



Strength. Performance. Passion

Lynwood Quarry
2021 Annual Review
1 January 2021 – 31 December 2021

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Appendix 1	2021 Noise Monitoring Reports
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Title Block

<u>Name of operation</u>	Lynwood Quarry
<u>Name of operator</u>	Holcim (Australia) Pty Ltd
<u>Development consent #</u>	DA 128-5-2005
<u>Annual review start date</u>	1 January 2021
<u>Annual review end date</u>	31 December 2021
<p>I, Wayne Beattie, certify that this audit report is a true and accurate record of the compliance status of Lynwood Quarry for the period 1 January 2021 to 31 December 2021 and that I am authorised to make this statement on behalf of Holcim.</p> <p><i>Note.</i></p> <p>a) <i>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.</i></p> <p>b) <i>The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement – maximum penalty 5 years imprisonment): sections 307A, 307B and 307C (False or misleading applications/information/documents – maximum penalty 2 years imprisonment or \$22,000, or both).</i></p>	
<u>Name of authorized reporting officer</u>	Wayne Beattie
<u>Title of authorized reporting officer</u>	Lynwood Quarry Manager
<u>Signature of authorised reporting officer</u>	
<u>Date</u>	29/03/2022

1.0 Statement of Compliance

This Annual Review has been prepared to provide a summary of the performance of the Lynwood Quarry operations over the period 1 January 2021 to 31 December 2021 (referred to hereafter as the report period). The compliance of the operation with relevant approvals is summarised in **Table 1**.

Table 1 below provides a statement of compliance for the report period. The non-compliances have been ranked according to the risk matrix included in **Table 2**. A description of each non-compliance is provided in **Table 3**.

Table 1: Statement of Commitments

Relevant Approval	All Conditions Complied With?
Development Consent (DA) 128-5-2005 (Mod 5)	No
Environment Protection Licence (EPL) 12939	No
Water Access Licence (WAL) No. 25575	Yes
Controlled Activity Approval (CAA) No. 10 ERM 2011/0446	Yes
Aboriginal Heritage Impact Permit (AHIP) No. 1100264	Yes
S65 Approval under the <i>Heritage Act 1977</i> 2009/S65A/13	Yes

Table 2: Compliance Status Key for Table 3

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of likelihood of occurrence
Medium	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> Potential for serious environmental consequences, but is unlikely to occur; or Potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> Potential for moderate environmental consequences, but is unlikely to occur; or Potential for low environmental consequences, but is likely to occur
Administrative Non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval condition)

Source: Annual Review Guideline (NSW Government, 2015).

Table 3: 2021 Non-Compliances

Relevant approval	Condition	NC Summary	Compliance status	Comment from Holcim	Where addressed in this Report
DA128-5-2005 (Mod 5) EPL 12939	Condition 15 of Schedule 3 (Air Quality Management Plan) Condition 12 of Schedule 3 (Impact Air Assessment) Condition M2.2 (EPL Air Quality Monitoring Requirements)	PM10 sampling event missed on 24/03/2021 due to flooding causing HVAS 1 to become inaccessible.	Low Non-Compliance	Holcim notified DPE of an inability to capture Lockersleigh HVAS data due to flooding. As a result there was no data captured for 24 March 2021. DPE acknowledged the receipt of this notification on 7/04/2021.	Section 6.3
DA128-5-2005 (Mod 5) EPL 12939	Condition 15 of Schedule 3 (Air Quality Management Plan) Condition M2.2 (EPL Air Quality Monitoring Requirements)	Depositional dust was not sampled for the month of June 2021.	Low Non-Compliance	Sampling event missed for depositional dust in June 2021 due to Covid-19 restrictions at site. Holcim notes that the remaining 11 months returned depositional dust results considerably less than the maximum criteria levels.	Section 6.3
DA128-5-2005 (Mod 5) EPL 12939	Condition 15 of Schedule 3 (Air Quality Management Plan) Condition 12 of Schedule 3 (Impact Air Assessment) Condition M2.2 (EPL Air Quality Monitoring Requirements)	HVAS 1 did not sample every six days in 2021. 50 24-hour PM10 samples were taken in 2021 at HVAS 1.	Low Non-Compliance	HVAS 1 software error impacted sampling schedule, and therefore samples were not taken by unit on the correct dates. Monitoring contractor reported issue and followed up on unit errors across March to July 2021 to resolve the issues. Resolution of unit errors and calibration were delayed due to Covid-19 restrictions preventing timely attendance to site. DPE and EPA were notified of this incident by email.	Section 6.3

