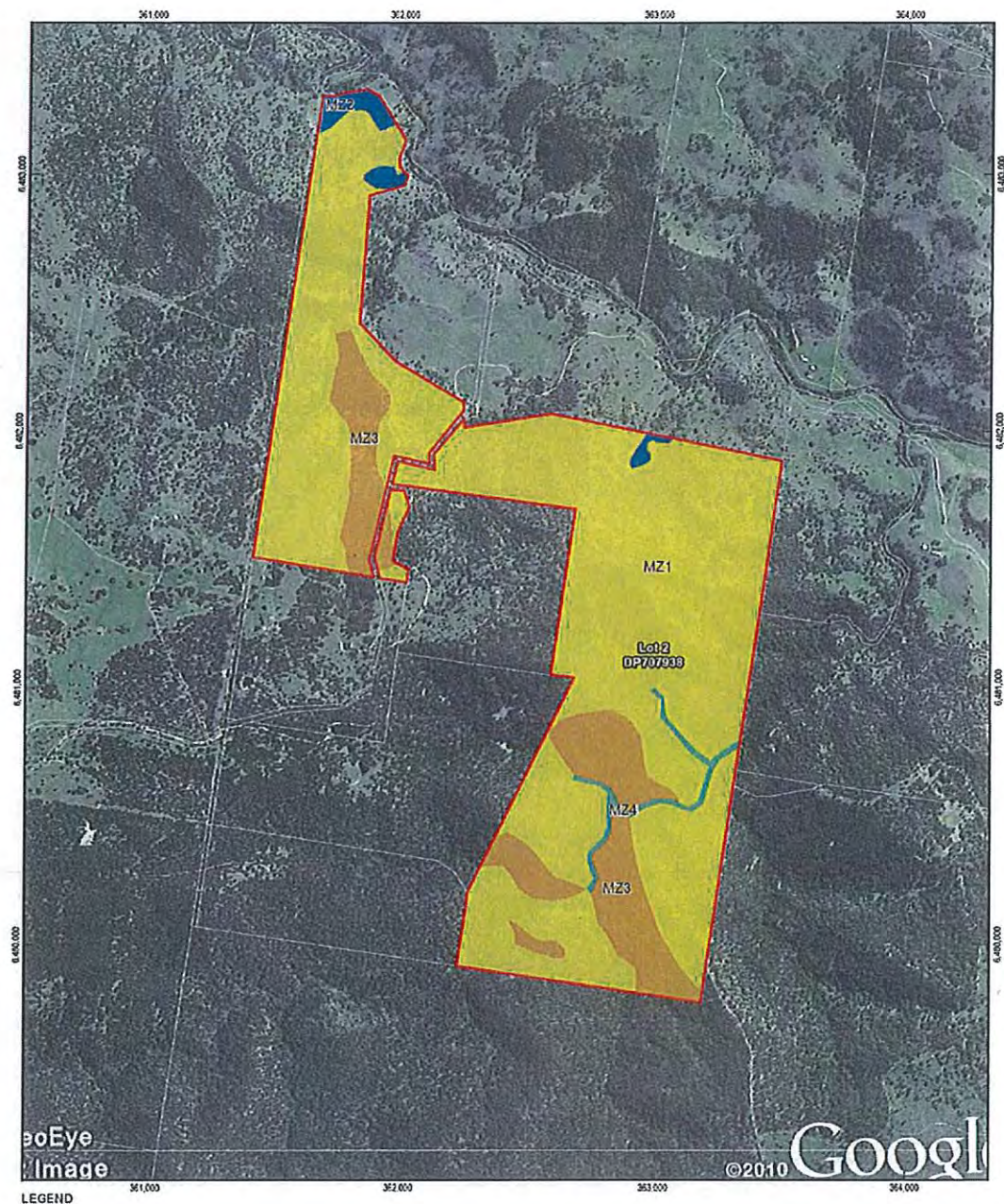
APPENDIX B VEGETATION TYPES MAP

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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Job Number 22-16240
Revision 1
Date 10 Nov 2014

Management Zone Plan

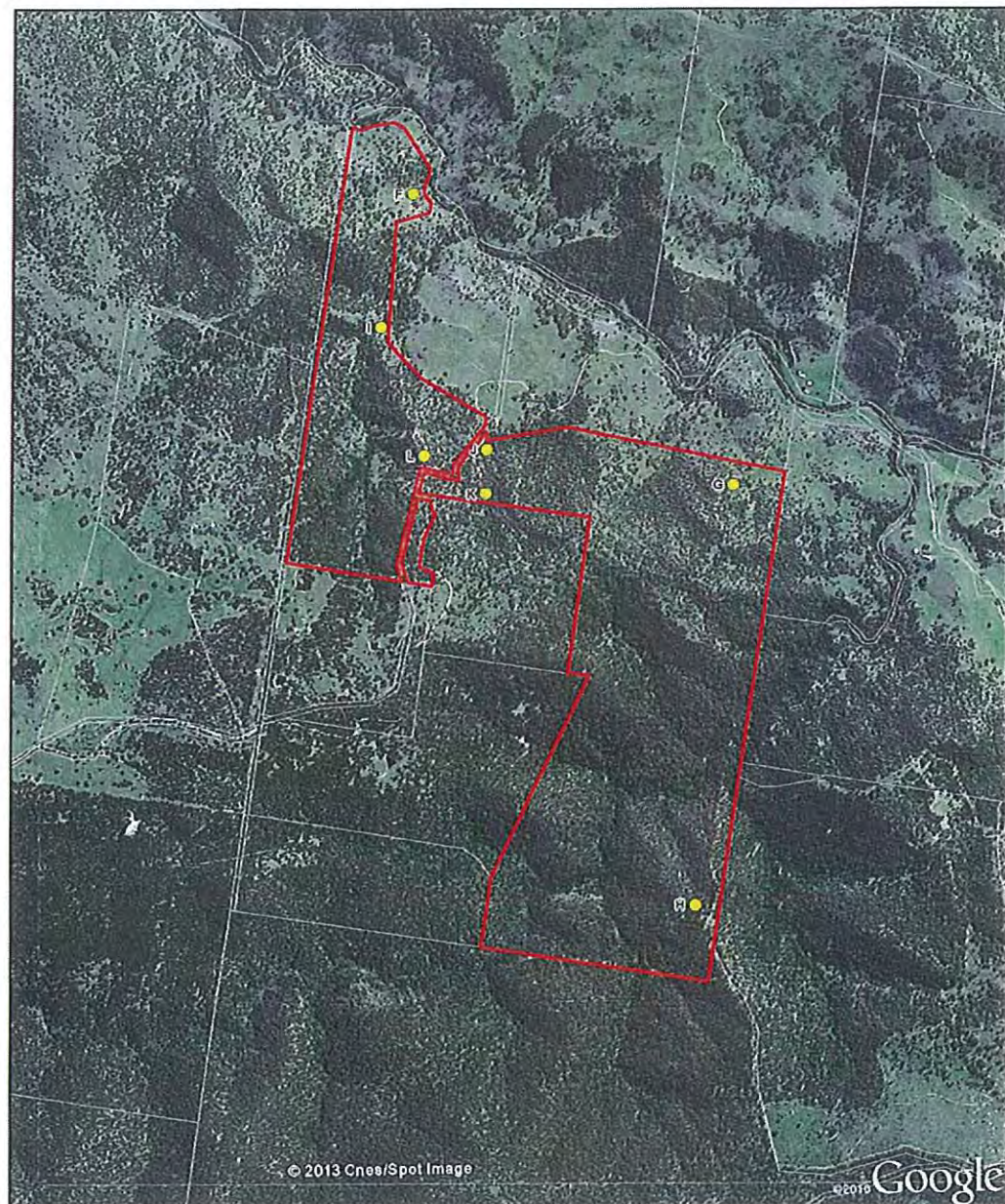
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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4973 5559 F 61 2 4973 9583 E info@ghd.com W www.ghd.com.au

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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
- Cadastre

Paper Size A4
0 100 200 400 600 800
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



ATB Morton Pty Ltd
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
G:\216240\GIS Maps Deliverables\Biobank\216240_005_PhotoPoints_2.mxd
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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 leucoptera
- 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).

