Walker Quarries

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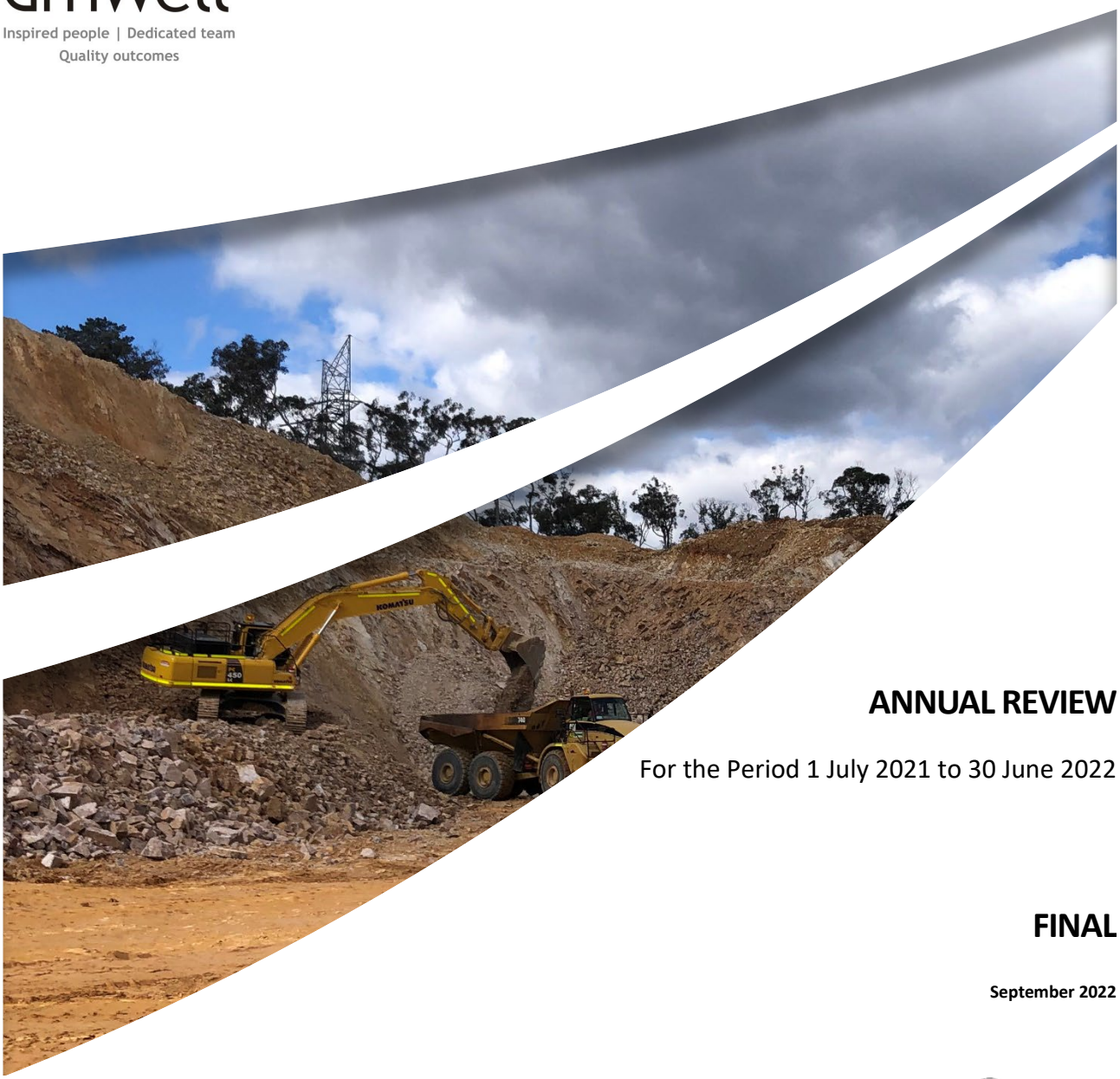

ANNUAL REVIEW

For the Period 1 July 2021 to 30 June 2022

FINAL

September 2022

umwelt
Environmental & Social
Consultants

ANNUAL REVIEW

For the Period 1 July 2021 to 30 June 2022

FINAL

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

Project Director: Alex Irwin
Project Manager: David McQueeney
Report No. 4433/R23
Date: September 2022

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	Alex Irwin	30 September 2022	Alex Irwin	30 September 2022

TITLE BLOCK

Wallerawang Quarry	
Name of operator	Walker Quarries Pty Ltd
Development consent/project approval #	DA 344-11-2001 MOD3
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
Name of holder of water licence	Walker Quarries Pty Ltd
MOP/RMP start date	20 July 2020
MOP/RMP end date	19 July 2025
Annual Review start date	1 July 2021
Annual Review end date	30 June 2022
I, Wayne Chapman, certify that this report is a true and accurate record of the compliance status of the Wallerawang Quarry for the period 1 July 2021 to 30 June 2022 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	
Date	30 September 2022

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1.0 Statement of Compliance

The Statement of Compliance comprises **Table 1.1** and

Table 1.2 below and reflects the non-compliances that occurred as a result of activities during the reporting period, 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 (2 administrative, 4 low risk and 1 medium risk non-compliances)
ML 1633	Yes
EPL 13172	No (1 low risk non-compliance)

Table 1.2 Non-Compliances

Condition	Condition Description (summary)	Compliance Status	Comment	Section
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.*	ANC	Relating to the fact that non-conformances against some conditions requirements were noted.	**All**
DA 344-11-2001 Schedule 2 Condition 11(b)	The Applicant must ensure that all plant and equipment at the site, or to monitor the performance of the development is: … (b) operated in a proper and efficient manner	Non-compliant Low Risk	The truck wheel wash was observed to not be operating efficiently as it is undersized and vehicles observed exiting the wash before sprays have been applied to all tyres.	**4.4.1 / 7.2**

Condition	Condition Description (summary)	Compliance Status	Comment	Section
DA 344-11-2001 Schedule 2 Condition 12	The Applicant must: a) from the commencement of quarrying operations provide calendar year annual quarry production data to RR using the standard form for that purpose; and b) include a copy of this data in the Annual Review	ANC	Form S1 not available at the time of Review preparation	**4.2.3**
DA 344-11-2001 Schedule 3 Condition 4(a)	The Applicant must: a) implement best practice management to minimise the construction, operational and road transportation noise of the development;	Non-compliant Low Risk	The in-pit crushing trains were at times operating adjacent to the pit edge (not behind a quarry face or bund wall as nominated in the Noise Management Plan). Noise monitoring has confirmed compliance with criteria despite this non-conformance with the NMP.	**6.3**
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 in-pit crushing trains were at times operating adjacent to the pit edge (not behind a quarry face or bund wall) and are visible from the Great Western Highway (east-bound lanes) for a very short period of time. A stockpile of crusher dust (KIS Sand) has increased in size during the reporting period and is visible from east-bound lanes of the Great Western Highway.	**6.9**
DA 344-11-2001 Schedule 3 Condition 34	The Applicant must 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	Non-compliant Low Risk	The in-pit crushing trains were at times operating adjacent to the pit edge (not behind a bund wall) and are visible from the Great Western Highway (east-bound lanes).	**6.9**

Condition	Condition Description (summary)	Compliance Status	Comment	Section
DA 344-11-2001 Schedule 3 Condition 37	The Applicant must ensure that all tanks and similar storage facilities (other than for water) are protected by appropriate bunding or other containment, in accordance with the relevant Australian Standards.	Non-compliant Medium Risk	Waste oil drums and other containers were stored on bunded pallets, however, evidence of spillage beyond the pallets observed. The hydrocarbon storage area is scheduled for major upgrade in the next reporting period.	**6.11**
EPL 13172 Condition O4.1	The stormwater control structures (sediment dams) identified at condition L2.4 EPA identification point 1 and 2 must be drained or pumped out as necessary to maintain each basins design storage capacity within 5 days following rainfall	Non-compliant Low Risk	The water level in SB2 was high following recent rainfall and water was planned to be pumped out.	**7.2**

Table 1.3 Compliance Status Key

Risk Level	Colour Code	Description
High	**Non-compliant**	• Potential for significant environmental harm, regardless of the likelihood of occurrence.
Medium	**Non-compliant**	• Potential for serious environmental harm, but is unlikely to occur; or • Potential for moderate environmental harm but is likely to occur.
Low	**Non-compliant**	• Potential for moderate environmental harm, but is unlikely to occur; or • Potential for low environmental harm but is likely to occur.
Administrative Non-compliant	**ANC**	• 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 inspection and a review of data and documentation completed by Umwelt (Australia) Pty Limited and Walker Quarries Pty Ltd.

2.0 Introduction

2.1 Scope and Format

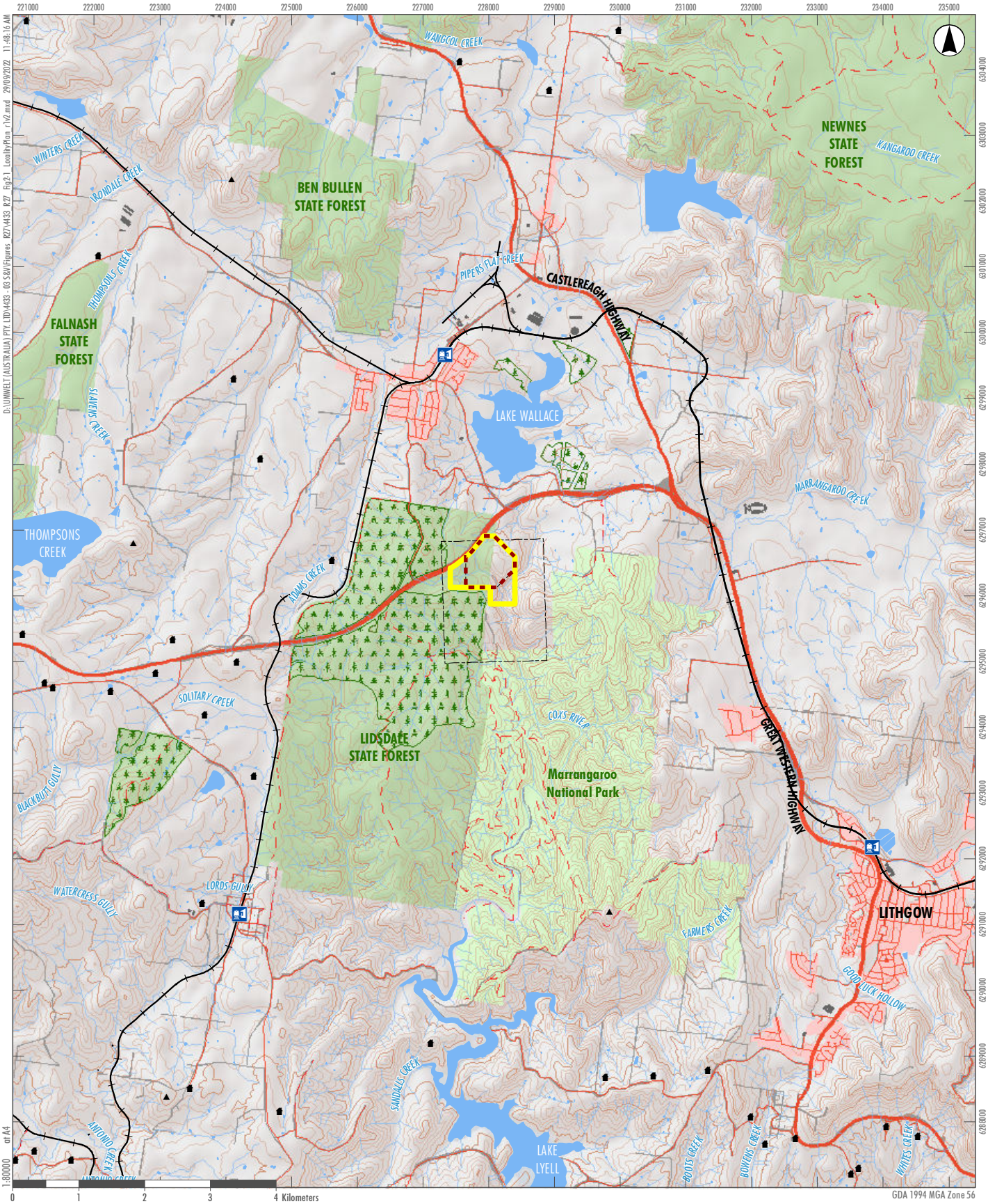
The Wallerawang Quarry (the Quarry) is operated by Walker Quarries Pty Ltd (Walker Quarries) under Project Approval DA 344-11-2001. The Quarry is located approximately 8 km north-west of Lithgow NSW (**Figure 2.1**).

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

- MOD 1 was granted on 25 August 2017 to regularise several constructed components of the Quarry and formalise the approval of production 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 Condition 5(11) of DA 344-11-2001 (DA 344-11-2001) (refer to **Appendix 1**). Condition 5(11) of DA 344-11-2001-MOD 3 is reproduced below.

> *"By the end of September in each year after the commencement of development, or other timeframe agreed by the Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Secretary. This review must:*
>
> *a) describe the development (including any progressive rehabilitation) that was carried out in the previous financial year, and the development that is proposed to be carried out over the current financial year;*
>
> *b) include a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, including a comparison of these results against the:*
>
> – *relevant statutory requirements, limits or performance measures/criteria;*
>
> – *requirements of any plan or program required under this consent;*
>
> – *monitoring results of previous years; and*
>
> – *relevant predictions in the documents listed in condition 2(c) of Schedule 2.*



Legend

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

FIGURE 2.1

Locality Plan

c) *identify any non-compliance or incident which occurred in the previous financial year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid reoccurrence;*

d) *evaluate and report on:*

- *the effectiveness of the noise and air quality management systems; and*
- *compliance with the performance measures, criteria and operating conditions of this consent;*

e) *identify any trends in the monitoring data over the life of the development;*

f) *identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and*

g) *describe what measures will be implemented over the next financial year to improve the environmental performance of the development."*

This Annual Review documents the works undertaken and environmental performance from 1 July 2021 to 30 June 2022 (the reporting period).

The information presented within this Annual Review has been prepared based on information compiled by Umwelt (Australia) Pty Limited (Umwelt) and provided by Walker Quarries, as well as an inspection of the Quarry undertaken by Umwelt on 29 June 2022. This Annual Review adheres to the format and content requirements identified in the Department of Planning, Infrastructure and Environment's (DPIE) *Annual Review Guideline*, *Post-approval requirements for State significant mining developments* (DPIE, 2015). It should also be noted that this Annual Review has been prepared based upon the approval and licensing requirements applicable to DA 344-11-2001.

2.2 Walker Quarries

Walker Quarries Pty Ltd was created to carry out mining, processing, transport and other ancillary activities at the Wallerawang Quarry.

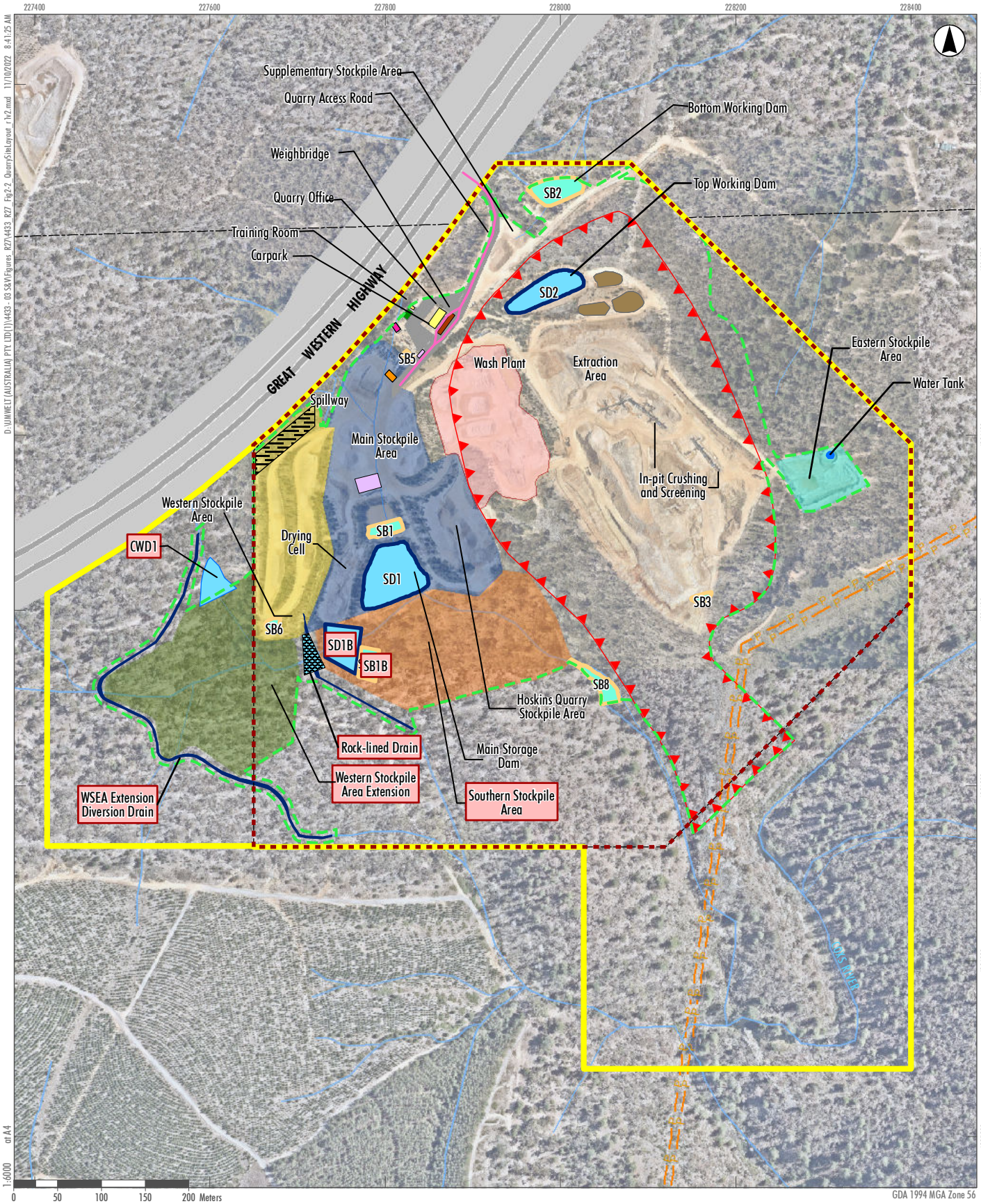
Walker Quarries Pty Ltd is committed to operating the Quarry in a manner that complies with relevant environmental legislation and is environmentally responsible. Walker Quarries Directors maintain a hands-on management style and are either Lithgow or Sydney based.

2.3 Overview of Operations

2.3.1 Approved Activities

The approved activities at the Quarry are as follows (refer also to **Figure 2.2**).

- Extraction of quartzite aggregate by conventional drill and blast, load and haul methods from an area of 13.3 ha and to a depth of 901 m Australian Height Datum (AHD) (extending to within 1 metre (m) of the groundwater level once established to the satisfaction of the Secretary of the Department of Planning, Industry and Environment (DPIE).



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- ML1633
- EL 4473
- To be developed in future
- Approved Extraction Area
- Processing Pad
- Main Stockpile Area
- Southern Stockpile Area
- Western Stockpile Area
- Western Stockpile Extension
- Eastern Stockpile Area
- Clean Water Dam
- Silt Cells
- Hydrogen Storage Area
- Visual Amenity Bund
- P Electricity Transmission Lines
- Quarry Access Road
- Clean Water Diversion
- Sediment Basins
- Settlement Ponds
- Storage Dam
- Water Tank
- Rock-lined Drain

NOTE: Component marked SB1B are approved but yet to be constructed

Image Source: Nearmap (2020), CEH Survey (2021) Data source: Walker Quarries (2019); Umwelt (2019); NSW LPI DTDB (2019); CEH Survey (November 2016)

FIGURE 2.2

Quarry Site Layout
(DA 344-11-2001-MOD3)

- Construction and use of stockpile areas for storage of extracted and processed material.
- Use of mobile processing 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 stockpiles 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, or equivalent wash plant on the Quarry stockpile areas at some time in the future.
- Construction and operation of various water storages, sediment basins, silt cells and drainage lines. It is noted **Figure 2.2** identifies both the existing and approved structures.
- 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.

2.3.2 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
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
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.

2.3.3 Employment

The Quarry currently employs 5 management staff and 10 equipment operators. Employment is expected to remain the same during the next reporting period.

2.4 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
Trevor Hoffman	Operations Manager	0417 663 222
Paul Hensley	Compliance Advisor	0418 680 022
Kerry Burke	Managing Director	0418 242 619

2.5 Management of Document Preparation

This document has been prepared by Ms. Caroline Gazi (B.Sc.), Environmental Consultant and Mr Alex Irwin (B.Sc. (Hons)), Principal Environmental Consultant, both with Umwelt. The document was reviewed and approved by Mr. Alex Irwin.

Alex and Caroline completed the site inspection of 29 June 2022 noted in **Section 2.1**.

Mr Wayne Chapman, Mine Manager, Walker Quarries, provided technical input and information on Quarry operations and environmental performance during the reporting period. Mr Chapman was present during the site inspection and was assisted during the inspection by Mr Irwin and Ms Gazi.

3.0 Approvals

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

Table 3.1 Wallerawang Quarry – 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	Issued by Lithgow City Council for demountable office buildings
Environment Protection Licence 13172	21/10/2012 Last varied 17/7/2018	Renewed annually	Issued by the Environment Protection Authority
Mining Lease 1633	15/7/2009	15/7/2040	Issued by the Minister for Mineral Resources
Exploration Licence 4473	23/7/2021	23/7/2026	Group Two Minerals
Exploration Licence 9255	23/7/2021	23/7/2026	Group Two Minerals
Water Access Licence 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

In addition to the approvals and licences listed in **Table 3.1**, Walker Quarries retains a Compensation Agreement with *Forestry Corporation of NSW* (FC NSW) which allows Walker Quarries to operate within an area of Lidsdale State Forest on Lot 7322 DP1149335 and Lot 7071 DP1201227.

Table 3.2 presents the documentation used by Quarry management to guide day-to-day operations at the Quarry. In accordance with *Condition 5(3)* of DA 344-11-2001, all plans were reviewed, revised and re-submitted to the DPIE[1] in November 2021 following the completion of an Independent Environmental Audit (IEA) completed in July 2021.

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
Supporting Documentation for ML 1633	
Mining Operations Plan (incorporating a Rehabilitation Management Plan)	7/7/2020
Environmental Management Plans	
Environmental Management Strategy (V3.0 November 2021)	23/5/2022
Rehabilitation Management Plan (4th MOP July 2020)	7/7/2020
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 (V4.0 November 2021)	16/6/2021
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)	-

[1] The Rehabilitation Management Plan was submitted to the Resources Regulator of DPIE in accordance with the *Condition 3(31)*.

4.0 Operations Summary

4.1 Introduction

Operations were undertaken in accordance with the Mining Operations Plan (MOP) in effect over the reporting period with no new vegetation clearing or soil stripping during the reporting period. The total disturbance area remains stable from the previous year, at 17.2ha.

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 Areas

During the reporting period, extraction was undertaken as follows (refer to **Figure 4.1**).

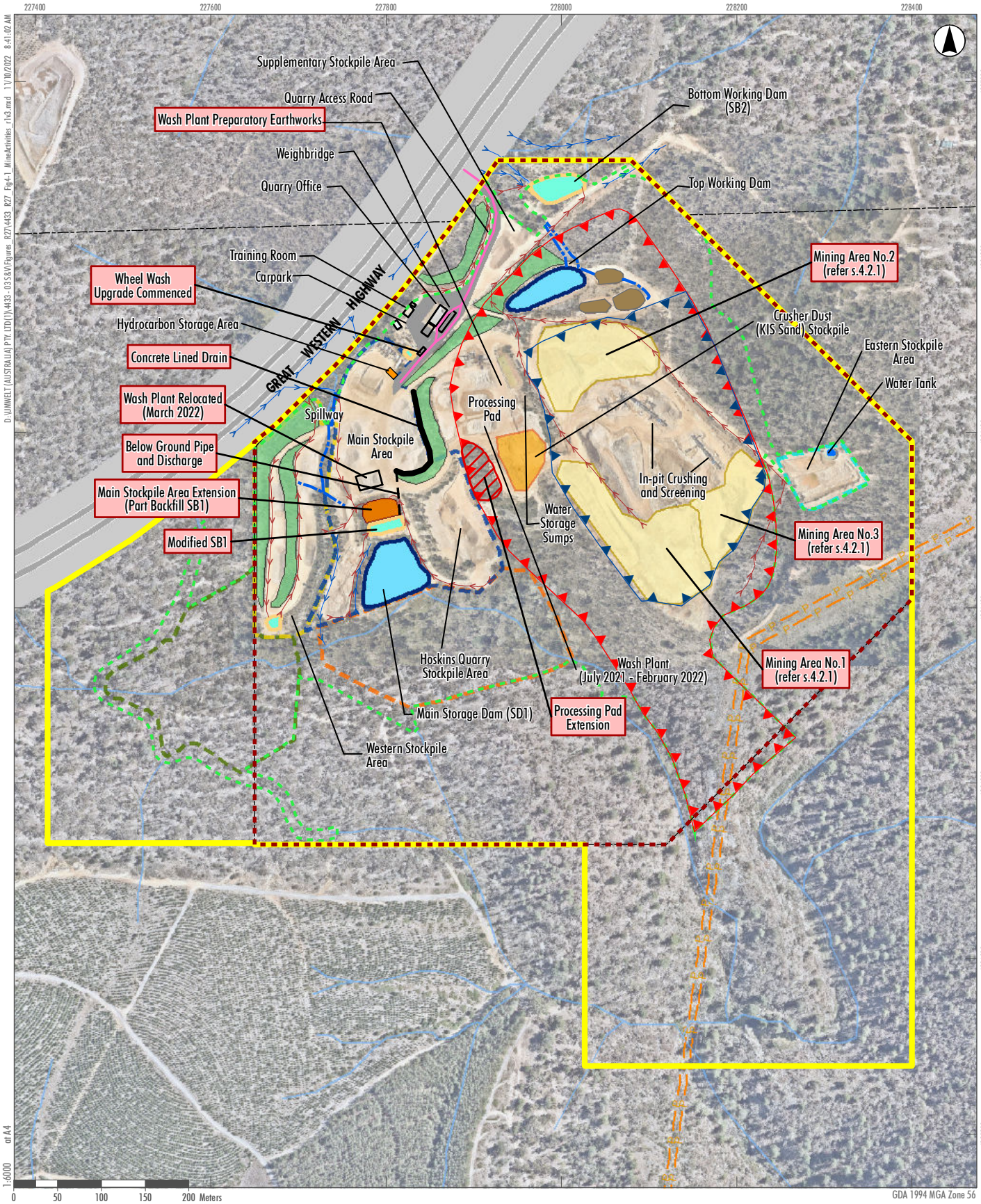
1. Extending the western perimeter of the pit where clearing and soil stripping was undertaken during the 2020-2021 reporting period (**Photo 4.1**). Blasting and extraction of sandstone, shale, hornfels and other non-quartzite material from the western side of the pit to expose higher value quartzite. Blasting and extraction of quartzite to a depth of approximately 940 mAHD to the western edge of the pit (refer to **Photo 4.2)**.

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 and access road to the eastern side of the pit) to an elevation of approximately 955 mAHD (refer to **Photo 4.3**).

3. Temporary stockpiling and some extraction (by ripping) of predominantly non-quartzite materials within the southern portion of the cleared extraction area in preparation for relocation of the in-pit crushing activities and extension (in 2022-2023) of the pit to the approved southern limit).

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

With extraction focusing on removal of non-quartzite materials from the northern section of the pit (Mining Area 2), the proposed north easterly extension of the extraction area proposed in the 2020-2021 Annual Review and identified on Plan 3A of the MOP, was again delayed. This will be included in the next reporting period when the pit will be also be expanded to the southern-most boundary of the approved extraction area (refer to **Section 4.4**).



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- ML1633
- EL 4473
- Approved Extraction Area
- To be developed in future
- Main Stockpile Area (935m AHD)
- Southern Stockpile Area (935m AHD)
- Western Stockpile Area
- Western Stockpile Extension (940m AHD)
- Eastern Stockpile Area
- Sediment Basins
- Settlement Ponds
- Storage Dam
- Backfill
- Water Tank
- Silt Cells
- Ecosystem Establishment
- Electricity Transmission Lines
- Clean Water Drain
- Dirty water drain
- Water Pipeline
- Quarry Access Road
- Crusher Dust Stockpile
- Mining Areas

NOTE: Component marked SB1B are works completed during the reporting period.

Image Source: Nearmap (2020); CEH Survey (2021) Data source: Walker Quarries (2019); Umwelt (2019); NSW LPI DTDB (2019); CEH Survey (November 2016)

FIGURE 4.1

Mine Activities and Operations of the Reporting Period

Photo 4.1 **Mining Area 1 – Western Limit**

Photo 4.2 **Mining Area 1**

Photo 4.3 **Mining Area 2 – Northern Limit**

4.2.2 Blasting

A total of 4 blasts were initiated during the reporting period. Error! Reference source not found. 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 (tonnes)
15th July 2021	16,094
24 September 2021	87,922
5 November 2021	52,052
24 November 2021	87,922
6 June 2022	45,115
Total	**289,105**

Source: Walker Quarries Pty Ltd

Walker Quarries and blast contractors implement a continuous improvement protocol for blasting through implementation of the following procedures (which are nominated in the *Blast Management Plan*).

- 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, and the impact/damage 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 6.7**).

4.2.3 Production

Based on the Annual Exploration Report for ML 1633 (RME, 2022), approximately 245,000 t of quartzite and select fill materials were extracted from the Quarry[2].

A total of 245,745 t of quartzite were 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 – tonnes

Material	Approved limit (specify source)	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Soil (m^3)	N/A	3,200	0	0
Overburden (m^3)	N/A	0	0	0
Quartzite and Select Fill (saleable)	N/A	220,000	245,000	260,000
Product (sold and transported off site) (t)	500,000	217,812	245,745	250,000

Source: Walker Quarries Pty Ltd

Form S1, submitted to *Mining, Exploration and Geoscience* (MEG), was not complete at the time of preparation (with this identified as an administrative non-compliance – refer to **Section 1.0**). While it is noted Form S1 only requires reporting on the products for which royalties are payable, Walker Quarries will ensure that this form is available for inclusion in future Annual Reviews.

4.3 Other Operations

4.3.1 Construction Operations

A planned upgrade to the truck wheel wash to improve prevention of dust tracking commenced in June 2022 (refer to **Photo 4.4**), and is scheduled for completion by September 2022.

The weighbridge upgrade also led to a review and reconfiguration of drainage from the Quarry Access Road, office area and internal haul roads. As a result, runoff previously directed to a small sediment basin to the east of the office area (SB5) is now diverted to SB1 on the Main Stockpile Area. To reduce erosion hazard, a concrete line drain was constructed to carry these flows (refer to **Photo 4.5**)

As nominated in the 2021 Annual Review, works also commenced on the upgrade to the sand washing infrastructure (refer to **Photo 4.5**). The upgraded wash plant, identified in the Statement of Environmental Effects (SEE) supporting Modification 3 and referenced by Condition 1 of Schedule 2 of DA 344-11-2001, will be constructed as a fixed plant incorporating high efficiency dewatering components to significantly reduce the requirement to draw water and discharge and settle turbid water. The upgraded plant will also allow for the processing of the growing stockpiles of crusher dust /

[2] RME (2022) reports from 15 July 2021 – 15 July 2022)

KIS Sand (currently located on the northern end of the processing pad) and production of a high demand manufactured sand product.

The work completed during the reporting period included:

- geotechnical drilling and site stabilization
- ground compaction
- ground excavation and concrete pouring.

The site preparation works required the temporary relocation of the existing mobile washing plant to the Main Stockpile Area to the north of Sediment Basin 1 (SB1) (refer to **Figure 4.1**).

4.3.2 Processing Operations

The processing operations involve the use of a series of crushers and screens to crush, separate and wash the quartzite into various size aggregates and sands. During the reporting period, crushing and screening was undertaken in the extraction area (refer to **Photo 4.7**).

A sand washing plant was operated between July 2021 and February 2022 on the Processing Pad before being relocated to the Main Stockpile Area (to the north of a modified SB2) in March 2022 to accommodate the site preparation works of the wash plant upgrade commenced on the Processing Pad (refer to **Photo 4.8**).

	**Photo 4.4** **Weighbridge upgrade**
	**Photo 4.5** **Concrete Drain Construction**
	**Photo 4.6** **Site Preparation – Wash Plant Upgrade**

	**Photo 4.4 Weighbridge upgrade**
	**Photo 4.7 In-pit Crushing (concrete aggregates**
	**Photo 4.8 Relocated (Temporary) Wash Plant Location**

The current wash plant is limited in its ability to effectively wash the crusher dust / KIS Sand generated by the aggregate crushing train and as a result, the stockpile of this material at the southern end of the processing pad (which adjoins the eastern haul ramp into the pit) has increased in size over the reporting period.

Quarry management has confirmed the stockpile will be depleted once the new sand plant is operational in the next reporting period. As the stockpile is depleted, it's height will reduce and the impact on the visibility of the Quarry reduced. This is discussed further in **Section 6.9.**

4.3.3 Stockpiling Operations

The Quarry features several hardstand stockpile areas and is compliant with the approved activities.

4.3.4 Product Transportation

Product transported off site during the reporting period was approximately 245,745 tonnes of material, below the approved annual transportation volume of 500,000 tonnes.

Walker Quarries reports the number of truck movements from the Quarry on their website on a 6 monthly basis, in accordance with *Condition 3(19)* of DA 344-11-2001. Truck movements are currently reported for the following periods:

- 1 July – 31 December
- 1 January – 30 June.

There was a total of 9,641 truck movements during the period 1 July 2021 to 30 June 2022.

This is compliant with *Condition 3(19)* of DA 244-11-2001.

4.3.5 Exploration Activities

During the reporting period an Annual Exploration Progress Report for Exploration Licence 4473 was prepared by Rangott Mineral Exploration Pty Ltd and submitted to DPIE, in accordance with the requirements of ML 1633 (Rangott, 2022) (refer to Error! Reference source not found.). The report covered activities for the period 15 July 2021 to 15 July 2022.

Exploration activities undertaken during this period were focused on access and permit negotiations with Forestry Corporation of NSW, review of published geology maps and historic geological reports and desktop geological interpretation. No exploration boreholes were drilled during this period.

4.4 Next Reporting Period

Figure 4.2 identifies the activities and key changes to the layout of the Quarry planned for the next reporting period. A summary of these activities, operations and changes during the 2022-2023 reporting period are as follows.

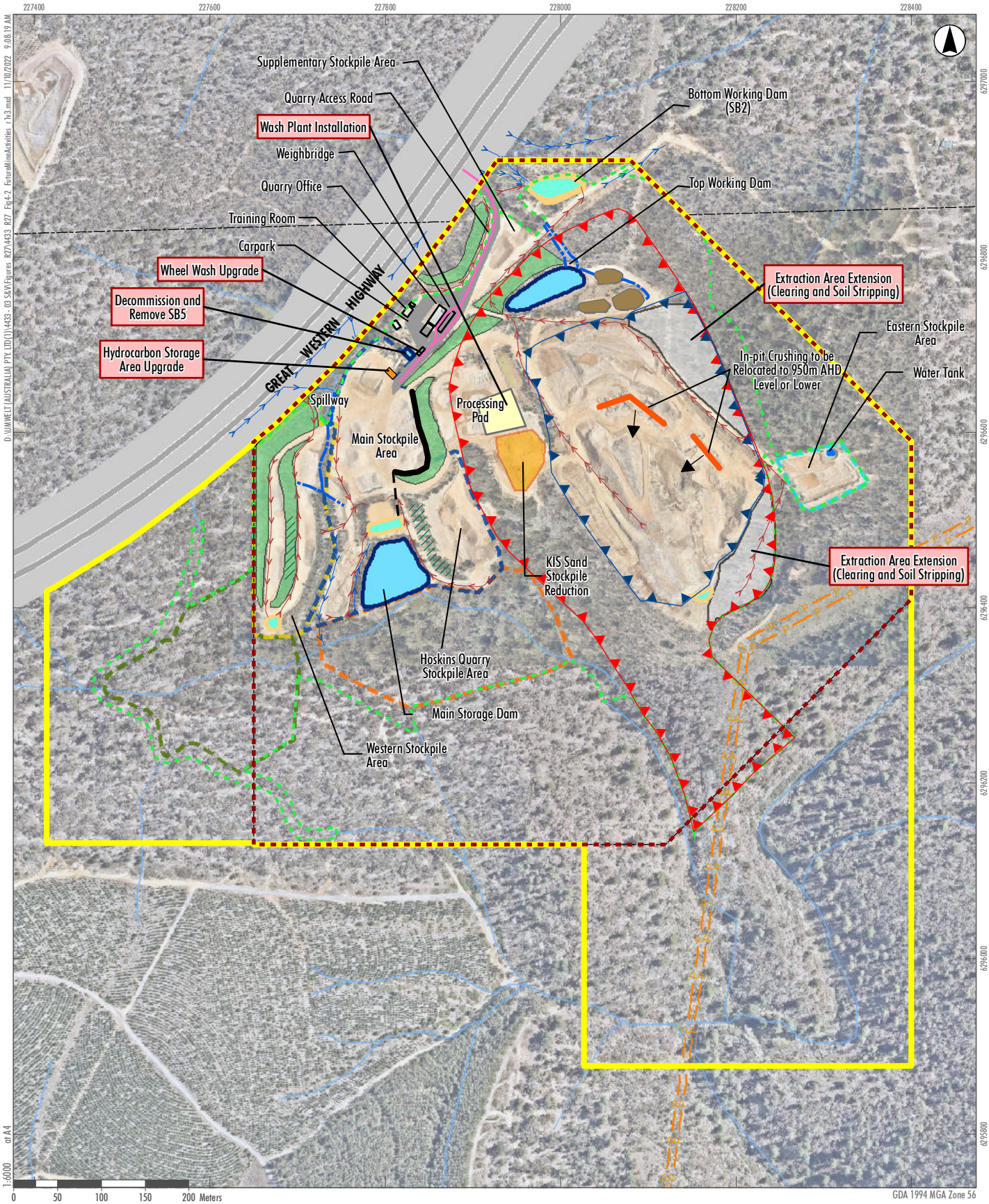
4.4.1 Construction

The following construction is planned for the 2022-2023 reporting period as follows.

- Upgrades to the Quarry Hydrocarbon Storage Area will be undertaken to increase the capacity of bunding and install a concrete pad.
- Preparatory earthworks and establishment of foundations is planned to continue on the Processing Pad for the placement of a new wash plant (which will replace the current wash plant once installed).
- An extension to the main Quarry office and amenities buildings is on hold until the new wash plant is active, estimated to be February 2023 and is subject to the approval of a separate development application to Lithgow City Council.
- Completion of upgrades to the truck wheel wash to improve effectiveness at minimising dust tracking, estimated for completion by September 2022.

4.4.2 Mining

The extraction area is proposed to be extended to the south and east of the current pit, to the limit of the approved extraction area. In accordance with the Quarry 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. These areas are identified on **Plan 2A** of the recently prepared Rehabilitation Management Plan (RMP) and Forward Program which replaces the MOP (Umwelt, 2020), in accordance with the NSW Rehabilitation Reforms, during the 2022-2023 reporting period.



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- ML1633
- EL 4473
- To be developed in future
- Main Stockpile Area (935m AHD)
- Southern Stockpile Area (935m AHD)
- Western Stockpile Area
- Western Stockpile Extension (940m AHD)
- Eastern Stockpile Area
- Sediment Basins
- Water Tank
- Silt Cells
- Ecosystem Establishment
- P Electricity Transmission Lines
- Clean Water Drain
- Dirty water drain
- Water Pipeline
- Quarry Access Road
- Crusher Dust Stockpile
- Overtopping Material Remediation

FIGURE 4.2

Mine Activities and Operations for the Next Reporting Period

NOTE: Component marked SB1B are works to be completed during the next reporting period.

Image Source: Nearmap (2020); CEH Survey (2021) Data source: Walker Quarries (2019); Umwelt (2019); NSW LPI DTDB (2019); CEH Survey (November 2016)

Quartzite will continue to be mined from the south-eastern face of the pit with blasting required to fracture the quartzite prior to extraction and processing. Between 5 and 10 blasts will be undertaken with Walker Quarries anticipating production to increase slightly during the next reporting period to approximately 250,000t (**Table 4.2**).

The northern portion of the current pit will also continue to be mined for low value quartzite which is sold as a select fill material.

4.4.3 Processing

No changes to crushing and screening operations are planned during the 2022-2023 reporting period, noting that the location of the crushing trains within the pit will be relocated to a lower elevation. The aim is to relocate the main aggregate crushing train to a lower elevation (950 mAHD or lower) as the extraction area is widened to the west.

Sand washing will continue in its current temporary location until the upgraded wash plant is commissioned (February 2023). On commissioning of the upgrade wash plant, the current wash plant will be decommissioned, sold and removed from the Quarry.

Once the new wash plant is commissioned, the requirement to maintain the silt cells to the north of the current pit will be removed. It is planned to retain these, however, to the end of the next reporting period at least as a contingency while the dewatering process of the new wash plant is refined.

4.4.4 Stockpiling Operations

No changes to product stockpiling areas are planned during the next reporting period.

Remedial works to address previous overtopping of stockpiled materials from the Hoskins and Western Stockpile Areas will be undertaken to ensure effective vegetation growth on the associated batter slopes.

It is also noted that a reduction in the stockpile of KIS Sand on the processing pad will commence during the next reporting as this material is processed through the upgraded wash plant.

5.0 Actions Required from Previous Annual Review

Correspondence from the Department of Planning, Industry and Environment regarding the *Annual Review 2021* was provided on 8 October 2021. No actions were identified in this correspondence.

Table 5.1 describes the actions identified for completion in the 2020-2021 Annual Review.

Table 5.1 Actions from the Previous Annual Review

Acton Required from Previous Annual Review	Requested By	Action Taken	Refer to Section
2020-2021 Annual Review			
Finalise and implement all environmental management plans following approval of MOD 3.	Walker Quarries/ Operator	All environmental management plans have been reviewed and were resubmitted for approval to DPE. With the exception of the Soil and Water Management Plan, all resubmitted management plans were approved by the DPIE.	**3.0** (**Table 3.2**)
Update the Noise Management Plan to replace N2 with N4	Walker Quarries/ Operator	Completed. The Noise Management Plan was approved by DPE in May 2022 and as such both monitoring locations have been included in noise monitoring completed during the reporting period.	**6.3.1**
Implementation of Environmental Management Commitments checklist.	Walker Quarries/ Operator	The Environmental Management Commitments Checklist has been implemented and is completed six-monthly.	**6.1**
Quarry operations will continue generally as completed during the reporting period and in accordance with the Quarry MOP. Should any deviations from this be required, these will only be undertaken subject to approval by the DPIE and (if required) approval of an updated MOP	Walker Quarries/ Operator	Operations have been undertaken in generally in accordance with the MOP. It is noted future operations will be undertaken in accordance with a Rehabilitation Management Plan and Forward Program required to be prepared and data submitted during the next reporting period in accordance with the NSW Rehabilitation Reforms implemented by the NSW Resources Regulator.	**4.2**

Acton Required from Previous Annual Review	Requested By	Action Taken	Refer to Section
Rehabilitation activities will be restricted to the maintenance of areas already rehabilitated and ad hoc stabilisation and revegetation works as required.	Walker Quarries/ Operator	No additional rehabilitation activities undertaken during the reporting period. Areas of rehabilitation will continue to be monitored and ad hoc maintenance works undertaken if required.	**8.1**

6.0 Environmental Performance

6.1 Introduction

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.

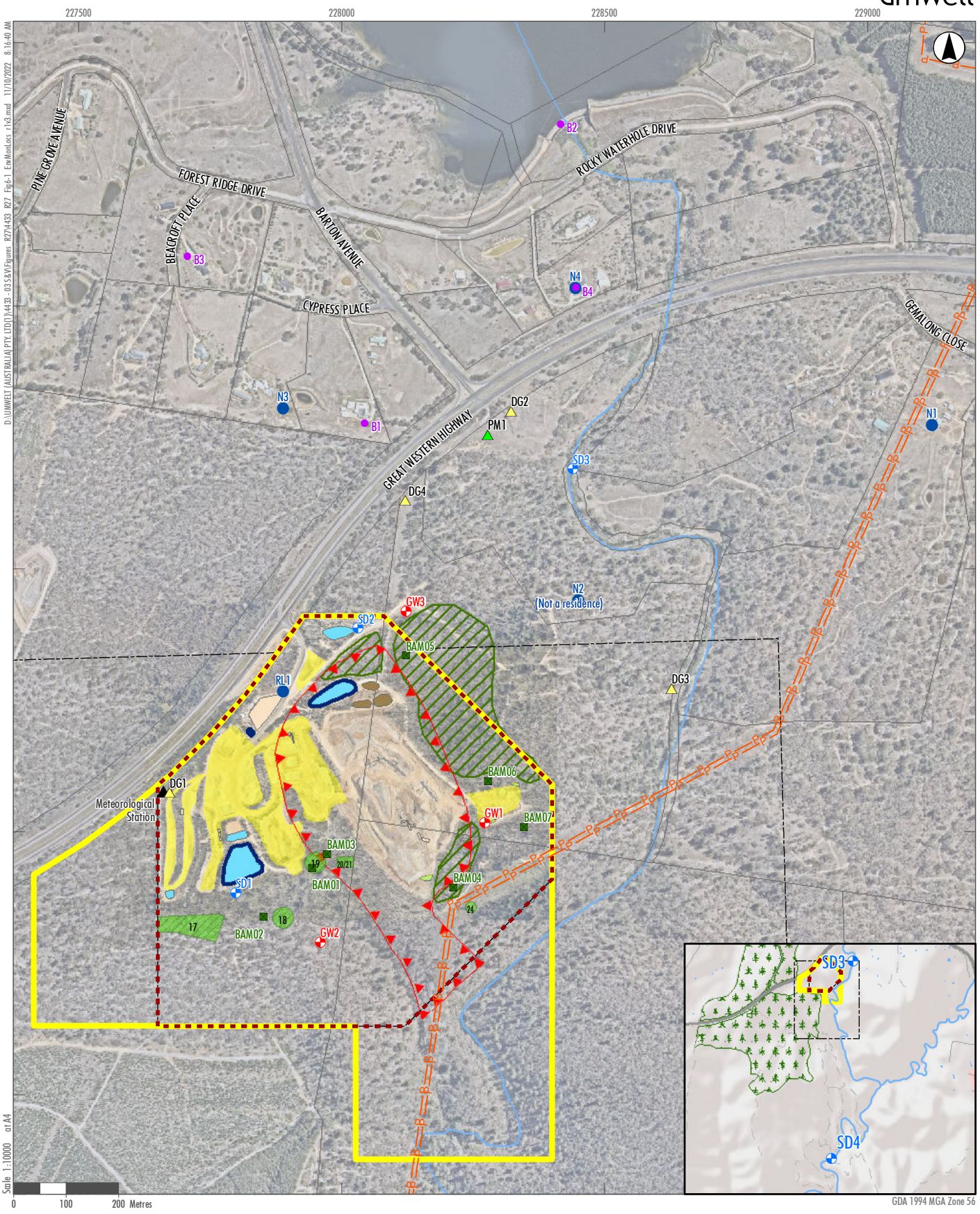
Walker Quarries has established an Environmental Management Register, where all environmental management commitments are compiled and can be viewed by date required, person responsible, environmental parameter. The register is regularly reviewed and updated as required.

During the reporting period, Walker Quarries implemented the environmental commitments checklist drafted in the previous reporting period. The checklist compiles all environmental commitments included in the various management plans and allows for internal or external review of these during inspections of the Quarry. Walker Quarries engaged Umwelt to review implementation of these commitments against the checklist three times during the reporting period (December 2021, March 2022 and June 2022). The December 2021 and March 2022 inspections by Umwelt were undertaken to trial the checklist with results provided to Walker Quarries by email. Following the June 2022 inspection, a formal report in the form of a Briefing Note was provided to Walker Quarries identifying several areas of environmental management where improvements could be made. These are reflected in the Compliance Statement of **Section 1.0**, as well as the following sub-sections which present the results of the various monitoring programs undertaken throughout the reporting period and review environmental performance more generally. Where appropriate, results of the previous years' monitoring are also presented for comparative purposes.

6.2 Meteorological Monitoring

A meteorological monitoring station has been operating at the Quarry, in 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.

During the reporting period, the meteorological monitoring station was upgraded to allow for collection of the standard deviation of wind direct (sigma theta) and Pasquil - Gifford (noise category) determination. The addition of these data categories will allow for greater power of analysis should noise complaints be received or concerns over Quarry noise levels be raised by the community, Council or the EPA.



Legend

- Approved Quarry Site (DA 344-11-2001 MOD3)
- ML1633
- EL 4473
- Stockpile Area
- Sediment Basin
- Silt Cell
- Storage Dam
- Approved Extraction Area
- Cadastral boundary
- Remnant Patches of Bursaria spinosa
- Weed Spraying
- Air Quality Monitoring Locations
- Biodiversity Monitoring Locations
- Blast Monitor
- Meteorological Station
- Noise Monitoring Locations
- Surface Water Monitoring Location
- Groundwater Bore Location
- Power Line
- Particulate Matter Monitoring Location

FIGURE 6.1

Environmental Monitoring Locations and Weed Spraying

Image Source: Google Earth (2016); Nearmap (2020); CEH Survey (2021) Data source: NSW DFSI (2019); CEH Survey (November 2016)

Table 6.1 presents key data outputs from the meteorological station for each month. Separate data files can be supplied as required for data validation.

Table 6.1 Meteorological Monitoring Results

Year		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
Average Temperature (°C)														
2020/21	Max	No Data	No Data	No Data	No Data	31.5	33.6	25.6	29.0	29.8	20.0	17.0	17.0	26.0[1]
	Min	No Data	No Data	No Data	No Data	11.0	9.2	13.2	7.8	3.9	-0.8	-3.5	-3.3	4.7[1]
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
Rainfall (mm)														
2020/21	Total	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
	No. Rain Days	No Data	No Data	No Data	No Data	No Data	No Data	5	17	15	7	15	20	79[2]
	Max. Daily Rainfall	No Data	No Data	No Data	No Data	No Data	No Data	11.0	24.6	34.0	0.2	12.8	17	34.0[2]
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

Source: Walkers Quarry Pty Ltd (2022)
Note 1: Annual figure only represents November 2020 – June 2021
Note 2: Annual figure only represents January – June 2021

6.3 Noise

6.3.1 Performance Criteria and Predicted Impacts

Table 6.2 identifies the relevant noise-related performance criteria for residences surrounding the Quarry Site identified by *Condition 3(3)* of DA 344-11-2001. These criteria are the same as those of Condition L4.1 of EPL 13172 (as varied on 16 November 2020).

Table 6.2 EPL and Development Consent, Noise Limits (dBA)

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	43	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 DPIE 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 of Condition 3(3) (Table 2) of DA 344-11-2001 (refer to **0**).

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 (MAC, 2021). The more conservative criteria of the Development Consent was adopted for the NVIA, although Mac (2021) note that the difference is inconsequential on the basis that the Quarry does not operate at night.

MAC (2022) also included sound power levels and relevant criteria for individual pieces of equipment operating at the Quarry as part of the NVIA. This criteria is included in the monitoring results tables in **Section 6.3.3**.

6.3.2 Measured Performance

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

- N1: 139 Gemalong, Marrangaroo – "Gemalong" property residence.
- N2: 987 Great Western Highway, Marrangaroo – "Cockatoo Pines" property boundary.
- N3: 2 Cypress Place, Wallerawang.RL1: located adjacent to the Quarry office.

During the reporting period it has been confirmed that there is no inhabited residence on the "Cockatoo Pines" property. Furthermore, Walker Quarries holds an agreement with this landowner for noise levels exceeding those nominated in **Table 6.2**. As such, Noise Monitoring Location N4 (located at 42 Rocky Waterhole Drive) was added (refer to **Figure 6.1**) for the August 2021 and March 2022 attended noise monitoring. Since then, an updated *Noise Management Plan* was approved by the DPIE in May 2022, and 43 Rocky Waterhole Drive has been identified as N2 for future attended noise monitoring programs.

Attended noise monitoring was undertaken on 18 August 2021, and 23 March 2022 by Muller Acoustic Consulting Pty Ltd. The resulting reports (MAC, 2021 and MAC, 2022) are presented as **Appendix 4 .**

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, N2, N3, N4 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 *Noise Management Plan* (NMP) identifies that the Sound Power Level (SWL) of active mobile and fixed plant operating at the quarry will be measured on an annual basis and reported in the Annual Review. SWL monitoring was undertaken during the March 2022 noise monitoring assessment. The results are presented in **Table 6.5.**

6.3.3 Discussion and Analysis

Monitoring during the reporting period at locations N1, N2, N3 and N4 confirmed compliance with the assessment criteria in all instances during the reporting period, other than one instance in March 2022 for N3, where wind conditions were outside the applicable EPL parameters, and therefore the criteria was not applicable. In this case, the monitoring was repeated when wind conditions returned to the applicable range and the Quarry noise was found to be within the criteria. The attended monitoring program found that the Quarry was audible (over background noise levels) during several offsite measurements however the Quarry's contribution during the measurements was calculated to be well 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 SWL testing of operational quarry equipment undertaken in March 2022 identified that sound power levels from individual items of plant and overall are below target sound power levels outlined in MAC (2022).

The monitoring results which indicate the Quarry as generally inaudible from residential receivers is supported by the fact that no new queries or complaints were received during the reporting period.

It is noted that during the reporting period, Noise Monitoring location N2 (Cockatoo Pines) (which is uninhabited and with whom Walker Quarries holds an agreement relating to noise emissions with the owner) was replaced with 42 Rocky Waterhole Drive (N4). This has been reflected in the updated *Noise Management Plan* which was approved in May 2022 and identifies 42 Rocky Waterhole Drive as the new N2 for future noise monitoring programs.

No non-compliances with *Condition 3(3)* of DA 344-11-2001 were identified.

Table 6.3 Noise Monitoring Results – 18 August 2021

Location	Date and Time (hrs)	Attended Noise Monitoring Results (dB(A))				Criteria dB(A)	Met Conditions[1]		Comments
		Total Measured			Site Contribution LA_{eq}		Wind Speed (m/s)	Wind Direction	
		LA_{max}	LA_{eq}	LA_{90}					
N1	18/8/21, 07:38	63	52	49	<43	43	0.2	SW	Traffic 45-63; Birds 45-57; Quarry Inaudible
	18/8/21, 09:27	67	49	43	<43	43	0.2	SW	Traffic 41-67; Birds 41-52; Quarry Inaudible
N2	18/8/21, 08:05	59	50	48	<43	43	0.1	SW	Traffic 48-59; Birds 48-59; Quarry Inaudible
	18/8/21, 09:49	61	47	44	<43	43	0.1	SW	Traffic 41-56; Birds 41-61; Quarry Inaudible
N3	18/8/21, 08:45	62	48	42	<43	43	0.2	SW	Traffic 42-62; Birds 42-54; Quarry Inaudible
	18/8/21, 10:30	65	50	38	<43	43	0.8	SW	Traffic 35-65; Birds 35-52; Quarry Inaudible
N4	18/8/21, 09:05	67	54	50	<43	43	0.2	SW	Traffic 48-67; Birds 48-64; Quarry Inaudible
	18/8/21, 10:48	65	47	41	<43	43	1.2	SW	Traffic 38-62; Birds 38-65; Local residential noise <38; Quarry Inaudible
RL1	18/8/21, 08:25	69	65	64	62	43	0.1	SW	Birds 63-66; Quarry Trucks 63-69; Quarry Generator 63-66
	18/8/21, 10:08	69	64	62	62	43	0.1	SW	Quarry Trucks 61-69; Quarry Generator 62-64

Notes 1: Meteorological data was recorded with a hand-held anemometer, N/A: Not applicable

Source: Muller Acoustic Consulting (2021) – Tables 4-8

Table 6.4 Noise Monitoring Results – 13 March 2022

Location	Date and Time (hrs)	Attended Noise Monitoring Results (dB(A))				Criteria dB(A)	Met Conditions[1]		Comments
		Total Measured			Site Contribution LA_{eq}		Wind Speed (m/s)	Wind Direction	
		LA_{max}	LA_{eq}	LA_{90}					
N1	23/02/22, 10:08	58	49	37	<27	43	0.1	E	Traffic 44-58; Birds 38-55; Local residential noise 40-43; Dog bark <40; Quarry inaudible.
	23/03/22, 13:07	71	49	38	<33	43	0.1	NW	Traffic 40-71; Birds35-38; Dog Bark <35; Quarry inaudible.
N2	23/02/22, 10:47	58	45	43	38	43	0.1	E	Wind in vegetation 34-38; Traffic 40-47; Birds 40-58; Quarry crusher 36-40.
	23/03/22	68	42	36	<30	43	01	E	Traffic 37-45; Birds 34-37; Insects 30-68; Quarry hum <30.
N3	23/03/22, 09:45	63	52	48	45[2]	43	4.7[3]	W	Traffic 53-58; Insects 30-33; Aircraft 43-45; Birds 40-63; Quarry crusher 38-45; Quarry excavator 38-57
	23/03/22, 09:45	79	48	37	<27	43	0.1	E	Traffic 47-55; Birds 43-50; Insects 30-35; Local residential noise 77-79; Quarry inaudible.
	23/03/22, 12:26	70	49	44	38	43	0.1	E	Traffic 49-70; Local residential noise 40-50; Quarry crusher 34-42.
N4	23/03/22, 09:21	68	55	51	41	43	0.1	E	Traffic 40-59; Birds 40-59; Local residential noise 60-68; Quarry processing 40-42.
	23/03/22, 12:45	66	55	50	31	43	0.1	ESE	Traffic 53-66; Birds <40; Quarry processing 30-33.
RL1	23/02/22, 08:30	79	59	52	58	N/A	0.1	ESE	Traffic 52-56; Quarry generator 45-48; Quarry FEL 52-79; Quarry excavator 55-62; Quarry water cart <50.
	23/02/22, 13:48	74	56	48	54		0.1	E	Quarry generator 47-48; Quarry water cart 53-54; Quarry haul truck 56-74; Traffic 54-58

Note 1: Meteorological data was recorded with a hand-held anemometer, N/A Not applicable
Note 2: Outside EPL Meteorological conditions, hence criteria not applicable
Note 3: Meteorological data measured at 10m obtained from the Bureau of Meteorology weather station Mount Boyce AWS, NSW Station 63292 (-33.6185o S 150.2741o E 1080m AMSL).
Source: Muller Acoustic Consulting (2022) – Tables 5-8

Table 6.5 Sound Power Audit Results – March 2022

Plant	Sound Power dB(A) Lw	Criteria/Target[1]
Komatsu Loader WA480 FEL	97	100
Screen and Crusher	113	111
Total Site Sound Power Level	**110**	**121**

Note 1: Total logarithmic sum of the overall site criteria (as reported in MAC, 2020)

Source: Muller Acoustic Consulting (2021) – Table 9.

6.4 Blasting

6.4.1 Performance Criteria, Public Notices and Predicted Performance

Condition 3(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 this 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 6.6 presents the air blast overpressure and ground vibration performance criteria identified in *Condition 3(6)* of DA 344-11-2001.

Table 6.6 Blasting-related 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 Blast Management and Explosives Control Plan identifies that blast monitoring will be undertaken at at least three locations, chosen from B1, B2, B3 and B4, for each blast event, as shown in **Figure 6.1**.

In addition to the above criteria, *Condition 3(1)* of DA 344-11-2001-MOD 3 permits blasting between 9:00am and 5:00pm, Monday to Friday, and between 9:00am and 1:00pm 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

Table 6.7 presents the results of blast monitoring during the reporting period.

Table 6.7 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**
15/07/2021		N/T	N/T	N/T	N/T	0.66	98.8	N/T	N/T
24/9/21		N/T	N/T	N/T	N/T	N/T	N/T	N/T	N/T
5/11/21		N/T	N/T	N/T	N/T	N/T	N/T	0.53	101.0
24/11/21		N/T	N/T	N/T	N/T	N/T	N/T	0.53	101.0
8/6/22		0.6	106	N/T	N/T	N/T	N/T	N/T	N/T

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).

Source: Walker Quarries Pty Ltd

6.4.3 Discussion and Analysis

The criteria of 5 mm/s for ground vibration and 115 dB for air blast overpressure were not exceeded during the reporting period. A small load factor of explosives were used to minimize environmental effects, with the majority of resulting blasting events not triggering the blast monitors. B1 and B3 were triggered on one occasion and B4 was triggered on two occasions.

The results for ground vibration and air overpressure are consistent with the previous reporting period. There is no identifiable trend in monitored ground vibration and air blast overpressure levels since the commencement of blasting operations at the Quarry.

No non-compliances with *Condition 3(9)* of DA 344-11-2001-MOD 3 were identified.

6.5 Air Quality

6.5.1 Performance Criteria and Predicted Impacts

Table 6.8 presents the air quality performance criteria presented in Condition 3(11) of DA 344-11-2001.

Table 6.8 Air Quality-related Performance Criteria

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM_{10})	Annual	25 µg/m^3
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	Annual	8 µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	24 hour	25 µg/m^3
Total suspended particulates (TSP)	Annual	90 µg/m^3
Deposited dust	Annual Incremental Increase	2 g/m^2/month
Deposited dust	Annual Average Total Deposited Dust	4 g/m^2/month

6.5.2 Measured Performance

6.5.2.1 Particulate Matter

The Quarry operated in accordance with the *Air Quality Management Plan* (AQMP) as most recently approved by DPE on 23 April 2022.

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 6.9 presents the results of the deposited dust monitoring program for 2021/2022 and the 2020/2021 average for comparison, while
Figure 6.2 presents these results graphically.

Table 6.9 Deposited Dust Monitoring Results

Start Date	End Date	Monitoring Location				Criterion
		DG1	DG2	DG3	DG4	
2020/2021 Annual Average		1.0	1.0	1.1	1.1	4.0
21/06/2021	20/07/2021	0.6	1.5	0.3	0.8	4.0
20/07/2021	18/08/2021	1	1.3	0.9	0.5	4.0
17/08/2021	13/09/2021	0.8	0.7	0.6	0.6	4.0
13/09/2021	13/10/2021	1.2	1.2	1.3	0.7	4.0

Start Date	End Date	Monitoring Location				Criterion
		DG1	DG2	DG3	DG4	
13/10/2021	15/11/2021	1.1	0.3	2.1	0.5	4.0
15/11/2021	14/12/2021	1.0	0.1	0.1	0.1	4.0
14/12/2021	10/01/2022	1.5	0.3	0.9	0.5	4.0
10/01/2022	07/02/2022	0.3	0.4	0.3	0.6	4.0
07/02/2022	15/03/2022	0.8	0.4	0.3	0.4	4.0
15/03/2022	12/04/2022	0.8	0.3	0.3	0.4	4.0
12/04/2022	11/5/2022	0.5	1.2	0.4	0.1	4.0
11/05/2022	14/06/2022	<0.1	0.6	0.1	<0.1	4.0
Annual Average^		**0.9**	**0.7**	**0.6**	**0.5**	**4.0**

Note [1] Units – g/m^2/month Source: Walker Quarries Pty Ltd

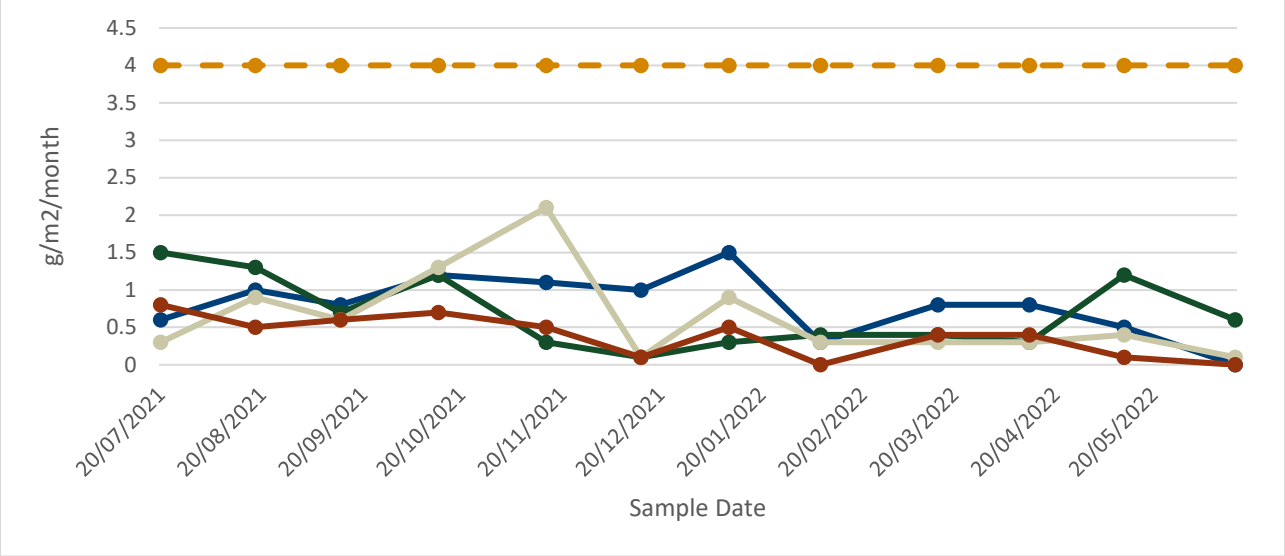


Figure 6.2 Deposited Dust 2021 - 2022

Airborne Particulate Matter

In accordance with the AQMP, monitoring of airborne particulate matter (monitor $PM_{2.5}$, PM_{10} and PM_{total}[3]) was commenced during the reporting period (August 2021) using the Dust Master Pro real-time particulate monitoring unit installed in the previous reporting period (refer to **Figure 6.1**). The location was chosen on the basis of the following.

[3] PM_{total} is equivalent to TSP (an outdated term for the purpose of referencing all airborne particulate matter).

- It is located between dust emitting operations of the Quarry Site and residential receivers most likely to be affected by the Quarry operations.
- It is located sufficient distance from remnant woodland vegetation to avoid canopy interference (in accordance with AS 2922:1987).
- It is located where electricity may be supplied by mains power (installed in February 2021).

The Dust Master Pro conforms to AS/NZS 3580.9.6:2015 Methods for sampling and analysis of ambient air (AM-18 of DEC, 2007) and has the capacity for real-time measurement of up to 5 particulate matter fractions simultaneously. Further detail on the Dust Master Pro Real-time monitoring unit, which is linked by telemetry to the server of the Quarry allowing for real-time review and decision making and monthly reporting purposes was provided in the previous Annual Review.

Over the reporting period, the results of the particulate matter monitoring confirmed compliance with 24 hour average concentration criteria for the majority of the reporting period. An exception to this occurred between 24 October and 24 November 2022 when aberrantly high values were received for both PM_{10} and $PM_{2.5}$ readings. Walker Quarries and their environmental representatives were alerted to the elevated readings by email alert (in accordance with the established alert system nominated in the AQMP). After initial consideration of meteorological conditions and periods when the highest readings were recorded, it was established that if representative of emission concentrations, it was almost certainly not a result of Quarry operations as the highest values creating the elevated 24-hr average occurred outside the period of Quarry operation with wind direction generally towards the Quarry. After receiving similar alerts on the ensuing days, the supplier of the monitoring gauge was contacted.

It was subsequently determined, following inspection by the supplier, that a faulty sensor was likely responsible for the high readings. A replacement sensor and dashboard were supplied and installed by Walker Quarries with readings returning to pre-sensor failure and compliant readings.

Outside of this period, the following exceedances of 24-hour average particulate matter were reported.

- 18 October 2022:
  - PM_{10}: 121 µg/m^3
  - $PM_{2.5}$: 39.4 µg/m^3

  Based on proximity to the date of sensor failure, this is thought to have been a result of faulty sensor as well.
- 28 November 2022
  - $PM_{2.5}$: 35.5 µg/m^3
- 29 November:
  - PM_{10}: 51 µg/m^3
  - $PM_{2.5}$: 36.1 µg/m^3

Excluding October and November which were affected by the faulty senor, the monthly average for both PM_{10} and $PM_{2.5}$ complies with the annual average criteria.

Table 6.10 Monthly Average Particulate Monitoring Results

Month	PM2.5 (µg/m³)	PM10 (µg/m³)
Criteria	**25**	**50**
August 2021	14	15.9
September 2021	9.3	15.6
October 2021	32.6*	164.8*
November 2021	98.5*	245.6*
December	7.7	25
January 2022	5.9	24.9
February 2022	6.2	22.9
March 2022	3.8	18.4
April 2022	3.8	16.6
May 2022	4.4	17.4
June 2022	5.5	13.9

Note *: Affected by faulty sensor

Appendix 5 provides the monthly reports generated by the particulate matter monitoring station.

6.5.3 Discussion and Analysis

All samples recorded in the reporting period were below 4g/m^2/month (between <0.1 g/m^2/month and 2.1 g/m^2/month). Annual averages were between 0.5 g/m^2/month and 0.9 g/m^2/month for the four dust gauges, indicating that the deposited dust impacts as a result of the Quarry's operations are less than the previous reporting period and well below the assessment criterion.

No non-compliances with *Condition 3(14)* of DA 344-11-2001 were identified.

6.6 Biodiversity

6.6.1 Consent Conditions

Condition 3(26) requires monitoring of biodiversity to be undertaken in accordance with a *Biodiversity Management Plan* (BMP). In accordance with *Condition 3(26)* 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 originally approved by the DPIE on 8 April 2019, with a further update during this reporting period approved by the DPE on 1 June 2022.

Condition 3(28A) identifies biodiversity credits to be retired prior to commencement of additional disturbance at the Quarry. **Table 6.11** presents the credit obligation of DA 344-11-2001 identifying both the original disturbance stages assessed by the BDAR (Ecoplanning, 2019) and consolidated Tranches nominated by *Condition 3(28A)*.

Table 6.11 Biodiversity Credit Obligations

Tranche[1]	Stage[2]	Vegetation (PCT)	Area (ha)	Credit Requirement		Status
				PCT 1093	PCT 732	
1	1	PCT 1093	1.15	39		Retired
	3	PCT 1093	1.75	61		Yet to be Triggered
		PCT 732	0.92		36	Yet to be Triggered
2	2A	PCT 1093	0.15	5		Yet to be Triggered
		PCT 732	0.25		10	Yet to be Triggered
	2B	PCT 1093	0.63	20		Yet to be Triggered
		PCT 732	2.42		93	Yet to be Triggered
	4	PCT 1093	1.2	39		Yet to be Triggered
3	5	PCT 1093	1.61	52		Yet to be Triggered
		PCT 732	1.95		75	Yet to be Triggered
4	6	PCT 1093	1.76	57		Yet to be Triggered
Total			**14.05**	**273**	**214**	

Note 1: As identified by Table 5A of DA 344-11-2001
Note 2: As nominated by BDAR (Ecoplanning, 2019)

6.6.2 Measured Performance

Annual Biodiversity Monitoring

Biodiversity monitoring for the period was undertaken by Ecoplanning Pty Ltd (Ecoplanning). The monitoring included a local fauna survey, conducted on 8 October 2021, and flora data gathering on 30 November and 1 December 2021.

This period was the first to require the floristic data be collected in-line with the requirements of DPIE's *Biodiversity Assessment Method* (BAM). Floristic data was collected in line with the requirements of DPIE's *Biodiversity Assessment* Method (BAM), utilizing 20m x 20m grids with 50m transects extending from each plot. Following approved vegetation clearing, the monitoring site BAM04 was impacted in 2021, resulting in the additional plot BAM07 being added for this reporting period. The location of BAM07 was selected to match the Plant Community Type and general vegetation condition of BAM04. The location of all plots are shown on **Figure 6.1**.

The resulting report (Ecoplanning, 2022) is presented as **Appendix 6.** As part of the BAM, vegetation integrity scores (VIS) were calculated for each plot, with the results shown in **Table 6.12**.

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 (WALLQ1)	732	98	99.4	70.5	**88.2**
BAM02 (WALLQ2)	732	96.8	82.5	88	**88.9**
BAM03 (WALLQ3)	732	92.5	88.9	84.9	**88.7**
BAM04 (WALLQ4)	1093	94.6	92	72.2	**85.6**
BAM04 (WALLQ5)	1093	90.4	72.6	72.8	**78.2**
BAM06 (WALLQ6)	1093	90.2	75	83.1	**82.5**
BAM07 (WALLQ7)	1093	91.9	66.9	72.5	**76.4**

The results indicate VIS scores were relatively high due to the relatively intact nature of the retained vegetation surrounding the Quarry. Generally high composition and structure scores, reflecting high species richness and foliage cover of the vegetation within the monitoring plots was also recorded. One exception (BAM04) recorded a low structure score due to low canopy cover. Vegetation function scores indicate moderately intact vegetation although with some habitat features absent or reduced. The cover of weed species in the monitoring plots including the presence of high-threat exotic species, including *Pinus radiata* (Radiata Pine) and *Rubus fruticosus* (Blackberry) was generally low (<5 %).

These scores indicate generally that retained vegetation isn't impacted by ongoing operations at the Quarry.