Relevant approval	Condition	NC Summary	Compliance status	Comment from Holcim	Where addressed in this Report
	Requirements)				
DA128-5-2005 (Mod 5)	Condition 20 of Schedule 3 (Water Management Plan) Condition 23 of Schedule 3 (Water Management Plan)	Full monitoring was not undertaken at SW8 across 2021, resulting in some absent results.	Low Non-Compliance	The parameters pH, TSS, or EC were not monitored at surface monitoring location SW8 on a quarterly basis. This is a low non-compliance because the full monitoring schedule outlined in the WMP was not implemented.	Section 6.4

2.0 Introduction

Holcim (Australia) Pty Ltd (Holcim) owns and operates Lynwood Quarry, a hard rock quarry located west of Marulan, approximately 160 km southwest of Sydney and 27 km northeast of Goulburn in New South Wales (NSW), as seen in **Figure 1** and **Figure 2**.

Holcim is the trading name for Holcim (Australia) Pty Ltd which, as a member of the LafargeHolcim group, is one of the leading suppliers of heavy construction material products in Australia, operating over 80 quarries, over 200 fixed concrete plants and a fleet of over 900 concrete delivery trucks. Holcim began quarry operations at Lynwood Quarry in 2015 and since this time has provided high quality sand and aggregates for use in construction and landscaping across the local, regional and Sydney markets.

Holcim was granted Development Consent in December 2005 (DA 128-5-2005) (Development Consent) by the then NSW Minister for Planning for the construction and operation of Lynwood Quarry. There have been 5 modifications approved to the Development Consent under section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) since 2005.

On 18 May 2016, Lynwood Quarry was granted modification to commence quarrying and associated activities in an alternative resource known as the Granite Pit located to the north-west of the Approved Pit area (refer to **Table 4**). The approval also allowed for the reduction in the extent of the approved pit to reflect limitations within the ignimbrite resource. Operations have continued in the Granite Pit since this time.

2.1 Quarry Contacts

The Lynwood Quarry Works Manager is responsible to the regulatory authorities for all aspects of environmental compliance at the site. Key personnel at Lynwood Quarry are described in **Table 4**.

Table 4: Key personnel responsible for environmental management

Name	Role	Company	Contact Details
Wayne Beattie	Quarry Manager	Holcim	02 4820 7007 +61 419 476 900
Rebecca McLean	Support Services Supervisor	Holcim	-
Shilpa Shashi	Planning and Environment Coordinator NSW/ACT	Holcim	+61 427 859 852

2.2 Annual Review Requirements

Condition 10 of Schedule 5 of the Lynwood Quarry Development Consent requires an Annual Review (AR) to be prepared and submitted to the Department of Planning Industry and Environment (DPE). This report has been prepared in accordance with the *NSW Government Annual Review Guideline* (NSW Government, 2015) and details the operational and environmental management activities of Lynwood Quarry during the report period 1 January 2021 to 31 December 2021. Development Consent requirements along with an explanation of where each requirement is addressed within this document are provided in **Table 5**.

Table 5: Development Consent 128-5-2005 (MOD 5) conditions for the Annual Review

Conditions		Addressed in Section
Schedule 2 – General Administrative Conditions		
Production Data		
13.	The Applicant must (a) Provide annual quarry production data to DRG using the standard form for that purpose; and (b) Include a copy of this data in the Annual Review.	Section 4.2
Schedule 3 – Specific Environmental Conditions		
Monitoring of Quarry Product Transport		
33A.	The Applicant must keep accurate records of all laden truck movements from the site (weekly, monthly and annually) and publish a summary of records in its Annual Review.	Section 4.2.2
Schedule 3 – Specific Environmental Conditions		
Retirement of Biodiversity Credits		
48A.	Each Annual Review required under condition 10 of Schedule 5 must record the number of credits retired in the reporting year (or previously) and the area of vegetation expected to be cleared in the forthcoming five years.	Section 6.7
Schedule 3 – Specific Environmental Conditions		
Waste Management		
53	The Applicant must: (d) Report on waste management and minimisation on the Annual Review to the satisfaction of the Secretary.	Section 6.10
Schedule 5 – Environmental Management, Reporting and Auditing		
Annual Review		
10	By the end of September each year, or other timing as may be agreed by the Secretary, the Applicant must review the environmental performance of the development to the satisfaction of the Secretary. This review must:	This document
	(a) Describe the development (including 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;	Section 4.0, Section 6.0 and Section 8.0
	(b) Include a comprehensive review of the monitoring results and complaints records of the development over the previous financial year, which includes a comparison of these results against: <ul style="list-style-type: none"> • The relevant statutory requirements, limits or performance measures/criteria; • The requirements of any plan or program required under this consent; • The monitoring results of previous years; and • The relevant predictions in the documents listed in condition 2(a) of Schedule 2; 	Section 6.0 and Section 9.2
	(c) Identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	Section 1.0 and Section 11.0
	(d) Identify any trends in the monitoring data over the life of the development;	Section 6.0
	(e) Identify any discrepancies between the predicted and actual impacts of the	Section 6.1