Rabbit damage	Seedling abundance					
	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.

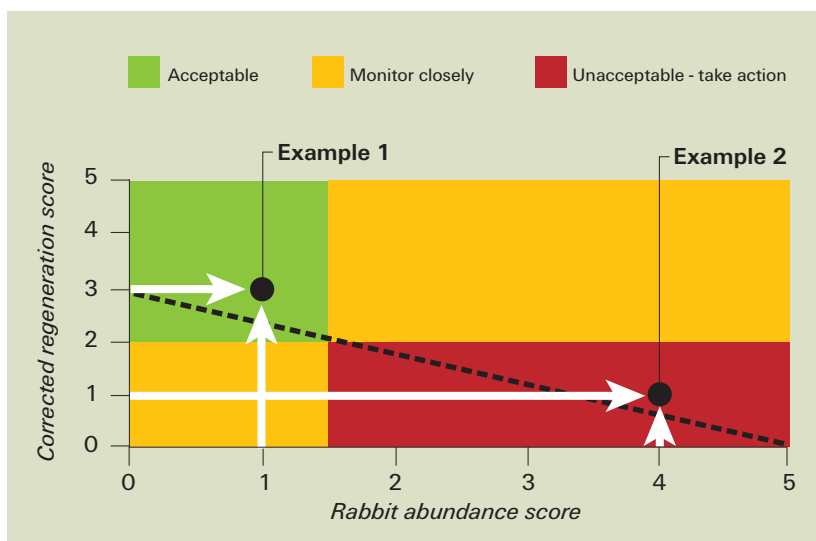


FIGURE 5: Assessing overall rabbit impact.

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

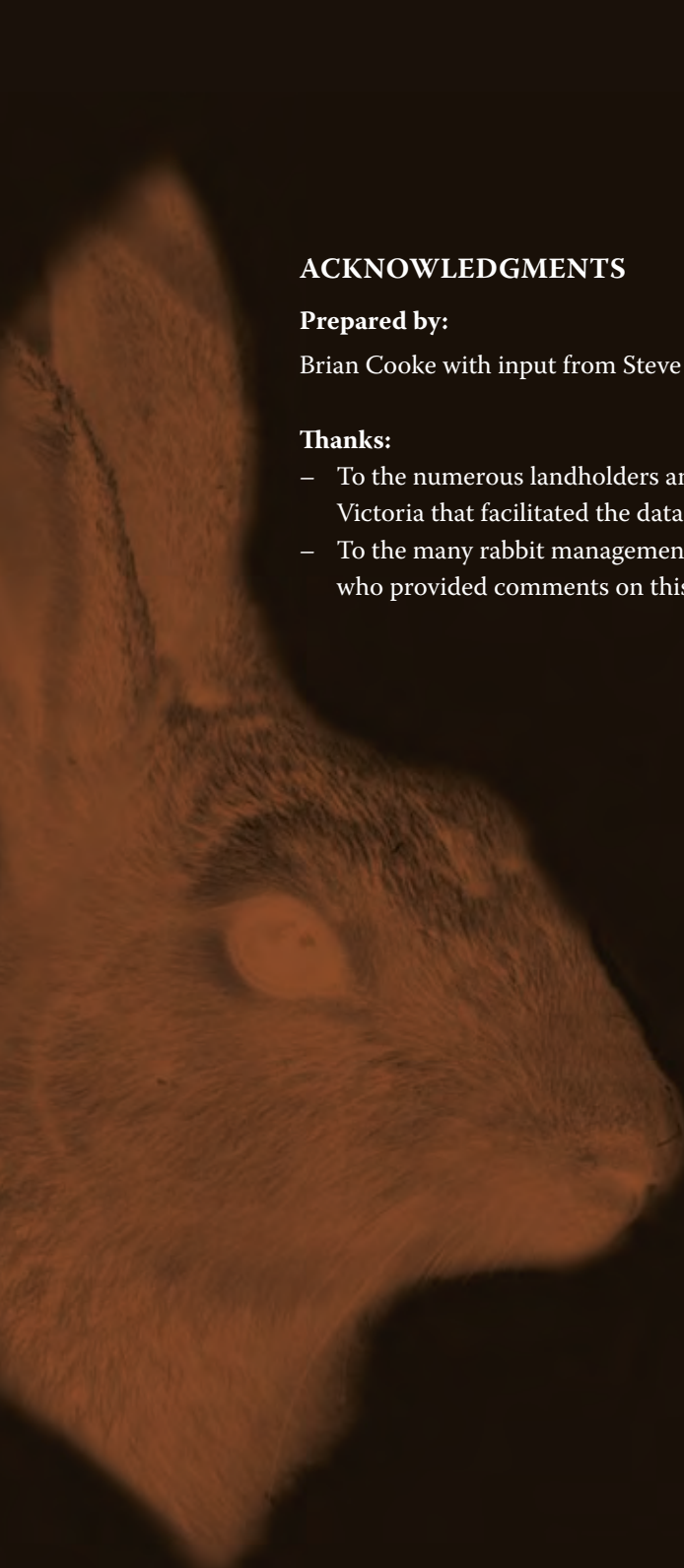
This simple method of assessing rabbits can be useful for measuring progress in rabbit control. Note the results in your diary so that you can measure progress by repeating the assessment again a year from now. Success should not be measured in terms of reduced rabbit numbers alone. The health of the 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 Stock Proof Fence | Tomalla Road |
| Existing Gate | Existing Stock Proof Fence - Repair as Required | Existing track to maintain |
| New Signage | New Fence | Biobanking Site |
| New Cattle Grid | | |

1:22,000 Paper Size A4
0 100 200 400 600
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
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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Level 3, GHD Tower, 24 Moneyville Drive, Newcastle NSW 2300 T 61 2 4379 6599 F 61 2 4379 6593 E estm@ghd.com W www.ghd.com.au

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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

Glycine microphylla

Small-leaf Glycine

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 (2023)

Report Number: 14751

Date Issued: 12/07/2023

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 29/06/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	29/06/2023	14751/1	Water	
BH3	29/06/2024	14751/2	Water	
BH4	29/06/2025	14751/3	Water	
BH5	29/06/2026	14751/4	Water	
BH6	29/06/2027	14751/5	Water	No sample. No water
MW1	29/06/2028	14751/6	Water	
MW2	29/06/2023	14751/7	Water	Not Tested
MW3	29/06/2023	14751/8	Water	
MW4	29/06/2023	14751/9	Water	
MW5	29/06/2023	14751/10	Water	
MW6	29/06/2023	14751/11	Water	
MW7	29/06/2023	14751/12	Water	
FD(BH3)	29/06/2023	14751/13	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 12/07/2023.