Ecoplanning (2022) identified that across all monitoring sites which were surveyed in 2020 and 2021, the VIS in 2021 were similar or slightly increased compared to 2020. While small increases and decreases in vegetation composition and structure were recorded at individual sites between seasons, the most consistent change between 2020 and 2021 was an increased function score at monitoring sites in 2021 compared to 2020. As vegetation function assesses aspects of the local vegetation which are the result of long-term vegetation management (large trees and fallen logs can take many decades to develop), the observed differences over 12 months are likely to be the result of different observers, rather than any recent change in the length of fallen logs or the number of large trees. No flora species listed in the NSW *Biodiversity Conservation Act 1995* (BC Act) or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were detected. Based on the results of BAM plot monitoring, the Quarry is not impacting on woodland within the monitoring sites and therefore native species richness is not being impacted.

Fauna species observed or heard during the field survey included one native mammal and 16 birds. One threated fauna species listed under the BC Act, the Gang-gang Cockatoo, was observed during the survey in proximity to BAM07 in the eastern portion of the Project area. Ecoplanning (2022)[4] confirmed that habitat for native fauna species continues to be available at the Quarry.

[4] Varied Sittellas (*Daphoenositta chrysoptera*) and Scarlet Robins (*Petroica boodang*), both listed as Vulnerable under the BC Act, were detected during the 2016 survey, but were not observed or heard during the 2021 survey.

Purple Copper Butterfly

Monitoring surveys for the Purple Copper Butterfly were undertaken on 8 October 2021 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.

A report of the investigation is included in the Biodiversity Monitoring Report (Ecoplanning, 2022) in Error! Reference source not found., and the results are summarised as follows.

- No Purple Copper Butterflies were observed within any of the monitoring sites.
- No *Anonychomyrma itinerans* ants were present within any of the monitoring sites.
- Species of butterfly, ants and other insects were present within the Quarry Site.
- All of the monitoring sites within the Quarry included healthy populations of Blackthorn with mature fruiting individuals and seedlings present. All sites exhibited no obvious grazing of the Blackthorn leaves.
- The DPIE identified Purple Copper Butterflies as being active in August 2021, which was earlier than previous seasons.
- Wet conditions and COVID-19 restrictions restricted opportunities to undertake the Purple Copper Butterfly surveys.
- These monitoring results are consistent with monitoring results from 2016-2020. Based on these results, it is likely that the population(s) of Purple Copper Butterfly that once existed in the Quarry has become locally extinct.

Weeds/Exotic Species

Ecoplanning (2021) found that exotic species richness has remained relatively stable between 2016 and 2021. No new exotic species were recorded in 2020. Predominant weed and exotic species within the quarry were Blackberry (*Rubus ulmifolius*), St Johns Wort (*Hypericum perforatum*) and Radiata Pines (*Pinus radiata*). Ecoplanning (2021) recommended that these species be targeted as part of weed control works within the Quarry.

Exotic vegetation coverage, especially *Anthoxanthum odoratum* (Sweet Vernal Grass) increased within all monitoring plots within PCT732 (BAM01, BAM02, BAM03). The increase of A. odoratum is attributed to ongoing above average rainfall in 2021, with the species generally occurring in moist habitats. Ecoplanning advised that the coverage of this species should be monitored and targeted weed control may be warranted if coverage increases further.

Weed spraying was undertaken at the Quarry during the reporting period. The location of weed spraying, which targeted Blackberry, St Johns Wort and Siften Bush, is identified on **Figure 6.1**.

Pre-Clearance Surveys

No pre-clearance surveys were completed during the reporting period.

Rehabilitation

No significant rehabilitation had been undertaken at the Quarry Site at the time of the field survey to allow monitoring of rehabilitation to commence.

6.6.3 Discussion and Analysis

The flora and fauna monitoring undertaken in accordance with the *Biodiversity Management Plan* has identified no evidence that the Quarry is having any detrimental effect on the biodiversity of the Quarry Site and surrounds.

No non-compliances with *Conditions 3(26) and 3(28)* of DA 344-11-2001 were identified.

6.7 Heritage

6.7.1 Consent Conditions

Condition 3(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. An archaeological survey of the Quarry Site undertaken in 1999 identified a single Aboriginal site containing 22 artefacts (**Figure 2.2**). A subsequent *Aboriginal Cultural Heritage Assessment Report* (ACHAR) prepared to support the application for DA 344-11-2001-MOD 3 (OzArk, 2019) confirmed this site and assessed the disturbance of it by salvage and relocation of artefacts. Disturbance of this site is approved subject to the preparation of an *Aboriginal Cultural Heritage Management Plan* (ACHMP) prepared, in consultation with the *Biodiversity Conservation Division* (BCD) (function now with NSW Heritage) and the Registered Aboriginal Parties (RAPs) of DA 344-11-2001-MOD 3, and in accordance with *Condition 3(23C)* of DA 344-11-2001-MOD 3.

In accordance with Condition *3(22)* of DA 344-11-2001, 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 within the NSW DPIE. Work must not recommence in the area until authorised by NSW Police and the BCD.

Conditions 3 (23, 23A and 23B) of DA 344-11-2001 relate to the discovery of previously unknown Aboriginal objects or Aboriginal Places on site. These conditions require Walker Quarries to:

- Stop all work in the immediate vicinity of the object or place immediately.
- Cordon off a 10-metre buffer area around the object or place.
- Contact BCD immediately.
- Only recommence work in the immediate vicinity if:
    - The object or place is confirmed not to be an Aboriginal object or place.
    - The Aboriginal Cultural Heritage Management Plan (ACHMP) required by Condition 23C is revised to include the Aboriginal object or place and appropriate measures in respect of it.

- The Planning Secretary is satisfied as to the measures to be implemented in respect of the Aboriginal object or place and makes a written direction in that regard.

- Record the Aboriginal object or place in the AHIMS Register.

6.7.2 Management and Performance

No new sites or artefacts were identified during the reporting period, including during the completion of clearing of the site of AHIMS Site #45-1-2802 in accordance with the approved ACHMP.

An updated ACHMP was completed, submitted and approved by DPE during the reporting period to reflect the completed salvage and relocation of artefact associated with AHIMS Site #45-1-2802.

No non-compliances with Conditions 3(21), 3(22) or 3(23, 23A, 23B or 23C) of DA 344-11-2001 were identified.

6.8 Traffic and Transport

Transportation activities during the reporting period occurred during the approved hours of operation (**Section 2.3.2**).

As provided in **Section 4.3.4**, 9,641 truck movements occurred during the reporting period which was reported as required by *Condition 3(19)* of DA 344-11-2001.

No non-compliances with *Condition 3(19)* of DA 344-11-2001 were identified.

6.9 Visual/Landscape Management

6.9.1 Consent Conditions

Conditions 32 and *34* of Schedule 3 of DA 344-11-2001 requires 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 (Condition 3(32))

- 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 (Condition 3(33)

- 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 (Condition 3(34)).

6.9.2 Performance

Operations with the potential to adversely impact visual amenity during the reporting period include the development of the Extraction Area and stockpiling of extracted material and products.

Walker Quarries continued to maintain a visual amenity bund located to the north of the Western Stockpile Area during the reporting period to minimise visual amenity impacts associated with its

operations. Vegetation establishment on this bund has been successful and it is expected that over the ensuing years this will provide additional screening of the Quarry Site from the Great Western highway. Furthermore, as the Extraction Area is developed below the current floor level of 941 m AHD, the visibility of these activities will reduce as natural screens formed by the retained hill slope and vegetation take effect.

As noted in **Section 4.3.3**, the location of the in-pit crushing activities and increase in height of a stockpile of KIS Sand on the processing pad increases the visibility of the Quarry from the great Western Highway and has been identified as a low risk non-compliance against Conditions 3(32) an 3(34).

6.9.3 Mitigation and Management

Walker Quarries has confirmed the relocation of the in-pit crushing train during the first half of 2023. Prior to relocation, Walker Quarries will carefully monitor dust and noise emissions from the crushing operations to ensure compliance with noise and air criteria, the latter of which will reduce adverse impacts on visual amenity as a result of the current location.

Walker Quarries also notes that stockpiles of KIS Sand will start to be processed through the upgraded wash plant in 4th quarter of the next reporting period. At this time, the stockpile will gradually be reduced in size and visibility.

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 licensed waste contractor. Liquid wastes, principally waste hydrocarbons generated during equipment servicing, are removed by a licensed oil waste contractor when their storage container reaches capacity. As a consequence of the limitations to on-site disposal, all wastewater generated via the effluent and ablutions system is collected and disposed of off-site by a licensed contractor.

No non-compliances with *Condition 35* of DA 344-11-2001 were identified.

6.11 Emergency and Hazards

Diesel delivered to the Quarry Site was delivered in bulk by a diesel supplier and stored in a self-bunded diesel tank. Refueling 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 refueled, 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.

As identified in the environmental inspection on 29 June 2022, waste oil drums and other containers were found to be stored outside of bunded pallets. It is noted that Walker Quarries has assessed the hydrocarbon storage area during the reporting period and identified opportunities for improvements which are scheduled for implementation in the next reporting period (refer to **Section 12.0**).

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.

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

6.12 Bushfire

Management of bushfire hazards is provided through the *Bushfire Management Plan* which was resubmitted for approval to DPE in November 2021 and approved by DPE on 10 June 2022. The plan outlines procedures to be implemented in the event of a bushfire within or surrounding the Site.

During the reporting period, Walker Quarries maintained fire extinguishers at the Fuel and Lube Bay, within the offices and workshops, and on all earthmoving machinery, mobile plant and light vehicles. In addition, Walker Quarries maintains a water truck with fire-fighting capability within the Quarry.

No fires occurred within the Site during the reporting period.

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

Compliance with consent conditions is noted.

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 approved by the NSW DPE in June 2021. An updated SWMP was submitted to DPE in November 2021, however, remained unapproved by DPE during the reporting period.

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.

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 4 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), however reflects above average rainfall during the reporting period.

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.

7.2 Surface Water

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 7.1**.

Table 7.1 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

It is noted that the limits presented in **Table 7.1** do not authorise the pollution of waters by any other pollutants and the Quarry must comply with Section 120 of the *Protection of the Environment Operations Act 1997* (POEO Act).

Water samples are collected and analysed when there is a discharge from the two licensed discharge points of the Quarry (SD1 and SB2) (refer to **Figure 6.1**).

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

Over the reporting period, water was carefully managed and at times pumped between water storages to prevent discharge from the Quarry Site. A single discharge event occurred on 23 August 2021 following 88 mm of rain in the preceding 5 days. While EPL 13172 notes that the water quality criteria of Condition L2.4 do not apply under these rainfall conditions, Condition M2.2 requires a sample to be taken monthly during discharge. No sample was taken during August during the discharge event which is identified as a as a non-conformance with the Quarry SWMP and non-compliance against EPL 13172 (refer to **Section 1.0** and **Table 1.2**).

The water levels retained in the sediment basins of the Quarry Site have been observed to be high with the water storage capacity nominated in the Quarry SWMP for each storage not retained. This has been identified as a minor non-conformance with the Quarry SWMP and non-compliance against Condition O4.1 of EPL 13172 (refer to **Section 1.0** and **Table 1.2**). It is noted that at the time of the inspection that Quarry Management were planning to pump water out of SB2 to increase water storage capacity.

The results of monthly monitoring of Coxs River sites SD3 and SD4 during the reporting period are provided in **Table 7.2**.

Table 7.2 Surface Water Monitoring Results – Monthly Monitoring

Period	TSS (mg/L)	EC (µS/cm)	Sulphate (mg/L)	Grease and Oil (mg/L)	pH
SD3 - Cox's Control					
July 2021	<10	580	150	-	7.9
August 2021	<10	500	130	<5	8.0
September 2021	<10	450	120	-	7.5
October 2021	<10	530	120	-	8.1
November 2021	8	410	90	-	7.7
December 2021				<5	
January 2022	<10	400	94	<5	7.5
February 2022	<5	390	82	-	7.7
March 2022	26	260	53	-	7.3
April 2022	<10	400	89	-	7.6
May 2022	<10	480	110	-	7.9
June 2022	<10	440	100	-	7.6
Average	**<10**	**440**	**103**	**<5**	**7.7**
SD4 - Cox's Receiving					
July 2021	<10	580	150	-	7.9
August 2021	<10	550	130	<5	8.1
September 2021	<10	450	120	-	7.5
October 2021	<10	520	130	-	8.0
November 2021	8	410	89	-	7.7
December 2021				<5	
January 2022	<10	400	94	<5	7.5
February 2022	6	390	83	-	7.7
March 2022	14	260	53	-	7.4
April 2022	<10	400	89	-	7.7
May 2022	<10	480	110	-	7.9
June 2022	<10	490	100	-	8.1
Average	**<10**	**448**	**104**	**<5**	**7.7**

Source: Walker Quarries/Envirolab Services Pty Ltd

It is noted that the Coxs River water flow is dependent on the discharge from the spillway of Lake Wallace, which is located downstream of a number of industrial operations independent of Walker Quarries.

The Coxs River monitoring sites were also sampled and monitored for metals during the reporting period. This was commenced to establish baseline levels within the Coxs River and future establishment of Site Specific Performance Criteria should future modifications of the development consent allow for extraction below the groundwater table and dewatering. Results of this monitoring are provided in **Table 7.3**.

Table 7.3 Surface Water Monitoring Results –Metals Monitoring

Sample Date	As	Ca	Cr	Cu	Pb	Hg	Ni	Zn
SD3								
16 February 2022	1	<0.1	<1	<1	<1	<0.05	9	1
SD4								
16 February 2022	1	<0.1	<1	<1	<1	<0.05	9	1

7.2.3 Discussion and Analysis

7.2.3.1 Monitoring Results

One discharge event occurred during the reporting period, and it is noted that the water quality criteria of EPL 13172 *Condition L2.4* do not apply under these rainfall conditions. A sample was not taken during the discharge which has been identified as a minor non-compliance of *Condition M2.2*.

Results from monthly monitoring of water quality in the Coxs River indicate no significant difference between the water quality upstream and downstream of the Quarry. This indicates that Quarry operations are not currently having any noticeable impact on local water quality.

The following reviews the monitoring results with respect to local water quality objectives and criteria.

- All remaining parameters were well within the acceptable criteria across the whole reporting period.
- March 2022 showed elevated *Total Suspended Solids* (TSS) compared to the average reading at both SD3 (26mg/L) and SD4 (14mg/L). Attributable to increased rainfall for the month, this still remained below the acceptable criteria of 30mg/L.
- Electrical conductivity results indicate that the water in Cox's River is less saline than during the previous reporting period with EC ranging from 260 – 580 µS/cm at both SD3 and SD4, compared to 600-1100 µS/cm and 350-1000 µS/cm respectively in 2020-2021.
- Sulphate concentrations were also higher in Cox's River, with results ranging from 110 – 230 mg/L at SD3 and 96 – 190 mg/L at SD4 (compared to 5mg/L recorded at SB2 during the March 2021 discharge event).

The results of the metals monitoring do not at this stage provide any significant guidance on local baseline levels although it is noted that they are generally similar (between SD3 and SD4).

7.2.3.2 Water Management System/Erosion and Sediment Control

With the exception of the lack of available storage in Quarry sediment basins at times over the reporting period, the dams, sediment basins, catchment drains and other erosion and sediment control structures of the Quarry Site were observed to be generally well maintained and managed in accordance with the Quarry SWMP.

The SWMP was updated and resubmitted during the reporting period reflecting changes to Quarry Site layout, most notably:

- the removal of SB7a and SB7b which had become redundant due to constructed bunding around the Eastern Stockpile area during the last reporting period
- The modification (reduction ins size) of SB1 to accommodate the relocation of the sand wash plant whilst an upgraded plant was constructed on the processing pad. Notably, the storage capacity of the modified SB1 satisfies the requirements of the Quarry Erosion and Sediment Control Plan (ESCP) which implements the minimum storage capacity requirements of Managing Urban Stormwater: Soils and Construction Vol. 2 (DECC, 2009).

During the inspection of 29 June 2022, it was confirmed that dirty water is effectively captured and drained to sediment basins in accordance with the SWMP.

The Clean Water Drainage Line which takes water from the Great Western Highway and transfers this to a tributary of the Coxs River to the south showed no signs of pollution and retained excellent vegetation growth. Quarry management confirmed that sediment dams and silt cells are regularly excavated of consolidated silt which is transferred to drying cells and eventual use in rehabilitation.

As identified in previous sections, Condition O4.1 of EPL 13172 (and the Quarry SWMP) requires that the minimum storage capacity of all sediment basins on the Quarry Site is reinstated within 5 days of a rainfall event. During the inspection of 29 June 2022, it was observed that SB2 was full and Quarry management confirmed pumping was planned to take place shortly.

With the construction of a new wheel wash, the flow and collection of water from the Quarry access road and office area will be modified. As a consequence, there will be no flow of water to SB5 which is now redundant. This sediment basin will be decommissioned, backfilled and rehabilitated during the next reporting period (with the Quarry SWMP updated to reflect this).

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. Rather, the elevation of the local water table is to be monitored to prevent unanticipated intersection by extraction operations at the Quarry, which is considered unlikely above an elevation of 900 m AHD. The maximum pit depth was at 941 m AHD at the time of writing.

Extraction below the groundwater table has not been approved by DA 344-11-2001-MOD 3 and as a result no impact on local groundwater levels, bores or ecosystems is likely.

7.3.2 Measured Performance

No groundwater was encountered within the extraction and the elevation of the extraction area remained above 941 m AHD.

To meet the environmental management and monitoring commitments of the Quarry's environmental management plans, groundwater monitoring at three bores continued during the reporting period (**Figure 6.1**). Continuous monitoring of these bores is undertaken by down-hole data loggers which monitor groundwater levels at a 6-hourly frequency. Monitoring commenced on 22 June 2018 at GW1, 12 July 2018 at GW2, and 3 August 2018 at GW3. The data loggers are owned by the Quarry and downloaded quarterly.

The data period covered by this report extends from 1 July 2021 to 30 June 2022. Groundwater levels (and changes in groundwater level) are summarised in **Table 7.4** and shown in **Figure 7.1**.

Table 7.4 Summarised Quarry Groundwater Monitoring Bore Groundwater Level Data

Bore ID	Data logger groundwater level – commencement of monitoring[1] (m AHD)	Data logger groundwater level – commencement of reporting period (m AHD)	Data logger groundwater level – end of reporting period (m AHD)	Change in groundwater level during reporting period (m)	Change in groundwater level since commencement of monitoring (m)
GW1	874.33	873.42	874.80	1.38	0.47
GW2	899.75	899.80	900.49	0.69	0.74
GW3	895.01	894.38	896.47	2.09	1.46

Note 1: Stabilised data start date, i.e. GW1 (1/9/2018), GW2 (20/7/2018), GW3 (5/8/2018)
Note 2: A pressure sensor error occurred during this period, with manually recorded data utilized.
Source: Walker Quarries

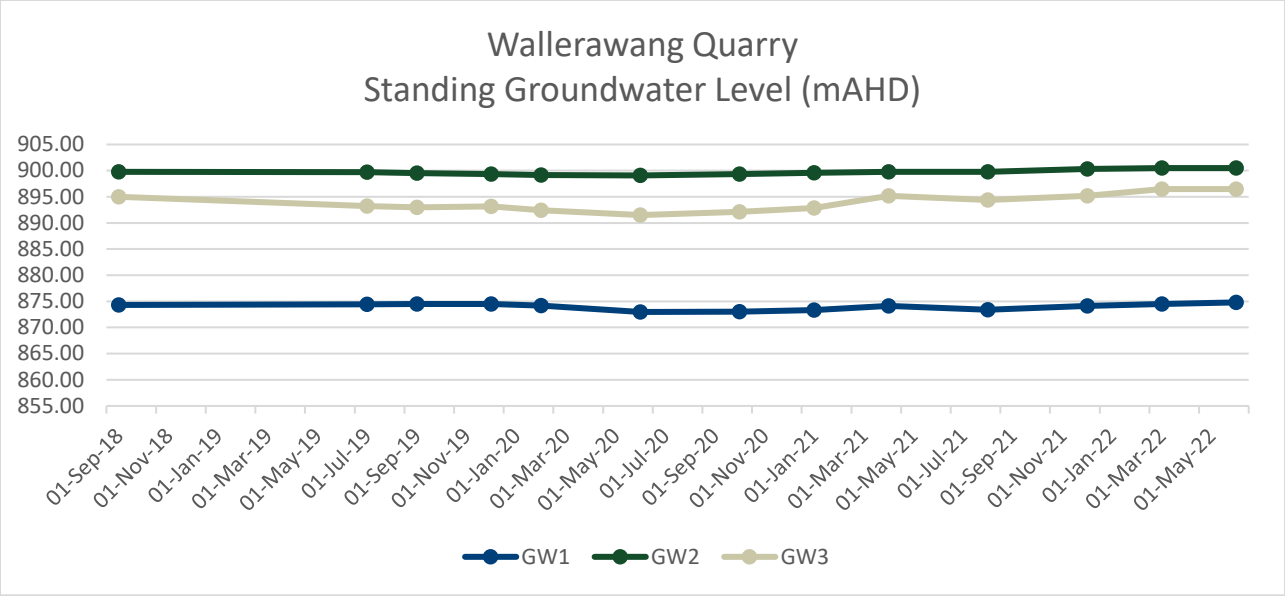


Figure 7.1 Groundwater Levels (2018 – 2022)

Samples were collected from all three groundwater bores (GW1, GW2 and GW3) for metals analysis on 19 August 2021, 10 January 2022 and 24 March 2022. Results are provided in **Table 7.5**.

Table 7.5 Summarised Quarry Groundwater Monitoring Bore Groundwater Metals Data

Bore ID	GW1	GW2	GW3	Criteria
26 August 2021				
Arsenic	0.013	0.004	0.003	24
Nickel	0.009	0.011	0.013	11
Zinc	<0.005	0.068	0.046	8
10 January 2022				
Arsenic	<0.001	<0.001	<0.001	24
Nickel	0.010	0.011	0.010	11
Zinc	0.053	0.077	0.050	8
24 March 2022				
Arsenic	0.009	0.002	0.002	24
Nickel	0.002	0.013	0.011	11
Zinc	0.036	0.094	0.159	8

Note: All units are µg/L
Source: Walker Quarries

7.3.3 Discussion and Analysis

As expected, groundwater was not encountered within the extraction area during the reporting period.

An analysis of the groundwater monitoring data indicates an increase in groundwater levels over the reporting period. This supports evidence reported in previous Annual Reviews which identifies a lagging relationship between rainfall and groundwater levels. During this reporting period, when above average rainfall was experienced, the monitoring identifies a recovery of groundwater levels which were gradually dropping over the previous reporting periods which occurred during or immediately followed a period of prolonged drought that saw groundwater level drop in all bores.

Limited sampling and analysis has been undertaken for metals in water samples collected from groundwater bores GW1, GW2 and GW3. Monitoring results for the samples collected in August 2021, January 2022 and March 2022 indicate concentrations of heavy metals including arsenic, nickel and zinc are well below the ANZECC 2000 criteria (95th percentile).

No non-compliances with DA 344-11-2001 were identified.

8.0 Rehabilitation

8.1 Rehabilitation Performance during the Reporting Period

Limited areas of the Quarry Site were available for new rehabilitation during the reporting period and as a result no additional rehabilitation was undertaken during the reporting period. Rehabilitation activities were limited to the following.

- Vegetation established on the Visual Amenity Bund, located to the north of the Western Stockpile Area was maintained. The onset of La Nina conditions during the reporting period has allowed the rehabilitation to establish and become self-sustaining (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 along the Great Western Highway on either side of the Quarry entrance were maintained.

Photo 8.1 Vegetation on Visual Amenity Bund)

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.

Table 8.1 provides a summary of the disturbance and rehabilitation areas (as nominated in the Quarry MOP, Umwelt, 2020).

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	19.7	19.8	20.4
B. Total active disturbance	17.1	17.2	17.8
C. Land being prepared for rehabilitation	0	0	0
D. Land under active rehabilitation	2.6	2.6	2.6
E. Completed rehabilitation	0	0	0

8.2 Actions for the Next Reporting Period

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

8.3 Compliance

No rehabilitation non-compliances with the consent conditions 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:

- 15 November 2021
- 20 May 2021.

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.

9.1.2 Other Consultation

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.

During the reporting period, no enquiries were received from the local community.

9.2 Complaints

Walker Quarries did not receive any complaints during the reporting period. The contact details for complaints, and a complaints register are maintained on the Walker Quarries' website.

9.3 Compliance

No consultation and community engagement non-compliances were identified.

10.0 Independent Audit

10.1 Requirement

In accordance with the requirements of *Condition 5(13)* of DA 344-11-2001-MOD 3, 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.

10.3 Compliance

Compliance with *condition 5(13)* was noted.

11.0 Incidents and Non-Compliances during the Reporting Period

11.1 Incidents

There were no Incidents recorded during the reporting period.

11.2 Warnings, Notices and Additional Regulatory Authority Advice

No warnings or notices were issued by the Department of Planning and Environment during the reporting period.

On 23 May 2022, personnel from the EPA completed a site inspection of the Quarry. As a result of this inspection, the EPA provided Walker Quarries with letter on 29 June 2022 identifying several actions for completion. These are summarized below.

- EPA requested Walker Quarries provide an updated map of all EPL licence points, label and identify all monitoring points with signage, and vary EPL to ensure the most up to date references to the license points were referenced.

  Walker Quarries has added signage to identify the EPL licence points, prepared a new figure identifying the licence points and on 28 July 2022 made an application to vary EPL 13172.

- EPA identified that the fuel storage areas were not being adequately maintained and required Walker Quarries to upgrade the storage to comply with AS 1940:2017.

  Walker Quarries completed a clean-up of the ground where leaks and spills had occurred and has since installed a new fuel storage container allowing for all drums and IBCs to be appropriately contained (refer to **Photo 11.1** to **Photo 11.3**).

  Walker Quarries has also committed to further improving this area through the laying of a concrete slab for future maintenance and refueling.

The resources Regulator also undertook an inspection of the Quarry on 3 May 2022 and on 16 May requested the following information.

REHABILITATION

- Recent rehabilitation risk assessment (completed April 2022).
- Evidence of landholder consultation regarding the rehabilitation objectives and completion criteria.
- Inspection reports completed by Umwelt during the audit period.
- Any rehabilitation care and maintenance programs developed and implemented to meet final land use objectives for the site.

Photo 11.1 **Hydrocarbon clean-up**

Photo 11.2 **New Hydrocarbon Storage Unit**

Photo 11.3 **AS 1940:2017 Compliant Storage of Hydrocarbons**

COMPLIANCE MANAGEMENT

- Screenshots of any "compliance management system".
- Information on any co-operational agreements in place with Sitegoal Pty Ltd being the authority holder of overlapping EL 4473.
- Minutes for 2 x operational meetings during the audit period.
- 2x signed participant sheets for toolbox talks during the audit period – particularly noting environmental/rehabilitation requirements or actions to be undertaken.
- 3 x JSAs approved during the audit period.

Walker Quarries responded to the Resources Regulator with the requested information on 27 May 2022. Walker Quarries has satisfied all requirements of the Resources Regulator to date.

11.3 Non-Compliant Conditions

Please refer to **Table 1.2** in **Section 1.0**, which summarise 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 Condition 2(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 Condition 2(11(b)): The condition states that all plant and equipment at the site, or to monitor the performance of the development is operated in a proper and efficient manner. During the reporting period, it was observed that the truck wheel wash was observed to not be operating efficiently as it is undersized and vehicles observed exiting the wash before sprays have been applied to all tyres.
- DA 344-11-2001 Condition 2(12): The condition states that the Applicant must include a copy of annual quarry production data supplied to the NSW Resources Regulator using the standard form in the Annual Review. Form S1 was not available at the time of Annual Review preparation.
- DA 344-11-2001 Condition 3(4(a)): The condition states Walker Quarries must implement best practice management to minimise the construction, operational and road transportation noise of the development. As noted previously, the -pit crushing trains are operating adjacent to the pit edge (not behind a quarry face or bund wall as nominated in the Noise Management Plan).
- DA 344-11-2001 Condition 3(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 -pit crushing trains are operating adjacent to the pit edge and are visible from the east-bound lanes Great Western Highway (for a very short period of time).
- DA 344-11-2001 Condition 3(34): The condition states Walker Quarries must 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. The in-pit crushing trains were not operated behind a bund walls and are visible from the Great Western Highway (east-bound lanes).

- DA 344-11-2001 Condition 3(37): The Applicant must ensure that all tanks and similar storage facilities (other than for water) are protected by appropriate bunding or other containment, in accordance with the relevant Australian Standards.
- EPL 13172 Condition 04.1: The stormwater control structures (sediment dams) identified at condition L2.4 EPA identification point 1 and 2 were observed to be at capacity when inspected (with the potential for discharge should further in-flow be received. Walker Quarries has indicated the water was to be pumped from the sediment basin to reinstate minimum water storage capacity for a 5-day 95th percentile rainfall event.

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. **Section 12.0** provides an overview of key actions to be undertaken in the next reporting period to improve compliance at the Quarry.

All environmental monitoring has been undertaken with results confirming compliance with relevant criteria and generally good environmental performance.

The development and implementation of a quarterly inspection and review of performance against environmental commitments of the Quarry management plans is considered a positive process which is likely to enable earlier identification of non-conformances with environmental commitments. This should result in continued improvement in environmental performance and compliance.

Continued excellent environmental performance is expected over the course of the next reporting period.

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 (Condition or MP)	Responsibility	Planned completion
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.	All management plans	Quarry Manager / Appointed Environmental Consultant	December 2022 and June 2023
The hydrocarbon storage area will be upgraded to reduce the potential for contamination and/or pollution.	DA 344-11-2001, Schedule 3, Condition 37	Quarry Manager / Operations Manager	December 2022
Mobile crushing operations within the extraction area will be relocated to a lower elevation.	DA 344-11-2001, Schedule 3, Condition 4(a); NMP	Quarry Manager / Operations Manager	May 2023
The wheel wash upgrade is to be complete to reduce dust tracking on Quarry Access Road and Great Western Highway.	DA 344-11-2001, Schedule 2, Condition 11(b); AQMP	Quarry Manager	September 2022
Upon completion of the wheel wash upgrade, SB5 will be decommissioned, backfilled and rehabilitated.	SWMP	Quarry Manager	December 2022
Rehabilitation across the Quarry Site will continue to be monitored.	Rehabilitation Management Plan / ML 1633	Quarry Manager	Whole reporting period
Quarry operations will continue generally as completed during the reporting period and in accordance with the Quarry MOP (and recently prepared Rehabilitation Management Plan and Forward Program).	Rehabilitation Management Plan / Forward Program	Quarry Manager	Whole reporting period
Complete installation of upgraded wash plant and decommission current wash plant.	SWMP	Quarry Manager / Operations Manager	June 2023

Action	Relating to (Condition or MP)	Responsibility	Planned completion
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	November 2022 / June 2023
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	30 November 2022
Update and resubmit relevant management plans.	DA 344-11-2001, Schedule 5, Condition 5	Quarry Manager / Appointed Environmental Consultant	30 December 2022

13.0 References

Ecoplanning Pty Ltd (Ecoplanning) (2022). *Biodiversity Monitoring 2021 Walker Quarry, Wallerawang, NSW*. Prepared for: Walker Quarries Pty Limited, 16 March 2022 Version: Final.

Jacobs Australia Pty Limited (Jacobs) (2019). *Wallerawang Quarry – Groundwater Impact Assessment. Wallerawang Quarry Extension*. Prepared for Walker Quarries, 2 July 2019 Version 001: Final

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) (2021). *Noise Monitoring Assessment Wallerawang Quarry, August 2021*. Prepared for Walker Quarries, 7 September 2021 Version: Final

Muller Acoustic Consulting Pty Ltd (MAC) (2022). *Noise Monitoring Assessment Wallerawang Quarry, March 2022*. Prepared for Walker Quarries, 8 April 2021 Version: Final

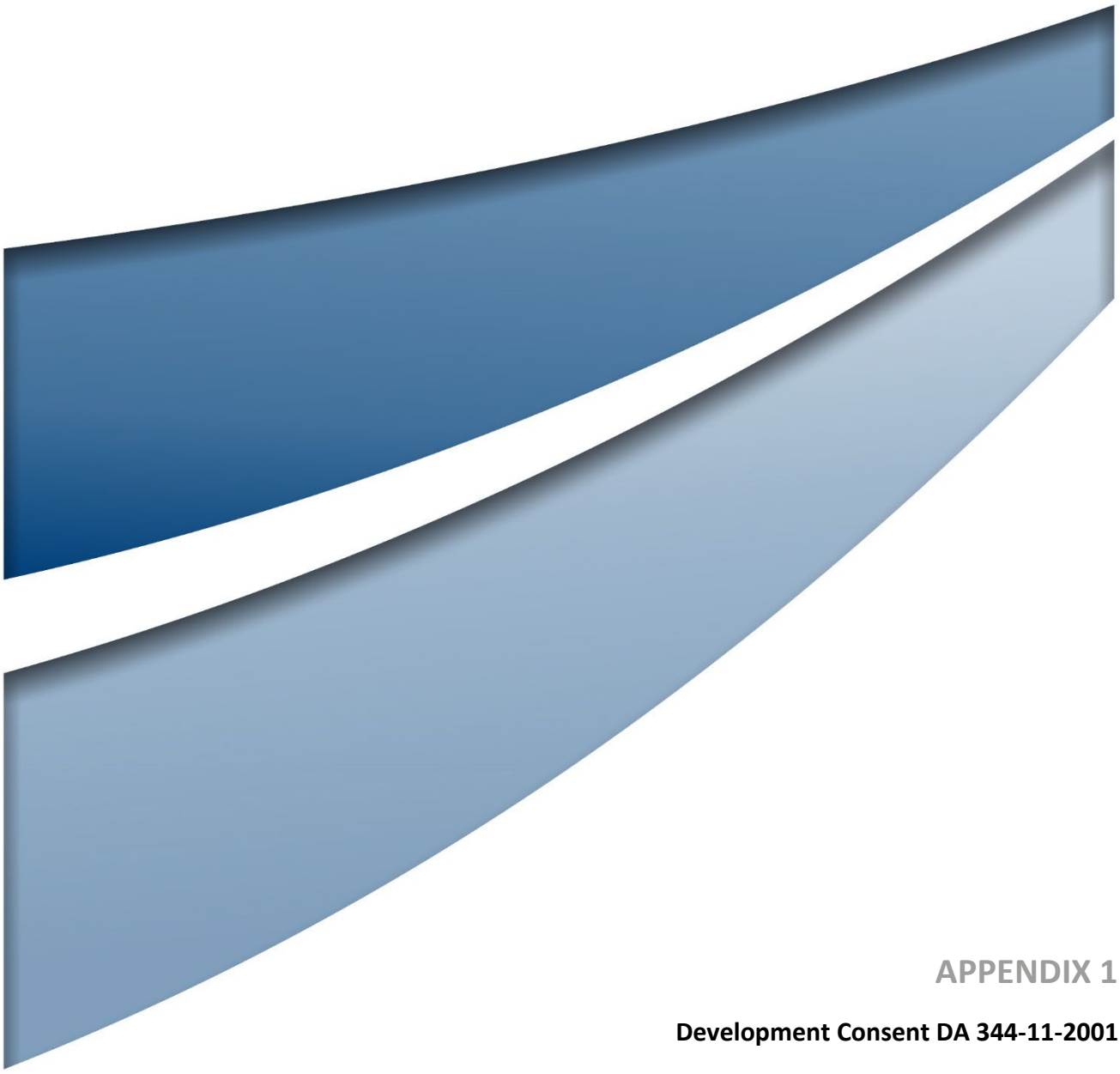
OzArk Environmental and Heritage Management Pty Ltd (OzArk) (2018). *Aboriginal and Cultural Heritage Assessment Report.* Prepared for Umwelt (Australia) Pty Limited on behalf of Walker Quarries Pty Limited, June 2019 Version: Final V3.

Pacrim Environmental (Pacrim) (2001). *Environmental Impact Statement Proposed Wallerawang Quarry*. Prepared for Sitegoal Pty. Limited, November 2001 (report 01/206.1).

Ramboll Australia Pty Ltd (Ramboll) (2019). Wallerawang Quarry Modification Air Quality Assessment. Intended for Walker Quarries Pty Ltd. May 2019. Final V1.

Rangott Mineral Exploration Pty Ltd (Rangott) (2022). *Annual Exploration Progress Report for the period 15 July 2021 to 15 July 2022*. Prepared for Walker Quarries, 2 August 2021.

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



APPENDIX 1

Development Consent DA 344-11-2001

Development Consent

Section 80 of the *Environmental Planning and Assessment Act 1979*

I, the Minister for Infrastructure and Planning, approve the Development Application referred to in Schedule 1, subject to the conditions in Schedule 2.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the development.

Craig Knowles, MP
Minister for Infrastructure and Planning

Signed 14 October 2004.

Sydney, 2004 File No. S03/02385

SCHEDULE 1

Development Application:	DA No. 344-11-2001
Applicant:	Sitegoal Pty Ltd (A.C.N. 052 317 503)
Consent Authority:	Minister for Infrastructure and Planning
Land:	Lot 6, DP 872230 Lot 7322, DP 1149335 Lot 7071, DP 1201227
Proposed Development:	To develop and operate a hard rock quarry and associated infrastructure with access from the Great Western Highway, including crushing and transport of product.
State Significant Development:	The proposal is classified as State significant development, under Section 76A(7) of the *Environmental Planning and Assessment Act 1979*, because it is an extractive industry where the proposed extraction rate is greater than 200,000 tonnes per annum, and consequently satisfies the criteria in the declaration made by the then Minister for Urban Affairs and Planning on 3 August 1999.

Integrated Development:	The proposal is classified as integrated development, under Section 91 of the *Environmental Planning and Assessment Act 1979*, because it requires additional approvals under the: • *Protection of the Environment Operations Act* 1997; and • *Roads Act 1993*.
Designated Development:	The proposal is classified as designated development, under Section 77A of the *Environmental Planning and Assessment Act 1979*, because it is for an extractive industry that would "obtain or process for sale, or reuse, more than 30,000 cubic metres of extractive material per year", and consequently meets the criteria for designated development in Schedule 3 of the *Environmental Planning and Assessment Regulation 2000*.
BCA Classification:	Class 5 Office/amenities building Class 8 Workshop/storage building

Notes:

- *To find out when this consent becomes effective, see Section 83 of the Environmental Planning and Assessment Act 1979;*
- *To find out when this consent is liable to lapse, see Section 95 of the Environmental Planning and Assessment Act 1979; and*
- *To find out about appeal rights, see Section 97 of the Environmental Planning and Assessment Act 1979.*

Schedules 2-5 updated in entirety during Modification 1, dated 25 August 2017

Red type represents Modification 2 (7 December 2018)

Blue type represents Modification 3 (26 February 2020)

TABLE OF CONTENTS

DEFINITIONS

AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
Applicant	Walker Quarries Pty Ltd, or any other person/s who rely on this consent to carry out the development that is subject to this consent
BC Act	*Biodiversity Conservation Act 2016*
BCA	Building Code of Australia
BCD	Biodiversity Conservation Division within the Department
BCT	Biodiversity Conservation Trust
Calendar year	A period of 12 months from 1 January to 31 December
CCC	Community Consultative Committee required by condition 8 of Schedule 5
Conditions of consent	Conditions contained in Schedules 2 to 5 inclusive
Construction	The demolition of buildings or works, carrying out of works and erection of buildings covered by this consent
Council	Lithgow City Council
Day	The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
Department	NSW Department of Planning, Industry and Environment
Development	The development described in the documents listed in condition 2(c) of Schedule 2 as modified by the conditions of this consent
DPIE - Crown Lands	Crown Lands Division within the Department
DPIE - Water	Water Group within the Department
DRG	Division of Resources and Geosciences within the Department
EA (Mod 1)	Environmental Assessment titled '*Modification to Operations at the Wallerawang Quarry (DA 344-11-2001)'* dated May 2017 and the Applicant's response to submissions documentation dated July 2017
EIS	Environmental Impact Statement titled *Proposed Wallerawang Quarry,* dated November 2001 and the Applicant's Supplementary Report to the EIS, dated July 2002
Environment	Includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence under the POEO Act
Evening	The period from 6pm to 10pm
Feasible	Means what is possible and practical in the circumstances
FCNSW	Forestry Corporation NSW
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Land	Has the same meaning as the definition of the term in Section 1.4 of the EP&A Act, except for where the term is used in the noise and air quality conditions in Schedules 3 and 4 of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the NSW Land Registry Services office at the date of Modification 3
Material harm	Is harm to the environment that: • involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial; or • results in actual or potential loss of property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment) This definition excludes "harm" that is authorised under either this consent or any other statutory approval
Maximum groundwater level	The highest recorded groundwater level as established under condition 6A of Schedule 2
Minister	Minister for Planning and Public Spaces, or delegate
Mitigation	Activities associated with reducing the impacts of the development
Modification 3	The modification to the development as described in SEE (Mod 3)
Negligible	Small and unimportant, such as to be not worth considering
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
Non-compliance	An occurrence, set of circumstances or development that is in breach of this consent
NPfI	*Noise Policy for Industry* (NSW EPA 2017)
POEO Act	*Protection of the Environment Operations Act 1997*
Privately-owned land	Land that is not owned by a public agency or the Applicant (or its subsidiary)
Public infrastructure	Linear and other infrastructure that provides services to the general public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc.

Quarrying operations	The extraction, processing, stockpiling and transportation of extractive materials (including quartzite, which is also a prescribed mineral) carried out on the site and the associated removal of vegetation, topsoil and overburden
Quarry products	Includes all saleable quarry products, but excludes tailings, other wastes and rehabilitation material
Reasonable	Means applying judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views, and the nature and extent of potential improvements
Rehabilitation	The restoration of land disturbed by the development to a good condition and for the purpose of establishing a safe, stable and non-polluting environment
RFS	NSW Rural Fire Service
RMS	Roads and Maritime Services
RR	NSW Resources Regulator within the Department
Secretary	Planning Secretary under the EP&A Act, or nominee
SEE	Statement of Environmental Effects
SEE (Mod 2)	The Statement of Environmental Effects titled *Proposed Modification No 2 (MOD 2) to DA 344-11-2001 (Wallerawang Quarry),* prepared by R.W. Corkery & Co Pty Ltd, dated October 2018; and associated Response to Submissions titled *Response to Submissions for Proposed Modification No 2 (Mod 2) to DA 344-11-2001 (Wallerawang Quarry),* prepared by R.W. Corkery & Co Pty Limited, dated November 2018
SEE (Mod 3)	The SEE titled "Walker Quarries – Wallerawang Quarry – Modification 3", prepared by Umwelt (Australia) Pty Ltd, dated June 2019; and associated Response to Submissions titled "Walker Quarries – Wallerawang Quarry – Modification 3 – Response to Submissions", prepared by Umwelt (Australia) Pty Ltd, dated September 2019
Site	The land described in Schedule 1
Waste	Has the same meaning as the definition of the term in the Dictionary of the POEO Act
WaterNSW	Water NSW
WSEA	Western Stockpile Extension Area

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. In addition to meeting the specific performance measures and criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent and/or minimise any material harm to the environment that may result from the construction, operation, or rehabilitation of the development.

TERMS OF CONSENT

2. The development may only be carried out:
   (a) in compliance with the conditions of this consent;
   (b) in accordance with all written directions of the Secretary;
   (c) generally in accordance with the EIS, EA (Mod 1), SEE (Mod 2) and SEE (Mod 3); and
   (d) generally in accordance with the Development Layout in Appendix 1.

3. If there is any inconsistency between the documents in condition 2(c), the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this consent shall prevail to the extent of any inconsistency.

4. The Applicant must comply with any written requirement/s of the Secretary arising from the Department's assessment of:
   (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this consent (including any stages of these documents);
   (b) any reviews, reports or audits undertaken or commissioned by the Department regarding compliance with this consent; and
   (c) the implementation of any actions or measures contained in these documents.

LIMITS ON CONSENT

Quarrying Operations

5. The Applicant may carry out quarrying operations on the site until 15 July 2040.

   Note: Under this consent, the Applicant is required to rehabilitate the site and carry out additional requirements and undertakings to the satisfaction of the Secretary. Consequently, this consent will continue to apply in all respects other than the right to conduct quarrying operations until the rehabilitation of the site and those requirements and undertakings have been carried out to the standard required by the applicable conditions.

Extraction Depth

6. The Applicant must not conduct quarrying operations within one metre of the maximum groundwater level, with the exception of areas where the Applicant has received the written approval of the Secretary for the construction and use of drainage sumps, groundwater monitoring bores, exploration boreholes or other similar activity agreed by the Secretary.

6A. Prior to the commencement of quarrying operations below 901 mAHD (unless approved under condition 6 of this Schedule), the Applicant must:
   (a) determine the maximum groundwater level within and adjacent to the proposed extraction area, in consultation with DPIE - Water, using all available groundwater and rainfall monitoring data collected from the site or in the vicinity of the site and appropriate modelling software and parameters;
   (b) establish the proposed maximum extraction depth to comply with condition 6; and
   (c) prepare a contour map or similar, showing the proposed maximum extraction depth;
   for the approval of the Secretary.

Limits on Extraction and Transport

7. The Applicant must not extract and/or transport more than 500,000 tonnes of quarry products from the site in any calendar year.

STRUCTURAL ADEQUACY

8. The Applicant must ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

   Notes:

- *Under Part 6 of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.*

DEMOLITION

9. The Applicant must ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

PROTECTION OF PUBLIC INFRASTRUCTURE

10. Unless the Applicant and the applicable authority agree otherwise the Applicant must:
    (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development; and
    (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

    Note: *This condition does not apply to damage to roads caused as a result of general road usage.*

OPERATION OF PLANT AND EQUIPMENT

11. The Applicant must ensure that all the plant and equipment used at the site, or to monitor the performance of the development is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

PRODUCTION DATA

12. The Applicant must:
    (a) from the commencement of quarrying operations provide calendar year annual quarry production data to RR using the standard form for that purpose; and
    (b) include a copy of this data in the Annual Review.

COMPLIANCE

13. The Applicant must ensure that all employees, contractors and sub-contractors are aware of, are instructed to and comply with, the conditions of this consent relevant to their respective activities.

CONTRIBUTIONS TO COUNCIL

14. Within 6 months of the date of approval of Modification 3, the Applicant must make contributions to Council for the provision of public facilities and to enhance amenity and services within the Lithgow LGA, in accordance with the *Section 94A Development Contributions Plan for Lithgow City Council October 2015*, or its most recent version.

    Note: *See also section 7.11 of the EP&A Act.*

APPLICABILITY OF GUIDELINES

15. References in the conditions of this consent to any guideline, protocol, Australia Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as the date of inclusion (or later update) in the condition.

16. However, consistent with the conditions of this consent and without altering any limits or criteria in this consent, the Secretary may, in respect of ongoing monitoring and management obligations, agree to or require compliance with an updated or revised version of such a guideline, protocol, Standard or policy, or a replacement of them.

CROWN LAND

17. The Applicant must consult with DPIE - Crown Lands prior to undertaking any development on Crown land or Crown roads.

    Notes:
    (a) *Under Section 265 of the Mining Act 1992, the Applicant is required to enter into a compensation agreement with DPIE - Crown Lands prior to undertaking any mining operations or related activities on Crown land or Crown roads within a mining lease.*
    (b) *Under Section 141 of the* Mining *Act 1992, the Applicant is required to enter into an access arrangement with DPIE - Crown Lands prior to undertaking any prospecting operations on Crown land or Crown roads within an exploration licence.*

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

NOISE

Hours of Operation

1. The Applicant must comply with the operating hours set out in Table 1.

Table 1: Operating Hours

Activity	***Permissible Hours***
Quarrying operations	• 7 am to 6 pm Monday to Friday • 8 am to 1 pm Saturday • At no time on Sundays or public holidays
Loading and dispatch of trucks	• May be conducted at any time, provided these activities comply with the noise criteria in Table 2
Blasting	• 9 am to 5 pm Monday to Friday • 9 am to 1 pm on Saturdays • At no time on Sundays or public holidays
Maintenance	• May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2. The following activities may be carried out outside the hours specified in condition 1 above:
   (a) delivery or dispatch of materials as requested by Police or other public authorities; and
   (b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

   In such circumstances, the Applicant must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

Operational Noise Criteria

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.

Table 2: Operational noise criteria dB(A)

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

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).

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 Department in writing of the terms of this agreement.

Operating Conditions

4. The Applicant must:
   (a) implement best practice management to minimise the construction, operational and road transportation noise of the development;
   (b) minimise the noise impacts of the development during meteorological conditions when the noise criteria in this consent do not apply (see Appendix 3);
   (c) carry out noise monitoring (at least every 3 months or as otherwise agreed with the Secretary) to determine whether the development is complying with the relevant conditions of this consent; and
   (d) regularly assess noise monitoring data and modify and/or stop operations on site to ensure compliance with the relevant conditions of this consent,

   to the satisfaction of the Secretary.

   Note: Required frequency of noise monitoring may be reduced if approved by the Secretary.

Noise Management Plan

5. The Applicant must prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) be submitted to the Secretary within three months of the determination of Modification 1, unless otherwise agreed by the Secretary;
   (c) describe the measures to be implemented to ensure:
      - compliance with the noise criteria and operating conditions of this consent;
      - best practice management is being employed; and
      - the noise impacts of the development are minimised during meteorological conditions under which the noise criteria in this consent do not apply (see NPfI);
   (d) describe the proposed noise management system; and
   (e) include a monitoring program to be implemented to measure noise from the development against the noise criteria in Table 2, and which evaluates and reports on the effectiveness of the noise management system on site.

   The Applicant must implement the Noise Management Plan as approved from time to time by the Secretary.

BLASTING

Blasting Impact Assessment Criteria

6. The Applicant must ensure that blasting on site does not cause any exceedance of the criteria in Table 3.

Table 3: Blasting Criteria

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

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner or infrastructure owner to exceed the limits in Table 3, and the Applicant has advised the Department in writing of the terms of this agreement.

Property Inspections

7. If the Applicant receives a written request from the owner of any privately-owned land within 2 kilometres of the site for a property inspection to establish the baseline condition of any buildings and structures on their land, or to have a previous property inspection updated, then within 2 months of receiving this request the Applicant must:
   (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to:
      - establish the baseline condition of any buildings and other structures on the land, or update the previous property inspection report; and
      - identify measures that should be implemented to minimise the potential blasting impacts of the development on these buildings and structures; and
   (b) give the landowner a copy of the new or updated property inspection report.

   If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the property inspection report, either party may refer the matter to the Secretary for resolution.

Property Investigations

8. If the owner of any privately-owned land within 2 kilometres of the site or any other landowner where the Secretary is satisfied an investigation is warranted, or claims in writing that buildings or structures on their land have been damaged as a result of blasting on the site, then within 2 months of receiving this written claim the Applicant must:
   (a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and
   (b) give the landowner a copy of the property investigation report.

If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant must repair the damage to the satisfaction of the Secretary.

If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.

Operating Conditions

9. During blasting operations, the Applicant must:
   (a) implement best practice management to:
      - protect the safety of people and livestock;
      - protect public or private infrastructure and property from damage; and
      - minimise the dust and fume emissions;
   (b) operate a suitable system to enable the local community to get up-to-date information on the proposed blasting schedule on site; and
   (c) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this consent,

   to the satisfaction of the Secretary.

Blast Management Plan

10. The Applicant must prepare a Blast Management Plan for the development to the satisfaction of the Secretary. This plan must:
   (a) be submitted to the Secretary for approval within three months of the determination of Modification 1, unless otherwise agreed by the Secretary;
   (b) describe the measures to be implemented to ensure compliance with the blast criteria and operating conditions of this consent;
   (c) include measures to manage flyrock to ensure the safety or people and livestock and to protect properties;
   (d) include a monitoring program for evaluating and reporting on compliance with the blasting criteria in this consent;
   (e) include local community notification procedures for the blasting schedule, in particular to nearby residences; and
   (f) include a protocol for investigating and responding to complaints related to blasting operations.

   The Applicant must implement the Blast Management Plan as approved from time to time by the Secretary.

AIR QUALITY

Air Quality Criteria

11. The Applicant must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 4 at any residence on privately-owned land.

Table 4: Air quality criteria

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

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.

12. The air quality criteria in Table 4 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or infrastructure to exceed the air quality criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Operating Conditions

13. The Applicant must:
    (a) implement best practice management to minimise the dust emissions of the development;
    (b) regularly assess meteorological and air quality monitoring data and relocate, modify and/or stop operations on site to ensure compliance with the air quality criteria in this consent;
    (c) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note c under Table 4);
    (d) monitor and report on compliance with the relevant air quality conditions in this consent; and
    (e) minimise the area of surface disturbance and undertake progressive rehabilitation of the site,
    to the satisfaction of the Secretary.

Air Quality Management Plan

14. The Applicant must prepare an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:
    (a) be submitted to the Secretary for approval within three months of the determination of Modification 1, unless otherwise agree by the Secretary;
    (b) describe the measures to be implemented to ensure:
        - compliance with the air quality criteria and operating conditions of this consent;
        - best practice management is being employed; and
        - the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events;
    (c) describe the proposed air quality management system;
    (d) include an air quality monitoring program that:
        - is capable of evaluating the performance of the development;
        - includes a protocol for determining any exceedances of the relevant conditions of consent;
        - effectively supports the air quality management system; and
        - evaluates and reports on the adequacy of the air quality management system.

    The Applicant must implement the approved Air Quality Management Plan as approved from time to time by the Secretary.

Meteorological Monitoring

15. For the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in close proximity to the site that:
    (a) complies with the requirements in the Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales (DEC, 2007); and
    (b) is capable of measuring meteorological conditions in accordance with the *NSW Noise Policy for Industry* (EPA, 2017),
    unless a suitable alternative is approved by the Secretary following consultation with EPA.

SOIL AND WATER

Water Supply

16. The Applicant must ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of operations under the consent to match its available water supply, to the satisfaction of the Secretary.

Water Discharges

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

Soil and Water Management Plan

18. The Applicant must prepare a Soil and Water Management Plan for the development to the satisfaction of the Secretary. This plan must:
    (a) be prepared by suitably qualified and experienced person/s approved by the Secretary;
    (b) be prepared in consultation with the EPA, DPIE - Water and WaterNSW;
    (c) be submitted to the Secretary for approval within three months of the determination of Modification 1 and Modification 3, unless otherwise agreed by the Secretary; and
    (d) include a:
        i. Site Water Balance that includes:
            - details of:
                a. sources and security of water supply;
                b. water use and management on site;
                c. any off-site water transfers; and
                d. reporting procedures; and
            - measures to be implemented to minimise clean water use on site;
        ii. Surface Water Management Plan, that includes:
            - a program for obtaining detailed baseline data on surface water flows and quality in water bodies that could potentially be affected by the development;
            - a detailed description of the surface water management system on site including the:
                a. clean water diversion system;
                b. erosion and sediment controls;
                c. dirty water management system; and
                d. water storages; and
            - a program to monitor and report on:
                a. any surface water discharges;
                b. the effectiveness of the water management system,
                c. the quality of water discharged from the site to the environment;
                d. surface water flows and quality in local watercourses;
        iii. Groundwater Management Plan that includes:
            - a provision that requires the Applicant to obtain appropriate water licence(s) to cover the volume of any unforeseen groundwater inflows into the quarry from the quarry face or floor; and
            - a monitoring program to manage potential impacts, if any, on any alluvium and associated surface water source near the proposed extraction area that includes:
                a. identification of a methodology for determining threshold water level criteria;
                b. contingency measures in the event of a breach of thresholds; and
                c. a program to regularly report on monitoring.

    The Applicant must implement the approved Soil and Water Management Plan as approved from time to time by the Secretary.

TRANSPORT

Monitoring of Product Transport

19. The Applicant must keep accurate records of all laden truck movements to and from the site and publish a summary of records on its website every 6 months.

Operating Conditions

20. The Applicant must:
    a. ensure that all laden trucks entering or exiting the site have their loads covered, with the exception of loads consisting solely of boulders greater than one tonne in weight;
    b. ensure that all laden trucks exiting the site are cleaned of material that may fall from vehicles, before leaving the site; and
    c. use its best endeavours to ensure that appropriate signage is displayed on all trucks used to transport product from the development so they can be easily identified by road users.

PROTECTION OF ABORIGINAL HERITAGE

21. The Applicant must ensure that the development does not cause any direct or indirect impact on any identified heritage item located outside the approved disturbance area, beyond those predicted in the document/s listed in condition 2(c) of Schedule 2.

22. If suspected human remains are discovered on site, then all work surrounding the area must cease, and the area must be secured. The Applicant must immediately notify NSW Police and BCD, and work must not recommence in the area until authorised by NSW Police and BCD.

23. If any previously unknown Aboriginal object or Aboriginal place is discovered on the site:
    (a) all work in the immediate vicinity of the object or place must cease immediately;
    (b) a 10 metre buffer area around the object or place must be cordoned off; and
    (c) BCD must be contacted immediately.

23A. Work in the immediate vicinity may only recommence if:
    (a) the potential Aboriginal object or Aboriginal place is confirmed by BCD upon consultation with the Registered Aboriginal Parties not to be an Aboriginal object or Aboriginal Place; or
    (b) the Aboriginal Cultural Heritage Management Plan required by condition 23C is revised to include the Aboriginal object or Aboriginal place and appropriate measures in respect of it, to the satisfaction of the Secretary; or
    (c) the Secretary is satisfied as to the measures to be implemented in respect of the Aboriginal object or Aboriginal place and makes a written direction in that regard.

23B. The Applicant must ensure that all known Aboriginal objects or Aboriginal places on the site and within any offset areas are properly recorded, and those records are kept up to date, in the AHIMS Register.

Aboriginal Cultural Heritage Management Plan

23C. The Applicant must prepare an Aboriginal Cultural Heritage Management Plan for the development to the satisfaction of the Secretary. This plan must:
    (a) be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;
    (b) be prepared in consultation with BCD and Registered Aboriginal Parties;
    (c) describe the measures to be implemented on the site or within any offset area to:
        (i) comply with the heritage-related operating conditions of this consent;
        (ii) ensure all workers receive suitable Aboriginal cultural heritage inductions prior to carrying out any activities which may cause impacts to Aboriginal objects or Aboriginal places, and that suitable records are kept of these inductions;
        (iii) protect, monitor and manage identified Aboriginal objects and Aboriginal places (including any proposed archaeological investigations of potential subsurface objects and salvage of objects within the approved disturbance area) in accordance with the commitments made in the document/s listed in condition 2(c) of Schedule 2;
        (iv) protect Aboriginal objects and Aboriginal places located outside the approved disturbance area from impacts of the development;
        (v) manage the discovery of suspected human remains and any new Aboriginal objects or Aboriginal places, including provisions for burials, over the life of the development;
        (vi) maintain and manage reasonable access for relevant Aboriginal stakeholders to Aboriginal objects and Aboriginal places (outside of the approved disturbance area); and
        (vii) facilitate ongoing consultation and involvement of Registered Aboriginal Parties in the conservation and management of Aboriginal cultural heritage on the site;
    (d) include a strategy for the care, control and storage of Aboriginal objects salvaged on site, in particular AHIMS Site #45-1-2802, both during the life of the development and in the long-term.

23D. The Applicant must not commence any ground disturbance associated with Modification 3 until the Aboriginal Cultural Heritage Management Plan is approved by the Secretary.

23E. The Applicant must implement the Aboriginal Cultural Heritage Management Plan approved by the Secretary.

BIODIVERSITY AND REHABILITATION

Biodiversity Offset Strategy

24. By 28 February 2018, the Applicant must provide a Biodiversity Offset Strategy in accordance with the *Framework for Biodiversity Assessment - NSW Biodiversity Offsets Policy for Major Projects,* for the retirement of ecosystem and species credits as set out in Table 5, to the satisfaction of the Secretary and BCD.

Table 5: Biodiversity credits to be retired

Credit type	***Number of Credits***
Ecosystem Credits	
PCT 732 – Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion	120
PCT 1093 – Red Stringybark – Brittle Gum – Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	34
Species Credits	
Purple Copper Butterfly	184

Security of Offsets

25. By 31 December 2018, unless otherwise agreed with the Secretary, the Applicant must make suitable arrangements to provide appropriate long-term security for the Biodiversity Offset Strategy, to the satisfaction of the Secretary. Any mechanism must remain in force in perpetuity.

    Note: Mechanisms to provide appropriate long-term security to the land within the Biodiversity Offset Strategy in accordance with the NSW Biodiversity Offset Policy for Major Projects 2014.

Biodiversity Management Plan

26. The Applicant must prepare a Biodiversity Management Plan for the development to the satisfaction of the Secretary. This plan must:
    (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary;
    (b) be prepared in consultation with BCD;
    (c) be submitted to the Secretary within three months of providing a satisfactory Biodiversity Offset Strategy or by 31 March 2018, whichever is earlier;
    (d) describe the short, medium, and long-term measures to be undertaken to manage the remnant vegetation and fauna habitat on the site
    (e) include a detailed description of the measures described in paragraph (d) to be implemented over the next 3 years (to be updated for each 3-year period following initial approval of the plan) including the procedures to be implemented for:
        - maximising the salvage of environmental resources within the approved disturbance area, including tree hollows, vegetative and soil resources, for beneficial reuse in the enhancement of any biodiversity offset areas or site rehabilitation;
        - restoring and enhancing the quality of native vegetation and fauna habitat in any biodiversity offset and rehabilitation areas through assisted natural regeneration, targeted vegetation establishment and the introduction of fauna habitat features;
        - protecting vegetation and fauna habitat outside the approved disturbance area on-site;
        - minimising the impacts on native fauna, including undertaking pre-clearance surveys;
        - ensuring minimal environmental consequences for threatened species, populations and habitats, including the Purple Copper Butterfly;
        - collecting and propagating seed;
        - controlling weeds and feral pests;
        - controlling erosion; and
        - managing bushfire risk;
    (f) include a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;
    (g) identify the potential risks to the successful implementation of the Biodiversity Offset Strategy, and include a description of the contingency measures to be implemented to mitigate these risks; and
    (h) include details of who is responsible for monitoring, reviewing, and implementing the plan.

    The Applicant must implement the Biodiversity Management Plan as approved from time to time by the Secretary.

Conservation Bond

27. Within six months of the approval of the Biodiversity Offset Strategy, unless otherwise agreed by the Secretary, the Applicant must lodge a Conservation Bond with the Department to ensure that the Biodiversity Offset Strategy is implemented in accordance with the performance and completion criteria in the Biodiversity Management Plan. The sum of the bond must be determined by:

a. calculating the full cost of implementing the Biodiversity Offset Strategy at third party rates (other than land acquisition costs); and
b. employing a suitably qualified, independent and experienced person to verify the calculated costs.

The calculation of the Conservation Bond must be submitted to the Department for approval at least 1 month prior to the lodgment of the bond.

28. The Conservation Bond must be reviewed and if required, an updated bond must be lodged with the Department within 3 months following:
    a. an update or revision to the Biodiversity Management Plan;
    b. the completion of an Independent Environmental Audit in which recommendations relating to the implementation of the Biodiversity Offset Strategy have been made; or
    c. in response to a request by the Secretary.

    If the Biodiversity Offset Strategy is completed generally in accordance with the completion criteria in the Biodiversity Management Plan to the satisfaction of the Secretary, the Secretary will release the bond.

    If the Biodiversity Offset Strategy is not completed generally in accordance with the completion criteria in the Biodiversity Management Plan, the Secretary will call in all, or part of, the conservation bond, and arrange for the completion of the relevant works.

Biodiversity Credits Required for Modification 3

28A. The Applicant must retire biodiversity credits for Stages A to D of the development approved under Modification 3 (see Figure 2 in Appendix 1) as specified in Table 5A below, prior to commencing vegetation clearing in that Stage. The retirement of credits must be carried out in consultation with BCD and in accordance with the Biodiversity Offsets Scheme of the BC Act, to the satisfaction of the BCT.

Table 5A: Biodiversity credit requirements

Credit Type	***Credits Required***
Ecosystem Credits	
Tranche 1 - Credits to be retired for Stage A PCT 1093 – 100 credits PCT 732 – 36 credits	136
Tranche 2 - Credits to be retired for Stage B PCT 1093 – 64 credits PCT 732 – 103 credits	167
Tranche 3 - Credits to be retired for Stage C PCT 1093 – 52 credits PCT 732 – 75 credits	127
Tranche 4 - Credits to be retired for Stage D PCT 1093 – 57 credits	57

Note: The stages referenced in Table 5A are shown in Figure 2 in Appendix 1.

Rehabilitation Objectives

29. The Applicant must rehabilitate the site to the satisfaction of RR and the Secretary. This rehabilitation must be generally consistent with the proposed rehabilitation activities described in the documents listed in condition 2 of Schedule 2 (and shown conceptually in the Rehabilitation Plan in Appendix 2), and comply with the objectives in Table 6.

Table 6: Rehabilitation Objectives

Feature	***Objective***
All areas of the site affected by the development	• Safe • Hydraulically and geotechnically stable • Non-polluting

	• Fit for the intended post-development land use(s) • Final landform integrated with surrounding natural landforms as far as is reasonable and feasible, and minimising visual impacts when viewed from surrounding land
Surface Infrastructure	• Decommissioned and removed, unless otherwise agreed by the Secretary
Quarry benches and pit floor	• Landscaped and vegetated using native tree and understorey species
Final Void	• Minimise the size, depth and slope of the batters of the final void • Minimise the drainage catchment of the final void

Progressive Rehabilitation

30. The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation.
Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to future re-disturbance.

Rehabilitation Management Plan

31. The Applicant must prepare a Rehabilitation Management Plan for the project to the satisfaction of RR. This plan must:
(a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Secretary;
(b) be prepared in consultation with the Department, DPIE - Water , FCNSW, BCD, WaterNSW and Council;
(c) be submitted to RR and the Secretary for approval within three months of the determination of Modification 1, unless the Secretary agrees otherwise, and Modification 3, unless the RR agrees otherwise;
(d) be prepared in accordance with any relevant RR Guideline;
(e) describe how the rehabilitation of the site would achieve the objectives identified in Table 6 and be integrated with the Biodiversity Offset Strategy described in condition 24;
(f) include a detailed soil and growing medium balance for the development;
(g) include a detailed plan for the reinstatement and review of the proposed rehabilitated woodland areas and fauna habitat, including a protocol for periodic trials to demonstrate that the target vegetation community is being achieved;
(h) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and for triggering remedial action (if necessary);
(i) describe the measures to be implemented to ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including closure of the development, final landform (including final voids), final land uses;
(j) include procedures for the use of interim stabilisation and temporary vegetation strategies, where reasonable to minimise the area exposed for dust generation;
(k) include a program to monitor, independently audit and report on the effectiveness of the measures in paragraph (h) above, and progress against the detailed performance and completion criteria in paragraph (g) above; and
(l) build on to the maximum extent practicable and integrate with the other Management Plans required under this consent.

VISUAL

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.

33. Prior to utilising the WSEA, the Applicant must construct a visual bund between the north-western boundary of the WSEA and the Great Western Highway, as described in EA (Mod 1). The visual bund must be maintained to the satisfaction of the Secretary.

34. The Applicant must 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, to the satisfaction of the Secretary

WASTE

35. The Applicant must:

(a) manage on-site sewage treatment and disposal in accordance with the requirements of its EPL, and to the satisfaction of the EPA and Council;

(b) minimise the waste generated by the development;

(c) ensure that the waste generated by the development is appropriately stored, handled, and disposed of; and

(d) report on waste management and minimisation in the Annual Review,

to the satisfaction of the Secretary.

36. Except as expressly permitted in an EPL, specific resource recovery order or exemption under the *Protection of the Environment Operations (Waste) Regulation 2014*, the Applicant must not receive waste at the site for storage, treatment, processing, reprocessing or disposal.

LIQUID STORAGE

37. The Applicant must ensure that all tanks and similar storage facilities (other than for water) are protected by appropriate bunding or other containment, in accordance with the relevant Australian Standards.

DANGEROUS GOODS

38. The Applicant must ensure that the storage, handling and transport of:

(a) dangerous goods are done in accordance with the relevant Australian Standards, particularly AS1940 and AS1596, and the Dangerous Goods Code; and

(b) explosives are managed in accordance with the requirements of the RR.

BUSHFIRE

39. The Applicant must:

(a) ensure that the development is suitably equipped to respond to any fires on site; and

(b) assist the Rural Fire Service and emergency services to the extent practicable if there is a fire in the vicinity of the site.

40. The Applicant must prepare a Bushfire Management Plan for the site, in consultation with FCNSW, to the satisfaction of the Rural Fire Service.

SCHEDULE 4

ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. As soon as practicable, and no longer than 7 days, after obtaining monitoring results showing:
   (a) an exceedance of any criteria in Schedule 3, the Applicant must notify the affected landowners in writing of the exceedance, and provide regular monitoring results, at least every 3 months, to each affected landowner until the development is again complying with the relevant criteria; and
   (b) an exceedance of any air quality criteria in Schedule 3, the Applicant must send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and current tenants of the land (including the tenants of land which is not privately-owned).

INDEPENDENT REVIEW

2. If an owner of privately-owned land considers the development to be exceeding the relevant criteria in Schedule 3, then he/she may ask the Secretary in writing for an independent review of the impacts of the development on his/her land.

   If the Secretary is satisfied that an independent review is warranted, then within 2 months of the Secretary's decision, the Applicant must:
   (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to:
      - consult with the landowner to determine his/her concerns;
      - conduct monitoring to determine whether the development is complying with the relevant criteria in Schedule 3; and
      - if the development is not complying with these criteria, then identify measures that could be implemented to ensure compliance with the relevant criteria; and
   (b) give the Secretary and landowner a copy of the independent review; and
   (c) comply with any written requests made by the Secretary to implement any findings of the review.

VISUAL IMPACT MITIGATION

3. If an owner of privately-owned land considers that the visual impacts of the development at his/her land could be minimised, then he/she may ask the Secretary in writing for a review of the visual impacts of the development on his/her land.

   If the Secretary is satisfied that a review is warranted, then within 2 months of the Secretary's decision, the Applicant must:
   (a) commission a suitably qualified and experienced person, whose appointment has been approved by the Secretary, to:
      - consult with the landowner to determine his/her concerns;
      - investigate ways to minimise the visual impacts of the development on land; and
      - prepare a visual mitigation report detailing the outcomes of the investigation and the proposed mitigation measures.
   (b) give the Secretary and landowner a copy of the review; and
   (c) comply with any written requests made by the Secretary to implement any findings of the review.

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:
   (a) be submitted to the Secretary for approval within 6 months of the Secretary requiring preparation of the strategy by notice to the Applicant;
   (b) provide the strategic framework for environmental management of the development;
   (c) identify the statutory approvals that apply to the development;
   (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
   (e) describe the procedures to be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the development;
      - receive, record, handle and respond to complaints;
      - resolve any disputes that may arise during the course of the development;
      - respond to any non-compliance and any incident;
      - respond to emergencies; and
   (f) include:
      - copies of any strategies, plans and programs approved under the conditions of this consent; and
      - a clear plan depicting all the monitoring to be carried out under the conditions of this consent.

   The Applicant must implement any Environmental Management Strategy as approved from time to time by the Secretary.

Evidence of Consultation

2. Where conditions of this consent require consultation with an identified party, the Applicant must:
   (a) consult with the relevant party prior to submitting the subject document; and
   (b) provide details of the consultation undertaken including:
      (i) the outcome of that consultation, matters resolved and unresolved; and
      (ii) details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.

Management Plan Requirements

3. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:
   (a) a summary of relevant background or baseline data;
   (b) details of:
      (i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);
      (ii) any relevant limits or performance measures and criteria; and
      (iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;
   (c) any relevant commitments or recommendations identified in the document/s listed in condition 2(c) of Schedule 2;
   (d) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;
   (e) a program to monitor and report on the:
      (i) impacts and environmental performance of the development; and
      (ii) effectiveness of the management measures set out pursuant to condition 2(c) of Schedule 2;
   (f) contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;
   (g) a program to investigate and implement ways to improve the environmental performance of the development over time;
   (h) a protocol for managing and reporting any:
      (i) incident, non-compliance or exceedance of the impact assessment criteria or performance criteria;
      (ii) complaint; or

(iii) failure to comply with statutory requirements;

(i) public sources of information and data to assist stakeholders in understanding environmental impacts of the development; and

(j) a protocol for periodic review of the plan.

Note: *The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*

3A. The Applicant must ensure that management plans prepared for the development are consistent with the conditions of this consent and any EPL issued for the site.

Application of Existing Management Plans

4. The Applicant must continue to apply existing approved management plans, strategies or monitoring programs that have most recently been approved under this consent, until the approval of a similar plan, strategy or program under this consent.

Revision of Strategies, Plans & Programs

5. Within 3 months of the submission of an:

(a) incident report under condition 9 below;

(b) Annual Review under condition 11 below;

(c) audit report under condition 14 below; and

(d) any modifications to this consent,

the Applicant must review the strategies, plans and programs required under this consent, to the satisfaction of the Secretary. The applicant must notify the Department in writing of any such review being undertaken. Where this review leads to revisions in any such document, then within 6 weeks of the review the revised document must be submitted for the approval of the Secretary.

Note: The purpose of this condition is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve environmental performance of the development.

Updating and Staging of Strategies, Plans or Programs

6. With the approval of the Secretary, the Applicant may:

(a) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program);

(b) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined); and

(c) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under the consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development).

6A. If the Secretary agrees, a strategy, plan or program may be staged without addressing particular requirements of the relevant condition of this consent if those requirements are not applicable to a particular stage.

6B. If the Secretary agrees, a strategy, plan or program may be staged or updated without consultation being undertaken with all parties required to be consulted in the relevant condition in this consent.

