Walker Quarries

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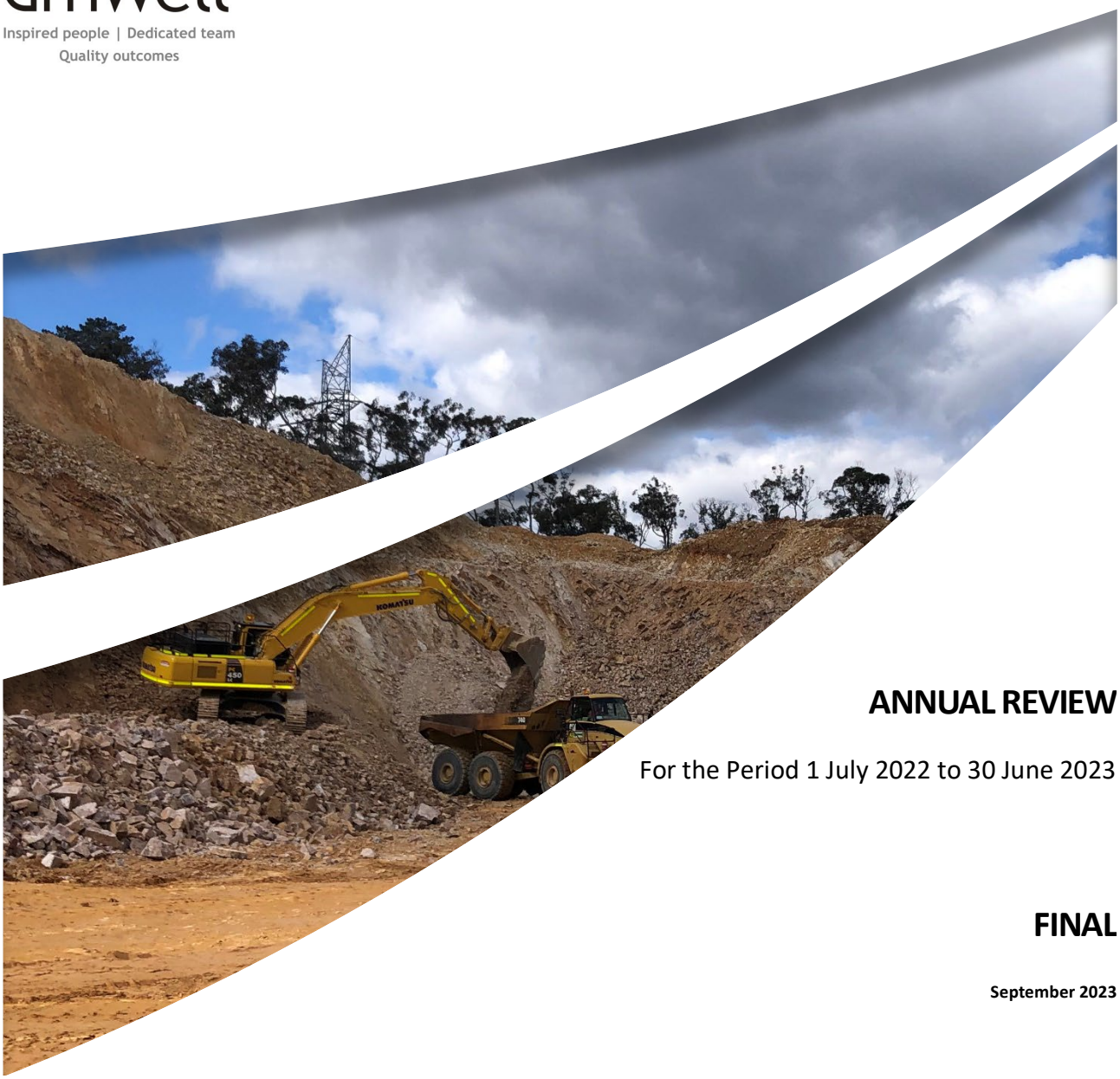

ANNUAL REVIEW

For the Period 1 July 2022 to 30 June 2023

FINAL

September 2023

umwelt
Environmental & Social
Consultants

ANNUAL REVIEW

For the Period 1 July 2022 to 30 June 2023

FINAL

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

Project Director: Adam Williams
Project Manager: Caroline Gazi
Report No. 4433_R29
Date: September 2023

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Final V1	Kelsy Sammons/Adam Williams	28 September2023	Adam Williams	28 September 2023

Wallerawang Quarry	
Name of operator	Walker Quarries Pty Ltd
Development consent/project approval #	DA 344-11-2001 MOD 3
Name of holder of development consent/project approval	Walker Quarries Pty Ltd
Mining Lease #	ML 1633
Name of holder of mining lease	Walker Quarries Pty Ltd
Environment Protection Licence	13172
Name of holder of Environment Protection Licence	Walker Quarries Pty Ltd
Water licence #	WAL42390; WAL41884
Name of holder of water licence	Walker Quarries Pty Ltd
RMP start date	November 2022
RMP end date	Not applicable
Annual Review start date	1 July 2022
Annual Review end date	30 June 2023

I, Wayne Chapman, certify that this audit report is a true and accurate record of the compliance status of the Wallerawang Quarry for the period 1 July 2022 to 30 June 2023 and that I am authorised to make this statement on behalf of Walker Quarries Pty Ltd.

Note

a. *The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.*

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); Section 307A, 307B and 307C (false or misleading application/information/documents – maximum penalty 2 years imprisonment or $22,000, or both).*

Name of authorised reporting officer	Wayne Chapman
Title of authorised reporting officer	Mine Manager
Signature of authorised reporting officer	W Chapman
Date	28 September 2023

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1.0 Statement of Compliance

The Statement of Compliance comprises **Table 1.1** and **Table 1.2**, with reference to the Compliance Status Key in **Table 1.3**.

Table 1.1 Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes/No
DA 344-11-2001	No
ML 1633	Yes
EPL 13172	No

Table 1.2 Non-Compliances

Condition	Condition Description (summary)	Compliance Status	Comment	Where addressed in Annual Review
DA 344-11-2001, Schedule 2, Condition 2(a)	The development may only be carried out: *(a) in compliance with the conditions of this consent.*	Administrative Non-compliance (ANC)	Relating to the fact that non-conformances against some condition requirements were noted.	**Sections 1.0 and 11.0**
DA 344-11-2001, Schedule 3, Condition 14	The Applicant must implement the approved Air Quality Management Plan as approved from time to time by the Secretary.	ANC	Did not to adhere to the air quality monitoring frequency as nominated in the approved AQMP.	**Section 6.5**
DA 344-11-2001, Schedule 3, Condition 18	The Applicant must implement the approved Soil and Water Management Plan as approved from time to time by the Secretary.	ANC	Did not to adhere to the nominated surface water and groundwater monitoring schedule as nominated in the approved SWMP.	**Sections 7.2 and 7.3**
DA 344-11-2001, Schedule 3, Condition 31(c)	The Applicant must prepare a Rehabilitation Management Plan (RMP) for the Project to the satisfaction of RR.	ANC	It could not be verified that the RMP (previously incorporated into the MOP) was provided to DPE within three months of the determination of MOD3. The recently prepared RMP is in the process of being updated and will be provided to DPE in the first half of the next reporting period.	**Section 8.2**

Condition	Condition Description (summary)	Compliance Status	Comment	Where addressed in Annual Review
DA 344-11-2001, Schedule 3, Condition 32	The Applicant must implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the development to the satisfaction of the Secretary.	Non-Compliant Low Risk	The mobile processing equipment, KIS Stockpile, and upgraded Wash Plant are visible from the east-bound lanes of the Great Western Highway. Screening vegetation outside the project boundary has been cleared by NSW Roads and Maritime Services (RMS). The extraction area bund will be raised in the next reporting period to improve visual screening.	**Sections 4.4.1 and 6.9**
DA 344-11-2001, Schedule 5, Condition 3(b(i))	Management plans required under this consent must be prepared in accordance with relevant guidelines and include details of the relevant statutory requirements (including any relevant approval, licence or conditions).	ANC	References to legislation in the Blast Management and Explosives Control Plan (BMECP) and Bushfire Management Plan (BFMP) required updates to legislation, which has since been rectified.	**Sections 6.4, 6.12 and 11.2**
DA 344-11-2001, Schedule 5, Condition 10	Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance.	ANC	Walker Quarries did not previously notify the Department of the non-compliances mentioned in this Annual Review.	**Sections 1.0 and 11.3**
DA 344-11-2001, Schedule 5, Condition 17(a(vii))	Within 6 months of the date of this consent until the completion of all rehabilitation required under the consent, the Applicant must make the following information and documents publicly available on its website: a comprehensive summary of the monitoring results of this development, reported in accordance with the specifications in any conditions of this consent or any approved plans and programs.	ANC	Walker Quarries did not present groundwater and particulate matter (PM) monitoring results on its website, which has since been rectified.	**Sections 6.5 and 7.3**

Condition	Condition Description (summary)	Compliance Status	Comment	Where addressed in Annual Review
EPL 13172, Condition M2	PM_{10} and $PM_{2.5}$ must be continuously monitored, in accordance with the AQMP.	ANC	PM_{10} and $PM_{2.5}$ were not continuously monitored as the real-time particulate monitor was off-site for repair. Continuous monitoring was recommenced as soon as possible, within the reporting period.	**Section 6.5**

Table 1.3 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-compliant	Non-compliant	• Administrative, i.e. missing a deadline for reporting, failure to keep records, but which has no direct environmental harm. • Minimal to no potential for environmental harm.

The analysis of compliance was based on site inspections, and data and documentation review completed by Umwelt and Walker Quarries Pty Ltd (Walker Quarries).

2.0 Introduction

2.1 Scope and Format

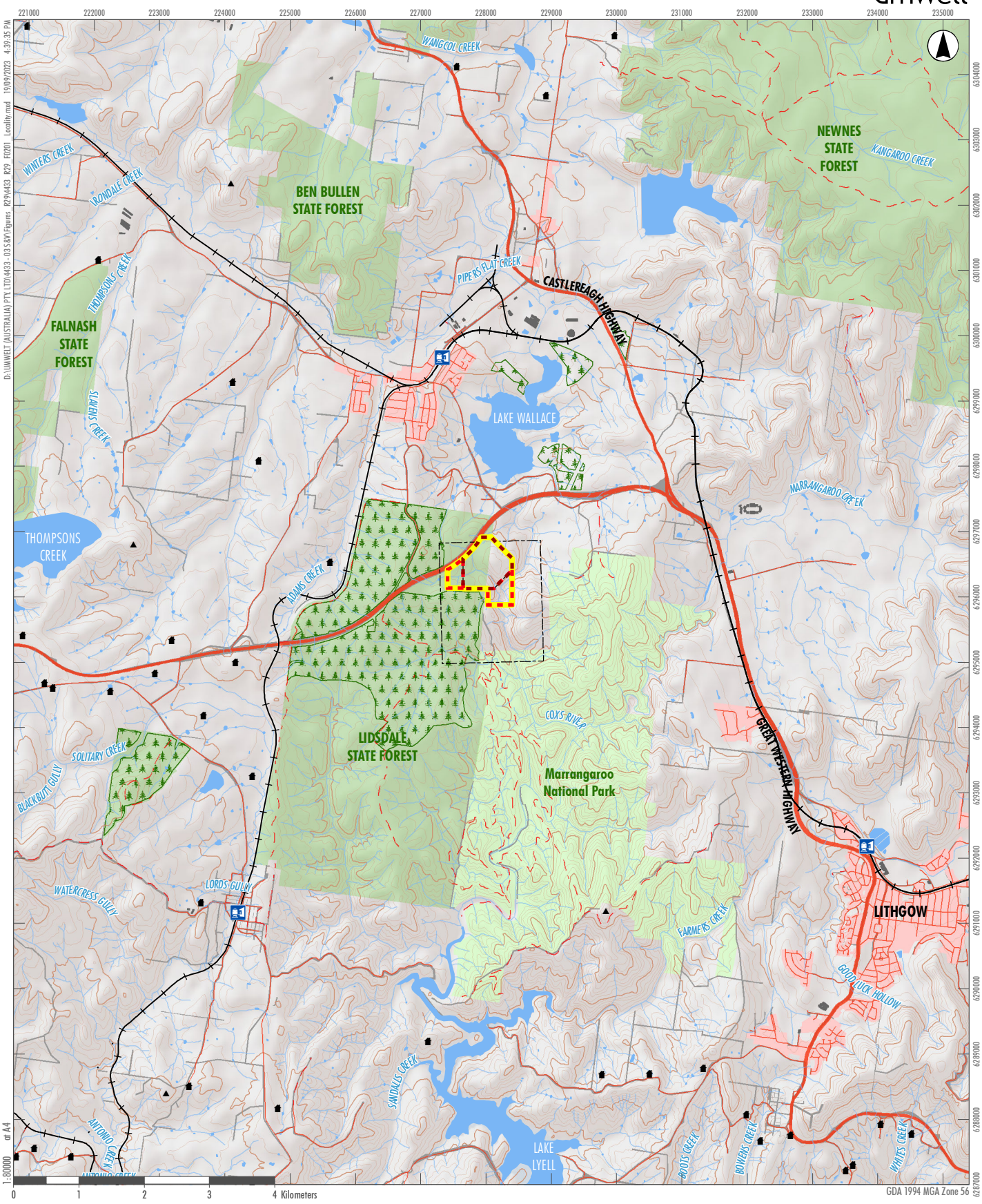
Wallerawang Quarry (the Quarry) is operated by Walker Quarries Pty Ltd (Walker Quarries) under development consent DA 344-11-2001. The Quarry is located approximately 8 kilometres (km) north-west of Lithgow NSW (**Figure 2.1**).

DA 344-11-2001 was granted by the Minister for Infrastructure and Planning on 19 October 2004, and has been modified three times.

- MOD 1 was granted on 25 August 2017 to regularise several constructed components of the Quarry and formalise the supply of a more extensive range of quarry products.
- MOD 2 was granted on 7 December 2018 to extend the operation of the Quarry to 15 July 2020.
- MOD 3 was granted on 26 February 2020 to extend the extraction area and increase the area available for stockpiling to the south-west and south of the Western Stockpile Area. MOD 3 also:
    - extended the operation of the Quarry to 15 July 2040
    - increased the maximum depth of extraction.

This Annual Review has been prepared for the Quarry in accordance with the requirements of Schedule 5, Condition 11 of DA 344-11-2001, it adheres to the format and content requirements identified in the Department of Planning and Environment's (DPE) *Annual Review Guideline*, *Post-approval requirements for State significant mining developments* (DPE, 2015). This Annual Review documents the works undertaken and environmental performance from 1 July 2022 to 30 June 2023 (the reporting period).

The information presented within this Annual Review has been prepared based on information compiled by Umwelt and provided by Walker Quarries, and inspections of the Quarry undertaken by Umwelt in March and July 2023.



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- ML1633
- MLA570
- EL 4473
- State Forest
- NPWS Estate

FIGURE 2.1

Locality Plan

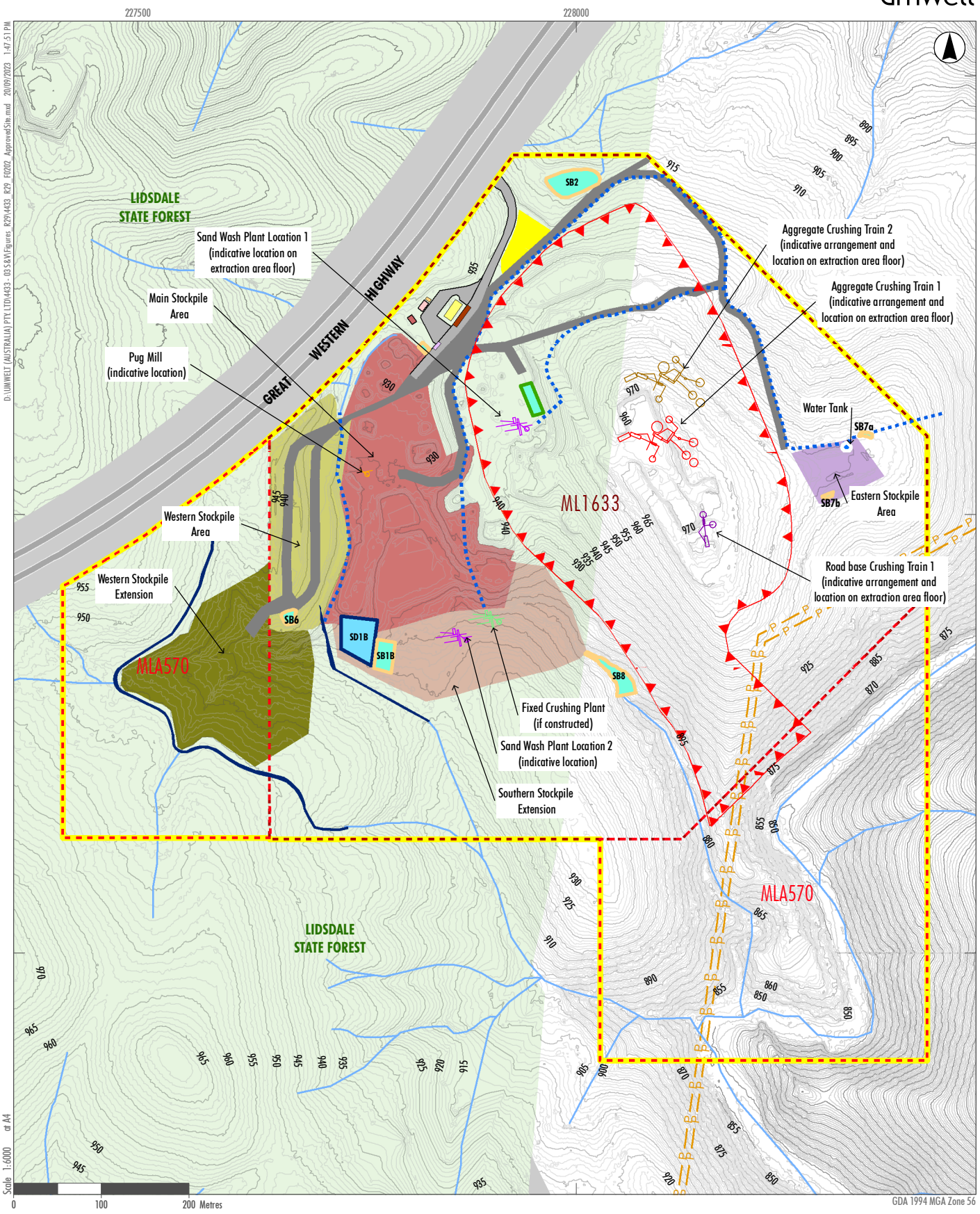
2.2 Overview of Operations

2.2.1 Approved Activities

The approved activities include:

- Extraction of quartzite and other rock aggregate by conventional drill and blast, load and haul methods from an area of 13.3 hectares (ha) and to a depth of 901 metres (m) Australian Height Datum (AHD) (extending to within 1 m of the groundwater level once established to the satisfaction of the Secretary of the DPE).
- Construction and use of stockpile areas for storage of extracted and processed material.
- Use of mobile processing plant and wash plant to process extracted material by crushing, screening and washing, to produce a range of aggregates, pebbles and sand.
- Crushing to produce coarse aggregates is currently undertaken using mobile crushing trains operated within the extraction area, with approval for the establishment of fixed plant on the stockpile areas also retained.
- Washing and screening to produce finer aggregates and sand is undertaken on the Processing Pad to the immediate west of the Extraction Area. Approval is provided for the relocation of this plant, or equivalent wash plant to the Quarry stockpile areas.
- Construction and operation of various water storages, sediment basins, silt cells and drainage lines.
- Construction and use of an access road, haul roads and an intersection with the Great Western Highway.
- Transportation of up to 500,000 t per year of quarry products via the Great Western Highway.

The approved site layout is presented in **Figure 2.2**.



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- Quarry Site (ML1633)
- Quarry Site Extension (MLA570)
- Clean Water Drainage
- State Forest

Indicative Plant Infrastructure Locations

- Aggregate Crushing Train 1
- Aggregate Crushing Train 2
- Fixed Crushing Plant (if constructed)
- Pug Mill
- Road base Crushing Train 1
- Sand Wash Plant

Approved & Proposed Quarry Layout

- Main Stockpile Area (935m AHD)
- Southern Stockpile Area (935m AHD)
- Western Stockpile Area
- Western Stockpile Extension (940m AHD)
- Eastern Stockpile Area
- Approved Extraction Area

Water Management Infrastructure (Proposed)

- Clean Water Diversion
- Sediment Basins
- Settlement Ponds
- Water Tank
- Water Pipeline (Indicative)
- Clean Water Drainage

FIGURE 2.2

Approved Site Layout

Data source: Walker Quarries (2019) ; NSW LPI DTDB (2019)

2.2.2 Hours of Operation

The approved hours of operation are outlined in **Table 2.1**.

Table 2.1 Hours of Operation

Activity	Hours
Quarrying operations	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday At no time on Sundays or public holidays
Loading and dispatch of trucks	Any time, provided activities comply with specified noise criteria
Blasting	9.00 am to 5.00 pm Monday to Friday 9.00 am to 1.00 pm Saturday At no time on Sundays or public holidays
Maintenance	Any time, provided activities are inaudible at privately-owned residences

All activities during the reporting period were undertaken within the approved hours of operation.

2.2.3 Employment

The Quarry currently employs three management staff and 13 equipment operators. No change to employment is expected in the next reporting period.

2.3 Key Personnel Contact Details

The key personnel contact names, position and phone numbers are listed in **Table 2.2**.

Table 2.2 Key Personnel Contact Details

Name	Position	24 Hour Contact
Wayne Chapman	Mine Manager	0418 958 779
Paul Hensley	Compliance Advisor	0418 680 022
Kerry Burke	Managing Director	0418 242 619

2.4 Environmental Management of the Operation

Mr Wayne Chapman (Quarry Manager) and Mr Paul Hensley (Compliance Advisor), both employees of Walker Quarries, are responsible for the environmental management of the operation.

Walker Quarries has engaged Umwelt to assist by providing operational environmental support.

Adam Williams of Umwelt completed the site inspections in March and July 2023 noted in **Section 2.1**, with assistance from the Quarry Manager.

3.0 Approvals

Table 3.1 presents the approvals and licences held in relation to the Quarry.