Test Report Number: 14751

Date Issued: 12/07/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14751/1 29/06/2023 BH1	14751/2 29/06/2024 BH3	14751/3 29/06/2025 BH4	14751/4 29/06/2026 BH5	14751/5 29/06/2027 BH6
Date Tested	--	--	29/06/2023	29/06/2023	29/06/2023	29/06/2023	29/06/2023
Depth to Water (TOM)	AS5667.11	m(bTOM)	3.60	18.91	13.20	6.75	20.62
Temperature	Temp	°C	18.6	18.6	19.1	18.1	[NT]
pH	APHA 4500-H B	pH Units	5.1	5.3	5.0	4.9	[NT]
Electrical Conductivity	APHA 2510 B	µS/cm	220	334	421	197	[NT]
Dissolved Oxygen	APHA 4500-O G	mg/L	3.0	4.0	2.1	1.3	[NT]
Oxidation Reduction Potential _#	APHA 2580 B	mV	207	175	236	198	[NT]
Turbidity	APHA 2130 B	NTU	770	2.0	160	85	[NT]

Field Analysis		Lab ID Sample Date Sample ID Units	14751/6 29/06/2028 MW1	14751/8 29/06/2023 MW3	14751/9 29/06/2023 MW4	14751/10 29/06/2023 MW5	14751/11 29/06/2023 MW6
Date Tested	--	--	29/06/2023	29/06/2023	29/06/2023	29/06/2023	29/06/2023
Depth to Water (TOM)	AS5667.11	m(bTOM)	1.45	2.76	12.93	1.31	3.32
Temperature	Temp	°C	14.6	17.7	18.6	13.8	17.6
pH	APHA 4500-H B	pH Units	4.1	4.2	5.5	5.2	5.4
Electrical Conductivity	APHA 2510 B	µS/cm	299	152	255	195	173
Dissolved Oxygen	APHA 4500-O G	mg/L	1.9	1.9	2.9	1.5	2.0
Oxidation Reduction Potential _#	APHA 2580 B	mV	236	160	147	197	156
Turbidity	APHA 2130 B	NTU	16	16	60	9.2	100

Field Analysis		Lab ID Sample Date Sample ID Units	14751/12 29/06/2023 MW7	14751/13 29/06/2023 FD(BH3)
Date Tested	--	--	29/06/2023	29/06/2023
Depth to Water (TOM)	AS5667.11	m(bTOM)	3.03	18.91
Temperature	Temp	°C	17.6	18.8
pH	APHA 4500-H B	pH Units	4.6	5.2
Electrical Conductivity	APHA 2510 B	µS/cm	101	338
Dissolved Oxygen	APHA 4500-O G	mg/L	2.0	4.0
Oxidation Reduction Potential _#	APHA 2580 B	mV	146	177
Turbidity	APHA 2130 B	NTU	37	1.1

Solids		Lab ID Sample Date Sample ID Units	14751/1 29/06/2023 BH1	14751/2 29/06/2024 BH3	14751/3 29/06/2025 BH4	14751/4 29/06/2026 BH5	14751/6 29/06/2028 MW1
Date Tested	--	--	6/07/2023	6/07/2023	6/07/2023	6/07/2023	6/07/2023
Total Dissolved Solids	AS3550.4	mg/L	240	200	240	150	270



Solids		Lab ID Sample Date Sample ID Units	14751/8 29/06/2023 MW3	14751/9 29/06/2023 MW4	14751/10 29/06/2023 MW5	14751/11 29/06/2023 MW6	14751/12 29/06/2023 MW7
	Method						
Date Tested	--	--	10/07/2023	10/07/2023	10/07/2023	10/07/2023	10/07/2023
Total Dissolved Solids	AS3550.4	mg/L	140	390	280	260	49

Solids		Lab ID Sample Date Sample ID Units	14751/13 29/06/2023 FD(BH3)
	Method		
Date Tested	--	--	10/07/2023
Total Dissolved Solids	AS3550.4	mg/L	190

Metals - Dissolved		Lab ID Sample Date Sample ID Units	14751/1 29/06/2023 BH1	14751/2 29/06/2024 BH3	14751/3 29/06/2025 BH4	14751/4 29/06/2026 BH5	14751/6 29/06/2028 MW1
	Method						
Arsenic	EXT	mg/L	0.001	<0.001	<0.001	0.003	0.003
Iron	EXT	mg/L	0.46	0.07	0.1	0.1	0.74
Manganese	EXT	mg/L	0.15	0.009	0.014	<0.005	0.008

Metals - Dissolved		Lab ID Sample Date Sample ID Units	14751/8 29/06/2023 MW3	14751/9 29/06/2023 MW4	14751/10 29/06/2023 MW5	14751/11 29/06/2023 MW6	14751/12 29/06/2023 MW7
	Method						
Arsenic	EXT	mg/L	<0.001	0.005	0.001	0.021	<0.001
Iron	EXT	mg/L	0.77	1.7	0.72	4.6	0.18
Manganese	EXT	mg/L	<0.005	0.015	0.010	0.044	<0.005

Metals - Dissolved		Lab ID Sample Date Sample ID Units	14751/13 29/06/2023 FD(BH3)
	Method		
Arsenic	EXT	mg/L	<0.001
Iron	EXT	mg/L	0.07
Manganese	EXT	mg/L	0.009

Anions and Cations		Lab ID Sample Date Sample ID Units	14751/1 29/06/2023 BH1	14751/2 29/06/2024 BH3	14751/3 29/06/2025 BH4	14751/4 29/06/2026 BH5	14751/6 29/06/2028 MW1
	Method						
Chloride, Cl	EXT	mg/L	45	83	91	52	81
Sulphate, SO ₄	EXT	mg/L	6	23	26	5	2

Anions and Cations		Lab ID Sample Date Sample ID Units	14751/8 29/06/2023 MW3	14751/9 29/06/2023 MW4	14751/10 29/06/2023 MW5	14751/11 29/06/2023 MW6	14751/12 29/06/2023 MW7
	Method						
Chloride, Cl	EXT	mg/L	36	44	58	34	15
Sulphate, SO ₄	EXT	mg/L	<1	3	<1	<1	<1

Anions and Cations	Method	Lab ID	14751/13
		Sample Date	29/06/2023
		Sample ID	FD(BH3)
		Units	
Chloride, Cl	EXT	mg/L	83
Sulphate, SO ₄	EXT	mg/L	22

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. 327070

Sampling Report Number: 14751

Date Issued: 12/07/2023

Revision No: 00

Sampling Conditions: 11 - 16°C, fine

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14751/1	BH1	13406-6	D.Walker	29/06/2023 10:50 AM	AS5667.11, Bail	AS5667.1
14751/2	BH3		D.Walker	29/06/2024 12:02 PM	AS5667.11, Pump	AS5667.1
14751/3	BH4	13406-7	D.Walker	29/06/2025 12:26 PM	AS5667.11, Bail	AS5667.1
14751/4	BH5		D.Walker	29/06/2026 1:15 PM	AS5667.11, Bail	AS5667.1
14751/5	BH6	13406-5	D.Walker	29/06/2027 1:32 PM	Depth only	
14751/6	MW1	13406-4	D.Walker	29/06/2028 9:45 AM	AS5667.11, Bail	AS5667.1
14751/7	MW2		D.Walker	29/06/2023		
14751/8	MW3		D.Walker	29/06/2023 12:45 PM	AS5667.11, Bail	AS5667.1
14751/9	MW4		D.Walker	29/06/2023 11:31 AM	AS5667.11, Bail	AS5667.1
14751/10	MW5		D.Walker	29/06/2023 9:59 AM	AS5667.11, Bail	AS5667.1
14751/11	MW6		D.Walker	29/06/2023 10:33 AM	AS5667.11, Bail	AS5667.1
14751/12	MW7		D.Walker	29/06/2023 12:58 PM	AS5667.11, Bail	AS5667.1
14751/13	FD(BH3)		D.Walker	29/06/2023 12:10 PM	AS5667.11, Bail	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
14751/1	BH1	
14751/2	BH3	
14751/3	BH4	
14751/4	BH5	
14751/5	BH6	depth to bottom, no sample
14751/6	MW1	mild sulphurous odour
14751/7	MW2	No Access
14751/8	MW3	
14751/9	MW4	
14751/10	MW5	sulphurous odour
14751/11	MW6	
14751/12	MW7	
14751/13	FD(BH3)	

Sampling procedures have been approved and report finalised on 12/07/2023.