Adaptive Management

7. The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedule 3. Any exceedance of these criteria and/or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

Where any exceedance of these criteria and/or performance measures has occurred, the Applicant must as soon as becoming aware of any exceedance:

(a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not reoccur;

(b) consider all reasonable and feasible options for remediation (where relevant);

(c) within 14 days of the exceedance occurring, submit a report to the Secretary describing these remediation options and any preferred remediation measures or other course of action; and

(d) implement remediation measures as directed by the Secretary;

to the satisfaction of the Secretary.

COMMUNITY CONSULTATIVE COMMITTEE

8. The Applicant must establish and operate a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. The CCC must be operated in general accordance with the Department's *Community Consultative Committee* Guidelines, *2019* (or later version).

Notes:

- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.*
- *In accordance with the guidelines, the Committee should comprise an independent chair and appropriate representation from the Applicant, Council and the local community.*

REPORTING

Incident Reporting

9. The Applicant must immediately notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing to compliance@planning.nsw.gov.au and identify the development (including the development application number and name) and set out the location and nature of the incident.

Non-Compliance Notification

10. Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance. The notification must be in writing to compliance@planning.nsw.gov.au and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, why it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Note: *A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.*

Annual Review

11. By the end of September in each year after the commencement of development, or other timeframe agreed by the Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Secretary. This review must:
    (a) describe the development (including any progressive rehabilitation) that was carried out in the previous financial year, and the development that is proposed to be carried out over the current financial year;
    (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, including a comparison of these results against the:
        (i) relevant statutory requirements, limits or performance measures/criteria;
        (ii) requirements of any plan or program required under this consent;
        (iii) monitoring results of previous years; and
        (iv) relevant predictions in the documents listed in condition 2(c) of Schedule 2;
    (c) identify any non-compliance or incident which occurred in the previous financial year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid reoccurrence;
    (d) evaluate and report on:
        (i) the effectiveness of the noise and air quality management systems; and
        (ii) compliance with the performance measures, criteria and operating conditions of this consent;
    (e) identify any trends in the monitoring data over the life of the development;
    (f) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
    (g) describe what measures will be implemented over the next financial year to improve the environmental performance of the development.

12. Copies of the Annual Review must be submitted to Council and made available to the CCC and any interested person upon request.

INDEPENDENT ENVIRONMENTAL AUDIT

13. Prior to the end of June 2021, and every three years after, unless the Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
    (a) be led by a suitably qualified, experienced and independent auditor whose appointment has been endorsed by the Secretary
    (b) be conducted by a suitably qualified, experienced and independent team of experts (including any expert in field/s specified by the Secretary) whose appointment has been endorsed by the Secretary;

(c) be carried out in consultation with the relevant agencies and CCC;
(d) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent, water licences and mining leases for the development (including any assessment, strategy, plan or program required under these approvals);
(e) review the adequacy of any approved strategy, plan or program required under the abovementioned approvals and this consent;
(f) recommend appropriate measures or actions to improve the environmental performance of the development and any assessment, strategy, plan or program required under the abovementioned approvals and this consent; and
(g) be conducted and reported to the satisfaction of the Secretary.

14. Within 12 weeks of commencing this audit, or as otherwise agreed by the Secretary, the Applicant must submit a copy of the audit report to the Secretary and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of these recommendations as required. The Applicant must implement these recommendations, to the satisfaction of the Secretary.

Monitoring and Environmental Audits

15. Any condition of this consent that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, compliance report and independent audit.

For the purposes of this condition, as set out in the EP&A Act, "monitoring" is monitoring of the development to provide data on compliance with the consent or on the environmental impact of the development, and an "environmental audit" is a periodic or particular documented evaluation of the development to provide information on compliance with the consent or the environmental management or impact of the development.

16. Noise, blast and/or air quality monitoring under this consent may be undertaken at suitable representative monitoring locations instead of at privately-owned residences or other locations listed in Schedule 3, providing that these representative monitoring locations are set out in the respective management plan/s.

ACCESS TO INFORMATION

17. Within 6 months of the date of this consent until the completion of all rehabilitation required under this consent, the Applicant must:
(a) make the following information and documents (as they are obtained, approved or as otherwise stipulated within the conditions of this consent) publicly available on its website:
(i) the document/s listed in condition 2(c) of Schedule 2;
(ii) all current statutory approvals for the development;
(iii) all approved strategies, plans and programs required under the conditions of this consent;
(iv) the proposed staging plans for the development if the construction, operation or decommissioning of the development if it is to be staged;
(v) minutes of CCC meetings;
(vi) regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent;
(vii) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;
(viii) a summary of the current progress of the development;
(ix) contact details to enquire about the development or to make a complaint;
(x) a complaints register, updated monthly;
(xi) the Annual Reviews of the development;
(xii) audit reports prepared as part of any Independent Environmental Audit of the development and the Applicant's response to the recommendations in any audit report;
(xiii) any other matters required by the Secretary; and
(b) keep such information up to date, to the satisfaction of the Secretary.

APPENDIX 1
DEVELOPMENT LAYOUT PLAN

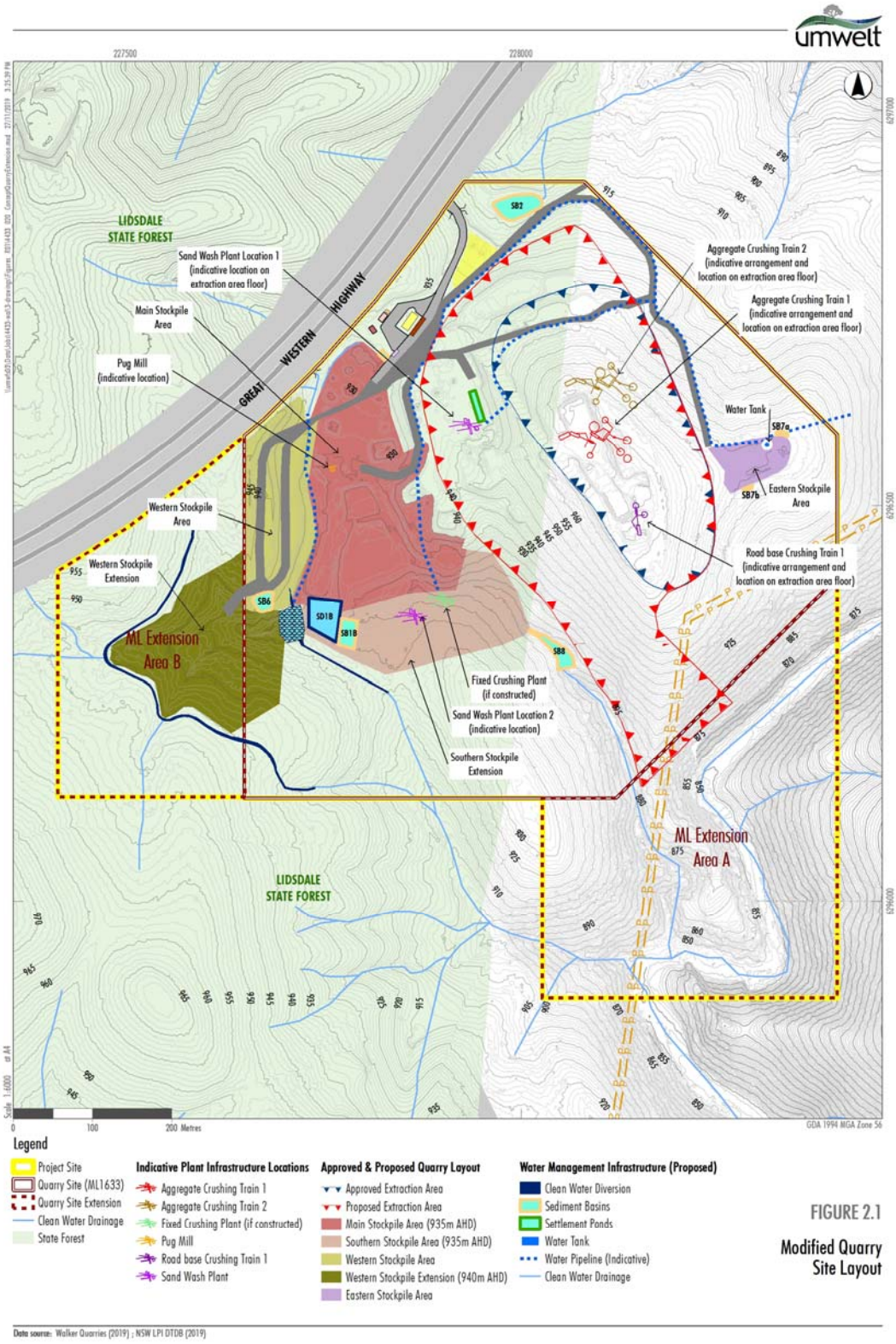


Figure 1: Development Layout incorporating Modification 3

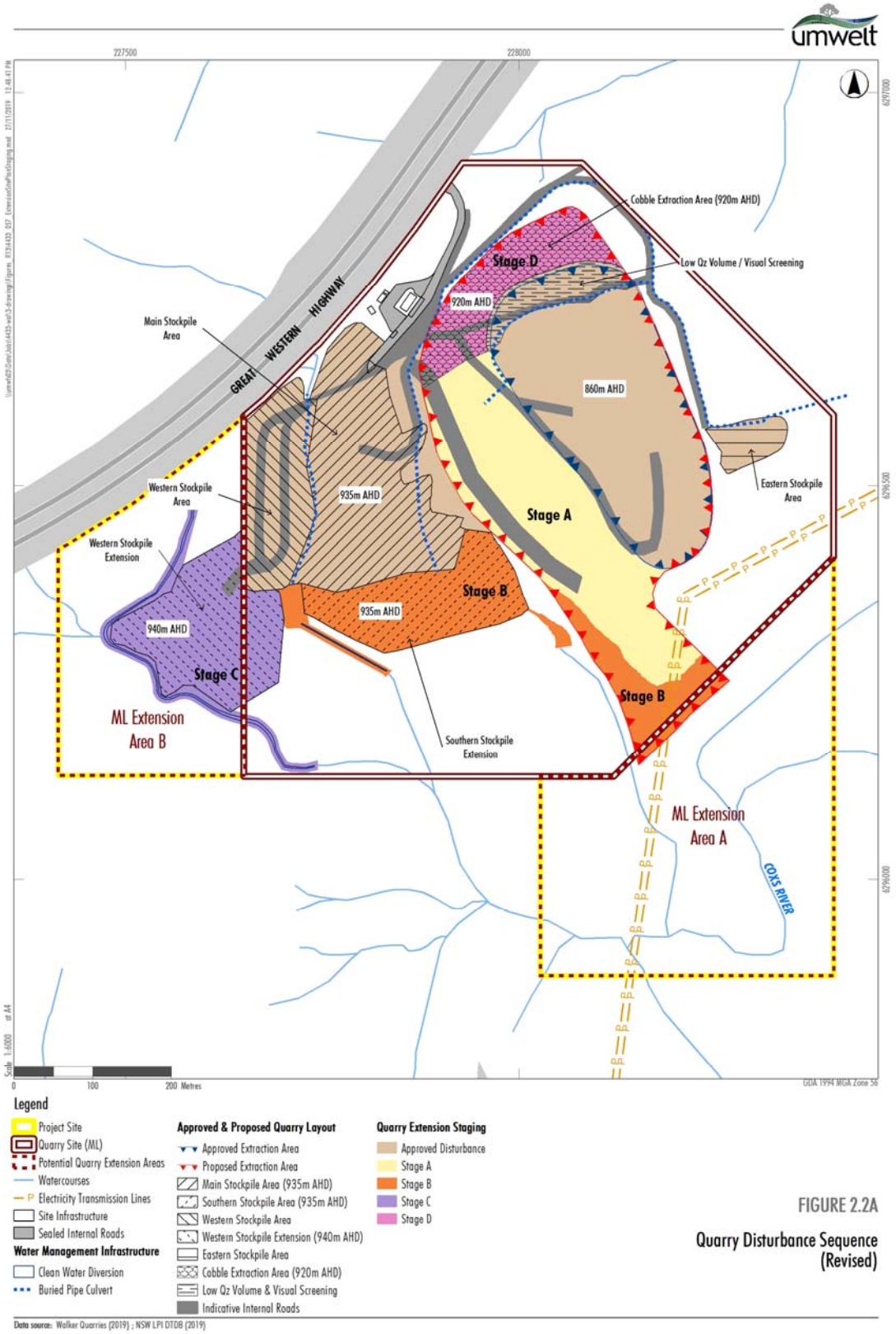


Figure 2: Development Layout incorporating proposed stages

APPENDIX 2
CONCEPTUAL REHABILITATION PLAN

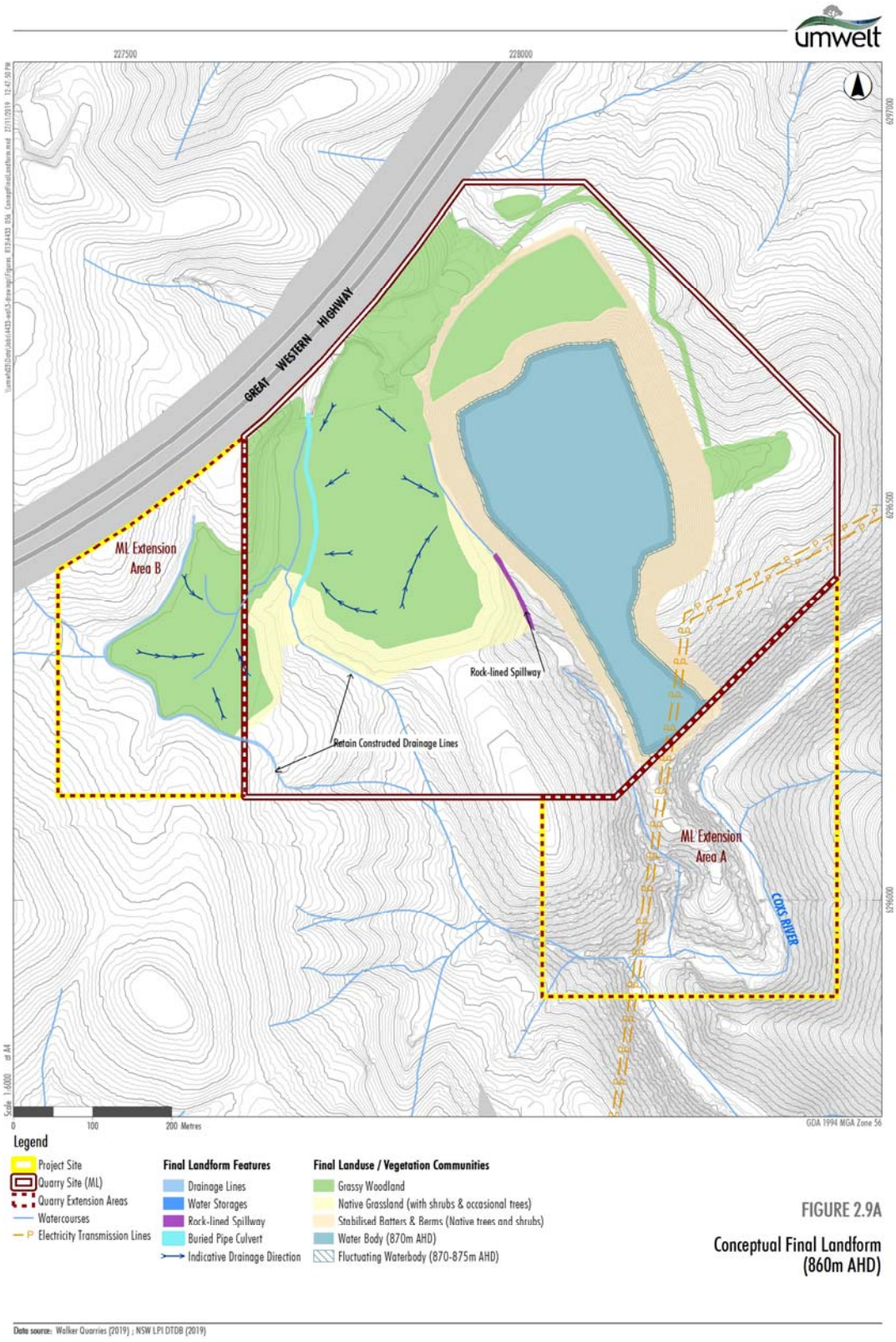


Figure 3: Conceptual final landform

APPENDIX 3
INCIDENT NOTIFICATION AND REPORTING REQUIREMENTS

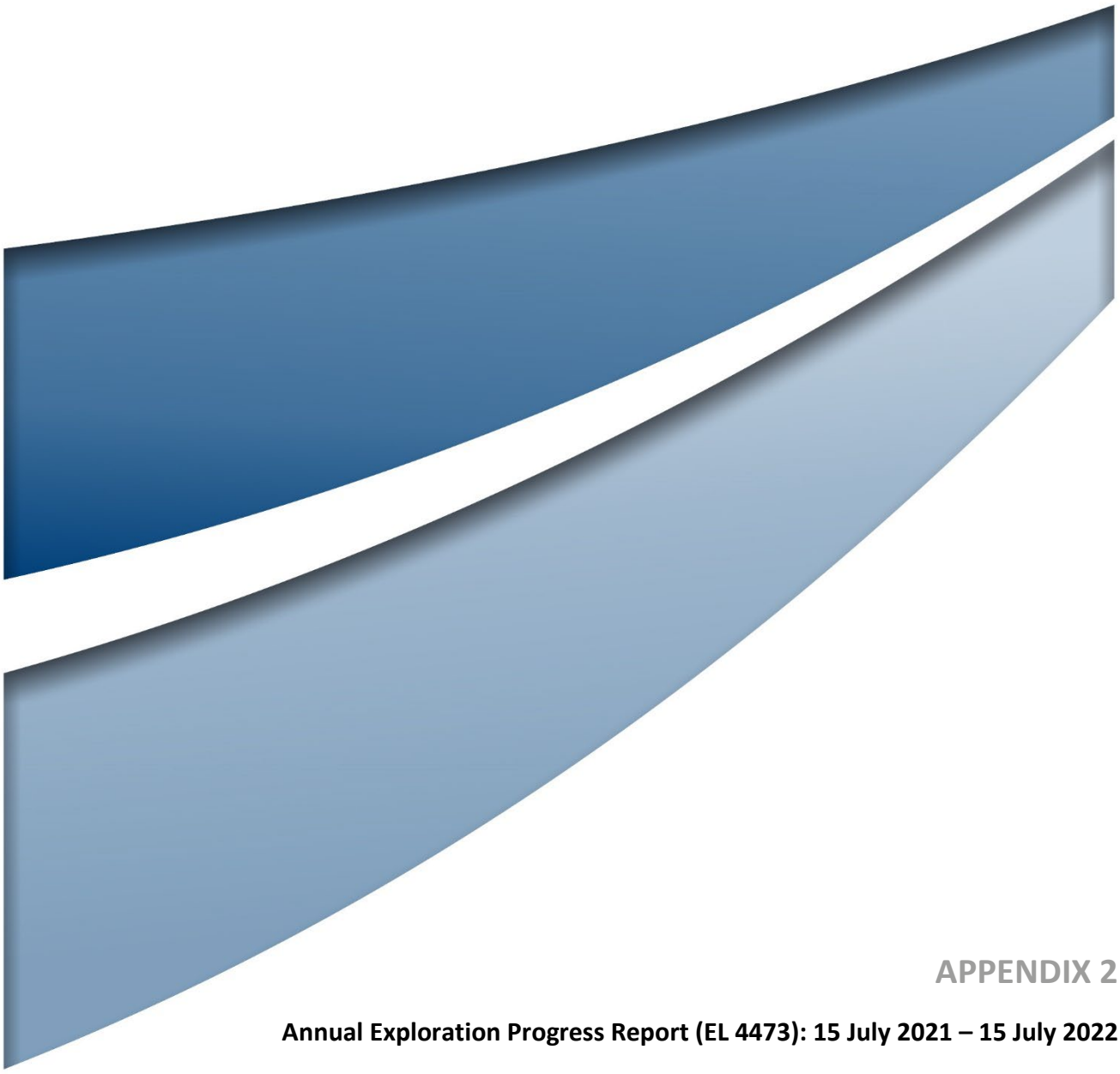
WRITTEN INCIDENT NOTIFICATION REQUIREMENTS

1. A written incident notification addressing the requirements set out below must be emailed to the Department at the following address: compliance@planning.nsw.gov.au within seven days after the Applicant becomes aware of an incident. Notification is required to be given under this condition even if the Applicant fails to give the notification required under condition 9 of Schedule 5 or, having given such notification, subsequently forms the view that an incident has not occurred.

2. Written notification of an incident must:
   (a) identify the development and application number,
   (b) provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);
   (c) identify how the incident was detected;
   (d) identify when the Applicant became aware of the incident;
   (e) identify any actual or potential non-compliance with the conditions of this consent;
   (f) describe what immediate steps were taken in relation to the incident;
   (g) identify further action(s) that will be taken in relation to the incident; and
   (h) identify a project contact for further communication regarding the incident.

3. Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Secretary, the Applicant must provide the Secretary and any relevant public authorities (as determined by the Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.

4. The Incident Report must include:
   (a) a summary of the incident;
   (b) outcomes of an incident investigation, including identification of the cause of the incident;
   (c) details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and
   (d) details of any communication with other stakeholders regarding the incident.



APPENDIX 2

Annual Exploration Progress Report (EL 4473): 15 July 2021 – 15 July 2022

Rangott Mineral Exploration Pty Ltd

ACN 002 536 825

For

WALKER QUARRIES PTY LTD

ABN 66 052 317 503

The Operator and Holder of

MINING LEASE No. 1633 – Wallerawang Quarry

Grant Date: 15 July 2009

Expiry Date: 15 July 2040

ANNUAL EXPLORATION REPORT – *PART A*

for the period

15 July 2021 to 15 July 2022

This report accurately discloses the nature, extent, timing, results, geological interpretation and expenditure of the exploration conducted during the reporting period.

Technical Manager:

M.F. Rangott, Principal Geologist
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2 August 2022

Distribution:

Geological Survey of NSW Mining Exploration & Geoscience
Walker Quarries Pty Ltd
Rangott Mineral Exploration Pty Ltd

ABSTRACT

ML1633 ‘Wallerawang Quarry’ was taken out by Walker Quarries Pty Ltd (Walker Quarries) for the purpose of quarrying quartzite rock for a number of end uses. Extraction of quartzite began in the sixth year of tenure, and construction of infrastructure was completed in the same year (2015). Exploration in the Lease area since grant has comprised rock chip sampling, geological mapping and resource definition drilling.

Exploration and geological work undertaken over the last couple of years has included a detailed review of published geology maps & historic geological reports and desktop geological interpretation relating to both ML1633 and the surrounding EL4473. Geological reconnaissance mapping was undertaken within the ML Extension Area B, on the western side of the quarry, and within Lidsdale State Forest and along public roads within EL4473 to the north of the quarry. This mapping was undertaken to determine the extent of Permian marine conglomerates in the area and to support exploration planning across the tenement areas. Desktop geological assessment of the mapping data was undertaken during the reporting period to support exploration planning.

Future exploration work will focus on further defining the main resources to facilitate long term quarry planning.

MAP REFERENCES

• Sydney	SI 56	1:1,000,000
• Sydney Special	SI 56-05	1:250,000
• Wallerawang	8931	1:100,000
• Lithgow	8931-3-S	1:25,000

KEY WORDS

Wallerawang, Cox’s River, Capertee Subprovince, Lambie Group, quartzite, hornfels, shale, granite, Megalong Conglomerate, Carboniferous, Devonian, blasthole drilling

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ML1633_202207_A_01_Annual Exploration Report_Part A.pdf

ML1633_202207_A_01_Annual Exploration Report_Part B.pdf

1.0 INTRODUCTION

This is the twelfth Annual Report on work conducted on Walker Quarries ML1633 'Wallerawang Quarry'. The Lease was taken out to extract high quality quartzite for construction aggregate including railway ballast, aggregate for concrete making, ground stabilisation, road-base, and aggregate and dust for bedding of pipes and infrastructure.

The Lease covers an area of 44.33 hectares, located three kilometres south of the village of Wallerawang and 8km northwest of the town of Lithgow in eastern New South Wales (**Figure 1**), approximately 115km west-northwest of Sydney. Access to the Lease area is afforded by the sealed Great Western Highway, which lies parallel to the northern boundary of the Lease area (**Figure 2**).

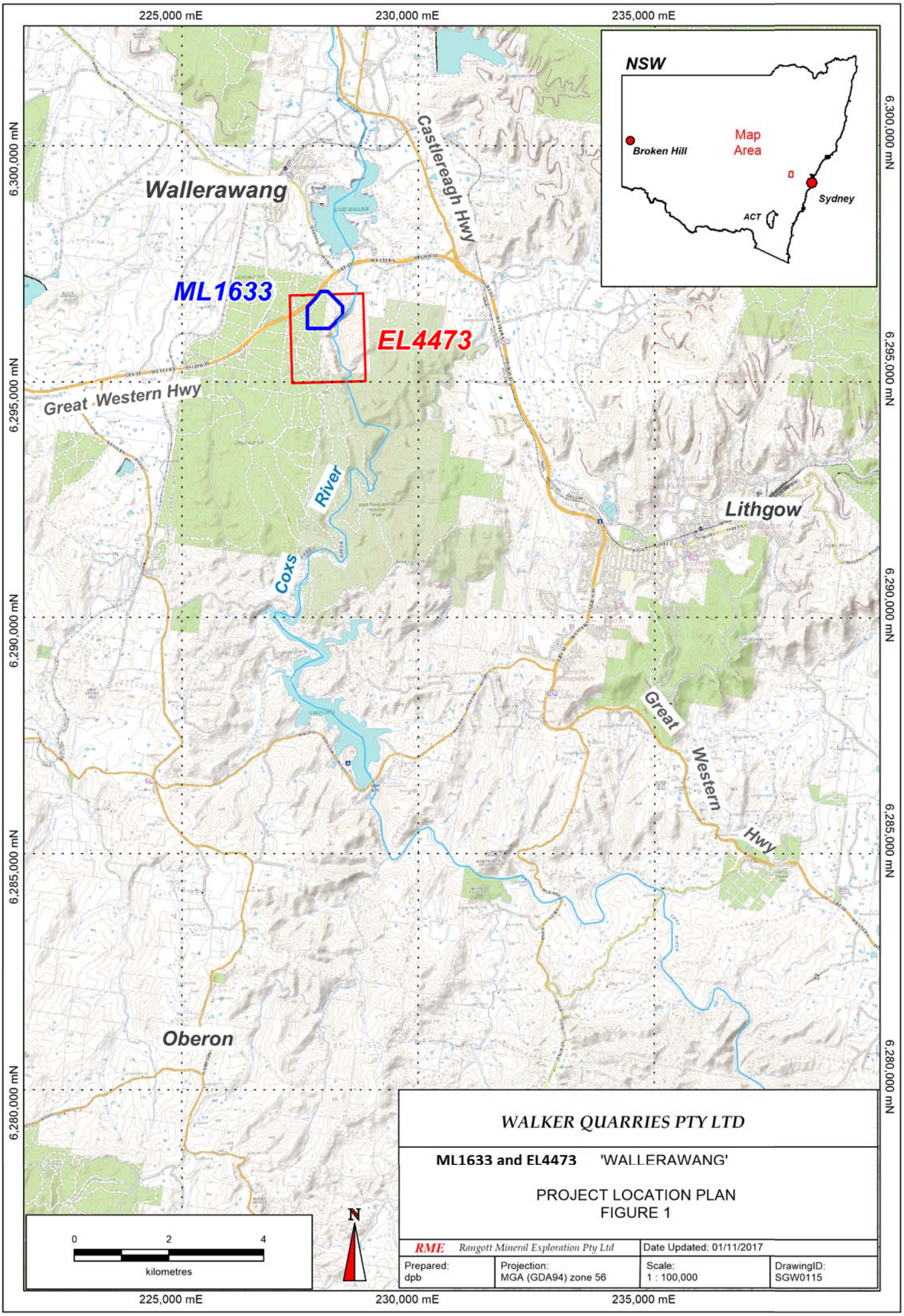
Topography within the Lease area varies from undulating to hilly, with local relief ranging from 30 to 40 metres. Vegetation consists of native open eucalypt forest and shrubs and grassland. Soil profiles tend to be poorly developed where underlain by metamorphosed lithologies and Carboniferous-aged granitoids, becoming thicker and more clay-rich where underlain by less metamorphosed sedimentary lithologies.

Sitegoal Pty Ltd, the parent company of Walker Quarries, holds the Exploration Licence (EL4473) surrounding Mining Lease no. 1633. The Mining Lease lies within the central northern portion of EL4473. In April, 2014 an extensive blast drilling program was undertaken within ML1633 to determine the top and bottom lithological boundaries of the main quartzite unit. Subsequently, Wallerawang Quarry was established within ML1633.

Walker Quarries have also recently acquired Exploration Licence 9255 (EL9255) for Group 2 minerals covering 10 units to the north and south-east of EL4473.

Three land holdings are present within ML1633 – Forestry Corporation of NSW (Lidsdale State Forest), a Crown Lands reserve, and a land parcel held by Sitegoal Pty. Ltd. The nearest residence from the quarry is approximately 1.2km to the northeast of the open cut.

The Wallerawang Quarry produces quartz from the hard rock quarry with a life expectancy exceeding 20 years. Extraction commenced in 2014 with annual production between 150,000 - 500,000 tonnes per annum (tpa), dependent on market demand.

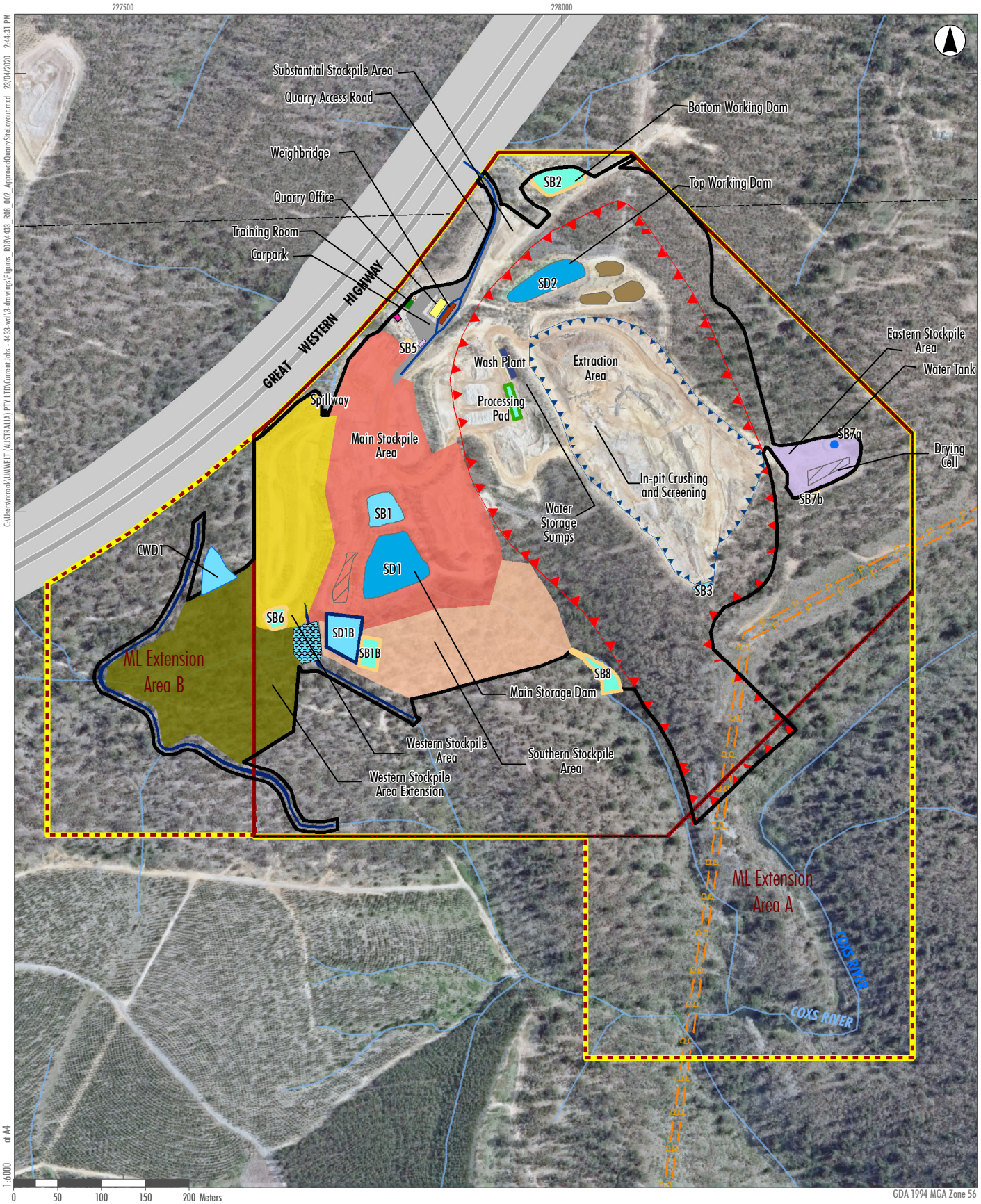


WALKER QUARRIES PTY LTD

ML1633 and EL4473 'WALLERAWANG'

PROJECT LOCATION PLAN
FIGURE 1

RME Rangott Mineral Exploration Pty Ltd		Date Updated: 01/11/2017	
Prepared: dpb	Projection: MGA (GDA94) zone 56	Scale: 1 : 100,000	DrawingID: SGW0115



Legend

- Quarry Site Boundary
- Quarry Site (ML1633)
- Quarry Site ML Extension
- EL 4473
- Disturbed Areas for Modified Operations
- Approved Extraction Area
- Current Extent of Extraction Area
- Main Stockpile Area (935m AHD)
- Southern Stockpile Area (935m AHD)
- Western Stockpile Area
- Western Stockpile Extension (940m AHD)
- Eastern Stockpile Area
- Clean Water Diversion
- Sediment Basins
- Settlement Ponds
- Storage Dam
- Water Tank
- Rubbled Lined Drain
- Clean Water Dam
- Silt Cells
- P Electricity Transmission Lines

FIGURE 2

Approved Quarry Site Layout

Image Source: Nearmap (2020) Data source: Walker Quarries (2019); Umwelt (2019); NSW LPI DTDB (2019); CEH Survey (November 2016)

2.0 TENURE

Mining Lease No.1633 was granted to the applicant, Walker Quarries on 15 July, 2009 for a ten- year period to extract quartzite. ML1633 was recently renewed for a further 21 year period and now expires on 15 July 2040. Walker Quarries operates under Development Approval (DA) 344-11-2001 (as modified) which was approved by the Department of Planning, Industry and Environment (DPIE) in 2004. DA 344-11-2001 has been modified on three occasions since it was initially determined, including:

- For consolidation of several constructed components of the Quarry and formalise the approval of production for additional quarry products (MOD 1). MOD1 was approved by DPIE on 25 August 2017;
- For an extension of Walker Quarries site operations (MOD2). MOD2 was approved by DPIE on 7 December 2018; and
- For further development of Walker Quarries extraction areas, increase in the area available for stockpiling to the southwest and south of the approved Western Stockpile Area and extension of the operational life of Walker Quarries to 15 July 2040 (MOD3). MOD3 was approved on 26 February 2020.

3.0 GEOLOGICAL SETTING

The tenement occupies an area largely underlain by the Capertee Subprovince of the Hill End Trough within the eastern exposed portion of the Lachlan Orogen of New South Wales. The Hill End Trough is a broadly north-south trending Siluro-Devonian rift system in which shelf and deep water sedimentary and volcanic sequences were deposited in the late Silurian and Early Devonian, being succeeded by shallower marine to fluvial sequences of the Lambie Shelf following tectonic activity which terminated sedimentation in the Hill End Trough (Pogson & Watkins, 1998). In the Wallerawang area, these sequences are intruded by Carboniferous granitoids of the Bathurst Batholith, and un-conformably overlain by members of the Permian Shoalhaven Group, a part of the Sydney Basin sequence.

3.1 Stratigraphy

Outcropping lithologies within ML1633 area are dominated by variably metamorphosed and silicified sandstones, siltstones and mudstones of the Late Devonian Lambie Group, which occupy the eastern limb of the Rydal Syncline, the core of which lies approximately 3km to the west of the Lease area. The Lambie Group consists of fine quartzose sandstone and siltstone of shallow marine origin, overlain by outwash fan lithic conglomerate, and low-energy fluvial

sequences of red mudstone, siltstone and sandstone. The majority of information on these units is derived from exposures on the Bathurst 1:250,000 geological sheet, but previous work has correlated the strata of this unit exposed within the Lease area with the Gibbons Creek Sandstone, which occurs at the base of the Lambie Group (Ingpen, 1999), and is inferred to have been deposited in a shallow marine (nearshore) setting (Pogson & Watkins, 1998). The Gibbons Creek Sandstone is noted elsewhere as consisting of white to grey fine- to medium-grained quartz-rich sandstone, with the top of the formation consisting of thinly bedded, very fine-grained dark grey to black sandstone and siltstone and lesser mudstone, with narrow pebbly horizons in places.

Unnamed phases of the Carboniferous Bathurst Batholith, which outcrop extensively in the adjacent Bathurst 1:250,000 geological sheet, underlie and intrude the Lambie Group sediments throughout the area. The granitoids observed to the immediate northeast of the Lease area (possibly correlatable with the Tarana Granite phase), are commonly medium-grained in-equigranular to megacrystic in texture, and composed of K-feldspar, quartz, biotite, and lesser plagioclase. The granitic lithologies observed are inferred to be the source of the heat and hydrothermal fluids responsible for the metamorphism of the surrounding sedimentary sequences.

Un-conformably overlying the Lambie Group and the Carboniferous intrusives in the area are irregular discontinuous exposures of relatively flat-lying weathered pebble to cobble conglomerates, lithic sandstones, and micaceous siltstones and (?)tillites of the Permian Shoalhaven Group, the lowest portion of the Sydney Basin sequence. Subdivision of these units within the Lease area is not possible due to their poorly preserved and limited exposures, but based on the sedimentary facies present, it is inferred that they represent portions of the fluvial to shallow marine Snapper Point Formation, and the deeper marine Berry Siltstone.

Interpretation of these units is further complicated by the presence in the basal conglomerates of the Shoalhaven Group of basement-derived metasedimentary clasts (“drop stones”), resistant to weathering, resulting in the outcrops of these units appearing to be recent reworked deposits of the underlying Lambie Group. The Snapper Point Formation is well exposed in a roadside cutting of the Great Western Highway adjacent to the quarry, and has been mapped in the far northeast corners of the Mining Lease and the adjacent part of EL4473.

3.2 Structural History

The published structural histories of the geological units exposed in the area surrounding the ML1633 area largely document pre-Permian deformation. A series of broad north-south trending folds occur in the Mt. Lambie area, the largest of which is the Rydal Syncline, centred to the west of the Lease area. The development of these folds/synclines is inferred to be related to deformation in the Carboniferous, predating or synchronous with the intrusion of volumetrically significant granites of the Bathurst Batholith.

4.0 PREVIOUS EXPLORATION

4.1 Prior Company Exploration

A review of available historical exploration data shows that prior exploration in the area underlain by ML1633 has been largely limited to a series of cursory investigations into the potential for mineable quantities of phosphate.

EL0090, held by Continental Oil Co. Australia Pty. Ltd. (1967-1968), covered the entire area of the current licence, and was taken out to explore areas underlain by the Narrabeen Group of the Sydney Basin for phosphate minerals. Phosphates were noted in the Narrabeen Group as nodule bands, beds and lenses of patchy secondary phosphate, confined to the Bulgoo Sandstone. No further information is available on the work completed and the reasons for relinquishment of the licence.

4.2 Previous Exploration within EL4473

Limited information is available on exploration activities conducted by Sitegoal Pty. Ltd. prior to 1996, with most information being drawn from significantly later annual reports.

Following granting of EL4473 in 1993, initial exploration work included reconnaissance mapping in that portion of the licence on the western side of the Cox's River, adjacent to an existing small quarry (Hoskins Quarry - Ingpen, 1999, now within the ML1633 Lease area) which resulted in the identification of a number of exposed meta-sedimentary horizons with similarities to those being extracted in the Marrangaroo Quarry approximately 3km to the southeast in the same geological unit. Identification of some of these units as relatively clean silica-rich quartzites prompted limited surface geochemical sampling, which returned relatively high silica concentrations (>90% SiO_2). Geological mapping of portions of the licence area

was carried out by consulting geoscientists Etheridge Henley and Williams to follow up on areas of high silica assays, resulting in the identification of nine potentially quartzite-bearing exposures, (named 'A' through 'I').

During 1997, three diamond drillholes were completed within the western portion of the licence to evaluate the down-dip continuity of the quartzite horizons identified and to evaluate the silica content of the horizons to assess their suitability for extraction for metallurgical purposes (Ingpen, 1997). Interpretation of the drilling results was aimed at determining the further work required to delineate an extractable silica resource within the quartzite horizons. Of the three drillholes, only one intersected any intervals with high silica contents. SIWD002 intersected significant quartzite, with 29.3 metres averaging 92.05% SiO_2 from approximately 38 metres downhole to end of hole. Based on the results of the drilling, a *non-JORC compliant* resource of 1.84 Mt of quartzite material was assumed around SIWD002, while the areas around the other two holes were considered not to be prospective for a metallurgical quartzite resource. Initial rock chip sampling of exposed quartzite units to the east of the Cox's River returned only moderate silica concentrations, resulting in the recommendation that further exploration work be concentrated around known quartzite occurrences close to drillhole SIWD002.

A further two diamond drillholes were completed during 1999, designed to intersect the silica-rich quartzite horizons observed at surface and at depth in drillhole SIWD002. Drillhole SIWD004 intersected two quartzite horizons, with best results of 17.06 metres at 85.19% SiO_2 from 46.25 metres down-hole. The presence of elevated concentrations of deleterious elements within the quartzite unit largely precluded its use in high-purity end products, however it was still considered prospective for use as aggregate. Drillhole SIWD005 intersected a broad zone of quartzite returning a result of 45.31 metres at 94.88% SiO_2 from 16.45 metres down-hole. Red Hill Geoscience used this result and the results from SIWD002 to define a *non-JORC compliant* resource of 3.26 Mt of high-grade quartzite material, assuming constant dip and thickness of the quartzite horizon, and continuity between holes (Ingpen, 1999).

In addition to drilling, geochemical sampling of the basal conglomerate horizon of the Permian Shoalhaven Group (Megalong Conglomerate) was undertaken to assess the potential of this horizon as a source of high-grade silica (Ingpen, 1999), analogous to the Glenella deposit near Cowra, New South Wales. The conglomerate is polymictic. The silica contents of some of the conglomerate pebbles was found to range from 83.8% to 89.9% SiO_2, which was significantly lower than that of the in-situ quartzite units, and as such, the prospectivity of this unit was downgraded.

In 2006, at the request of Gemac Services Pty. Ltd., consultant geologist Chris Stone of Rangott Mineral Exploration Pty. Ltd. (RME) conducted detailed geological mapping of the areas previously identified as being prospective for quartzite occurrences. Mapping encountered a series of metamorphosed sedimentary lithologies of shaley to sandy composition (Stone, 2007). Classifications of these lithologies lead to four field terms for rock-types, which could be correlated along strike:

- Sugary Quartzite - metasomatised quartz sandstone;
- Hornfels - metamorphosed arenaceous and argillaceous beds - commonly banded, massive elsewhere;
- Shale - weakly metamorphosed pelitic units; and
- Undifferentiated Metasediments - weakly metamorphosed and of variable composition.

The RME mapping resulted in the observation that the areas of 'quartzite' identified by Etheridge Henley and Williams actually encompassed resistant lithologies with varying compositions, striking north-northwest, and dipping 40-60° to the west. A number of the zones were interpreted to be parts of common resistant beds or horizons, of which only two fell within lithological units accurately termed sugary quartzites (and likely to host high-purity silica), the remainder being silica-rich (but lower purity) hornfels and shale horizons. Exposures of the sugary quartzite were found to form elongate spurs and strike-elongate hogback outcrops adjacent to the Cox's River (Stone, 2007). In the southern section of the tenement the sugary quartzite unit was inferred to bifurcate into two separate horizons. Also mapped, but not commented on in reporting were discrete areas of weathered cobble conglomerate, interpreted as being Permian in age (Shoalhaven Group). Concurrent with this work, the locations of drillhole collars and a number of cultural features within the licence area (now within the ML1633 Lease area) were picked up using a Differential GPS meter.

ML1633 was granted on 15 July 2009 for an initial 10 year period in an area immediately surrounding the existing Hoskins Quarry and the high-purity silica intersections of the sugary quartzite unit in drillholes SIWD002 and SIWD005.

Following the granting of ML1633, exploration recommenced within EL4473, the objective being to more precisely delineate the main quartzite unit within EL4473 and south of ML1633, and to assess the extent and quality of the rock present within the quartzite and other metasediment units on the western side of the Cox's River.

Previously collected rock chip samples were analysed and reported on in the 2013 annual report. These were tested for their potential to provide material suitable for various end-uses. Based on these geochemical and petrographic analytical results, preliminary categorisation of the sampled rock types into quarry products was made. Compressive strength testing of rock samples will be necessary to further test the suitability of the different rock types for quarried products.

During the 2013 - 2014 reporting period, detailed mapping of the 'Banded Hornfels' unit was undertaken. This unit had been identified as a potential source of aggregate or aggregate-like products. A better understanding of the presence and distribution of deleterious material within the unit was established. The distribution of samples exhibiting sulphides appeared to have no direct correlation with the intrusive granite. However, there did appear to be a moderate correlation between the distributions of sulphides with increasing proximity to the shale.

Additional discoveries included two shallow old workings and minor rusted machinery relics in the northeast of ML1633. The workings appeared to have targeted quartzite. The workings lie along strike from a number of other quartzite outcrops. It was understood to represent an additional quartzite unit.

Mapping the continuation of this potential unit was a main focus of the 2015 reporting period as it was interpreted to cut through the easternmost corner of ML1633. During the 2016 reporting period work was focussed on administrative requirements but included minor reconnaissance to establish accessibility and the level of disturbance necessary for a proposed drilling program. During the 2017 reporting period, work consisted of drillhole planning, site reconnaissance and Crown Land investigations.

Exploration completed during the 2017 – 2018 reporting period comprised the drilling of 35m of HQ diameter diamond drill core (from 85m to 119.65m (EOH) in hole WQDD005) into the EL4473 area at depth, the hole being collared within the eastern boundary of ML1633. The drilling was part of a 5-hole, 534m diamond drilling program designed to test the suitability of previously mapped, indurated rock types for quarrying products such as aggregate. Most of the drilling occurred within the ML1633 area, close to the current extraction pit. WQDD005 was planned to test the Lambie Group metamorphosed units all the way east to their contact with the granite at depth. The drilling was conducted by Drillit Consulting Pty. Ltd. using a Multidrill 600 rig. The drillholes were surveyed downhole with single shot surveys. Other work comprised geological and geotechnical logging of the drillcore, and the preparation of a global JORC-compliant resource estimate.

Drillhole WQDD005 intersected metamorphosed units of the Lambie Group, and their contact with the Carboniferous granite, as expected. The rock types intersected were variably skarn-mineralised hornfels rocks – mainly cordierite-biotite hornfels with retrograde replacement caused by close proximity to the granite, and a coarse-grained pink plagioclase-Kspar-biotite-hornblende-quartz granite from 118m onwards. In addition, thin-diopsidic and garnetiferous calc-silicate bands were intersected within the hornfels, which contained relict bedding. From 90m onwards, due to proximity to the granite contact, irregular zones of silica flooding, increased levels of disseminated pyrite and molybdenite (up to 0.3% pyrite per metre), greisen bands and granitic dykes are present.

Parts of the intersected rocks, particularly deeper than 90m, are unsuitable for aggregate due to a combination of retrograde mineralisation, random but minor greisenisation and localised clusters of pyrite mineralisation associated with skarn mineralisation. Some slightly weathered/oxidised rocks were intersected around a fault at 111m. Geotechnical logging using common drillcore strength tests measued a QSI index of 3-5, showing that on average the rocks intersected are very strong, but greisenisation would preclude some areas from aggregate production.

Parts of the intersected hornfels on EL4473 were included in a much larger resources study for the adjacent ML1633 area which is discussed in the next section.

4.3 Resources Study

RME was engaged by Walker Quarries to assess all rock resources in the Mining Lease area (ML1633) and beyond (EL4473), to assess their potential mainly as concrete aggregate, and to calculate resource estimate figures. Specifically, RME was asked to assess all prospective rock types from surface to the 850 RL level, which represents the approximate elevation of the nearby Cox's River. A copy of the full Resources Study report was presented the 2017 – 2018 Annual Report.

Four resource types were the subject of this resources study and assessment:

- Quartzite – a high silica, high purity metamorphosed (indurated) quartzose sandstone, currently exposed in the pit and sold mainly as concrete aggregate, rail ballast and gabion rock, and as manufactured sand as a processing product. This rock type is generally free of deleterious minerals. The quartzite occurs as Devonian-aged basement rock (Lambie Group). The quartzite was previously intersected within the

resource estimate area by diamond drill hole SIDW005 (1999), and by 20 vertical shallow open hole percussion drill holes (DEW series holes – 2014).

- Sandstone – less indurated than the quartzite and containing less silica – currently sold as road base/ fill and could potentially be processed to produce sand.
- Hornfels – A field term for the metamorphosed volcaniclastic, sedimentary and limey rocks that were historically extracted at the Hoskins Quarry. The hornfels is strongly indurated due to the intrusion of a granite nearby, and forms a north-south-trending resistant outcrop from the old Hoskins Quarry to the southern part of the Mining Lease and southwards into the Exploration Licence area. It was recognised from at least the early part of the 20th century as a hard resistant rock type with potential for use in works and construction. Rock from this quarry was reportedly used as aggregate in the old section of the Great Western Highway. This rock type is variable across its width (strike) depending on the precursor interbedded sedimentary units. The hornfels ranges in outcrop from dark grey, massive to spotted, brecciated, banded and thinly bedded. Past petrographic reports exist for five varied hornfels samples taken from the floor of the Hoskins Quarry, and for two hornfels outcrop samples. This rock type, based on past petrographic reports, contains the most numerous deleterious (e.g., meionite – the Ca-rich variety of scapolite) and potentially deleterious elements and minerals (opaline silica? patchy sulphides) of the resource rock types listed here. It contains weak, localised skarn mineralogy (new minerals formed by reactions with introduced fluids from the nearby granite at the time it intruded). However, this rock type, or parts of it, could potentially be used as concrete aggregate, ballast and gabion rock. The bands containing deleterious minerals may only be a very minor component of this rock unit; the assessment activities are designed to quantify the deleterious factors.
- Cobble conglomerate – well-rounded, 'flattened egg' ovoid cobbles of up to 20cm in length, of a variety of basement rock types but mainly of quartzite composition, in a clayey matrix. This unit overlies the Devonian basement rocks in a roughly horizontal layer at higher elevations, and belongs to the Permian-aged Snapper Point Formation (formerly named Megalong Conglomerate). The cobbles are sold as landscaping material and as architectural aggregate.

The aim of the resources study and assessment work was to test the prospective rock types with diamond drilling, geological and geotechnical core logging, petrographic analysis, and rock quality testing. The presence of any deleterious minerals, such as sulphides, soft minerals susceptible to weathering (e.g. scapolite) and very fine-grained quartz were also assessed.

Five diamond drillholes (WQDD001 to WQDD005) on three WSW – ENE drilling traverses were drilled within ML1633 to test the quality and consistency of the bedrock units. The drillhole locations are shown on **Figure 3** and the drillhole data is summarised in **Table 1**.

Table 1: Bedrock diamond drilling summary

HOLE no.	Depth (m)	Start date	Easting (MGA94z56)	Northing (MGA94z56)	Tenement	Core diameter	Lithologies
WQDD 001	99.6	13/07/ 2017	227910.194	6296328.572	ML1633	All HQ	Hornfels, calc-silicate rock, carbonaceous hornfels
WQDD 002	69.05	10/07/ 2017	227854.27	6296307.166	ML1633	All HQ	Hornfels, calc-silicate rock
WQDD 003	100.95	4/07/2 017	227774.582	6296530.8	ML1633	All HQ	Hornfels. Calc-silicate rock, carbonaceous hornfels
WQDD 004	145	30/07/ 2017	228335.506	6296579.621	ML1633	All HQ	Hornfels and calc-silicate rock, quartzite
WQDD 005	119.65	24/07/ 2017	228161.882	6296551.366	ML1633/ EL4473	All HQ	Quartzite, hornfels, calc-silicate rock, garnet skarn, granite
Total metres	**534.25**						

Two diamond drillholes – WQDD002 and WQDD003 – which were drilled early in July, 2017 were noted in the 2016 - 2017 Annual Report. The geological logs, surveyed collar coordinates, downhole surveys and geotechnical data for the five diamond drill holes were presented in 2017 - 2018 Annual Report.

Two vertical diamond drillholes (WQDD007 and WQDD008) were drilled to test parts of the mapped cobble conglomerate unit which is located in the northern most part of ML1633 and on Sitegoal's adjoining landholding to the north. Although these two drillholes were drilled just outside of ML1633 (see **Figure 3**) they were included in the Resources Study report.

227,700 mE | 227,800 mE | 227,900 mE | 228,000 mE | 228,100 mE | 228,200 mE | 228,300 mE | 228,400 mE | 228,500 mE

6,297,000 mN | 6,296,900 mN | 6,296,800 mN | 6,296,700 mN | 6,296,600 mN | 6,296,500 mN | 6,296,400 mN | 6,296,300 mN | 6,296,200 mN | 6,296,100 mN | 6,296,000 mN | 6,295,900 mN | 6,295,800 mN

EL4473

ML1633

Cross Section A - Cobble Resource
Cross Section B - Cobble Resource
Cross Section C - Cobble Resource
Cross Section D - Cobble Resource
Cross Section E - Cobble Resource
Cross Section 1
Cross Section - WQDD001 -Traverse 1
Cross Section 2
Cross Section - WQDD004 and 5 -Traverse 2
Cross Section 3
Cross Section - WQDD002 and 3 -Traverse 3
Cross Section 4
Cross Section 5
Cross Section 6
Cross Section 7

WQMB003
WQDD007
WQDD008
WQDD005
WQDD004
WQDD001
WQMB001
WQDD003
WQDD002
WQMB002
SIWD001
SIWD002
SIWD003
SIWD004
SIWD005

DEW001 DEW002 DEW003 DEW004 DEW005 DEW006 DEW007 DEW008 DEW009 DEW010 DEW011 DEW012 DEW013 DEW014 DEW015 DEW016 DEW017 DEW018 DEW019 DEW020 DEW021 DEW022 DEW023 DEW024 DEW025 DEW026 DEW027 DEW028 DEW029 DEW030 DEW031 DEW032 DEW033 DEW034 DEW035 DEW036 DEW037 DEW038 DEW039 DEW040 DEW041 DEW042 DEW043 DEW044 DEW049 DEW050 DEW051 DEW055 DEW056 DEW057 DEW058 DEW059 DEW060 DEW061

INT QUARTZITE
EASTERN HORNFELS
EASTERN HORNFELS
QUARTZITE B
QUARTZITE A
HOSKINS HORNFELS
SCAPOLITE ZONE

INFERRED RESOURCE
INDICATED RESOURCE
INFERRED RESOURCE
INDICATED RESOURCE
INFERRED RESOURCE
INFERRED RESOURCE

Lot 6/DP872230
Lot 7071/DP1201227
Lot 7322/DP1149335

Coxs River

Drillholes

- Diamond drillhole (2017)
- Drillhole (Cobble - 2017)
- Drillhole (2014)
- Water monitoring well

Legend

- 40m exclusion areas
- Coxs River
- Drainage
- Transmission tower
- Transmission line
- Highway
- Minor road
- Quarry Face (12/2016)
- Cadastre boundary
- Working
- Area of shallow workings
- Cross section line (March 2017)
- Aboriginal Heritage Site
- Wallerawang Dam notification area
- Resource domains
- Resource estimate areas

Interpreted Geology

- SHOALHAVEN CONGLOMERATE
- PERMIAN GRAVEL
- SHALE
- HORNFELS
- INTERBEDDED BHORN and C-S HORNFELS
- HOSKINS HORNFELS
- INTERBEDDED QUARTZITE BIOTITE HORNFELS
- QUARTZITE
- CALC-SIL HORNFELS and CONGLOMERATE
- METSAND
- VARIABLY SKARNED BIOTITE HORNFELS
- GRANITE

0 50 100
Metres

RME RANGOTT MINERAL EXPLORATION PTY LTD

WALKER QUARRIES PTY LTD
ML 1633 'WALLERAWANG QUARRY'

RE-INTERPRETED GEOLOGY showing
RESOURCE ESTIMATE DOMAINS

FIGURE 3

Date:12/08/2019
Author: dpb
Office: Orange
Drawing: SGW116A
Scale: 1:2,500
Projection:MGA Zone 56 (GDA94)

5.0 WORK COMPLETED IN REPORTING PERIOD

Community and Stakeholder Consultation

Walker Quarries has formed a Community Consultative Committee (CCC) which meets approximately every six months. Two meetings were held during the period. The minutes of these meetings are provided on the Company's website (www.walkerquarries.com.au). Representatives of the Company also meet with, or correspond with by phone or email, local and other concerned stakeholders on an ad hoc basis, i.e. opportunistically or as issues are identified. Moreover, a community information / complaints line is maintained by the Company and a complaints register is also available on the Company's website. As complaints or requests for information are received, the Company responds as quickly and comprehensively as possible. Furthermore, representatives of the Company or their consultants visit several of the surrounding properties to undertake monitoring activities, providing an opportunity for issues to be identified and discussed.

Umwelt Environmental and Social Consultants (Umwelt), who is preparing a Rehabilitation Management Plan (RMP) on behalf of Walker Quarries, has been engaged to seek feedback with respect to the proposed Rehabilitation Objectives and Completion Criteria for the Quarry. To ensure that the RMP best reflects the requirements and/or preferences for rehabilitation, consultation and input has been sought from the following stakeholders:

- NSW Department of Planning and Environment (DPE);
- DPE Water;
- NSW Resources Regulator;
- Forestry Corporation of NSW
- Lithgow City Council (LCC);
- Crown Lands
- Walker Quarries Community Consultative Committee (CCC) Chair; and
- Other members of the CCC.

Geological Reconnaissance & Water Monitoring Bores

Exploration work undertaken over the last two years included a review of published geology maps & historic geological reports and desktop geological interpretation relating to both ML1633 and the surrounding EL4473.

During the previous reporting period geological reconnaissance mapping was undertaken within the ML Extension Area B, on the western side of the quarry, and within Lidsdale State Forest and along public roads within EL4473 to the north of the quarry. This mapping was

undertaken to determine the extent of Permian marine conglomerates in the area and to support exploration planning across the tenement areas. Desktop geological assessment of the mapping data was undertaken during the reporting period to support exploration planning.

Two water monitoring bores WQMB001 and WQMB002 were drilled and geologically logged in the 2017 – 2018 reporting period. A third water monitoring bore WQMB003 was drilled and geologically logged in the 2018 – 2019 reporting period. Although WQMB003 is located just outside ML1633, it has been included in this report as the geological information is relevant to the mining lease. Groundwater level monitoring and water quality analysis of these monitoring bores was undertaken throughout the year.

Hydrogeological setting review and recommendations for modification to the groundwater monitoring network was completed by Umwelt (Australia) Pty Limited in July 2021.

The quarry intersects the Lambie Group basement unit, which is overlain by the Permian Berry Siltstone in the north-western area of the site. A granite intrusion is also mapped to the north-east of site, which was also intersected by WQMB001 within the site boundary. Review of the data identified that the existing site bores (WQMB001) intersect the hornfels (Lambie Group) and granite (Bathurst Supersuite). There is one bore in the Lambie Group (WQMB002) to the south of site, but there is insufficient spatial spread and depth to characterize the groundwater regime to inform a groundwater model.

Three additional monitoring bores are recommended, as follows:

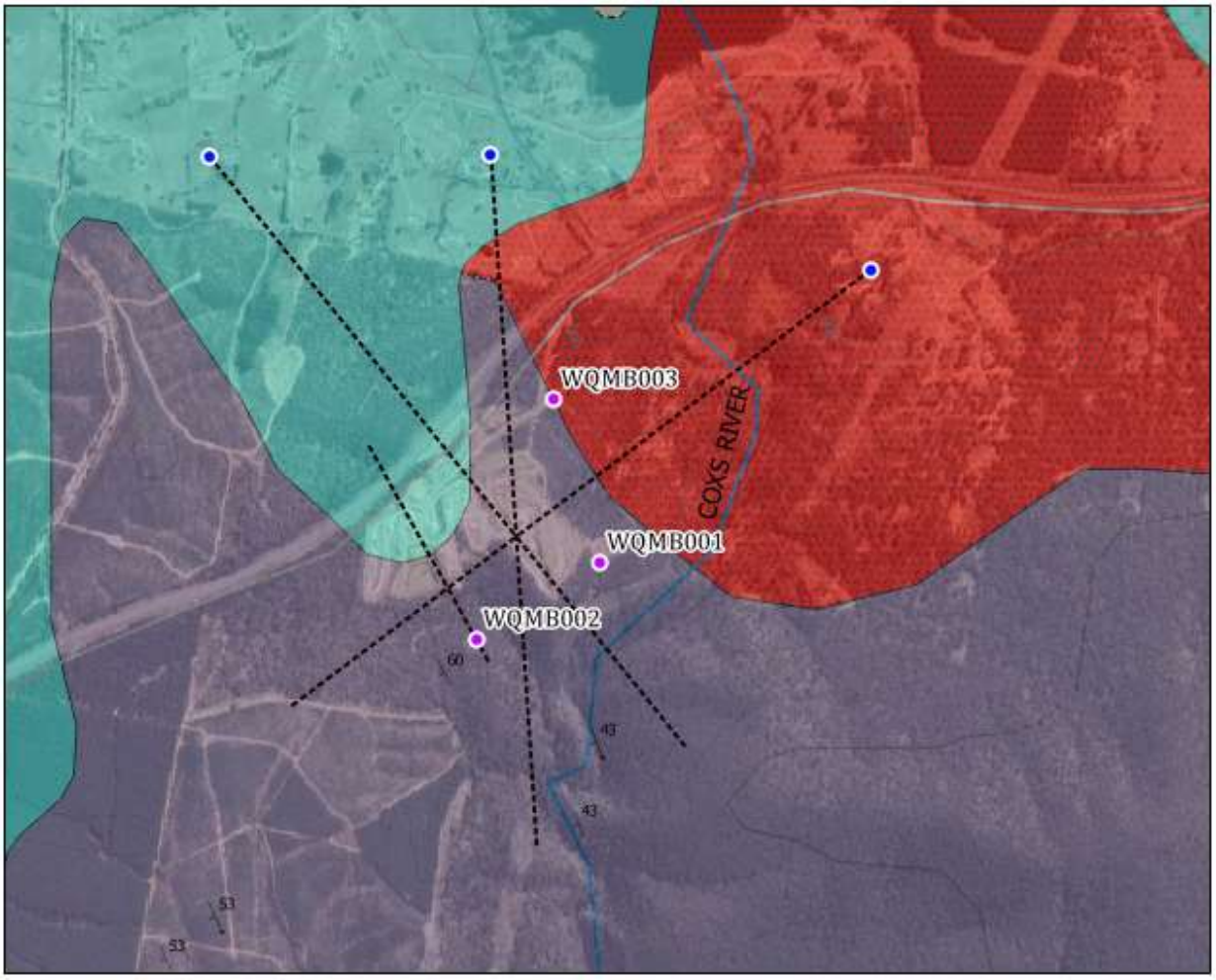
- Installation of monitoring bore P1 to the east of site within the Lambie Group, as a replacement for WQMB001. A replacement for WQMB001 is recommended as being screened across multiple units can influence the groundwater level within this bore.
- Additional monitoring bore P2 to around 90m deep to the west of the site screened within the Lambie Group to establish groundwater levels and flow gradients.
- Installation of monitoring bore P3 located to the north-east of the site screened within the Lambie Group to around 60m depth to establish groundwater levels and flow gradients.

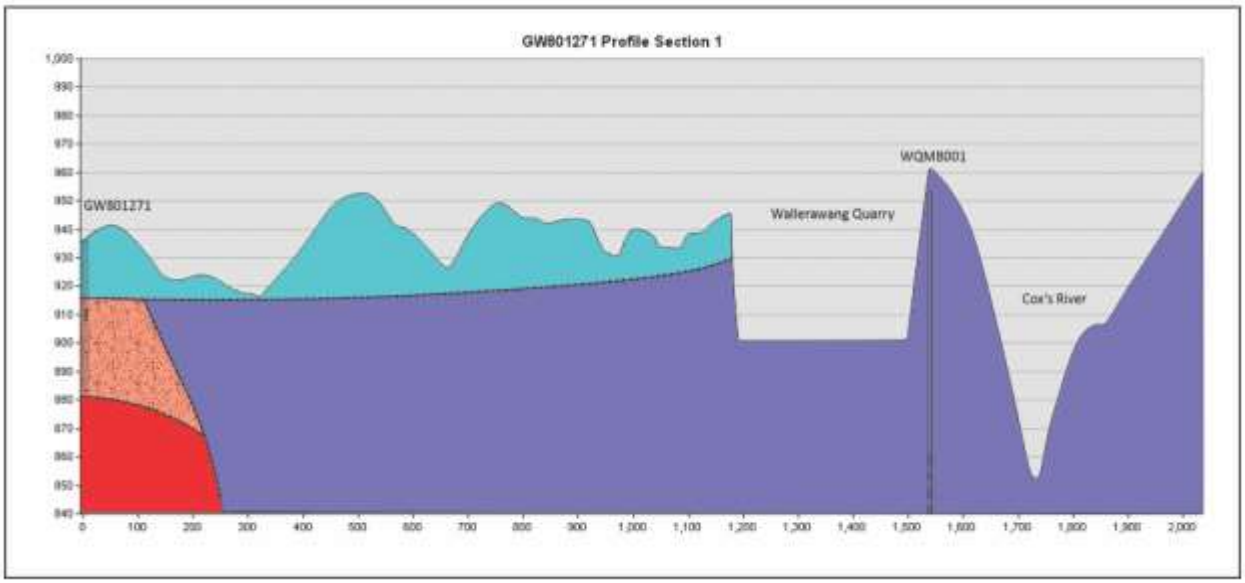
The existing network as well as the proposed additional bores with indicative locations is provided in **Table 2**. The table includes indicative depths and screened intervals. The location of existing water monitoring bores is shown on **Figure 3.**

Table 2: Site groundwater monitoring bores & proposed bores

Bore ID	Easting	Northing	RL (mAHD)	Depth (mbgl)	Depth (mAHD)	Screened Interval (mbgl)	Screened Unitt
WQMB001	228278	6296514	953.5	120.0	833.5	93-96, 99-102, 105-108, 111-114	Lambie Group (Hornfels) & Bathurst Supersuite (Granite)
WQMB002	227960	6296290	926.0	76.3	849.7	32.6-35.6, 38.6-41.6, 44.6-47.6, 50.6-53.6, 56.6-59.6, 62.6-65.6	Lambie Group (Hornfels)
WQMB003	228130	6296942	915.0	55.0	860.0	33.8-39.8, 48.8-51.8	Bathurst Supersuite (Granite)
P1	228252	6296479	956.0	100	-	88-100	Lambie Group
P2	227584	6296502	948.0	90	-	78-90	Lambie Group
P3	228024	6296969	917.0	60	-	48-60	Lambie Group

Figure 4 below shows a plan of the Wallerawang Quarry and profile sections with existing groundwater monitoring bores. The profile sections show that the Quarry is well above the level (RL) of the Cox's River.


WQMB003
COXS RIVER
WQMB001
WQMB002
60
43
43
53
53


GW801271 Profile Section 1
GW801271
Wallerawang Quarry
WQMB001
Cox's River

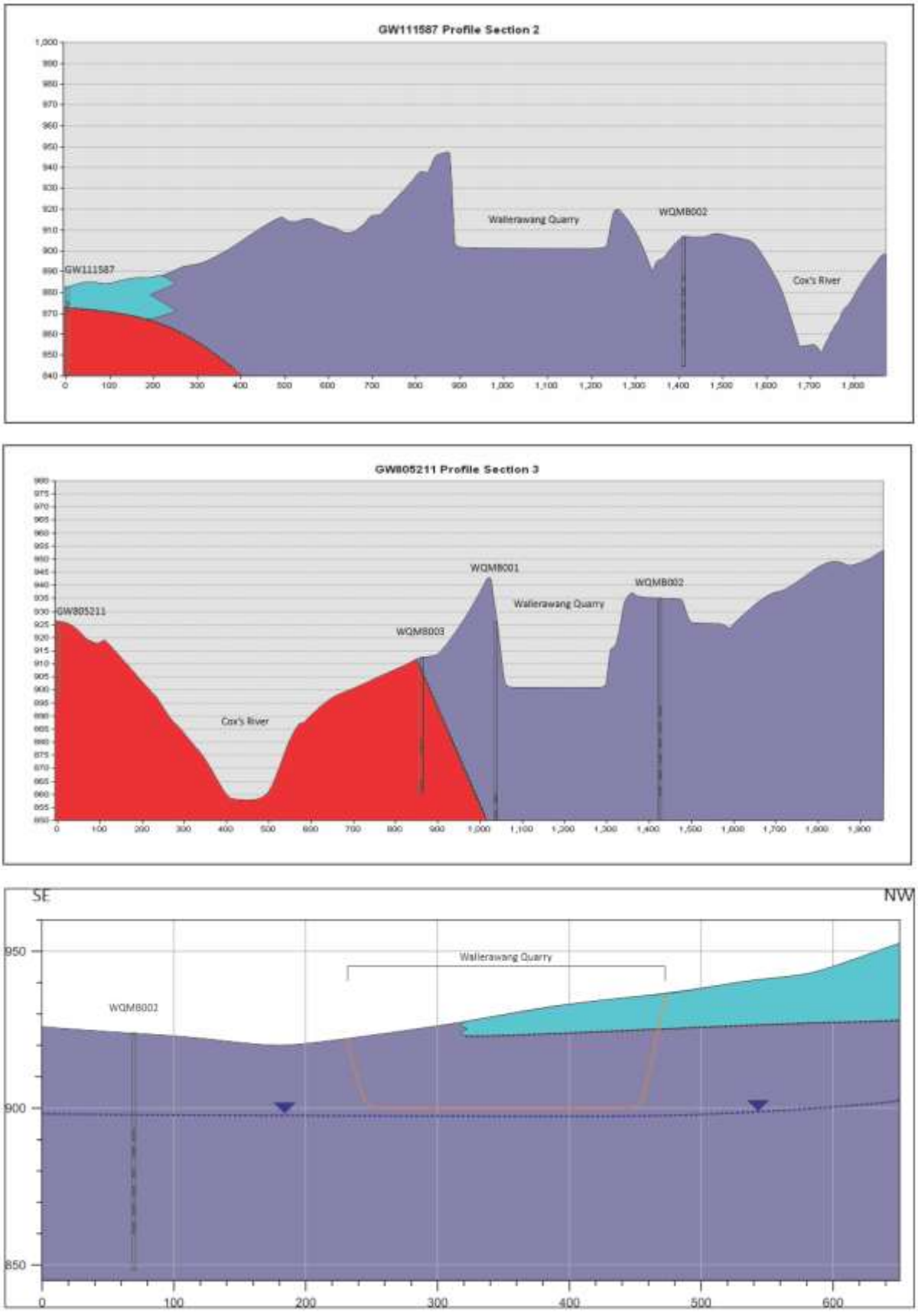


Figure 4: Wallerawang Quarry Plan and Profile Sections showing Groundwater Bores.

6.0 EXPLORATION EXPENDITURE

Exploration expenditure on ML1633 in the 2021 – 2022 reporting period is summarised in **Table 3**, below.

Table 3: Exploration Activity and Expenditure Table (15 July 2021 to 15 July 2022) – (Does not include quarrying / operations costs or environmental assessment / monitoring costs)

Exploration Category	Description of Activity	Quantity	Expenditure $
Compilation Activities			
Desktop activities, literature & data review	Review of NSW Geological Survey publications and geological mapping undertaken, drill hole data review and geological analysis for exploration planning purposes		2,101
Authority Management	Statutory reporting (Annual Report) & tenement management		2,591
Exploration Planning & Logistical Preparation	Planning of geological reconnaissance mapping		125
Community Consultation Activities			
Landholder Liaison / Negotiations	Access negotiations and permit with Forestry Corporation of NSW		1,007
		Total	$5,824

7.0 ADDITIONAL REQUIREMENTS FOR MINING AUTHORITY

7.1 Most recent resource/reserve statement (JORC Compliant)

Resource estimates were made for the biotite hornfels that comprises the highly resistant rock quarried at Hoskins Quarry, for the entire hornfels sequence west of the main quartzite unit, for the sandstone in the area of the current pit, for the main quartzite units (A and B), for the hornfels units east of the pit, and for the interbedded quartzite and hornfels unit east of the current pit. The resource estimate for scapolite bearing units were also calculated separately from the western hornfels units for future reference. A combined Indicated and Inferred resource estimate of 12,402,630 tonnes has been calculated for the two main quartzite units.