Conditions		Addressed in Section
	development, and analyse the potential cause of significant discrepancies;	
(f)	Describe what measures will be implemented over the current financial year to improve the environmental performance of the development;	Section 6.0
(g)	Describe the area of vegetation cleared as part of the development and identify the area proposed to be cleared over the next 5 years;	Section 6.7
(h)	Calculate the number of additional Bio Banking (or equivalent) credits that will need to be purchased, before that clearing can be done; and	Section 6.7
(i)	Report on the number of Bio Banking (or equivalent) credits that have been purchased to allow ongoing clearing and completion of stages.	Section 6.7



FIGURE 2.1
Locality Plan

File Name (A4): R01/4541_001.dgn
20190321 13.46

Figure 1: Locality Plan (Umwelt, 2016)

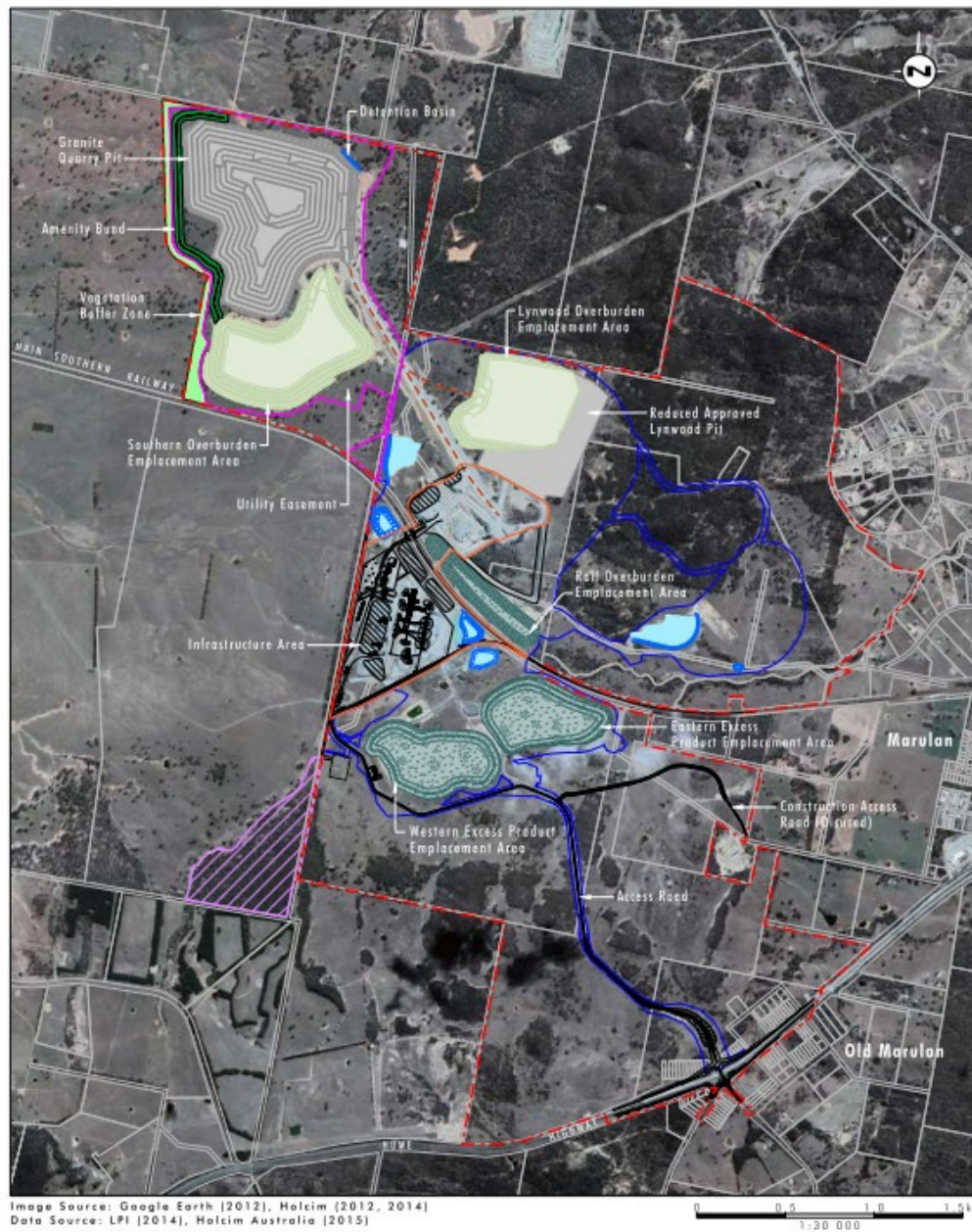


FIGURE 2.2
 Overview of Operations

File Name (A4): R01/4541_002.dgn
 20190321 13:46

Figure 2: Overview of Operations (Umwelt, 2016)

3.0 Approvals

Approvals currently held by Lynwood Quarry are listed in **Table 6**.

3.1 Development Consent History

The original Lynwood Quarry Development Consent 128-5-2005 (Development Consent) was granted on 21 December 2005. Subsequent modifications to the Development Consent were approved in 2009, 2011, 2016 and 2017. The Development Consent permits carrying out quarrying operations until 1 January 2038.

On 18 May 2016, Lynwood Quarry was granted modification (MOD 4) to commence quarrying and associated activities in an alternative resource known as the Granite Pit immediately north-west of the existing operations.

MOD 4 of the Development Consent included:

- Development of a new Granite Pit to the west of the existing Approved Pit;
- Construction of an additional haul road, to connect the new Granite Pit to the existing infrastructure, water management structures and other minor additions;
- Emplacement of overburden from the Granite Pit in the Approved Pit;
- Construction of an amenity bund to the west and northwest of the Granite Pit; and