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	Monument Height (TOM) (m)	Depth to Bottom (bTOM) (m)	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(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: 15109

Date Issued: 5/10/2023

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 21/09/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	21/09/2023	15109/1	Water	
BH3	21/09/2023	15109/2	Water	
BH4	21/09/2023	15109/3	Water	
BH5	21/09/2023	15109/4	Water	
BH6	21/09/2023	15109/5	Water	Dry, no sample
MW1	21/09/2023	15109/6	Water	
MW2	21/09/2023	15109/7	Water	Not Tested
MW3	21/09/2023	15109/8	Water	
MW4	21/09/2023	15109/9	Water	
MW5	21/09/2023	15109/10	Water	
MW6	21/09/2023	15109/11	Water	
MW7	21/09/2023	15109/12	Water	
Dup' (BH3)	21/09/2023	15109/13	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 5/10/2023.

Test Report Number: 15109

Date Issued: 5/10/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	15109/1 21/09/2023 BH1	15109/2 21/09/2023 BH3	15109/3 21/09/2023 BH4	15109/4 21/09/2023 BH5	15109/5 21/09/2023 BH6
Date Tested	--	--	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
Depth to Water (TOM)	AS5667.11	m(bTOM)	3.78	19.11	13.38	6.92	20.82
Temperature	Temp	°C	19.9	20.0	20.7	18.2	[NT]
pH	APHA 4500-H B	pH Units	5.6	5.3	5.3	5.2	[NT]
Electrical Conductivity	APHA 2510 B	µS/cm	249	256	448	249	[NT]
Dissolved Oxygen	APHA 4500-O G	mg/L	3.7	4.5	2.5	2.3	[NT]
Oxidation Reduction Potential _#	APHA 2580 B	mV	169	209	256	193	[NT]
Turbidity	APHA 2130 B	NTU	1,100	1.9	140	55	[NT]

Field Analysis		Lab ID Sample Date Sample ID Units	15109/6 21/09/2023 MW1	15109/8 21/09/2023 MW3	15109/9 21/09/2023 MW4	15109/10 21/09/2023 MW5	15109/11 21/09/2023 MW6
Date Tested	--	--	21/09/2023	21/09/2023	21/09/2023	21/09/2023	21/09/2023
Depth to Water (TOM)	AS5667.11	m(bTOM)	1.66	2.96	13.12	1.51	3.48
Temperature	Temp	°C	16.3	17.9	20.2	15.6	17.7
pH	APHA 4500-H B	pH Units	4.5	4.4	5.7	5.2	5.5
Electrical Conductivity	APHA 2510 B	µS/cm	271	131	248	203	279
Dissolved Oxygen	APHA 4500-O G	mg/L	2.3	2.5	3.8	2.5	2.8
Oxidation Reduction Potential _#	APHA 2580 B	mV	135	146	93	127	139
Turbidity	APHA 2130 B	NTU	5.2	23	75	4.4	140

Field Analysis		Lab ID Sample Date Sample ID Units	15109/12 21/09/2023 MW7	15109/13 21/09/2023 Dup' (BH3)
Date Tested	--	--	21/09/2023	21/09/2023
Depth to Water (TOM)	AS5667.11	m(bTOM)	3.23	[NT]
Temperature	Temp	°C	17.1	20.1
pH	APHA 4500-H B	pH Units	4.8	5.3
Electrical Conductivity	APHA 2510 B	µS/cm	59.0	256
Dissolved Oxygen	APHA 4500-O G	mg/L	2.8	4.7
Oxidation Reduction Potential _#	APHA 2580 B	mV	131	214
Turbidity	APHA 2130 B	NTU	15	1.8

Solids		Lab ID Sample Date Sample ID Units	15109/1 21/09/2023 BH1	15109/2 21/09/2023 BH3	15109/3 21/09/2023 BH4	15109/4 21/09/2023 BH5	15109/6 21/09/2023 MW1
Date Tested	--	--	25/09/2023	25/09/2023	26/09/2023	26/09/2023	26/09/2023
Total Dissolved Solids	AS3550.4	mg/L	220	170	330	200	270



Solids		Lab ID Sample Date Sample ID Units	15109/8 21/09/2023 MW3	15109/9 21/09/2023 MW4	15109/10 21/09/2023 MW5	15109/11 21/09/2023 MW6	15109/12 21/09/2023 MW7
Date Tested	--	--	26/09/2023	26/09/2023	26/09/2023	26/09/2023	26/09/2023
Total Dissolved Solids	AS3550.4	mg/L	180	440	270	290	88

Solids		Lab ID Sample Date Sample ID Units	15109/13 21/09/2023 Dup' (BH3)
Date Tested	--	--	26/09/2023
Total Dissolved Solids	AS3550.4	mg/L	180

Metals - Dissolved		Lab ID Sample Date Sample ID Units	15109/1 21/09/2023 BH1	15109/2 21/09/2023 BH3	15109/3 21/09/2023 BH4	15109/4 21/09/2023 BH5	15109/6 21/09/2023 MW1
Arsenic	EXT	mg/L	0.003	<0.001	<0.001	0.002	0.004
Iron	EXT	mg/L	1.4	0.07	0.17	0.09	0.58
Manganese	EXT	mg/L	0.11	0.020	0.009	<0.005	0.006

Metals - Dissolved		Lab ID Sample Date Sample ID Units	15109/8 21/09/2023 MW3	15109/9 21/09/2023 MW4	15109/10 21/09/2023 MW5	15109/11 21/09/2023 MW6	15109/12 21/09/2023 MW7
Arsenic	EXT	mg/L	<0.001	0.006	<0.001	0.020	<0.001
Iron	EXT	mg/L	0.87	1.2	0.48	5.9	0.16
Manganese	EXT	mg/L	<0.005	0.020	0.006	0.053	<0.005

Metals - Dissolved		Lab ID Sample Date Sample ID Units	15109/13 21/09/2023 Dup' (BH3)
Arsenic	EXT	mg/L	<0.001
Iron	EXT	mg/L	0.07
Manganese	EXT	mg/L	0.008

Anions and Cations		Lab ID Sample Date Sample ID Units	15109/1 21/09/2023 BH1	15109/2 21/09/2023 BH3	15109/3 21/09/2023 BH4	15109/4 21/09/2023 BH5	15109/6 21/09/2023 MW1
Chloride, Cl	EXT	mg/L	46	62	97	64	72
Sulphate, SO ₄	EXT	mg/L	6	13	34	4	1

Anions and Cations		Lab ID Sample Date Sample ID Units	15109/8 21/09/2023 MW3	15109/9 21/09/2023 MW4	15109/10 21/09/2023 MW5	15109/11 21/09/2023 MW6	15109/12 21/09/2023 MW7
Chloride, Cl	EXT	mg/L	35	40	42	66	11
Sulphate, SO ₄	EXT	mg/L	1	2	<1	<1	<1