Table 3.1 Approvals, Leases and Licences

Consent/Lease/Licence	Issue Date	Expiry Date	Details/Comments
Development Approval DA 344-11-2001	19/10/2004 Modified 25/8/2017 (MOD 1) Modified 7/12/2018 (MOD 2) Modified 26/02/2020 (MOD 3)	15/7/2040	Issued by the Minister for Planning
Development Approval DA 019/18	28/2/2018	28/2/2023[1]	Issued by Lithgow City Council for demountable office buildings
Environment Protection Licence (EPL) 13172	21/10/2012 Last varied 17/7/2018	-	Issued by the Environment Protection Authority
Mining Lease (ML) 1633	15/7/2009	15/7/2040	Issued by the Minister for Mineral Resources
Mining Lease Application (MLA) 558	6/6/2018	-	Application in progress
MLA 570	19/6/2019	-	Application in progress
Exploration Licence (EL) 4473	23/7/2021	23/7/2026	Issued by the Minister for Mineral Resources
EL 9255	23/7/2021	23/7/2026	Issued by the Minister for Mineral Resources
Water Access Licence (WAL) 42390	5/6/2019	-	0 units Water Source: Upper Nepean and Upstream Warragamba Water Source Water Sharing Plan: Greater Metropolitan Region Unregulated River Water Sources 2011
Water Access Licence 41884	16/5/2018	-	100 units Water Source: Coxs River Fractured Rock Groundwater Source Water Sharing Plan: Greater Metropolitan Region Groundwater Sources 2011
Approval 10CA123169	-	29/5/2029	Water Supply: ▪ Void: Lot 6 DP 872230 ▪ Groundwater Bore: Lot 7 DP872230 Water Use: Mining
Approval 10CA123996	-	27/7/2030	Water Supply: 150mm Centrifugal Pump on the Coxs River Water Use: Mining

[1] DA 019/18 is no longer required as construction was completed, and the Final Occupation Certificate was issued on 28 February 2018.

In addition to the approvals and licences listed in **Table 3.1**, Walker Quarries retains a Compensation Agreement with the Forestry Corporation of NSW (FCNSW) which allows Walker Quarries to operate within an area of Lidsdale State Forest on Lot 7322 in Deposited Plan (DP) 1149335 and Lot 7071 in DP 1201227.

Table 3.2 presents the documentation used by Quarry management to guide day-to-day operations at the Quarry. In accordance with Schedule 5, Condition 5 of DA 344-11-2001, all plans that required review were revised in November 2022 following the submission of the 2022 Annual Review. An updated version of the Rehabilitation Management Plan (RMP) will be submitted to DPE in the next reporting period (refer to **Section 8.2**).

Table 3.2 Quarry Documentation

Document Title (date)	Date Approved
Supporting Documentation for DA 344-11-2001	
Environmental Impact Statement Proposed Wallerawang Quarry (13/11/2001)	19/10/2004
Supplementary Report to the Environmental Impact Statement Proposed Wallerawang Quarry (July 2002)	
Environmental Assessment for Modification to Operations at the Wallerawang Quarry (DA 344-11-2001) (MOD 1) (4/5/2017)	25/8/2017
Statement of Environmental Effects for Proposed Modification No 2 (MOD 2) to DA 344-11-2001 (Wallerawang Quarry) (October 2018)	7/12/2018
Wallerawang Quarry Modification 3 Statement of Environmental Effects (MOD 3) to DA 344-11-2001 (28/6/2018)	26/2/2020
Environmental Management Plans	
Environmental Management Strategy (V3.0 November 2021)	23/5/2022
Rehabilitation Management Plan (V1.0 November 2022)	-[1]
Noise Management Plan (V4.0 November 2021)	23/5/2022
Blast Management and Explosives Control Plan (V3.1 May 2022)	23/5/2022
Air Quality Management Plan (V4.0 November 2021)	23/5/2022
Biodiversity Management Plan (V3.0 November 2021)	1/6/2022
Soil and Water Management Plan (V4.1 October 2022)	23/11/2022
Environmental Monitoring Program (V3.1 November 2021)	-
Bushfire Management Plan (V3.1 June 2022)	10/6/2022
Aboriginal Cultural Heritage Management Plan (V4.1 May 2022)	14/6/2022
Pollution Incident Response Management Plan (June 2022)	-

Note 1: The RMP is being revised at the time of reporting and will be submitted to DPE for approval.

4.0 Operations Summary

4.1 Introduction

Operations were undertaken in accordance with DA 344-11-2001 over the reporting period with no new vegetation clearing or soil stripping. Actual disturbance remains generally consistent with the previous year, noting that a review of spatial data was undertaken in 2023 to improve accuracy and this resulted in a slight reduction of disturbance (17.03 ha, reduced from 17.2 ha).

The following sections provide further detail on the activities undertaken over the reporting period, with photographic records where relevant.

4.2 Mining Operations

4.2.1 Mining

During the reporting period, extraction was undertaken including:

1. Blasting and extraction of quartzite within the existing pit footprint, to a depth of approximately 940 m AHD to the western edge of the pit (refer to **Photo 4.1**).
2. Extraction of lower value (lower silica concentration) material by dozer ripping for sale as select fill, from the northern section of the pit (to the south of the silt cells) (refer to **Photo 4.2**).
3. Temporary stockpiling and some extraction (by ripping) of predominantly non-quartzite materials within the southern portion of the cleared extraction area.

No vegetation clearing or soil stripping was undertaken during the reporting period.

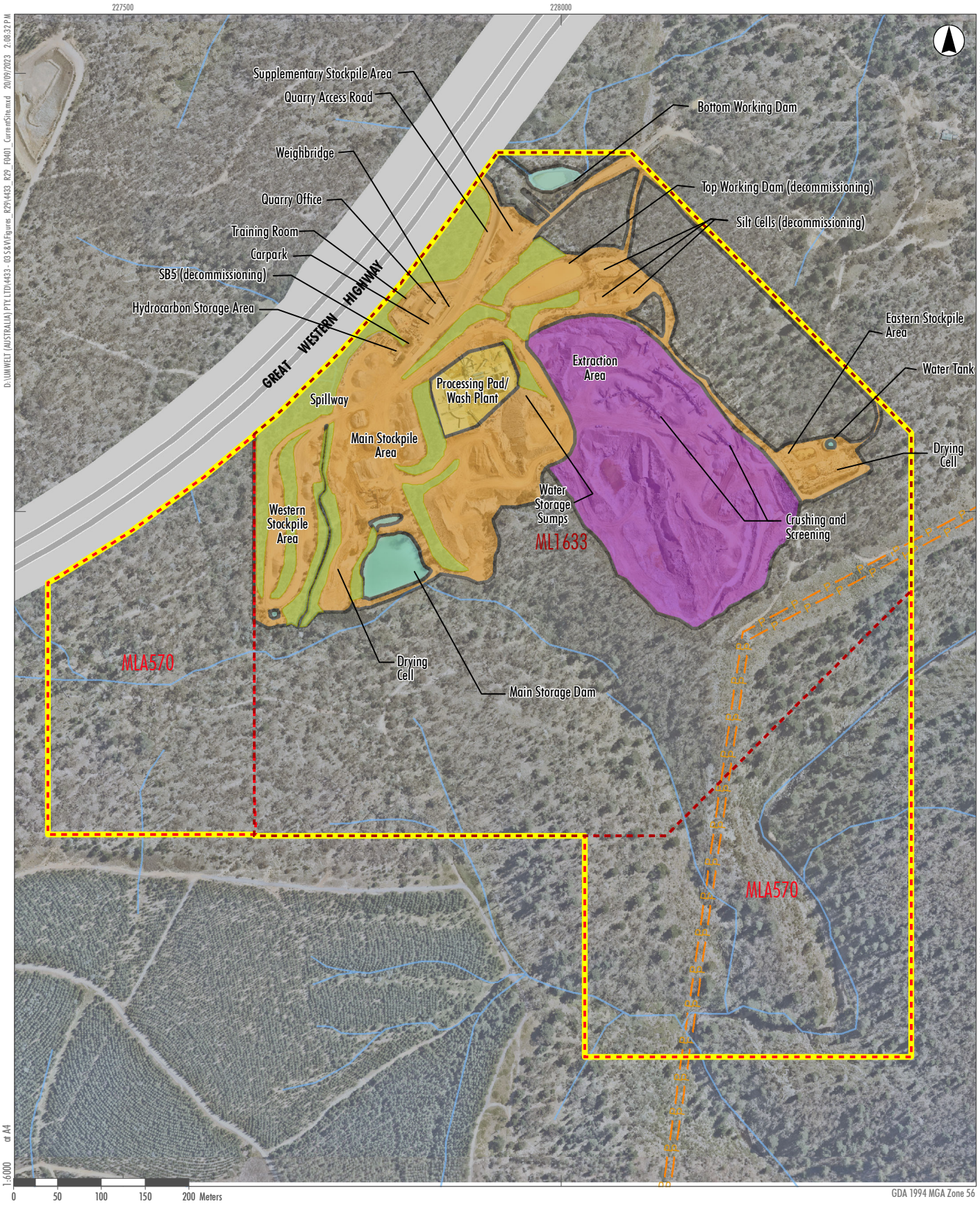
The current site layout as at 30 June 2023 is provided in **Figure 4.1.**

The applications for MLA 558 and MLA 570 have progressed during the reporting period with survey instructions issued by the NSW Resources Regulator (Titles).

Photo 4.1 Quarry Pit – Western Limit

Photo 4.2 Quarry Pit – Facing North

The north easterly development of the extraction area proposed in the 2022 Forward Program was delayed due to a slower rate of extraction than forecast, resulting from changes to encountered in-pit geology.



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- Quarry Site (ML1633)
- Quarry Site ML Extension (MLA570)
- Beneficiation Facility
- Infrastructure Area
- Extraction Area
- Water Management Area
- Rehabilitation
- P Electricity Transmission Lines

FIGURE 4.1

Current Site Layout
30 June 2023

Image Source: Nearmap (2023) Data source: Walker Quarries (2019); NSW LPI DTDB (2019)

4.2.2 Blasting

A total of four blasts were undertaken during the reporting period. **Table 4.1** presents the date and volume of each blast. All blasts were production blasts and occurred within the approved extraction area.

Table 4.1 Blasting Operations during the Reporting Period

Blast Date	Blast Size (t)
9 September 2022	51,384
16 November 2022	33,212
8 February 2022	76,610
15 June 2023	57,090
Total	**218,296**

Source: Walker Quarries Pty Ltd

Walker Quarries and the blast contractor implement a continuous improvement protocol for blasting through implementation of the following procedures as nominated in the approved Blast Management and Explosives Control Plan (BMECP):

- Blast energies are minimised as far as possible.
- Electronic detonators are not used at the Quarry at any time.
- Quality control practices are implemented on the ground to ensure blasts are kept within design tolerances.
- Adequate burden is maintained on all faces to prevent blowouts and blast anomalies.
- Blasts are designed to ensure fly-rock, dust and fumes, along with any potential impacts to people, property, livestock and infrastructure, are limited as much as reasonably practicable.
- Each blast is monitored to confirm compliance with air blast overpressure and ground vibration criteria.
- Following each blast, the area surrounding the blast location is inspected and fly-rock distribution to the front, rear and both sides of the blast site observed.
- Blast contractors, in conjunction with the Quarry Manager, review blast monitoring records to enable continuous improvement and quality control, resulting in continual development of optimum blast parameters.

The results of blast monitoring are provided in **Section 6.4.2** (**Table 6.8**).

4.2.3 Production

Approximately 350,000 t of quartzite and select fill was produced and sold during the reporting period. **Table 4.2** presents the material movements during the reporting period and the anticipated movements during the next reporting period.

Table 4.2 Production Summary

Material	Approved limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Soil (m^3)	N/A	0	0	0
Overburden (m^3)	N/A	0	0	0
Ore (t)	N/A	245,000	350,457	350,000
Course reject (tailings)	N/A	0	0	0
Product (sold and transported off site) (t)	500,000	245,745	350,457	350,000

Source: Walker Quarries Pty Ltd

Annual production data for the reporting period was submitted to the Department of Regional NSW – Resources Regulator (RR), Mining, Exploration and Geoscience (MEG), using the *S1 Return for Extractive Materials*, in accordance with Schedule 2, Condition 12 of DA 344-11-2001.

4.3 Other Operations

4.3.1 Construction Operations

A planned upgrade to the truck wheel wash (refer to **Photo 4.3**) to further limit dust tracking commenced in June 2022 and was completed in September 2022. The wheel wash was subject to ongoing refinements and adjustments throughout the reporting period to improve performance.

Construction associated with the upgraded Wash Plant (refer to **Photo 4.4**) was completed in February 2023. The upgraded Wash Plant, identified in the Statement of Environmental Effects (SEE) that supported Modification 3 was constructed as a fixed plant incorporating high efficiency dewatering components to significantly reduce the requirement to draw water, discharge and settle turbid water. The upgrade allows for the processing of the stockpiles of crusher dust/KIS Sand (currently located on the northern end of the processing pad) and production of a high demand manufactured sand product called McCluskey Sand (refer to **Section 4.3.2**).

Water Storage Capacity was increased at the Bottom Working Dam (SB2) in the second half of 2022 to reduce the risk of dirty water discharge and to accommodate the planned decommission of the Top Working Dam (SD2), which commenced in the final quarter of the reporting period. This is further discussed in **Section 7.2.3.**

Photo 4.3 Upgraded Wheel Wash

Photo 4.4 Upgraded Wash Plant

The Hydrocarbon Storage Area upgrade was completed in late 2022 to reduce the potential for hydrocarbon contamination and/or pollution. A new concrete pad and bunded Hydrocarbon Storage Unit have been installed.

4.3.2 Processing Operations

The processing operations involve series of crushers and screens to crush, separate and wash quartzite into aggregates and sands of varying sizes. During the reporting period, crushing and screening was undertaken in the extraction area (refer to **Photo 4.5**), consistent with the previous reporting period.

The mobile processing equipment is visible from the Great Western Highway. Following an inspection by DPE in December 2022, Walker Quarries have developed a strategic mining plan (in consultation with DPE) to relocate the crushing train to within the pit.

At the beginning of the reporting period, the old wash plant continued to be operated in the Main Stockpile Area to accommodate the upgrades to the Wash Plant.

Upon commissioning the upgraded Wash Plant, the old wash plant equipment became redundant. It has been removed from site and is for sale through an external service.

Photo 4.5 Mobile Processing Equipment Operating in the Extraction Area

The completion of the upgraded Wash Plant has allowed the Quarry to commence production of a new saleable product called “McCluskey Sand.” The production of McCluskey Sand has been progressively depleting the KIS Stockpile, which has reduced the height of the stockpile and subsequently the visual impact of the Quarry (refer **Section 6.9**).

4.3.3 Stockpiling Operations

Stockpiling continued to be generally consistent with the previous reporting year and in accordance with DA 344-11-2001, being undertaken in the Western Stockpiling Area and Main Stockpiling Area.

As noted in **Section 4.3.2**, the KIS stockpile has been progressively depleted since the upgraded Wash Plant commenced operations.

4.3.4 Product Transportation

Product transported off-site during the reporting period was approximately 350,457 t of material, below the approved annual transportation volume of 500,000 t.

Walker Quarries reports the number of truck movements from the Quarry on their website on a 6 monthly basis, in accordance with Schedule 3, Condition 19 of DA 344-11-2001. There were 12,848 truck movements for the reporting period including:

- 1 July – 31 December 2022: 7,076 movements
- 1 January – 30 June 2023: 5,772 movements.

4.3.5 Exploration Activities

An Annual Exploration Progress Report for Exploration Licence 4473 was prepared by Rangott Mineral Exploration Pty Ltd and submitted to DPE, in accordance with the requirements of ML 1633 (**Appendix 1**). The report covered activities for the period 15 July 2022 to 15 July 2023.

Exploration activities undertaken during this period were focused on access and permit negotiations with the FCNSW, geological data review and analysis, and review of the extractable resource.

4.4 Next Reporting Period

A summary of these activities, operations and changes planned for the 2023-2024 reporting period are outlined below. **Figure 4.2** provides the proposed site layout for the next reporting period.

4.4.1 Construction

While the mobile processing equipment is temporarily located in the upper portion of the extraction area, the existing bund located on the western side of the extraction area will be increased in height by approximately 1 m to screen the mobile processing equipment from the Great Western Highway. The mobile processing equipment will be relocated to its long-term position within the pit during the next reporting period.

An extension to the Quarry Office and amenities buildings is on hold and is subject to the approval of a separate development application to Lithgow City Council.

4.4.2 Mining

Extraction of high-value quartzite will continue within the existing pit footprint.

Blasting will continue to fracture the quartzite and other rock for extraction during the next reporting period. Between five and ten blasts will be undertaken, with Walker Quarries anticipating production to remain stable at approximately 350,000 t (**Table 4.1**).

Following the decommissioning of the silt cells north of the pit, the area will be benched to allow for extraction of low-value quartzite material to commence.

In accordance with the approved Biodiversity Management Plan, a pre-clearance vegetation survey will be completed to confirm the absence of native fauna, key fauna habitat such as nests or roosting sites or threatened flora prior to disturbance. Topsoil and future resources for rehabilitation will be recovered in accordance with the RMP.

4.4.3 Processing

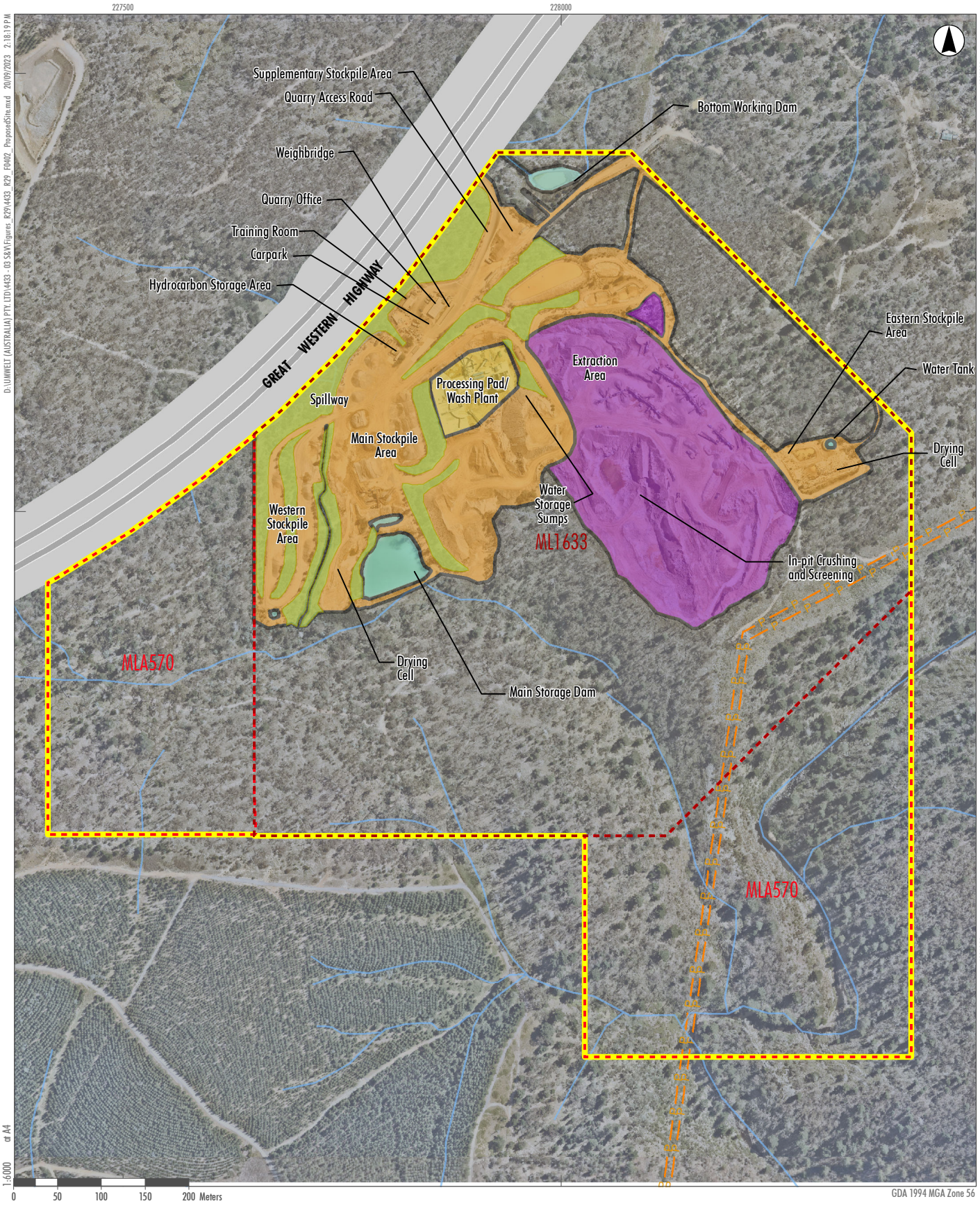
No changes to crushing and screening operations are planned during the 2023-2024 reporting period. The mobile processing equipment will initially be relocated at a lower elevation of the upper extraction area, behind the planned bund (which will increase in height). When operational circumstances permit, the mobile processing equipment will be relocated to the long-term position within the pit.

Sand washing is expected to continue at the upgraded Wash Plant.

4.4.4 Stockpiling Operations

Stockpiling will be generally consistent with previous reporting periods, with the majority of product stockpiles being located in the Main Stockpile area and Western Stockpile Area.

The previously reported overtopping KIS Sand stockpile will continue to be processed into “McCluskey Sand,” reducing the stockpile size throughout the next reporting period.



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- Quarry Site (ML1633)
- Quarry Site ML Extension (MLA570)
- Beneficiation Facility
- Infrastructure Area
- Extraction Area
- Water Management Area
- Rehabilitation
- P Electricity Transmission Lines

FIGURE 4.2

Proposed Site Layout
30 June 2023

Image Source: Nearmap (2023) Data source: Walker Quarries (2019); NSW LPI DTDB (2019)

5.0 Actions Required from Previous Annual Review

Table 5.1 describes the actions identified for completion in the reporting period (including those from Table 12.1 of the 2022 Annual Review) and actions taken.