7.2 Production statistics for the reporting period including amount of material mined

Mining operations during the reporting period involved extraction of quartzite and pebbles, processing and sand washing. Total production was about 245,033 tonnes, comprising 144,950 tonnes of quartzite and 100,083 tonnes of select fill. About 27 different products including a range of aggregate sizes, DGB20, DGS20, DGS40, small and medium pebbles and fine and coarse washed sand products are produced.

The total expenditure on mining and processing during the reporting period was about $3,751,000.

7.3 A description of current mining operations

The approved Wallerawang Quarry includes the various components listed below and also shown on **Figure 2**.

- Continued extraction from the approved quarry area using conventional drill and blast, load and haul methods.
- A crushing and screening plant to produce a range of aggregate sizes located within the void of the Quarry.
- A sand washing plant for the removal of clay and other small diameter particulates and three silt cells for the settlement of these finer particles. The sand washing plant is being updated under the Modification 3 Development Consent.
- Three principal hardstand stockpile areas, Main, Western and Eastern.

- An office, car park and amenities buildings.
- Various water storages and drainage structures.
- An intersection with the Great Western Highway, security gates and sealed entrance road.
- A range of ancillary infrastructure, including internal roadways, bunds, soil stockpiles and laydown areas.

The following activities are undertaken, subject to market demand.

- Where it can be accessed, topsoil will be stripped and stockpiled for use in rehabilitation activities. Vegetation that is cleared will be selectively placed within areas being revegetated to take advantage of the existing seed bank, where available.
- Extraction by conventional drill and blast, load and haul methods.
- Overburden material is temporarily stockpiled within the footprint of the open cut from where it is either used within the site for approved construction activities or sold.
- Processing of raw material involving crushing, screening and washing using fixed or mobile plant to meet customer requirements.
- Product transportation involves loading of road registered trucks. Trucks then enter the Great Western Highway directly from the Quarry Site entrance.
- Progressive rehabilitation of eastern slopes of the extraction area and rehabilitation of the remaining landform at Quarry closure in accordance with the approved Mining Operations Plan.

7.4 A description of any assessment activities carried out during the reporting period

Assessment activities carried out during the reporting period included submission of the Annual Review for the previous reporting period.

7.5 A summary of geological findings including the main results of activities conducted in the mine, such as geological and structural mapping and petrological and mineralogical studies. Information on stratigraphy, distribution and controls of mineralisation, alteration features, etc should be included if available

Geological work focussed on product quality testing and increasing an understanding of the resource.

7.6 Where there have been external studies, such as university theses, or where research papers have been prepared for publication, the main conclusions of those works should be briefly summarised and a reference to the full work provided

No assessment activities or external studies were completed in the reporting period.

8.0 REFERENCES

Ross, E. J. A. (2014): Twenty-First Annual Exploration Progress Report for Exploration Licence No. 4473 'Wallerawang for the period ending 11th January, 2014. *Annual Report to the NSW Department of Trade, Industry, Regional Infrastructure and Services, Division of Resources and Energy by Rangott Mineral Exploration Pty. Ltd. on behalf of Sitegoal Pty. Ltd.*

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Rangott Mineral Exploration Pty Ltd

ACN 002 536 825

For

WALKER QUARRIES PTY LTD

ABN 66 052 317 503

The Operator and Holder of

MINING LEASE No. 1633 – Wallerawang Quarry

Grant Date: 15 July 2009

Expiry Date: 15 July 2040

ANNUAL EXPLORATION REPORT – *PART B*

for the period

15 July 2021 to 15 July 2022

This report accurately discloses the nature, extent, timing, results, geological interpretation and expenditure of the exploration conducted during the reporting period.

Technical Manager:

M.F. Rangott, Principal Geologist
Rangott Mineral Exploration Pty Ltd
Tel: (02) 6362 5155

Author:

David Coleman, Senior Consulting Geologist
Rangott Mineral Exploration Pty. Ltd.
PO Box 1141, Orange, NSW
Tel: (02) 6362 5155

2 August 2022

Distribution:
Geological Survey of NSW Mining Exploration & Geoscience
Walker Quarries Pty Ltd
Rangott Mineral Exploration Pty Ltd

TABLE OF CONTENTS

1.0 INTERPRETATION and DISCUSSION

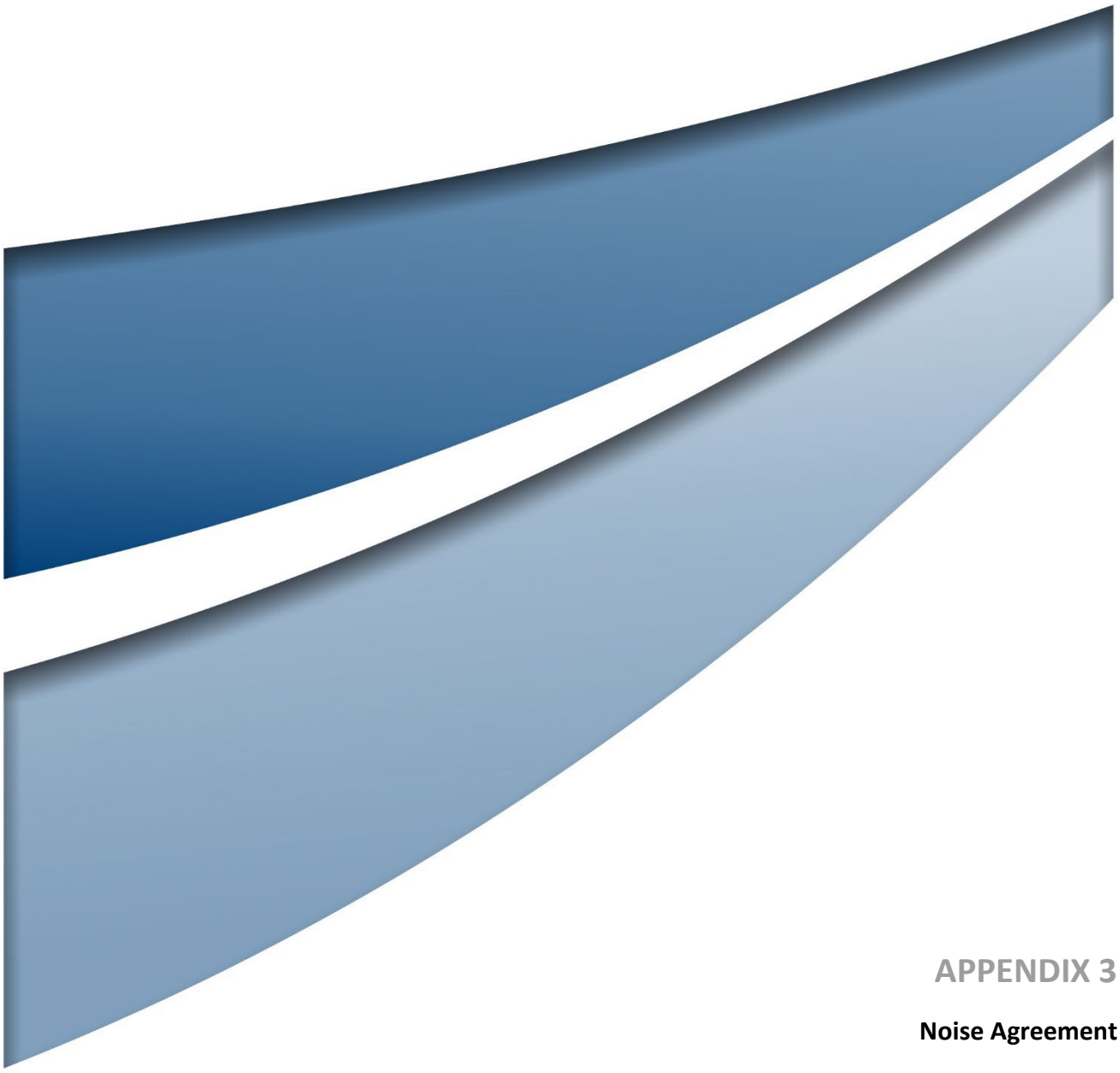
As noted in *Part A*, exploration and geological work undertaken during the past two years has included a detailed review of published geology maps & historic geological reports and desktop geological interpretation relating to both ML1633 and the surrounding EL4473. Desktop geological assessment of the mapping data was undertaken during the reporting period to support exploration planning.

Exploration activities undertaken in the reporting period do not include any commercially sensitive and / or proprietary geological information or interpretations.

2.0 PROPOSED EXPLORATION in the NEXT REPORTING PERIOD

The following work is proposed in the future:

- Continued extraction and processing of quartzite product and sand washing.
- Shipping of quartzite product.
- Geological mapping within the quarry void and along the southern boundary of ML1633 to more accurately delineate the limits of quartzite and indurated metasedimentary rocks.
- Further shallow percussion drilling to test the continuity and consistency of prospective rock units may also be undertaken.
- DGPS topographic surveys as required to support the ongoing mining operations.



APPENDIX 3

Noise Agreement

Walker Quarries
963 Great Western Highway
Wallerawang NSW 2845

8th July 2021

Dear Trevor,
Operations Manager
Walker Quarries

Re: Noise Lot 7 DP87220

As owner of Lot 7 DP87220 since January 2018, I am aware of the operation of the Wallerawang Quarry and am accepting of noise levels on my property which may exceed the limits listed in the Walker Quarries development consent.

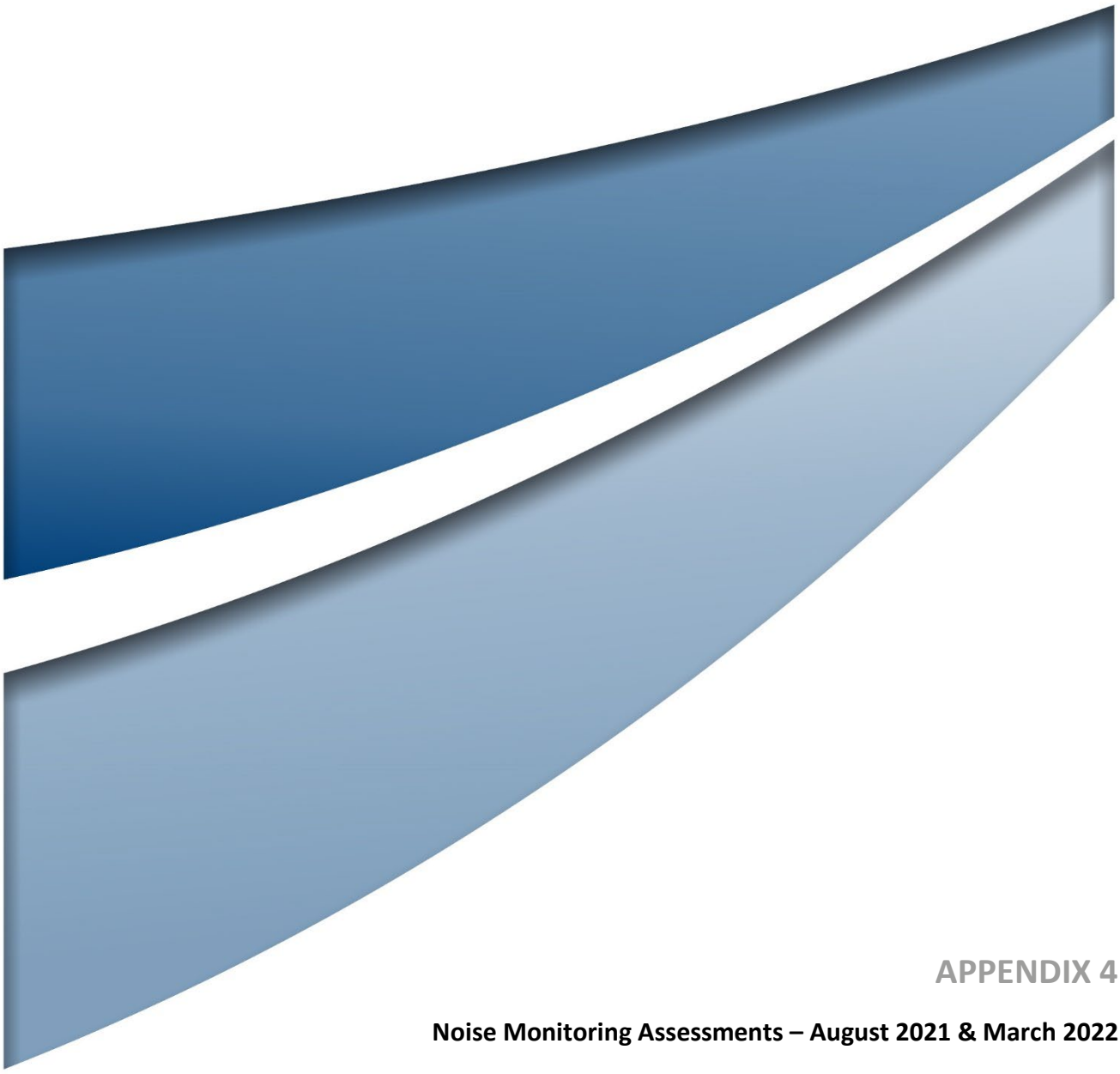
I can confirm that the receiver identified as N2 on various quarry management plans is a shed and not a residence.

I have been provided with a commitment by Walker Quarries that should noise received on my property become intrusive, or should a residence be built at the location N2 or some other location that I May review my position.

I can confirm this agreement with Walker Quarries has been in place since I took ownership of the property but I have seen no reason to this point to formalise in writing as I am more than happy with the performance of the Quarry."

Yours sincerely

Connor MacRae
93 Whitely Road
Oberon NSW 2787



APPENDIX 4

Noise Monitoring Assessments – August 2021 & March 2022

Noise Monitoring Assessment

Wallerawang Quarry
August 2021

Prepared for: Walker Quarries Pty Ltd
September 2021
MAC160392RP10

Muller Acoustic Consulting

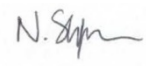
Document Information

Noise Monitoring Assessment

Wallerawang Quarry, August 2021

Prepared for: Walker Quarries Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
P: +61 2 4920 1833
www.mulleracoustic.com

Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC160392RP10	Final	7 September 2021	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 2021.

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.

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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 3** and graphically in the locality plan shown in **Figure 1.**

Table 3 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 18 August 2021. 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 – Onsite Reference Location (RL1)

Operational attended noise monitoring was completed at RL1 on Wednesday 18 August 2021. **Table 4** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 4 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}			
18/08/2021	08:25	69	65	64	N/A	WS: 0.1m/s WD: SW Rain: Nil	Birds 63-66 Quarry Trucks 63-69 Quarry Generator 63-66
Quarry Site $L_{Aeq(15min)}$ Contribution							62
18/08/2021	10:08	69	64	62	N/A	WS: 0.1m/s WD: SW Rain: Nil	Quarry Trucks 61-69 Quarry Generator 62-64
Quarry Site $L_{Aeq(15min)}$ Contribution							62

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 18 August 2021. **Table 5** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 5 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}			
18/08/2021	07:38	63	52	49	43	WS: 0.2m/s WD: SW Rain: Nil	Traffic 45-63 Birds 45-57 Quarry Inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<43
18/08/2021	09:27	67	49	43	43	WS: 0.2m/s WD: SW Rain: Nil	Traffic 41-67 Birds 41-52 Quarry Inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<43

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 18 August 2021. **Table 6** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 6 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}			
18/08/2021	08:05	59	50	48	43	WS: 0.1m/s WD: SW Rain: Nil	Traffic 48-59 Birds 48-59 Quarry Inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<43
18/08/2021	09:49	61	47	44	43	WS: 0.1m/s WD: SW Rain: Nil	Traffic 41-56 Birds 41-61 Quarry Inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<43

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 18 August 2021. **Table 7** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 7 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}			
18/08/2021	08:45	62	48	42	43	WS: 0.2m/s WD: SW Rain: Nil	Traffic 42-62 Birds 42-54 Quarry Inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<43
18/08/2021	10:30	65	50	38	43	WS: 0.8m/s WD: SW Rain: Nil	Traffic 35-65 Birds 35-52 Quarry Inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<43

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 18 August 2021. **Table 8** presents the monitored noise level contributions and observed meteorological conditions for each measurement.

Table 8 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}			
18/08/2021	09:05	67	54	50	43	WS: 0.2m/s WD: SW Rain: Nil	Traffic 48-67 Birds 48-64 Quarry Inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<43
18/08/2021	10:48	65	47	41	43	WS: 1.2m/s WD: SW Rain: Nil	Traffic 38-62 Birds 38-65 Local residential noise <38 Quarry Inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<43

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

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5 Discussion

5.1 Discussion of Results – Reference Location (RL1)

Noise measurements conducted on Wednesday 18 August 2021 when Wallerawang Quarry was operating at normal production levels, which included use of crusher train, mobile screen, excavator, road trucks and water cart.

The noise contribution from the quarry at the reference location was 62dB $LA_{eq(15min)}$ for both measurements. The noise environment at the reference location was primarily dominated by a nearby generator and onsite traffic.

To verify the offsite noise levels, calculations were undertaken to estimate the attenuation from the site to each monitoring location. The attenuation calculations incorporated loss due to distance, and conservative topography (ie barrier attenuation) and air absorption losses. The results of the attenuation calculations identified received noise level and the results of the attended surveys are discussed for each monitoring location in **Section 5.2** to **Section 5.4**.

5.2 Discussion of Results – Location N1

Measurements conducted on Wednesday 18 August 2021 identified that Wallerawang Quarry noise was inaudible during both measurements conducted, and therefore satisfied the relevant noise limits of 43dB $LA_{eq(15min)}$. Extraneous non-quarry related sources included highway traffic and birds, that were significant contributors to the ambient noise environment.

The calculated attenuation between the quarry site and N1, considering distance loss, the surrounding topography and air absorption, was 76dB. Based on the site Lw established from the near field measurements, the resulting received quarry contribution at N1 is <41dBA. This level is significantly lower than the ambient dominant sources which generally masks site noise and confirms the quarry was audible as a background noise source at this location for both measurements conducted.

5.3 Discussion of Results – Location N2

Measurements conducted on Wednesday 18 August 2021 identified that Wallerawang Quarry noise was inaudible during both measurements conducted at N2, and therefore satisfied the relevant noise limits of 43dB $LA_{eq(15min)}$. Extraneous non-quarry related sources included highway traffic and birds, that were significant contributors to the ambient noise environment.

The attenuation between the quarry site and N2 taking into account distance between the locations, the loss due to surrounding topography (ie ground attenuation) and air absorption is 66dB. Based on the current site sound power level established from the near field measurements of the screening/crushing plant, the resulting received quarry contribution at N2 is 51dBA. This estimated noise level is generally higher than the measured noise contribution from the attended monitoring. This may be attributed to underestimating the barrier effect of topography between the monitoring location and the current location of the crushing plant.

5.4 Discussion of Results – Location N3

Measurements conducted on Wednesday 18 August 2021 for N3 were dominated by local and highway traffic which masked quarry noise. Quarry operations were inaudible during all measurements at this location, notwithstanding quarry contributions remained below the relevant criteria of 43dB $LA_{eq(15min)}$ for both measurements conducted at the location.

The total attenuation due to distance, air absorption and surrounding topography for N3 was estimated to be 73dB. This resulted in an estimated site noise contribution of <44dBA which is consistent with the measured noise contribution from the attended monitoring.

5.5 Discussion of Results – Location N4

Measurements conducted on Wednesday 18 August 2021 for N4 were dominated by local and highway traffic which masked quarry noise. Quarry operations were inaudible during all measurements at this location, notwithstanding quarry contributions remained below the relevant criteria of 43dB $LA_{eq(15min)}$ for both measurements conducted at the location.

The total attenuation due to distance, air absorption and surrounding topography for N4 was estimated to be 72dB. This resulted in an estimated site noise contribution of <45dBA which is consistent with the measured noise contribution from the attended monitoring.

6 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 18 August 2021, which satisfies the specified noise limits in the Noise Management Plan and Environmental Protection Licence. These monitoring locations were dominated by extraneous sources that predominantly masked quarry operations.

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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

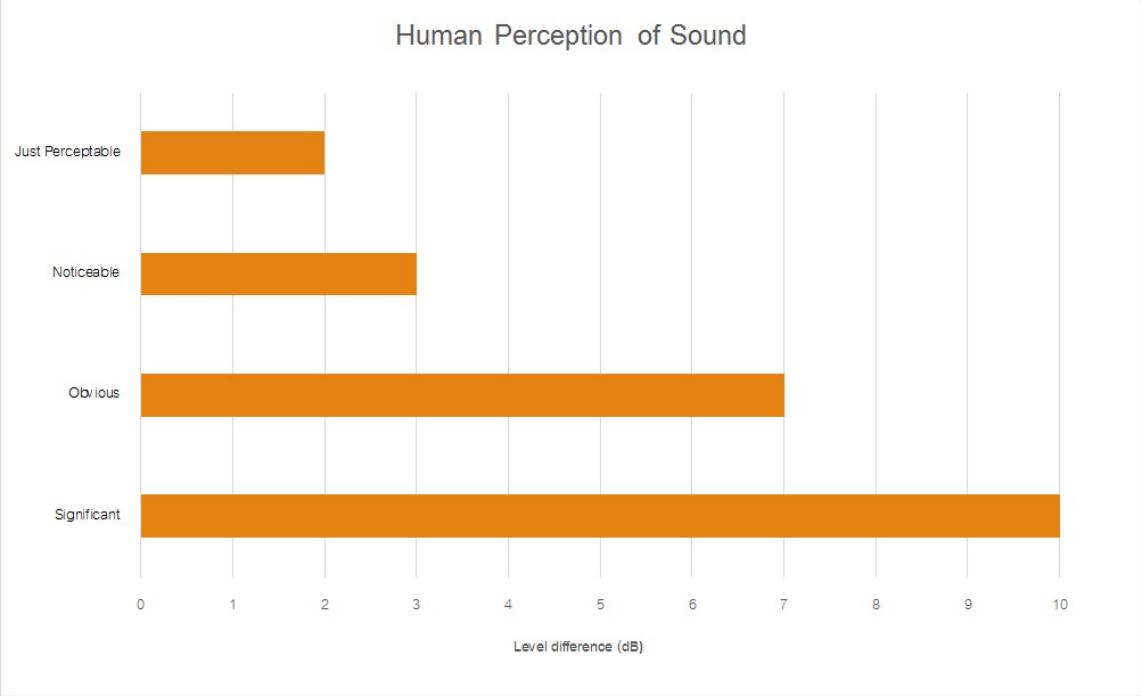
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for 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
Monday 2 August 2021	R Heaton, A Irwin	Phone Call	Initial contact to schedule environmental compliance survey and sound power audit in August 2021.
Monday 2 August 2021	R Heaton, A Irwin	Email	Email to discuss new site manager and additional monitoring location confirm go ahead for survey.
Tuesday 10 August 2021	A Irwin, W Chapman and R Heaton	Email	Email confirming monitoring schedule
Monday 16 August 2021	W Chapman and R Heaton	Phone Call	Call to confirm access to all monitoring location including additional location
Wednesday 18 August 2021	N Shipman	Onsite meeting	Meeting prior to survey to confirm operations for the day, survey completed.

Muller Acoustic Consulting Pty Ltd
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MAC
Muller Acoustic Consulting

Noise Monitoring Assessment

Wallerawang Quarry
March 2022

Prepared for: Walker Quarries Pty Ltd
April 2022
MAC160392RP11

Muller Acoustic Consulting

Document Information

Noise Monitoring Assessment

Wallerawang Quarry, March 2022

Prepared for: Walker Quarries Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd
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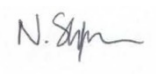
Document ID	Date	Prepared By	Signed	Reviewed By	Signed
MAC160392RP11	8 April 2022	Nicholas Shipman		Oliver Muller	

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 first bi-annual assessment for 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 23 March 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 23 March 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}			
23/03/2022	08:30	79	59	52	N/A	WS: 0.1m/s WD: ESE Rain: Nil	Traffic 52-56 Quarry generator 45-48 Quarry FEL 52-79 Quarry excavator 55-62 Quarry water cart <50
Quarry Site $L_{Aeq(15min)}$ Contribution							58
23/03/2022	13:48	74	56	48	N/A	WS: 0.1m/s WD: E Rain: Nil	Quarry generator 47-48 Quarry water cart 53-54 Quarry haul truck 56-74 Traffic 54-58
Quarry Site $L_{Aeq(15min)}$ Contribution							54

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 23 March 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}			
23/03/2022	10:08	58	49	37	43	WS: 0.1m/s WD: E Rain: Nil	Traffic 44-58 Birds 38-55 Local residential noise 40-43 Dog bark <40 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<27
23/03/2022	13:07	71	49	38	43	WS: 0.1m/s WD: E Rain: Nil	Traffic 40-71 Birds 35-38 Dog bark <35 Aircraft 44-47 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<33

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 23 March 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}			
23/03/2022	10:47	58	45	43	43	WS: 0.1m/s WD: E Rain: Nil	Wind in vegetation 35-38 Traffic 40-47 Birds 40-58 Quarry crusher 36-40
		Quarry Site $L_{Aeq(15min)}$ Contribution					38
23/03/2022	13:28	68	42	36	43	WS: 0.1m/s WD: E Rain: Nil	Traffic 37-45 Birds 34-37 Insects 30-68 Quarry hum <30
		Quarry Site $L_{Aeq(15min)}$ Contribution					<30

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 23 March 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}			
23/03/2022	08:54	63	52	48	43	WS: 4.7m/s[2] WD: W[2] Rain: Nil	Traffic 53-58 Insects 30-33 Aircraft 43-45 Birds 40-63 Quarry crusher 38-45 Quarry excavator 38-57
Quarry Site $L_{Aeq(15min)}$ Contribution							45[3]
23/03/2022	09:45	79	48	37	43	WS: 0.1m/s WD: E Rain: Nil	Traffic 47-55 Birds 43-50 Insects 30-35 Local residential noise 77-79 Quarry inaudible
Quarry Site $L_{Aeq(15min)}$ Contribution							<27
23/03/2022	12:26	70	49	44	43	WS: 0.1m/s WD: E Rain: Nil	Traffic 49-70 Local residential noise 40-50 Quarry Crusher 34-42
Quarry Site $L_{Aeq(15min)}$ Contribution							38

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

Note 2: Meteorological data measured at 10m obtained from the Bureau of Meteorology weather station Mount Boyce AWS, NSW Station 63292 (-33.6185°S 150.2741°E 1080m AMSL).

Note 3: Outside EPL meteorological conditions, hence criteria not applicable.

4.5 Assessment Results – Location N4

Operational attended noise monitoring was completed at N4 on Wednesday 23 March 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}			
23/03/2022	09:21	68	55	51	43	WS: 0.1m/s WD: E Rain: Nil	Traffic 40-59 Birds 40-59 Local residential noise 60-68 Quarry processing 40-42
		Quarry Site $L_{Aeq(15min)}$ Contribution					41
23/03/2022	12:45	66	55	50	43	WS: 0.1m/s WD: ESE Rain: Nil	Traffic 53-66 Birds <40 Quarry processing 30-33
		Quarry Site $L_{Aeq(15min)}$ Contribution					31

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

4.6 Assessment Results – Sound Power Audit

Sound power calculations for measured on-site plant are presented in **Table 10**. 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.

Table 10 Sound Power Levels, dBA

Plant	Octave Band Centre Frequency, Lw Spectrum									Sound Power Lw	Criteria
	32	63	125	250	500	1k	2k	4k	8k		
Komatsu WA480 FEL	69	82	84	86	93	92	88	84	82	97	100
Screen and Crusher	71	90	96	98	108	109	107	102	94	113	111
Total Site Sound Power										**110**	**121**

It is noted that the sound power level of the 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 overall site criteria as shown in **Table 10**. Hence, the total target sound power levels are satisfied for site.

5 Discussion

5.1 Discussion of Results – Reference Location (RL1)

Noise measurements conducted on Wednesday 23 March 2022 when Wallerawang Quarry was operating at normal production levels, which included use of crusher train, mobile screen, excavator, road trucks and water cart.

The noise contribution from the quarry at the reference location was 58dB $LA_{eq(15min)}$ and 54dB $LA_{eq(15min)}$ respectively. The noise environment at the reference location was primarily dominated by a nearby generator, processing activities and onsite traffic.

To verify the offsite noise levels, calculations were undertaken to estimate the attenuation from the site to each monitoring location. The attenuation calculations incorporated loss due to distance, and conservative topography (ie barrier attenuation) and air absorption losses. The results of the attenuation calculations identified received noise level and the results of the attended surveys are discussed for each monitoring location in **Section 5.2** to **Section 5.5**

5.2 Discussion of Results – Location N1

Measurements conducted on Wednesday 23 March 2022 identified that Wallerawang Quarry noise was inaudible during both measurements conducted, and therefore satisfied the relevant noise limits of 43dB $LA_{eq(15min)}$. Extraneous non-quarry related sources included highway traffic, local residential noise, aircraft, dog bark and birds, that were significant contributors to the ambient noise environment.

The calculated attenuation between the quarry site and N1, considering distance loss, the surrounding topography and air absorption, was 72dB. Based on the site Lw established from the near field measurements, the resulting received quarry contribution at N1 is 38dBA. This level is significantly lower than the ambient dominant sources which generally masks site noise.

5.3 Discussion of Results – Location N2

Measurements conducted on Wednesday 23 March 2022 identified that Wallerawang Quarry noise was audible during both measurements conducted at N2, with contributions measured between <30dB $LA_{eq(15min)}$ and 38dB $LA_{eq(15min)}$ respectively. Therefore, the relevant noise limit of 43dB $LA_{eq(15min)}$ was satisfied. Extraneous non-quarry related sources included highway traffic, wind in vegetation, insects and birds that were significant contributors to the ambient noise environment.

The attenuation between the quarry site and N2 taking into account distance between the locations, the loss due to surrounding topography (ie ground attenuation) and air absorption is 64dB. Based on the current site sound power level established from the near field measurements of the screening/crushing plant, the resulting received quarry contribution at N2 is <46dBA. This estimated noise level is generally higher than the measured noise contribution from the attended monitoring. This may be attributed to underestimating the barrier effect of topography between the monitoring location and the current location of the crushing plant.

5.4 Discussion of Results – Location N3

Measurements conducted on Wednesday 23 March 2022 for N3 were dominated by highway traffic and quarry activities. During the first round of noise monitoring at this location, the measured quarry noise contribution of 45dB $LA_{eq(15min)}$ which was above the applicable noise criteria of 43dB $LA_{eq(15min)}$. The measured noise level was attributed to an excavator operating on the high wall of the quarry loading the jaw crusher. At the time of the measurement, the prevailing wind speed at the closest bureau of meteorology weather station, Mt Boyce, was 4.6m/s (17km/hr). This is outside the wind speed parameters where noise emission limits are applicable (as per Condition L4.3 of the EPL). Accordingly, the measured noise level of 45dBA is not an exceedance. Notwithstanding, as best practice and in accordance with the methodology outlined in Section 8.2.1 of the site's NMP, the quarry manager was notified, and corrective actions were implemented. The actions implemented included ceasing excavators' operations on the highwall on the highwall and relocating it to a lower bench.

An additional measurement round was completed at N3 to confirm the emissions from the quarry satisfied the noise criteria. The results of the second measurement confirmed the received noise level at N3 complied with the noise criteria and the corrective action had adequately mitigated the nuisance noise from site. It is noted that no noise complaints were received from any of the surrounding noise sensitive receivers during this period or in the weeks leading up to the survey.

The measured quarry noise contribution during the round two noise measurement at R3 complied with the applicable noise criteria for the site.

Notwithstanding, in accordance with the site NMP, it is recommended that excavation and jaw crusher activities should not have a clear line of sight to ant residential receivers and should be located behind a high wall or stockpile at all times

Extraneous non-quarry related sources included local residential noise, insects and birds that were significant contributors to the ambient noise environment.

The total attenuation due to distance, air absorption and surrounding topography for N3 was estimated to be 66dB. This resulted in an estimated site noise contribution of 44dBA which is consistent with the measured noise contribution from the attended monitoring during the first measurement counted at N3, prior to corrective actions being implemented.

5.5 Discussion of Results – Location N4

Measurements conducted on Wednesday 23 March 2022 for N4 were dominated by local and highway traffic. Quarry operations were audible during all measurements at this location with contributions measured between 31dB $L_{Aeq(15min)}$ and 41dB $L_{Aeq(15min)}$ respectively, demonstrating that quarry contributions remained below the relevant criteria of 43dB $L_{Aeq(15min)}$ for both measurements conducted at the location. Extraneous non-quarry related sources included local residential noise and birds that were significant contributors to the ambient noise environment.

The total attenuation due to distance, air absorption and surrounding topography for N4 was estimated to be 68dB. This resulted in an estimated site noise contribution of <42dBA which is consistent with the measured noise contribution from the attended monitoring.

5.6 Discussion of Results – Sound Power Audit

The results of the sound power audit demonstrate that current plant used onsite comply with the relevant mobile and static sound power criteria as outlined in the NVIA, with the exception of the screening plant and the crusher train. This is as the screening plant and the crusher train consists of several items of plant with the criteria outlined in the NVIA for a single item of plant. Notwithstanding, the overall emissions from combined plant on site remain below the combined site sound power criteria.

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6 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 was audible at most residential locations conducted on Wednesday 23 March 2022, although satisfied the specified noise limits in the Noise Management Plan and Environmental Protection Licence at all locations.

Measurements at N3 were noted to be elevated although outside applicable meteorological conditions for compliance. Notwithstanding, the quarry manager was notified, and corrective actions implemented as outlined in Section 5.4. Following the corrective actions, an additional measurement at this N3 demonstrated that site noise emissions satisfied noise criteria for that location.

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

The results of the sound power audit demonstrate that current plant used onsite comply with the relevant mobile and static sound power criteria as outlined in the NVIA, with the exception of the screen plant and the crusher train. 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

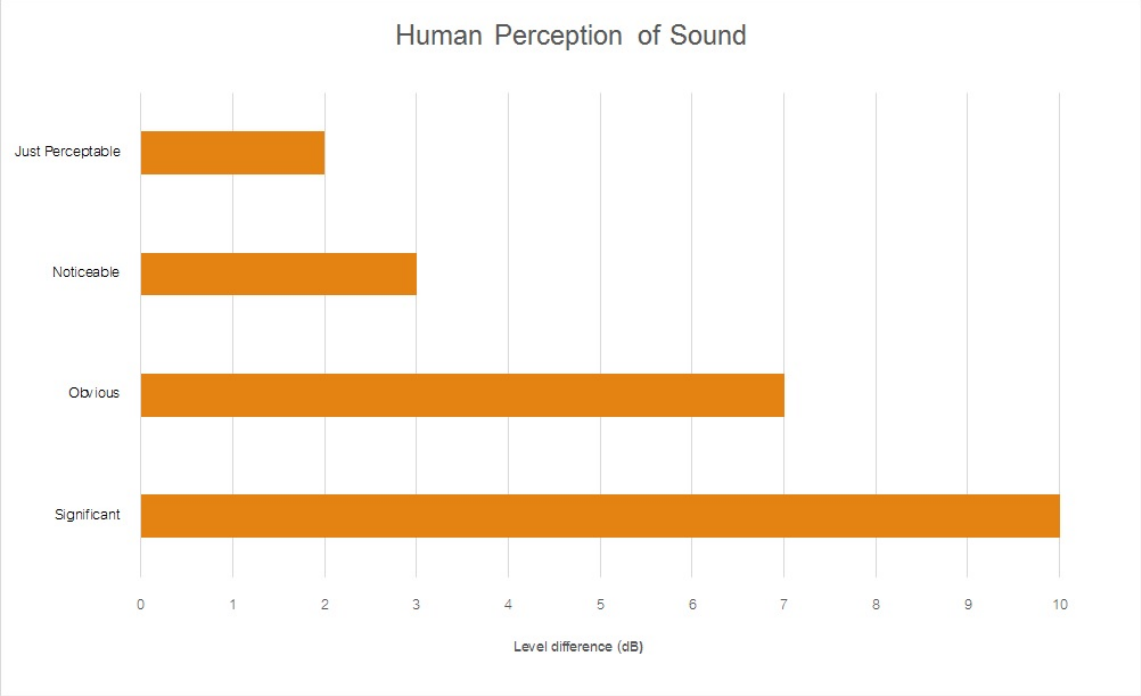
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for 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
Monday17 February 2022	R Heaton, A Irwin, W Chapman	Email	Initial contact to schedule environmental compliance survey and sound power audit in March 2022
Tuesday 18 February 2022	R Heaton, A Irwin, W Chapman	Email	Email to confirm go ahead for survey in March
Thursday 24 February 2022	A Irwin, W Chapman, R Heaton	Email	Updated Proposal
Monday 28 February 2022	A Irwin, W Chapman, R Heaton	Email	Fee proposal acceptance
Monday 21 March 2022	A Irwin, W Chapman, R Heaton	Phone Calls	Finalising date of Survey for 23 March 2022
Wednesday 23 March 2022	L Abell, W Chapman	Onsite meeting	Meeting prior to survey to confirm operations for the day, survey completed
Wednesday 23 March 2022	R Heaton W Chapman	Phone Call	Phone Call to discuss results at N3 and corrective action to be taken
Wednesday 23 March 2022	R Heaton A Irwin	Phone Call	Phone Call to discuss results at N3 and corrective action implemented

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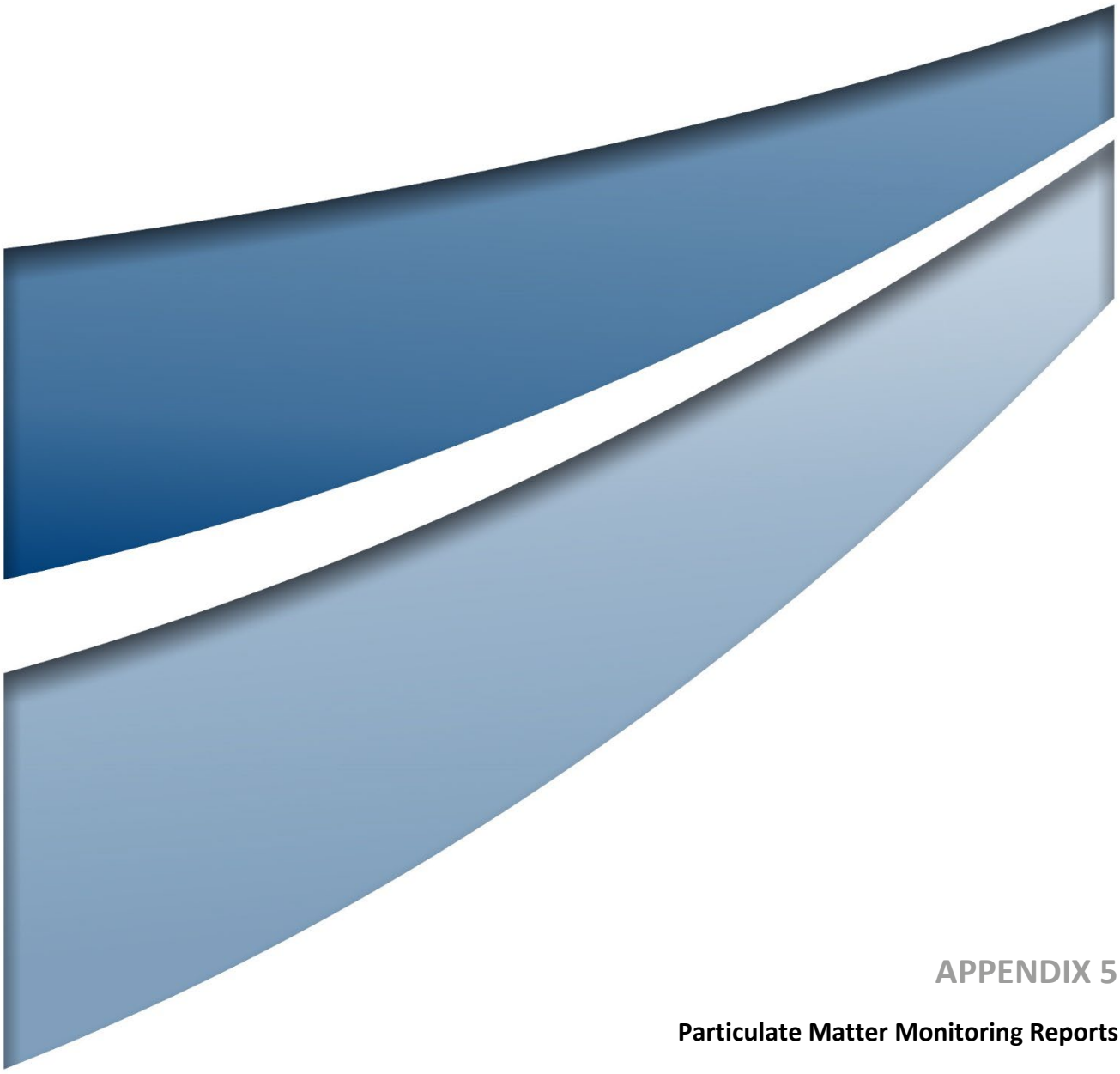
MAC
Muller Acoustic Consulting



APPENDIX 5

Particulate Matter Monitoring Reports

Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

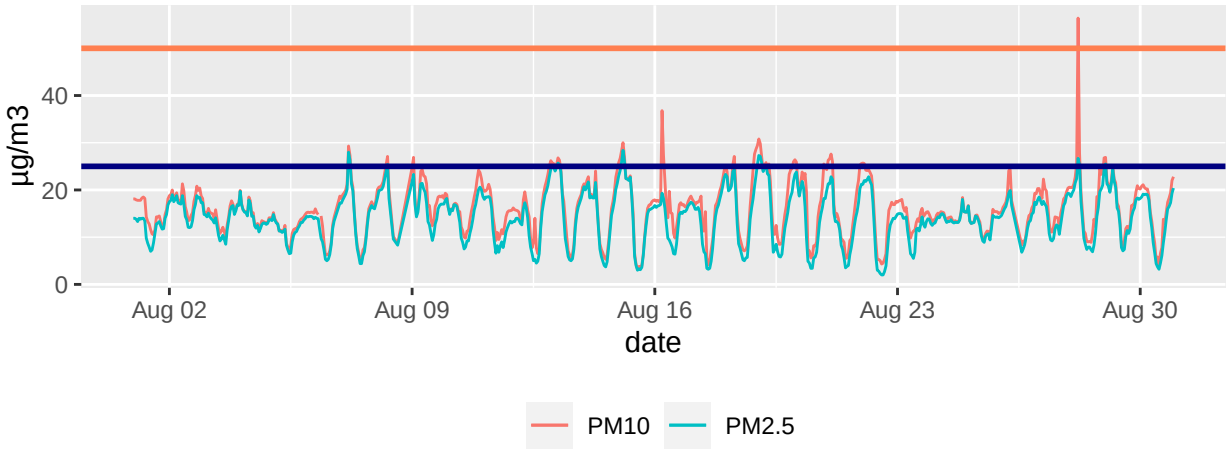
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2021-08-01	12.1	15.0	100.0	100.0
2021-08-02	16.5	18.0	100.0	100.0
2021-08-03	13.3	14.3	100.0	100.0
2021-08-04	14.3	14.7	100.0	100.0
2021-08-05	11.4	12.0	100.0	100.0
2021-08-06	11.5	12.8	87.5	83.3
2021-08-07	14.6	15.4	100.0	100.0
2021-08-08	NA	NA	37.5	37.5
2021-08-09	16.4	18.9	100.0	100.0
2021-08-10	14.2	16.0	100.0	100.0
2021-08-11	13.0	15.5	100.0	100.0
2021-08-12	12.9	15.0	100.0	100.0
2021-08-13	16.5	17.7	100.0	100.0
2021-08-14	14.5	15.9	100.0	100.0
2021-08-15	14.9	15.7	100.0	100.0
2021-08-16	13.6	17.5	100.0	100.0
2021-08-17	12.7	14.9	100.0	100.0
2021-08-18	16.3	18.8	95.8	95.8
2021-08-19	16.0	18.9	100.0	100.0
2021-08-20	14.2	17.7	100.0	100.0
2021-08-21	13.0	15.9	100.0	100.0
2021-08-22	12.2	15.1	100.0	100.0
2021-08-23	12.0	14.5	100.0	100.0
2021-08-24	14.0	14.4	100.0	100.0
2021-08-25	12.8	13.3	100.0	100.0
2021-08-26	14.2	15.7	75.0	75.0
2021-08-27	14.9	17.0	100.0	100.0
2021-08-28	15.7	19.2	100.0	100.0
2021-08-29	16.1	17.2	100.0	100.0
2021-08-30	13.2	15.1	100.0	100.0

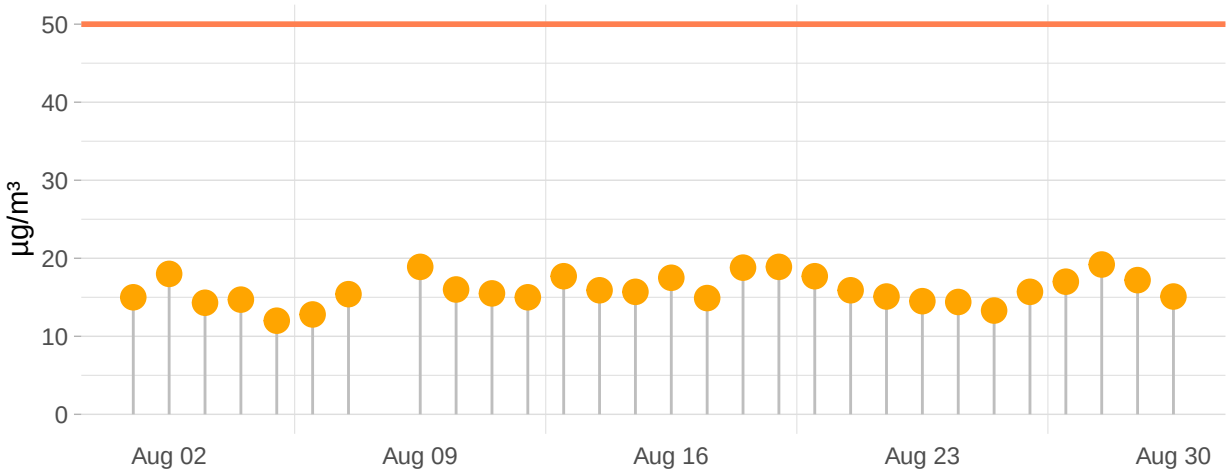
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
August 2021	14	15.9	96.5	96.38667

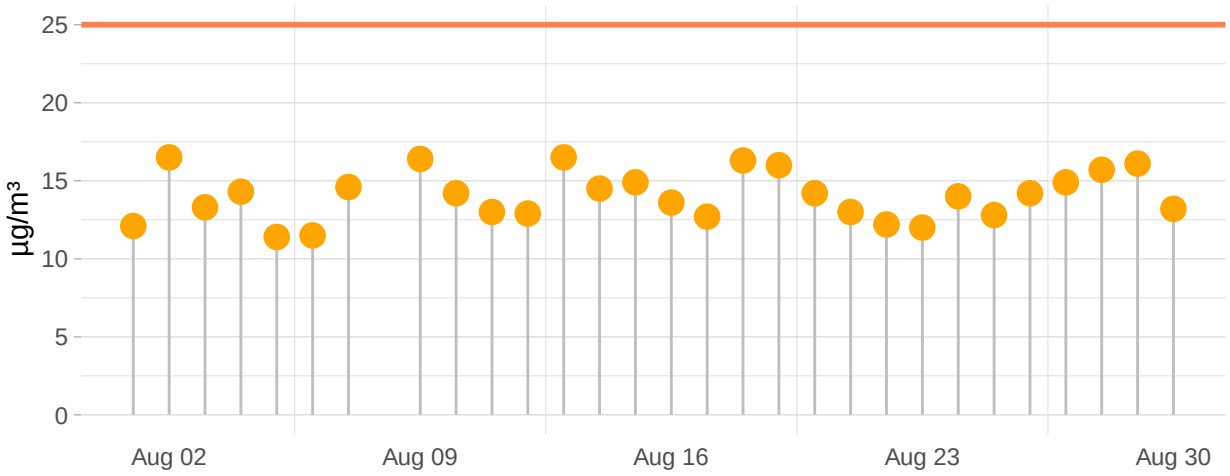
PM10 & PM2.5 hourly averages



PM10 daily averages

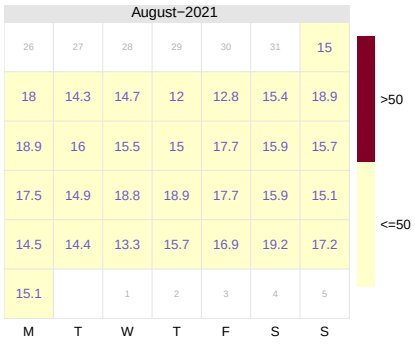


PM2.5 daily averages

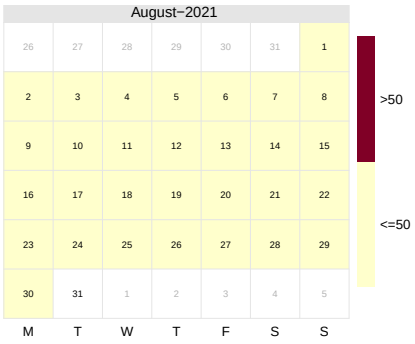


Daily Exceedances

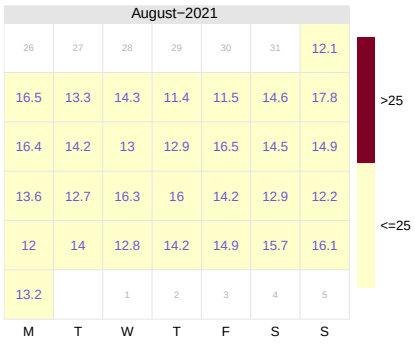
PM_{10}. Daily Exceedances Walker Quarries DMP



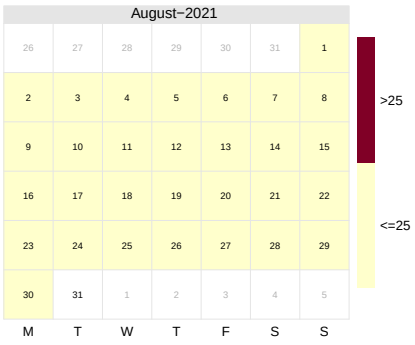
PM_{10}. Daily Exceedances Walker Quarries DMP



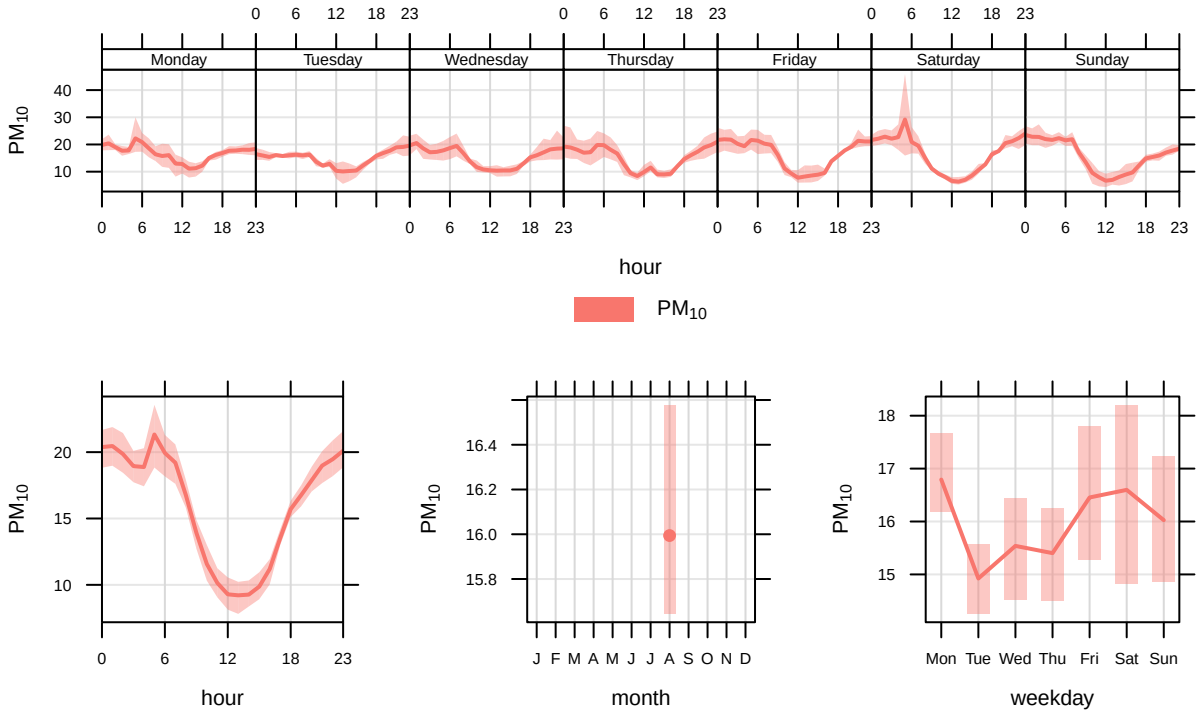
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

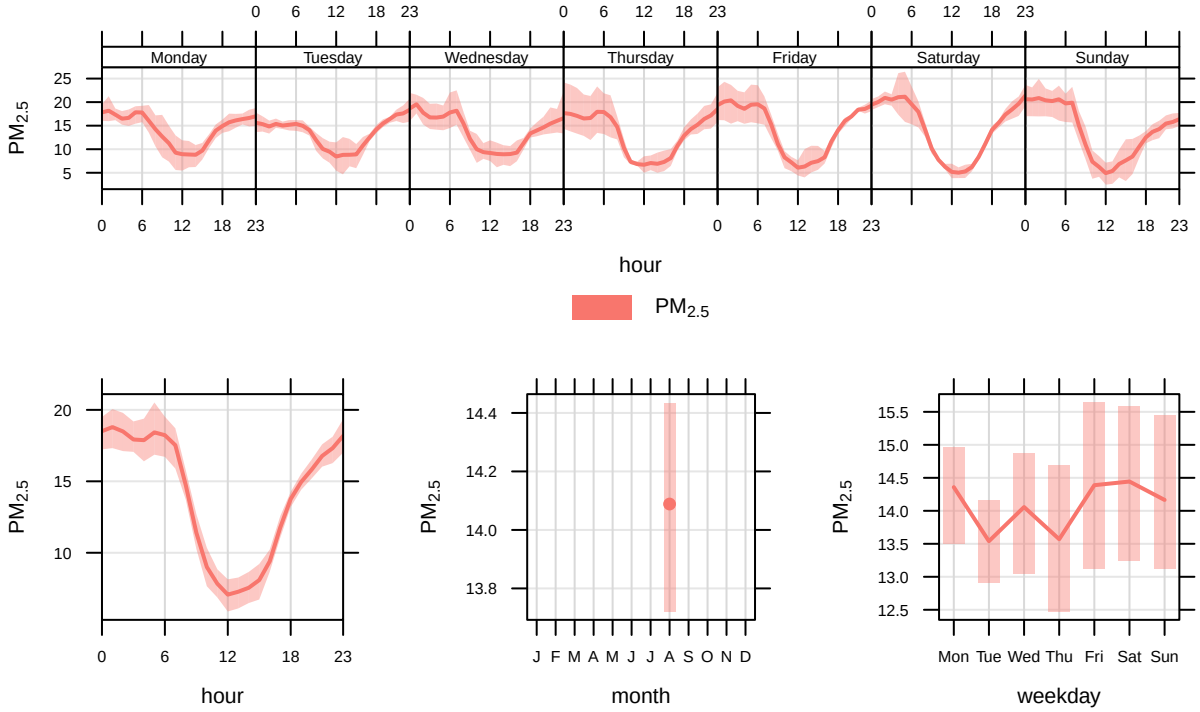


PM_{10} Time Variation at Walker Quarries DMP



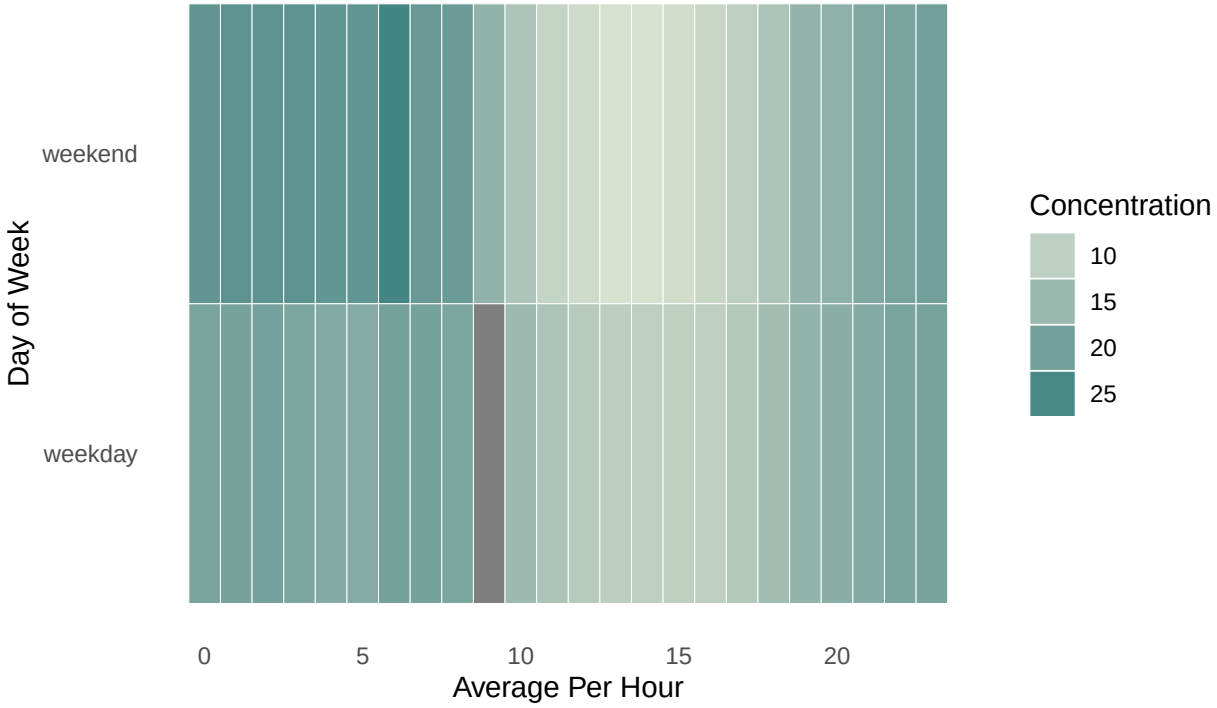
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

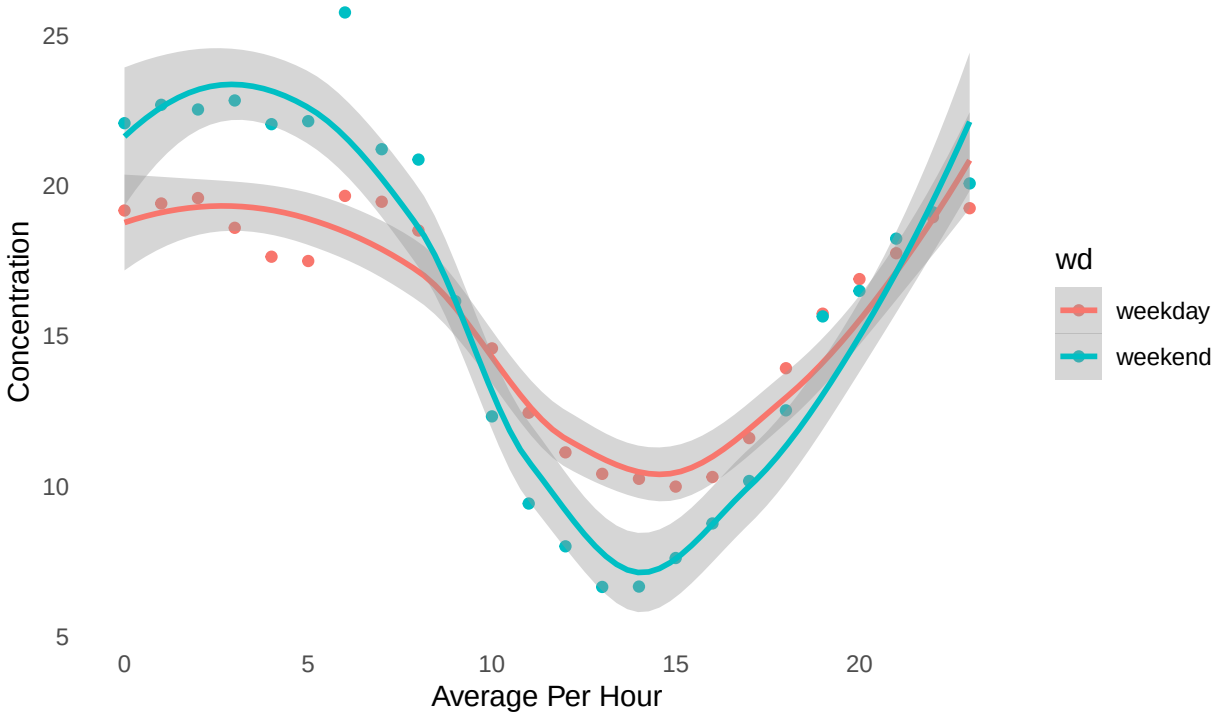


mean and 95% confidence interval in mean

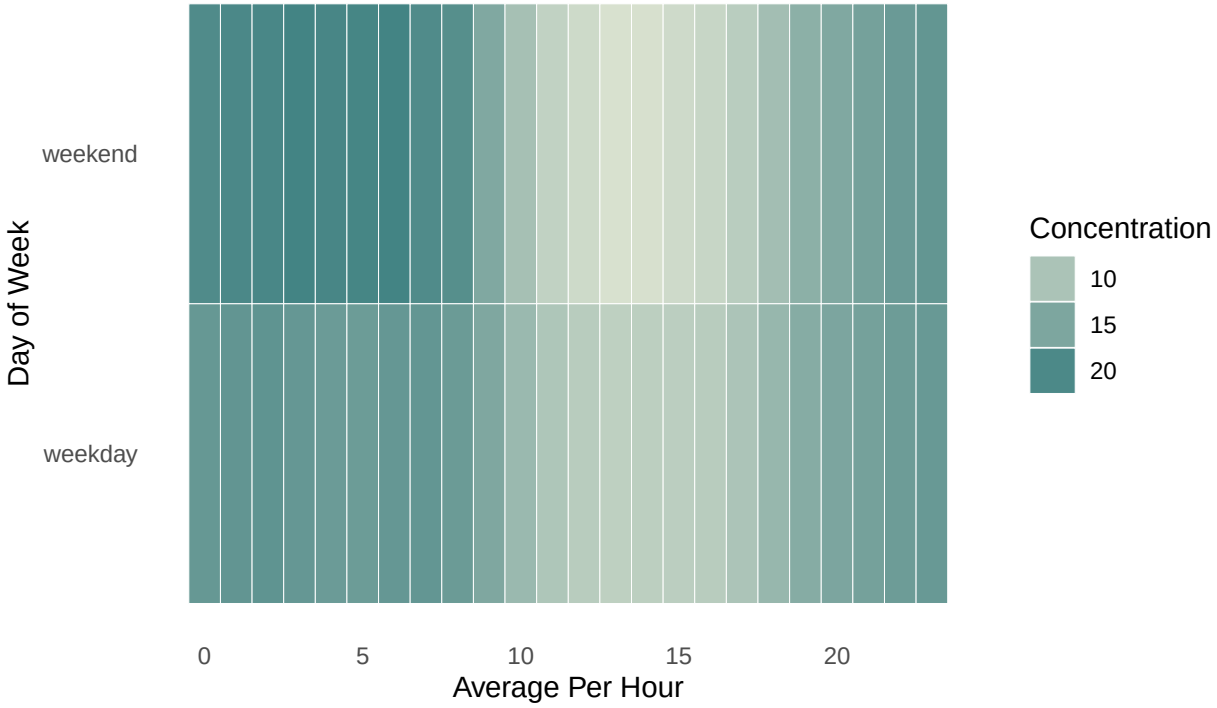
PM10 concentration by Weekday/weekend and Hour



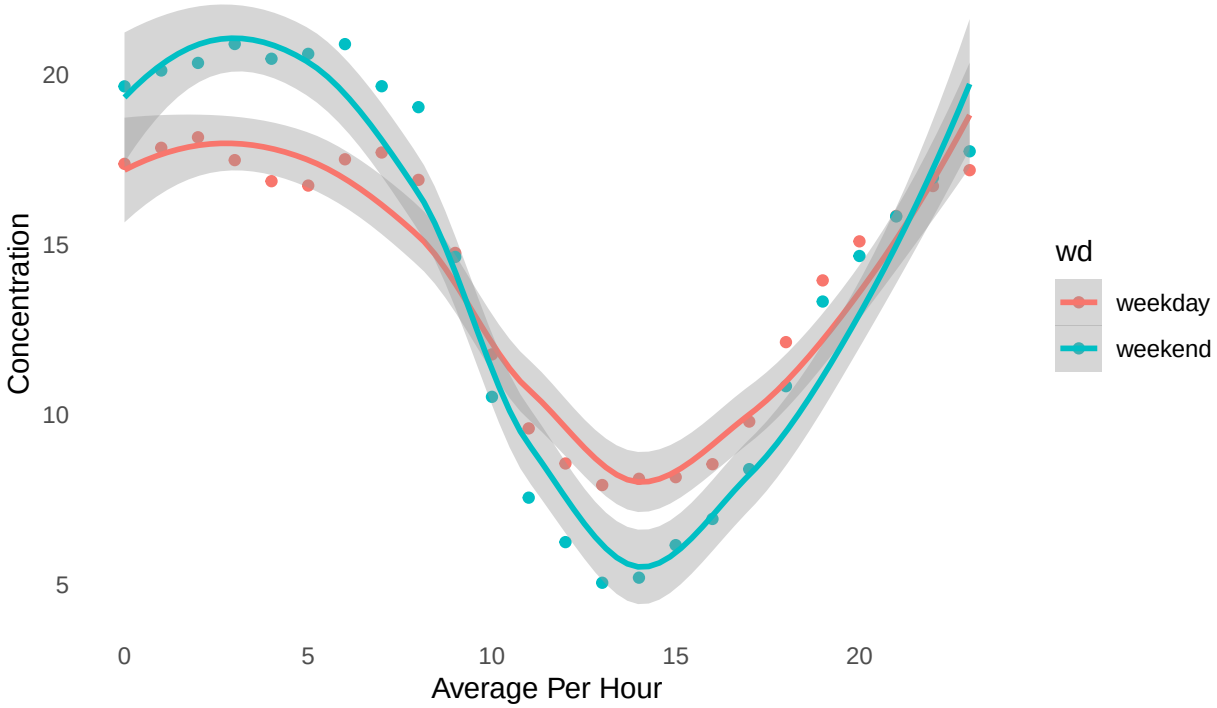
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

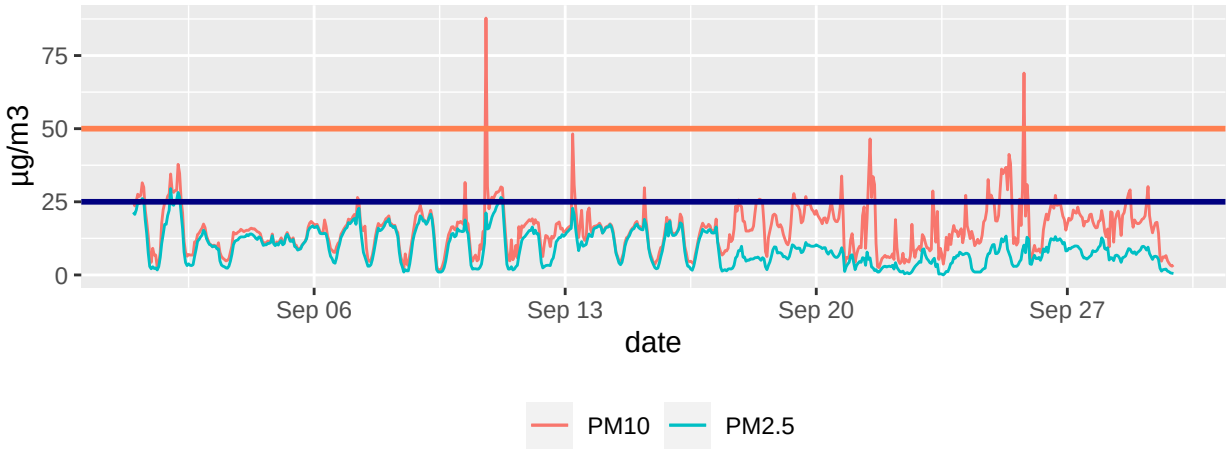
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2021-09-01	13.9	18.2	100.0	100.0
2021-09-02	14.3	18.2	100.0	100.0
2021-09-03	8.2	10.1	100.0	100.0
2021-09-04	12.1	13.5	100.0	100.0
2021-09-05	11.8	12.4	100.0	100.0
2021-09-06	12.2	13.9	100.0	100.0
2021-09-07	12.9	15.4	100.0	100.0
2021-09-08	11.6	13.7	100.0	100.0
2021-09-09	11.3	13.0	100.0	100.0
2021-09-10	10.9	18.5	100.0	100.0
2021-09-11	12.3	16.9	91.7	91.7
2021-09-12	9.6	14.7	100.0	100.0
2021-09-13	14.2	18.6	100.0	100.0
2021-09-14	12.3	12.9	100.0	100.0
2021-09-15	11.1	12.9	100.0	100.0
2021-09-16	10.6	12.2	100.0	100.0
2021-09-17	7.3	15.1	95.8	95.8
2021-09-18	5.8	18.0	100.0	100.0
2021-09-19	8.6	20.0	100.0	100.0
2021-09-20	7.2	17.9	100.0	100.0
2021-09-21	3.6	14.6	100.0	100.0
2021-09-22	2.5	7.8	100.0	100.0
2021-09-23	3.8	12.2	100.0	100.0
2021-09-24	5.0	17.4	100.0	100.0
2021-09-25	7.7	26.1	100.0	100.0
2021-09-26	9.0	17.0	100.0	100.0
2021-09-27	8.3	19.3	100.0	100.0
2021-09-28	7.2	19.1	100.0	100.0
2021-09-29	5.0	13.1	100.0	100.0

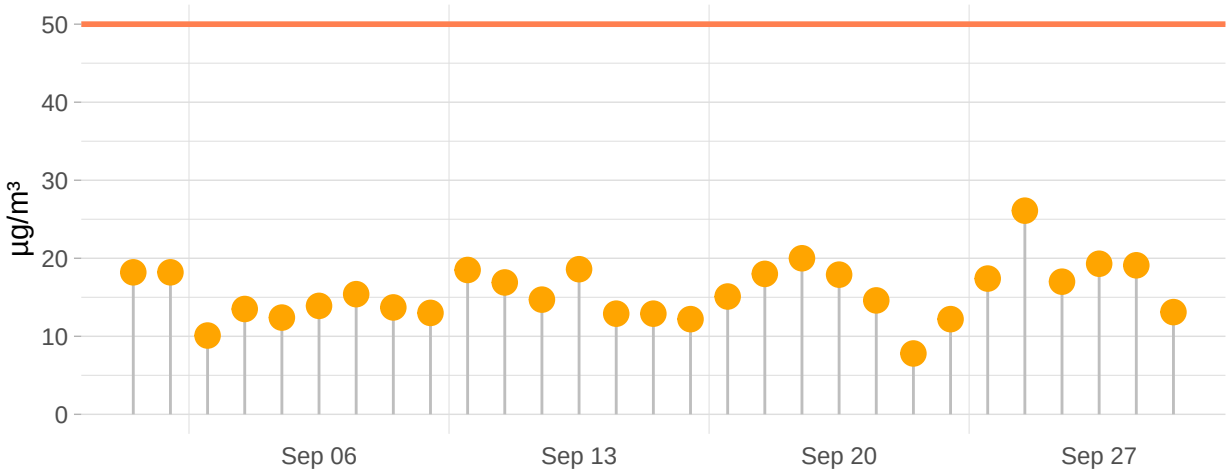
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
September 2021	9.3	15.6	99.6	99.56897