Anions and Cations	Method	Lab ID	15109/13
		Sample Date	21/09/2023
		Sample ID	Dup' (BH3)
		Units	
Chloride, Cl	EXT	mg/L	62
Sulphate, SO ₄	EXT	mg/L	13

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. 333927

Sampling Report Number: 15109

Date Issued: 5/10/2023

Revision No: 00

Sampling Conditions: Cloudy, 21°- 24°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15109/1	BH1	13406-6	T & D.Walker	21/09/2023 12:46 PM	AS5667.11, Bail	AS5667.1
15109/2	BH3		T & D.Walker	21/09/2023 1:43 PM	AS5667.11, Pump	AS5667.1
15109/3	BH4	13406-7	T & D.Walker	21/09/2023 2:13 PM	AS5667.11, Bail	AS5667.1
15109/4	BH5		T & D.Walker	21/09/2023 3:12 PM	AS5667.11, Bail	AS5667.1
15109/5	BH6	13406-5	T & D.Walker	21/09/2023 3:28 PM	Depth only	
15109/6	MW1	13406-4	T & D.Walker	21/09/2023 11:44 AM	AS5667.11, Bail	AS5667.1
15109/7	MW2		T & D.Walker	21/09/2023		
15109/8	MW3		T & D.Walker	21/09/2023 2:43 PM	AS5667.11, Bail	AS5667.1
15109/9	MW4		T & D.Walker	21/09/2023 1:04 PM	AS5667.11, Bail	AS5667.1
15109/10	MW5		T & D.Walker	21/09/2023 12:06 PM	AS5667.11, Bail	AS5667.1
15109/11	MW6		T & D.Walker	21/09/2023 12:26 PM	AS5667.11, Bail	AS5667.1
15109/12	MW7		T & D.Walker	21/09/2023 2:57 PM	AS5667.11, Bail	AS5667.1
15109/13	Dup' (BH3)		T & D.Walker	21/09/2023 1:53 PM	AS5667.11, Pump	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
15109/1	BH1	Very dark & turbid
15109/2	BH3	
15109/3	BH4	Rootlets
15109/4	BH5	
15109/5	BH6	Dry, no sample - Depth to bottom
15109/6	MW1	
15109/7	MW2	No Access
15109/8	MW3	
15109/9	MW4	Logger faulty - needs replacing
15109/10	MW5	(0.35m knot in logger string)
15109/11	MW6	turbid
15109/12	MW7	
15109/13	Dup' (BH3)	

Sampling procedures have been approved and report finalised on 5/10/2023.

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
Dup' (BH3)	0400389	6370976			

Well ID	Date Well Measured	Monument Height (TOM) (m)	Depth to Bottom (bTOM) (m)	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
Dup' (BH3)	24/09/2019		21.40	Good 75%	4

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: 15366

Date Issued: 7/12/2023

Revision Number: 00

Site/Job: Redisand Sand

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

The following 1 sample(s) were received on 1/12/2023 14:03

Sample Reference	Date Sampled	Sampled by	Comments
Sand	1/12/2023		Sampled by Client

The information in this table is supplied by the client. VGT takes no responsibility for its validity.

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 7/12/2023.

Test Report Number: 15366

Date Issued: 7/12/2023

Revision No: 00

Results

Acid Sulphate Soil Screen	Method	Lab ID	15366/1
		Sample Date Sample ID Units/Matrix	1/12/2023 Sand Soil
pH(f)	(QASSIT) 2004	pH units	6.7
pH(fox)	(QASSIT) 2004	pH units	6.3
pH Difference	(QASSIT) 2004	pH units	0.4
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:

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: 14056

Date Issued: 18/01/2023

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 12/01/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	12/01/2023	14056/1	Water	White
Settled Pond	12/01/2023	14056/2	Water	Black
Creek	12/01/2023	14056/3	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 18/01/2023.

Test Report Number: 14056

Date Issued: 18/01/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14056/1 12/01/2023 Feed Pond	14056/2 12/01/2023 Settled Pond	14056/3 12/01/2023 Creek
Date Tested	--	--	12/01/2023	12/01/2023	12/01/2023
Temperature	Temp	°C	23.7	24.5	20.8
pH	APHA 4500-H B	pH Units	5.9	6.4	5.8
Electrical Conductivity	APHA 2510 B	µS/cm	255	306	247
Dissolved Oxygen	APHA 4500-O G	mg/L	8.3	5.7	2.6
Oxidation Reduction Potential _#	APHA 2580 B	mV	215	220	57

Solids		Lab ID Sample Date Sample ID Units	14056/1 12/01/2023 Feed Pond	14056/2 12/01/2023 Settled Pond	14056/3 12/01/2023 Creek
Date Tested	--	--	17/01/2023	17/01/2023	17/01/2023
Total Dissolved Solids	AS3550.4	mg/L	560	220	160
Date Tested	--	--	12/01/2023	12/01/2023	12/01/2023
Total Suspended Solids	AS3550.4	mg/L	2,520	10	<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: 14056

Date Issued: 18/01/2023

Revision No: 00

Sampling Conditions: Cloudy, 26°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14056/1	Feed Pond		T.Walker	12/01/2023 10:52 AM	AS5667.4 Lake, Grab	AS5667.1
14056/2	Settled Pond		T.Walker	12/01/2023 11:08 AM	AS5667.4 Lake, Grab	AS5667.1
14056/3	Creek		T.Walker	12/01/2023 10:02 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14056/1	Feed Pond	400167	6370993	No Visible Oil and Grease
14056/2	Settled Pond	400167	6371005	No Visible Oil and Grease
14056/3	Creek	399964	6371336	No Visible Oil and Grease

Sampling procedures have been approved and report finalised on 18/01/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 14157

Date Issued: 16/02/2023

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 9/02/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	9/02/2023	14157/1	Water	White
Settled Pond	9/02/2023	14157/2	Water	Black
Creek	9/02/2023	14157/3	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 16/02/2023.

Test Report Number: 14157

Date Issued: 16/02/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14157/1 9/02/2023 Feed Pond	14157/2 9/02/2023 Settled Pond	14157/3 9/02/2023 Creek
Date Tested	--	--	09/02/2023	09/02/2023	09/02/2023
Temperature	Temp	°C	24.3	24.8	21.2
pH	APHA 4500-H B	pH Units	5.9	6.4	5.8
Electrical Conductivity	APHA 2510 B	µS/cm	255	294	244
Dissolved Oxygen	APHA 4500-O G	mg/L	8.4	5.9	1.5
Oxidation Reduction Potential _#	APHA 2580 B	mV	293	190	178

Solids		Lab ID Sample Date Sample ID Units	14157/1 9/02/2023 Feed Pond	14157/2 9/02/2023 Settled Pond	14157/3 9/02/2023 Creek
Date Tested	--	--	14/02/2023	14/02/2023	14/02/2023
Total Dissolved Solids	AS3550.4	mg/L	500	200	140
Date Tested	--	--	9/02/2023	9/02/2023	9/02/2023
Total Suspended Solids	AS3550.4	mg/L	2,170	27	<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: 14157

Date Issued: 16/02/2023

Revision No: 00

Sampling Conditions: 26 °C, cloudy

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14157/1	Feed Pond		D.Walker	9/02/2023 11:38 AM	AS5667.4 Lake, Grab	AS5667.1
14157/2	Settled Pond		D.Walker	9/02/2023 11:27 AM	AS5667.4 Lake, Grab	AS5667.1
14157/3	Creek		D.Walker	9/02/2023 11:08 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14157/1	Feed Pond	400167	6370993	
14157/2	Settled Pond	400167	6371005	
14157/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 16/02/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 14302

Date Issued: 17/03/2023

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 10/03/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	9/03/2023	14302/1	Water	White
Settled Pond	9/03/2023	14302/2	Water	Black
Creek	9/03/2023	14302/3	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 17/03/2023.