Table 5.1 Actions from the Previous Annual Review

Action from 2022 Annual Review	Action Taken This Reporting Period	Refer to Section
The environmental management commitment checklist will be completed and implemented. The checklist will be referenced at least twice annually by independent inspection of the Quarry Site.	Checklist was completed and implemented in January 2023 and checked by the environmental consultant during inspections in March and July 2023.	**Section 6.1**
The Hydrocarbon Storage Area will be upgraded to reduce the potential for contamination and/or pollution.	Hydrocarbon Storage Area upgrade completed.	**Sections 4.3.1 and 6.11**
Mobile crushing operations within the extraction area will be relocated to a lower elevation.	Relocation to the pit was delayed due to a change in geology being identified, slowing the planned extraction rate. Action is anticipated for completion in the next reporting period. As a temporary measure until relocation into the pit becomes possible, the mobile crushing equipment will be relocated to a lower elevation behind the extraction area bund wall.	**Sections 4.3.2, 4.4.3**
The wheel wash upgrade is to be complete to reduce dust tracking on Quarry Access Road and Great Western Highway.	Wheel wash upgrade completed, and operation commenced.	**Sections 4.3.1 and 7.2.3**
Upon completion of the wheel wash upgrade, SB5 will be decommissioned, backfilled and rehabilitated.	SB5 in the process of being decommissioned. To be complete in the next reporting period.	**Section 7.2.3**
Rehabilitation across the Quarry Site will continue to be monitored.	Rehabilitation monitored visually by Quarry Manager at monthly inspections, and at each environmental consultant inspection. Photos were taken in July to document vegetation development.	**Section 8.1**
Quarry operations will continue generally as completed during the reporting period [2021-2022] and in accordance with the Quarry MOP (and recently prepared Rehabilitation Management Plan [RMP] and Forward Program).	Operations continued generally as per previous reporting period and the RMP, which has superseded the MOP. Deviations from the Forward Program will be reported in the Quarry's Annual Rehabilitation Reports.	**Section 4.2**
Complete installation of upgraded Wash Plant and decommission current wash plant.	Upgraded wash plant construction completed and operation commenced February 2023. Previous wash plant decommissioned and removed, currently for sale off-site.	**Sections 4.3.1 and 4.3.2**

Action from 2022 Annual Review	Action Taken This Reporting Period	Refer to Section
Complete and document an investigation into installation of a weir upstream of SB2 / install if confirmed as appropriate.	Delayed. To be investigated as time permits.	**Section 7.2.3**
Review and advise DPE of any intention to modify Quarry management plans.	Completed during the reporting year. Action remains ongoing.	Not applicable
Update and resubmit relevant management plans.	DPE advised in November 2022 that updates were not required as management plans had only recently been approved. Intention to update and resubmit management during the next reporting period (2023-2024) – RMP, BMECP, BFMP, SWMP, AQMP.	Not applicable
Quarterly updates to be provided to DPE addressing actions from Table 12.1 of the 2022 Annual Review.	One update provided to DPE via post-approval letter DA344-11-2001-PA-45, which DPE has accepted.	Not applicable

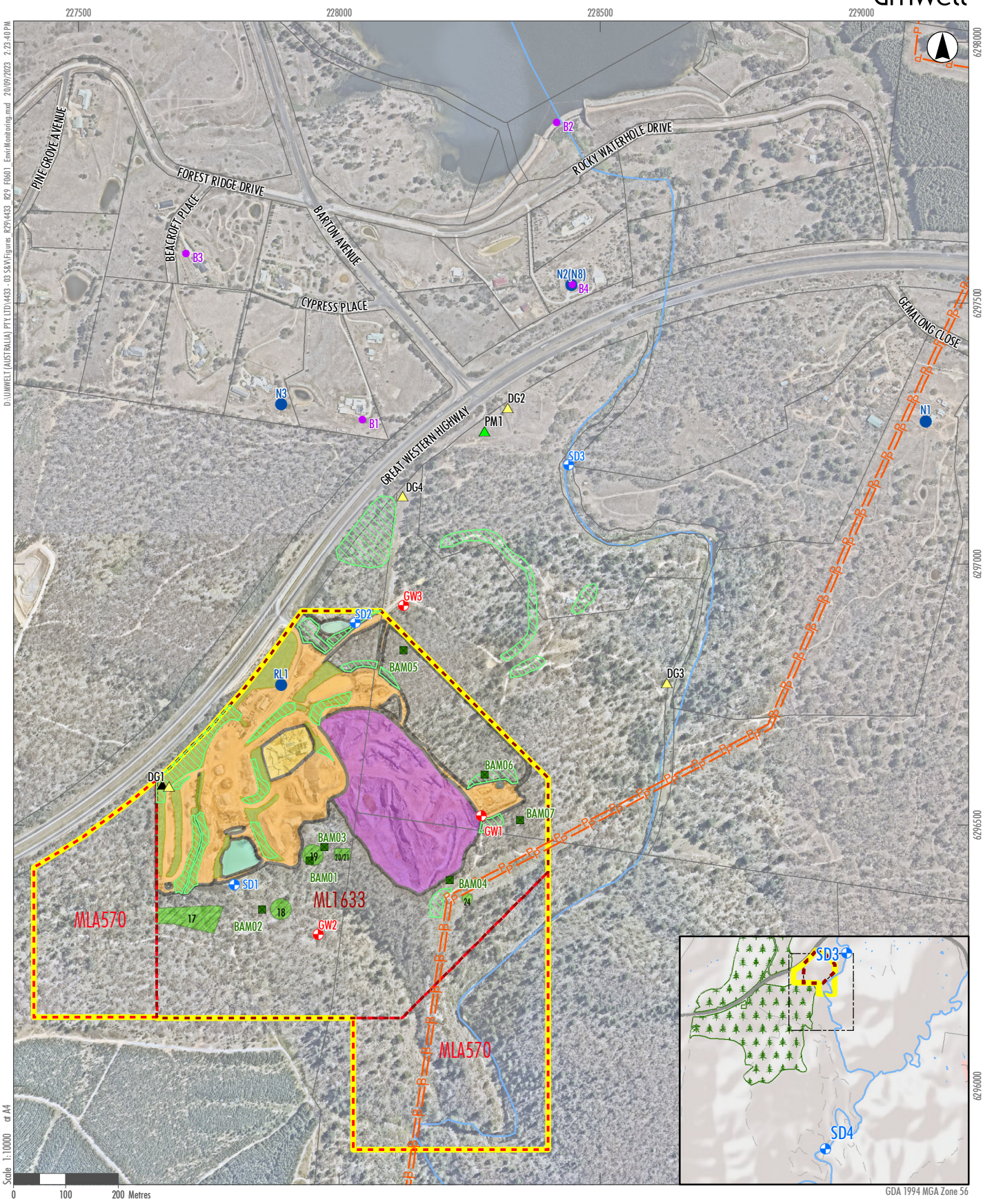
6.0 Environmental Performance

6.1 Monitoring Overview

Environmental monitoring is undertaken to determine the degree of impact the Quarry is having on the environment. Assessment of these results can establish if environmental management systems are being successfully applied in the short term and if the management systems need to be amended.

Appropriate environmental monitoring, apart from satisfying necessary statutory requirements, demonstrates to the local community and relevant authorities Walker Quarries commitment to the protection of the environment. **Figure 6.1** provides the monitoring locations referred to in this section.

During the reporting period, Walker Quarries engaged Umwelt to prepare the Environmental Management Compliance System (the Compliance System, previously referred to in the 2022 Annual Review as the "environmental commitments checklist") in the form of a Microsoft Excel spreadsheet, which was implemented in January 2023. The Compliance System was developed in response to the "Suggestions for Improvement" found in the Draft Compliance Audit Program Report provided to the Quarry by the RR in August 2022 and the Final Audit Report provided in March 2023 (RR, 2023). The audit reviewed environmental compliance relating to the *Mining Act 1992* and was conducted by RR in the previous reporting period (3 May 2022). The Compliance System allows the Quarry Manager to track the status and due date of each environmental compliance requirement for the Quarry.



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- Quarry Site (ML1633)
- Quarry Site ML Extension (MLA570)
- Cadastral boundary
- Weed Spraying Area
- Remnant Patches of Bursaria spinosa
- Air Quality Monitoring Locations
- Biodiversity Monitoring Locations
- Blast Monitor
- Meteorological Station
- Noise Monitoring Locations
- Surface Water Monitoring Location
- Groundwater Bore Location
- Particulate Matter Monitoring Location
- Power Line
- Beneficiation Facility
- Infrastructure Area
- Extraction Area
- Water Management Area
- Rehabilitation

FIGURE 6.1

Environmental Monitoring Locations and Weed Spraying

Image Source: Nearmap (2023) Data source: NSW DFSI (2019); CEH Survey (November 2016)

6.2 Meteorological Monitoring

A meteorological monitoring station has been operating at its current location since July 2016. Data is downloaded at 15-minute intervals and Quarry management can download meteorological files in real time should interrogation of data be required e.g. in response to a noise compliant or air quality monitoring results.

Table 6.1 presents key data outputs from the meteorological station for each month.

Table 6.1 Meteorological Monitoring Results

Year		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
Average Temperature (°C)														
2021/22	Max	9.9	12.2	15.2	17.6	17.6	22.3	22.8	21.4	19.6	17.1	13.5	9.5	16.6
	Min	2.0	1.8	4.3	6.5	10.2	11.4	15.0	12.6	12.8	8.9	6.2	2.4	7.8
2022/23	Max	10.0	12.7	14.3	17.6	19.5	22.1	25.5	26.7	24.7	17.5	13.8	11.9	18.0
	Min	2.2	3.0	4.6	8.0	6.7	8.3	12.4	12.0	11.5	7.1	1.8	1.9	6.6
Rainfall (mm)														
2021/22	Total	58.8	83.6	57.2	47.8	189.2	107.4	154.2	61.2	154	92.6	67.6	15.2	1080.8
	No. Rain Days	22	18	10	13	19	16	21	19	22	20	26	9	215
	Max. Daily Rainfall	12.8	43.8	13.8	9	33.6	41.2	51	16	30.2	21.2	13.8	5.4	43.8
2022/23	Total	163.6	81.4	131.8	156	110.6	29.2	93.2	21.2	80.8	58.6	17.0	29.0	972.4
	No. Rain Days	24	19	21	19	16	13	16	9	13	16	9	16	191
	Max. Daily Rainfall	56.6	36.8	42.0	45.6	39.0	18.6	29.2	7.0	18.8	33.4	12.2	11.4	56.6

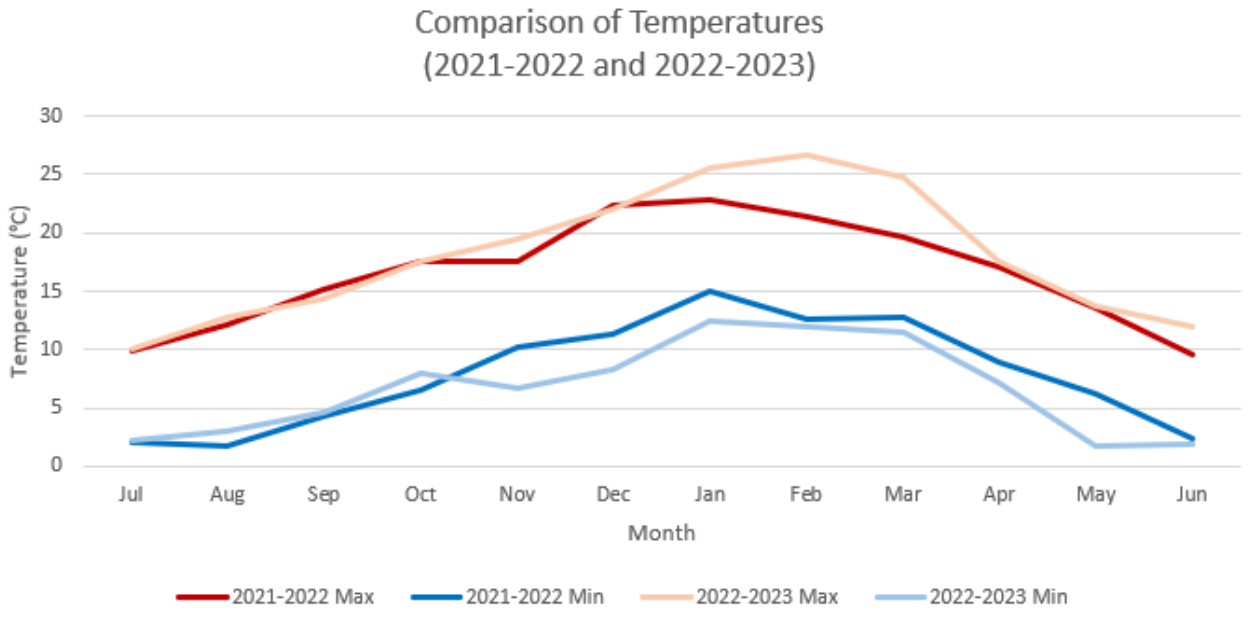


Figure 6.2 Comparison of Temperatures

Overall the reporting period experienced a wider range of temperature than the previous year, with a higher annual average maximum, and a lower annual average minimum. The average maximum for the period January to March was notably warmer than the same period in the previous year.

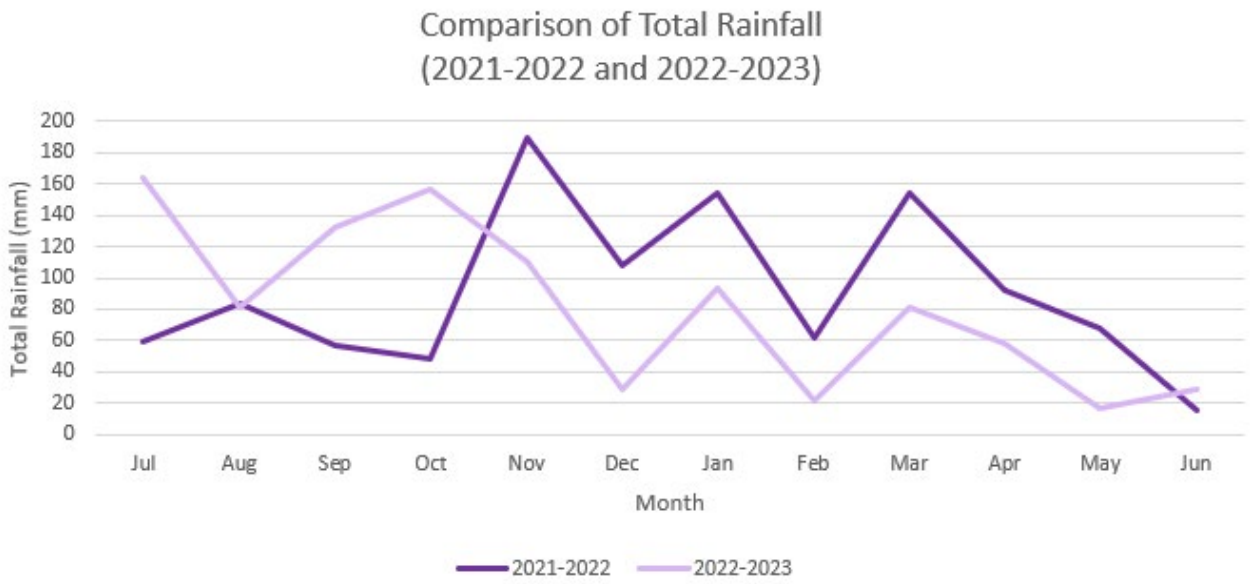


Figure 6.3 Comparison of Total Rainfall

This reporting period also experienced less annual rainfall (972.4 mm compared to 1080.8 mm in 2021/2022) and less rain days than the previous year (191 compared to 215 in 2021/2022).

6.3 Noise

6.3.1 Consent Conditions

The following conditions of DA 344-11-2001 relate to operational noise at the Quarry:

- Schedule 3, Condition 3: The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land. The criteria from Table 2 of DA 344-11-2001 is provided in **Table 6.2** below.
- Schedule 3, Condition 3A: Noise generated by the development must be monitored and measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Noise Policy for Industry (EPA, 2017).
- Schedule 3, Condition 3B: The noise criteria in Table 2 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the DPE in writing of the terms of this agreement.

6.3.2 Performance Criteria and Predicted Impacts

Table 6.2 identifies the relevant noise-related performance criteria for residences surrounding the Quarry Site as identified by Schedule 3, Condition 3 of DA 344-11-2001. These criteria are consistent with Condition L4.1 of EPL 13172.

Table 6.2 Noise-related Performance Criteria

Receiver	Day dB(A)[1]	Evening dB(A)[1]	Night dB(A)[1]
EPL 13172			
Any residence on privately owned land[2]	43	43	39
DA344-11-2001 MOD3			
Any residence on privately owned land[2]	43	39	35

Note 1: Units = LAeq 15 minutes

Note 2: The criteria do not apply where an agreement is negotiated with a landowner to exceed the noise criteria, and the DPE has been advised in writing of the terms of this agreement. Walker Quarries holds an agreement with the owner of Lot 7 DP872230 for noise levels exceeding the noise criteria in **Table 6.2**.

The noise criteria presented in **Table 6.2** are based on the results of a *Noise and Vibration Impact Assessment* (NVIA) to quantify potential noise emissions associated with the extension to the Quarry as part of Mod 3 (Muller Acoustic Consulting Pty Ltd (MAC), 2019). The more conservative criteria of the Development Consent was adopted for the NVIA, although MAC (2019) note that the difference is inconsequential on the basis that the Quarry does not operate at night.

MAC also included sound power levels and relevant criteria for individual pieces of equipment operating at the Quarry as part of the NVIA (MAC, 2019). This criteria is included in the monitoring results tables in **Section 6.3.3**.

In addition, Schedule 3, Condition 4(a) of DA 344-11-2001 states Walker Quarries must implement best practice management to minimise the construction, operational and road transportation noise of the development.

6.3.3 Performance and Discussion

Section 7.3 of the Noise Management Plan (NMP) identifies that attended noise monitoring will be undertaken at least twice annually at the three off-site monitoring locations shown on **Figure 6.1**. These monitoring sites represent the closest residential receivers to the Quarry and include:

- N1: “Gemalong” property residence
- N2: 42 Rocky Waterhole Drive
- N3: Cypress Place, Wallerawang
- RL1: located adjacent to the Quarry office (reference location).

Walker Quarries holds an agreement with the landowner of “Cockatoo Pines” (unattended noise monitoring location NM1 as identified in the NMP) for noise levels exceeding those nominated in **Table 6.2**. This location represents a shed, not a residence. A copy of the noise agreement has been provided to DPE in satisfaction of Schedule 3, Condition 3B of DA 344-11-2001.

Attended noise monitoring programs were undertaken on 7 September 2022, and 17 March 2023 by MAC. The resulting reports (MAC, 2022 and MAC, 2023) are presented on the Walker Quarries website. A change in naming convention has resulted in N2 being referred to as N8 in the two noise monitoring reports.

All noise monitoring was undertaken under the following operational conditions:

- extraction of quartzite using standard load and haul techniques
- processing of extracted quartzite and stockpiling
- transportation of quarry products.

Noise monitoring was undertaken at monitoring locations N1, N3, N8 and RL1 (see **Figure 6.1**) during each monitoring campaign. The noise monitoring results are summarised in **Table 6.3** and **Table 6.4**.

Section 7.4 of the NMP identifies that the Sound Power Level (SPL) of active mobile and fixed plant operating at the quarry will be measured on an annual basis and reported in the Annual Review. SPL monitoring was undertaken during the September 2022 (for acoustically significant items of plant) and March 2023 (annual SPL assessment) monitoring rounds. The SPL for the acoustically significant items of plant was calculated to be 104dB $LA_{eq(15min)}$ during the September 2022 monitoring. Results for the March 2023 annual SPL assessment are summarised in **Table 6.5** and **Table 6.6**.

Table 6.3 Noise Monitoring Results – 7 September 2022

Location	Date and Time (hrs)	Site Contribution LA_{eq}	Criteria dB(A)	Comments
N1	7/9/22, 07:48	<38	43	Quarry inaudible; compliant.
	7/9/22, 11:58	<34	43	Quarry inaudible; compliant.
N3	7/9/22, 08:10	<32	43	Quarry inaudible; compliant.
	7/9/22, 11:17	<30	43	Quarry inaudible; compliant.
N2 (N8)	7/9/22, 08:34	<37	43	Quarry inaudible; compliant.
	7/9/22, 11:37	<36	43	Quarry inaudible; compliant.
RL1	7/9/22, 09:05	68	N/A	Traffic 52-82, Quarry generator 41-57, Quarry water cart 66-71.
	7/9/22, 10:15	66	N/A	Traffic 62-75, Quarry generator <54, Quarry water cart 61-72, Quarry reverse alarms 62-68.

Source: MAC, 2022

Table 6.4 Noise Monitoring Results – 17 March 2023

Location	Date and Time (hrs)	Site Contribution LA_{eq}	Criteria dB(A)	Comments
N1	17/3/23, 07:29	<40	43	Quarry inaudible; compliant.
	17/3/23, 10:26	<35	43	Quarry inaudible; compliant.
N3	17/3/23, 07:50	<37	43	Quarry inaudible; compliant.
	17/3/23, 10:46	<34	43	Quarry inaudible; compliant.
N2 (N8)	17/3/23, 08:16	<43	43	Quarry inaudible; compliant.
	17/3/23, 11:07	<41	43	Quarry inaudible; compliant.

Location	Date and Time (hrs)	Site Contribution LA_{eq}	Criteria dB(A)	Comments
RL1	17/3/23, 08:48	56	N/A	Traffic 44-60, Quarry loading 44-45; Quarry light vehicle 49-62, Quarry hand tools 47-56, Quarry trucks 44-69.
	17/3/23, 09:42	58	N/A	Traffic 51-61; Quarry processing plant 56-60; Quarry light vehicle 52-60; Quarry personnel 60-83.

Source: MAC, 2023

Table 6.5 Sound Power Level Monitoring Results – September 2022

Plant	Sound Power Level dB(A) Lw	Target[1] dB(A)
Komatsu Loader WA480 FEL	101	100
Screen and Crusher	118	111
Volvo 6 Wheeled Water Cart	105	101
Wirtgen Kleeman Cone/Sand Plant	109	110
Total Site Sound Power Level		

Note 1: Total logarithmic sum of the overall site criteria (as reported in MAC, 2020)
Source: MAC (2022) – Table 9.

Table 6.6 Sound Power Level Monitoring Results – April 2023

Plant	Sound Power Level dB(A) Lw	Target[1] dB(A)
Sand Processing Plant (upgraded Wash Plant)	108	N/A
Total Site Sound Power Level	108	121

Note 1: Total logarithmic sum of the overall site criteria (as reported in MAC, 2020)
Source: MAC (2023) – Table 10.

Monitoring during the reporting period at locations N1, N3 and N2 (N8) confirmed compliance with the assessment criteria in all instances. The attended monitoring program found that the Quarry was audible at these locations (over background noise levels) during several offsite measurements, however the Quarry's contribution during the measurements was calculated to be below the daytime assessment criteria of 43 dB(A). As such, there are no identifiable trends in noise levels, except the continued compliance of the operation.