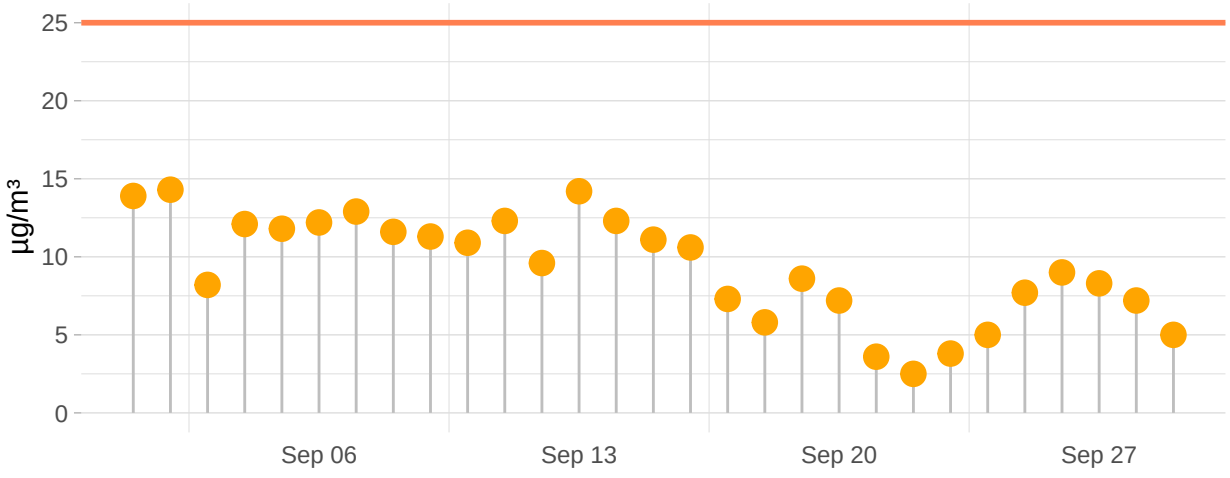
PM10 & PM2.5 hourly averages



PM10 daily averages

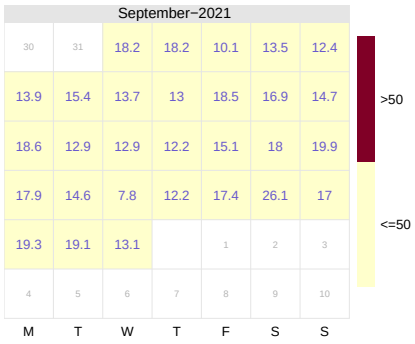


PM2.5 daily averages

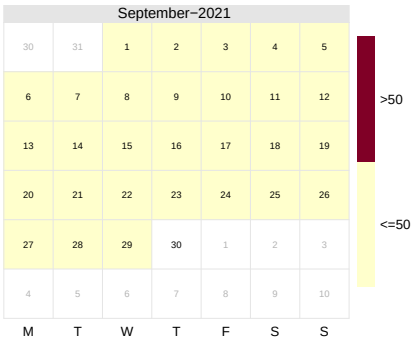


Daily Exceedances

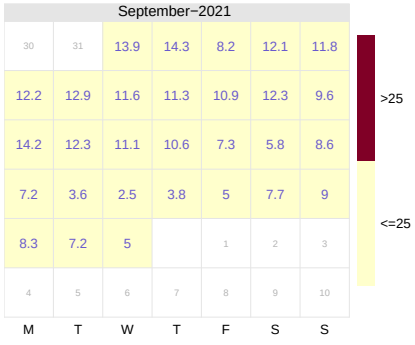
PM_{10}. Daily Exceedances Walker Quarries DMP



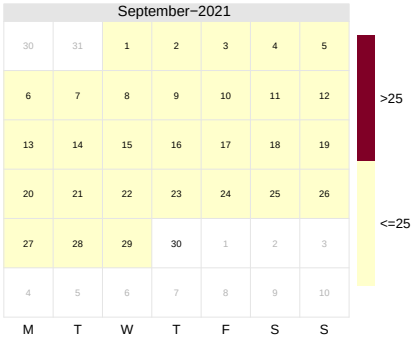
PM_{10}. Daily Exceedances Walker Quarries DMP



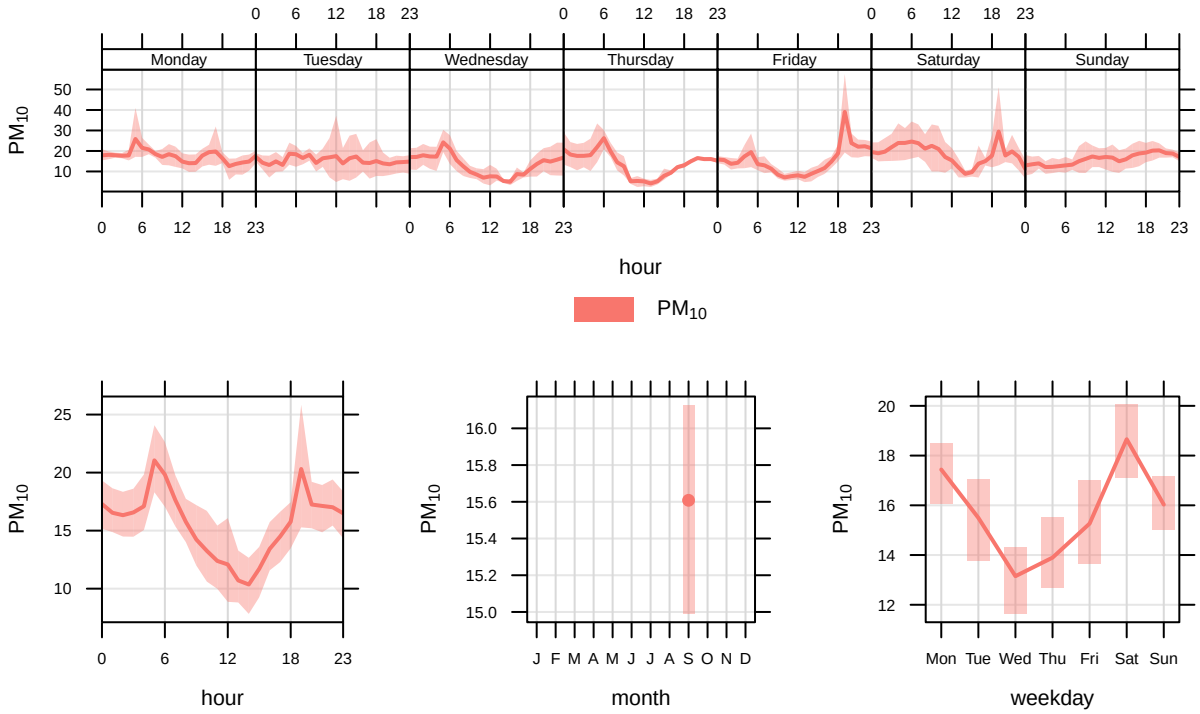
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

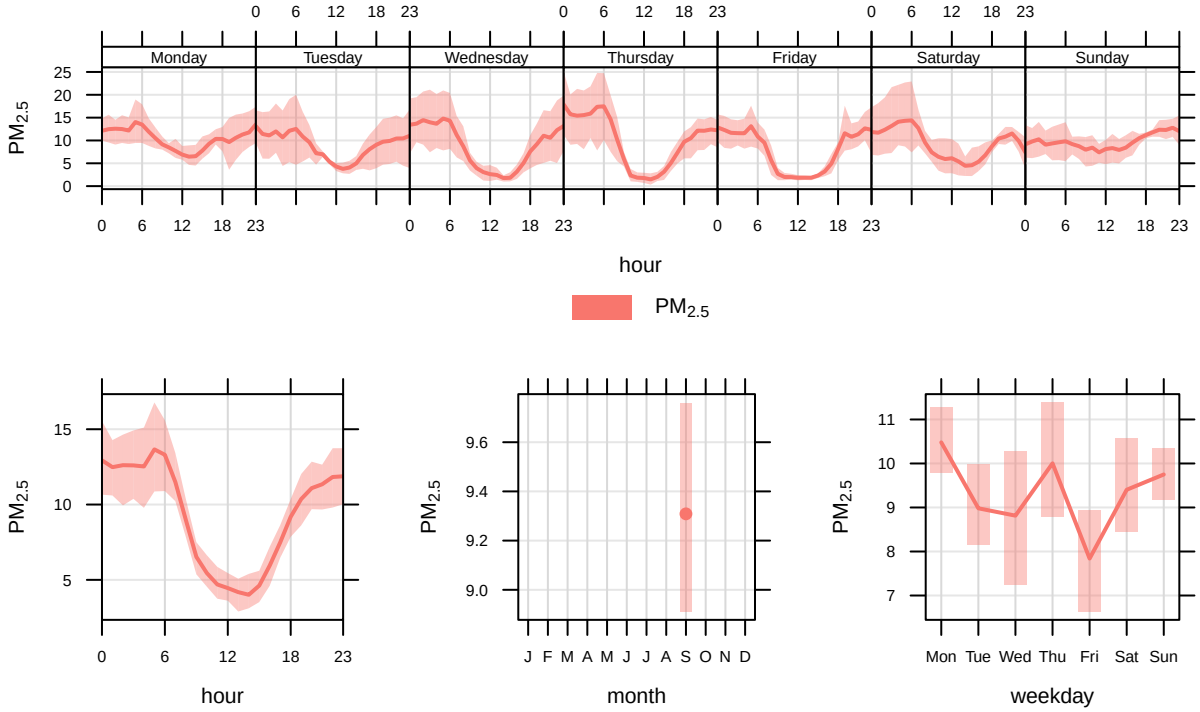


PM_{10} Time Variation at Walker Quarries DMP



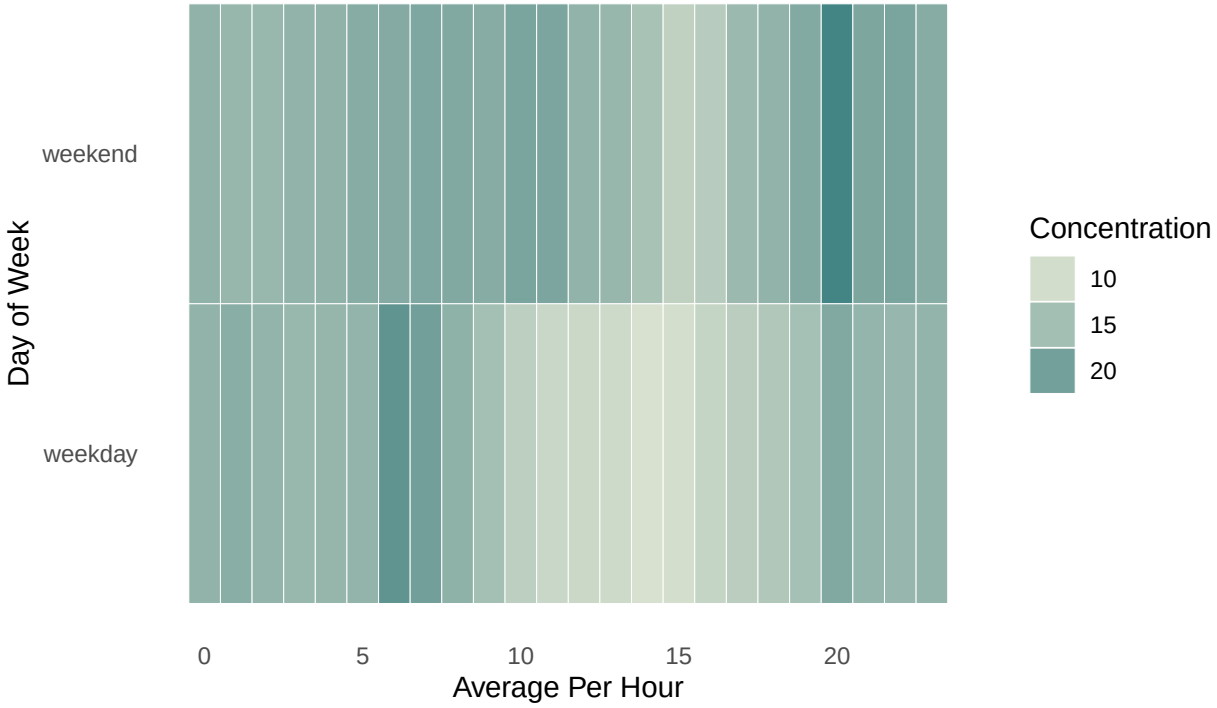
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

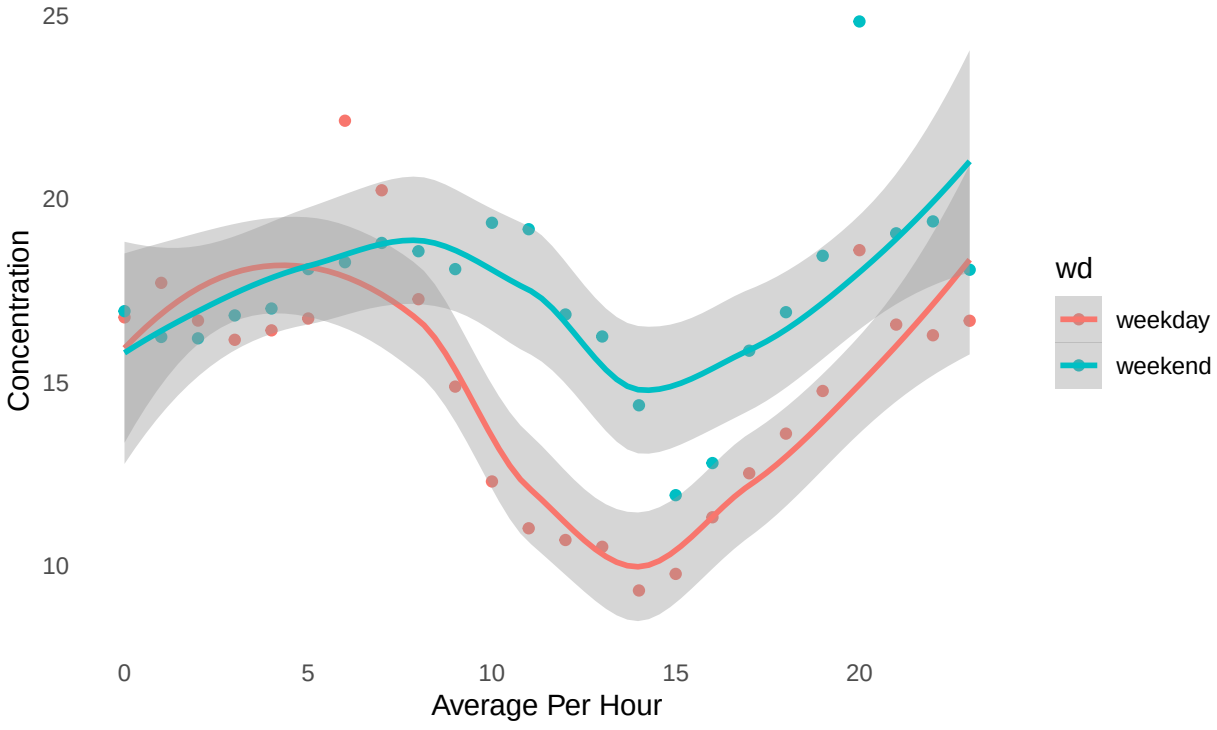


mean and 95% confidence interval in mean

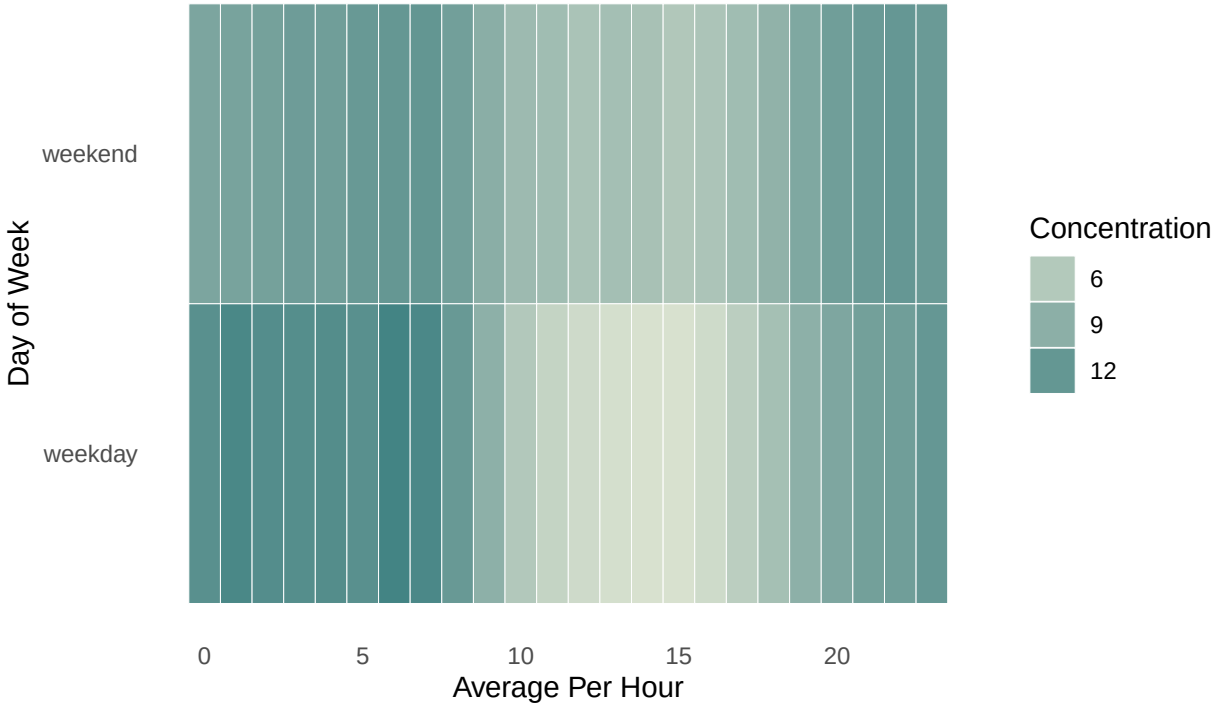
PM10 concentration by Weekday/weekend and Hour



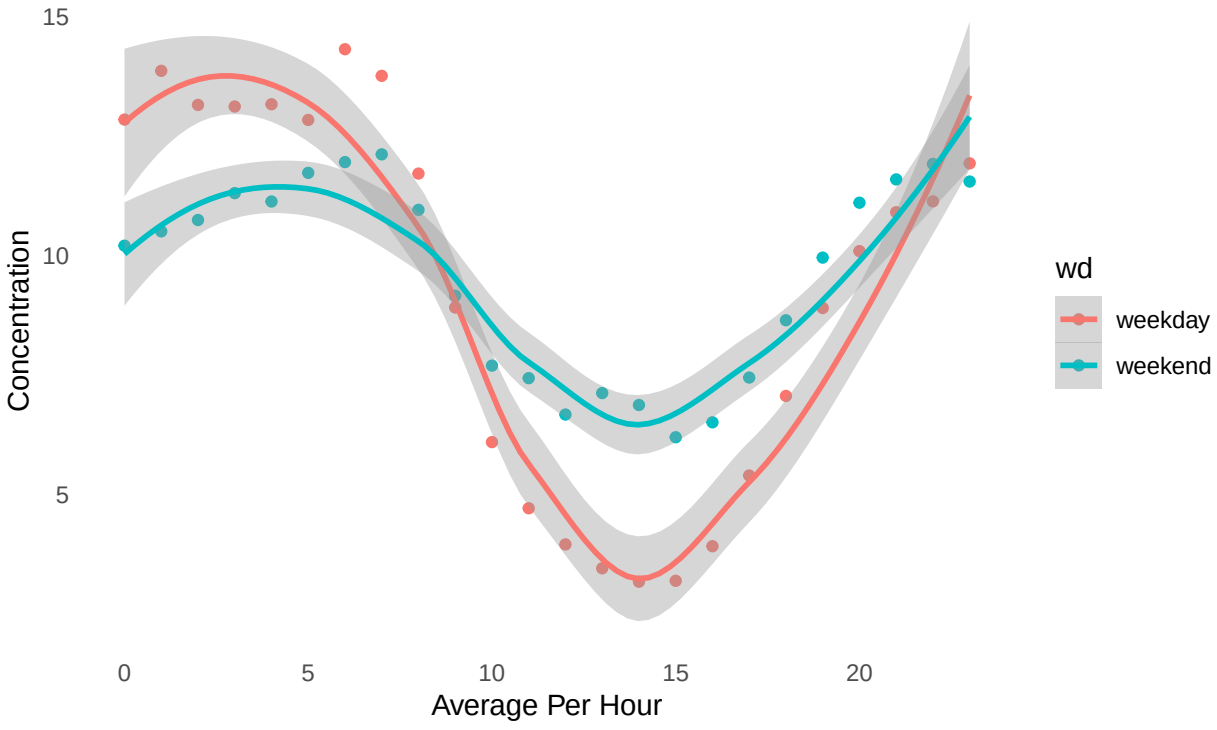
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

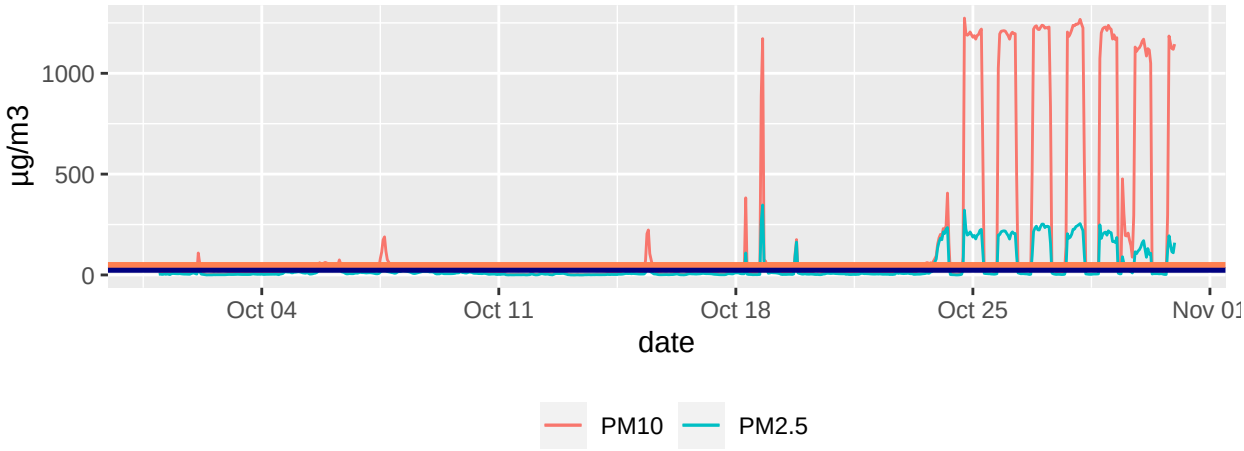
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2021-10-01	4.8	14.2	100.0	100.0
2021-10-02	4.0	12.8	100.0	100.0
2021-10-03	2.6	9.4	100.0	100.0
2021-10-04	6.7	17.9	100.0	100.0
2021-10-05	15.0	38.0	95.8	95.8
2021-10-06	14.3	33.7	100.0	100.0
2021-10-07	12.9	54.1	100.0	100.0
2021-10-08	15.2	40.0	100.0	100.0
2021-10-09	9.0	29.8	100.0	100.0
2021-10-10	7.2	26.0	100.0	100.0
2021-10-11	1.4	5.2	100.0	100.0
2021-10-12	4.1	10.3	100.0	100.0
2021-10-13	0.7	2.6	100.0	100.0
2021-10-14	3.5	16.1	100.0	100.0
2021-10-15	7.5	40.9	100.0	100.0
2021-10-16	3.2	11.0	100.0	100.0
2021-10-17	4.4	13.3	100.0	100.0
2021-10-18	39.4	121.2	100.0	100.0
2021-10-19	16.3	29.1	100.0	100.0
2021-10-20	4.7	11.2	100.0	100.0
2021-10-21	4.7	12.1	100.0	100.0
2021-10-22	5.0	16.6	100.0	100.0
2021-10-23	19.2	42.1	100.0	100.0
2021-10-24	119.1	385.1	100.0	100.0
2021-10-25	118.6	677.8	100.0	100.0
2021-10-26	116.2	654.7	100.0	100.0
2021-10-27	121.8	659.1	100.0	100.0
2021-10-28	127.4	699.0	100.0	100.0
2021-10-29	93.3	676.3	100.0	100.0
2021-10-30	74.6	585.1	100.0	100.0

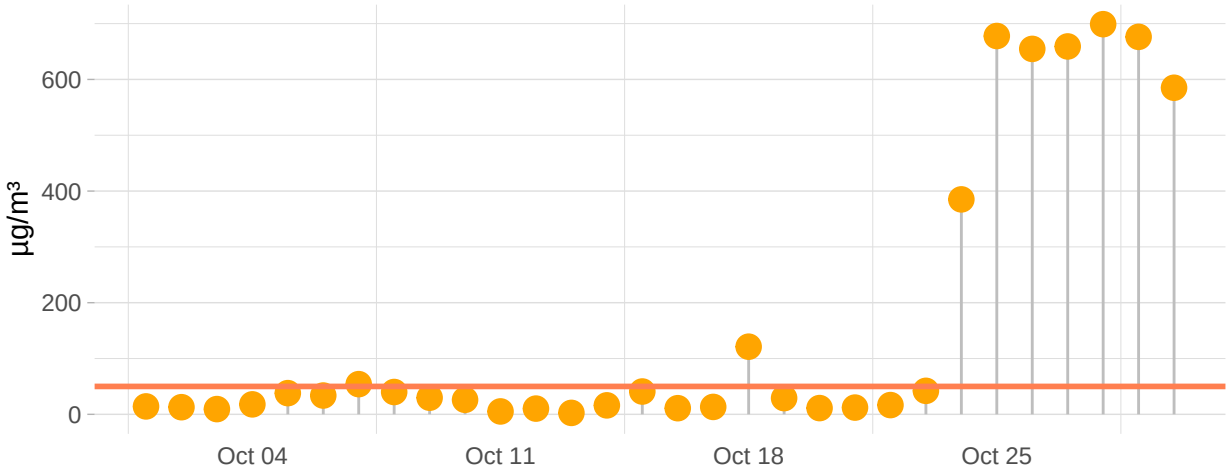
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
October 2021	32.6	164.8	99.9	99.86

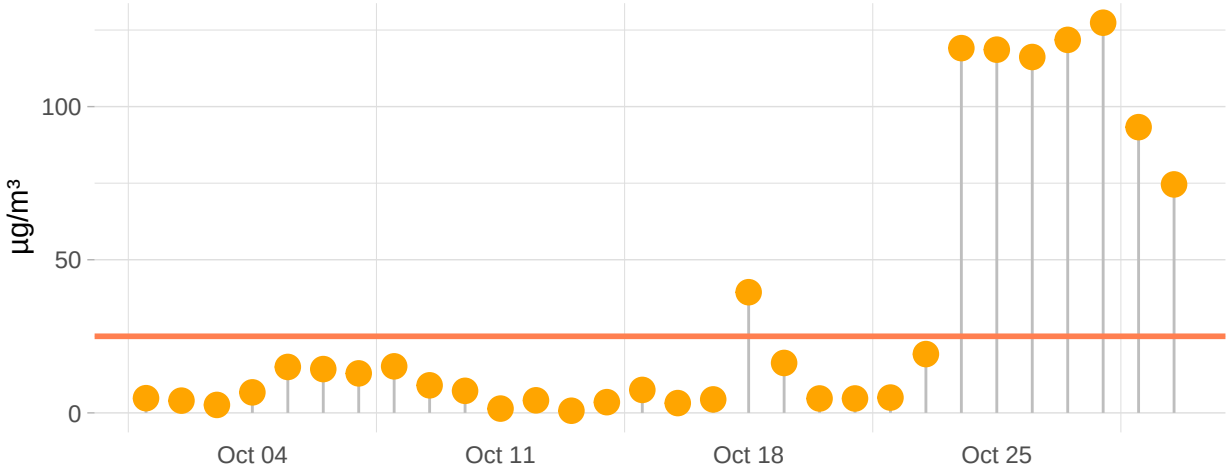
PM10 & PM2.5 hourly averages



PM10 daily averages

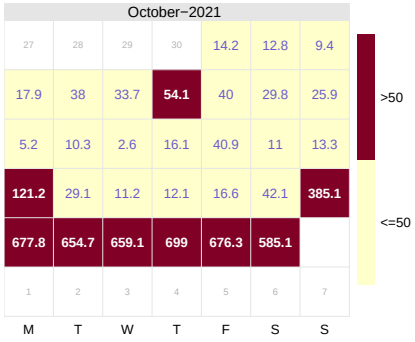


PM2.5 daily averages

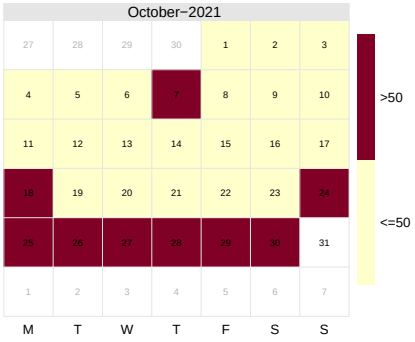


Daily Exceedances

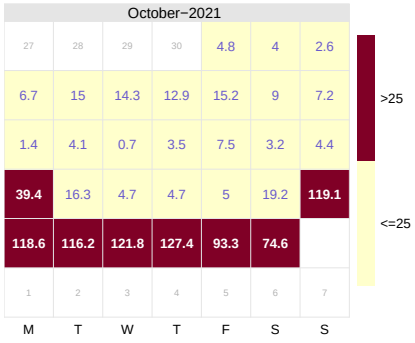
PM_{10}. Daily Exceedances Walker Quarries DMP



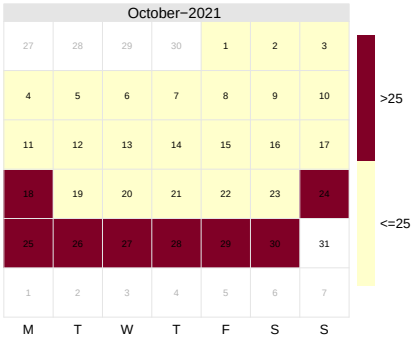
PM_{10}. Daily Exceedances Walker Quarries DMP



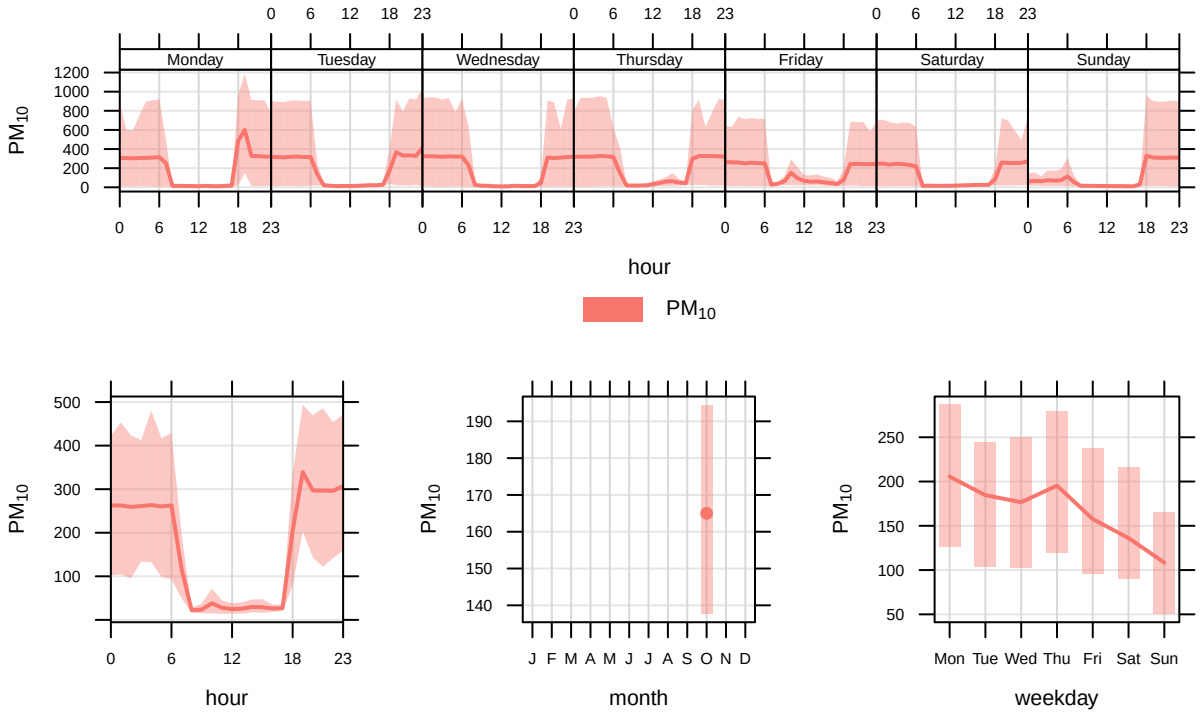
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

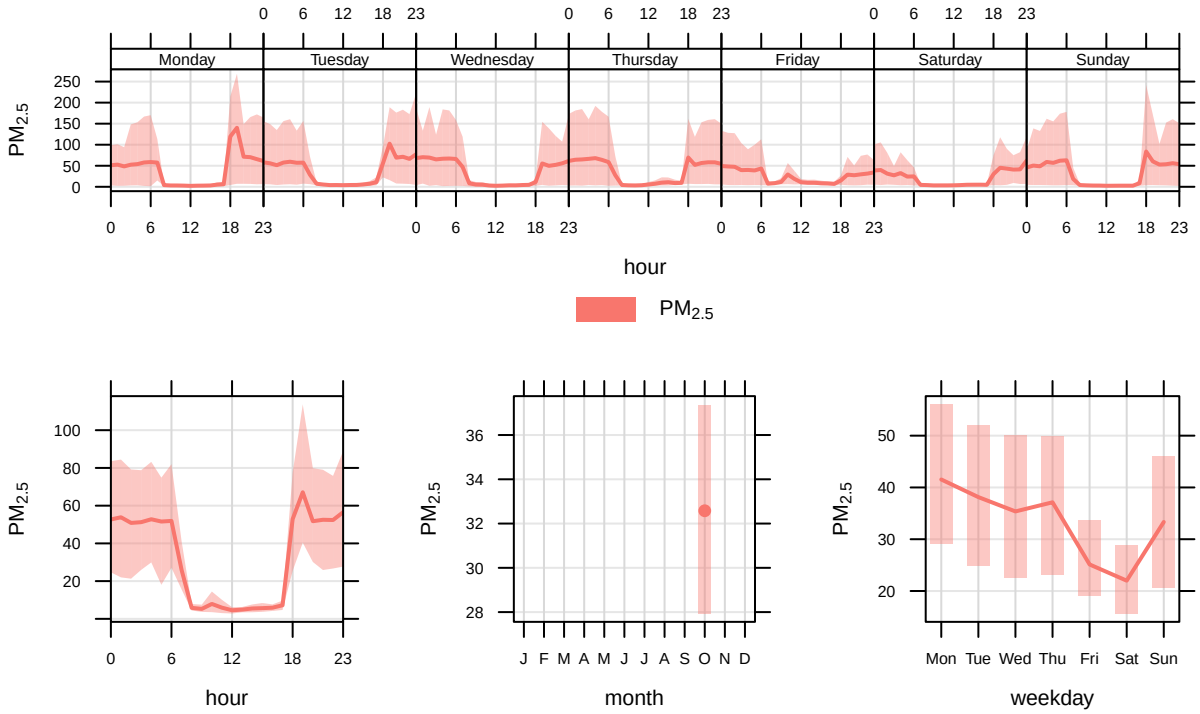


PM_{10} Time Variation at Walker Quarries DMP



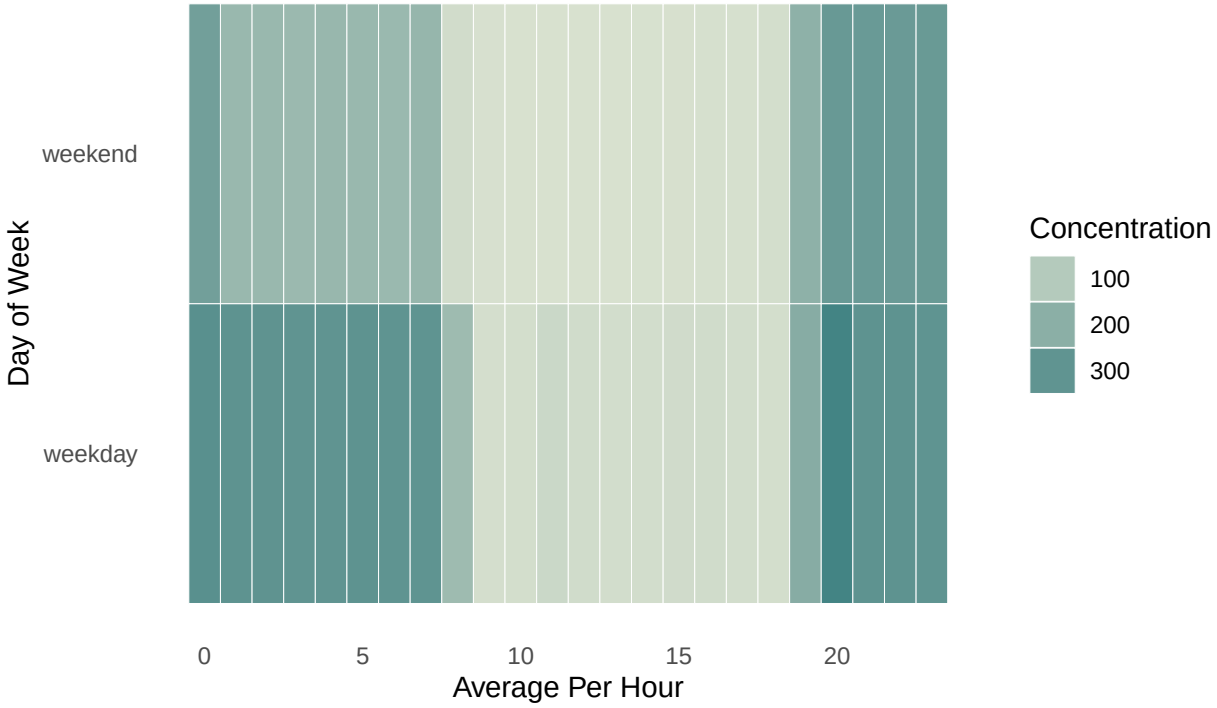
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

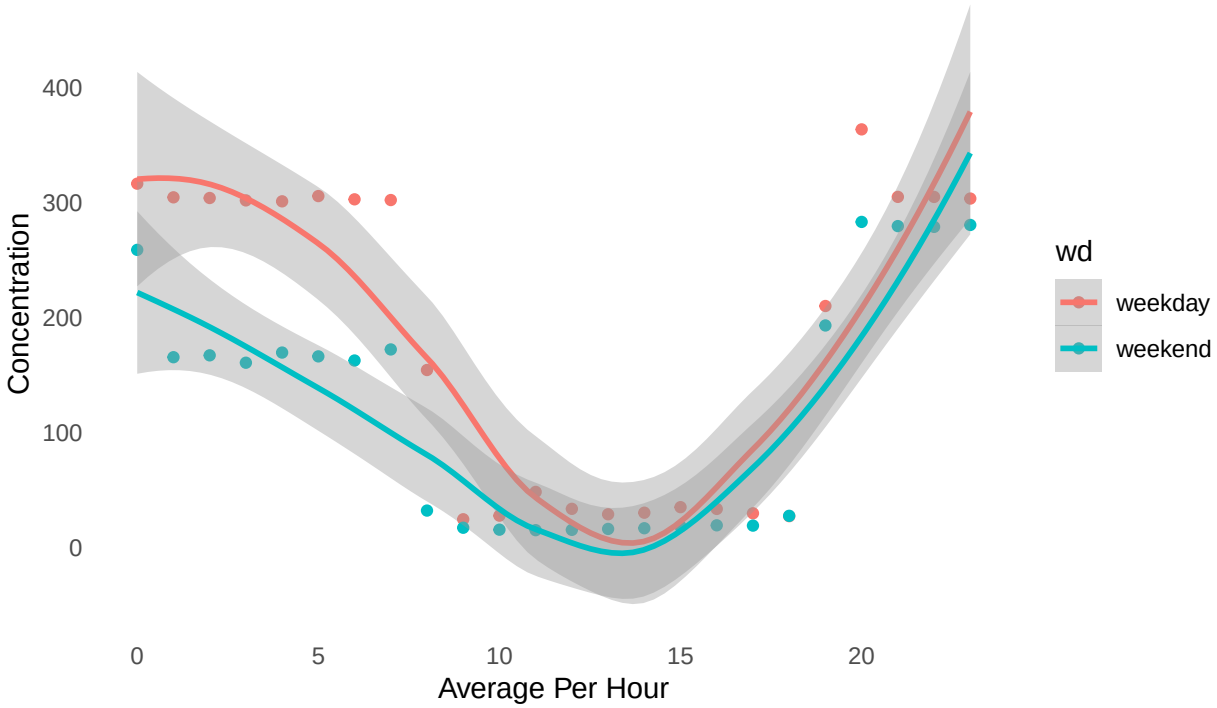


mean and 95% confidence interval in mean

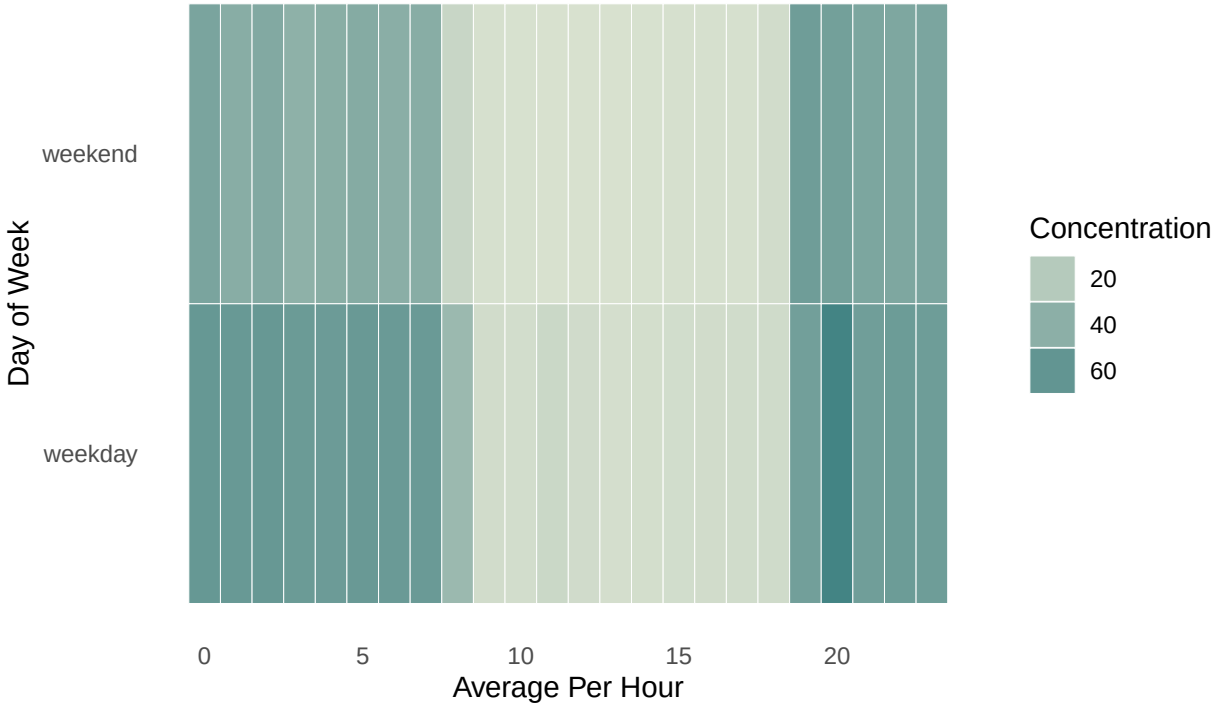
PM10 concentration by Weekday/weekend and Hour



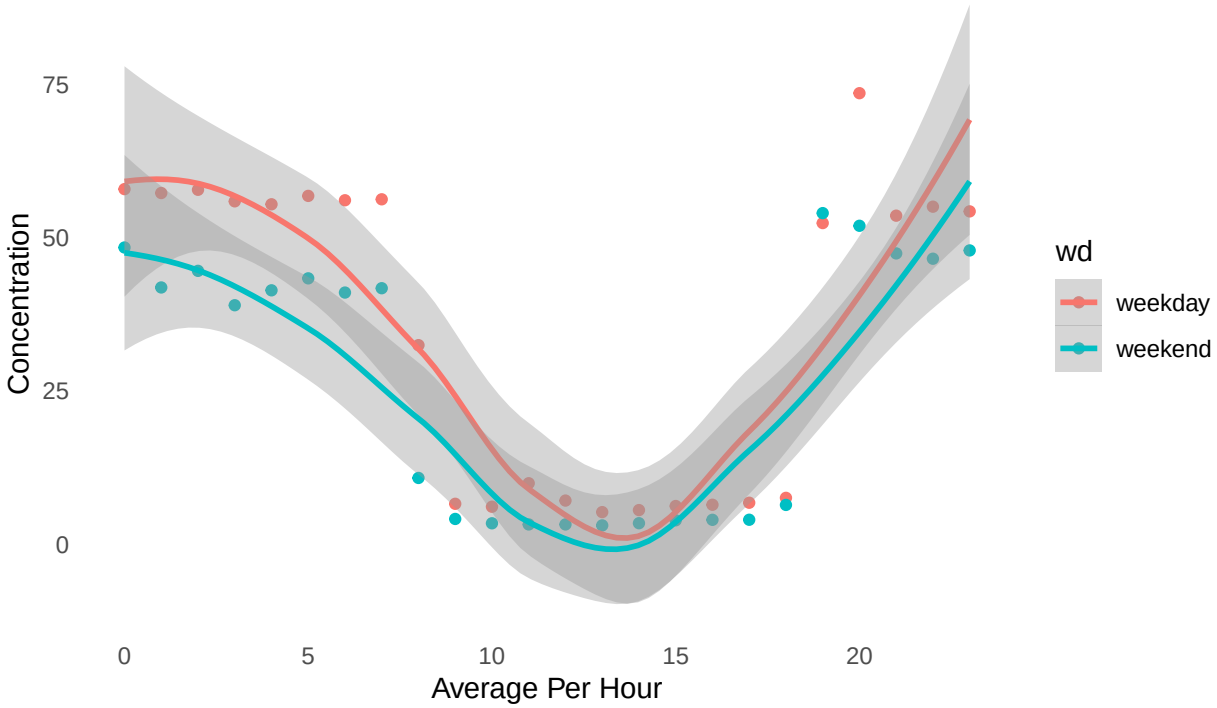
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

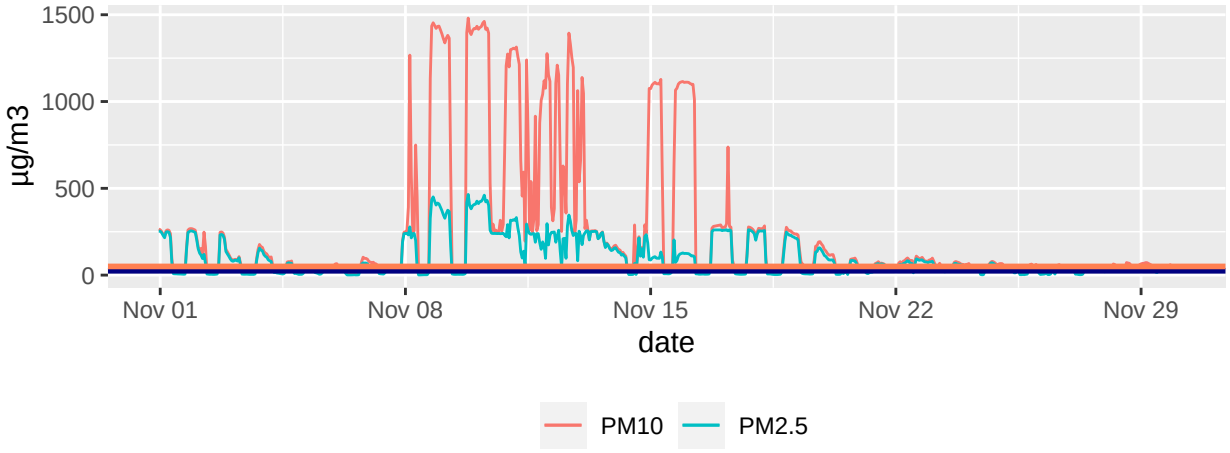
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2021-11-01	142.7	157.8	100.0	100.0
2021-11-02	103.1	126.7	100.0	100.0
2021-11-03	61.7	74.7	100.0	100.0
2021-11-04	39.1	51.8	100.0	100.0
2021-11-05	25.0	32.2	100.0	100.0
2021-11-06	28.6	43.0	100.0	100.0
2021-11-07	44.6	58.1	100.0	100.0
2021-11-08	200.6	596.8	100.0	100.0
2021-11-09	217.3	788.6	100.0	100.0
2021-11-10	317.6	901.3	100.0	100.0
2021-11-11	224.2	826.2	100.0	100.0
2021-11-12	214.7	837.8	100.0	100.0
2021-11-13	210.3	309.8	100.0	100.0
2021-11-14	105.7	186.8	100.0	100.0
2021-11-15	82.0	746.8	100.0	100.0
2021-11-16	71.1	422.2	83.3	83.3
2021-11-17	149.4	185.6	100.0	100.0
2021-11-18	119.6	137.6	100.0	100.0
2021-11-19	104.2	139.4	100.0	100.0
2021-11-20	50.0	68.7	100.0	100.0
2021-11-21	38.1	44.1	100.0	100.0
2021-11-22	67.7	80.2	100.0	100.0
2021-11-23	50.9	58.5	100.0	100.0
2021-11-24	42.3	50.7	100.0	100.0
2021-11-25	28.6	39.3	100.0	100.0
2021-11-26	22.0	29.7	100.0	100.0
2021-11-27	22.6	28.3	100.0	100.0
2021-11-28	35.5	47.4	100.0	100.0
2021-11-29	36.1	51.0	100.0	100.0

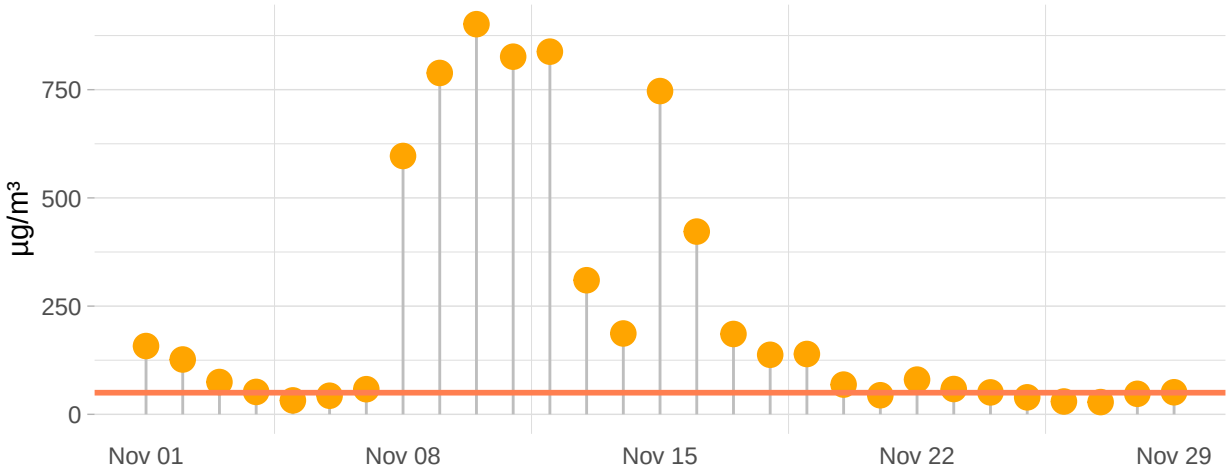
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
November 2021	98.5	245.6	99.4	99.42414

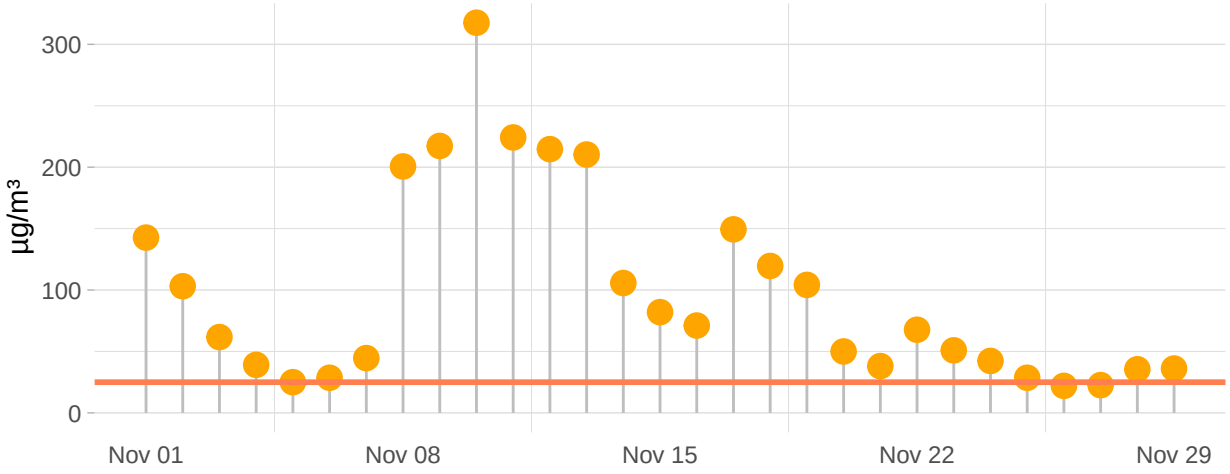
PM10 & PM2.5 hourly averages



PM10 daily averages

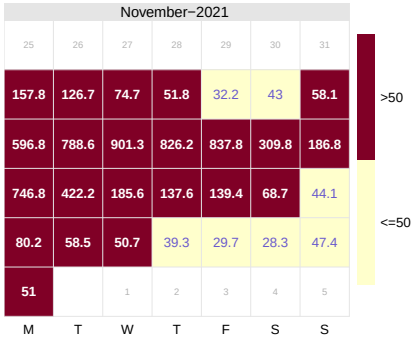


PM2.5 daily averages

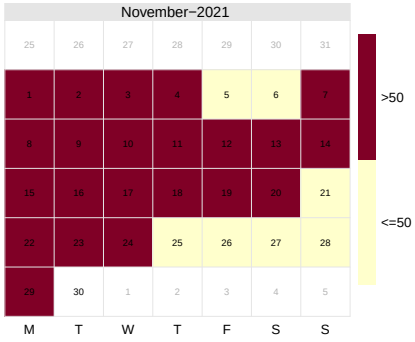


Daily Exceedances

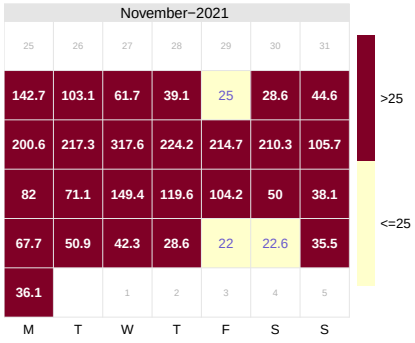
PM_{10}. Daily Exceedances Walker Quarries DMP



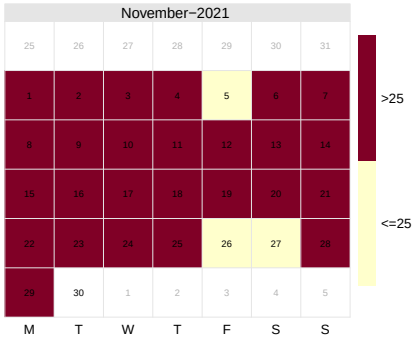
PM_{10}. Daily Exceedances Walker Quarries DMP



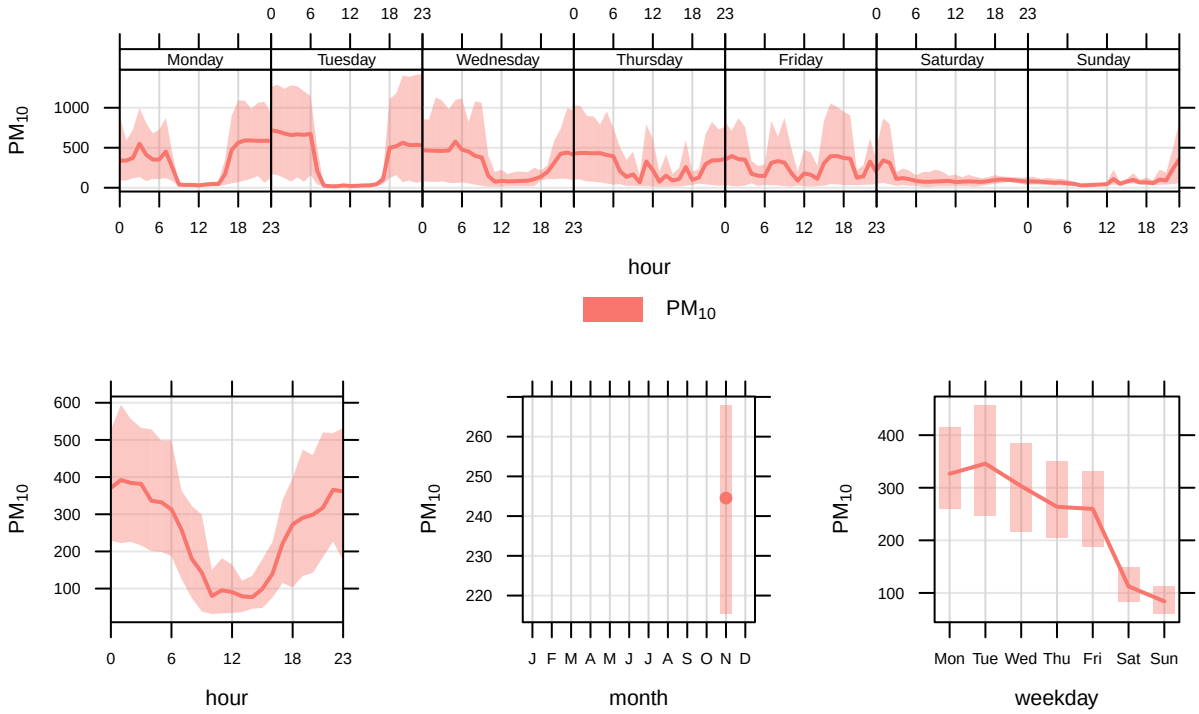
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

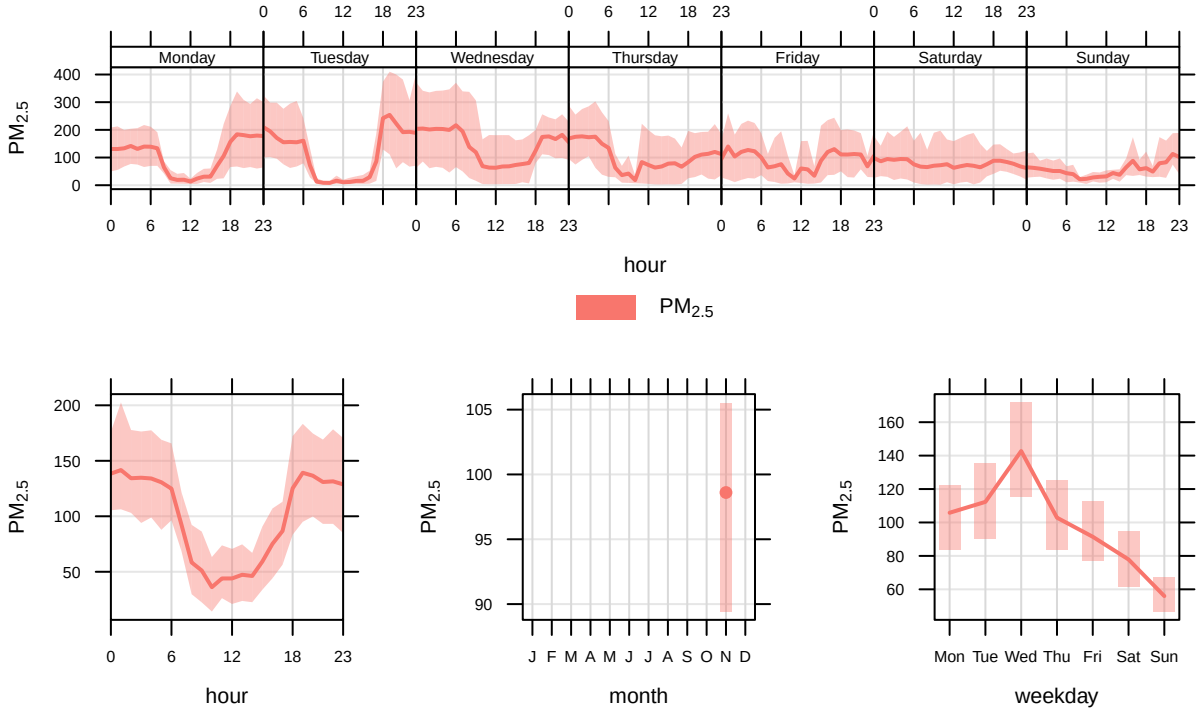


PM_{10} Time Variation at Walker Quarries DMP



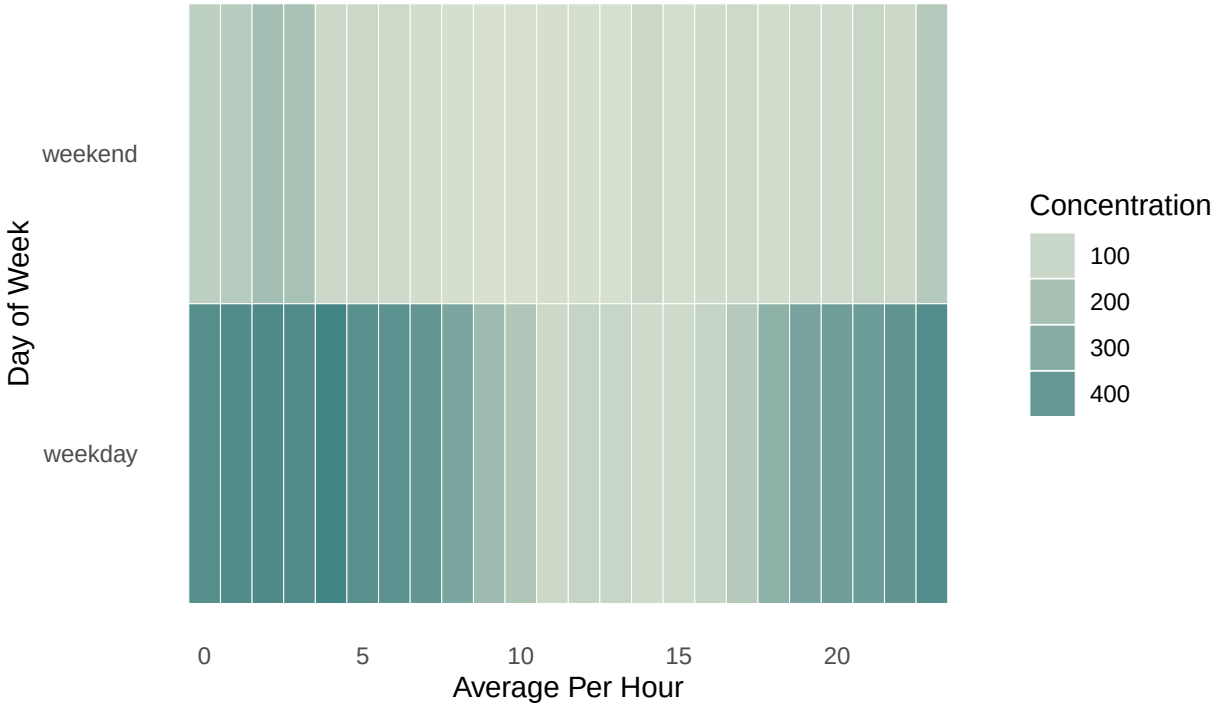
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

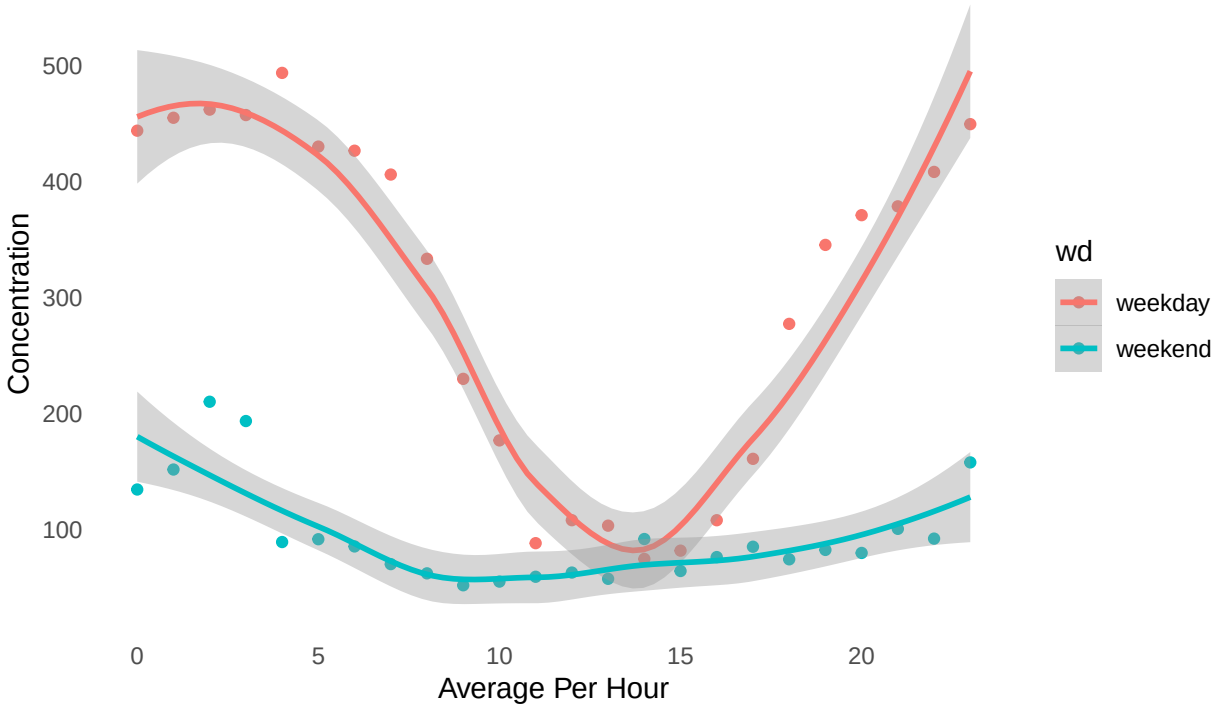


mean and 95% confidence interval in mean

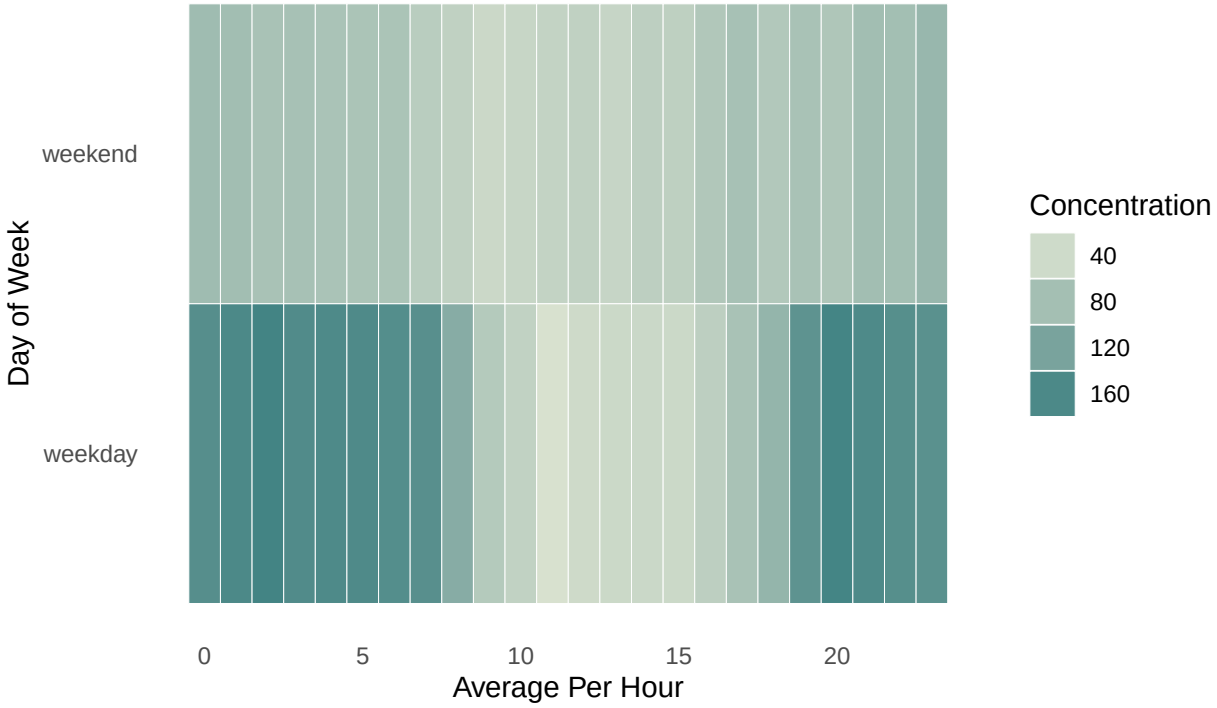
PM10 concentration by Weekday/weekend and Hour



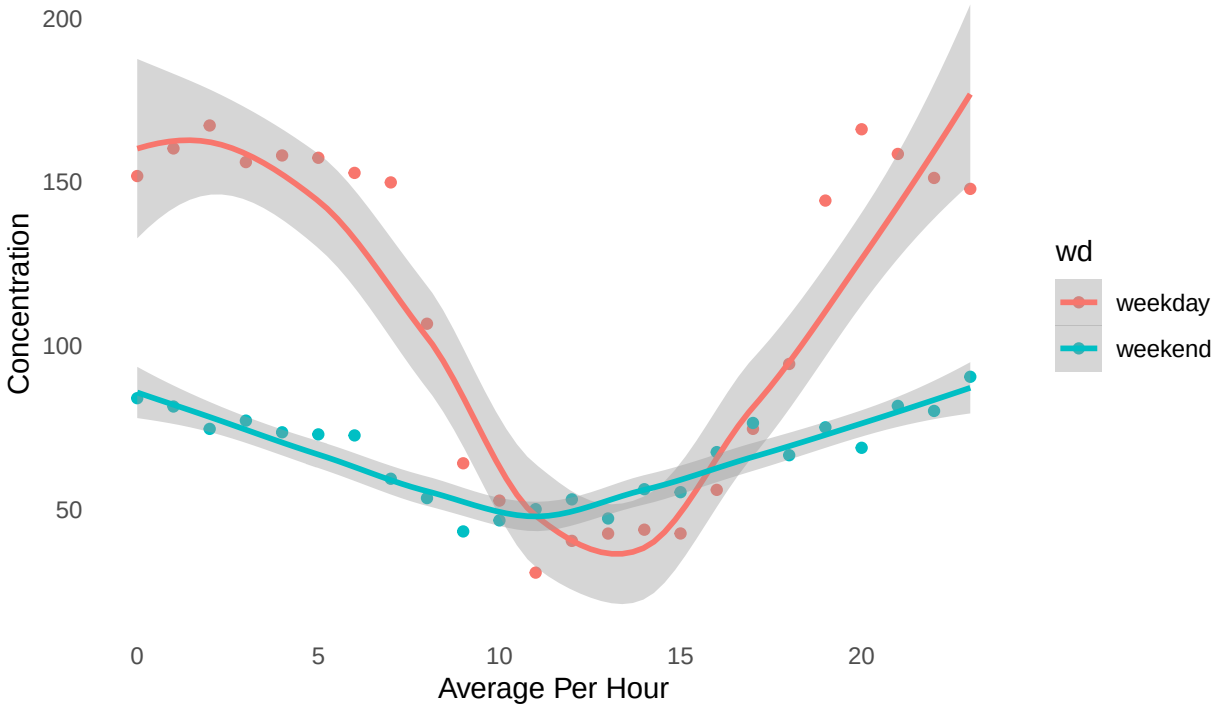
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

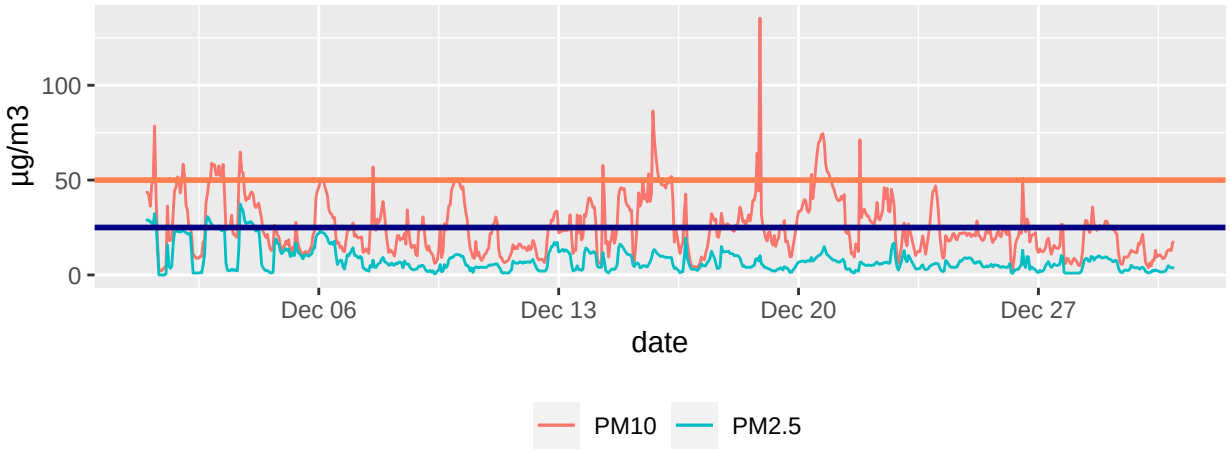
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2021-12-01	15.6	30.7	100.0	100.0
2021-12-02	16.1	31.5	100.0	100.0
2021-12-03	17.9	40.3	100.0	100.0
2021-12-04	13.3	25.7	100.0	100.0
2021-12-05	12.4	17.5	100.0	100.0
2021-12-06	13.9	29.6	100.0	100.0
2021-12-07	6.7	24.3	100.0	100.0
2021-12-08	5.1	17.4	100.0	100.0
2021-12-09	4.2	22.0	100.0	100.0
2021-12-10	5.7	23.6	100.0	100.0
2021-12-11	4.4	15.2	100.0	100.0
2021-12-12	7.7	17.4	100.0	100.0
2021-12-13	9.0	25.8	100.0	100.0
2021-12-14	7.6	27.3	100.0	100.0
2021-12-15	7.8	42.0	100.0	100.0
2021-12-16	6.5	28.2	100.0	100.0
2021-12-17	7.6	19.3	100.0	100.0
2021-12-18	7.3	36.4	100.0	100.0
2021-12-19	3.2	19.6	100.0	100.0
2021-12-20	9.1	50.3	100.0	100.0
2021-12-21	5.0	30.9	100.0	100.0
2021-12-22	6.9	30.5	100.0	100.0
2021-12-23	5.6	21.2	83.3	83.3
2021-12-24	5.7	21.8	100.0	100.0
2021-12-25	5.6	21.3	100.0	100.0
2021-12-26	4.4	21.1	100.0	100.0
2021-12-27	4.0	13.5	100.0	100.0
2021-12-28	6.4	20.2	100.0	100.0
2021-12-29	4.7	15.4	100.0	100.0
2021-12-30	2.6	11.0	100.0	100.0