Test Report Number: 14302

Date Issued: 17/03/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14302/1 9/03/2023 Feed Pond	14302/2 9/03/2023 Settled Pond	14302/3 9/03/2023 Creek
Date Tested	--	--	09/03/2023	09/03/2023	09/03/2023
Temperature	Temp	°C	24.6	22.9	20.3
pH	APHA 4500-H B	pH Units	5.7	6.5	5.9
Electrical Conductivity	APHA 2510 B	µS/cm	242	283	225
Dissolved Oxygen	APHA 4500-O G	mg/L	7.7	5.2	2.4
Oxidation Reduction Potential _#	APHA 2580 B	mV	138	120	149

Solids		Lab ID Sample Date Sample ID Units	14302/1 9/03/2023 Feed Pond	14302/2 9/03/2023 Settled Pond	14302/3 9/03/2023 Creek
Date Tested	--	--	13/03/2023	13/03/2023	13/03/2023
Total Dissolved Solids	AS3550.4	mg/L	1,820	250	210
Date Tested	--	--	10/03/2023	10/03/2023	10/03/2023
Total Suspended Solids	AS3550.4	mg/L	2,840	18	<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: 14302

Date Issued: 17/03/2023

Revision No: 00

Sampling Conditions: Fine, 21°- 28°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14302/1	Feed Pond		T & D.Walker	9/03/2023 11:39 AM	AS5667.4 Lake, Grab	AS5667.1
14302/2	Settled Pond		T & D.Walker	9/03/2023 11:31 AM	AS5667.4 Lake, Grab	AS5667.1
14302/3	Creek		T & D.Walker	9/03/2023 9:24 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14302/1	Feed Pond	400167	6370993	
14302/2	Settled Pond	400167	6371005	
14302/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 17/03/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 14397

Date Issued: 18/04/2023

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 6/04/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	6/04/2023	14397/1	Water	White
Settled Pond	6/04/2023	14397/2	Water	Black
Creek	6/04/2023	14397/3	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 18/04/2023.

Test Report Number: 14397

Date Issued: 18/04/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14397/1 6/04/2023 Feed Pond	14397/2 6/04/2023 Settled Pond	14397/3 6/04/2023 Creek
Date Tested	--	--	06/04/2023	06/04/2023	06/04/2023
Temperature	Temp	°C	21.7	22.0	19.8
pH	APHA 4500-H B	pH Units	6.1	6.5	5.9
Electrical Conductivity	APHA 2510 B	µS/cm	207	272	270
Dissolved Oxygen	APHA 4500-O G	mg/L	8.2	6.8	2.2
Oxidation Reduction Potential _#	APHA 2580 B	mV	115	126	116

Solids		Lab ID Sample Date Sample ID Units	14397/1 6/04/2023 Feed Pond	14397/2 6/04/2023 Settled Pond	14397/3 6/04/2023 Creek
Date Tested	--	--	17/04/2023	17/04/2023	17/04/2023
Total Dissolved Solids	AS3550.4	mg/L	310	190	230
Date Tested	--	--	11/04/2023	11/04/2023	11/04/2023
Total Suspended Solids	AS3550.4	mg/L	1,180	13	10

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: 14397

Date Issued: 18/04/2023

Revision No: 00

Sampling Conditions: Cloudy, 24°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14397/1	Feed Pond		D.Walker	6/04/2023 10:23 AM	AS5667.4 Lake, Grab	AS5667.1
14397/2	Settled Pond		D.Walker	6/04/2023 10:37 AM	AS5667.4 Lake, Grab	AS5667.1
14397/3	Creek		D.Walker	6/04/2023 9:24 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14397/1	Feed Pond	400167	6370993	No Visible Oil and Grease
14397/2	Settled Pond	400167	6371005	No Visible Oil and Grease
14397/3	Creek	399964	6371336	No Visible Oil and Grease

Sampling procedures have been approved and report finalised on 18/04/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 14558

Date Issued: 10/05/2023

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 4/05/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	4/05/2023	14558/1	Water	White
Settled Pond	4/05/2023	14558/2	Water	Black
Creek	4/05/2023	14558/3	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 10/05/2023.

Test Report Number: 14558

Date Issued: 10/05/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14558/1 4/05/2023 Feed Pond	14558/2 4/05/2023 Settled Pond	14558/3 4/05/2023 Creek
Date Tested	--	--	04/05/2023	04/05/2023	04/05/2023
Temperature	Temp	°C	17.6	17.5	16.6
pH	APHA 4500-H B	pH Units	5.6	6.3	5.8
Electrical Conductivity	APHA 2510 B	µS/cm	234	278	237
Dissolved Oxygen	APHA 4500-O G	mg/L	7.9	4.2	2.8
Oxidation Reduction Potential _#	APHA 2580 B	mV	247	236	171

Solids		Lab ID Sample Date Sample ID Units	14558/1 4/05/2023 Feed Pond	14558/2 4/05/2023 Settled Pond	14558/3 4/05/2023 Creek
Date Tested	--	--	9/05/2023	9/05/2023	9/05/2023
Total Dissolved Solids	AS3550.4	mg/L	680	250	170
Date Tested	--	--	4/05/2023	4/05/2023	4/05/2023
Total Suspended Solids	AS3550.4	mg/L	2,790	11	<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: 14558

Date Issued: 10/05/2023

Revision No: 00

Sampling Conditions: Clear, 15°- 16°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14558/1	Feed Pond		T.Walker	4/05/2023 9:54 AM	AS5667.4 Lake, Grab	AS5667.1
14558/2	Settled Pond		T.Walker	4/05/2023 10:12 AM	AS5667.4 Lake, Grab	AS5667.1
14558/3	Creek		T.Walker	4/05/2023 9:06 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14558/1	Feed Pond	400167	6370993	No visible oils, very turbid
14558/2	Settled Pond	400167	6371005	No visible oils, fairly clear
14558/3	Creek	399964	6371336	No visible oils, clear

Sampling procedures have been approved and report finalised on 10/05/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 14658

Date Issued: 7/06/2023

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 1/06/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	1/06/2023	14658/1	Water	White
Settled Pond	1/06/2023	14658/2	Water	Black
Creek	1/06/2023	14658/3	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 7/06/2023.