The SPL testing of operational quarry equipment undertaken in September 2022 identified that whilst the SPL of a number of individual pieces of plant exceeded the SPL target, the overall sound power of plant used at the Quarry are below target sound power levels. As the upgraded Wash Plant was operated for the first time in February 2023, it was not included in the NVIA (MAC, 2020) or the monitoring undertaken in September 2022, and has no SPL target. The monitoring undertaken in March 2023 is for information purposes, and the upgraded Wash Plant will be included in future SPL monitoring.

The monitoring results indicate the Quarry is generally inaudible from residential receivers and is supported by no noise enquiries or complaints received in the reporting period.

6.4 Blasting

6.4.1 Performance Criteria, Public Notices and Predicted Performance

Schedule 3, Condition 9 of DA 344-11-2001 requires Walker Quarries during blasting operations to:

- Implement best practice management to:
    - protect the safety of people and livestock
    - protect public or private infrastructure and property from damage
    - minimise the dust and fume emissions.
- Operate a suitable system to enable the local community to get up-to-date information on the proposed blasting schedule on site.
- Carry out regular monitoring to determine whether the development is complying with the relevant conditions of consent.

A blast notification board, detailing the date and time of the next blast is maintained at the Quarry entrance on the Great Western Highway and updated at least 24 hours before each blast. In addition, Walker Quarries provides specific notification of individual blasts to any landowner, within 2 km of the Quarry who has registered an interest in being notified about the blasting schedule at the Quarry.

Table 6.7 presents the airblast overpressure and ground vibration performance criteria identified in Schedule 3, Condition 6 of DA 344-11-2001.

Table 6.7 Blasting Performance Criteria

Receiver	Airblast Overpressure (dB Linear Peak)	Ground Vibration (mm/s)	Allowable Exceedance
Any residence on privately-owned land	120	10	0%
	115	5	5% of the total number of blasts over a period of 12 months
All public infrastructure	-	50	0%

The BMECP identifies that blast monitoring will be undertaken at four locations, B1, B2, B3 and B4 for each blast event, as shown in **Figure 6.1.** Results are included in **Table 6.8**.

In addition to the above criteria, Schedule 3, Condition 1 of DA 344-11-2001 permits blasting between 9:00 am and 5:00 pm, Monday to Friday, and between 9:00 am and 1:00 pm on Saturdays. No blasting is permitted on Sundays or public holidays.

The NVIA prepared to quantify potential noise and vibration emissions associated with the proposed extension to the Quarry as part of the Mod 3 application (MAC, 2019) predicts compliance with relevant criteria would be achieved.

6.4.2 Measured Performance and Discussion

Table 6.8 presents the results of blast monitoring during the reporting period.

Table 6.8 Blast Monitoring Results

Date		B1 (Intersection)		B2 (Dam Wall)		B3 (Residence)		B4 (Residence)	
		Ground Vibration (mm/s)	Air Blast (dB)	Ground Vibration (mm/s)	Air Blast (dB)	Ground Vibration (mm/s)	Air Blast (dB)	Ground Vibration (mm/s)	Air Blast (dB)
Criterion	**95%/yr**	**5**	**115**	**5**	**115**	**5**	**115**	**5**	**115**
	100%	**10**	**120**	**10**	**120**	**10**	**120**	**10**	**120**
09/09/2022 12:45		0.63	101.0	N/T	N/T	0.73	95.9	0.78	102.8
16/11/2022 13:55		N/T	N/T	N/T	N/T	N/T	N/T	N/T	N/T
08/02/2023 12:56		0.76	102.8	0.51	101.0	0.81	91.5	0.58	104.2
15/06/2023 12:18		0.75	103.5	N/T	N/T	0.64	100.0	0.64	105.4

N/T: No Trigger. Blast was not sufficient to 'trigger' monitors, which were set to trigger at 95dBL (air blast) and 0.05mm/sec (ground vibration).

The criteria of 5 mm/s for ground vibration and 115 dB for air blast overpressure were not exceeded during the reporting period.

The results for ground vibration and air overpressure is consistent with the previous reporting period and the predictions in MAC (2019).

RR issued a Notice NTCE0012363 on 8 June 2023 (refer to **Section 11.2**), directing Walker Quarries to review and update the Quarry Safety Management System (SMS), which includes the BMECP. Revisions were required to reflect changes to the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 (WHS (MPS) Reg) and the Work Health and Safety Regulation 2017. The BMECP was updated and submitted to the NSW Resources Regulator as required by the Notice, and will be submitted to DPE

following the completion of this Annual Review. It is noted that DPE has not yet approved the updated BMECP.

6.5 Air Quality

6.5.1 Performance Criteria and Predicted Impacts

Table 6.9 presents the air quality performance criteria presented in Schedule 3, Condition 11 of DA 344-11-2001.

Table 6.9 Air Quality-related Performance Criteria

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM_{10})	Annual	[a, c] 25 µg/m^3
Particulate matter < 10 µm (PM_{10})	24 hour	[b] 50 µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	Annual	[a, c] 8 µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	24 hour	[b] 25 µg/m^3
Total suspended particulates (TSP)	Annual	[a, c] 90 µg/m^3
Deposited dust	Annual Incremental Increase	[b] 2 g/m^2/month
[d] Deposited dust	Annual Average Total Deposited Dust	[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 activity 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 for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

6.5.2 Measured Performance and Discussion

A summary of the Quarry's air quality performance is provided in **Table 6.10**.

Table 6.10 Performance Summary

Pollutant	Averaging Period	Criterion	Performance Summary
Particulate matter < 10 µm (PM_{10})	Annual	25 µg/m^3	Compliant. 12.7[1] µg/m^3
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3	Compliant. One elevated result[1], 11 June: 89.4 µg/m^3 was not related to the site (refer to **Section 6.5.2.1**).
Particulate matter < 2.5 µm ($PM_{2.5}$)	Annual	8 µg/m^3	Compliant. 4.0[1] µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	24 hour	25 µg/m^3	Compliant. No exceedances.[1]
Total suspended particulates (TSP)	Annual	90 µg/m^3	Compliant. Annual average 13.9[1] µg/m^3
Deposited dust	Annual Incremental Increase	2 g/m^2/month	Compliant. No exceedances.
Deposited dust	Annual Average Total Deposited Dust	4 g/m^2/month	

Note 1: PM averages excluded anomalous periods explained in **Section 6.5.2.1.**

6.5.2.1 Particulate Matter

The Quarry implemented the approved Air Quality Management Plan (AQMP). PM_{10}, $PM_{2.5}$ and TSP were continuously monitored for most of the reporting period by the Dust Master Pro Real-time Particulate Monitor (DMP) north of the site.

From 10 October 2022 to 12 December 2022 the DMP experienced technical issues resulting in frequent anomalous PM readings. An initial internal investigation suggested anomalies were occurring at times associated with low temperatures and/or high humidity, which typically occurred at night and outside of Quarry operating hours. It was determined that the DMP required repairs and servicing offsite through the external provider, resulting in no data being recorded between 13 December 2022 and 26 April 2023. PM monitoring recommenced on 27 April 2023. The two periods (anomalous data and no data) are reflected in **Figure 6.2** to **Figure 6.4**.

The DMP did not record any data on 26 May 2023. PM_{10} data recorded on 30 June – 1 July 2023 was also unusual, remaining at exactly 1 µg/m^3 for 14 continuous hours, followed by several periods of other unusual data activity in July 2023, casting further doubt regarding the reliability of the ongoing monitoring data. Quarry Management will continue to monitor and analyse the data beyond the reporting period with support from an environmental consultant, and enquiries have been made with the DMP provider to investigate the instrument further. Additional investigations will be undertaken as required to rectify the issues in the next reporting period.

The inability to continuously monitor PM data due to off-site repairs is considered a non-compliance with Condition M2 of EPL 13172 and the AQMP. An administrative non-compliance for non-adherence to the AQMP is noted against Schedule 3, Condition 14.

With the exclusion of anomalous data, compliance with all PM performance criteria identified in Schedule 3, Condition 11 of DA 344-11-2001 is noted.

PM_{10}

Excluding the periods discussed above, there was one elevated PM_{10} 24-hour average recorded, on 11 June 2023. This was immediately investigated by an environmental consultant. Similar to the high readings identified in October to December 2022, this occurred in the early morning hours in low temperature conditions on a non-operational day. The investigation included a review of wind speed and direction from the on-site meteorological station and a comparison against the nearest Bureau of Meteorology station (Station 063308, located approximately 5.7 km east of the Quarry). It was determined that the high reading was not associated with the Quarry development and compliance with Schedule 3, Condition 11 of DA 344-11-2001 was maintained.

During the anomalous period, 24 exceedances of the PM_{10} 24-hour average were recorded.

The annual average of PM_{10}, excluding anomalous periods, was 12.7 µg/m^3 which is below the criteria.

All PM_{10} monitoring data from the reporting period is presented in **Figure 6.4.**

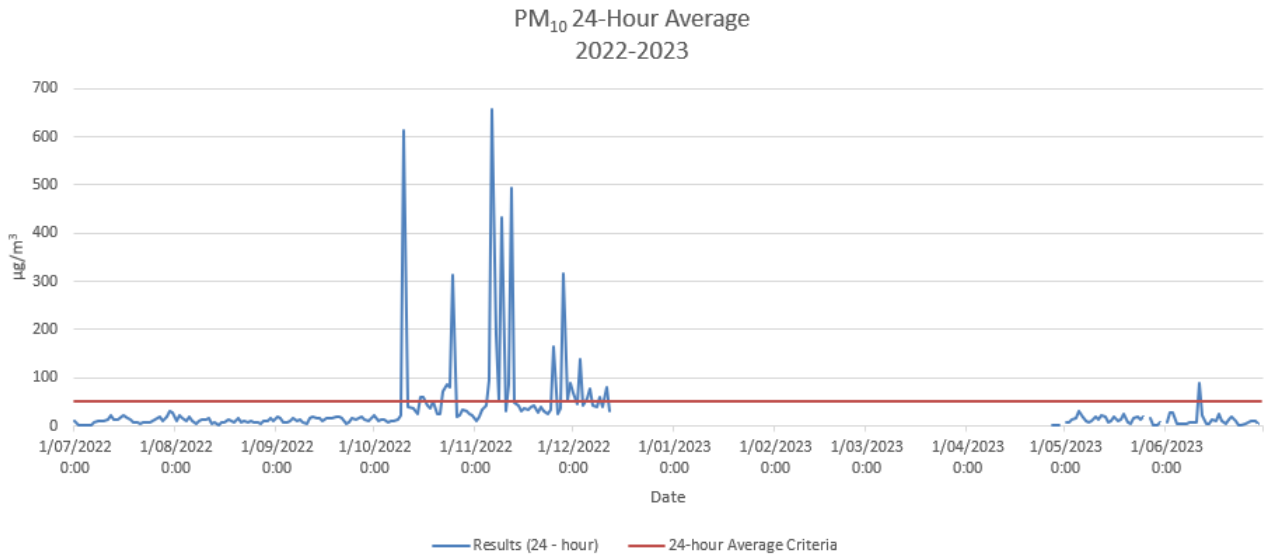


Figure 6.4 PM_{10} Monitoring Data

$PM_{2.5}$

Excluding the anomalous periods, there were no exceedances of the 24-hour average $PM_{2.5}$ during the reporting period.

The annual average of PM_{10}, excluding anomalous periods, was 4.0 µg/m^3 which is below the criteria.

All 24-hour $PM_{2.5}$ monitoring data from the reporting period is presented in **Figure 6.5**.

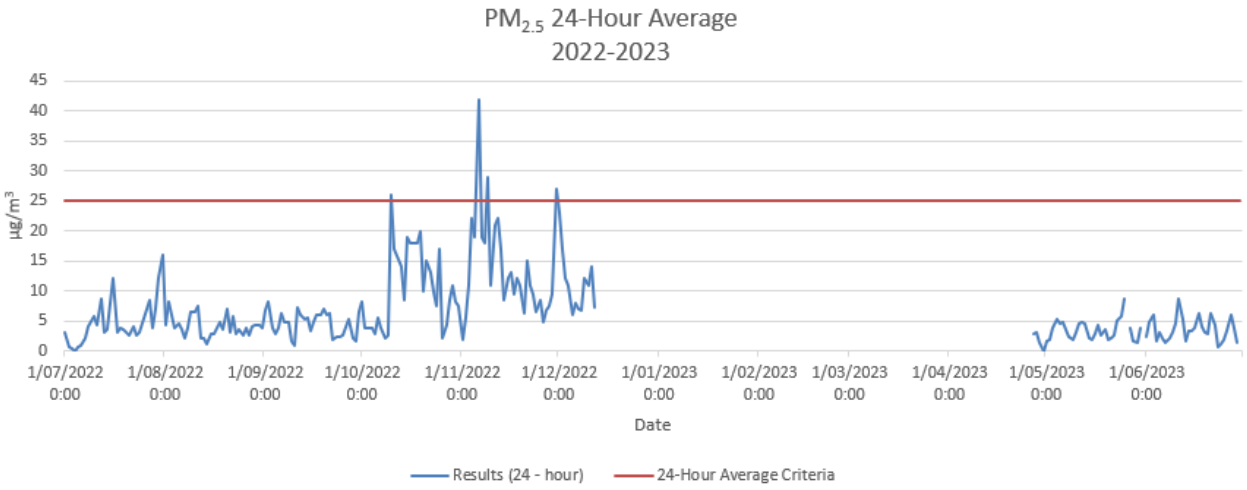
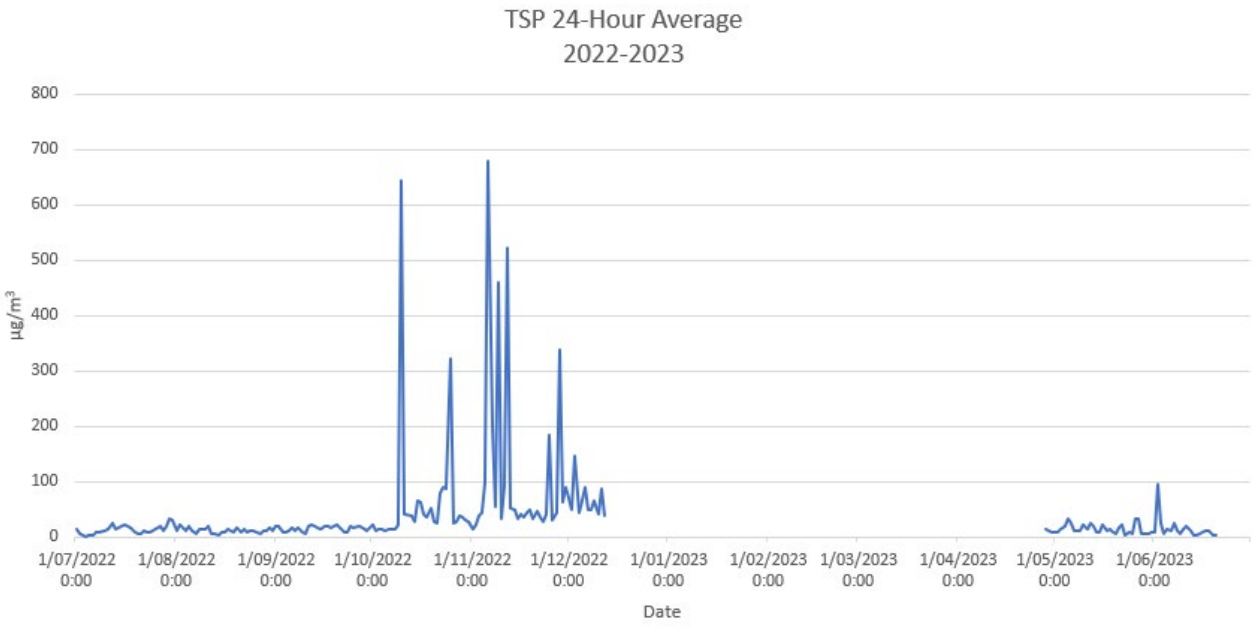


Figure 6.5 $PM_{2.5}$ Monitoring Data

TSP

The annual average of TSP, excluding anomalous periods, was 13.9 µg/m^3 which is below the criteria.

All TSP monitoring data obtained during the reporting period is presented in **Figure 6.6.**



Note: There is no performance criteria associated with TSP 24-Hour Average. The data has been used to calculate the Annual Average, for which the criteria is 90 µg/m³

Figure 6.6 TSP Monitoring Data

6.5.2.2 Deposited Dust

Deposited dust was monitored over the reporting period in accordance with the AQMP. Locations of the deposited dust monitoring locations are shown on **Figure 6.1**.

Table 6.11 and **Figure 6.7** present the results of the deposited dust monitoring program.

Table 6.11 Deposited Dust Monitoring Results

Start Date	End Date	Monitoring Location				Criterion
		DG1	DG2	DG3	DG4	
2021-2022 Annual Average		**0.9**	**0.8**	**0.7**	**0.7**	**4.0**
14/06/2022	11/07/2022	0.3	0.5	0.2	0.3	4.0
11/07/2022	15/08/2022	0.2	1.8	0.1	1.1	4.0
15/08/2022	12/09/2022	0.6	N/D	<0.1	0.9	4.0
12/09/2022	14/10/2022	1.2	2.1	0.8	2.1	4.0
14/10/2022	14/11/2022	1.5	0.4	1.3	0.6	4.0
14/11/2022	12/12/2022	0.8	0.6	3.1	1.2	4.0
12/12/2022	12/01/2023	0.5	0.8	1.8	0.6	4.0
12/01/2023	13/02/2023	5.2	1.1	0.4	2.2	4.0
13/02/2023	08/03/2023	0.6	0.4	0.2	0.6	4.0
08/03/2023	12/04/2023	5.1	4.3	1.5	2.4	4.0
12/04/2023	11/05/2023	0.4	0.4	1.2	0.5	4.0
11/05/2023	12/06/2023	0.2	0.6	3.4	0.3	4.0
Annual Average 2022-2023		**1.4**	**1.2**	**1.3**	**1.1**	**4.0**

Note [1] Units – g/m²/month Source: Walker Quarries Pty Ltd
N/D: no data (gauge inaccessible due to weather)

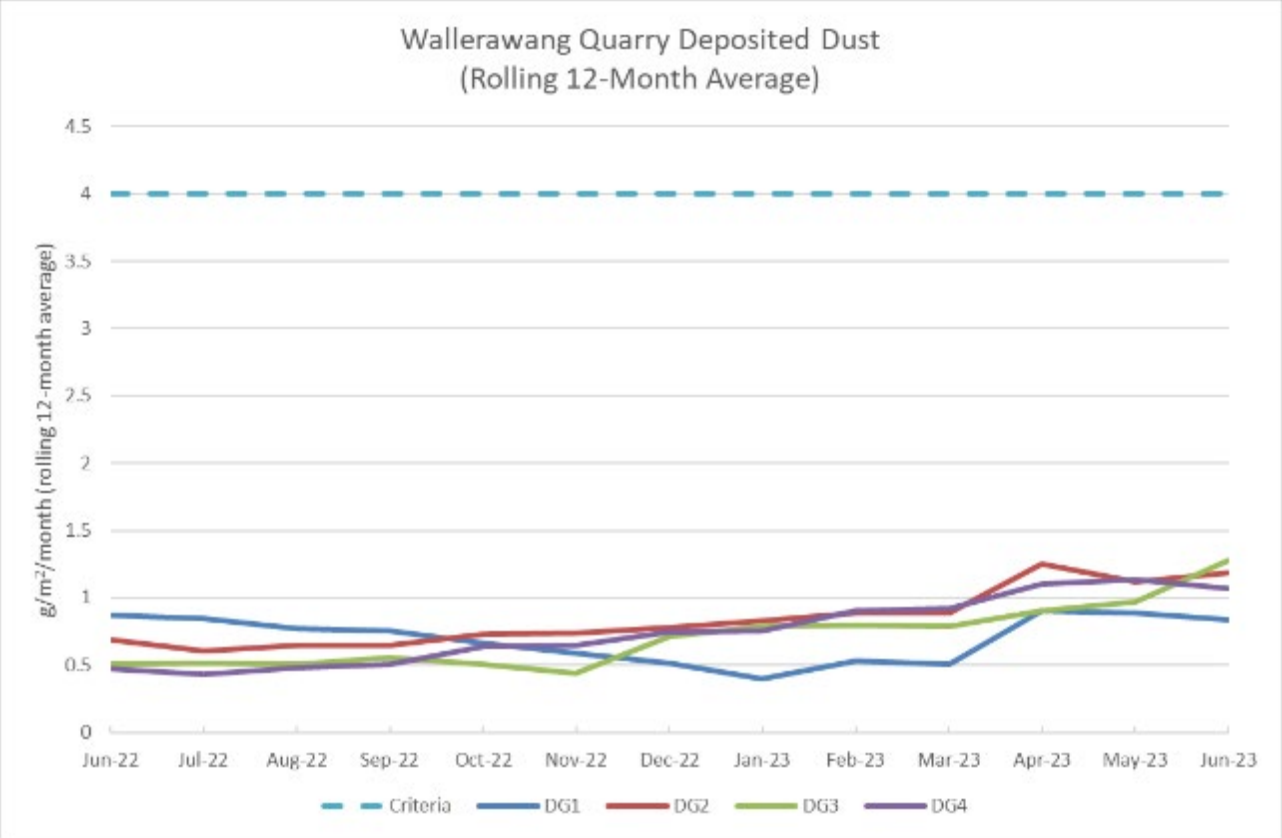


Figure 6.7 Deposited Dust 2022-2023 – Rolling 12-Month Average

All samples recorded in the reporting period were well below 4g/m^2/month, with the exception of DG1 in January and March 2023. DG1 is located adjacent to the Great Western Highway. The Quarry Manager attributes the high readings to road work construction activities at this part of the highway during January and March.

Annual averages were between 1.1 g/m^2/month and 1.4 g/m^2/month for the four dust gauges, indicating that the deposited dust impacts as a result of the Quarry's operations are marginally higher than the previous year (provided in **Table 6.11**), yet still well below the criteria.

Deposited dust results remained compliant throughout the reporting period.

6.6 Biodiversity

6.6.1 Consent Conditions

Schedule 3, Condition 26 requires monitoring of biodiversity to be undertaken in accordance with the Biodiversity Management Plan (BMP). The BMP describes the procedures to be implemented for ensuring minimal environmental consequences for threatened species, populations and habitats, including the Purple Copper Butterfly. The BMP was most recently approved by DPE on 1 June 2022.

6.6.2 Measured Performance and Discussion

Annual Biodiversity Monitoring

Biodiversity monitoring for the period was undertaken by Ecoplanning Pty Ltd (Ecoplanning). The monitoring included a local fauna survey, conducted on 10 October 2022, and flora data gathering from fixed quadrats on 15 and 16 December 2022.