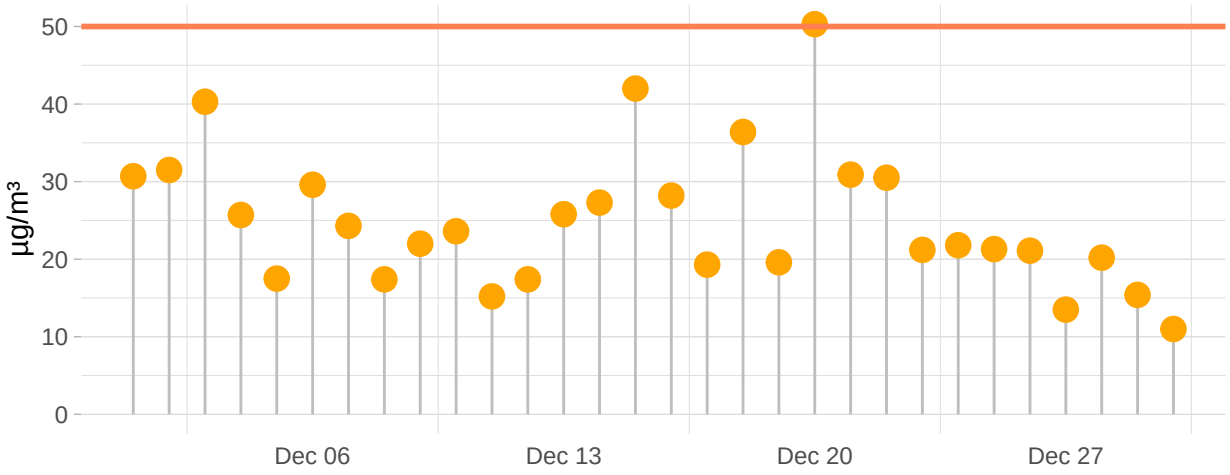
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
December 2021	7.7	25	99.4	99.44333

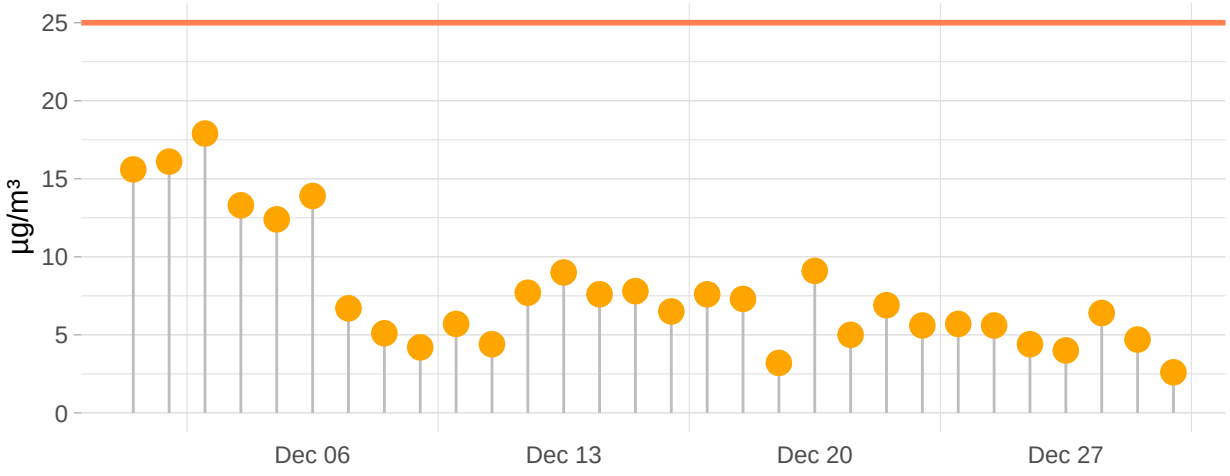
PM10 & PM2.5 hourly averages



PM10 daily averages

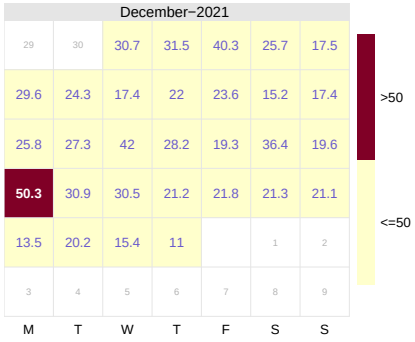


PM2.5 daily averages

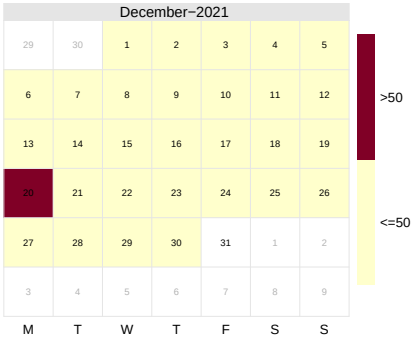


Daily Exceedances

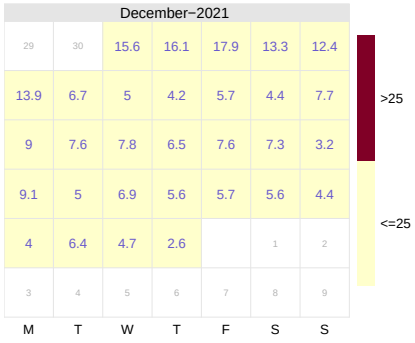
PM_{10}. Daily Exceedances Walker Quarries DMP



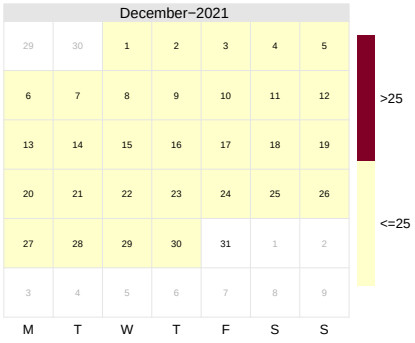
PM_{10}. Daily Exceedances Walker Quarries DMP



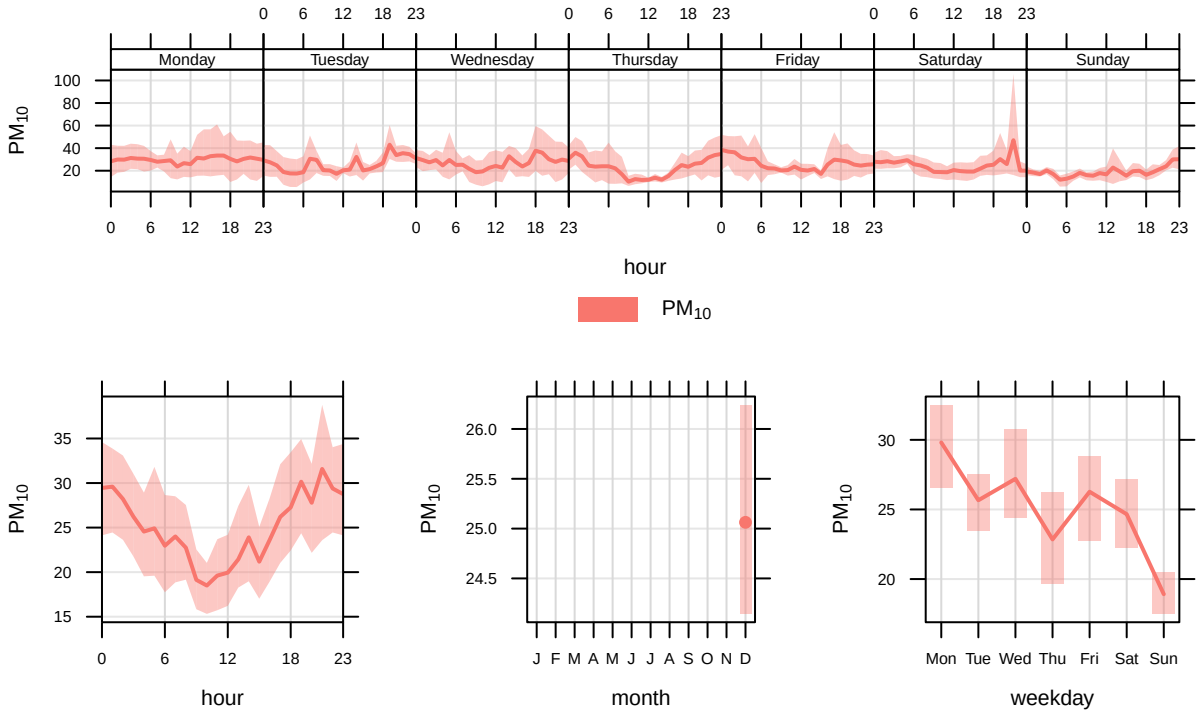
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

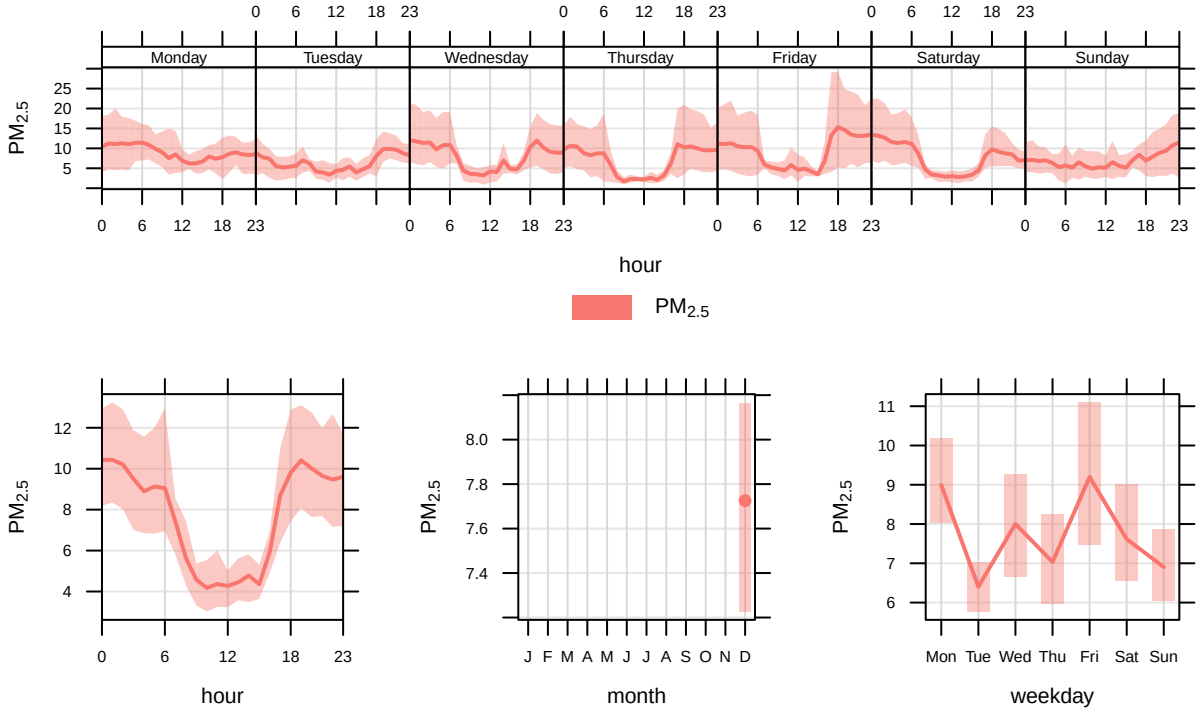


PM_{10} Time Variation at Walker Quarries DMP



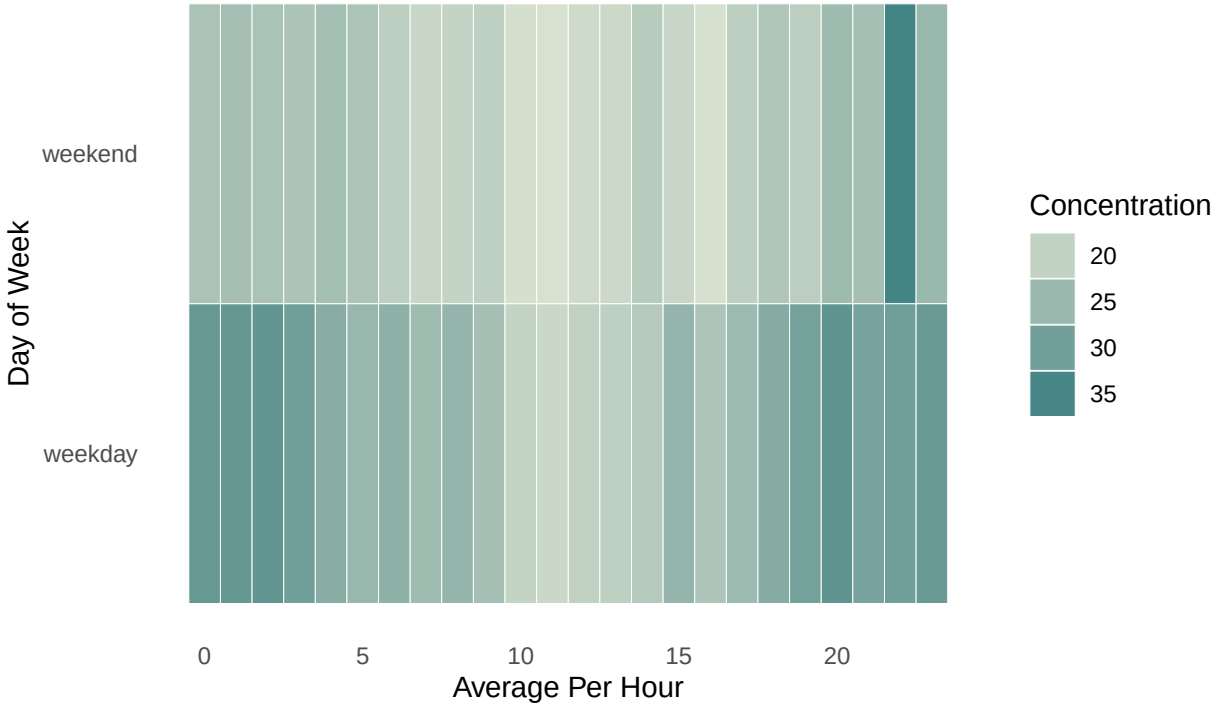
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

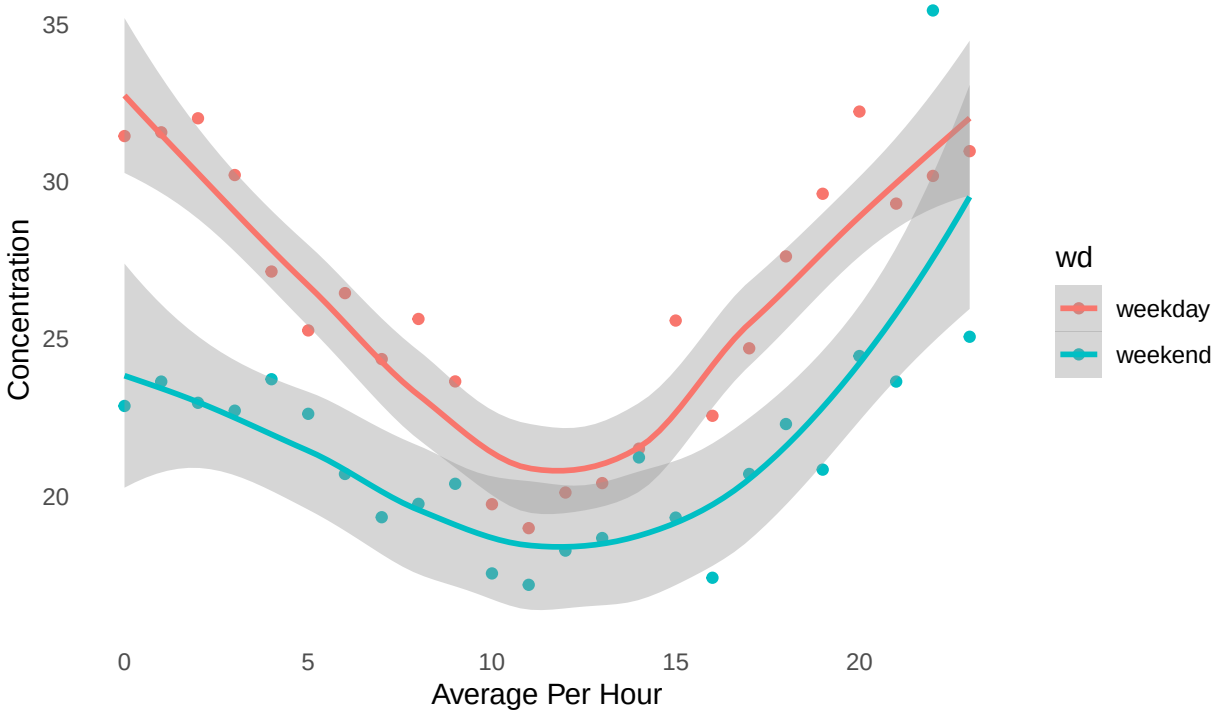


mean and 95% confidence interval in mean

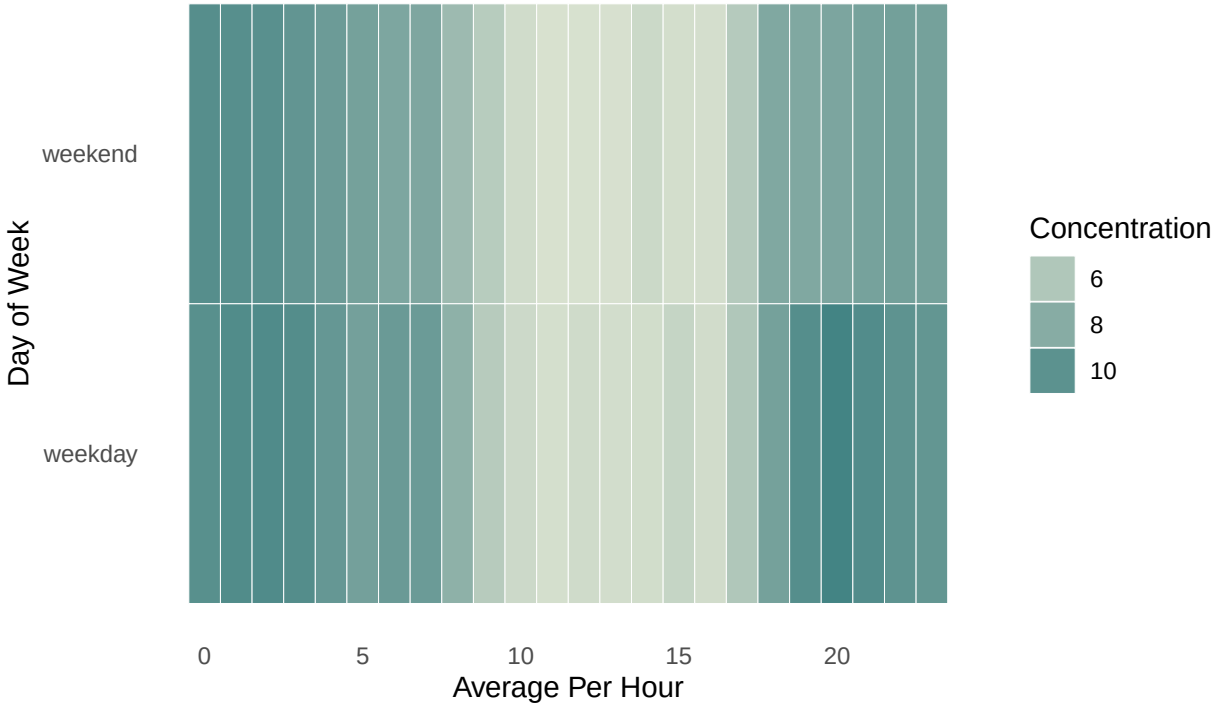
PM10 concentration by Weekday/weekend and Hour



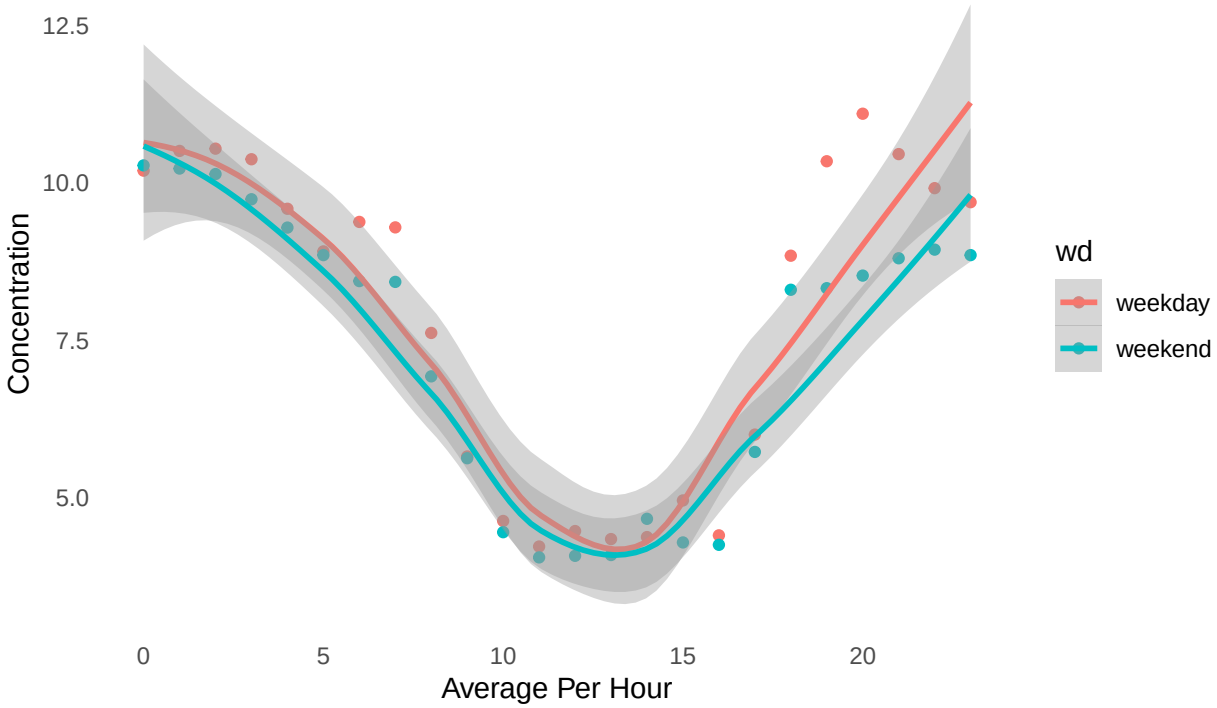
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

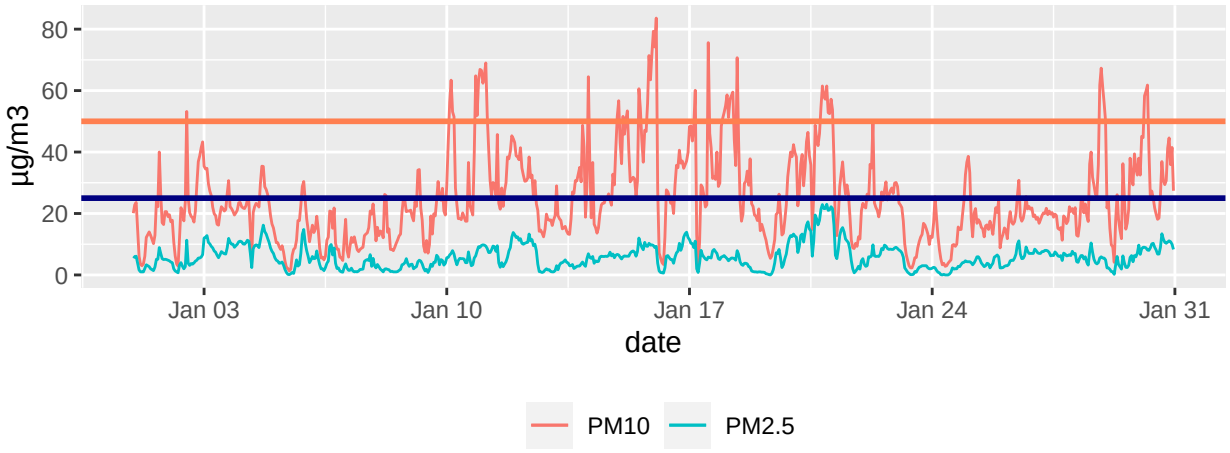
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2022-01-01	3.9	15.9	91.7	91.7
2022-01-02	3.9	22.4	100.0	100.0
2022-01-03	9.1	23.7	100.0	100.0
2022-01-04	10.4	23.2	100.0	100.0
2022-01-05	4.5	12.1	100.0	100.0
2022-01-06	4.6	12.1	100.0	100.0
2022-01-07	2.7	12.2	100.0	100.0
2022-01-08	2.2	16.0	100.0	100.0
2022-01-09	3.4	20.0	100.0	100.0
2022-01-10	5.8	35.9	100.0	100.0
2022-01-11	7.8	39.4	100.0	100.0
2022-01-12	7.4	26.8	100.0	100.0
2022-01-13	3.0	23.5	100.0	100.0
2022-01-14	5.7	28.7	100.0	100.0
2022-01-15	8.1	47.2	100.0	100.0
2022-01-16	6.7	30.3	100.0	100.0
2022-01-17	6.6	35.9	100.0	100.0
2022-01-18	4.0	38.0	100.0	100.0
2022-01-19	4.3	18.3	100.0	100.0
2022-01-20	15.3	41.2	100.0	100.0
2022-01-21	10.0	26.0	100.0	100.0
2022-01-22	7.0	27.0	100.0	100.0
2022-01-23	2.9	12.0	100.0	100.0
2022-01-24	1.7	11.9	100.0	100.0
2022-01-25	4.2	19.3	100.0	100.0
2022-01-26	5.9	19.1	100.0	100.0
2022-01-27	6.9	18.4	100.0	100.0
2022-01-28	5.7	30.3	100.0	100.0
2022-01-29	3.9	24.2	100.0	100.0
2022-01-30	9.3	35.2	100.0	100.0

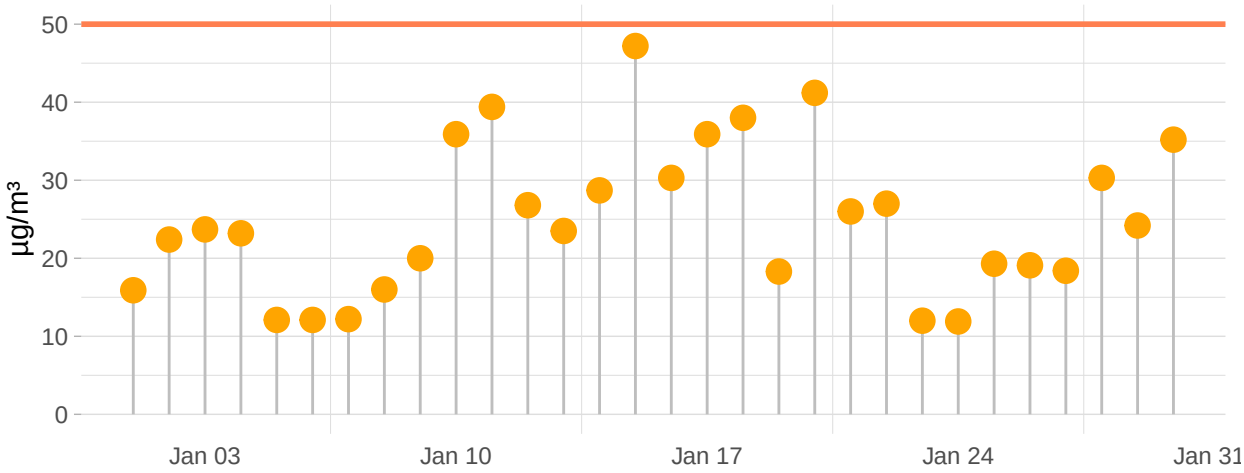
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
January 2022	5.9	24.9	99.7	99.72333

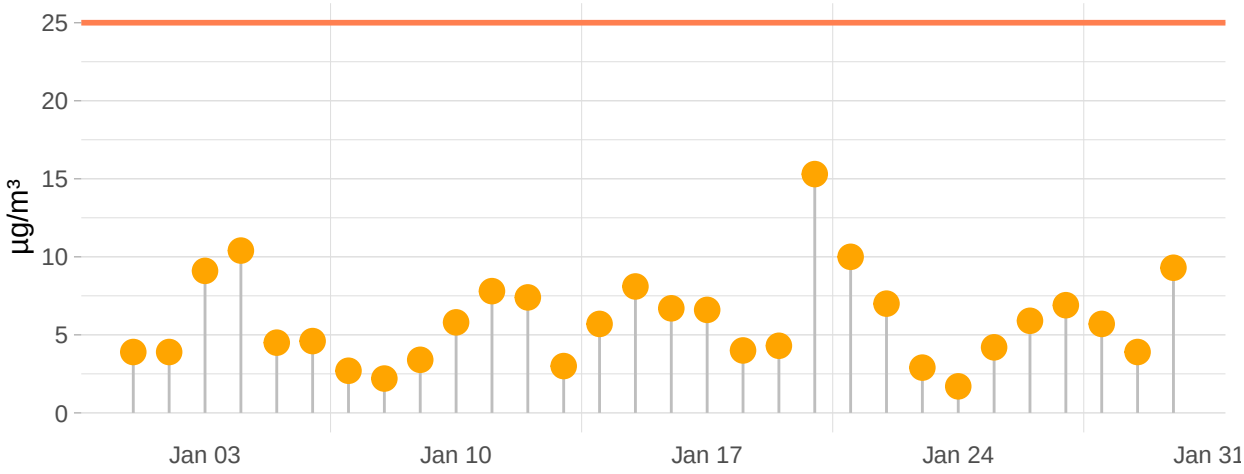
PM10 & PM2.5 hourly averages



PM10 daily averages

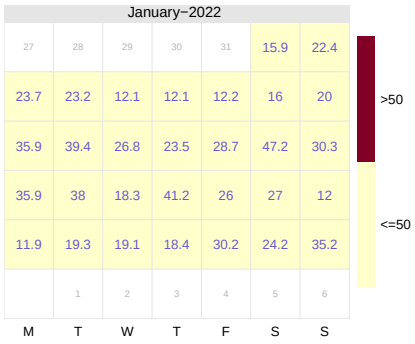


PM2.5 daily averages

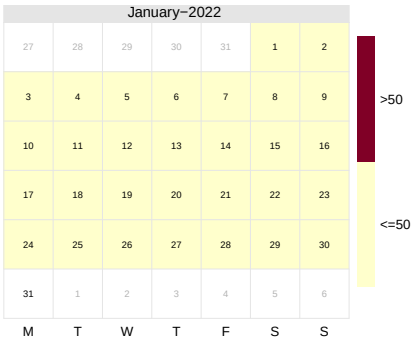


Daily Exceedances

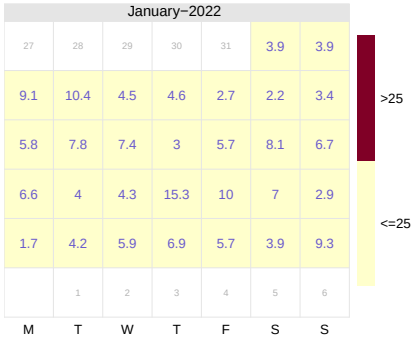
PM_{10}. Daily Exceedances Walker Quarries DMP



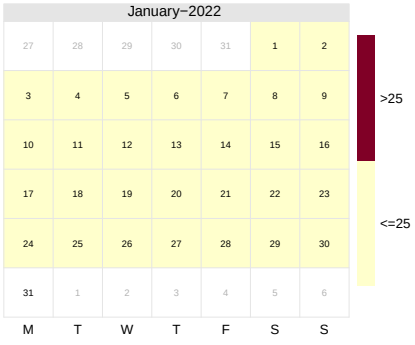
PM_{10}. Daily Exceedances Walker Quarries DMP



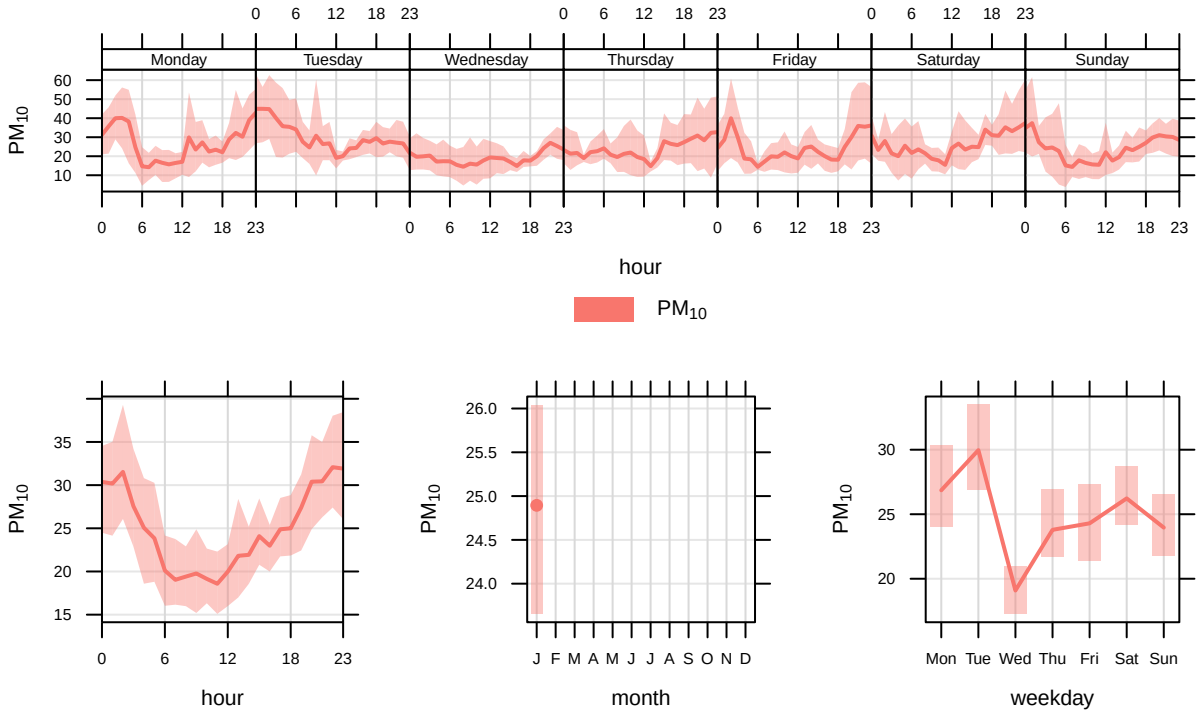
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

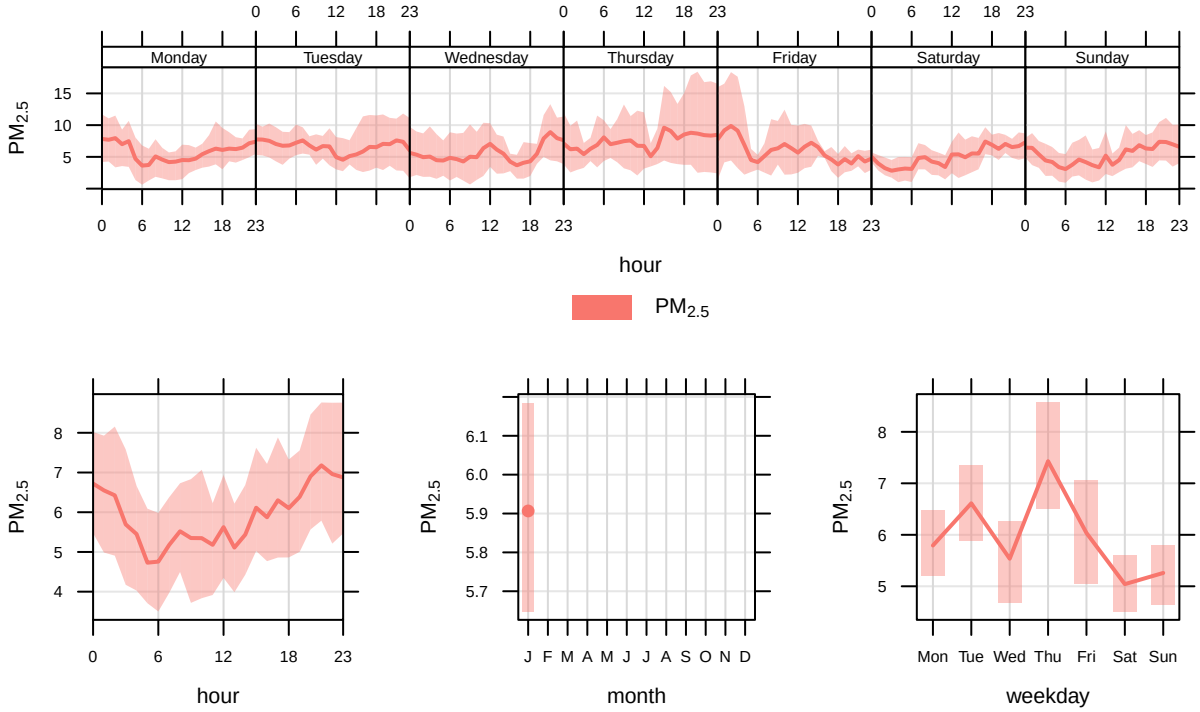


PM_{10} Time Variation at Walker Quarries DMP



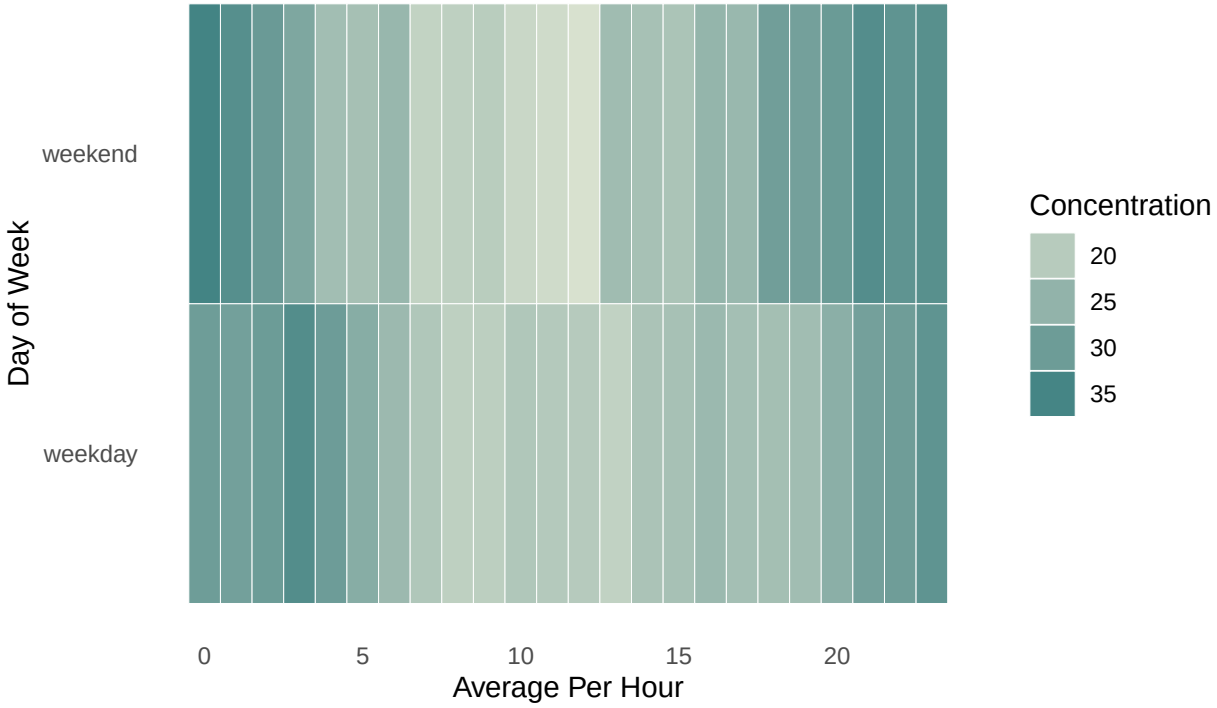
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

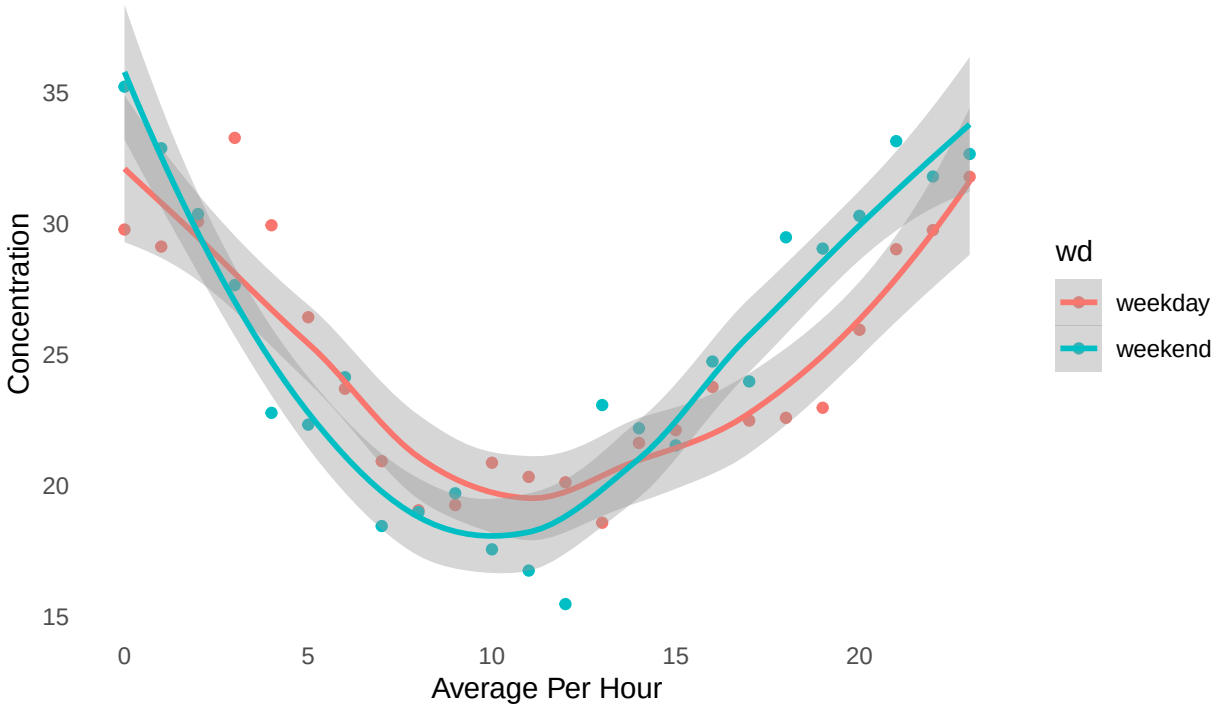


mean and 95% confidence interval in mean

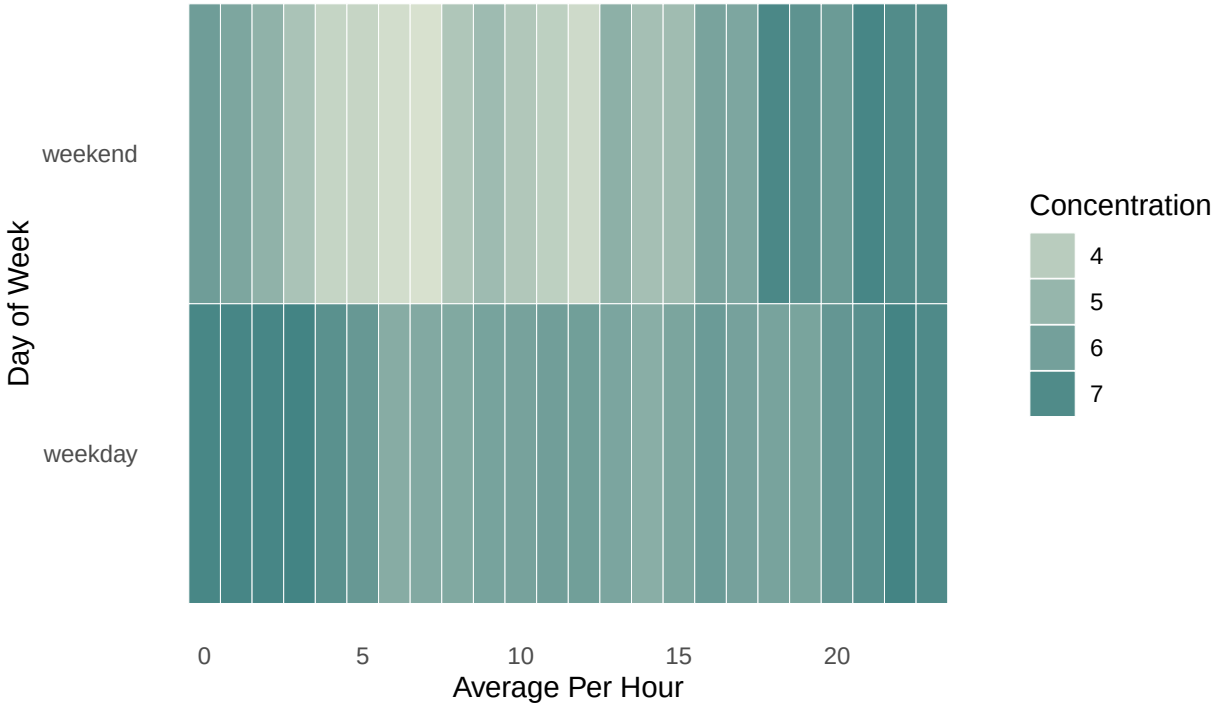
PM10 concentration by Weekday/weekend and Hour



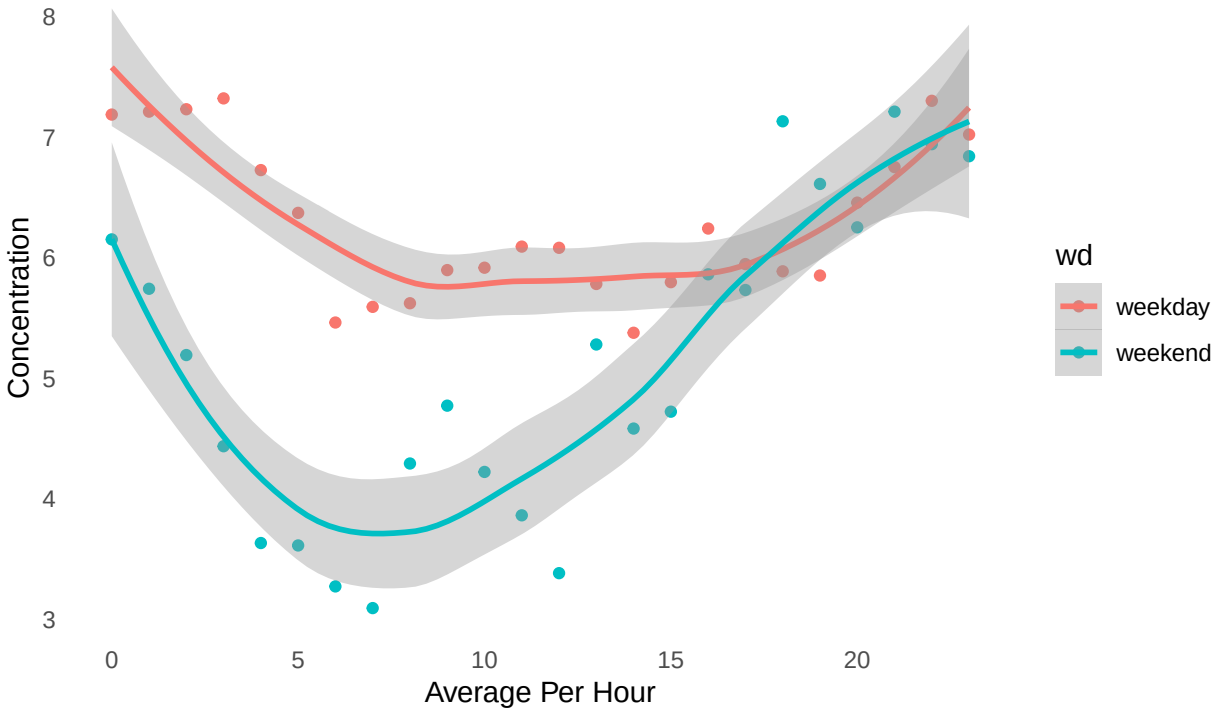
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m^3)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

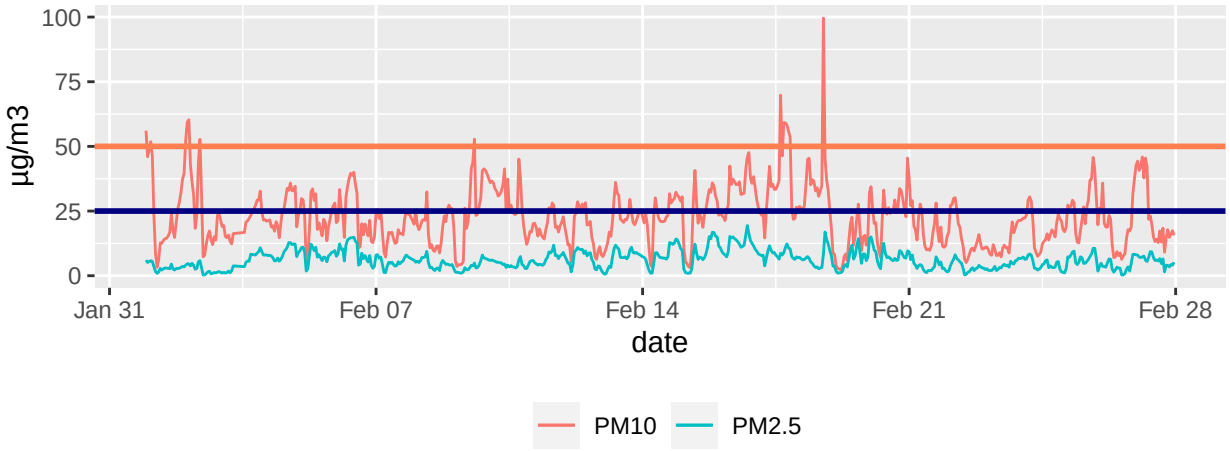
Daily Averages

	µg/m^3	µg/m^3	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2022-02-01	3.2	23.9	100.0	100.0
2022-02-02	2.5	27.3	100.0	100.0
2022-02-03	NA	NA	66.7	66.7
2022-02-04	8.8	24.5	100.0	100.0
2022-02-05	8.2	22.2	100.0	100.0
2022-02-06	9.1	24.2	100.0	100.0
2022-02-07	5.4	18.1	95.8	95.8
2022-02-08	4.8	18.5	100.0	100.0
2022-02-09	3.7	25.3	100.0	100.0
2022-02-10	4.5	29.8	100.0	100.0
2022-02-11	6.7	19.4	100.0	100.0
2022-02-12	6.4	16.8	100.0	100.0
2022-02-13	7.3	22.3	100.0	100.0
2022-02-14	8.0	22.9	100.0	100.0
2022-02-15	8.6	23.2	100.0	100.0
2022-02-16	12.3	33.4	100.0	100.0
2022-02-17	8.6	37.6	100.0	100.0
2022-02-18	6.9	34.9	100.0	100.0
2022-02-19	6.4	12.7	100.0	100.0
2022-02-20	8.0	25.2	100.0	100.0
2022-02-21	4.0	18.2	100.0	100.0
2022-02-22	3.5	15.3	100.0	100.0
2022-02-23	3.9	13.0	100.0	100.0
2022-02-24	4.8	17.7	100.0	100.0
2022-02-25	6.0	25.3	100.0	100.0
2022-02-26	3.8	18.5	100.0	100.0
2022-02-27	6.0	23.9	100.0	100.0

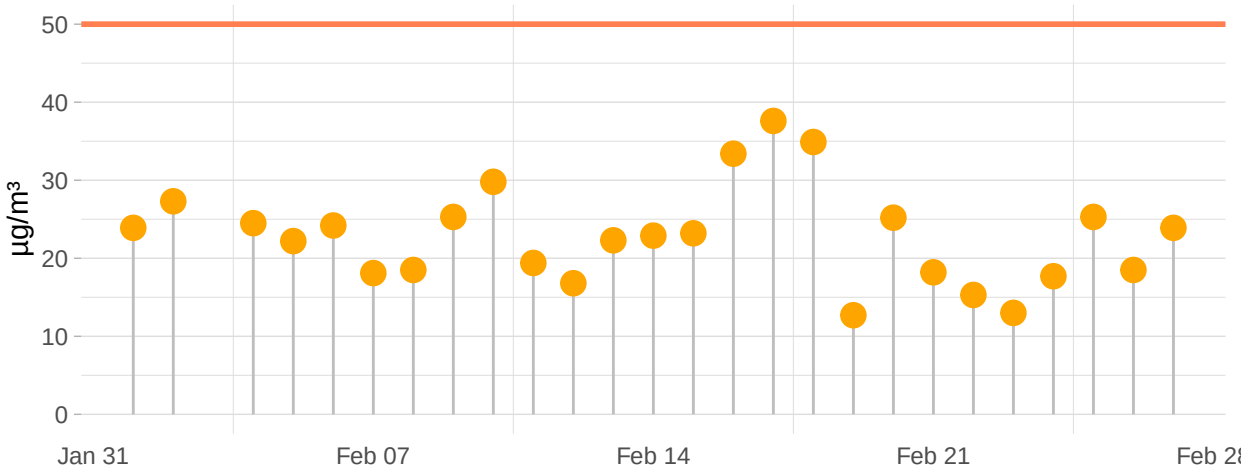
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
February 2022	6.2	22.9	98.6	98.61111

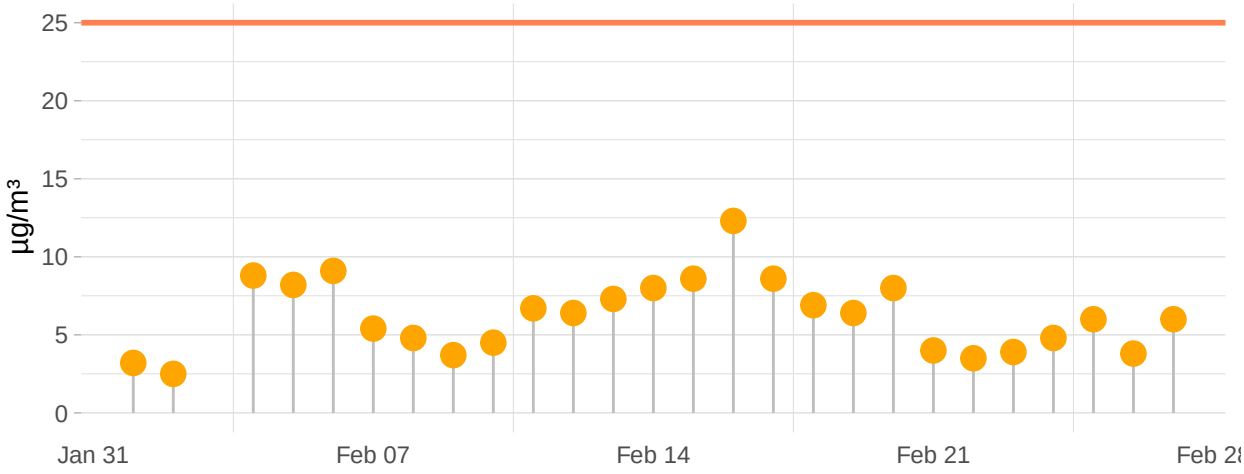
PM10 & PM2.5 hourly averages



PM10 daily averages

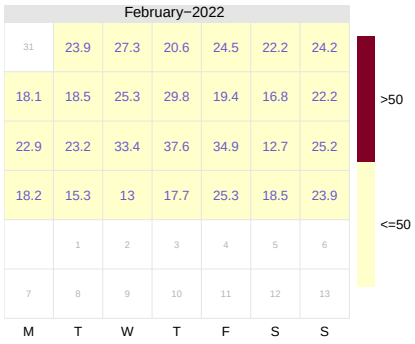


PM2.5 daily averages

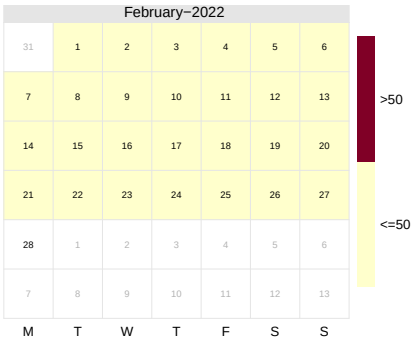


Daily Exceedances

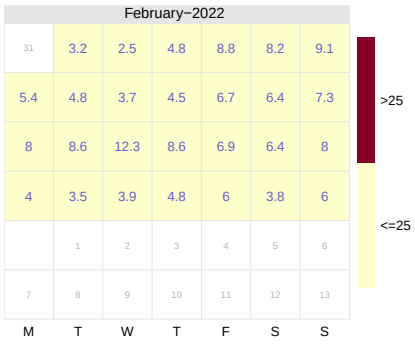
PM_{10}. Daily Exceedances Walker Quarries DMP



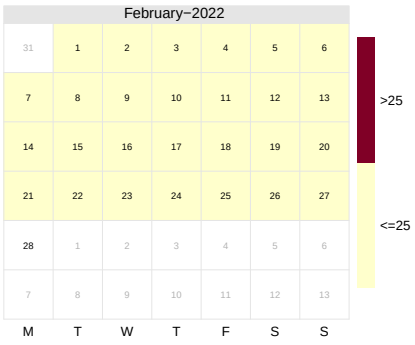
PM_{10}. Daily Exceedances Walker Quarries DMP



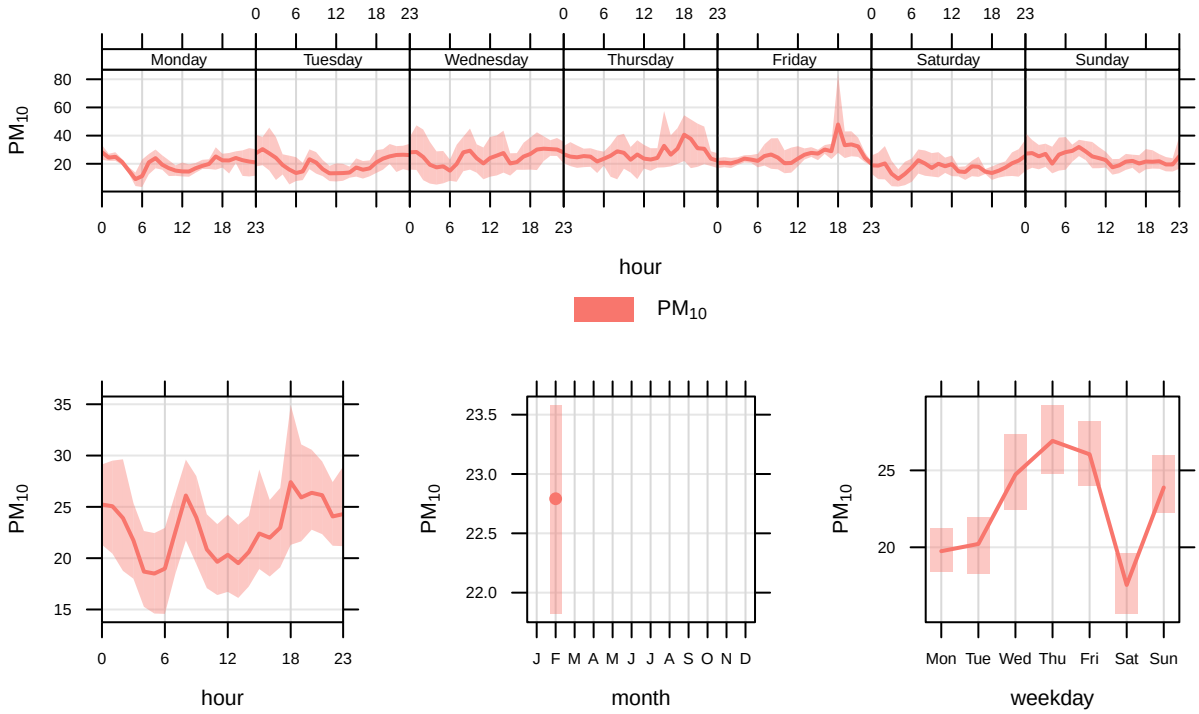
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

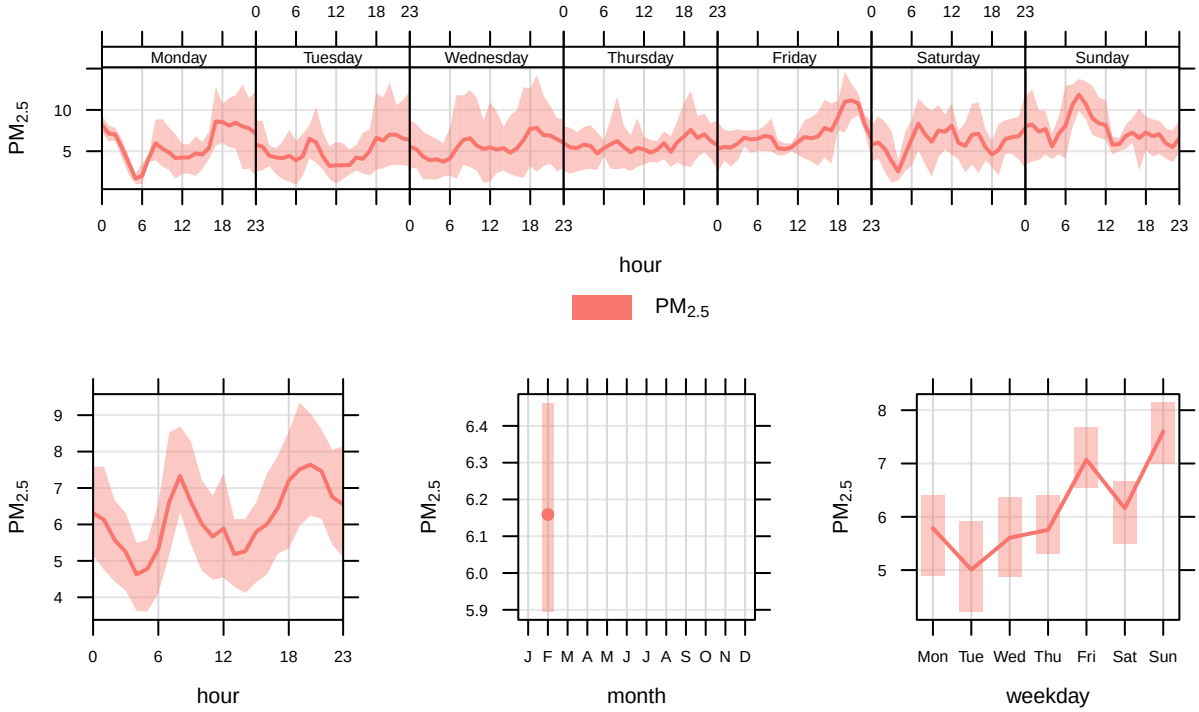


PM_{10} Time Variation at Walker Quarries DMP



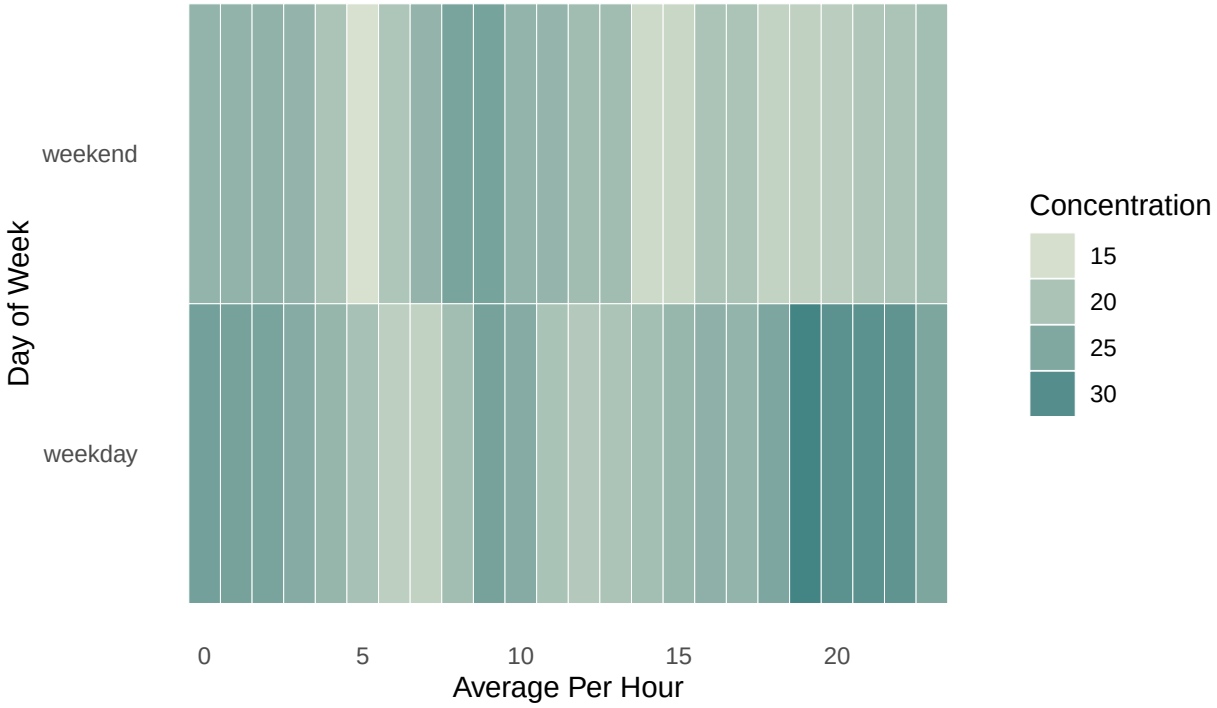
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

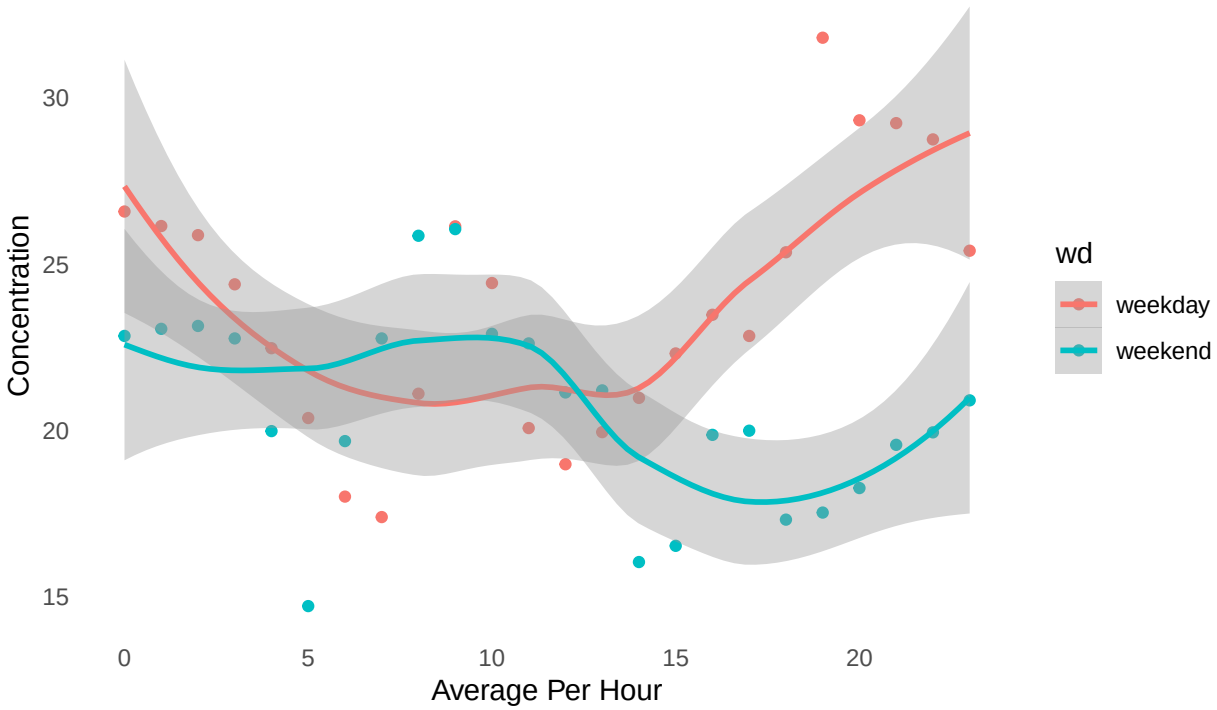


mean and 95% confidence interval in mean

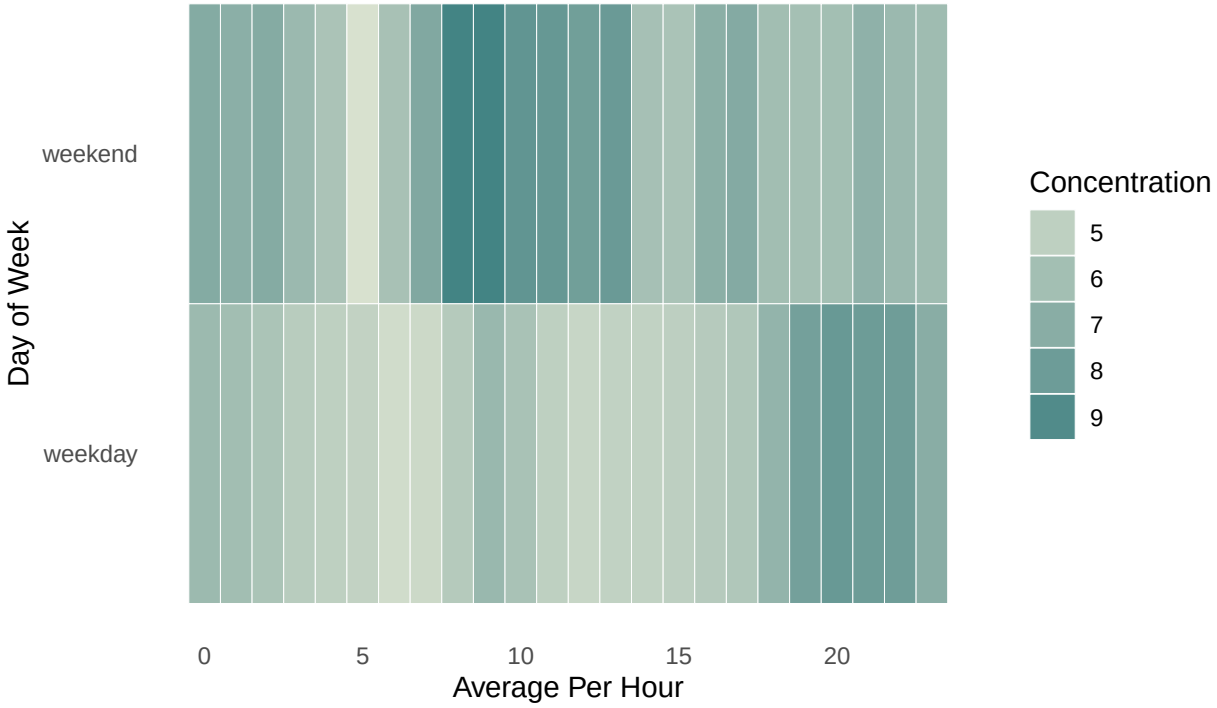
PM10 concentration by Weekday/weekend and Hour