- A reduction in total disturbance area due to a decrease in the Approved Pit disturbance footprint and associated overburden storage and haul roads.

In May 2018, Lynwood Quarry was granted approval (MOD 5) to modify Condition 48A of Schedule 3 of the Development Consent. This condition related to the retirement of biodiversity credits for the site. All references to Development Consent conditions within this document refer to the MOD 5 unless stated otherwise. Approvals and licences held by Holcim are provided in **Table 6**.

Table 6: Current Approvals, Licences and Leases

Approval and Relevant Legislation	Details
Development Consent (DA) 128-5-2005 (Mod 5) <i>NSW Environmental Planning and Assessment Act 1979</i>	The MOD 5 Development Consent applied through the report period. Mining operations permitted to 1 January 2038 in accordance with the MOD 5 Development Consent.
Part 3A permit <i>Water Management Act 2000</i>	Obtained for works within 40 m of stream
Part 2 Licence <i>Water Act 1912 Part 2</i>	Obtained for surface water capture and use
Part 5 Licence <i>Water Act 1912 Part 5</i>	Obtained for groundwater monitoring
Controlled Activity Approval (CAA) No. 10 ERM 2011/0446 <i>Rivers and Foreshores Improvement Act 1948</i>	Works within the riparian zones on site
Environment Protection Licence (EPL) 12939 <i>Protection of the Environment Operations Act 1997</i>	Held by Holcim over the Lynwood Quarry premises.
Water Access Licence (WAL) No. 25575	Obtained under the water sharing plan for the Upper Nepean and Upstream Warragamba Water source (refer to Section 7.2)
Aboriginal Heritage Impact Permit (AHIP) No. 1100264 <i>National Parks and Wildlife Act 1974</i>	Discussed further in Section 6.11 .

3.2 Management Plan Approvals

Environmental monitoring data and a copy of the current Lynwood Quarry Management Plans are published on the Holcim website (<https://www.holcim.com.au/lynwood>). During the preparation of this Annual Review, Holcim has assessed the need to review or update Management Plans.