Floristic data was gathered in accordance with the DPE's Biodiversity Assessment Method (BAM), requiring grids of 20 m x 20 m with additional 50 m transects extending off these plots. The resulting report (Ecoplanning, 2023) is available on the Quarry website. As part of the BAM, vegetation integrity scores (VIS) were calculated for each plot, with the results shown in **Table 6.12**.

It is noted that monitoring plot BAM04 was impacted by approved vegetation clearing in 2021, resulting in the addition of the new monitoring plot BAM07 (from the 2021-2022 reporting period) which was selected to match the Plant Community Type and general vegetation condition of BAM04. The 2022-2023 reporting period was the first where BAM04 was no longer surveyed and BAM07 has served as its replacement.

Table 6.12 Vegetation Integrity Score for Floristic Monitoring Plots

Monitoring plot (previous identifier)	PCT	Composition Score	Structure Score	Function Score	Vegetation Integrity Score
BAM01	732	97.6	47.9	88.6	**74.5**
BAM02	732	80.7	27.3	86.8	**57.6**
BAM03	732	100	91.3	72.6	**87.2**
BAM05	1093	88.6	45.2	74.7	**61.9**
BAM06	1093	93.1	57.2	99.8	**66.9**
BAM07	1093	91.5	59.4	73.8	**81**

The Vegetation Integrity Score (VIS) varied more across sites than in previous years, ranging from 57.6 to 87.9. Table 3.2 of the Biodiversity Monitoring Report (Ecoplanning, 2023) provides a comparison of the 2022 results to that of 2020 and 2021. All monitoring plots had high composition scores, ranging from 80.7 to 100, which are reflective of high species richness within the monitoring plots. Vegetation structure scores were much more variable between monitoring plots, ranging from 27.3 to 91.3. This broad range is reflective of sharply lower coverage of native grasses in some plots as compared to previous years. Vegetation function scores were broadly similar across all plots, ranging from 72.2 to 88, and are indicative of moderately intact vegetation. The high VIS and generally high scores for composition and function indicate that retained vegetation within the Quarry site is generally in a relatively intact condition and has not been heavily impacted by ongoing operations at the Quarry.

The VIS in 2022 was similar to 2021 and 2020 scores for sites BAM03 and BAM06, and similar between 2021 and 2022 for plot BAM07. For plot BAM05, the 2022 VIS was moderately down as compared to 2021 but broadly similar to the score recorded in 2020. However, the VIS was sharply down in 2022 for plots BAM01 and BAM02 as compared to both 2020 and 2021.

The most significant difference in the data collected for these two plots compared to 2021 is much lower component scores for structure. The most significant reason for the lower component scores is much lower coverage for the grasses Poa sieberiana (Snow Grass) and Microlaena stipoides (Weeping Grass). P. sieberiana declined from 15% coverage in BAM01 in 2021 to 2% in 2022, and from 10% coverage in BAM02 in 2021 to 2% in 2022. Microlaena stipoides declined from 5% coverage in BAM01 in 2021 to 2% in 2022, and from 20% coverage in BAM02 in 2021 to 5% in 2022. These two species did not comprise a significant component of groundcover in other plots, so it is not clear whether the decline in the two species occurred elsewhere within the Quarry site. No disturbance such as erosion or compaction was apparent from observation of the plots where P. sieberiana and M. stipoides declined. In the absence of further observations indicating a multi-year trend, or evidence of disturbance, the most likely explanation for the difference is seasonal variation. However, coverage of P. sieberiana and M. stipoides should be monitored carefully in subsequent years.

Structure scores are also down for BAM05, BAM06 and BAM07 between 2021 and 2022, although not to the same degree as in BAM01 and BAM02, and not to such an extent as to dramatically change the overall VIS. The main reason for lower structure scores in these plots is lower scores for canopy coverage. For BAM05, tree coverage decreased from 30% to 15.2% from 2021 to 2022; for BAM06, from 40% to 20.7%; and for BAM07, from 30% to 20%. As there is no evidence of tree dieback or other disturbance, and no obvious alternative explanation for decreased canopy such as low rainfall, the observed differences are likely to be at least partially the result of different observers, rather than any recent change in amount of canopy coverage.

Across all monitoring sites, small fluctuations were observed in native species richness and exotic species richness in 2022 compared to 2020 and 2021. No consistent trend was identified across sites indicating an increase or decrease in native or exotic species richness. However, the cover of exotic vegetation either remained at a high level or increased within all monitoring plots within PCT 732 (BAM01, BAM02 and BAM03). Exotic cover remained relatively consistent in BAM01, decreasing from 62.8% to 61.1% from 2021 to 2022. However, it increased substantially in BAM02 and BAM03, from 37.2% to 54.7% and from 15.3% to 41.3% respectively. This increased cover of exotic vegetation in BAM02 and BAM03, and the maintenance of high exotic cover in BAM01, was driven by large increases in the cover of the exotic grass species Anthoxanthum odoratum (Sweet Vernal Grass) from 2020 to 2022. Specifically, the cover of A. odoratum from 2020 to 2022 doubled within BAM01 (increased from 30% to 60%), increased from 23% to 55% in BAM02 and increased from 10% to 51% in BAM03.

The increased cover of A. odoratum in from 2020 to 2022 is attributed to ongoing above average rainfall in 2021 and 2022, with the species generally occurring in moist habitats. It is likely that the cover of the species will decline if drier conditions prevail in future monitoring seasons. However, the cover of this species should continue to be monitored and if vegetation integrity scores decline further as a result of increased cover of this species, targeted control may be warranted. The cover of high threat exotic species, as defined under the BAM, remained relatively consistent between 2020 and 2022. Function scores were relatively consistent across monitoring sites from 2021 to 2022.

Purple Copper Butterfly

Monitoring surveys for the Purple Copper Butterfly were undertaken on 10 October 2022 at five Blackthorn (*Bursaria spinosa* subsp*. lasiophylla*) monitoring sites, in accordance with the BMP (**Figure 6.1**).

Monitoring was also undertaken at the control site at Cheetham Flats TSR, Hampton Road, Rydal, consistent with previous surveys. The Coxs River, Wallerawang control site and the Eusdale Road, Yetholme control site were not surveyed. The survey aimed to detect any evidence of Purple Copper Butterfly located within the monitoring plots, including the presence of the ant species *Anonychomyrma itinerans* with which the Purple Copper Butterfly has a mutualistic relationship.

Due to extended wet, windy and overcast conditions, the survey was conducted late in the period where Purple Copper Butterfly was likely to be most active.

The full Purple Copper Butterfly survey report is provided in Biodiversity Monitoring Report (Ecoplanning, 2023) available on the Walker Quarries website. Results are summarized as follows:

- No Purple Copper Butterflies were observed within any of the monitoring sites. Two other butterfly species and a variety of other arthropods were observed.
- No *Anonychomyrma itinerans* ants or any other ant species were observed on Blackthorn within any of the monitoring sites. One other ant species was observed on adjacent vegetation.
- Blackthorn was observed within each monitoring site in a healthy condition with mature fruiting individuals and seedlings present. At all sites, new Blackthorn growth shoots were observed, and several plants were flowing vigorously. No obvious signs of grazing were apparent.
- The monitoring results are largely consistent with monitoring results from 2016-2021 and suggest that the Purple Copper Butterfly remains absent from the Quarry site. It is noted that Purple Copper Butterfly has not been detected within the Quarry since monitoring commenced.

Local Fauna

Two native mammals and 23 birds were opportunistically observed during the monitoring surveys. One threatened species listed under the *NSW Biodiversity Conservation Act 2016* (BC Act), the Gang-gang Cockatoo, was observed during the surveys. This species has been previously recorded within vegetation surrounding the Quarry. In 2022 an individual was observed in proximity to the monitoring plot BAM02.

Walker Quarries has retained a small stockpile of large landscape features such as major tree trunks, major tree limbs and minor branches in accordance with the RMP (refer to **Photo 6.1**). These features have the potential to create habitat with structural complexity to encourage a diverse range of native species into rehabilitated areas. This material will be used in future rehabilitation.

Photo 6.1 Stockpile of Previously Cleared Vegetation for Rehabilitation Purposes

Pre-Clearance Surveys

No vegetation clearing was undertaken during the reporting period. Accordingly, no pre-clearance surveys were required.

6.7 Heritage

6.7.1 Consent Conditions

Schedule 3, Condition 21 of DA 344-11-2001 requires that Walker Quarries not cause any direct or indirect impact on any identified heritage item located outside the approved disturbance area, beyond those predicted in the EIS.

Schedule 3, Condition 22 of DA 344-11-2001 requires that if suspected human remains are discovered on site, Walker Quarries must stop work in the area surrounding the remains, secure the area and immediately notify NSW Police and the BCD. Work must not recommence in the area until authorised by NSW Police and the BCD.

Schedule 3, Conditions 23, 23A and 23B of DA 344-11-2001 relate to the discovery of previously unknown Aboriginal objects or Aboriginal Places on site.

6.7.2 Management and Performance

No new sites or artefacts were identified during the reporting period. No non-compliances were identified.

6.8 Traffic and Transport

Transportation activities during the reporting period occurred during the approved hours of operation (**Section 2.2.2**).

As provided in **Section 4.3.4**, 12,848 truck movements occurred during the reporting period. This was reported as required by Schedule 3, Condition 19 of DA 344-11-2001. No non-compliances were identified.

6.9 Visual/Landscape Management

6.9.1 Consent Conditions

Schedule 3, Conditions 32 to 34 of DA 344-11-2001 require that Walker Quarries:

- Implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the development to the satisfaction of the Secretary.
- Construct and maintain to the satisfaction of the Secretary, a visual bund between the north-western boundary of the Western Stockpile Area and the Great Western Highway.
- Install bunds at strategic locations around the site and plant additional trees along the boundary of the development site to screen, so far as is reasonable and feasible, the development from external viewers.

6.9.2 Performance and Discussion

Key components of the Quarry with the potential to impact visual amenity during the reporting period include the development of the pit, construction of the upgraded Wash Plant, the position of mobile processing equipment and material/product stockpiles.

Walker Quarries continued to maintain a visual amenity bund located to the north of the Western Stockpile Area during the reporting period. This bund is used to minimise visual amenity impacts associated with its infrastructure and operations. Vegetation has successfully established on the bund and is expected to continue to develop.

Along the Great Western Highway, immediately outside of the north-western Quarry site boundary was an area of established trees that contributed to visually screening Quarry activities when viewed from the highway. In April 2023, NSW Roads and Maritime Services (RMS) conducted highway construction activities and removed the trees that provided a visual screen. As a result, visual amenity of the Quarry was impacted, with increased line of sight from the highway to processing equipment. It is noted that Walker Quarries had no involvement with the removal of this vegetation.

As the vegetation established by Walker Quarries on the visual amenity bund continues to mature, it is expected to progressively reduce the visual impact left by the removal of established trees beyond the Quarry boundary. Vegetation development is visually inspected and documented in photos by the environmental consultant at least annually, as nominated in the RMP.

It is anticipated the mobile processing equipment will be relocated to within the pit in the next reporting period. This action was delayed from the previous reporting period due to a change in geology affecting the previous extraction timeline. In an effort to minimize the visual impact of the existing elevated position, the Quarry plans to increase the height of the second visual amenity bund (in the extraction area) by approximately 1m in the first quarter of the next reporting period.

Walker Quarries notes that stockpiles of KIS Sand have started to be processed through the upgraded Wash Plant in the reporting period, and the stockpiles will progressively reduce in size as the product is sold **Section 4.3.3**.

It is noted that the Quarry does not operate at night, and there is no off-site lighting impact associated with the development.

The increased visual impact of the Quarry is identified as a low-risk non-compliance against Schedule 3, Conditions 32. No non-compliances were identified against Conditions 33 and 34.

6.10 Waste Management

Waste generation during the reporting period was negligible, with general waste placed within skip bins that are serviced monthly by a licenced waste contractor. Liquid wastes, principally waste hydrocarbons generated during equipment servicing, are removed by a licenced waste contractor when the storage containers reach capacity. Due to limitations for on-site disposal, all wastewater generated via the effluent and ablutions system is collected and disposed of off-site by a licenced contractor.

6.11 Emergency and Hazards

Diesel was delivered in bulk by a supplier and stored in a self-bunded diesel tank. Refuelling of equipment was undertaken either within a secured, sealed and bunded area where any spillage or leakage can be contained, or by a mobile fuel truck away from natural or artificial drainage lines. The mobile fuel truck, as well as the plant or vehicle being refuelled, maintain hydrocarbon spill kits for use in the event of leakage or spillage. No significant hydrocarbon spills occurred during the reporting period. Oils and lubricants are stored under shelter on a catchment pallet where spillage or leakage can be contained.

Explosives used during the reporting period were transported to site by the blasting contractor on the day of the blast and explosives are not stored on site.

As noted in **Section 4.3.1**, the Hydrocarbon Storage Area was upgraded during the reporting period to reduce the potential for contamination and/or pollution. At the March inspection, the upgrades were noted as complete. The area was observed to be generally tidy and within the containment bund.

No significant safety hazards occurred during the reporting period, and compliance is noted.

6.12 Bushfire

Management of bushfire hazards is provided through the Bushfire Management Plan (BFMP) which outlines procedures to mitigate potential fire risks or to be implemented in the event of a bushfire within or surrounding the Site.

RR issued the Notice NTCE0012363 on 8 June 2023 (refer to **Section 11.2**), directing Walker Quarries to review and update the Quarry Safety Management System (SMS), which includes the BFMP, to reflect the requirements of the WHS (MPS) Reg and the Work Health and Safety Regulation 2017. The BFMP was updated and submitted to RR as required by the Notice and will be submitted to DPE.

As required by the BFMP, the Fire Officer completed inspections and audits of fire extinguishers, potential fire hazards, operational controls, safeguards and management measures nominated in the BFMP. Walker Quarries continued to maintain fire extinguishers at the Fuel and Lube Bay, within the offices and workshops, on all earthmoving machinery, mobile plant and light vehicles. In addition, Walker Quarries maintains a water truck with fire-fighting capability at the Quarry.

In accordance with the BFMP, the Quarry Daily Inspection Checklist, which includes inspection of the Hydrocarbon Storage Area, was implemented daily. Plant equipment (including fire extinguishers) was also inspected and signed off by equipment operators prior to commencement of equipment operation each day.

No fires occurred within the Site during the reporting period.

Walker Quarries maintains regular communication with FCNSW during the fire season and is subscribed to the FCNSW daily notification system.

7.0 Water Management

7.1 Water Use

Water use is managed at the Quarry in accordance with the Soil and Water Management Plan (SWMP) which was submitted to DPE in October 2022 and approved on 23 November 2022. With the recent completion and commencement of operation of the upgraded Wash Plant, the SWMP will be reviewed and updated following submission of this Annual Review.

Water is required at the Quarry for three principal purposes:

1. Dust suppression of active and exposed areas, e.g. internal roads, hardstand surface and stockpile areas.
2. Dust suppression of crushing operations.
3. Sand and cobble washing.

The following provides information on the anticipated water use for each of these activities.

Table 7.1 Quarry Water Use

Purpose	Predicted Use (From Approved SWMP)	Actual Use (This Reporting Period)
Dust suppression – general	14 – 16 ML	8 ML
Dust suppression - crushing	Crushed aggregate: 20 L/t Crushed road base: 7 L/t	Combined aggregate and load base: 3 L/t
Sand and cobble washing	1,500 L/t	450 L/t

Dust Suppression – General

Exposed and trafficked areas of the Quarry site are watered using a 14 kL water truck to reduce the potential for wind or wheel generated dust. The volume of water used for this purpose varies significantly from day to day and month to month based on seasonal and meteorological conditions.

The following provides an indication of water use under various meteorological conditions:

- rainfall conditions: no applications
- temperature ≤15°: 1 to 2 applications
- temperature >15° ≤25°: 2 to 3 applications
- temperature >25° ≤30°: 3 to 4 applications
- temperature >30°: 5 to 6 applications.

Walker Quarries advises that approximately 8 ML of water was used for general dust suppression during the reporting period. This is less than forecast of 14 to 16 ML by Umwelt (2022).

Dust Suppression - Crushing

Walker Quarries has reviewed water usage for suppressing dust from its crushing trains and confirms the usage rate is much lower than previously calculated. While previously an application rate of 20 L/t for crushed aggregate and 7 L/t for crushed road base has been assumed, a review of actual usage confirms the actual application rate is 3L/t.

Sand and Cobble Washing

The commencement of operation of the upgraded Wash Plant, which allows for water recycling, has presented the benefit of reducing the water requirement for sand and cobble washing. The actual water usage rate for sand and cobble washing in the reporting period was 450 L/t, which included 8 months using the previous Wash Plant and 4 months using the upgraded Wash Plant. This is less than one third of the water usage rate estimated for sand and cobble washing in the SWMP (1,500 L/t).

7.2 Surface Water

The Quarry implements an established surface water quality monitoring program that includes sampling and analysis at four locations, described in **Table 7.2** (refer to **Figure 6.1**).

Table 7.2 Surface Water Monitoring Locations

Monitoring Point	Description
SD1 (SW1)	Main Storage Dam licensed discharge point
SB2 (SW2)	Bottom Working Dam licensed discharge point
SD3 (SW3)	Coxs River Control (Upstream)
SD4 (SW4)	Coxs River Receiving (Downstream)

Surface water monitoring was carried out during the reporting period as outlined in **Table 7.3.**

Table 7.3 Summary of Surface Water Monitoring

Parameter	Monitoring Required	Monitoring in Reporting Period
SD3 and SD4: General	Monthly	SD3 and SD4: Sampled monthly; analysis all months except July.
SD3 and SD4: Oil and Grease; Metals	Quarterly	Not undertaken
SD1 and SB2: General	Quarterly, or monthly during discharge	SD1: December 2022 and March 2023
		SB2: August and December 2022

There were no discharges from SD1 or SB2 during the reporting period.

There was an administrative non-compliance against Schedule 3, Condition 18 of DA 344-11-2001 as a result of non-adherence to the SWMP monitoring schedule, including:

- There was no analysis of the July 2022 samples from SD3 and SD4 as the samples were lost in transit.
- There was no analysis of metals or oil and grease for SD3 and SD4 in the reporting period.
- SD1 and SB2 were monitored twice during the reporting period instead of quarterly.
- Walker Quarries will make enquiries with an external sampling service to improve compliance with the monitoring schedule in the next reporting period.

7.2.1 Performance Criteria

EPL 13172 specifies the water quality criteria that apply to water discharged from the Quarry, which are presented in **Table 7.4**.

Table 7.4 Surface Water Monitoring Criteria

Pollutant	Unit of Measure	Criteria
TSS	mg/L	30
Sulphate	mg/L	250
Grease and Oil	mg/L	10
pH	pH unit	6.5-8.5

There was no discharge during the reporting period.

To meet the environmental management and monitoring commitments of the Quarry's environmental management plans, monthly surface water monitoring is also undertaken in the Coxs River upstream (SD3 - Cox's Control) and downstream (SD4 - Cox's Receiving) of the Quarry (refer to **Figure 6.1**).

7.2.2 Measured Performance and Discussion

Excluding the July results that were not analysed, pH, electrical conductivity, and turbidity remained within the criteria limits throughout the reporting period.

Sulphate readings were high at the Coxs River monitoring sites in August. As the result was consistent both upstream and downstream, and there were no Quarry discharge events, it is determined that the result was non-mine contributed. In accordance with EPL 13172, the criteria did not apply and compliance was maintained.

Total Suspended Solids (TSS) was high in August and December 2022 at SB2. TSS was high at both Coxs River sites in November. It is noted that the region received high rainfall in 2022, and no discharge events occurred during the reporting year. In accordance with EPL 13172, the criteria did not apply and compliance was maintained.

Discharges

Over the reporting period, water was carefully managed and at times pumped between water storages to prevent discharge from the Quarry Site. There were no discharge events in the reporting period.

Although there were four elevated readings, it is noted that the water quality criteria only apply to water discharged from the Quarry as stipulated by EPL 13172 and the SWMP. As there were no discharge events during the reporting period, compliance with all conditions of DA 344-11-2001 and EPL 13172 is noted.

7.2.3 Water Management System/Erosion and Sediment Control

The dams, sediment basins, catchment drains and other erosion and sediment control structures of the Quarry site were observed to be generally well maintained.

In the 2022 Annual Review, it was identified that the water storage capacity for SB2 had not been maintained as nominated in the SWMP. During this reporting period the storage capacity for SB2 was increased from 2.8 ML to 4.0 ML, to minimize the risk of discharge and with consideration of the loss of total dirty water storage capacity resulting from the impending removal of SB1. There were no discharge events during the reporting period.

The SWMP and Erosion and Sediment Control Plan (ESCP) state that sediment basins are to be maintained as 'dry structures' to maintain storage capacity up to the design rainfall conditions (56.4 mm over 5 days). At the July inspection, SB2 was holding water. However, due to the increase in total capacity during the reporting year, the minimum required water storage capacity for the rainfall conditions specified in Condition O4.3 of EPL 13172 was maintained (refer to **Photo 7.1**). Quarry management confirmed that sediment dams and silt cells are regularly excavated to remove consolidated silt which is transferred to drying cells for eventual use in rehabilitation.

Photo 7.1 SB2 was observed to hold water at the July inspection, but the nominated storage capacity was maintained in compliance with the SWMP

With the construction of the new wheel wash, the flow and collection of water from the Quarry access road and office area was modified. As a consequence, there was no flow of water to SB5 which is now redundant. With the construction of the upgraded Wash Plant, the Top Working Dam (SB1) and silt cells to the north of the extraction area were also made redundant.

At the time of the July 2023 inspection these water management areas were in the process of being decommissioned, which is expected to be completed in the next reporting period. SB5 is anticipated to be rehabilitated, while the Top Working Dam and silt cell area will be utilised for infrastructure and processing activities until the pit development reaches that area, which is forecast to occur within 3 years.

The SWMP and ESCP will be updated in the next reporting period to reflect the aforementioned changes to the Water Management System.

General compliance with consent conditions was noted.

7.3 Groundwater

7.3.1 Predicted Impacts and Performance Criteria

There are no prescribed groundwater monitoring criteria in DA 344-11-2001 or EPL 13172. The elevation of the local water table is monitored to prevent unanticipated intersection by extraction operations at the Quarry, which is considered unlikely above an elevation of 900 m AHD.

Extraction below the groundwater table has not been approved by DA 344-11-2001 and as a result no impact on local groundwater levels, bores or ecosystems is likely.