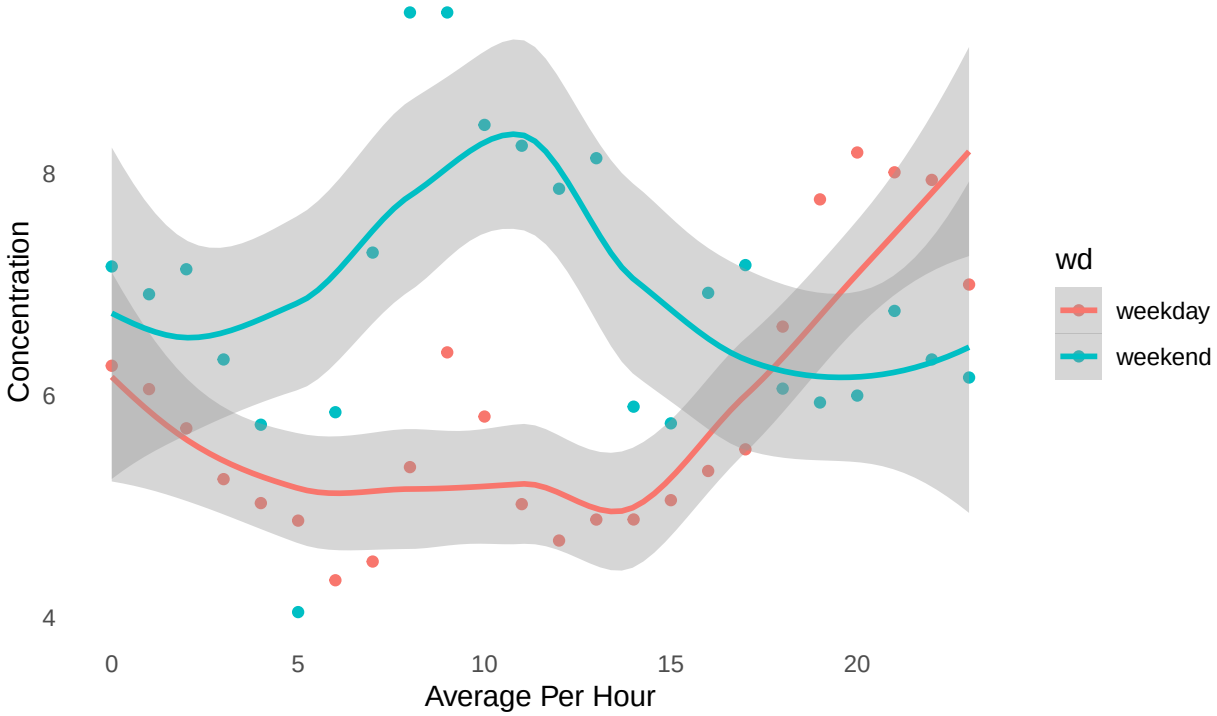
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

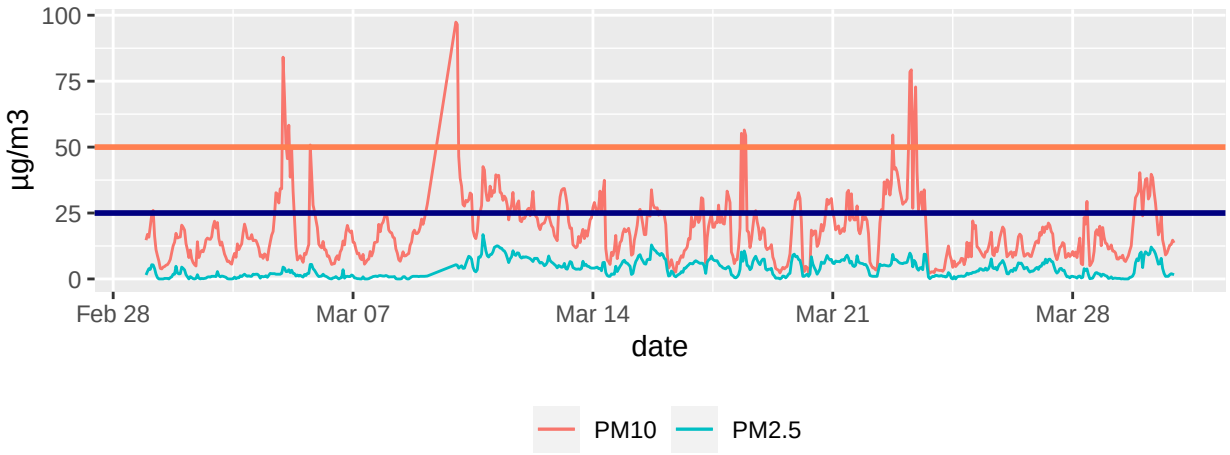
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2022-03-01	1.8	12.0	100.0	100.0
2022-03-02	1.0	12.9	100.0	100.0
2022-03-03	0.8	12.5	100.0	100.0
2022-03-04	1.6	20.1	100.0	100.0
2022-03-05	2.5	27.0	100.0	100.0
2022-03-06	0.8	11.7	100.0	100.0
2022-03-07	0.6	12.9	100.0	100.0
2022-03-08	0.6	13.9	100.0	100.0
2022-03-09	NA	NA	16.7	16.7
2022-03-10	7.0	35.3	100.0	100.0
2022-03-11	9.8	30.0	100.0	100.0
2022-03-12	6.8	22.4	100.0	100.0
2022-03-13	4.7	21.2	100.0	100.0
2022-03-14	3.9	18.4	100.0	100.0
2022-03-15	7.5	21.6	100.0	100.0
2022-03-16	4.2	12.4	100.0	100.0
2022-03-17	5.8	22.9	100.0	100.0
2022-03-18	5.1	21.5	100.0	100.0
2022-03-19	3.3	11.3	100.0	100.0
2022-03-20	4.8	17.7	100.0	100.0
2022-03-21	6.5	22.6	100.0	100.0
2022-03-22	4.5	25.5	100.0	100.0
2022-03-23	5.0	31.4	100.0	100.0
2022-03-24	1.1	6.4	100.0	100.0
2022-03-25	4.0	13.1	100.0	100.0
2022-03-26	3.9	11.4	100.0	100.0
2022-03-27	4.1	13.9	100.0	100.0
2022-03-28	1.4	13.7	100.0	100.0
2022-03-29	1.6	14.7	100.0	100.0
2022-03-30	6.2	23.4	100.0	100.0

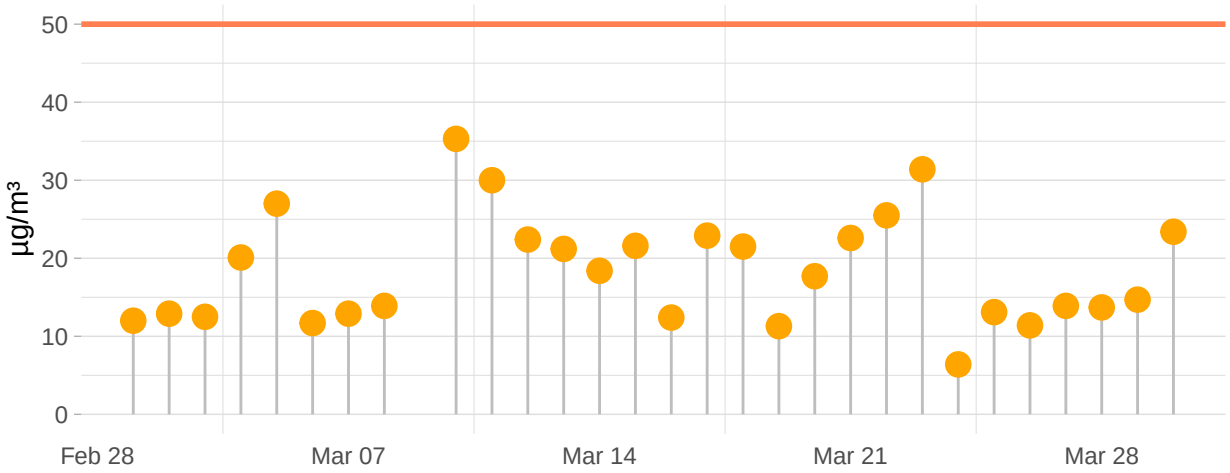
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
March 2022	3.8	18.4	97.2	97.22333

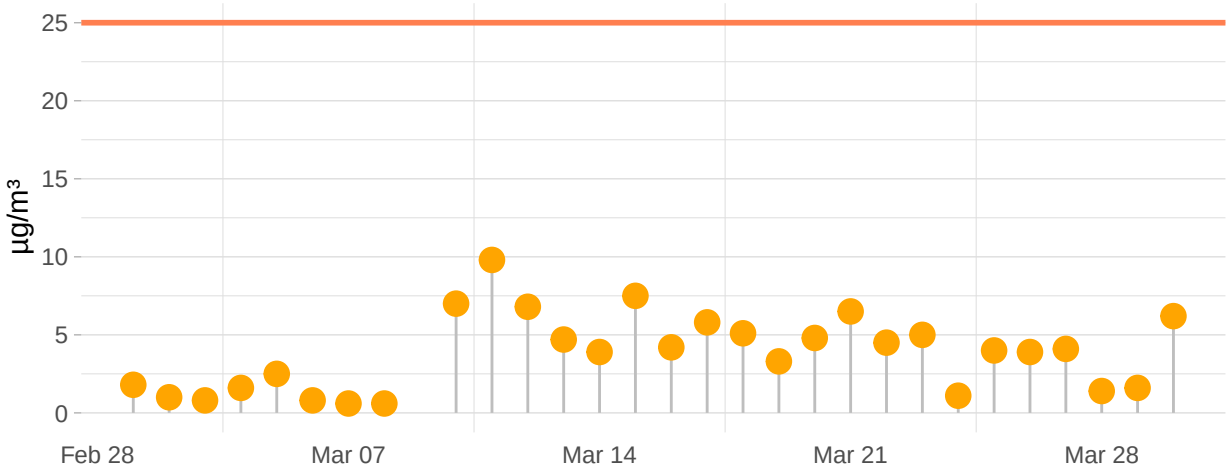
PM10 & PM2.5 hourly averages



PM10 daily averages

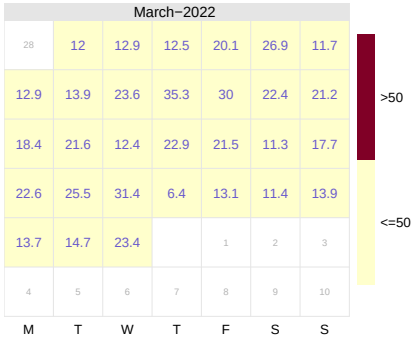


PM2.5 daily averages

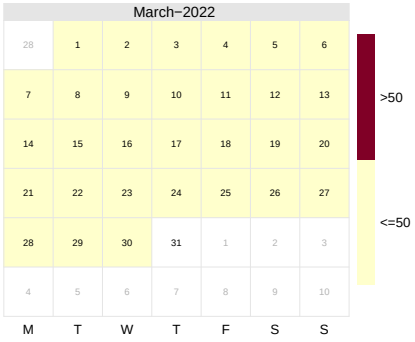


Daily Exceedances

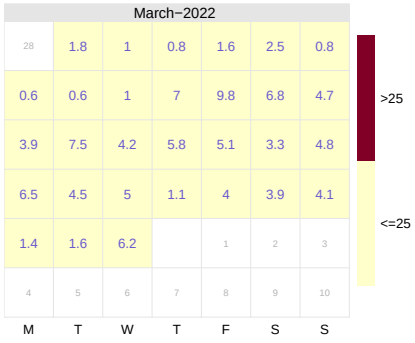
PM_{10}. Daily Exceedances Walker Quarries DMP



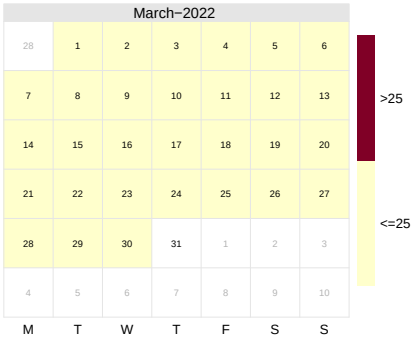
PM_{10}. Daily Exceedances Walker Quarries DMP



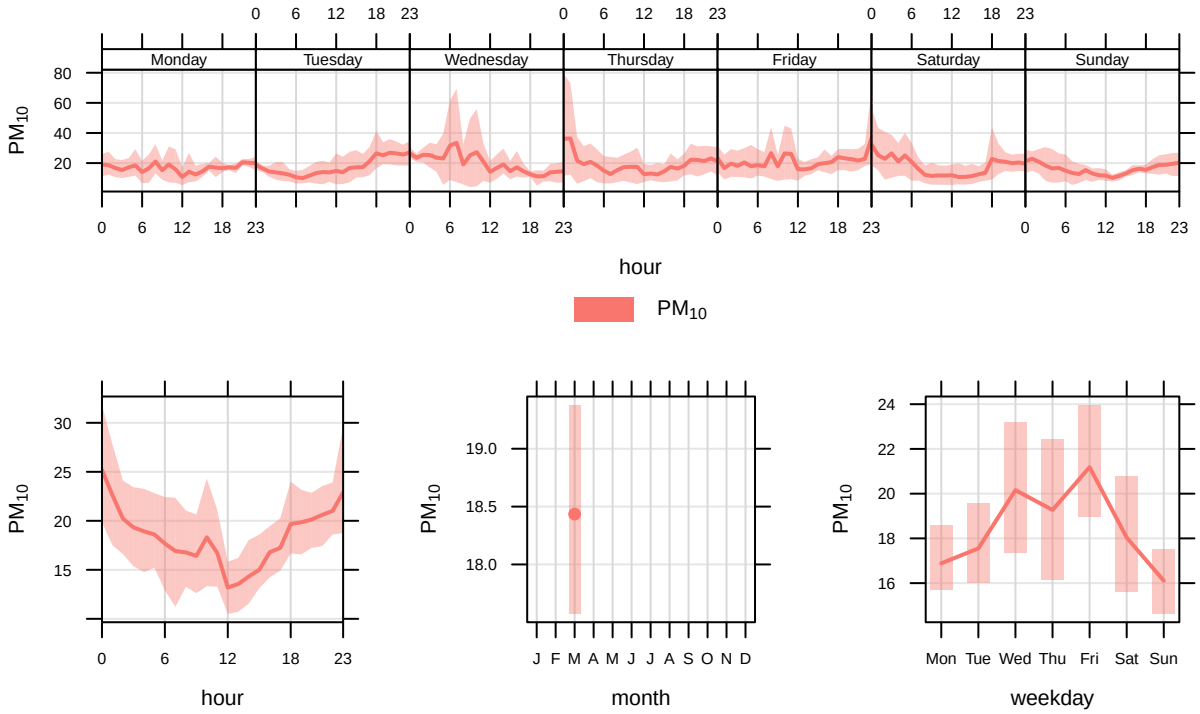
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

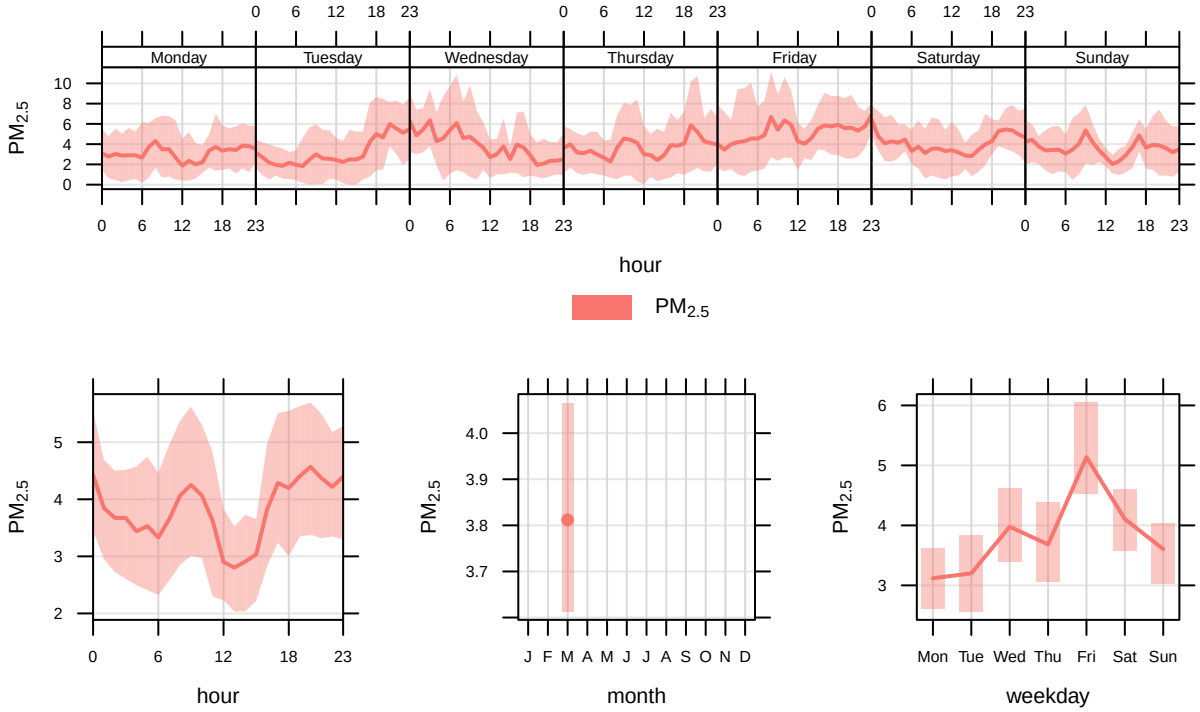


PM_{10} Time Variation at Walker Quarries DMP



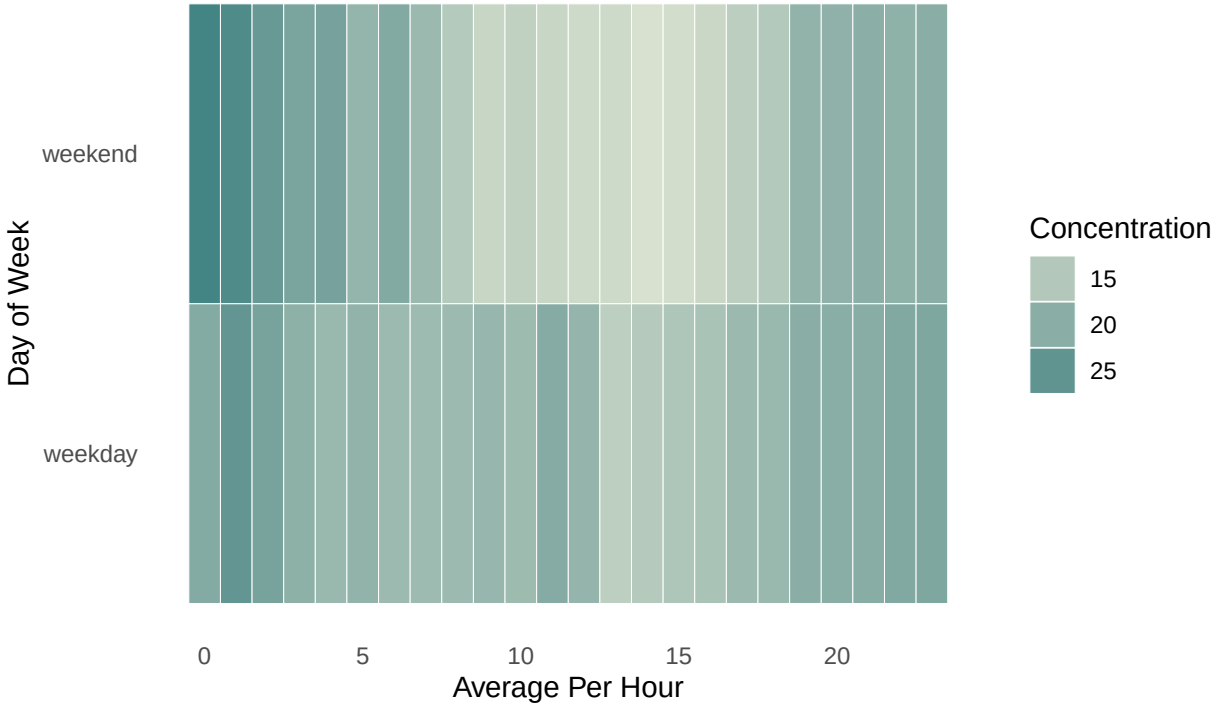
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

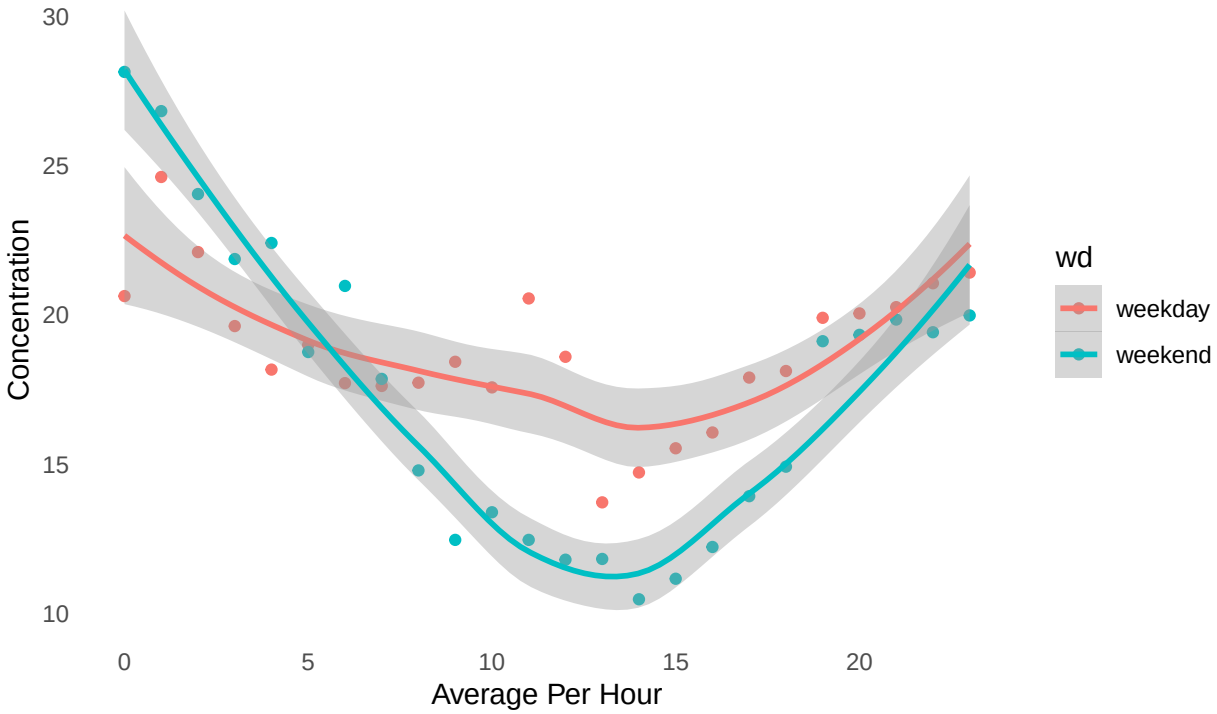


mean and 95% confidence interval in mean

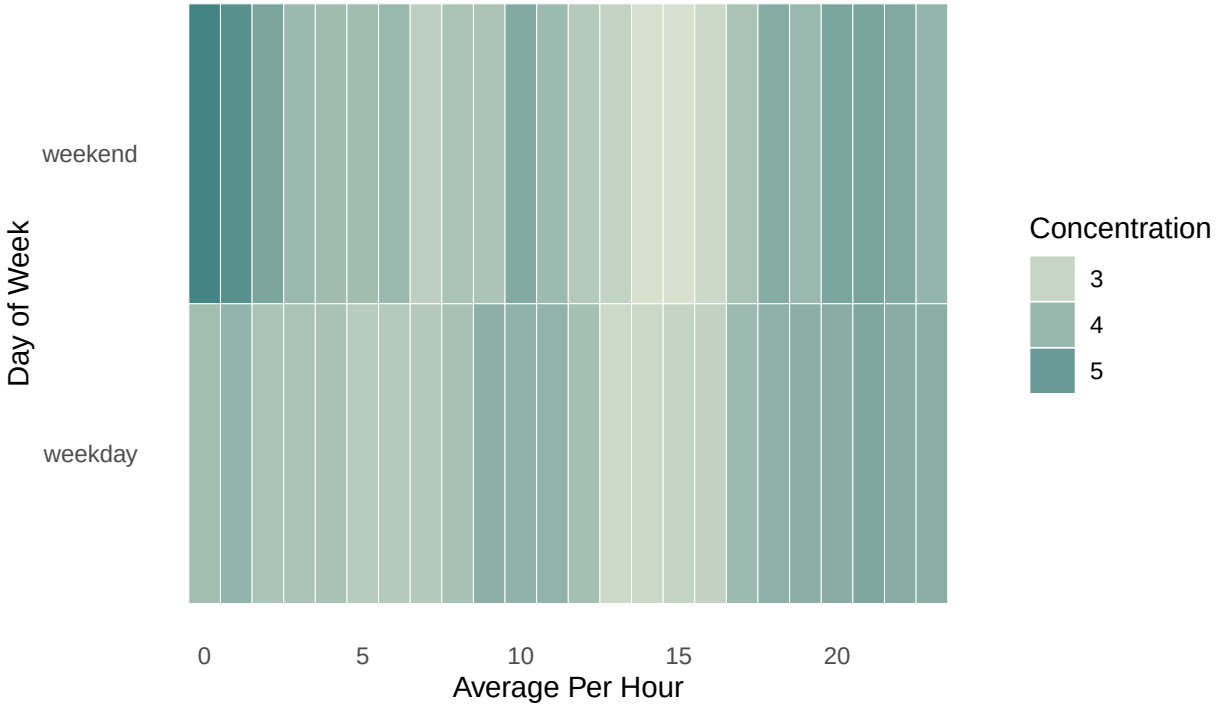
PM10 concentration by Weekday/weekend and Hour



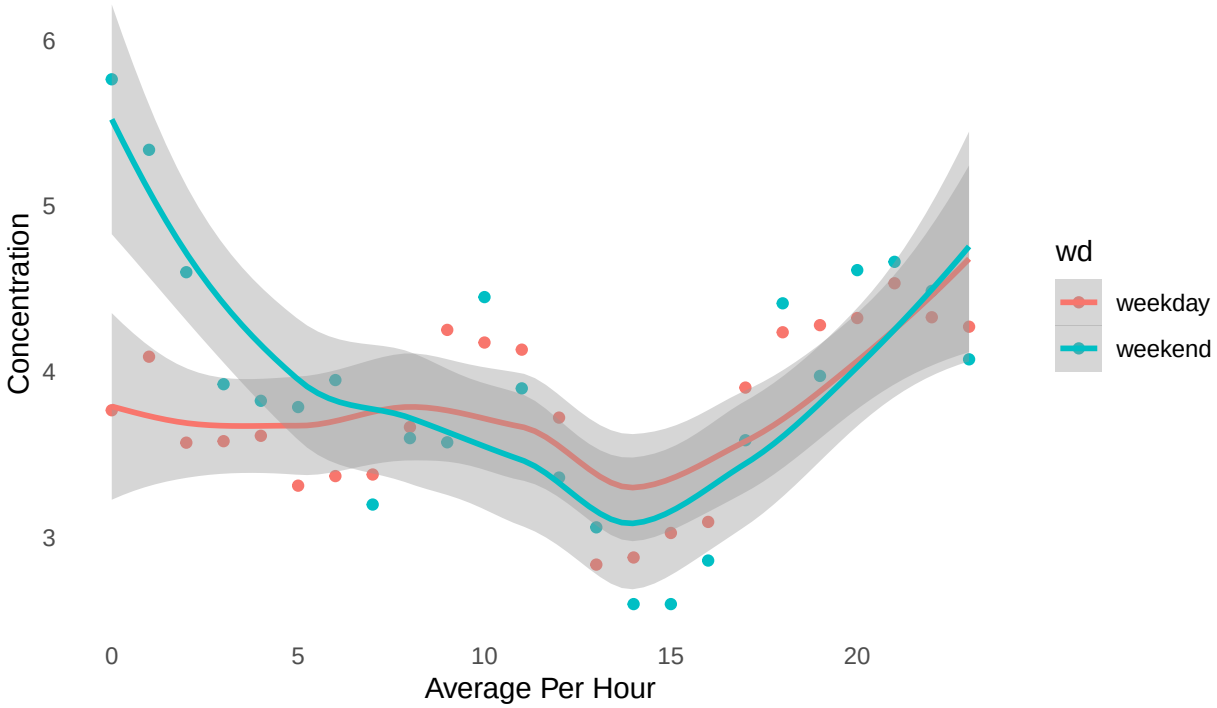
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

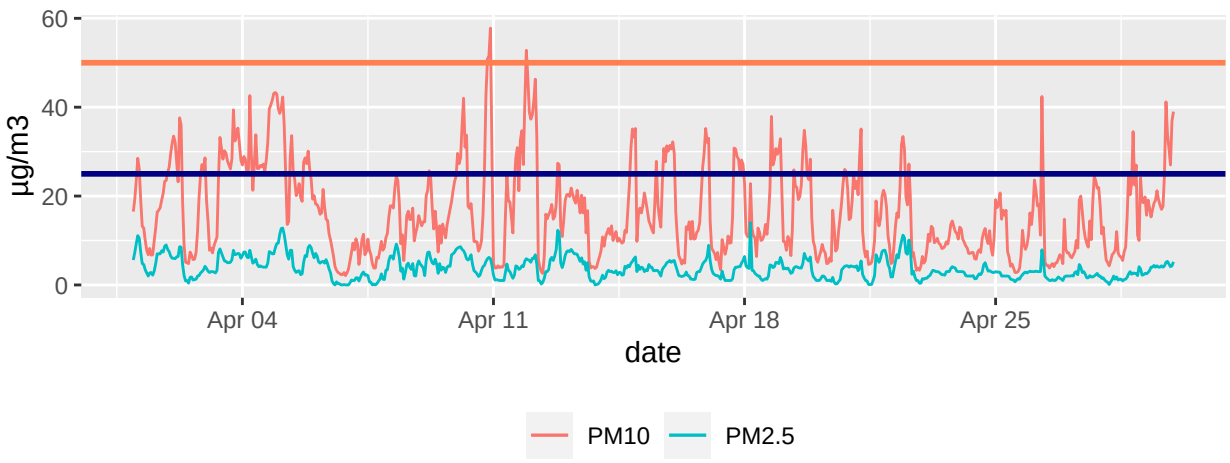
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2022-04-01	6.2	16.7	100.0	100.0
2022-04-02	3.7	19.4	100.0	100.0
2022-04-03	5.2	23.5	95.8	95.8
2022-04-04	6.0	31.6	100.0	100.0
2022-04-05	7.0	26.9	100.0	100.0
2022-04-06	2.7	10.0	100.0	100.0
2022-04-07	1.3	7.5	100.0	100.0
2022-04-08	4.7	14.9	100.0	100.0
2022-04-09	5.0	16.4	100.0	100.0
2022-04-10	5.4	26.0	100.0	100.0
2022-04-11	2.9	19.9	100.0	100.0
2022-04-12	4.9	20.0	100.0	100.0
2022-04-13	4.5	14.0	100.0	100.0
2022-04-14	3.3	15.3	100.0	100.0
2022-04-15	3.8	20.1	100.0	100.0
2022-04-16	3.1	16.0	100.0	100.0
2022-04-17	3.0	15.4	100.0	100.0
2022-04-18	3.7	17.6	100.0	100.0
2022-04-19	4.2	19.1	100.0	100.0
2022-04-20	2.0	12.0	100.0	100.0
2022-04-21	3.8	15.8	100.0	100.0
2022-04-22	4.9	13.5	100.0	100.0
2022-04-23	2.7	10.0	95.8	95.8
2022-04-24	2.7	9.1	100.0	100.0
2022-04-25	2.1	10.4	100.0	100.0
2022-04-26	2.3	11.4	100.0	100.0
2022-04-27	2.3	13.4	100.0	100.0
2022-04-28	1.6	12.3	100.0	100.0
2022-04-29	3.9	22.5	100.0	100.0

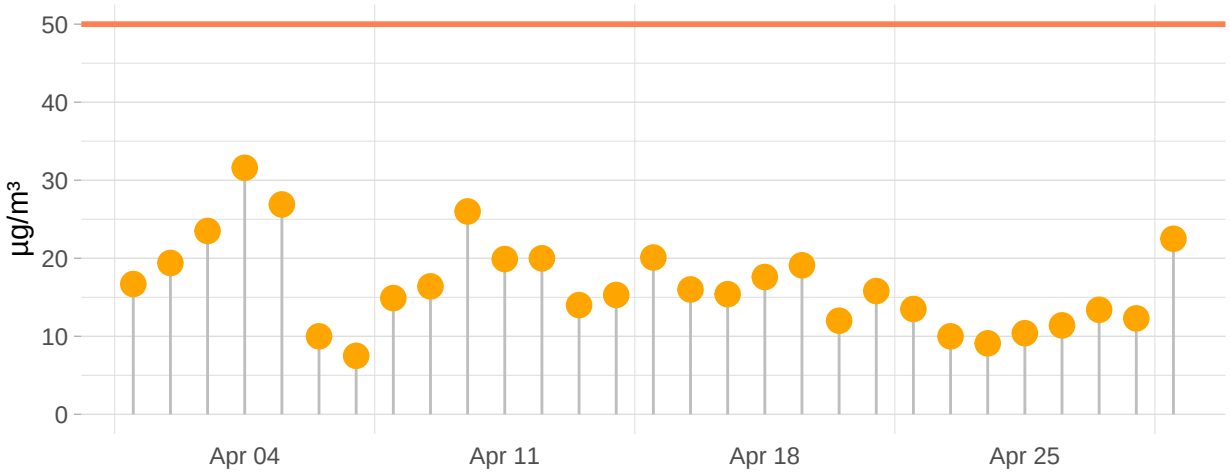
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
April 2022	3.8	16.6	99.7	99.71034

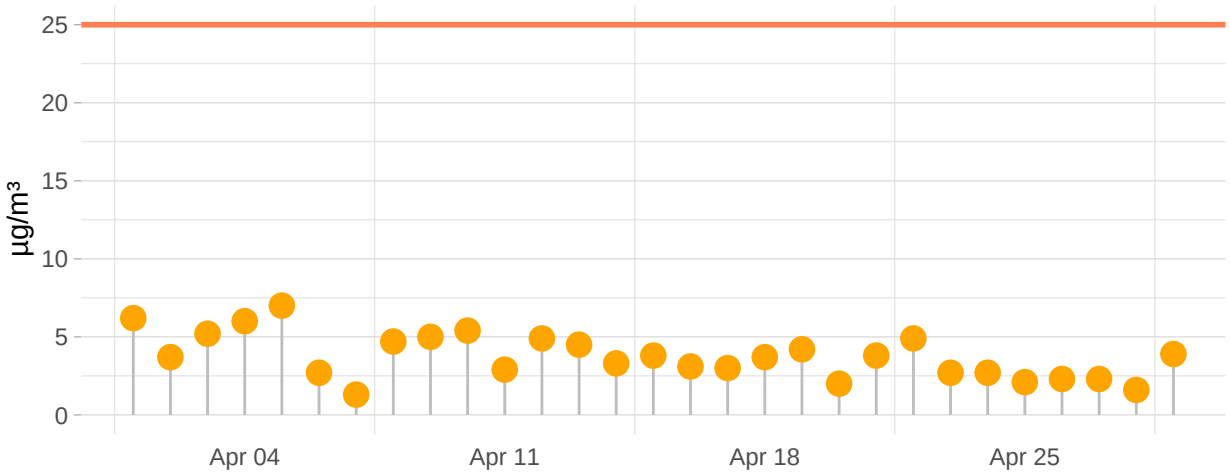
PM10 & PM2.5 hourly averages



PM10 daily averages

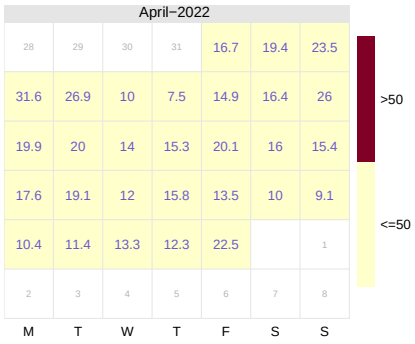


PM2.5 daily averages

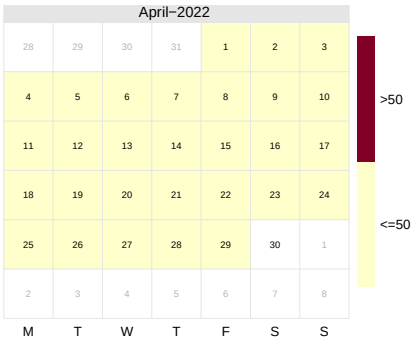


Daily Exceedances

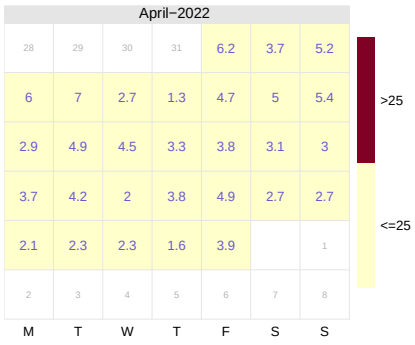
PM_{10}. Daily Exceedances Walker Quarries DMP



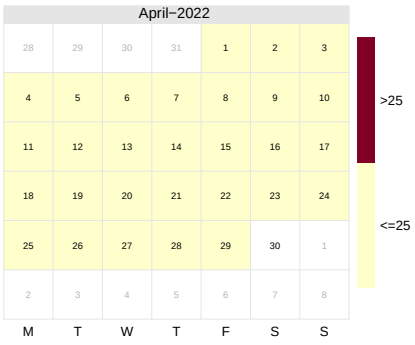
PM_{10}. Daily Exceedances Walker Quarries DMP



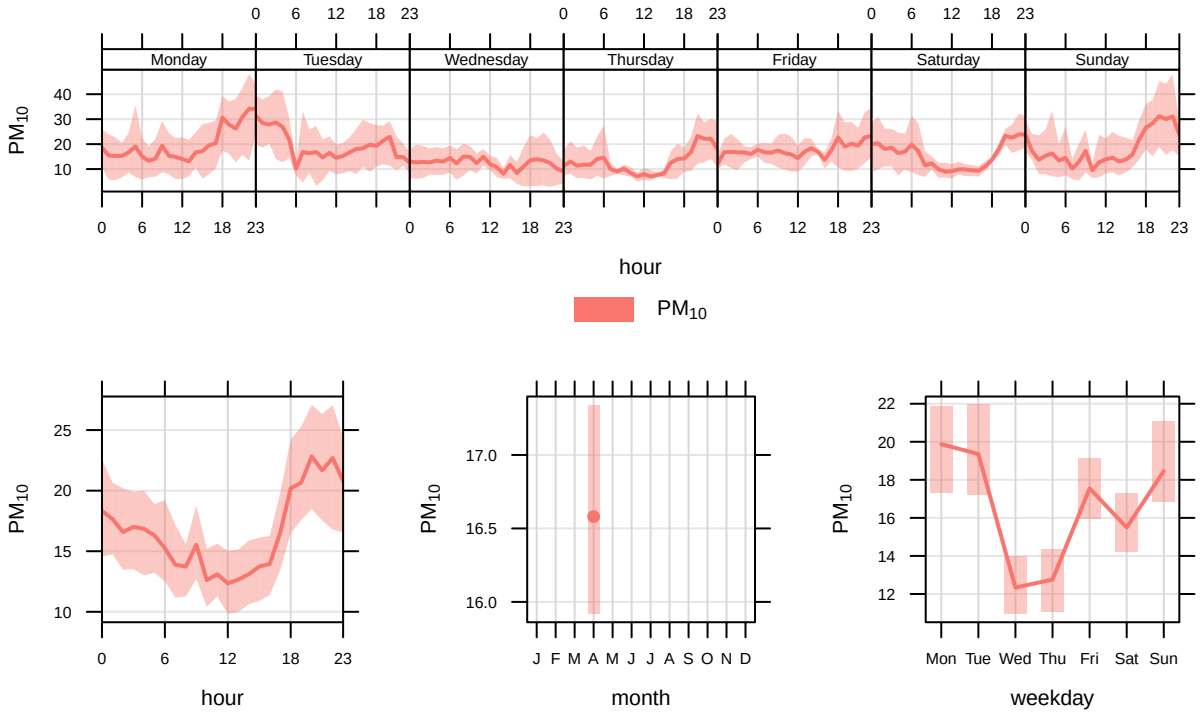
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

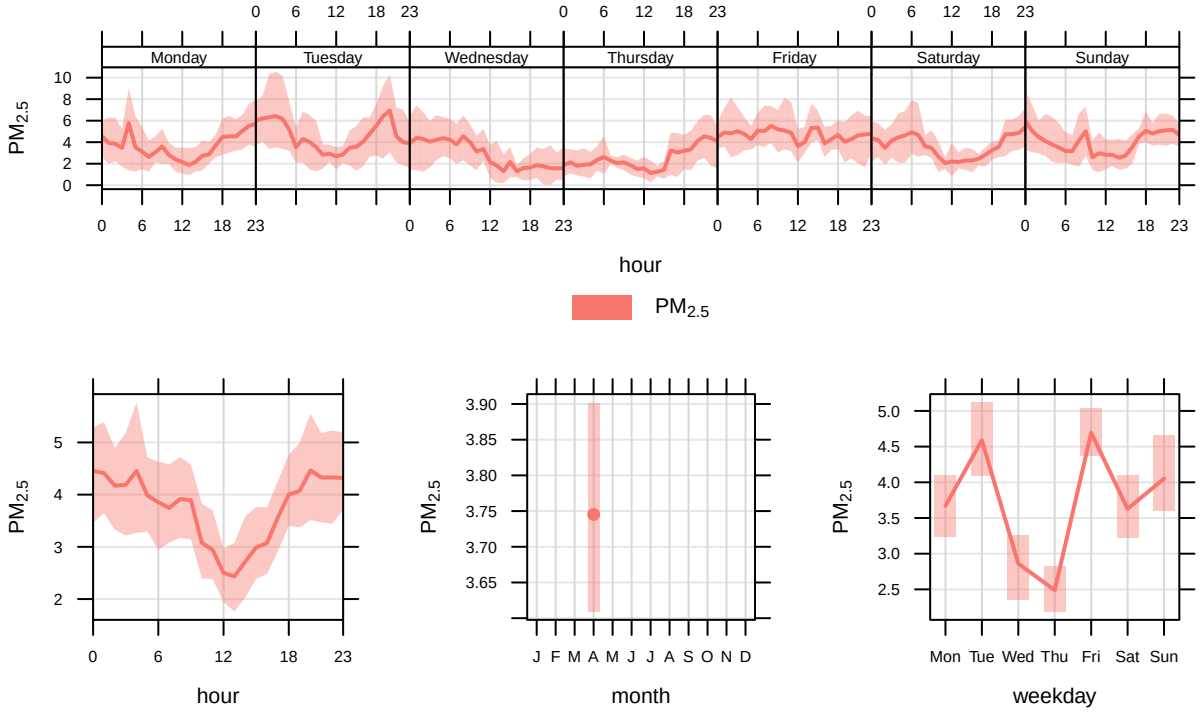


PM_{10} Time Variation at Walker Quarries DMP



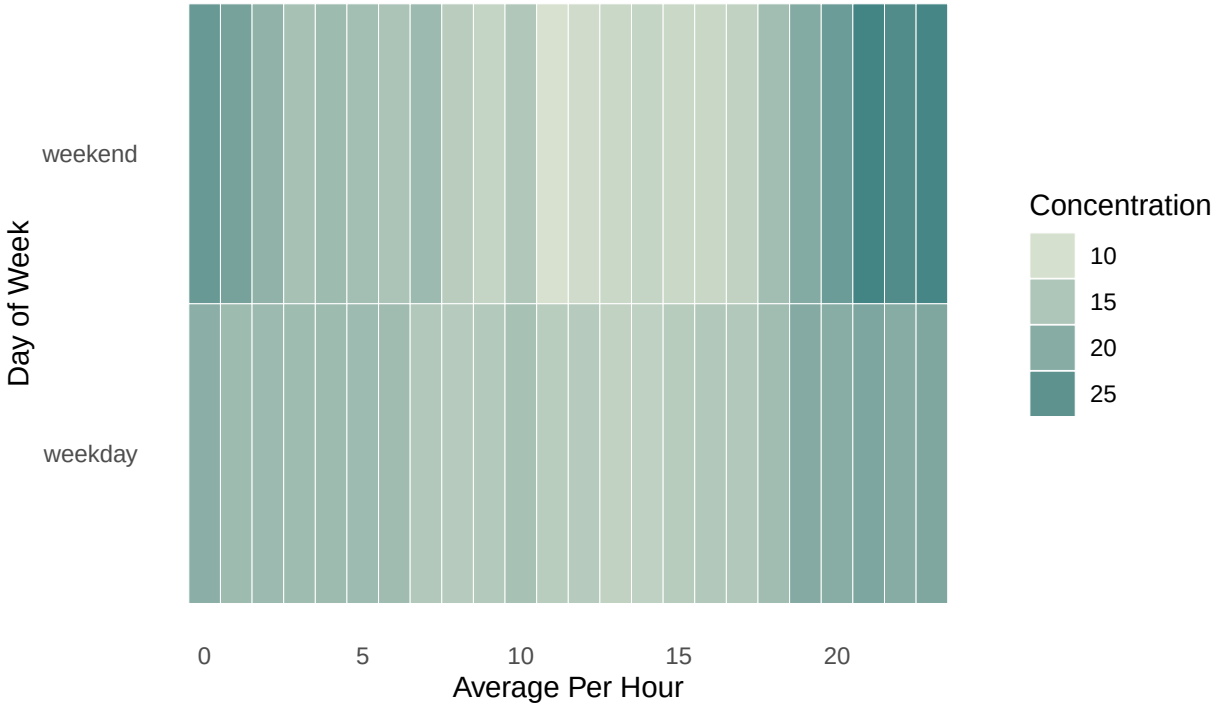
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

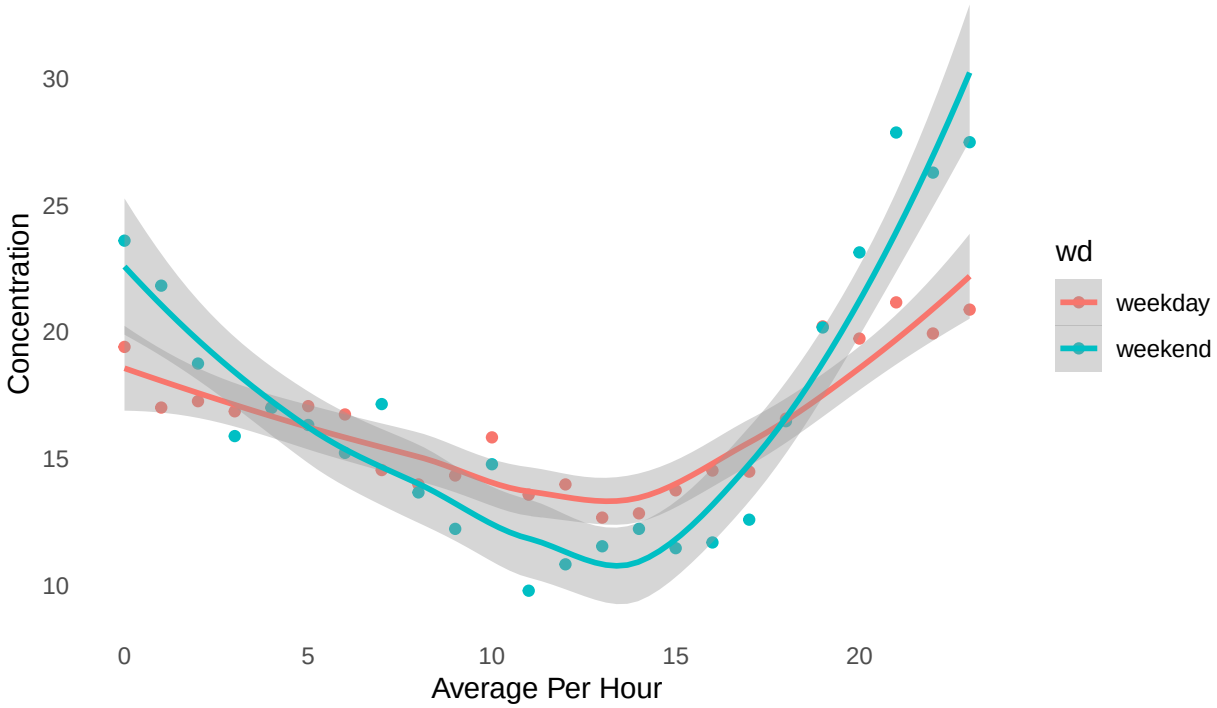


mean and 95% confidence interval in mean

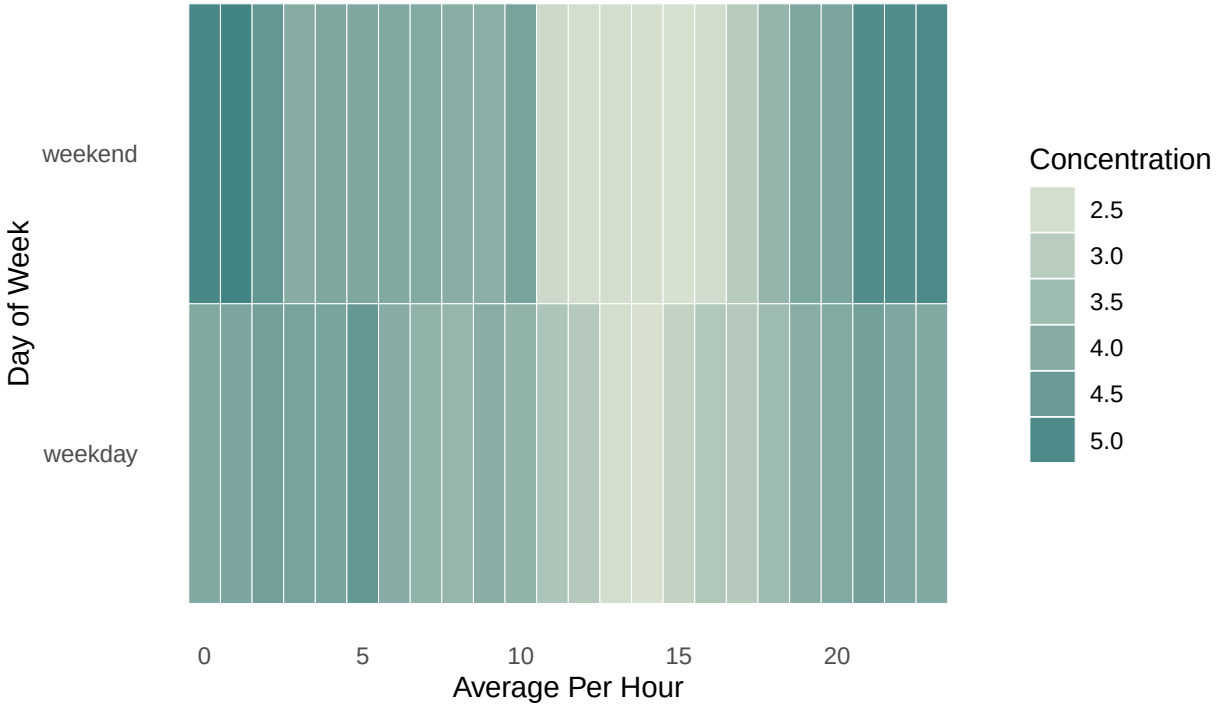
PM10 concentration by Weekday/weekend and Hour



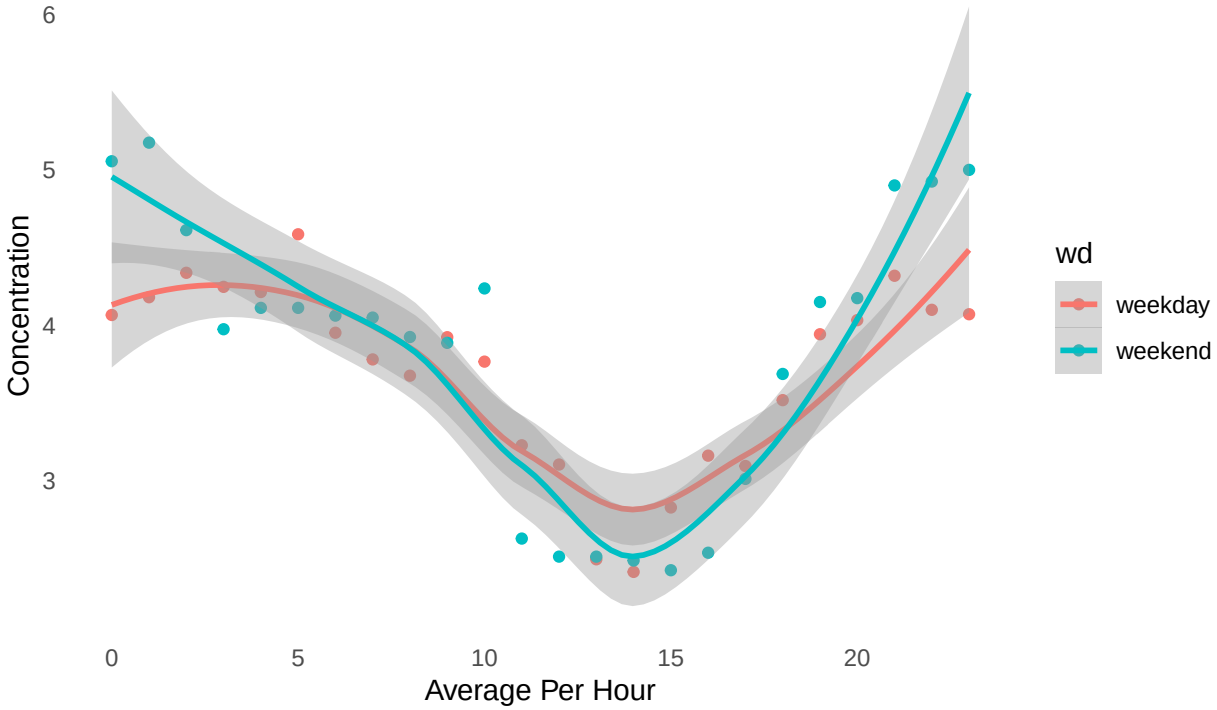
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

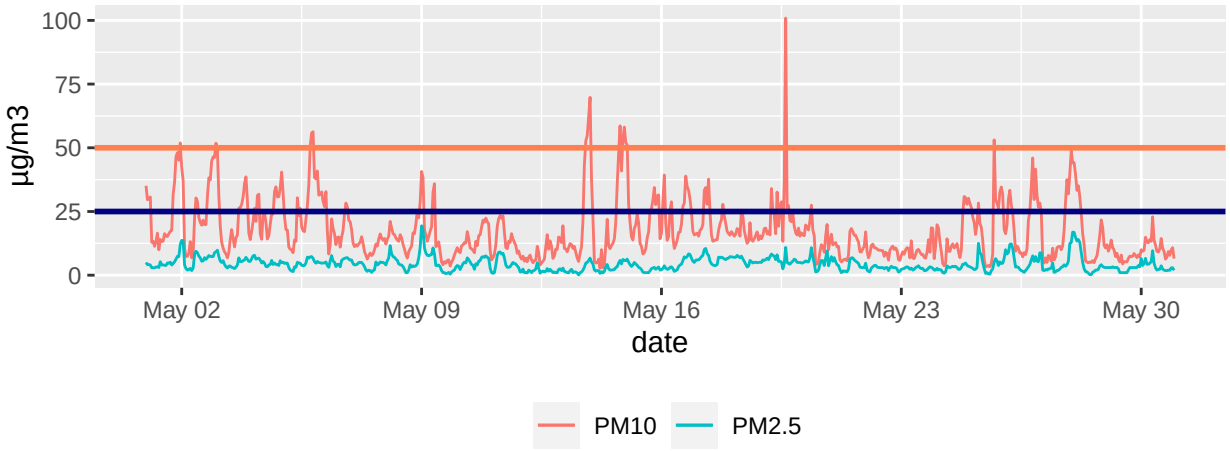
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2022-05-01	4.7	23.6	100	100
2022-05-02	6.5	24.6	100	100
2022-05-03	5.2	22.0	100	100
2022-05-04	5.2	24.9	100	100
2022-05-05	4.6	26.0	100	100
2022-05-06	5.3	21.0	100	100
2022-05-07	3.7	11.5	100	100
2022-05-08	5.1	15.5	100	100
2022-05-09	5.6	14.4	100	100
2022-05-10	5.1	14.1	100	100
2022-05-11	4.3	13.0	100	100
2022-05-12	1.7	8.0	100	100
2022-05-13	2.4	22.1	100	100
2022-05-14	3.1	21.9	100	100
2022-05-15	2.9	21.4	100	100
2022-05-16	4.3	22.6	100	100
2022-05-17	6.5	20.7	100	100
2022-05-18	5.8	16.4	100	100
2022-05-19	6.1	25.6	100	100
2022-05-20	5.3	14.6	100	100
2022-05-21	4.0	11.3	100	100
2022-05-22	2.7	9.4	100	100
2022-05-23	2.7	9.7	100	100
2022-05-24	2.9	14.4	100	100
2022-05-25	4.0	20.2	100	100
2022-05-26	5.6	20.8	100	100
2022-05-27	4.2	17.0	100	100
2022-05-28	5.6	17.5	100	100
2022-05-29	2.5	7.9	100	100
2022-05-30	3.6	11.1	100	100

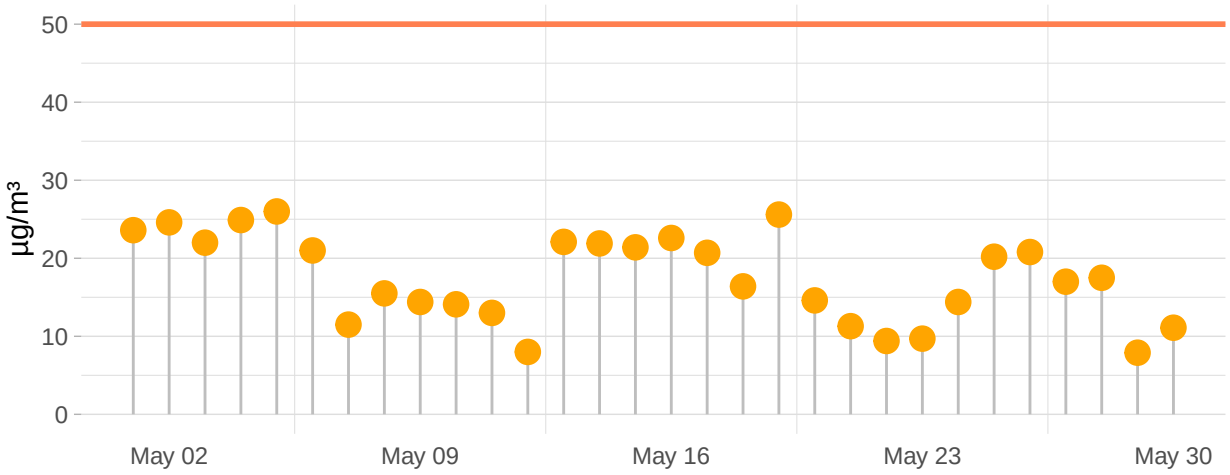
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
May 2022	4.4	17.4	100	100

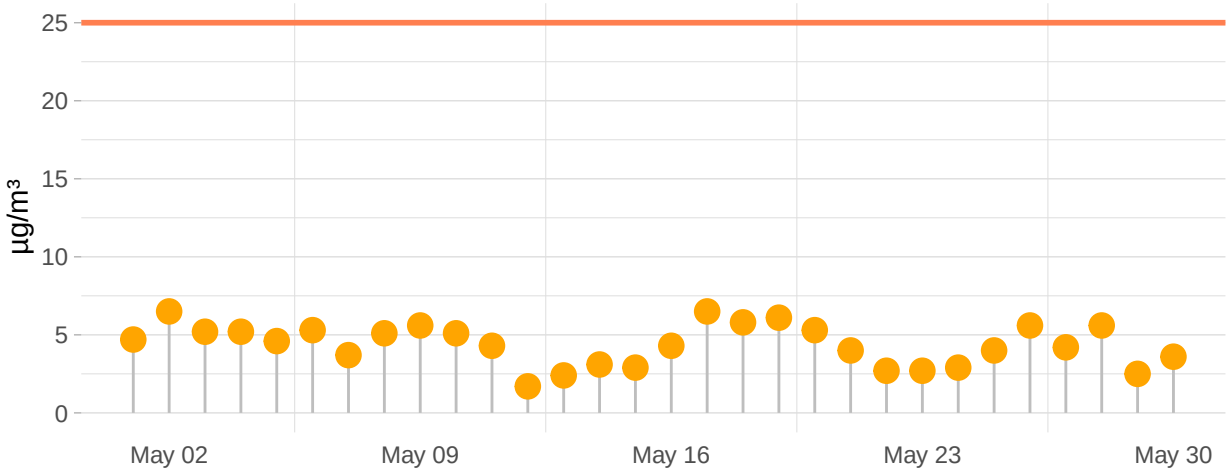
PM10 & PM2.5 hourly averages



PM10 daily averages

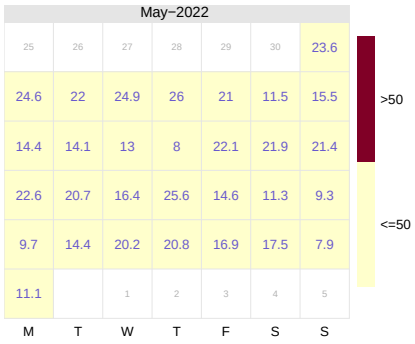


PM2.5 daily averages

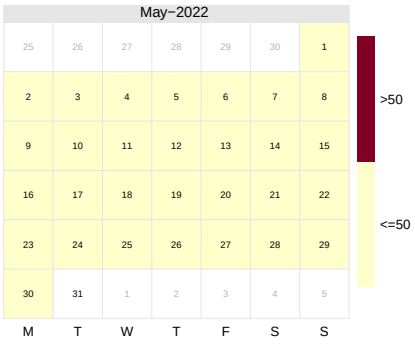


Daily Exceedances

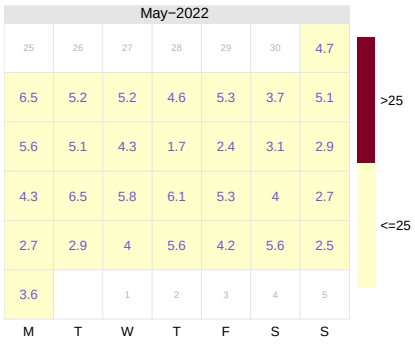
PM_{10}. Daily Exceedances Walker Quarries DMP



PM_{10}. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



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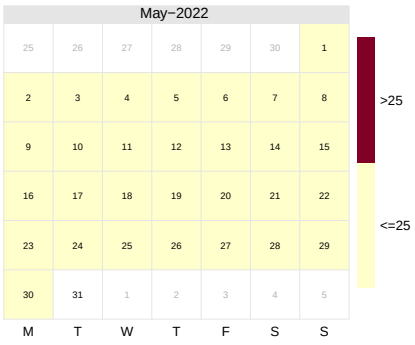

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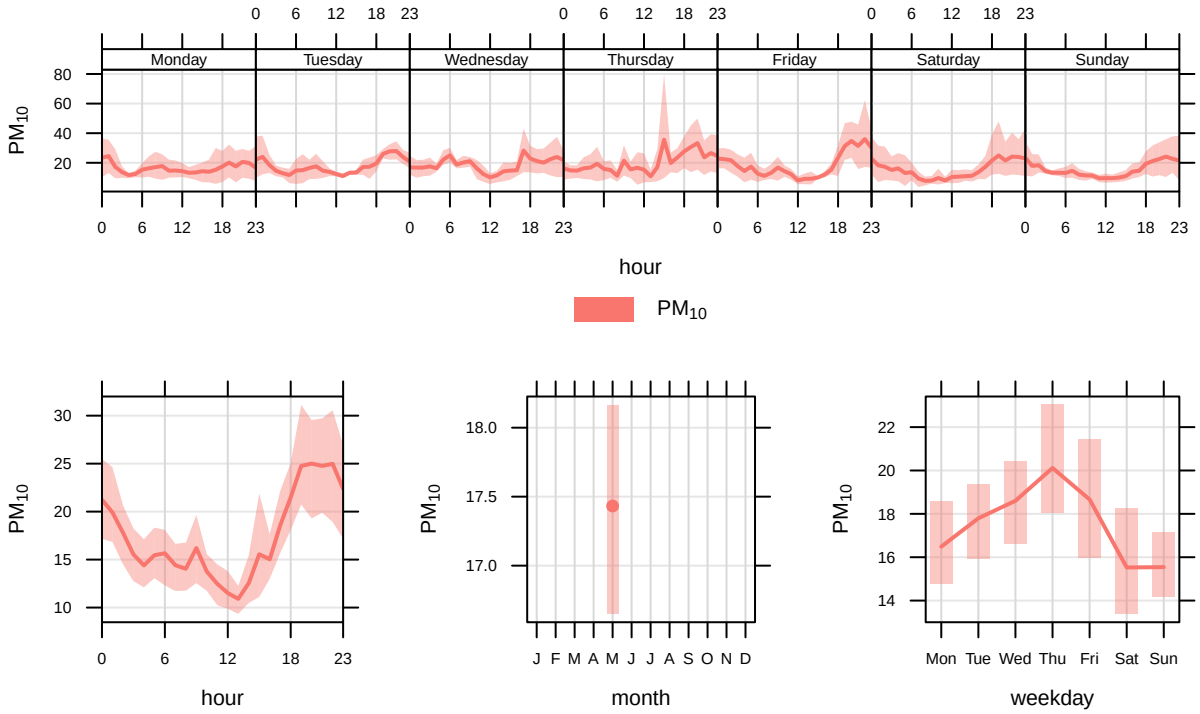
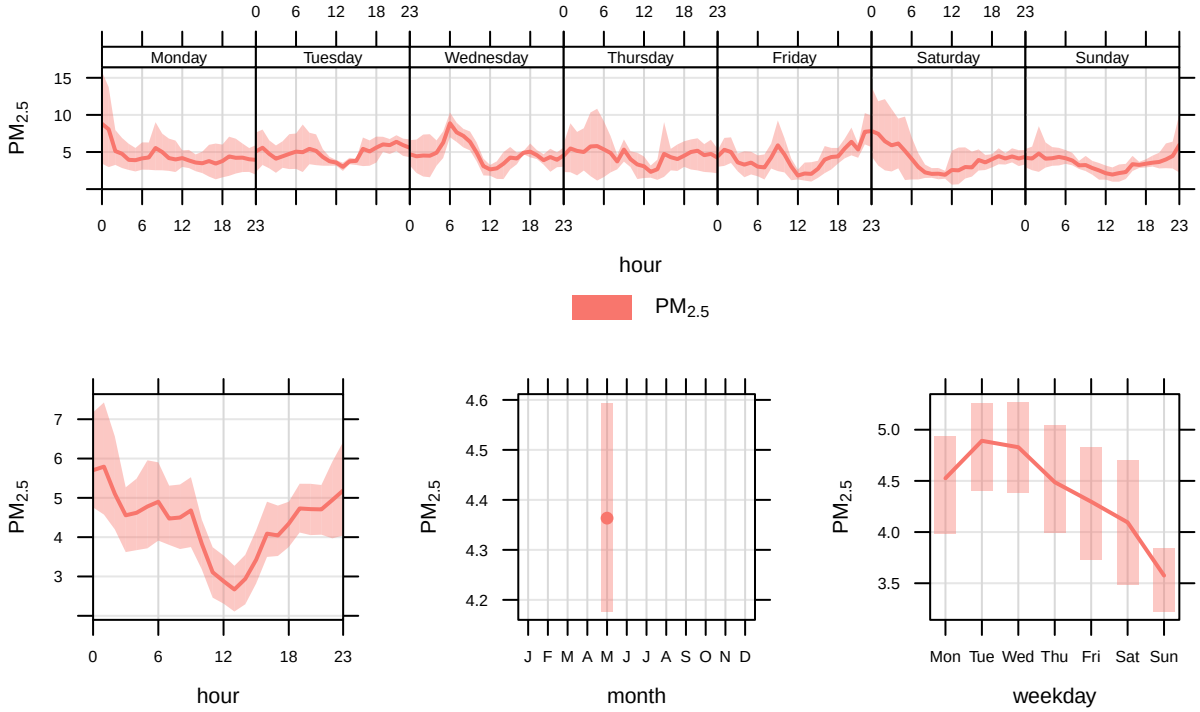


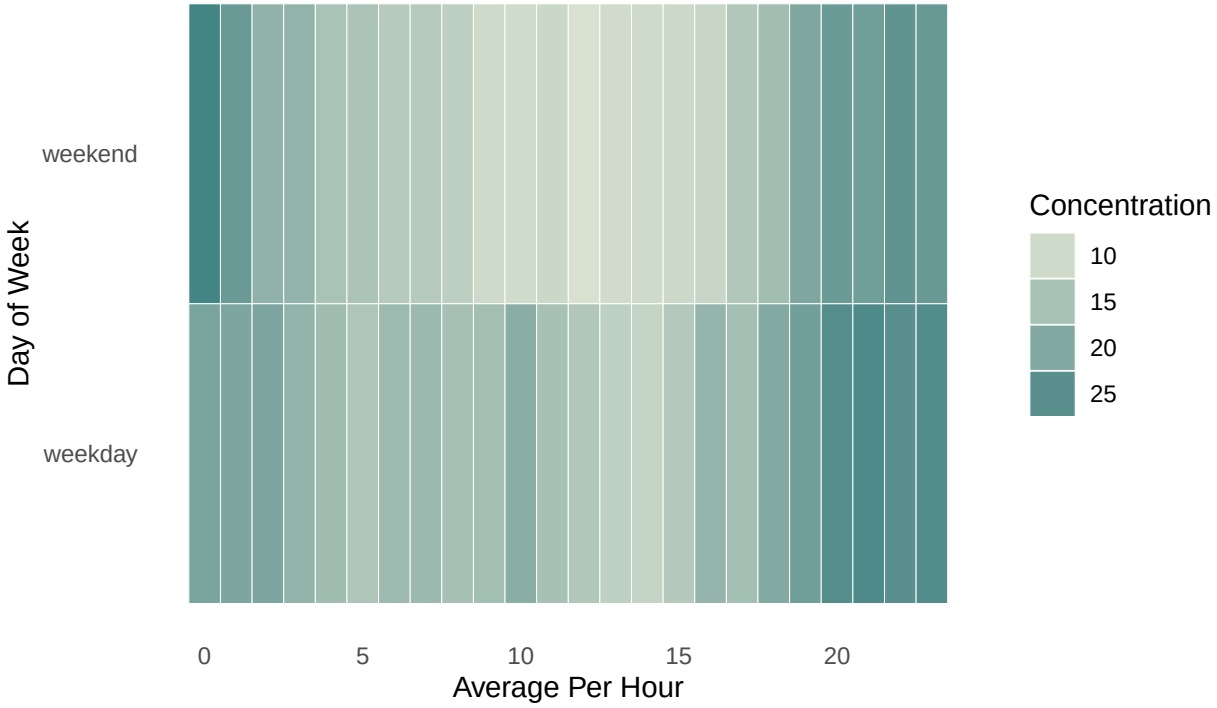
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