The following Management Plans have been submitted to DPE and are awaiting approval:

- Rehabilitation and Landscape Management Plan (September 2020)
- Air Quality Management Plan (2020)
- Riparian Management Plan (2021) (Submitted for approval 24 August 2021).

4.0 Operations Summary

A summary of the operations undertaken at Lynwood Quarry during the reporting period is presented in the following sections.

4.1 Quarrying Operations

Full scale quarrying operations were completed within the Lynwood Ignimbrite Pit in March 2018. The small scale of ongoing campaign quarrying in this area reflects the limitations of the quarry resource. Quarrying operations commenced in the Granite Pit in 2017 and continued in 2021.

The quarrying process on site consists of the following four stages:

- Clearing and topsoil stripping – typically undertaken using a dozer and/or excavator in accordance with Lynwood Quarry’s clearing procedure, with selected material stockpiled for later use in rehabilitation;
- Overburden removal and emplacement – overlain material is typically removed via blasting and hauled to emplacement areas;
- Blasting, loading and haulage of primary raw feed (PRF) material – target resource removed via drill and blast then loaded by front-end loaders into haul trucks for transportation to the primary crusher; and
- Crushing and screening – resources are processed by the primary crusher are then transported via conveyor to the infrastructure area for tertiary processing and screening. Products are stockpiled awaiting transport to local, regional and Sydney markets via road and rail transportation methods.

The construction of the earthen visual amenity bund continued from 2020 into 2021. Adverse weather and high rainfall delayed the completion of the bund. It is expected the bund will be completed at the end of 2022.

4.2 Production Limits

Production in 2021 met the limits on total saleable product and amount of product transported by road outlined in Schedule 2 Condition 13 of the Development Consent. During the report period, a total of 2,018,000 tonnes of quarry product was transported from the quarry by road and rail. This is less than the total production for the previous two reporting periods. In 2021 a total of 1,129,000 tonnes was transported from the quarry by road transport using Hume Highway.

Table 7 provides the annual production and transportation volumes for the 2019, 2020, and 2021 reporting periods and also provides a forecast for the 2022 report period.

Table 7: Long-term Production Summary

Material	Approved limit DA 128-5-2005	2019 (actual) (t)	2020 (actual) (t)	2021 (actual) (t)	2022 (forecast) (t)	Compliance with criterion
Product - total	5 million tonnes from the site in a year	2,262,468	2,257,967	2,018,000	2,140,000	Yes
Product Transported - Rail	5 million tonnes from the site in a year	1,386,838	1,063,128	696,409	1,100,000	Yes
Product Transported - Road	1.5 million tonnes from the site in a year by road	875,630	1,194,840	1,129,000	1,100,000	Yes

4.2.1 Hours of Operation

Lynwood Quarry operates in accordance with the operating hours specified in **Table 8** below.

Table 8: Operating hours at Lynwood Quarry

Activity	Day	Time	Compliance with Operating Hours during this report period
Construction works	Monday – Friday	7am to 6pm	Yes
	Saturday	8am to 1pm	Yes
	Sunday and Public Holidays	None	Yes
Topsoil/overburden removal/emplacement; drilling	Any day	7am to 6pm	Yes
Blasting	Monday – Saturday	9am to 5pm	Yes
	Sunday and Public Holidays	None	Yes
Extraction	Any day	7am to 10pm	Yes
Processing (crushing, screening, stockpiling); loading, delivery and distribution; maintenance	Any day	Anytime	Yes

4.2.2 Vehicle Movements

In accordance with Condition 33A of Schedule 3 of the Development Consent, the number of laden truck movements from Lynwood Quarry are summarised in **Table 9**. Product transported by road from Lynwood Quarry is restricted to less than 1.5 million tonnes per annum, with the 2021 report period road transport tonnages being within the approved limits.

Table 9: Summary of Laden Trucks Movements 2021

Month	Laden Truck Movements	Product by Road Transport (tonnes)
January	2240	71,298.69
February	2085	70,548.54
March	2311	78,166.62
April	2369	82,038.12
May	3276	121,825.11
June	4067	150,357.55
July	3422	127,320.38
August	3301	111,993.84
September	3478	123,133.31
October	2606	91,807.95
November	3384	117,063.65
December	1273	100,501.05
Total	32539	1246055

4.3 Construction Activities

Construction of the visual amenity bund commenced in late 2018 with continued construction during the report period. It is expected to be completed at the end of the 2022 report period.