7.3.2 Measured Performance and Discussion

To meet the commitments of the Quarry's environmental management plans, groundwater monitoring at three bores (GW1, GW2 and GW3) continued during the reporting period, which included groundwater levels (elevation) and groundwater quality.

7.3.2.1 Groundwater Levels

No groundwater was encountered within the extraction area and the elevation of the extraction area remained above 940 m AHD.

During the reporting period, all three groundwater bore levels were recorded by an external sampling service, the environmental consultant and by data logger as outlined in **Table 7.5**.

Table 7.5 Monitoring of Groundwater Levels

Monitoring By	Method	When
External Sampling Service	Manual	November 2022 and March 2023.
Environmental Consultant	Manual	December 2022, March and July 2023.
Data Logger	Automated data logging	Continuous at 6-hour intervals. Downloaded December 2022, March and July 2023.

Continuous monitoring of these bores is undertaken by down-hole data loggers which monitor groundwater levels at a 6-hourly frequency. The data loggers are owned by the Quarry and downloaded approximately quarterly by an environmental consultant.

The frequency of downloads was a minor administrative non-compliance against Schedule 3, Condition 18 of DA 344-11-2001 relating to non-adherence to the approved SWMP. Walker Quarries will ensure future downloads occur quarterly in accordance with the SWMP.

Groundwater level results obtained using the three methods are provided in **Figures 7.1**, **7.2** and **7.3.**

The levels recorded by the data logger and environmental consultant were similar for all bores. GW2 and GW3 levels remained consistent with previous years, and relatively stable throughout the reporting period.

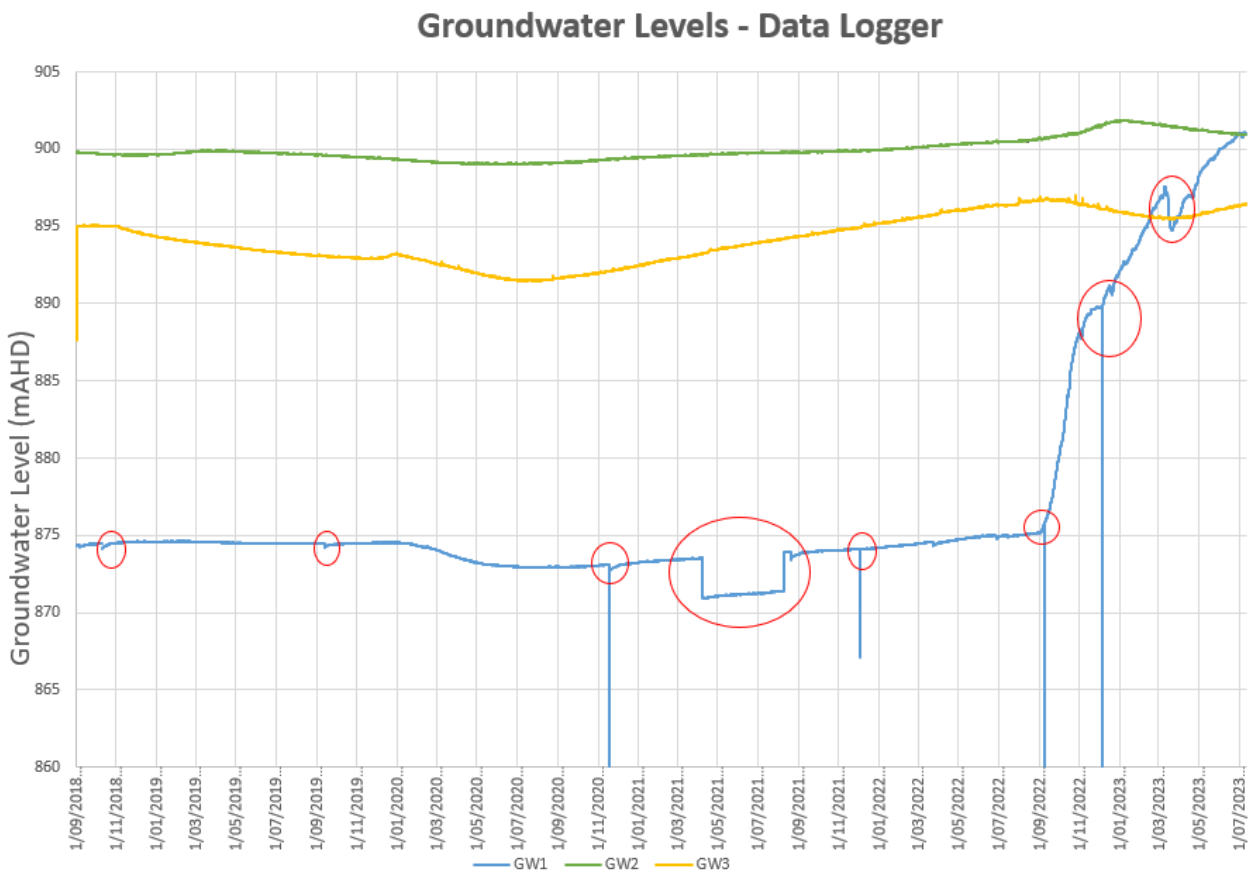
Both the data logger and environmental consultant identified an increase in the level of GW1 from September 2022 until the end of the reporting period. This increase was not detected by the external sampling service and the reason for the discrepancy has not yet been determined.

With the GW1 logger experiencing a history of data logger and pressure sensor errors, this was initially assumed to be the cause of the rise, although manual readings taken by the environmental consultant appear to confirm the increase.

The environmental consultant has commenced an initial investigation, with the following possibilities being considered:

- GW1 may intersect multiple geological units.
- The data logger may be experiencing errors, providing incorrect data.
- Surface water may have entered the bore.
- The investigation will continue as necessary in the next reporting period.

Groundwater was not encountered during quarry operations in the reporting period.



Note: The GW1 logger has a history of periodic logger errors and pressure sensor failures which are circled in red.

Figure 7.1 Groundwater Levels – Logger Data Results

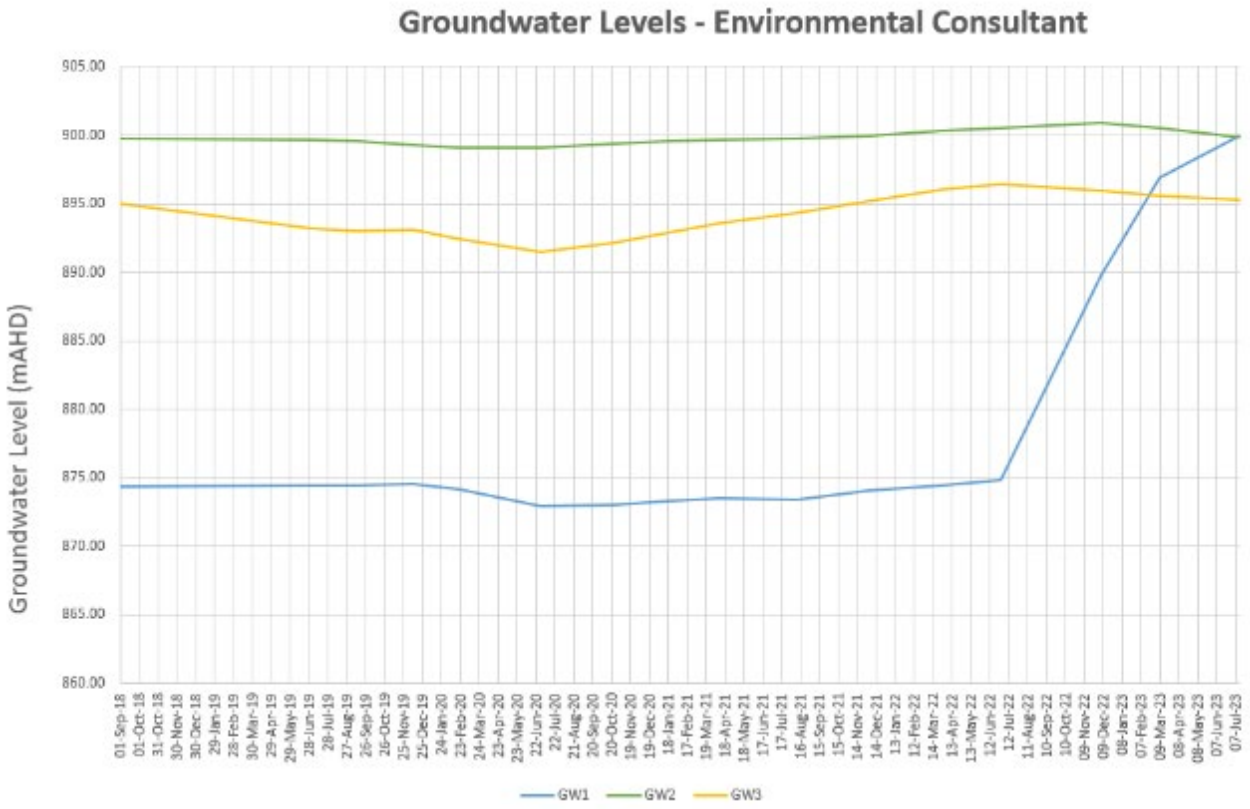
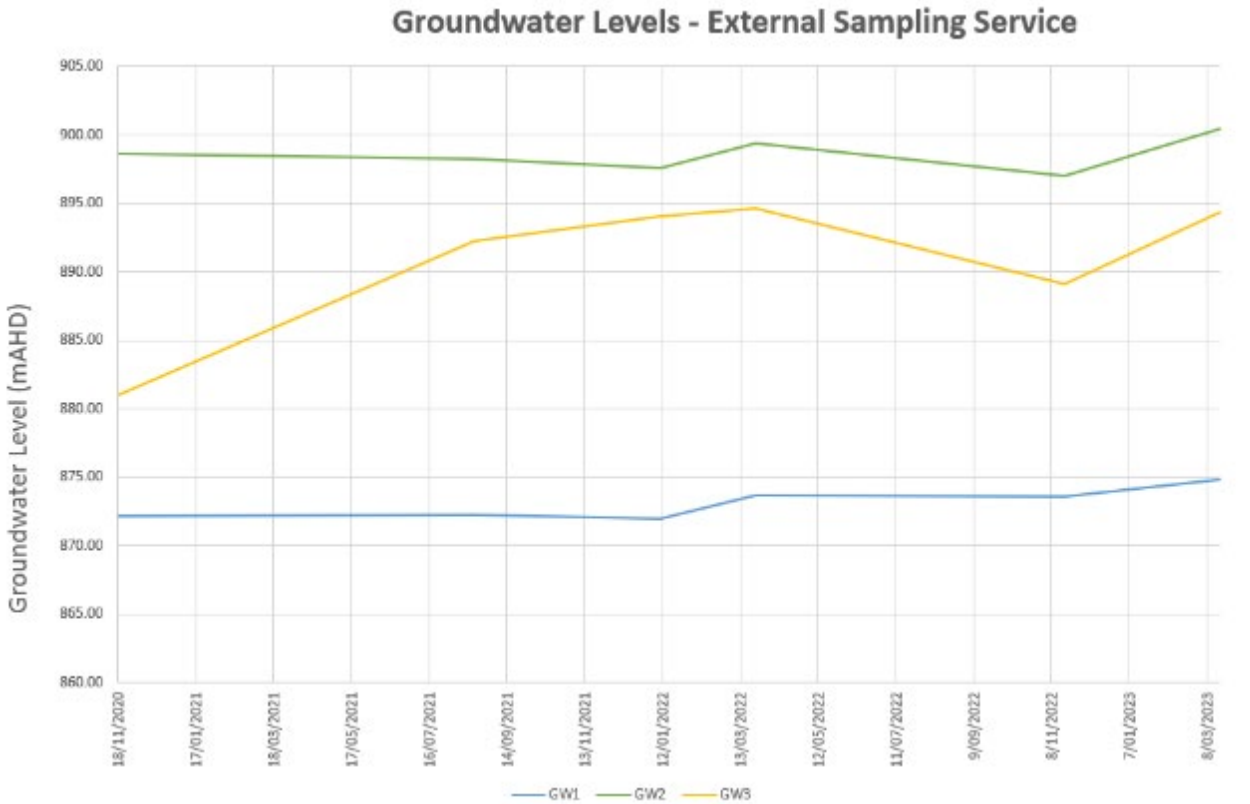


Figure 7.2 Groundwater Levels – Environmental Consultant Results



Source: ALS Limited

Figure 7.3 Groundwater Levels – External Sampling Service Results

7.3.2.2 Groundwater Quality

Samples were collected from the groundwater bores (GW1, GW2 and GW3) for metals analysis in November 2022 and March 2023. The November sample was taken 8 months after the previous sample (March 2022) which is a minor administrative non-compliance against the SWMP, which states sampling is to occur at least every six months.

No criteria apply to the groundwater quality monitoring which is for the establishment of baseline concentrations only.

8.0 Rehabilitation

8.1 Rehabilitation Performance during the Reporting Period

No areas of the Quarry Site became available for rehabilitation during the reporting period due to the ongoing approved activities requiring use of existing disturbance areas. Rehabilitation activities were limited to:

- Vegetation established on the Visual Amenity Bund adjacent to the Great Western Highway was maintained. La Nina conditions during the reporting period has allowed the vegetation to develop and areas are considered stable (see **Photo 8.1**).
- Natural revegetation of the batters to the south of the weighbridge (along the haul road), east of the MSA and on the batter slopes of the silt cells and storage dams continued.
- Rehabilitation areas either side of the Quarry entrance were maintained.
- Walker Quarries has retained and promoted the re-establishment of significant vegetation throughout the Quarry Site. This promotes ground stability, filtration of runoff and future re-establishment of vegetation.
- The Quarry site is subject to severe winter conditions including frequent sub-zero temperatures, heavy frosts and snowfall, which has prevented successful establishment of some juvenile plants. It is believed that tubestock previously planted around the Quarry entrance have been impacted by these winter conditions.
- A targeted weed management campaign was undertaken across the rehabilitated areas of the site in March 2023. Weed spraying locations are identified in **Figure 6.1.**

Photo 8.1 Vegetation on Visual Amenity Bund

Table 8.1 provides a summary of the disturbance and rehabilitation areas.

Table 8.1 Rehabilitation Status

Mine Area Type	Previous Reporting Period (Actual) (ha)	This Reporting Period (Actual) (ha)	Next Reporting Period (Forecast) (ha)
A. Total mine footprint	19.8	20.1	0
B. Total active disturbance	17.2	17.03[1]	17.13
C. Land being prepared for rehabilitation	0	0	0
D. Land under active rehabilitation	2.6	3.07[1]	3.2
E. Completed rehabilitation	0	0	0

Note 1: Spatial data has been reviewed and updated for accuracy during the reporting year, resulting in minor changes to the figure for Total Active Disturbance and Land Under Active Rehabilitation, even though no new areas were rehabilitated.

8.2 Rehabilitation Actions for the Next Reporting Period

As all areas of disturbance will be required for ongoing Quarry operations, no major rehabilitation activities are proposed for the next reporting period. Although, all existing rehabilitation areas are now considered stable, they will continue to be monitored with maintenance undertaken as required.

The following actions are planned for the next reporting period:

- The RMP update will be finalized in the first half of the next reporting period and submitted to DPE.
- The inaugural Annual Rehabilitation Report will be submitted to RR, outlining disturbance and rehabilitation activities for the period 15 July 2022 – 14 July 2023.
- A new Forward Program will be submitted to RR, providing forecast rehabilitation and disturbance for the next three years.

8.3 Compliance

It could not be verified that the RMP (formerly incorporated into the Mining Operations Plan (MOP) (Umwelt, 2020)) was provided to DPE within 3 months of the determination of MOD 3, which is a historical administrative non-compliance against Schedule 3, Condition 31(c) identified during this reporting period. It is noted that the MOP incorporating the RMP at the time was provided to RR in accordance with Mining Lease requirements, and was approved.

The current RMP was prepared in accordance with RR's *Form and Way: Rehabilitation Management Plan (Large Mines)* to satisfy the Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021. The RMP has been the subject of review which commenced in the final quarter of the reporting period. It was unable to be finalized during the period due to the request of RR to update the proposed Rehabilitation Objectives and Final Landform and Rehabilitation Plans, which form a key component of the RMP. The RMP will be finalized in the next reporting period and submitted to DPE.

No additional rehabilitation non-compliances were identified.

9.0 Community

9.1 Consultation and Community Engagement

9.1.1 Community Consultative Committee

Two meetings of the Wallerawang Quarry Community Consultative Committee (CCC) were held during the reporting period:

- 22 November 2022
- 30 May 2023.

The Quarry staff present at the meeting provided information about Quarry operations, planning and compliance matters, and answered questions. Minutes are presented on the Walker Quarries website once tabled at the following CCC meeting.

Following the May 2023 CCC meeting, Quarry Management resolved to present graphs at future CCC meetings to summarise environmental performance.

9.1.2 Other Consultation

Walker Quarries hosted a stall at the Lithgow Business Exhibition in Portland on 6 – 7 May 2023. The event provided an opportunity to field a wide range of enquiries from the public, industry and government agencies, and to supply information sheets as requested.

Walker Quarries maintains an open door policy and has offered to provide local community members with 'tours' of the Quarry if requested. Both the Quarry Manager and Operations Manager have indicated they are happy to field queries and respond to issue of concern.

9.2 Complaints

Walker Quarries maintains a monthly complaints register on the company website in accordance with Schedule 5, Condition 17(a(x)) of DA 344-11-2001. During the reporting period, no complaints were received from the community**.** One complaint was received from the EPA regarding dust on 22 November 2022, which is discussed further in **Section 11.2**.

9.3 Compliance

No non-compliances were identified with regard to community consultation.

10.0 Independent Audit

10.1 Requirement

In accordance with the requirements of Schedule 5, Condition 13 of DA 344-11-2001 the next Independent Environmental Audit (IEA) of the Quarry is to be completed prior to the end of June 2024.

10.2 Independent Environment Audit

The next IEA is due to be completed by the end of June 2024. Quarry Management will prepare for and facilitate the IEA during the next reporting period.

10.3 Compliance

Compliance with Schedule 5, Condition 13 was noted.

11.0 Incidents and Non-Compliances during the Reporting Period

11.1 Incidents

There were no incidents as defined by DA 344-11-2001 in the reporting period and no non-compliances against Schedule 5, Condition 9 were identified.

11.2 Warnings, Notices and Additional Regulatory Authority Advice

EPA - Show Cause Notice and Formal Warning

The EPA issued a Show Cause Notice dated 12 December 2022 regarding the observation of dust leaving the Quarry site on 22 November 2022. The dust appeared to originate from the operation of the mobile processing equipment in an elevated position, combined with a sudden onset of high wind.

Walker Quarries responded on 30 January 2023, providing:

- The reasons why the mobile processing equipment was not being operated below ground level.
- A description of actions taken to minimise the impacts of the incident in compliance with the AQMP, including the cessation of crushing operations.
- Meteorological and air quality monitoring data.
- The findings of an investigation by Umwelt that concluded no breaches of EPL conditions or legislation occurred.

The EPA responded on 31 March 2023 and recommended "Walker Quarries review its air quality management system and refine the trigger action response for the premises, especially in relation to system notifications for wind speeds above 4.0 m/s."

It is noted that Walker Quarries has since arranged automated notifications for elevated PM readings and high wind speeds (August 2023).

During the next reporting period, Walker Quarries intends to (refer to **Section 12.0**):

- Review the AQMP and Air Quality Trigger Action Response Plan.
- Relocate the mobile processing equipment to within the pit (refer to **Section 4.4.3**) to minimize the risk of dust leaving the Quarry site.

RR - Notice

As discussed in **Sections 6.4.2** and **6.12**, RR issued Notice NTCE0012363 on 8 June 2023, directing Walker Quarries to review and update the Quarry Safety Management System (SMS), which includes the BMECP and BFMP to reflect the requirements of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 (WHS (MPS) Reg) and the Work Health and Safety Regulation 2017. Walker Quarries

updated the BMECP and BFMP to reflect current statutory requirements and submitted both updated management plans to RR in August 2023.

11.3 Non-Compliant Conditions

Please refer to **Table 1.2** in **Section 1.0**, which summarises the Quarry's non-compliances with conditions of DA 344-11-2001 and EPL13172 during the reporting period.

In summary, during the reporting period the following non-compliances are reported.

- DA 344-11-2001, Schedule 2, Condition 2(a): The condition states that the development may only be carried out in compliance with the conditions of this consent. As documented below, some administrative, low and medium risk non-compliances with conditions of DA 34-11-2001 have been noted.

- DA 344-11-2001, Schedule 3, Condition 14: The condition states Walker Quarries must implement the approved AQMP as approved from time to time by the Secretary. Walker Quarries did not adhere to the particulate matter monitoring frequency as nominated in the AQMP (continuous monitoring).

- DA 344-11-2001, Schedule 3, Condition 18: The condition states Walker Quarries must implement the approved SWMP as approved from time to time by the Secretary. Walker Quarries did not adhere to the nominated surface water and groundwater monitoring schedule as approved in the SWMP, which is an administrative non-compliance.

- DA 344-11-2001, Schedule 3, Condition 31(c): The condition requires that the Applicant must prepare an RMP to the satisfaction of RR, and that it must be submitted to RR and DPE for approval within three months of the determination of MOD3. The RMP (as part of the MOP at the time) was submitted to RR and approved, but it could not be verified that the RMP was submitted to DPE, which is an historical administrative non-compliance identified during this reporting period.

- DA 344-11-2001, Schedule 3, Condition 32: The condition states Walker Quarries must implement reasonable and feasible measures to minimise the visual and off-site lighting impacts of the development. The mobile processing equipment, KIS Stockpile, and upgraded wash plant are visible from the east-bound lanes of the Great Western Highway. This is a low-risk non-compliance.

- DA 344-11-2001, Schedule 5, Condition 3(b(i)): The condition states that management plans required under the consent must be prepared in accordance with relevant guidelines and include details of the relevant statutory requirements. References to legislation in the BMECP and BFMP were not up to date which is an administrative non-compliance and has since been rectified.

- DA 344-11-2001, Schedule 5, Condition 10: The condition requires Walker Quarries to notify DPE of a non-compliance within seven days of becoming aware of the non-compliance. Walker Quarries did not previously notify DPE of the non-compliances identified in this Annual Review.

- DA 344-11-2001, Schedule 5, Condition 17(a(vii)): The condition states that the Applicant (Walker Quarries) must include a comprehensive summary of the monitoring results from the development on its website. It was identified that Walker Quarries did not have particulate matter and groundwater monitoring results available on its website, which is an administrative non-compliance and has been rectified.