Test Report Number: 14658

Date Issued: 7/06/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14658/1 1/06/2023 Feed Pond	14658/2 1/06/2023 Settled Pond	14658/3 1/06/2023 Creek
Date Tested	--	--	01/06/2023	01/06/2023	01/06/2023
Temperature	Temp	°C	16.8	17.3	14.3
pH	APHA 4500-H B	pH Units	5.7	6.5	5.9
Electrical Conductivity	APHA 2510 B	µS/cm	234	283	239
Dissolved Oxygen	APHA 4500-O G	mg/L	9.4	6.2	2.5
Oxidation Reduction Potential _#	APHA 2580 B	mV	257	245	180

Solids		Lab ID Sample Date Sample ID Units	14658/1 1/06/2023 Feed Pond	14658/2 1/06/2023 Settled Pond	14658/3 1/06/2023 Creek
Date Tested	--	--	5/06/2023	5/06/2023	5/06/2023
Total Dissolved Solids	AS3550.4	mg/L	820	230	200
Date Tested	--	--	2/06/2023	2/06/2023	2/06/2023
Total Suspended Solids	AS3550.4	mg/L	3,660	7	<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: 14658

Date Issued: 7/06/2023

Revision No: 00

Sampling Conditions: Cloudy, 17°- 18°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14658/1	Feed Pond		T.Walker	1/06/2023 10:54 AM	AS5667.4 Lake, Grab	AS5667.1
14658/2	Settled Pond		T.Walker	1/06/2023 11:12 AM	AS5667.4 Lake, Grab	AS5667.1
14658/3	Creek		T.Walker	1/06/2023 10:02 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14658/1	Feed Pond	400167	6370993	Very turbid
14658/2	Settled Pond	400167	6371005	
14658/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 7/06/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 14750

Date Issued: 6/07/2023

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 29/06/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	29/06/2023	14750/1	Water	White
Settled Pond	29/06/2023	14750/2	Water	Black
Creek	29/06/2023	14750/3	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 6/07/2023.

Test Report Number: 14750

Date Issued: 6/07/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14750/1 29/06/2023 Feed Pond	14750/2 29/06/2023 Settled Pond	14750/3 29/06/2023 Creek
Date Tested	--	--	29/06/2023	29/06/2023	29/06/2023
Temperature	Temp	°C	14.5	15.3	12.4
pH	APHA 4500-H B	pH Units	5.4	6.1	6.0
Electrical Conductivity	APHA 2510 B	µS/cm	244	285	229
Dissolved Oxygen	APHA 4500-O G	mg/L	9.2	5.0	2.1
Oxidation Reduction Potential _#	APHA 2580 B	mV	299	240	277

Solids		Lab ID Sample Date Sample ID Units	14750/1 29/06/2023 Feed Pond	14750/2 29/06/2023 Settled Pond	14750/3 29/06/2023 Creek
Date Tested	--	--	4/07/2023	4/07/2023	4/07/2023
Total Dissolved Solids	AS3550.4	mg/L	410	200	150
Date Tested	--	--	30/06/2023	30/06/2023	30/06/2023
Total Suspended Solids	AS3550.4	mg/L	4,780	12	<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: 14750

Date Issued: 6/07/2023

Revision No: 00

Sampling Conditions: 11 - 16°C, fine

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14750/1	Feed Pond		D.Walker	29/06/2023 11:18 AM	AS5667.4 Lake, Grab	AS5667.1
14750/2	Settled Pond		D.Walker	29/06/2023 11:11 AM	AS5667.4 Lake, Grab	AS5667.1
14750/3	Creek		D.Walker	29/06/2023 9:06 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14750/1	Feed Pond	400167	6370993	
14750/2	Settled Pond	400167	6371005	
14750/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 6/07/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 14912

Date Issued: 4/08/2023

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 27/07/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	27/07/2023	14912/1	Water	White
Settled Pond	27/07/2023	14912/2	Water	Black
Creek	27/07/2023	14912/3	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 4/08/2023.

Test Report Number: 14912

Date Issued: 4/08/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	14912/1 27/07/2023 Feed Pond	14912/2 27/07/2023 Settled Pond	14912/3 27/07/2023 Creek
Date Tested	--	--	27/07/2023	27/07/2023	27/07/2023
Temperature	Temp	°C	14.9	14.1	13.5
pH	APHA 4500-H B	pH Units	5.4	6.6	6.0
Electrical Conductivity	APHA 2510 B	µS/cm	239	267	249
Dissolved Oxygen	APHA 4500-O G	mg/L	9.9	8.7	2.9
Oxidation Reduction Potential _#	APHA 2580 B	mV	282	234	222

Solids		Lab ID Sample Date Sample ID Units	14912/1 27/07/2023 Feed Pond	14912/2 27/07/2023 Settled Pond	14912/3 27/07/2023 Creek
Date Tested	--	--	28/07/2023	28/07/2023	28/07/2023
Total Suspended Solids	AS3550.4	mg/L	10,500	10	<5
Date Tested	--	--	31/07/2023	31/07/2023	31/07/2023
Total Dissolved Solids	AS3550.4	mg/L	1,290	190	190

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: 14912

Date Issued: 4/08/2023

Revision No: 00

Sampling Conditions: Fine, 14°- 17°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14912/1	Feed Pond		T.Walker	27/07/2023 11:07 AM	AS5667.4 Lake, Grab	AS5667.1
14912/2	Settled Pond		T.Walker	27/07/2023 11:23 AM	AS5667.4 Lake, Grab	AS5667.1
14912/3	Creek		T.Walker	27/07/2023 10:24 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14912/1	Feed Pond	400167	6370993	Very turbid
14912/2	Settled Pond	400167	6371005	
14912/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 4/08/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 15108

Date Issued: 27/09/2023

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 21/09/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	21/09/2023	15108/1	Water	White
Settled Pond	21/09/2023	15108/2	Water	Black
Creek	21/09/2023	15108/3	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 27/09/2023.

Test Report Number: 15108

Date Issued: 27/09/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	15108/1 21/09/2023 Feed Pond	15108/2 21/09/2023 Settled Pond	15108/3 21/09/2023 Creek
Date Tested	--	--	21/09/2023	21/09/2023	21/09/2023
Temperature	Temp	°C	21.4	21.8	18.1
pH	APHA 4500-H B	pH Units	5.7	6.5	6.0
Electrical Conductivity	APHA 2510 B	µS/cm	273	281	221
Dissolved Oxygen	APHA 4500-O G	mg/L	7.1	4.9	2.4
Oxidation Reduction Potential _#	APHA 2580 B	mV	218	214	180

Solids		Lab ID Sample Date Sample ID Units	15108/1 21/09/2023 Feed Pond	15108/2 21/09/2023 Settled Pond	15108/3 21/09/2023 Creek
Date Tested	--	--	22/09/2023	22/09/2023	22/09/2023
Total Suspended Solids	AS3550.4	mg/L	3,320	17	<5
Date Tested	--	--	25/09/2023	25/09/2023	25/09/2023
Total Dissolved Solids	AS3550.4	mg/L	760	220	150

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: 15108

Date Issued: 27/09/2023

Revision No: 00

Sampling Conditions: Cloudy, 21°- 24°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15108/1	Feed Pond		T & D.Walker	21/09/2023 10:12 AM	AS5667.4 Lake, Grab	AS5667.1
15108/2	Settled Pond		T & D.Walker	21/09/2023 10:28 AM	AS5667.4 Lake, Grab	AS5667.1
15108/3	Creek		T & D.Walker	21/09/2023 9:29 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15108/1	Feed Pond	400167	6370993	Very turbid
15108/2	Settled Pond	400167	6371005	
15108/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 27/09/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 15249

Date Issued: 26/10/2023

Revision Number: 00

Site/Job: Redisand Surface Waters

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

The following 3 water sample(s) were received on 19/10/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	19/10/2023	15249/1	Water	White
Settled Pond	19/10/2023	15249/2	Water	Black
Creek	19/10/2023	15249/3	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 26/10/2023.