Minor upgrades to the processing plant and its equipment commenced in the 2021 report period.

All construction activities in 2021 occurred within the project footprint.

5.0 Actions Required from Previous Annual Review

5.1 Actions from 2020 Annual Review – DPE Actions

Holcim received a letter DPE on the 2020 Annual Review on 19 April 2021. DPE indicated the 2020 Annual Review generally satisfied Condition 10 of Schedule 5 of the Approval. Additional comments are presented in the table below with Holcim’s comments.

Table 10: DPE Comments on Previous Annual Review

Comments on Previous Annual Review	Works Undertaken	Where addressed in this Document
DPE notes the failure to undertake water monitoring at SW4 is a non-compliance.	2020 Annual Review self-reported failure to monitor at SW4 for the entire 2020 period.	Section 7
Lynwood Groundwater Management Plan should be reviewed and if necessary revised to reflect the cessation of water monitoring at GPZ2 due to the relocation of the pit.	Lynwood has reflected the removal of GPZ2 in this Annual Review.	Section 7
Submission of the Annual Review to the Goulburn Mulwaree Council is required under Schedule 5 Condition 10 of DA 128-5-2005.	Noted. Holcim submitted the 2020 Annual Review to Goulburn Mulwaree Council. Holcim will submit this 2021 Annual Review to Council.	Section 5.1

5.2 Actions From the 2020 Annual Review – Holcim Proposed Actions

Actions proposed to be undertaken at Lynwood Quarry during this reporting period (2021) based on the previous Annual Review are detailed in **Table 11**.

Table 11: Actions Required from the 2020 Annual Review

Actions from Previous Annual Review	Works Undertaken	Where addressed in this Document
Complete implementation of the actions identified in the IEA Action Plan	All IEA Actions have been closed out.	Section 10 – Independent Audit
Implementation of environmental Management Plans	All Management Plans have been implemented by Lynwood in 2021.	Section 6 – Environmental Performance

Actions from Previous Annual Review	Works Undertaken	Where addressed in this Document
Undertake nest box and fauna monitoring in accordance with the Lynwood Quarry Rehabilitation and Landscape Management Plan	Nest box monitoring undertaken in 2021 as per the Rehabilitation and Landscape Management Plan, including by a suitably qualified expert.	Section 6.7 and Section 8.0
Finalise the Development Approval for the construction and management of the Keeping Place	Approval Modification submitted to Council on 23 December 2021.	Section 6.11 – Indigenous Heritage
Continued extraction within the Granite Pit	Extraction continued in 2021.	Section 4.0 - Operations Summary
Continue works associated with construction of the visual amenity bund to the west of the Granite Pit	Construction of the visual amenity bund was delayed due to adverse weather conditions. However, the construction will recommence in 2022.	Section 4.0 Operations Summary

6.0 Environmental Performance

The following sections provide a summary of environmental monitoring and management undertaken during the report period. In accordance with the Development Consent, Lynwood Quarry has prepared several management plans in consultation with relevant stakeholders.

The environmental monitoring network is shown in **Figure 3**.

6.1 Summary of Performance Against EA Predictions

The Lynwood Quarry has been subject to three environmental assessments (EA) and five modifications since the original environmental impact statement and development application was approved in 2005. MOD 4 involved expanding quarrying operations to the west of the existing operations. This was assessed by the most recent EA dated November 2015 (Umwelt, 2015). The results of environmental monitoring data obtained during the report period have been compared to the predictions in the EA dated November 2015 within this Annual Review. During the report period, monitoring was undertaken at Lynwood Quarry for meteorological, noise, air quality, surface water and groundwater.

A summary of environmental performance during the report period is given in **Table 12**.

Table 12: Summary of the environmental performance during the report period

Aspect	Approval Criteria/ EIS Prediction	Performance during the report period	Trend / key management implications	Implemented / proposed management actions
Air Quality (Refer to Section 6.3)	Refer to Section 6.1.1 Refer to Section 6.3.2	Compliant with the monitoring program and criteria levels.	Depositional dust and PM10 monitoring results continued to trend below impact assessment criteria limits during the report period and remained within historical range.	Actions to be undertaken are detailed in Section 6.3 .
Surface Water Quality (refer to Section 6.4)	Refer to Section 6.1.2 / Refer to Section 6.4.2	Non-compliance due to exceedances in oil and grease and electrical conductivity. Exceedances also occurred in pH and TSS. Some samples were missed at SW8 for part of 2021.	Generally, surface water monitoring results were below impact assessment criteria during the report period and remained within historical range. There were some increased levels of oil and grease in 2021 compared to 2020 which were investigated and reported to DPE and EPA. A number of monitoring sites were dry during the report period therefore, some samples could not be taken during those occasions.	Actions to be undertaken are detailed in Section 6.4
Groundwater (Refer to Section 6.5)	Refer to Section 6.1.3 / Refer to Section	Non-compliance as pH at GPZ1 and GPZ5 exceedance occurred	Generally, groundwater results were below impact assessment criteria during the report period and	Actions to be undertaken are detailed in Section 6.5 .