- EPL 13172, Condition M2: The condition requires continuous monitoring of PM_{10} and $PM_{2.5}$. Due to the DMP requiring off-site repairs, monitoring was not continuous throughout the reporting period.

11.4 General Compliance

For each of the non-compliances identified, Walker Quarries has identified and either commenced or has a plan in pace to commence actions to return the Quarry to compliance. Where necessary, Walker Quarries has liaised with regulatory agencies throughout the reporting year to develop satisfactory plans to rectify any identified issues.

The preparation of this Annual Review has identified some opportunities for improvement to ensure the environmental monitoring program and results remain compliant with all management plans and performance criteria. **Section 12.0** provides an overview of key actions to be undertaken in the next reporting period to improve and maintain compliance at the Quarry.

Environmental inspections, implementation of the Compliance Manager and preparation for the pending IEA will allow compliance to be tracked in close detail. These actions are expected to facilitate early identification of non-conformances with environmental commitments and minimize the risk of environmental harm.

12.0 Activities to be Completed in the Next Reporting Period

Key actions to be completed during the next reporting period are summarised in **Table 12.1**.

Table 12.1 Activities to be Completed in the Next Reporting Period

Action	Relating to	Responsibility	Planned completion
• Arrange automatic notifications when the DMP detects elevated PM levels.	AQMP	Quarry Manager	August 2023 (completed)
• Arrange automatic notifications when the meteorological station detects high wind speeds.	AQMP	Quarry Manager	August 2023 (completed)
• Submit updated BFMP and BMECP to NSW RR	RR Notice NTCE0012363; BFMP; BMECP.	Quarry Manager / Operations Manager	August 2023 (completed)
• Submit Annual Rehabilitation Report to RR	ML 1633	Operations Manager / Appointed Environmental Consultant	September 2023 (completed)
• Submit Forward Program to RR	ML 1633	Operations Manager / Appointed Environmental Consultant	September 2023 (completed)
• Increase height of extraction area visual amenity bund by approximately 1 m.	DA 344-11-2001, Schedule 3, Conditions 32 and 34	Quarry Manager	September 2023
• Seek quotes from a qualified sampler to meet compliance with the approved air quality and water quality monitoring programs.	AQMP; SWMP	Quarry Manager / Appointed Environmental Consultant	September 2023 (completed)
• Review and advise DPE of any intention to modify Quarry management plans.	DA 344-11-2001, Schedule 5, Condition 5	Quarry Manager / Appointed Environmental Consultant	November 2023
• Review the AQMP and update the Air Quality Trigger Action Response Plan	AQMP; EPL 13172, Conditions O1.1 and O3.1	Quarry Manager / Appointed Environmental Consultant	December 2023
• Update and resubmit relevant management plans to DPE.	DA 344-11-2001, Schedule 5, Condition 5.	Quarry Manager / Appointed Environmental Consultant	December 2023
• Mobile crushing operations within the extraction area will be relocated to the long-term position within the pit.	DA 344-11-2001, Schedule 3, Condition 4(a); AQMP	Quarry Manager / Operations Manager	March 2024

Action	Relating to	Responsibility	Planned completion
• Arrange for completion of 2024 IEA by a qualified independent consultant.	DA 344-11-2001, Schedule 5, Condition 13	Quarry Manager	June 2024
• Completion of decommissioning of SB5, and update SWMP.	SWMP	Quarry Manager	June 2024
• Completion of decommissioning of SD2 (Top Working Dam) and silt cells north of the pit, and update SWMP.	SWMP	Quarry Manager	June 2024
• Rehabilitation across the Quarry Site will continue to be visually inspected by the environmental consultant.	Rehabilitation Management Plan; ML 1633	Quarry Manager	June 2024
• Complete and document an investigation into installation of a weir upstream of SB2 / install if confirmed as appropriate.	SWMP; EPL 13172 Condition O4.1	Quarry Manager / Operations Manager	June 2024, or as time permits
• Continue investigation into GW1 groundwater level increase.	SWMP	Quarry Manager / Appointed Environmental Consultant	Until complete
• Continue investigation to resolve DMP technical issues with external provider.	AQMP	Quarry Manager	Until complete

13.0 References

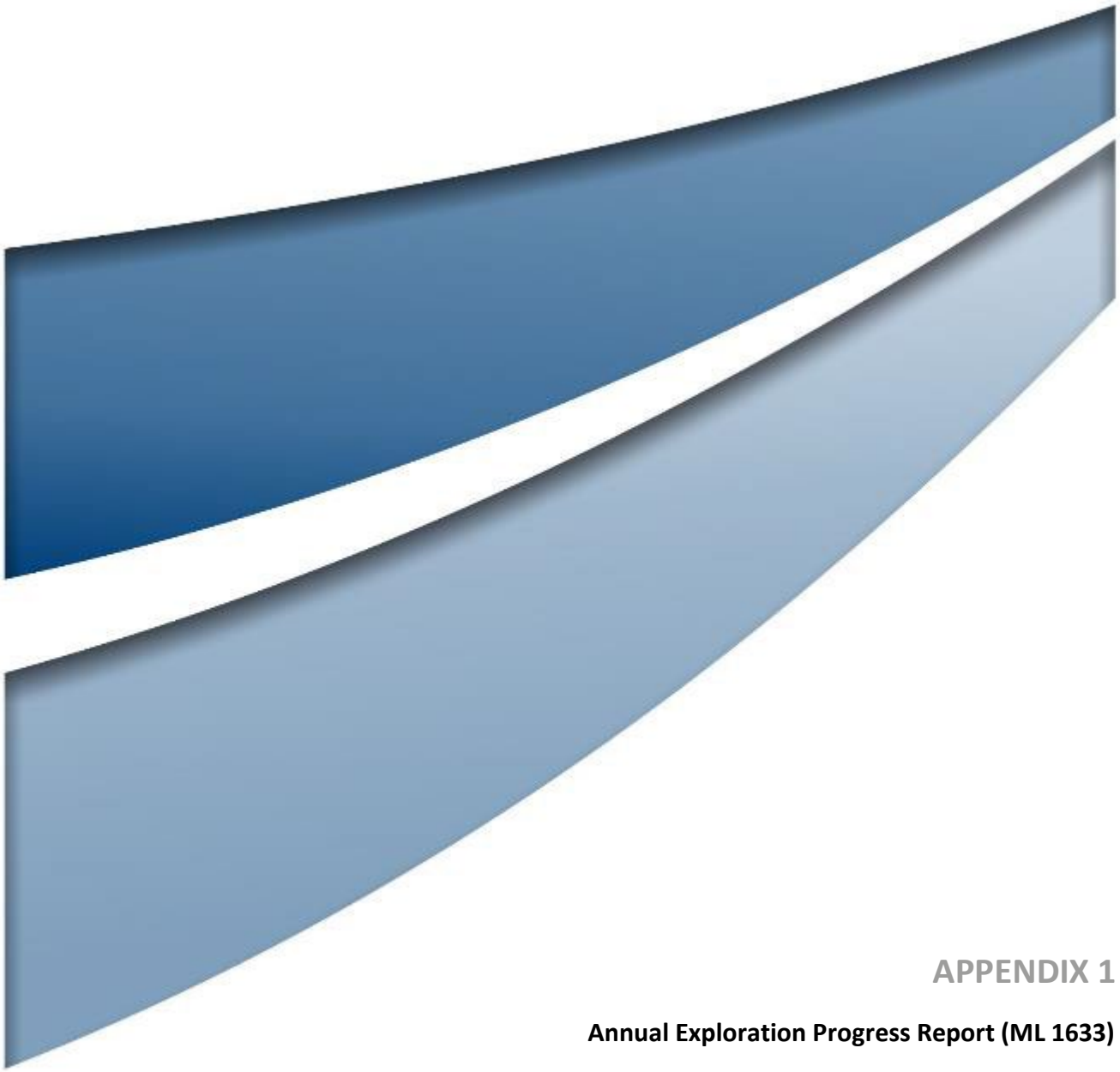
Ecoplanning Pty Ltd (Ecoplanning) (2023). *Biodiversity Monitoring 2022 Walker Quarry, Wallerawang, NSW*. Prepared for: Walker Quarries Pty Limited, 1 May 2023. Version: Draft.

Muller Acoustic Consulting Pty Ltd (MAC) (2019). *Noise and Vibration Impact Assessment, Wallerawang Quarry, Wallerawang NSW.* Prepared for Umwelt (Australia) Pty Ltd, May 2019. Version: Final.

Muller Acoustic Consulting Pty Ltd (MAC) (2022). *Noise Monitoring Assessment Wallerawang Quarry, September 2022*. Prepared for Walker Quarries, September 2022. Version: Final

Muller Acoustic Consulting Pty Ltd (MAC) (2023). *Noise Monitoring Assessment Wallerawang Quarry, March 2023*. Prepared for Walker Quarries, April 2023. Version: Final

Umwelt (Australia) Pty Ltd (Umwelt) (2020). Mining Operations Plan (incorporating Rehabilitation Management Plan) for the Wallerawang Quarry, July 2020.



APPENDIX 1

Annual Exploration Progress Report (ML 1633)

Noise Monitoring Assessment

Wallerawang Quarry
September 2022

Prepared for: Walker Quarries Pty Ltd
September 2022
MAC160392RP12

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Wallerawang Quarry, September 2022

Prepared for: Walker Quarries Pty Ltd

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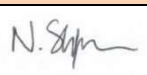
Document ID	Date	Prepared By	Signed	Reviewed By	Signed
MAC160392RP12	23 September 2022	Nicholas Shipman		Oliver Muller	

CONTENTS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Walker Quarries Pty Ltd to complete a bi-annual Noise Monitoring Assessment (NMA) for Wallerawang Quarry ('the quarry'). This assessment has been undertaken as the second bi-annual assessment for 2022 (September 2022).

The NMA involved quantifying the noise contribution of the quarry by direct attended measurements to compare quarry emissions against relevant criteria. Monitoring has been conducted at four representative receiver locations in accordance with the Walker Quarry Noise Management Plan (NMP) and the quarry's Environmental Protection License (ref: 13172). An additional measurement at a nearfield reference location was also conducted to verify the operation of quarry plant and to quantify the noise contribution from site.

The assessment has been conducted in accordance or with reference to the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence EPL 13172 (EPL);
- Development Consent 344-1-2001 (Mod 3), February 2020;
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures;
- Muller Acoustic Consulting Pty Ltd (MAC), Noise and Vibration Impact Assessment (NVIA), 2019; and
- Umwelt, Wallerawang Quarry Noise Management Plan (NMP), 2019.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 Noise Criteria

2.1 Environmental Protection License Noise Limits

Table 1 reproduces the noise criteria for the quarry as per Condition L4.1 of EPL 13172.

Table 1 EPL Noise Limits, dBA

Location	Day	Evening	Night
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$
All privately owned residences	43	43	39

Note: Day Period is 7am to 6pm, Evening Period is 6pm to 10pm, Night Period is 10pm to 7am.

It is noted that Condition L4.3 of EPL 13172 identifies conditions under which the noise criteria do not apply and include:

a) Wind speeds greater than 3m/s at 10m above ground level;

b) Temperature inversion conditions greater than 3 degrees Celsius / 100m; or

c) Under "non-significant weather conditions".

2.2 Development Consent Noise Limits

Schedule 3 of the site's Development Consent (DA344-11-2001) outlines applicable noise criteria for the operation of the quarry. **Table 2** reproduces the criteria as outlined in the development consent.

Table 2 Development Consent Noise Limits, dBA

Location	Day	Evening	Night
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$
All privately owned residences	43	43	35

Additionally, Condition 3B of Schedule 3 of the Development Consent states, '*The noise criteria in Table 2 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.*'

2.3 Variance in noise limits

It is noted that the night-time criteria presented in the Development Consent differs from that outlined in the EPL. This is due to the consent being updated to reflect the recent modification for site. Hence, the more conservative criteria outlined in the consent have been adopted for this assessment. Notwithstanding, as the quarry is not operational during the night period, the variance in the applicable noise criteria is inconsequential.

2.4 Quarry Plant Sound Power Noise Limits

Table 15 of the Noise and Vibration Impact Assessment (NVIA) (Muller Acoustic Consulting Pty Ltd, April 2019) prepared for the Environmental Impact Statement (EIS) (Umwelt (Australia)) sets out the noise targets for mobile plant operating at the quarry. The logarithmic site total sound powers are reproduced in **Table 3.**

Table 3 Quarry Plant Sound Power Levels, dBA (re 10^{-12} Watts)

Noise Source/Item	Total dBA
Sandvik Crusher	111
Pugmill	108
Service Vehicle	82
Wirtgen Kleeman Secondary/Tertiary Crusher	111
Wirtgen MR130Z Track Mounted Impact Crusher	113
Wirtgen Kleeman Cone/Sand Plant	110
Wirtgen Kleeman Screen	111
Drill	115
Cat D8 Dozer	111
Komatsu PC450 Excavator	109
Komatsu Loader	99
Komatsu WA500 Loader	105
Komatsu WA480 Wheel Loader	100
Komatsu HM400 Articulated Dump Truck (x3)	106
Volvo 6 Wheeled Water Cart	101
Manitou	96
Standard Road Truck (x3)	102
Total Site Sound Power	**121**

3 Methodology

3.1 Locality

Wallerawang is located approximately 10km to the north west of Lithgow, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential and for consistency the naming conventions for each receiver has been retained from the NMP. It is noted that N4 has been added to the assessment, although has not been retained from the NMP. The monitoring locations with respect to the quarry are presented in **Table 4** and graphically in the locality plan shown in **Figure 1**.

Table 4 Receiver Locations

ID	Address	Distance to Quarry Boundary
RL1	Reference Location (adjacent to site office)	N/A
N1	139 Gemalong, Marrangaroo, NSW	1200m
N2	987 Great Western Highway, Marrangaroo, NSW	400m
N3	2 Cypress Close, Wallerawang, NSW	550m
N4	42 Rocky Waterhole Drive, Wallerawang, NSW	980m

3.2 Environmental Noise Assessment Methodology

The attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise", the EPL and NMP. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Wednesday 7 September 2022. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Two daytime measurements of 15-minutes in duration were completed at each monitoring location during standard onsite operations. Where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis to calculate the $LA_{eq(15min)}$ quarry noise contribution for comparison against the relevant EPL limits.

FIGURE 1

LOCALITY PLAN

REF: MAC160392

0 200m

KEY

- N1 — RECEIVER/MONITORING LOCATION
- RL1 — REFERENCE LOCATION
- SITE LOCATION

MAC
Muller Acoustic Consulting

*Imagery Source : nearmaps

4 Results

4.1 Assessment Results –Reference Location (RL1)

Operational attended noise monitoring was completed at RL1 on Wednesday 7 September 2022. **Table 5** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 5 Operator-Attended Noise Survey Results – Reference Location 1 (RL1)

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit[1]	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
07/09/2022	09:05	82	65	55	N/A	WS: 0.4m/s WD: E Rain: Nil	Traffic 52-82 Quarry generator 41-57 Quarry water cart 66-71
Quarry Site $L_{Aeq(15min)}$ Contribution							68
07/09/2022	10:15	75	65	55	N/A	WS: 0.2m/s WD: E Rain: Nil	Traffic 62-75 Quarry generator <54 Quarry water cart 61-72 Quarry reverse alarms 62-68
Quarry Site $L_{Aeq(15min)}$ Contribution							66

Note 1: EPL not applicable for this onsite reference location.

4.2 Assessment Results – Location N1

Operational attended noise monitoring was completed at N1 on Wednesday 7 September 2022. **Table 6** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 6 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
07/09/2022	07:48	77	62	48	43	WS: 0.2m/s WD: E Rain: Nil	Traffic 39-54 Birds 39-59 Roadworks 39-77 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<38
07/09/2022	11:58	73	56	44	43	WS: 1.3m/s WD: E Rain: Nil	Traffic 40-73 Birds 40-54 Dog bark <46 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<34

Note 1: Quarry Site $L_{Aeq(15min)}$ calculated based on nearfield measurements.

4.3 Assessment Results – Location N2

Operational attended noise monitoring was completed at N2 on Wednesday 7 September 2022. **Table 7** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 7 Operator-Attended Noise Survey Results – Location N2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
07/09/2022	09:45	69	45	37	43	WS: 0.2m/s WD: E Rain: Nil	Traffic 34-62 Birds 39-69 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<27
07/09/2022	10:55	65	48	41	43	WS: 0.6m/s WD: E Rain: Nil	Traffic 39-58 Birds 38-65 Wind in trees <40 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<31

Note 1: Quarry Site $L_{Aeq(15min)}$ calculated based on nearfield measurements.

4.4 Assessment Results – Location N3

Operational attended noise monitoring was completed at N3 on Wednesday 7 September 2022. **Table 8** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 8 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
07/09/2022	08:10	61	52	42	43	WS: 0.6m/s WD: E Rain: Nil	Traffic 36-61 Birds 36-57 Dog bark 36-44 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<32
07/09/2022	11:17	95	73	40	43	WS: 0.2m/s WD: E Rain: Nil	Traffic 35-62 Birds 41-49 Dog bark 48-95 Insects <35 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<30

Note 1: Quarry Site $L_{Aeq(15min)}$ calculated based on nearfield measurements.

4.5 Assessment Results – Location N4

Operational attended noise monitoring was completed at N4 on Wednesday 7 September 2022. **Table 9** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 9 Operator-Attended Noise Survey Results – Location N4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
07/09/2022	08:34	73	53	47	43	WS: 0.6m/s WD: E Rain: Nil	Traffic 44-62 Birds 45-73 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<37
07/09/2022	11:37	65	51	46	43	WS: 1.2m/s WD: E Rain: Nil	Traffic 42-65 Birds 42-51 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<36

Note 1: Quarry Site LAeq(15min) calculated based on nearfield measurements.

4.6 Assessment Results – Sound Power Audit

Near field measurements of plant and equipment were also completed to determine their operating sound power levels. The measurements were conducted in general accordance with AS 5331:2019 – Acoustics – Determination of sound power levels of noise sources – Guidelines for the use of basic standards. Results of the analysis identify that the overall sound power of items of plant used at the project site are below target sound power levels outlined in the EIS and NVIA and are presented in **Table 10**.

Table 10 Sound Power Levels, L_{Aeq}

Plant	Octave Band Centre Frequency, Lw Spectrum									Sound Power Lw	Goal[1]
	32	63	125	250	500	1k	2k	4k	8k		
Komatsu WA480 FEL	58	78	89	90	97	94	93	89	79	101	100
Screen and Crusher	79	93	100	105	108	113	114	110	99	118	111
Volvo 6 Wheeled Water Cart	66	82	92	89	96	100	100	96	88	105	101
Wirtgen Kleeman Cone/Sand Plant	76	87	90	97	103	104	103	100	90	109	110
Total Site Sound Power										**118**	**121[2]**

Note 1: These are the SWLs of individual plant modelled in the EIS / NVIA.

Note 2: This is the total SWL of all plant modelled in the EIS / NVIA.

It is noted that the sound power level of the front-end loader, water cart, screen and crusher are above the EIS levels for each item of plant. Notwithstanding, the total emissions from all onsite plant are lower than the total logarithmic sum of the total site criteria as shown in **Table 10**. Hence, the total target sound power levels are satisfied for site.

5 Noise Verification Modelling Methodology

Due to the high ambient noise levels attributed to passing traffic on the Great Western Highway, site operations are often masked at the noise monitoring locations. To verify the offsite noise levels from the quarry and correlate the established noise contributions from attended noise monitoring, predictive noise modelling was undertaken.

Noise modelling utilised the DGMR (iNoise, Version 2022.1) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613:1 and ISO 9613:2 including corrections for meteorological conditions using CONCAWE[1]. The ISO 9613 standards are the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

Site mobile and fixed equipment was positioned in locations representative of the areas in which they were operating during the attended noise monitoring survey (7 September 2022). The results of the predictive modelling are presented in **Section 6** and compared to the measured site contribution from the attended monitoring.

[1] Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

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6 Discussion

6.1 Discussion of Results – Reference Location (RL1)

Noise measurements were conducted on Wednesday 7 September 2022 when Wallerawang Quarry was operating at normal production levels, which included use of crusher train, mobile screen, front-end loader, excavator, road trucks and water cart.

The noise contribution from the quarry at the reference location was 68dB $L_{Aeq(15min)}$ and 66dB $L_{Aeq(15min)}$ respectively. The noise environment at the reference location was primarily dominated crushing activities and weigh bridge operations.

6.2 Discussion of Results – Location N1

Measurements conducted Wednesday 7 September 2022 identified that Wallerawang Quarry noise was inaudible during both measurements conducted at N1 with contributions measured between <38dB $L_{Aeq(15min)}$ and <34dB $L_{Aeq(15min)}$ respectively. and satisfied the relevant noise limits of 43dB $L_{Aeq(15min)}$ for this location. Extraneous non-quarry related sources included highway traffic, roadworks, dog bark and birds, that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N1, which included distance loss, the surrounding topography and air absorption, was <32dBA, which is consistent with the site being inaudible at this location during the attended noise monitoring. This level is also significantly lower than the ambient dominant sources which generally masks site noise emissions.

6.3 Discussion of Results – Location N2

Measurements conducted on Wednesday 7 September 2022 identified that Wallerawang Quarry noise was inaudible during both measurements conducted at N2, with contributions measured between <27dB $L_{Aeq(15min)}$ and <31dB $L_{Aeq(15min)}$ respectively. Therefore, the relevant noise limit of 43dB $L_{Aeq(15min)}$ was satisfied. Extraneous non-quarry related sources included traffic, birds and wind in trees that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N2, which included distance loss, the surrounding topography and air absorption, was <36dBA, which is generally consistent with the measured site contribution at this location during the attended noise monitoring. This level is also significantly lower than the ambient dominant sources which generally masks site noise.

6.4 Discussion of Results – Location N3

Measurements conducted on Wednesday 7 September 2022 identified that Wallerawang Quarry noise was inaudible during both measurements conducted at N3, with contributions measured between <30dB $LA_{eq(15min)}$ and <32dB $LA_{eq(15min)}$ respectively. Therefore, the relevant noise limit of 43dB $LA_{eq(15min)}$ was satisfied. Extraneous non-quarry related sources included traffic, birds, dogs barking and insects that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N3 which included distance loss, the surrounding topography and air absorption, was <34dBA, which is consistent with the measured site contribution at this location during the attended noise monitoring.