Test Report Number: 15249

Date Issued: 26/10/2023

Revision No: 00

Results

Field Analysis		Lab ID Sample Date Sample ID Units	15249/1 19/10/2023 Feed Pond	15249/2 19/10/2023 Settled Pond	15249/3 19/10/2023 Creek
	Method				
Date Tested - Field	--	--	19/10/2023	19/10/2023	19/10/2023
Temperature	Temp	°C	20.9	20.7	17.5
pH	APHA 4500-H B	pH Units	6.1	6.6	6.3
Electrical Conductivity	APHA 2510 B	µS/cm	251	295	237
Dissolved Oxygen	APHA 4500-O G	mg/L	7.6	7.6	2.6
Oxidation Reduction Potential _#	APHA 2580 B	mV	297	273	187

Solids		Lab ID Sample Date Sample ID Units	15249/1 19/10/2023 Feed Pond	15249/2 19/10/2023 Settled Pond	15249/3 19/10/2023 Creek
	Method				
Date Tested - TSS	AS3550.4	--	19/10/2023	19/10/2023	19/10/2023
Total Suspended Solids	AS3550.4	mg/L	1,540	12	<5
Date Tested - TDS	AS3550.4	--	20/10/2023	20/10/2023	20/10/2023
Total Dissolved Solids	AS3550.4	mg/L	540	220	150

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: 15249

Date Issued: 26/10/2023

Revision No: 00

Sampling Conditions: Cloudy, 18° - 20°C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15249/1	Feed Pond		T.Walker	19/10/2023 10:27 AM	AS5667.4 Lake, Grab	AS5667.1
15249/2	Settled Pond		T.Walker	19/10/2023 10:43 AM	AS5667.4 Lake, Grab	AS5667.1
15249/3	Creek		T.Walker	19/10/2023 9:36 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15249/1	Feed Pond	400167	6370993	Turbid, no visible oils
15249/2	Settled Pond	400167	6371005	Fairly clear, no visible oils
15249/3	Creek	399964	6371336	Clear, no flow, no visible oils

Sampling procedures have been approved and report finalised on 26/10/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 15328

Date Issued: 21/11/2023

Revision Number: 00

Site/Job: Redisand Surface Waters

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

The following 3 water sample(s) were received on 16/11/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	16/11/2023	15328/1	Water	White
Settled Pond	16/11/2023	15328/2	Water	Black
Creek	16/11/2023	15328/3	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 21/11/2023.

Test Report Number: 15328

Date Issued: 21/11/2023

Revision No: 00

Results

Field Analysis	Method	Lab ID Sample Date Sample ID Units	15328/1 16/11/2023 Feed Pond	15328/2 16/11/2023 Settled Pond	15328/3 16/11/2023 Creek
Temperature	Temp	°C	23.5	21.9	20.3
pH	APHA 4500-H B	pH Units	5.9	6.3	6.1
Electrical Conductivity	APHA 2510 B	µS/cm	256	293	235
Dissolved Oxygen	APHA 4500-O G	mg/L	6.8	6.7	1.8
Oxidation Reduction Potential _#	APHA 2580 B	mV	297	311	223

Solids	Method	Lab ID Sample Date Sample ID Units	15328/1 16/11/2023 Feed Pond	15328/2 16/11/2023 Settled Pond	15328/3 16/11/2023 Creek
Total Suspended Solids	AS3550.4	mg/L	1,250	6	14
Date Tested - TDS	AS3550.4	--	20/11/2023	20/11/2023	20/11/2023
Total Dissolved Solids	AS3550.4	mg/L	440	230	190

Date Tested	Method	Lab ID Sample Date Sample ID Units	15328/1 16/11/2023 Feed Pond	15328/2 16/11/2023 Settled Pond	15328/3 16/11/2023 Creek
Date Tested - Field	--	--	16/11/2023	16/11/2023	16/11/2023
Date Tested - TDS	AS3550.4	--	20/11/2023	20/11/2023	20/11/2023
Date Tested - TSS	AS3550.4	--	16/11/2023	16/11/2023	16/11/2023

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: 15328

Date Issued: 21/11/2023

Revision No: 00

Sampling Conditions: Cloudy, 22 - 23 °C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15328/1	Feed Pond		D.Walker	16/11/2023 10:01 AM	AS5667.4 Lake, Grab	AS5667.1
15328/2	Settled Pond		D.Walker	16/11/2023 10:16 AM	AS5667.4 Lake, Grab	AS5667.1
15328/3	Creek		D.Walker	16/11/2023 10:47 AM	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15328/1	Feed Pond	400167	6370993	
15328/2	Settled Pond	400167	6371005	
15328/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 21/11/2023.

Where method is "unknown" sampling procedures are not endorsed

Report Number: 15365

Date Issued: 8/12/2023

Revision Number: 00

Site/Job: Redisand Surface Waters

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

The following 3 water sample(s) were received on 1/12/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
Feed Pond	1/12/2023	15365/1	Water	White
Settled Pond	1/12/2023	15365/2	Water	Black
Creek	1/12/2023	15365/3	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 8/12/2023.

Test Report Number: 15365

Date Issued: 8/12/2023

Revision No: 00

Results

Field Analysis	Method	Lab ID Sample Date Sample ID Units	15365/1 1/12/2023 Feed Pond	15365/2 1/12/2023 Settled Pond	15365/3 1/12/2023 Creek
Temperature	Temp	°C	25.4	25.5	21.2
pH	APHA 4500-H B	pH Units	5.8	6.5	6.4
Electrical Conductivity	APHA 2510 B	µS/cm	275	292	251
Dissolved Oxygen	APHA 4500-O G	mg/L	5.8	8.3	2.8
Oxidation Reduction Potential _#	APHA 2580 B	mV	106	121	189

Solids	Method	Lab ID Sample Date Sample ID Units	15365/1 1/12/2023 Feed Pond	15365/2 1/12/2023 Settled Pond	15365/3 1/12/2023 Creek
Total Suspended Solids	AS3550.4	mg/L	1,790	9	10
Total Dissolved Solids	AS3550.4	mg/L	600	180	150

Date Tested	Method	Lab ID Sample Date Sample ID Units	15365/1 1/12/2023 Feed Pond	15365/2 1/12/2023 Settled Pond	15365/3 1/12/2023 Creek
Date Tested - Field	--	--	01/12/2023	01/12/2023	01/12/2023
Date Tested - TDS	AS3550.4	--	7/12/2023	7/12/2023	7/12/2023
Date Tested - TSS	AS3550.4	--	04/12/2023	04/12/2023	04/12/2023

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: 15365

Date Issued: 8/12/2023

Revision No: 00

Sampling Conditions:

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15365/1	Feed Pond		T & D.Walker	1/12/2023	AS5667.4 Lake, Grab	AS5667.1
15365/2	Settled Pond		T & D.Walker	1/12/2023	AS5667.4 Lake, Grab	AS5667.1
15365/3	Creek		T & D.Walker	1/12/2023	AS5667.6 River, Grab	AS5667.1

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15365/1	Feed Pond	400167	6370993	
15365/2	Settled Pond	400167	6371005	
15365/3	Creek	399964	6371336	

Sampling procedures have been approved and report finalised on 8/12/2023.

Where method is "unknown" sampling procedures are not endorsed

Appendix H

Active Rehabilitation and Nestboxes (2023)



Photo 1: Flowering eucalyptus.



Photo 2: Budding eucalyptus.



Photo 1: Healthy rehabilitation with hollow bearing trees.

Note: Multiple hollow bearing trees are unsable and unsafe to monitor for site personel.



Photo 4: Rehabilitation showing large hollow bearing trees.

Note: Multiple hollow bearing trees are unsable and unsafe to monitor for site personel.



Photo 5: Active rehabilitation.