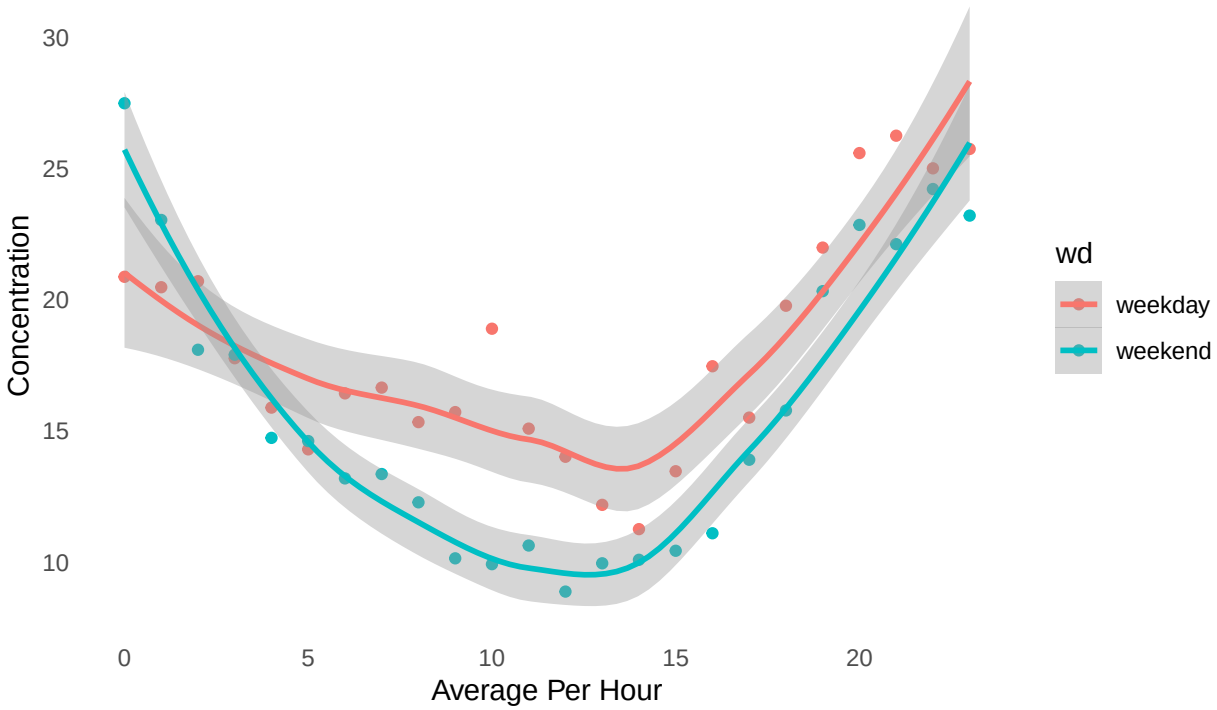


mean and 95% confidence interval in mean

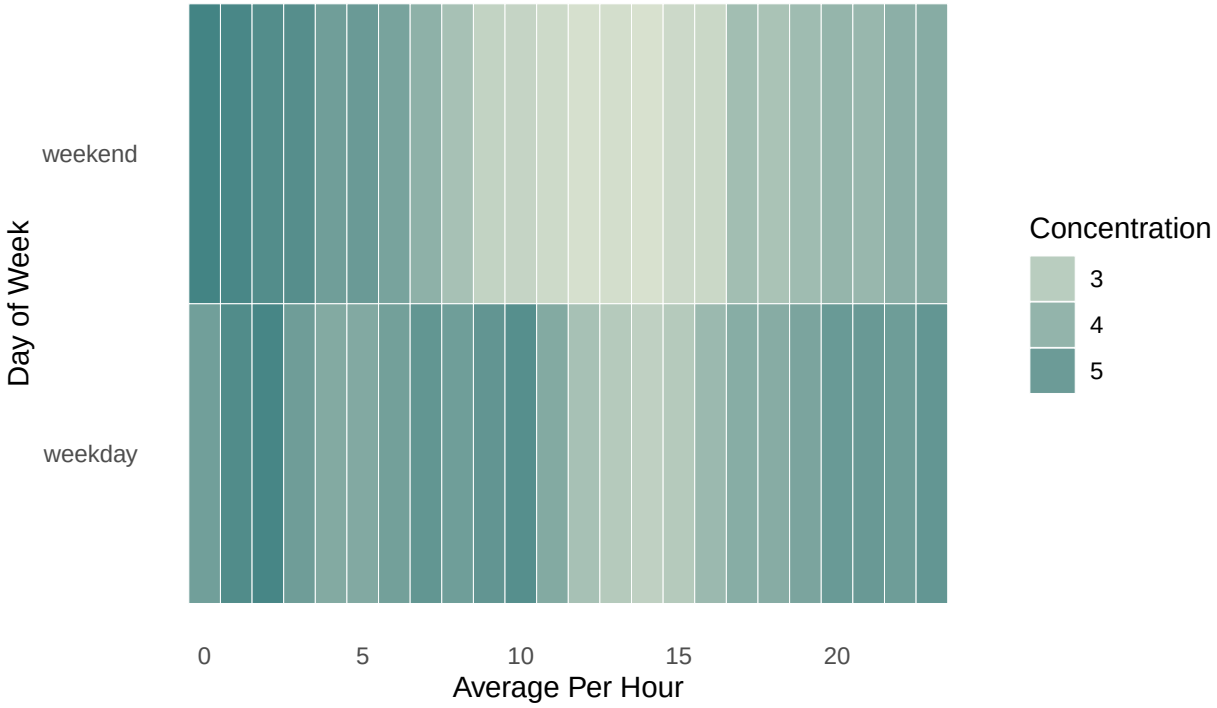
PM10 concentration by Weekday/weekend and Hour



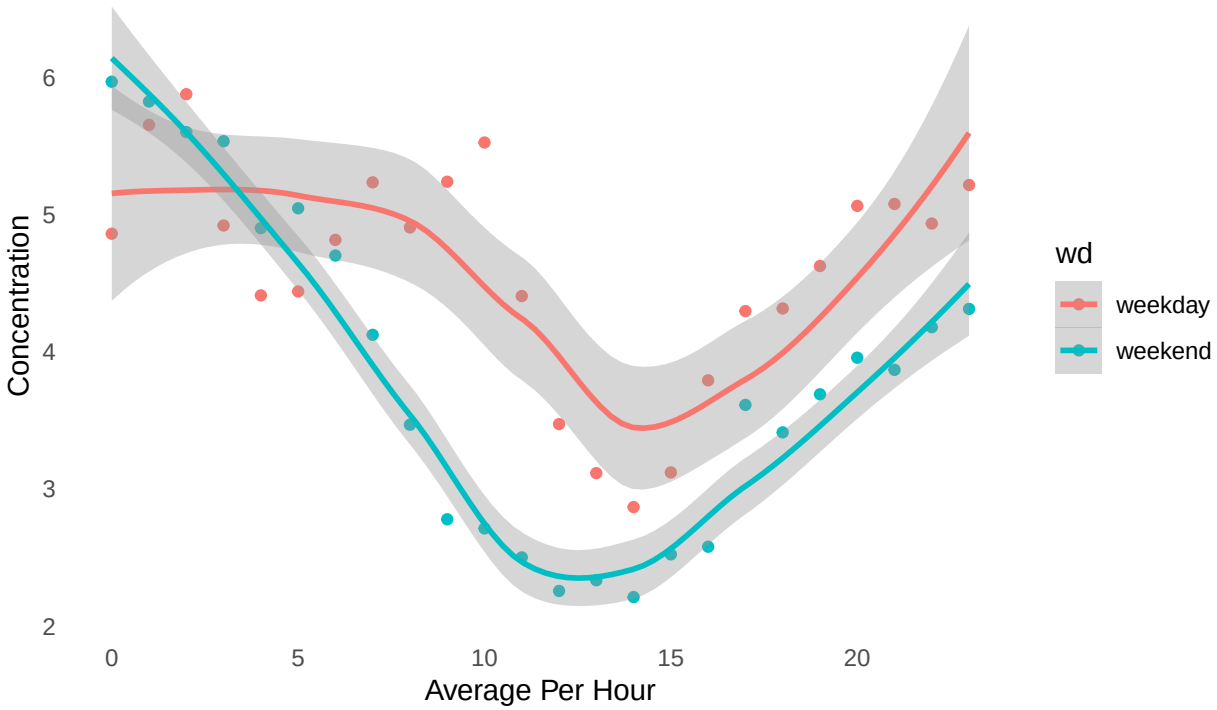
PM10 concentration by weekday and weekend with trend



PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend



Air quality monitoring limits

Pollutant	Averaging period	Criterion (ug/m³)
Particulate matter (PM2.5)	24 hour	25
Particulate matter (PM10)	24 hour	50

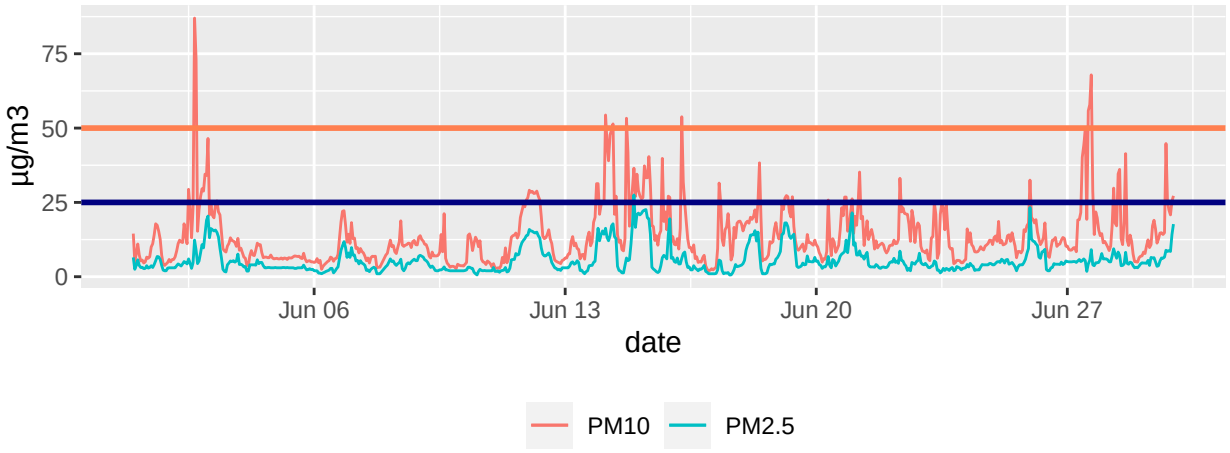
Daily Averages

	µg/m³	µg/m³	%	%
	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
2022-06-01	3.7	8.3	100.0	100.0
2022-06-02	5.8	22.0	100.0	100.0
2022-06-03	9.0	17.1	100.0	100.0
2022-06-04	3.5	7.2	100.0	100.0
2022-06-05	2.9	6.2	100.0	100.0
2022-06-06	3.9	8.7	100.0	100.0
2022-06-07	4.0	8.0	87.5	87.5
2022-06-08	4.7	10.9	100.0	100.0
2022-06-09	3.2	7.8	100.0	100.0
2022-06-10	2.1	7.3	100.0	100.0
2022-06-11	5.8	11.9	100.0	100.0
2022-06-12	8.3	15.9	100.0	100.0
2022-06-13	4.7	12.6	100.0	100.0
2022-06-14	11.0	29.5	100.0	100.0
2022-06-15	12.0	24.2	100.0	100.0
2022-06-16	4.0	12.6	100.0	100.0
2022-06-17	2.3	12.6	100.0	100.0
2022-06-18	7.4	16.0	100.0	100.0
2022-06-19	8.9	15.8	100.0	100.0
2022-06-20	6.3	13.6	100.0	100.0
2022-06-21	6.1	15.4	100.0	100.0
2022-06-22	4.8	15.9	100.0	100.0
2022-06-23	3.0	12.4	100.0	100.0
2022-06-24	3.4	9.7	100.0	100.0
2022-06-25	5.7	13.2	100.0	100.0
2022-06-26	6.2	12.9	100.0	100.0
2022-06-27	5.2	24.5	100.0	100.0
2022-06-28	5.4	15.5	100.0	100.0
2022-06-29	6.6	15.8	100.0	100.0

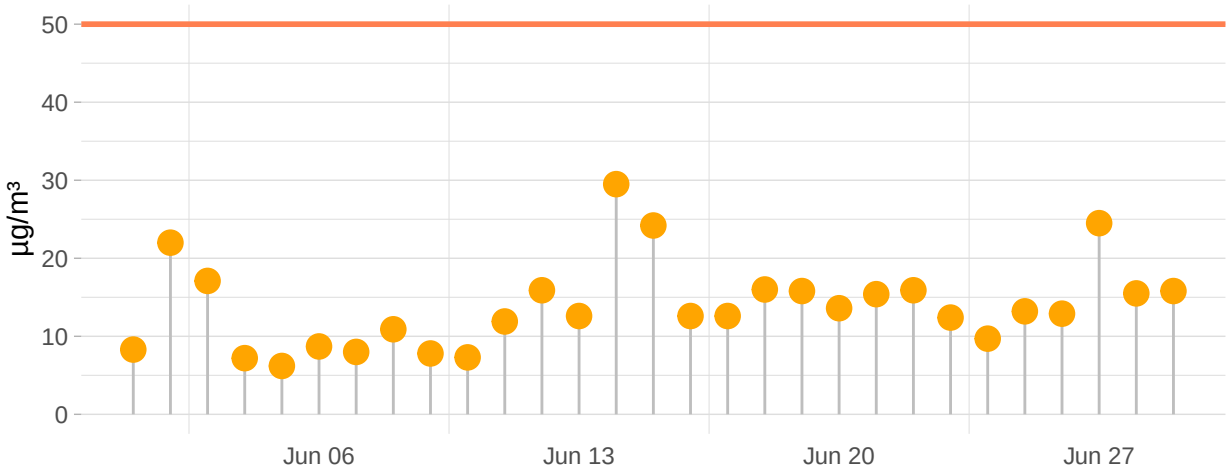
Monthly Average

	PM2.5-WQ370	PM10-WQ370	PM2.5 data capture-WQ370	PM10 data capture-WQ370
June 2022	5.5	13.9	99.6	99.56897

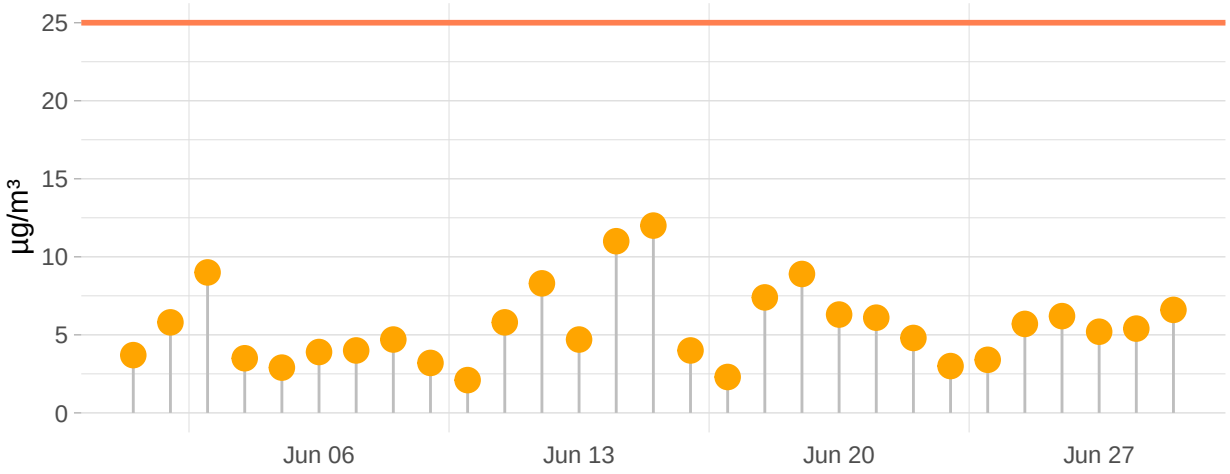
PM10 & PM2.5 hourly averages



PM10 daily averages

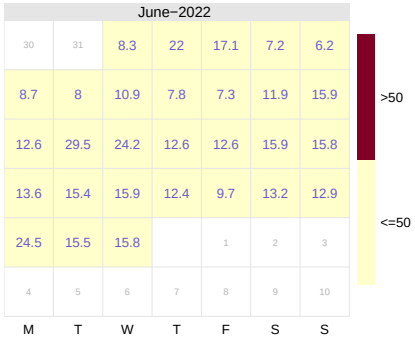


PM2.5 daily averages

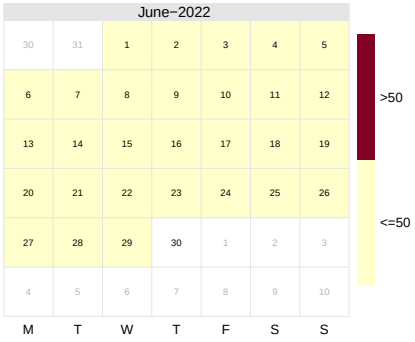


Daily Exceedances

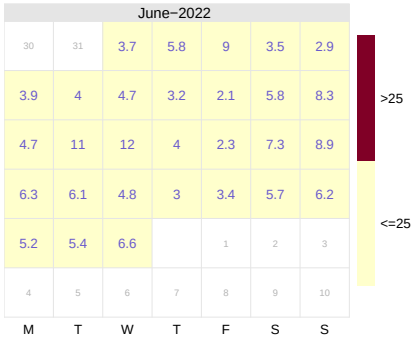
PM_{10}. Daily Exceedances Walker Quarries DMP



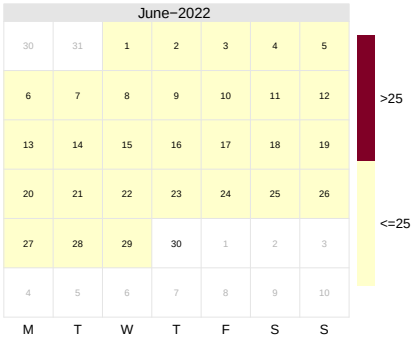
PM_{10}. Daily Exceedances Walker Quarries DMP



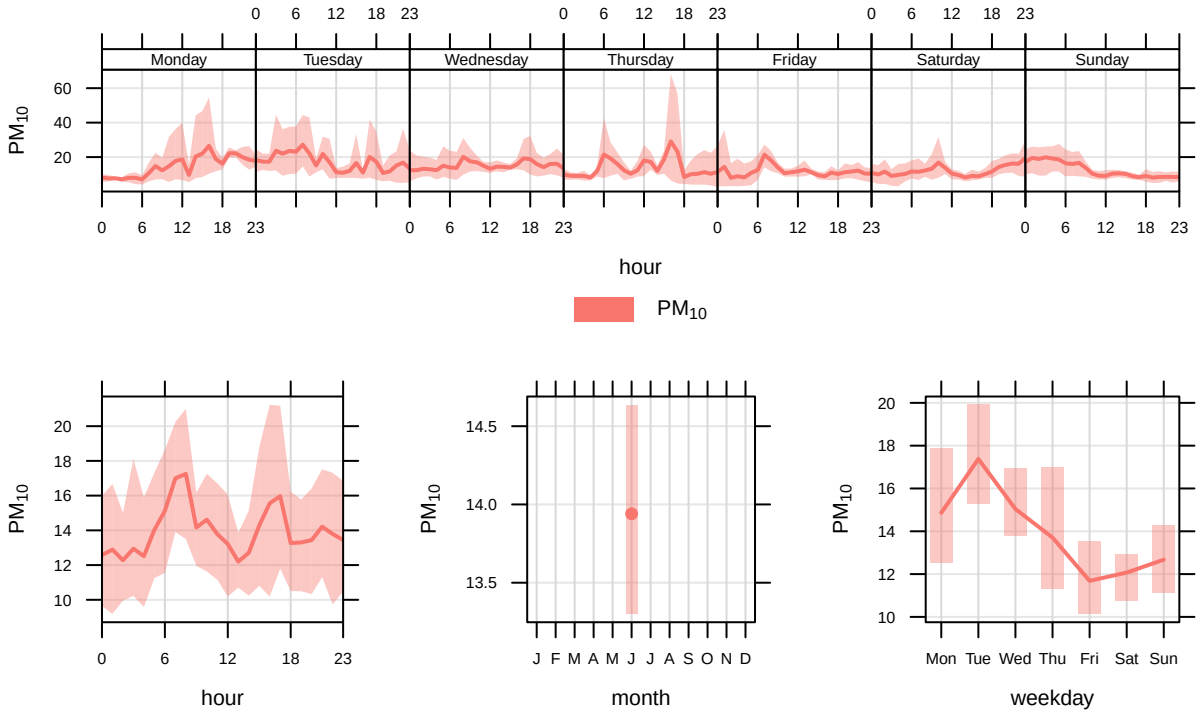
$PM_{2.5}$. Daily Exceedances Walker Quarries DMP



$PM_{2.5}$. Daily Exceedances Walker Quarries DMP

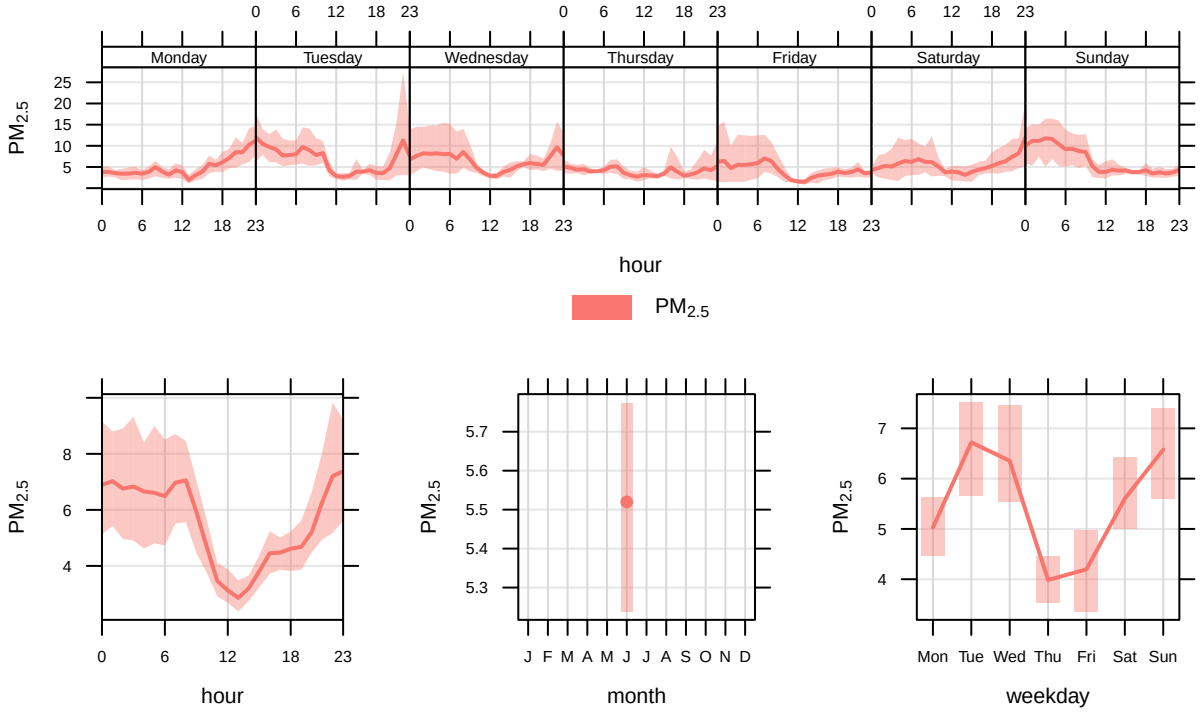


PM_{10} Time Variation at Walker Quarries DMP



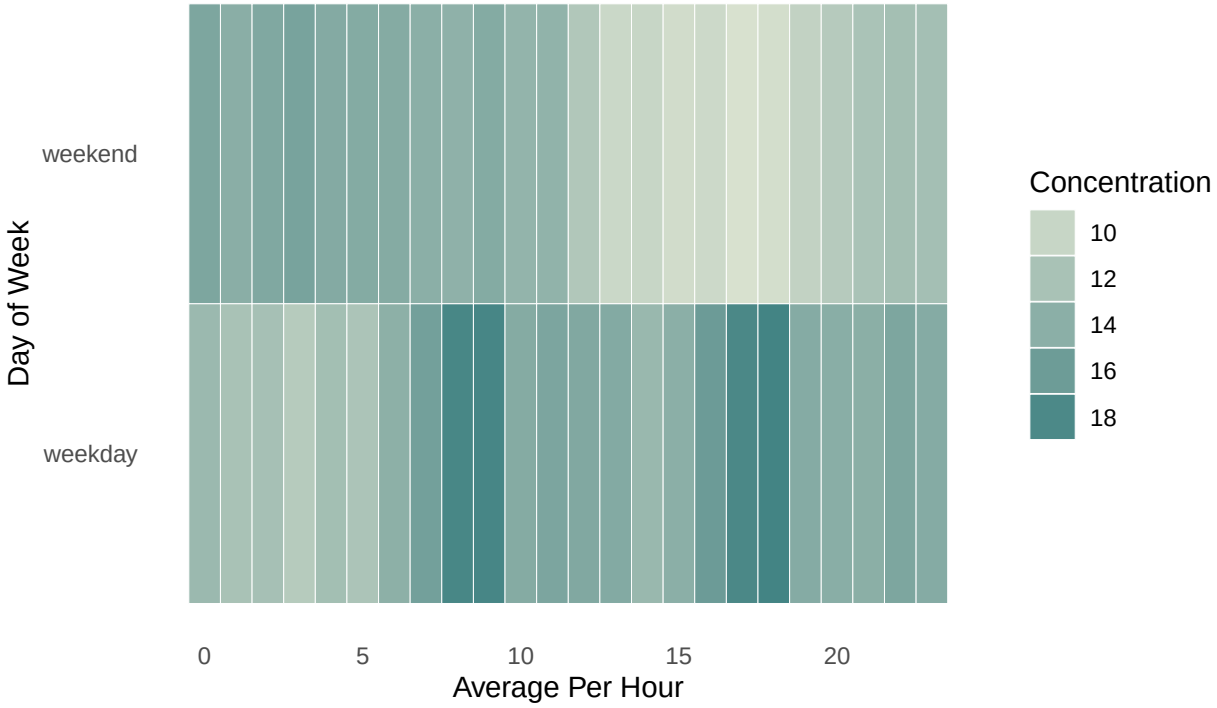
mean and 95% confidence interval in mean

$PM_{2.5}$ Time Variation at Walker Quarries DMP

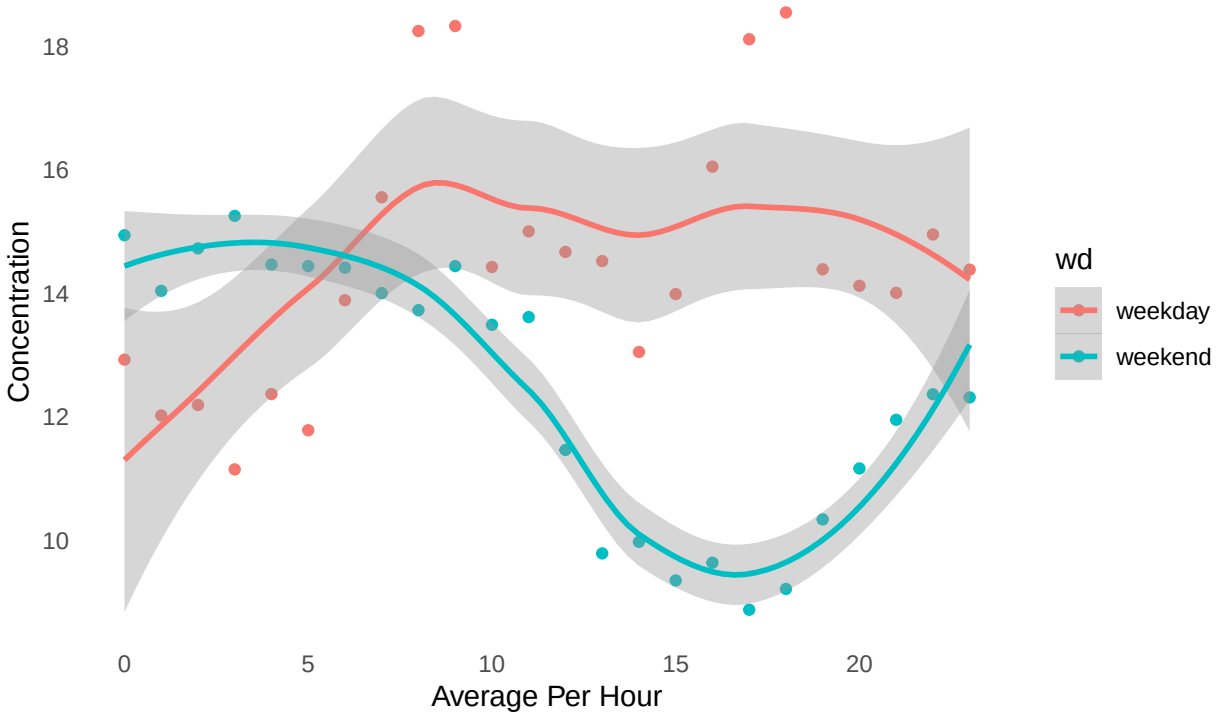


mean and 95% confidence interval in mean

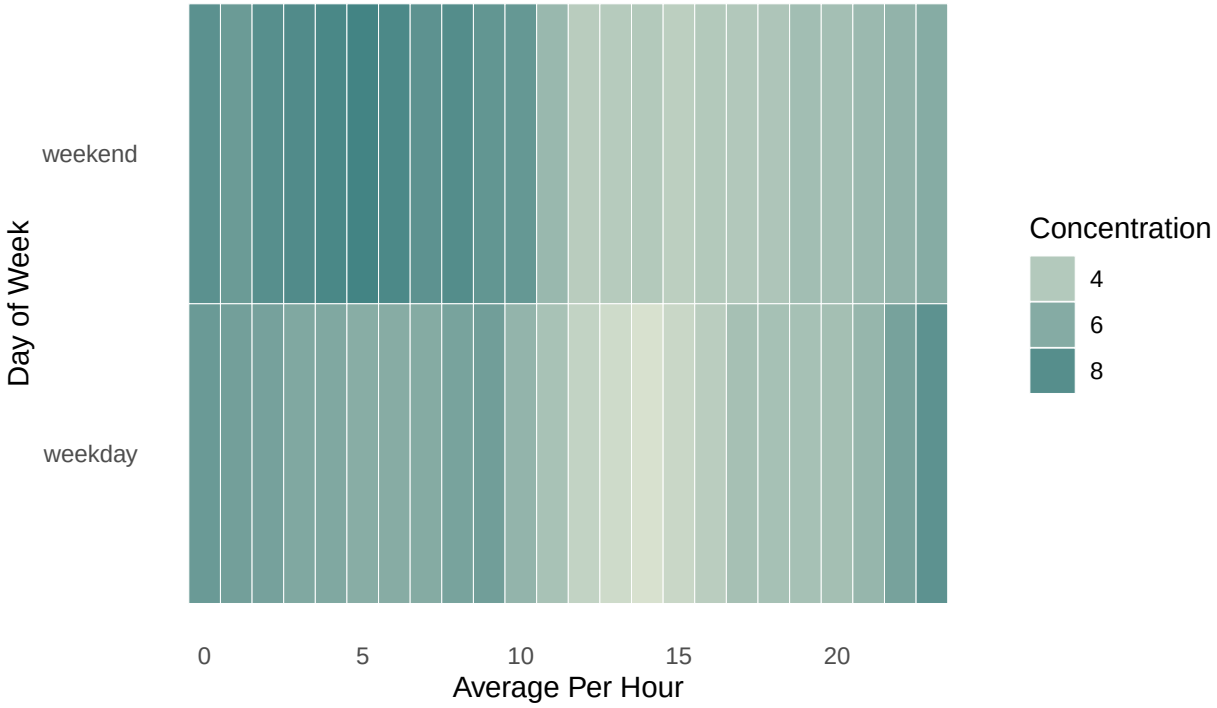
PM10 concentration by Weekday/weekend and Hour



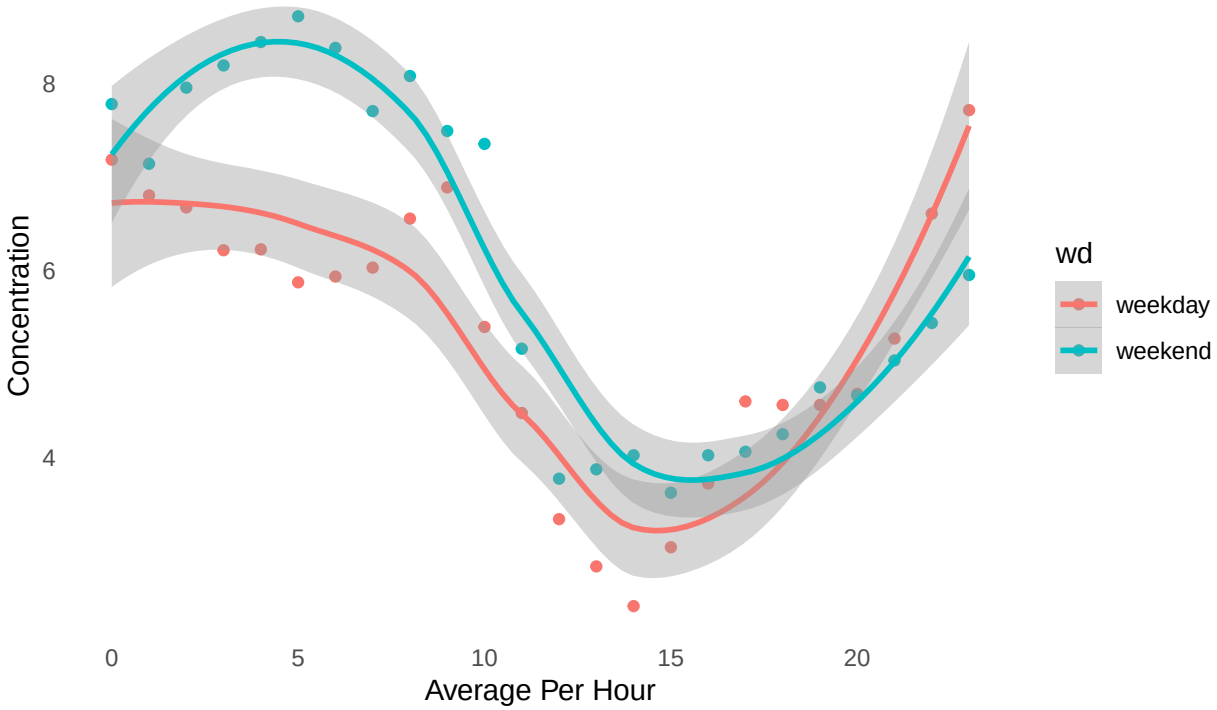
PM10 concentration by weekday and weekend with trend

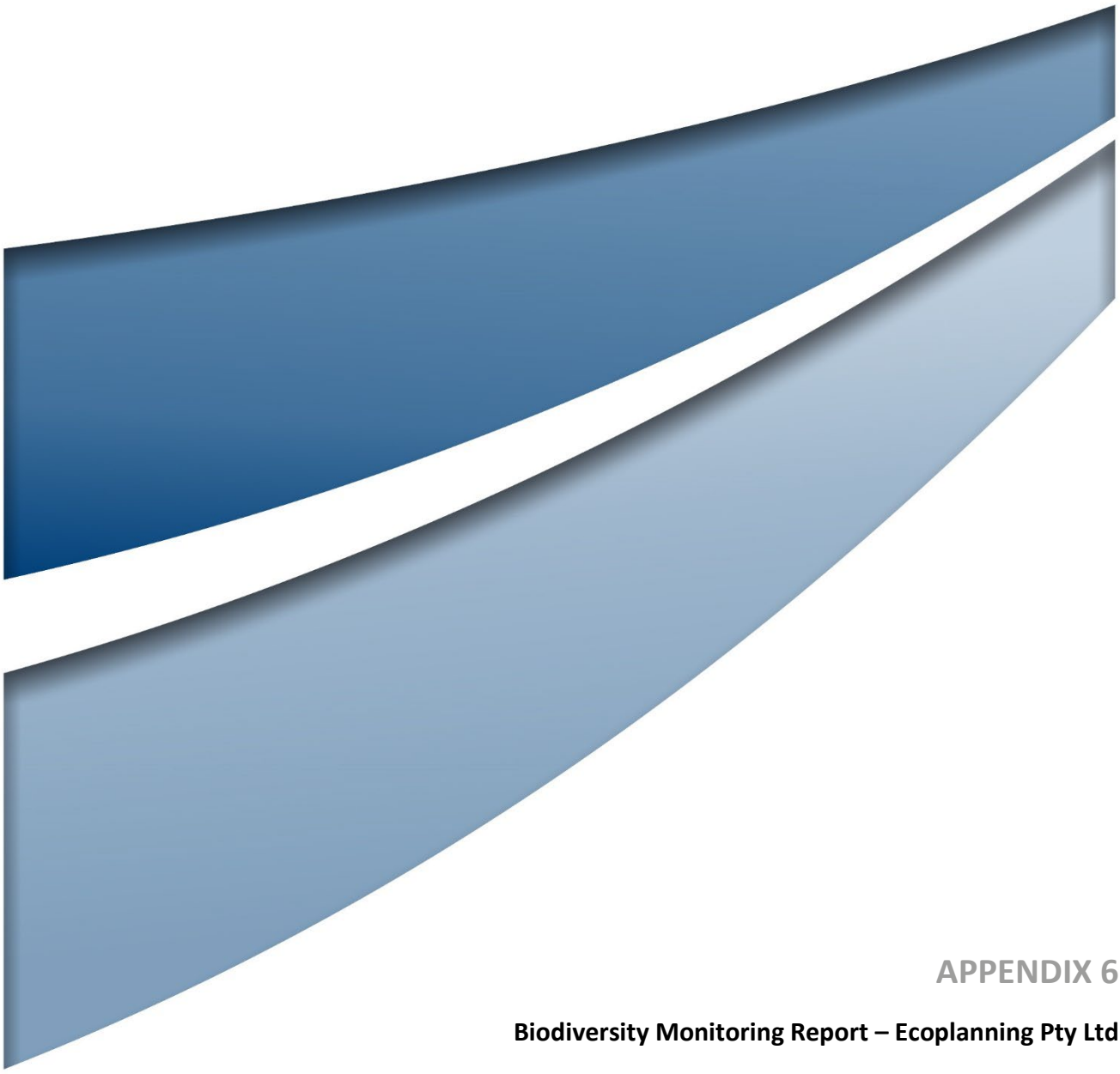


PM2.5 concentration by Weekday/weekend and Hour



PM2.5 concentration by weekday and weekend with trend





APPENDIX 6

Biodiversity Monitoring Report – Ecoplanning Pty Ltd

ecoplanning
ecology | planning | offsets

Biodiversity Monitoring 2021

Wallerawang Quarry

Prepared for: Walker Quarries

16 March 2022 Version: 1.0 - DRAFT

PROJECT NUMBER	2021-175			
PROJECT NAME	Biodiversity Monitoring 2021			
PROJECT ADDRESS	Wallerawang Quarry			
PREPARED FOR	Walker Quarries			
AUTHOR/S	Brian Towle			
REVIEW	**Technical**	**QA**	**Version**	**Date to client**
	Ed Cooper		1.0 - DRAFT	15 March 2022
LICENCES	**Scientific Licence**		SL101557	
	Bionet Sensitive Species Data Licence		1115	
	Animal Research Authority Ethics Licence		Fauna Surveys and Monitoring (16/346)	
	Scientific Collection - Aquatic		P19/0009-1.0 & OUT19/2602	

This report should be cited as: 'Ecoplanning (2022). Biodiversity Monitoring 2021– Wallerawang Quarry. Prepared for Walker Quarries.'

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Glossary and abbreviations

Acronym	Description
ASL	above sea level
BAM	Biodiversity Assessment Method
BMP	Biodiversity Management Plan
DPIE	Department of Planning, Industry and Environment
HBT	Hollow Bearing Trees
PCB	Purple Copper Butterfly
PCT	Plant Community Type
TSR	Travelling Stock Route
VIS	Vegetation Integrity Score

1 Introduction

Walker Quarries Pty Ltd (Walker Quarries) currently operates Wallerawang Quarry ('the Quarry'), located on land adjoining the Great Western Highway to the south of Wallerawang, approximately 8 km northwest of Lithgow (**Figure 1.1**). A Biodiversity Management Plan (BMP; Umwelt 2020) has been prepared to guide the management of biodiversity values on the Quarry and in accordance DA 344-11-2001 (Condition 3(26)).

Section 6 of the BMP for the Quarry (Umwelt 2020) outlines the ecological monitoring program for the Quarry. The monitoring is designed to assess the adequacy of the ecological management strategies to be undertaken as part of the BMP.

The specific objectives of the monitoring program are to:

- evaluate the success of flora and fauna management strategies;
- facilitate continuous improvement in rehabilitation and revegetation practices;
- record and document changes in retained vegetation within the Quarry, and allow for comparison with previous records;
- record and document fauna population changes and identify any breeding and critical habitat; and
- ensure the ecological significance of the remnant vegetation or rehabilitated areas are maintained or improved as a result of ongoing management practices.

The BMP includes specific monitoring procedures in relation to the Purple Copper Butterfly (*Paralucia spinifera;* PCB) and local flora and fauna. This report presents the method and results of monitoring for the PCB and local flora and fauna undertaken in spring 2021 and in accordance with the BMP.

Figure 1.1: Site location

2 Methods

2.1 Local flora and fauna

Monitoring surveys for local fauna were undertaken by Brian Towle (Senior Ecologist, Ecoplanning) on 8 October 2021. Flora data from fixed quadrats were collected by Brian Towle (Senior Ecologist, Ecoplanning) and Jo Daly (Ecologist, Ecoplanning) on 30 November 2021 and 1 December 2021.

In accordance with the requirements of the BMP, monitoring of local flora involved annual monitoring of vegetation within six monitoring plots in-line with the Biodiversity Assessment Method (BAM 2020). In brief, BAM involves collecting floristic data within a 20 m × 20 m plot as well as a number of vegetation metrics (e.g. litter cover) along a 50 m transect. These data are entered into the BAM calculator (BAM-C) to derive a Vegetation Integrity Score (VIS) that reflects a site's vegetation condition relative to a benchmark condition for the same vegetation type in the contemporary landscape.

The locations of floristic monitoring plot-transects were consistent with monitoring locations in 2020, with the exception of BAM04 (**Figure 2.1**). The monitoring site BAM04 was impacted by approved vegetation clearing during 2021. A new monitoring site ('BAM07') was established in 2021 to replace BAM04. The location of BAM07 was selected to match the Plant Community Type and general vegetation condition present within BAM04. Location details for the new monitoring locations are shown in **Table 2.1 .**

Observations of local fauna, including species identified from call recognition, indirect observations (including scats, tracks, chewed cones etc.) or observed visually were recorded concurrently with surveys for the PCB. These fauna observations were not confined to any specific plot and included areas of retained bushland within the Quarry which were traversed to access monitoring plots.

Table 2.1: Floristic monitoring plot locations

Monitoring plot	Coordinates (GDA94 z56)		Orientation (°)	Plant Community Type
	Easting	Northing		
BAM01	227963	6296432	95	732 – Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion
BAM02	227842	6296341	250	
BAM03	228015	6296433	130	
BAM04	228196	6296437	190	1093 – Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
BAM05	228130	6296822	130	
BAM06	228290	6296629	55	
BAM07	228339	6296510	50	

Figure 2.1: Plot locations

2.2 Purple Copper Butterfly

Monitoring surveys for the PCB at the Quarry and control site were undertaken on 8 October 2021 by Brian Towle. In accordance with the BMP, five patches of *Bursaria spinosa* subsp. *lasiophylla* (Blackthorn) within the Quarry were monitored. The locations of the five monitoring sites are shown in **Figure 2.2** and summarised in **Table 2.2**. At each of the monitoring sites the following methods were employed:

- Surveyor positioned themselves to survey the site and conduct visual inspections to observe any butterfly activity for at least 10 minutes per site.
- Random plants were searched for PCB caterpillars.
- Random plants were selected and searched for the ant species *Anonychomyrma itinerans*, as this ant has a mutualistic relationship with PCB.
- Selected *Bursaria spinosa* subsp. *lasiophylla* plants were gently shaken to trigger a flight response from any butterflies present.
- Any butterflies observed were captured using a butterfly net and identified using Braby (2016). All animals captured were released at their point of capture.
- The age of plants (large plants and seedlings present), health (any new shoots present) and evidence of grazing (chewed leaves) were recorded.

The BMP identifies that this survey methodology is also to be undertaken at two control sites, with control sites located at Cox's Creek, Wallerawang, and Eusdale Road, Yetholme surveyed in previous seasons (2016 and 2017). Consultation with the NSW Department of Planning, Industry and Environment prior to the 2018 surveys identified an alternative control site at the Cheetham Flats TSR (Hampton Road, Rydal) located approximately 13 km south-west of the Quarry. As in 2018 to 2020, the 2021 surveys for PCB at control sites were limited to the single site at Cheetham Flat TSR.

Weather conditions during the survey period (8 October 2020), as recorded onsite, were warm with maximum temperatures of approximately 22°C and with only minor cloud cover. Winds were generally light. Weather conditions as recorded at the nearest meteorological station at Marrangaroo (station 063308), located approximately 5 km east of the Quarry, are presented in **Table 2.3**. Monthly rainfall totals for 2016 to 2020, as recorded at the Lidsdale (Maddox Lane) Meteorological Station, is presented in **Table 2.4**.

Survey timing was identified as being towards the end of the active period for PCB in 2021. In 2021 PCB were identified as being active in August which was earlier than in previous seasons (J. Petrie, DPIE Threatened Species Officer pers. comm. 2021). The combination of an early active period for the species and prolonged wet, cloudy and cool conditions in late September restricted opportunities to undertake the PCB surveys.

Figure 2.2: Purple Copper Butterfly monitoring locations

Table 2.2: Purple Copper Butterfly site details

Monitoring plot	Coordinates (GDA94)		Elevation (m ASL), aspect & slope (°)	Approx. stand size
	Easting	Northing		
17	227716	6295941	~922 m ASL. North facing slope, ~10°	100 × 30 m
18	227887	6295945	~917 m ASL. North facing slope, ~5°	20 × 20 m
19	227948	6296046	~915 m ASL. East facing slope, ~30°	20 × 20 m
20/21	228005	6296045	~910 m ASL. South facing slope, ~30°	30 × 20 m
24	228244	6295945	~955 m ASL. North-east facing slope, ~20°	20 × 20 m

ASL – Above Sea Level

Table 2.3: Weather conditions during Purple Copper Butterfly surveys, as recorded at Marrangaroo meteorological station (#063308)

Date	Temperature (°C)		Rainfall (mm)	Wind - 9 am		Wind – 3 pm	
	Min	Max		Direction	Speed (km/hr)	Direction	Speed (km/hr)
8/10/2021	5.5	20.4	0	N	6	N	6

Table 2.4: Total monthly rainfall (mm) from 2016 to 2021, as recorded at the Lidsdale (Maddox Lane) Meteorological Station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	142	28.8	69.6	6.2	26	173.4	91.4	52.2	118.6	71.4	58.4	86.4
2017	37.2	12.2	141.4	21.2	32.6	19.6	6.6	41.8	4.2	106	28.8	75.2
2018	49	65.2	56.6	13.6	12.6	34.6	5.4	38	67.6	79.8	124.6	80.6
2019	154.6	21.4	84.2	1	37.2	16.2	10.8	18	52	9.4	35.8	2.8
2020	46.8	131.6	115.0	93.6	47.8	39.0	77.8	103.8	57.0	68.6	Not available	
2021	82.8	87.4	154	0.6	25.2	51.8	60.6	81.4	43.2	53.2	172.4	63.0
Mean	**86.2**	**77.0**	**68.8**	**42.5**	**47.5**	**49.6**	**50.0**	**63.4**	**52.9**	**66.9**	**73.5**	**73.5**

3 Results and Discussion

3.1 Local flora and fauna

The photos and floristic data recorded within each of the six monitoring plots are presented in **Appendix A**.

3.1.1 Photo-point monitoring

No disturbance to vegetation or soils including vegetation clearing, widespread dieback, erosion or excavations associated with the Quarry operations were recorded within monitoring plots as shown in site photographs (**Appendix A**).

3.1.2 Floristic monitoring

Vegetation integrity scores (VIS) were calculated for each monitoring plot and are shown in **Table 3.1**. The VIS across all sites were broadly similar, ranging from 78.2 to 89.2, and generally high reflecting the relatively intact nature of the retained vegetation surrounding the Quarry.

All monitoring plots had very high composition scores, ranging from 90.2 to 96.8, which are reflective of high species richness within the monitoring plots. Vegetation structure scores were more variable between monitoring plots, although generally all plots had a relatively high structure scores, ranging from 66.9 to 92. This is reflective of a high foliage cover of the vegetation structural layers which are characteristic of the respective Plant Community Type (PCT). Vegetation function score 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, structure 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.

Table 3.1: VIS for floristic monitoring plots in 2021

Monitoring plot	PCT	Composition score	Structure Score	Function Score	Vegetation Integrity Score
BAM01	732	96.8	82.5	88	**88.9**
BAM02	732	92.5	88.9	84.9	**88.7**
BAM03	732	94.6	92	72.2	**85.6**
BAM05	1093	90.4	72.6	72.8	**78.2**
BAM06	1093	90.2	75	83.1	**82.5**
BAM07	1093	91.9	66.9	72.5	**76.4**

Comparison with previous monitoring seasons

A comparison of vegetation integrity scores, including component composition, structure and function scores, and species richness is presented for those monitoring sites surveyed in 2020 and 2021 (all sites excluding BAM04 and BAM07). No comparisons are presented against earlier monitoring seasons which employed a different monitoring method. The overall VIS and the component scores for vegetation composition, structure and function for each monitoring plot surveyed in 2020 and 2021 are presented in **Table 3.2** and **Figure 3.1**.

Across all monitoring sites which were surveyed in 2020 and 2021, the VIS in 2021 were similar or slightly increased compared to 2020. While small increases and decreases in vegetation composition and structure were recorded at individual sites between seasons, the most consistent change between 2020 and 2021 was an increased function score at monitoring sites in 2021 compared to 2020. As vegetation function assesses aspects of the local vegetation which are the result of long-term vegetation management (large trees and fallen logs can take many decades to develop), the observed differences over 12 months are likely to be the result of different observers, rather than any recent change in the length of fallen logs or the number of large trees.

Table 3.2: VIS for floristic monitoring plots in 2020 and 2021

Monitoring plot	Composition score		Structure Score		Function Score		Vegetation Integrity Score	
	2020	2021	2020	2021	2020	2021	2020	2021
BAM01	98	96.8	99.4	82.5	70.5	88	**88.2**	**88.9**
BAM02	81.5	92.5	88.8	88.9	64.3	84.9	**77.5**	**88.7**
BAM03	94.6	94.6	89.5	92	63.2	72.2	**81.2**	**85.6**
BAM05	84.1	90.4	75.2	72.6	63.3	72.8	**73.7**	**78.2**
BAM06	83.1	90.2	77.2	75	59.8	83.1	**72.7**	**82.5**

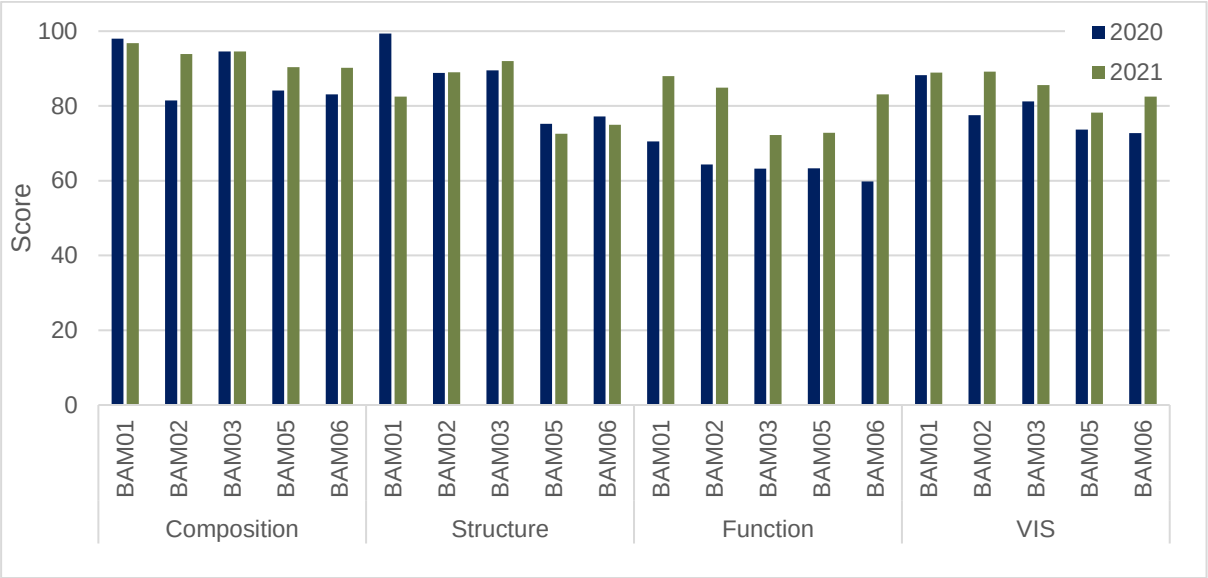

Figure 3.1: Vegetation structure, composition, function and overall VIS for monitoring sites

Across all monitoring sites, small fluctuations were observed in native species richness and exotic species richness in 2021 compared to 2020 (**Table 3.3**). No consistent trend was identified across sites indicating an increase or decrease in native or exotic species richness. However, the cover of exotic vegetation within monitoring plots (**Table 3.4**) increased within all monitoring plots within PCT 732 (BAM01, BAM02 and BAM03). This increased cover of exotic vegetation was driven by large increases in the cover of the exotic grass species *Anthoxanthum odoratum** (Sweet Vernal Grass) within these sites. Specifically, the cover of *A. odoratum** from 2020 to 2021 doubled within BAM01 (increased from 30 % to 60 %), increased from 20% to 35 % in BAM02 and increased from 10 % to 15 % in BAM03. The increased cover of *A. odoratum** in 2021 compared to 2020 is attributed to ongoing above average rainfall in 2021, 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 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 2021 (**Table 3.4**).

Table 3.3: Species richness within monitoring plots in 2020 and 2021

FACTOR	BAM01		BAM02		BAM03		BAM05		BAM06	
	2020*	2021	2020*	2021	2020*	2021	2020*	2021	2020*	2021
No. native species	47	42	40	44	54	51	34	40	35	37
No. exotic species	14	11	14	13	5	4	3	3	3	5
Total species richness	61	53	54	57	59	55	37	43	38	43

Table 3.4: Cover of exotic species and high threat exotic species within monitoring plots

FACTOR	BAM01		BAM02		BAM03		BAM05		BAM06	
	2020*	2021	2020*	2021	2020*	2021	2020*	2021	2020*	2021
Exotic species cover	35.5	62.8	23.2	37.2	10.8	15.3	2.1	2.2	5.1	5.5
High threat exotic cover	0.2	0.3	0.2	0.3	0	0	2	2	5	5.1

3.1.3 Local fauna

One native mammal and 16 birds were opportunistically observed during the monitoring surveys (**Appendix B**). 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 2021 two individuals of the species were observed foraging within the eastern portions of the quarry, in proximity to the monitoring plot BAM07 (**Figure 2.1**).

Observations of local fauna made during the monitoring indicate that the vegetated areas of the Quarry continue to provide habitat for an array of native fauna species.

3.2 Purple Copper Butterfly

No PCBs were detected at the reference site during the survey period. This is likely the result of the late timing of the PCB surveys which was the result of wet, windy and overcast conditions in much of September 2020 as well as delays associated with COVID restrictions.

No PCBs were observed within any of the monitoring sites at the Quarry. However, two butterfly species, Caper White Butterfly (*Belenois java*) and Common Grass-blue (*Zizina otis*), were recorded in addition to a number of other arthropods including moths, spiders, beetles, and bees.

No *Anonychomyrma itinerans*, or any other ant species were observed on *Bursaria spinosa* subsp. *lasiophylla* during surveys at the quarry. One ant species was observed on adjacent vegetation, although was identified as a *Crematogaster* sp. and not the species *Anonychomyrma itinerans* with which PCB has mutualistic relationship.

Bursaria spinosa subsp. *lasiophylla* within each of the monitoring sites was observed to be in a healthy condition with mature fruiting individuals and seedlings present. At all sites, *Bursaria spinosa* subsp. *lasiophylla* was observed with new growth shoots up to 8 cm in length. No obvious signs of grazing were apparent.

These monitoring results are largely consistent with monitoring results from 2016-2020, where no PCB or *Anonychomyrma itinerans* were recorded within the Quarry, although *Bursaria spinosa* subsp. *lasiophylla* remained in good health with new growth evident. While the definitive absence of PCB from the Quarry site in 2021 is difficult to determine as surveys in did not coincide with the optimal time for detection of the species, the absence of *Anonychomyrma itinerans* suggests that PCB remain absent from the Quarry site (noting that PCBs have not been detected within the Quarry during any of the last six years of monitoring).

4 Conclusions and recommendations

Consistent with the previous years' monitoring report, no large-scale disturbance to vegetation or soils which were attributable to the quarry operations were detected within the areas surrounding the Quarry operations. Observations of local fauna made during the monitoring indicate that the vegetated areas of the Quarry continue to provide habitat for an array of native fauna species, including the threatened bird species, Gang-gang Cockatoo. Based upon results from the 2021 monitoring period, no observable or significant trends in the occurrence of specific threatened species or quality / quantity of available habitat has been identified.

Several exotic flora species which have potential to invade native vegetation and outcompete native species were recorded within the Quarry including *Hypericum perforatum** (St Johns Wort), *Pinus radiata** (Radiata Pine) and *Rubus fruticosus* sp. agg.* (Blackberry). These species should be targeted as part of weed control works within the Quarry.

As no PCB or attendant ants (*Anonychomyrma itinerans*) have been recorded within the Quarry during the last six monitoring surveys (Lesryk 2016; 2017; Ecoplanning 2019, 2020, 2021), with PCB last detected in the Quarry in September 2002, it is likely that the population of PCB which once occurred within the Quarry is now locally extinct.

5 References

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Appendix A Floristic monitoring data

Site Photos

BAM01 – Start transect

BAM01 – End transect

BAM02 – Start transect

BAM02 – Start end

BAM03 – Start transcect

BAM05 – Start transect

BAM05 – End transect

BAM06 – Start transcript

BAM06 – End transcript

BAM07 – Start transect

BAM07 – End transect

Plot data

Plot No.	Composition					
	Tree	Shrub	Grass	Forb	Fern	Other
BAM01	4	7	8	21	1	1
BAM02	3	5	10	24	1	0
BAM03	5	15	7	21	0	3
BAM05	2	11	9	17	0	1
BAM06	2	6	9	16	1	1
BAM07	2	9	7	21	1	1

Plot No.	Structure					
	Tree	Shrub	Grass	Forb	Fern	Other
BAM01	24.0	8.0	22.0	14.0	0.1	2.0
BAM02	17.0	0.6	37.2	13.0	0.3	0.0
BAM03	21.1	10.2	28.3	8.6	0.0	0.3
BAM05	30.0	3.1	20.7	4.0	0.0	0.1
BAM06	40.0	1.2	19.6	3.9	0.1	0.1
BAM07	30.0	2.4	17.0	3.5	0.1	0.5

Plot No.	Function										
	Large trees	HBT	Litter cover (%)	Logs (m)	Tree stem 5-10 cm	Tree stem 10-20 cm	Tree stem 20-30 cm	Tree steam 30-50 cm	Tree stem 50-80 cm	regen	High threat exotic
BAM01	3	1	13.0	117	1	1	1	1	-	1	0.3
BAM02	2	1	17	94	1	1	1	1	-	1	0.3
BAM03	1	2	44	35	1	1	1	1	-	1	0.0
BAM05	1	6	88	77	1	1	1	1	-	1	2.0
BAM06	1	7	65	35	1	1	1	1	-	1	5.0
BAM07	1	2	78	75	1	1	1	1	-	1	0.0

Appendix B Flora and Fauna species list

Flora

Family	Scientific name	Common name	Status	BAM01	BAM02	BAM03	BAM05	BAM06	BAM07
Anthericaceae	Laxmannia gracilis	Slender Wire Lily	Native				0.1	0.1	0.1
Apiaceae	Hydrocotyle laxiflora	Stinking Pennywort	Native	2	5	1		0.1	0.3
Asphodelaceae	Bulbine bulbosa	Bulbine Lily	Native	0.1					
Aspleniaceae	Asplenium flabellifolium	Necklace Fern	Native	0.1					
Asteraceae	Brachyscome spp.		Native			0.1			0.1
	Cassinia laevis	Cough Bush	Native	0.1	0.1	0.1	0.1	0.2	0.1
	Cirsium vulgare	Spear Thistle	Exotic	0.1	0.1	0.1			0.1
	Conyza spp.	Flaxleaf Fleabane	Exotic	0.1	0.1			0.1	0.1
	Coronidium scorpioides	Button Everlasting	Native			0.1	0.1	0.1	0.1
	Cymbonotus lawsonianus	Bear's Ear	Native	0.1	0.1	0.1			
	Euchiton involucratus	Star Cudweed	Native	0.1	0.2	0.2		0.1	0.2
	Gamochaeta calviceps	Cudweed	Exotic						0.1
	Hypochaeris glabra	Smooth Catsear	Exotic				0.1		
	Hypochaeris radicata	Catsear	Exotic	1	1	0.1	0.1	0.2	0.1
	Ozothamnus diosmifolius	White Dogwood	Native				0.1		
	Senecio bathurstianus		Native	5	0.1				
	Senecio hispidulus	Hill Fireweed	Native		0.1				
	Senecio prenanthoides		Native			0.2			0.2
	Senecio quadridentatus	Cotton Fireweed	Native	3	0.1		0.1	0.1	
	Solenogyne gunnii	Solengyne	Native		0.1				
	Sonchus oleraceus	Common Sowthistle	Exotic	0.1	0.1				

Family	Scientific name	Common name	Status	BAM01	BAM02	BAM03	BAM05	BAM06	BAM07
	Vittadinia spp.	Fuzzweed	Native		0.1				
	Xerochrysum bracteatum	Golden Everlasting	Native	0.1	0.1		0.1		
Boraginaceae	Cynoglossum australe		Native	0.5	0.2				
Campanulaceae	Wahlenbergia spp.	Bluebell	Native	0.1	0.1		0.1		0.1
	Wahlenbergia stricta	Tall Bluebell	Native			0.1		0.2	
Caryophyllaceae	Stellaria pungens	Prickly Starwort	Native	0.5					
Clusiaceae	Hypericum gramineum	Small St John's Wort	Native		0.1	0.1	0.1		0.1
	Hypericum perforatum	St. Johns Wort	Exotic	0.1	0.1				
Convolvulaceae	Dichondra repens	Kidney Weed	Native	0.2	2				
Crassulaceae	Crassula sieberiana	Australian Stonecrop	Native	0.1					
Cyperaceae	Carex inversa	Knob Sedge	Native		0.2				
	Lepidosperma gunnii		Native			0.1	0.2	0.5	
	Schoenus apogon	Fluke Bogrush	Native	0.1	0.1	0.1			
Dilleniaceae	Hibbertia obtusifolia	Hoary Guinea Flower	Native			0.1		0.2	1
Droseraceae	Drosera peltata	A Sundew	Native			0.1	0.1		
Ericaceae	Acrotriche serrulata	Honeypots	Native	0.1		0.2			
	Brachyloma daphnoides	Daphne Heath	Native			0.1		0.1	0.1
	Leucopogon attenuatus	A Beard-heath	Native				0.1		
	Leucopogon virgatus		Native			0.2			0.2
	Lissanthe strigosa	Peach Heath	Native	0.2	0.2	1	0.1		0.1
	Monotoca scoparia		Native	0.1		2			
Fabaceae (Faboideae)	Bossiaea buxifolia		Native			0.1		0.1	
	Desmodium gunnii	Slender Tick-trefoil	Native		0.1				
	Dillwynia phylicoides	Parrot-pea	Native		0.1	0.5	0.2	0.2	0.2

Family	Scientific name	Common name	Status	BAM01	BAM02	BAM03	BAM05	BAM06	BAM07
	Glycine clandestina	Twining glycine	Native			0.1			
	Gompholobium huegelii	Pale Wedge Pea	Native			0.1		0.1	
	Hardenbergia violacea	False Sarsaparilla	Native				0.1	0.1	0.5
	Hovea heterophylla		Native			0.1		0.1	0.1
	Mirbelia platylobioides		Native			0.1	0.1	0.2	
	Pultenaea tuberculata		Native				0.1		
	Vicia spp.	Vetch	Exotic	0.1					
Fabaceae (Mimosoideae)	Acacia dealbata	Silver Wattle	Native	1	1	0.1			
	Acacia gunnii	Ploughshare Wattle	Native						0.1
	Acacia spp.	Wattle	Native				0.1		
	Acacia ulicifolia	Prickly Moses	Native				0.1		
Gentianaceae	Centaurium erythraea	Common Centaury	Exotic		0.1	0.1		0.1	0.1
Geraniaceae	Geranium solanderi	Native Geranium	Native	0.5	0.3				
Goodeniaceae	Goodenia bellidifolia		Native				1	0.2	0.2
	Goodenia hederacea	Ivy Goodenia	Native			0.1	0.1	0.2	0.1
Haloragaceae	Gonocarpus teucrioides	Germander Raspwort	Native	0.1	1	0.5	1	0.3	0.2
Iridaceae	Patersonia sericea	Silky Purple-Flag	Native				0.5	1.5	0.5
Lamiaceae	Ajuga australis	Austral Bugle	Native	0.1		0.1			
	Mentha satureioides	Native Pennyroyal	Native		1				
Lauraceae	Cassytha glabella		Native			0.1			
Loganiaceae	Mitrasacme polymorpha		Native				0.1		
Lomandraceae	Lomandra filiformis	Wattle Matt-rush	Native	1	5	1	1	0.5	1
	Lomandra longifolia	Spiny-headed Mat-rush	Native		0.1		15	2	5

Family	Scientific name	Common name	Status	BAM01	BAM02	BAM03	BAM05	BAM06	BAM07
	Lomandra multiflora subsp. Multiflora	Many-flowered Mat-rush	Native	0.1	1				
Myrtaceae	Eucalyptus bridgesiana	Apple Box	Native	10	4	2			
	Eucalyptus dalrympleana	Mountain Gum	Native	10		8			
	Eucalyptus dives	Broad-leaved Peppermint	Native	3		10	5	5	20
	Eucalyptus mannifera	Brittle Gum	Native		12		25	35	10
	Eucalyptus pauciflora	White Sally	Native			1			
Orchidaceae	Caladenia spp.		Native					0.1	
	Calochilus robertsonii	Purplish Beard Orchid	Native				0.1		
	Dipodium spp.		Native						0.1
	Diuris sulphurea	Tiger Orchid	Native					0.1	0.1
	Glossodia major	Waxlip Orchid	Native						0.1
	Microtis unifolia	Common Onion Orchid	Native				0.1		
	Thelymitra spp.		Native				0.1		0.1
Oxalidaceae	Oxalis spp.		Native	0.1	0.3	0.1			
Phormiaceae	Dianella caerulea	Blue Flax-lily	Native				0.1	0.2	
	Dianella longifolia	Blueberry Lily	Native			0.1			
	Dianella revoluta	Blueberry Lily	Native	1	1	5			0.5
Phyllanthaceae	Poranthera microphylla	Small Poranthera	Native			0.1	0.2	0.3	0.1
Pinaceae	Pinus radiata	Radiata Pine	Exotic		0.1		2	5	
Pittosporaceae	Billardiera scandens	Hairy Apple Berry	Native			0.1			
	Bursaria spinosa subsp. lasiophylla	Native Blackthorn	Native	5	0.1	5			
Plantaginaceae	Plantago gaudichaudii	Narrow Plantain	Native	0.1		0.2			

Family	Scientific name	Common name	Status	BAM01	BAM02	BAM03	BAM05	BAM06	BAM07
	Plantago lanceolata	Lamb's Tongues	Exotic	1	0.2				
	Veronica calycina	Hairy Speedwell	Native		0.1				0.1
	Veronica plebeia	Trailing Speedwell	Native					0.1	
Poaceae	Aira spp.	A Hairgrass	Exotic		0.1				0.1
	Anthoxanthum odoratum	Sweet Vernal Grass	Exotic	60	35	15			0.5
	Aristida vagans	Threeawn Speargrass	Native				0.2		
	Austrostipa spp.	A Speargrass	Native	0.1					
	Briza maxima	Quaking Grass	Exotic		0.1				
	Dichelachne micrantha	Shorthair Plumegrass	Native			2	0.1	0.2	
	Dichelachne spp.	A Plumegrass	Native					0.1	0.5
	Echinopogon caespitosus	Bushy Hedgehog-grass	Native			0.1	0.2	0.2	0.5
	Echinopogon ovatus	Forest Hedgehog Grass	Native	0.5	0.5				
	Microlaena stipoides	Weeping Grass	Native	5			1		1
	Microlaena stipoides var. stipoides	Weeping Grass	Native		20				
	Poa sieberiana	Snowgrass	Native	15	10	5	1	1	1
	Rytidosperma pallidum	Redanther Wallaby Grass; Silvertop Wallaby Grass	Native	0.2	0.2	20	2	15	8
	Rytidosperma spp.		Native		0.1			0.1	
Polygonaceae	Rumex brownii	Swamp Dock	Native					0.1	
Primulaceae	Lysimachia arvensis	Scarlet Pimpernel	Exotic		0.1				
Proteaceae	Persoonia linearis	Narrow-leaved Geebung	Native			0.5	2		0.5
Pteridaceae	Cheilanthes sieberi	Rock Fern	Native		0.3			0.1	0.1
Ranunculaceae	Clematis aristata	Old Man's Beard	Native	2					

Family	Scientific name	Common name	Status	BAM01	BAM02	BAM03	BAM05	BAM06	BAM07
Rosaceae	Acaena novae-zelandiae	Bidgee-widgee	Native	0.1	0.5				0.1
	Acaena ovina	Acaena	Native	0.1					
	Rosa rubiginosa	Sweet Briar	Exotic	0.1					
	Rubus fruticosus sp. agg.	Blackberry complex	Exotic	0.1	0.1			0.1	
	Rubus parvifolius	Native Raspberry	Native	0.5	0.1				
Rubiaceae	Asperula cunninghamii	Twining Woodruff	Native		0.1				
	Galium spp.		Native		0.1	0.1			
	Opercularia diphylla	Stinkweed	Native				0.1	0.1	
Scrophulariaceae	Orobanche minor	Broomrape	Exotic	0.1					
Stackhousiaceae	Stackhousia monogyna	Creamy Candles	Native			0.1			
Stylidiaceae	Stylidium graminifolium	Grass Triggerplant	Native			0.1			0.1
Thymelaeaceae	Pimelea curviflora	Rice Flower	Native			0.1			
Violaceae	Melicytus dentatus	Tree Violet	Native	2					
	Viola betonicifolia	Native Violet	Native	0.1	0.2	0.1			

Fauna

Common name	Scientific name	Status (BC Act)	2021 monitoring	Previously recorded[#]
MAMMALS				
Common Wombat	*Vombatus ursinus*			X
Common Ringtail Possum	*Pseudocheirus peregrinus*			X
Eastern Grey Kangaroo	*Macropus giganteus*		X	X
Common Wallaroo	*Macropus robustus*			X
Swamp Wallaby	*Wallabia bicolor*			X
Yellow-bellied Sheathtail-bat	***Saccolaimus flaviventris***	**V**		**X**
Large Forest Bat	*Vespadelus darlingtoni*			X
* Fox	*Vulpes vulpes*			X
* Feral Cat	*Felis catus*			X
* Rabbit	*Oryctolagus cuniculus*			X
* Pig	Sus scrofa			X
AVES (BIRDS)				
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*			X
Striated Thornbill	*Acanthiza lineata*			X
Brown Thornbill	*Acanthiza pusilla*			X
Buff-rumped Thornbill	*Acanthiza reguloides*			X
Eastern Spinebill	*Acanthorhynchus tenuirostris*			X
Grey Goshawk	*Accipiter novaehollandiae*			X
Australian King Parrot	*Alisterus scapularis*		X	X
Pacific Black Duck	*Anas superciliosa*			X
Red Wattlebird	*Anthochaera carunculata*		X	X
Brush Wattlebird	*Anthochaera chrysoptera*			X
Wedge-tailed Eagle	*Aquila audax*			X
Fan-tailed Cuckoo	*Cacomantis flabelliformis*			X
Pallid Cuckoo	*Cacomantis pallidus*			X
Gang-gang Cockatoo	***Callocephalon fimbriatum***	**V**	**X**	**X**
Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*		X	X
Australian Wood Duck	*Chenonetta jubata*			X
Spotted Quail-thrush	*Cinclosoma punctatum*			X
Red-browed Treecreeper	*Climacteris erythrops*			X
Grey Shrike-thrush	*Colluricincla harmonica*			X
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*		X	X
White-winged Chough	*Corcorax melanorhamphos*			X
White-throated Treecreeper	*Cormobates leucophaea*		X	X
Australian Raven	*Corvus coronoides*		X	X
Australian Magpie	*Cracticus tibicen*		X	X
Grey Butcherbird	*Cracticus torquatus*			X
Laughing Kookaburra	*Dacelo novaeguineae*		X	X

Common name	Scientific name	Status (BC Act)	2021 monitoring	Previously recorded#
Varied Sittella	***Daphoenositta chrysoptera***	**V**		**X**
Eastern Yellow Robin	*Eopsaltria australis*		X	X
Dollarbird	*Eurystomus orientalis*			X
White-throated Gerygone	*Gerygone albogularis*			X
Welcome Swallow	*Hirundo neoxena*			X
Yellow-faced Honeyeater	*Lichenostomus chrysops*			X
White-eared Honeyeater	*Lichenostomus leucotis*			X
Superb Fairy-wren	*Malurus cyaneus*		X	X
Brown-headed Honeyeater	*Melithreptus brevirostris*			X
White-naped Honeyeater	*Melithreptus lunatus*			X
Restless Flycatcher	*Myiagra inquieta*			X
Leaden Flycatcher	*Myiagra rubecula*			X
Red-browed Finch	*Neochmia temporalis*			X
Rufous Whistler	*Pachycephala rufiventris*			X
Spotted Pardalote	*Pardalotus punctatus*			X
Striated Pardalote	*Pardalotus striatus*			X
Scarlet Robin	***Petroica boodang***	**V**		**X**
Red-capped Robin	*Petroica goodenovii*			X
Rose Robin	*Petroica rosea*			X
Noisy Friarbird	*Philemon corniculatus*			X
New Holland Honeyeater	*Phylidonryis novaehollandiae*			X
Crimson Rosella	*Platycercus elegans*		X	X
Eastern Rosella	*Platycercus eximius*		X	X
Tawny Frogmouth	*Podargus strigoides*			X
Grey Fantail	*Rhipidura albiscapa*		X	X
Willie Wagtail	*Rhipidura leucophrys*		X	X
White-browed Scrubwren	*Sericornis frontalis*		X	X
Pied Currawong	*Strepera graculina*			X
Grey Currawong	*Strepera versicolor*			X
Sacred Kingfisher	*Todiramphus sanctus*			X
Silvereye	*Zosterops lateralis*			X
AMPHIBIANS				
Common Eastern Froglet	*Crinia signifera*			X
Bleating Tree Frog	*Litoria dentata*			X
REPTILES				
Copper-tailed Skink	*Ctenotus taeniolatus*			X
Pale-flecked Garden Sun-skink	*Lampropholis guichenoti*			X
Jacky Lizard	*Amphibolurus muricatus*			X

* denotes an introduced species; V – listed as 'Vulnerable' under the NSW *Biodiversity Conservation Act 2016* (BC Act); # Wildthing Consultants (1999), Lesryk Environmental (2016; 2017) and Ecoplanning (2020).