6.5 Discussion of Results – Location N4

Measurements conducted on Wednesday 7 September 2022 for N4 were dominated by local and highway traffic. Quarry operations were inaudible during all measurements at this location with estimated contributions measured between <36dB $LA_{eq(15min)}$ and <37dB $LA_{eq(15min)}$ respectively, demonstrating that quarry contributions remained below the relevant criteria of 43dB $LA_{eq(15min)}$ for both measurements conducted at the location. Extraneous non-quarry related sources included traffic and birds that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N4, which included distance loss, the surrounding topography and air absorption, was <36dBA, which correlates with the measured site contribution at this location during the attended noise monitoring. This level is also significantly lower than the ambient dominant sources which generally masks site noise.

6.6 Discussion of Results – Sound Power Audit

The results of the sound power audit demonstrate that current plant such the front-end loader, water cart, screen and crusher used onsite exceed the relevant mobile and static sound power criteria as outlined in the NVIA. Notwithstanding, the overall emissions from combined plant on site remain below the combined site sound power criteria.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment on behalf of Walker Quarries Pty Ltd. The assessment was completed to assess Wallerawang Quarry noise emissions against relevant criteria presented in EPL 13172 and DA 344-11-2001.

Quarry noise remained inaudible at all residential locations conducted on Wednesday 7 September 2022, therefore satisfied the specified noise limits in the Noise Management Plan and Environmental Protection Licence at all locations.

All monitoring locations were dominated by extraneous sources such as traffic that predominantly masked quarry operations.

Predictive noise modelling was generally consistent with the findings of the attended noise monitoring, confirming the site the site complied with the applicable noise criteria at all assessed locations and also confirmed the site was inaudible when compared against extraneous ambient noise sources (ie masked by ambient levels).

The results of the sound power audit demonstrate that the front-end loader, water cart, screen and crusher used onsite exceed the individual sound power criteria as outlined in the NVIA. Notwithstanding, the overall emissions from combined plant on site remain below the combined site sound power criteria.

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Appendix A – Glossary of Terms

Several technical terms have been used in this report and are explained in **Table A1**.

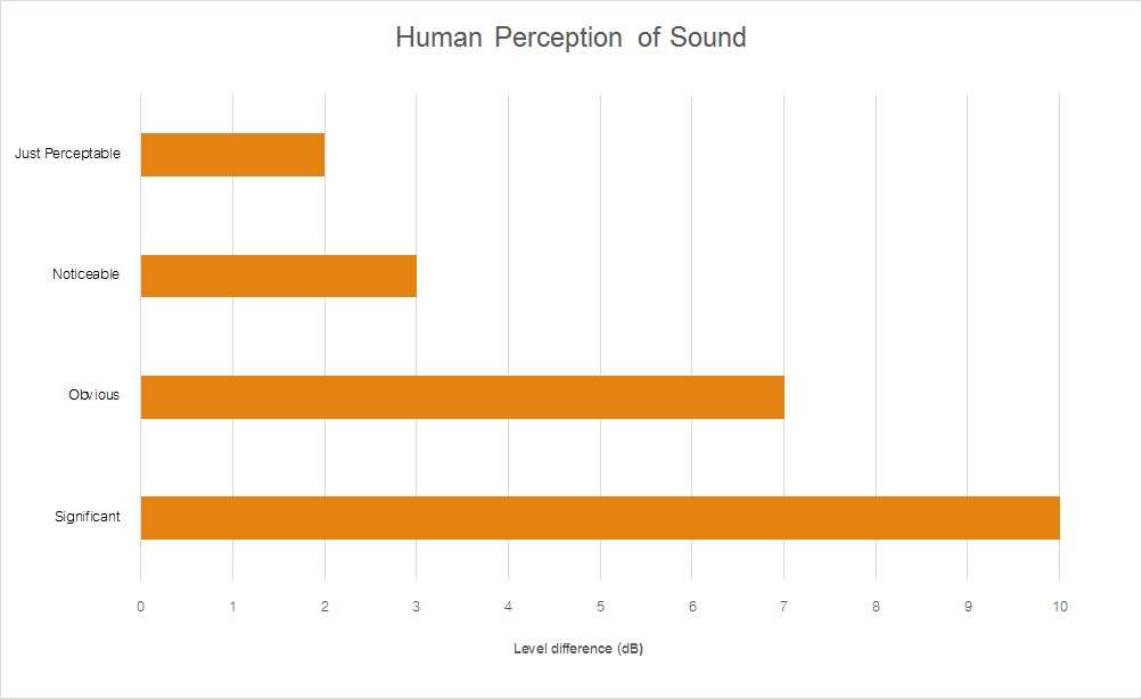
Table A1 Glossary of Terms

Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The noise associated with a given environment. Typically, a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (SWL)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Appendix B – Correspondence Register

Table B1 Correspondence Register			
Date	Contact Between	Phone/Email	Comment
Monday5 September 2022	R Heaton, A Irwin, W Chapman N Shipman	Email	Initial contact to schedule environmental compliance survey and sound power audit in September 2022
Wednesday 7 September 2022	N Shipman	On site	Site check in and survey completed

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MAC
Muller Acoustic Consulting

Noise Monitoring Assessment

Wallerawang Quarry
March 2023

Prepared for: Walker Quarries Pty Ltd
April 2023
MAC160392RP13

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Wallerawang Quarry

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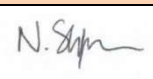
Document ID	Date	Prepared By	Signed	Reviewed By	Signed
MAC160392RP13	24 April 2023	Nicholas Shipman		Oliver Muller	

CONTENTS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Walker Quarries Pty Ltd to complete a bi-annual Noise Monitoring Assessment (NMA) for Wallerawang Quarry (the quarry). This assessment has been undertaken as the first bi-annual assessment for 2023 (March 2023).

The NMA involved quantifying the noise contribution of the quarry by direct attended measurements to compare quarry emissions against relevant criteria. Monitoring has been conducted at four representative receiver locations in accordance with the Walker Quarry, Noise Management Plan (NMP) and the quarry's Environmental Protection License (ref: 13172). An additional measurement at a nearfield reference location was also conducted to verify the operation of quarry plant and to quantify the noise contribution from site.

The assessment has been conducted in accordance or with reference to the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence EPL 13172 (EPL);
- NSW Environment Protection Authority (EPA's), Approved methods for the measurement and analysis of environmental noise in NSW, 2022;
- Development Consent 344-1-2001 (Mod 3), February 2020;
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures;
- Muller Acoustic Consulting Pty Ltd (MAC), Noise and Vibration Impact Assessment (NVIA), 2019; and
- Umwelt, Wallerawang Quarry Noise Management Plan, Version 4 (NMP), 2021.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 Noise Criteria

2.1 Environmental Protection License Noise Limits

Table 1 reproduces the noise criteria for the quarry as per Condition L4.1 of EPL 13172.

Table 1 EPL Noise Limits, dBA

Location	Day	Evening	Night
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$
All privately owned residences	43	43	39

Note: Day Period is 7am to 6pm, Evening Period is 6pm to 10pm, Night Period is 10pm to 7am.

It is noted that Condition L4.3 of EPL 13172 identifies conditions under which the noise criteria do not apply and include:

a) Wind speeds greater than 3m/s at 10m above ground level;

b) Temperature inversion conditions greater than 3 degrees Celsius / 100m; or

c) Under "non-significant weather conditions".

2.2 Development Consent Noise Limits

Schedule 3 of the site's Development Consent (DA344-11-2001) outlines applicable noise criteria for the operation of the quarry. **Table 2** reproduces the criteria as outlined in the development consent.

Table 2 Development Consent Noise Limits, dBA

Location	Day	Evening	Night
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$
All privately owned residences	43	39	35

Additionally, Condition 3B of Schedule 3 of the Development Consent states, '*The noise criteria in Table 2 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.*'

2.3 Variance in noise limits

It is noted that the night-time criteria presented in the Development Consent differs from that outlined in the EPL. This is due to the consent being updated to reflect the recent modification for site. Hence, the more conservative criteria outlined in the consent have been adopted for this assessment. Notwithstanding, as the quarry is not operational during the evening and night period, the variance in the applicable noise criteria is inconsequential.

2.4 Quarry Plant Sound Power Noise Limits

Table 15 of the Noise and Vibration Impact Assessment (NVIA) (Muller Acoustic Consulting Pty Ltd, April 2019) prepared for the Environmental Impact Statement (EIS) (Umwelt (Australia)) sets out the noise targets for mobile plant operating at the quarry. The logarithmic site total sound powers are reproduced in **Table 3.**

Table 3 Quarry Plant Sound Power Levels, dBA (re 10^{-12} Watts)

Noise Source/Item	Total dBA
Sandvik Crusher	111
Pugmill	108
Service Vehicle	82
Wirtgen Kleeman Secondary/Tertiary Crusher	111
Wirtgen MR130Z Track Mounted Impact Crusher	113
Wirtgen Kleeman Cone/Sand Plant	110
Wirtgen Kleeman Screen	111
Drill	115
Cat D8 Dozer	111
Komatsu PC450 Excavator	109
Komatsu Loader	99
Komatsu WA500 Loader	105
Komatsu WA480 Wheel Loader	100
Komatsu HM400 Articulated Dump Truck (x3)	106
Volvo 6 Wheeled Water Cart	101
Manitou	96
Standard Road Truck (x3)	102
Total Site Sound Power	**121**

3 Methodology

3.1 Locality

Wallerawang is located approximately 10km to the northwest of Lithgow, NSW. Receivers in the locality surrounding the quarry are primarily rural/residential and for consistency the naming conventions for each receiver has been retained from the NMP. It is noted that N8 has been added to the assessment, although has not been retained from the NMP. The monitoring locations with respect to the quarry are presented in **Table 4** and graphically in the locality plan shown in **Figure 1.**

Table 4 Receiver Locations

ID	Address	Distance to Quarry Boundary
RL1	Reference Location (adjacent to site office)	N/A
N1/N11	139 Gemalong, Marrangaroo, NSW	1200m
N3	2 Cypress Close, Wallerawang, NSW	550m
N8	42 Rocky Waterhole Drive, Wallerawang, NSW	980m

3.2 Environmental Noise Assessment Methodology

The attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise", the EPL and NMP. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Friday 17 March 2023. The acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

Two daytime measurements of 15-minutes in duration were completed at each monitoring location during standard onsite operations. Where possible, throughout each survey the operator quantified the contribution of each significant noise source. Extraneous noise sources were excluded from the analysis to calculate the $LA_{eq(15min)}$ quarry noise contribution for comparison against the relevant EPL limits.

FIGURE 1

LOCALITY PLAN

REF: MAC160392

0 200m

KEY

N1	RECEIVER/MONITORING LOCATION
RL1	REFERENCE LOCATION
	SITE LOCATION

MAC
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*Imagery Source : nearmaps

4 Results

4.1 Meteorological Conditions

Weather data for the noise assessment period was sourced from Wallerawang Quarries on-site meteorological station as well as operator measured conditions on site of EPL nominated receiver locations to determine prevailing meteorological conditions at the time of the attended measurements and are presented in **Table 5**.

Table 5 Prevailing Meteorological Conditions

Time & Date	Wallerawang Quarries on-site Meteorological Station		Operator Measured Weather EPL Monitoring Location (1.8m AGL)	
	Wind Direction	Wind (m/s)	Wind Direction	Wind (m/s)
07:29 17/03/2023	WSW	0.1	W	0.1
07:50 17/03/2023	W	0.2	W	0.1
08:16 17/03/2023	WSW	1.0	W	0.2
08:48 17/03/2023	WSW	1.8	W	0.2
09:42 17/03/2023	SW	2.8	W	1.0
10:26 17/03/2023	SW	3.2	W	1.6
10:46 17/03/2023	SW	3.1	W	1.2
11:07 17/03/2023	SSW	3.0	W	1.0

4.2 Assessment Results –Reference Location (RL1)

Operational attended noise monitoring was completed at RL1 on Friday 17 March 2023. **Table 6** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 6 Operator-Attended Noise Survey Results – Reference Location 1 (RL1)

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit[1]	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
17/03/2023	08:48	69	53	48	N/A	WS: 0.2m/s WD: W Rain: Nil	Traffic 44-60 Quarry loading 44-55 Quarry light vehicle 49-62 Quarry hand tools 47-56 Quarry trucks 44-69
Quarry Site $L_{Aeq(15min)}$ Contribution							56
17/03/2023	09:42	83	58	53	N/A	WS: 1m/s WD: W Rain: Nil	Traffic 51-61 Quarry processing plant 56-60 Quarry light vehicle 52-60 Quarry personnel 60-83
Quarry Site $L_{Aeq(15min)}$ Contribution							58

Note 1: EPL not applicable for this onsite reference location.

4.3 Assessment Results – Location N1/N11

Operational attended noise monitoring was completed at N1 on Friday 17 March 2023. **Table 7** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 7 Operator-Attended Noise Survey Results – Location N1/N11

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
17/03/2023	07:29	65	55	50	43	WS: 0.1m/s WD: W Rain: Nil	Birds 43-49 Traffic 43-65 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution[1]							<40
17/03/2023	10:26	72	53	45	43	WS: 1.6m/s WD: W Rain: Nil	Traffic 43-60 Birds 43-54 Insects <43 Wind in vegetation 44-50 Local residential noise 50-72 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution[1]							<35

Note 1: Quarry Site $L_{Aeq(15min)}$ calculated based on nearfield measurements.

4.4 Assessment Results – Location N3

Operational attended noise monitoring was completed at N3 on Friday 17 March 2023. **Table 8** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 8 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
17/03/2023	07:50	95	76	47	43	WS: 0.1m/s WD: W Rain: Nil	Dogs barking 43-95 Traffic 43-62 Birds 43-64 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution[1]							<37
17/03/2023	10:46	65	50	44	43	WS: 1.2m/s WD: W Rain: Nil	Traffic 41-65 Birds 44-56 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution[1]							<34

Note 1: Quarry Site LAeq(15min) calculated based on nearfield measurements.

4.5 Assessment Results – Location N8

Operational attended noise monitoring was completed at N8 on Friday 17 March 2023. **Table 9** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 9 Operator-Attended Noise Survey Results – Location N8

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit	Meteorology	Comments
		L_{Amax}	L_{Aeq}	L_{A90}			
17/03/2023	08:16	64	57	53	43	WS: 0.2m/s WD: W Rain: Nil	Traffic 51-64 Birds <51 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution[1]							<43
17/03/2023	11:07	69	58	51	43	WS: 1m/s WD: W Rain: Nil	Traffic 47-69 Birds 47-52 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution[1]							<41

Note 1: Quarry Site $L_{Aeq(15min)}$ calculated based on nearfield measurements.

4.6 Assessment Results – Sound Power Audit

Near field measurements of plant and equipment were also completed to determine their operating sound power levels. The measurements were conducted in general accordance with AS 5331:2019 – Acoustics – Determination of sound power levels of noise sources – Guidelines for the use of basic standards. Results of the analysis identify that the overall sound power of items of plant used at the project site are below target sound power levels outlined in the EIS and NVIA and are presented in **Table 10**.

Table 10 Sound Power Levels, LAeq

Plant	Octave Band Centre Frequency, Lw Spectrum									Sound Power Lw	Goal[1]
	32	63	125	250	500	1k	2k	4k	8k		
Sand Processing Plant	86	89	94	97	100	103	103	100	92	108	N/A
Total Site Sound Power										**108**	**121**[2]

Note 1: These are the SWLs of individual plant modelled in the EIS / NVIA.

Note 2: This is the total SWL of all plant modelled in the EIS / NVIA.

It is noted that the newly constructed sand plant does not have a specified sound goal. Notwithstanding, the cumulative site sound goal as shown in **Table 10** is satisfied for site. Other fixed and mobile plant items will be measured in the second round of monitoring for 2023.

5 Noise Verification Modelling Methodology

Due to the high ambient noise levels attributed to passing traffic on the Great Western Highway, site operations are often masked at the noise monitoring locations. To verify the offsite noise levels from the quarry and correlate the established noise contributions from attended noise monitoring, predictive noise modelling was undertaken.

Noise modelling utilised the DGMR (iNoise, Version 2023.1) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613:1 and ISO 9613:2 including corrections for meteorological conditions using CONCAWE[1]. The ISO 9613 standards are the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

Site mobile and fixed equipment was positioned in locations representative of the areas in which they were operating during the attended noise monitoring survey (17 March 2023). The results of the predictive modelling are presented in **Section 6** and compared to the measured site contribution from the attended monitoring.

1 Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

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6 Discussion

6.1 Discussion of Results – Reference Location (RL1)

Noise measurements were conducted on Friday 17 March 2023 when Wallerawang Quarry was operating at normal production levels, which included use of crusher train, mobile screen, front-end loader, excavator, road trucks and water cart. It is noted that levels at this location are lower than previous assessments as the on-site generator was not operational.

The noise contribution from the quarry at the reference location was 56dB $LA_{eq(15min)}$ and 58dB $LA_{eq(15min)}$ respectively. The noise environment at the reference location was primarily dominated crushing activities, weigh bridge operations and mobile plant.

6.2 Discussion of Results – Location N1/N11

Measurements conducted Friday 17 March 2023 identified that Wallerawang Quarry noise was inaudible during both measurements conducted at N1 with contributions measured between <35dB $LA_{eq(15min)}$ and <40dB $LA_{eq(15min)}$ respectively. and satisfied the relevant noise limits of 43dB $LA_{eq(15min)}$ for this location. Extraneous non-quarry related sources included highway traffic, birds, insects, wind in vegetation and local residential noise, that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N1, which included distance loss, the surrounding topography and air absorption, was 32dBA, which is consistent with the site being inaudible at this location during the attended noise monitoring. This level is also significantly lower than the ambient dominant sources which generally masks site noise emissions.

6.3 Discussion of Results – Location N3

Measurements conducted on Friday 17 March 2023 identified that Wallerawang Quarry noise was inaudible during both measurements conducted at N3, with contributions measured between <34dB $LA_{eq(15min)}$ and <37dB $LA_{eq(15min)}$ respectively. Therefore, the relevant noise limit of 43dB $LA_{eq(15min)}$ was satisfied. Extraneous non-quarry related sources included traffic, birds and dogs barking that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N3 which included distance loss, the surrounding topography and air absorption, was 34dBA, which is consistent with the measured site contribution at this location during the attended noise monitoring.

6.4 Discussion of Results – Location N8

Measurements conducted on Friday 17 March 2023 for N8 were dominated by local and highway traffic. Quarry operations were inaudible during all measurements at this location with estimated contributions measured between <41dB $LA_{eq(15min)}$ and <43dB $LA_{eq(15min)}$ respectively, demonstrating that quarry contributions remained below the relevant criteria of 43dB $LA_{eq(15min)}$ for both measurements conducted at the location. Extraneous non-quarry related sources included traffic and birds that were significant contributors to the ambient noise environment.

The predicted quarry site contribution at N8, which included distance loss, the surrounding topography and air absorption, was 35dBA, which correlates with the measured site contribution at this location during the attended noise monitoring. This level is also significantly lower than the ambient dominant sources which generally masks site noise.

6.5 Discussion of Results – Sound Power Audit

The results of the sound power audit demonstrate that the newly constructed fixed screen and crushing plant used onsite comply with the combined sound power goal as outlined in the NVIA. Other fixed and mobile plant used on site will be assessed and included in the second bi-annual 2023 assessment.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment on behalf of Walker Quarries Pty Ltd. The assessment was completed to assess Wallerawang Quarry noise emissions against relevant criteria presented in EPL 13172 and DA 344-11-2001.

Quarry noise remained inaudible at all residential locations conducted on Friday 17 March 2023, therefore satisfied the specified noise limits in the Noise Management Plan and Environmental Protection Licence at all locations.

All monitoring locations were dominated by extraneous sources such as traffic that predominantly masked quarry operations.

Predictive noise modelling was generally consistent with the findings of the attended noise monitoring, confirming the site the site complied with the applicable noise criteria at all assessed locations and also confirmed the site was inaudible when compared against extraneous ambient noise sources (ie masked by ambient levels).

The results of the sound power audit demonstrate that the fixed screen and crushing plant used onsite comply with the combined sound power goal as outlined in the NVIA.

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Appendix A – Glossary of Terms

Several technical terms have been used in this report and are explained in **Table A1**.

Table A1 Glossary of Terms

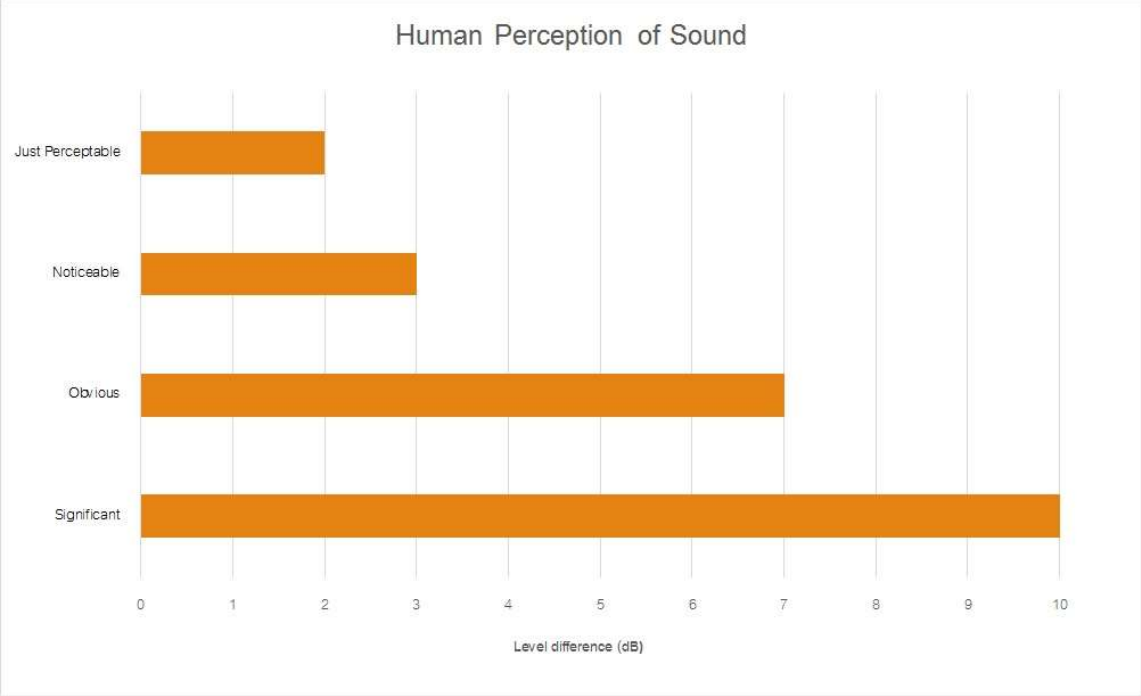
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The noise associated with a given environment. Typically, a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (SWL)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by: = 10.log10 (W/Wo) Where: W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawnmower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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