Aspect	Approval Criteria/ EIS Prediction	Performance during the report period	Trend / key management implications	Implemented / proposed management actions
	6.5.2	in Quarters 1 and 4.	remained within historical ranges. However, exceedances of the trigger levels from the WMP occurred for some pH results.	
Noise (Refer to Section 6.6)	Refer to Section 6.1.4/ Refer to Section 6.6.2	Compliant with the monitoring program and criteria levels.	Noise results were below impact assessment criteria in 2021.	Any further actions to be undertaken are in Section 6.6.
Biodiversity (Refer to Section 6.7)	Refer to Section 6.7.2 Refer to Section 8.3	Compliant with the monitoring program and Consent.	Rehabilitation outcomes continue to improve. Fauna monitoring was undertaken during the report period.	Any further actions to be undertaken are in Section 6.7.
Blasting (refer to Section 6.9)	Refer to Section 6.9	Compliant.	Blasting monitoring was undertaken in 2021 and complied with the Consent and EPL Criteria.	Any further actions to be undertaken are in Section 6.9.

6.1.1 Air Quality Predictions Against the EA

An Air Quality Impact Assessment (PEL, 2015) was completed as part of the Lynwood Quarry Extraction Area Modification EA (Umwelt, 2015). The assessment predicted that as operations move in a westerly direction, there would be no predicted exceedances of the assessment criteria for all PM₁₀ and Depositional Dust at private residences during the operational phase of the quarry. In summary, the EA concluded that:

- EPA air quality impact assessment criteria were not predicted to be exceeded at nearby residences; and
- The modification is not anticipated to cause adverse impacts offsite.

A discussion of air quality monitoring results recorded during the report period is provided in Section 6.3.

The annual depositional dust averages were below the impact assessment criteria and EA predictions for this report period. Depositional dust averages were calculated from 11 months of data due to the monitoring schedule being interrupted in June 2021 due to Covid-19 restrictions. However, this is not recorded as a non-compliance because the remaining 11 months of data were consistently below the criteria levels.

PM₁₀ results for 2021 were similarly below impact assessment criteria and EA predictions, however there were a number of short-term exceedances as a result of equipment failure, contamination by agricultural activity, disturbances outside the project area, and severe regional bushfires. A summary of these invalid or contaminated monitoring events for PM₁₀ is presented in **Table 17**.

6.1.2 Surface Water Quality Predictions Against the EA

The outcomes of the surface water assessment (Umwelt 2005 & 2015) indicated that Lynwood Quarry would not significantly alter the flow regimes or annual flow volumes in the surrounding creek network in terms of peak discharges, flood levels or peak in-stream velocities either upstream or downstream of Lynwood. No adverse impacts are predicted in terms of channel stability, in-stream habitat of either Joarimin Creek or Lockyersleigh Creek systems. No adverse impacts are predicted in terms of water quality in Joarimin Creek, Lockyersleigh Creek or the downstream drainage systems.

A discussion of the surface water quality results recorded during report period is provided in **Section 7**. All surface water quality results were generally consistent with criteria. Low to little flow was observed at a number of sampling events. There was no evidence that the site caused impact to water quality downstream.

6.1.3 Groundwater Predictions Against the EA

Drawdown impacts are expected within the immediate vicinity of the quarry pit. As the expansion of the granite pit continues, a progressively deepening and slightly expanding cone of depression surrounding the pit is expected (Umwelt, 2015). Groundwater inflow rates are predicted to be negligible given the early stage of operations in the extension area.

Groundwater results for 2021 were generally consistent with the historical minimum and maximum bounds reaching back to 2010. Groundwater results indicated there has been no considerable impact on the local groundwater from operations. Exceedances in the maximum triggers occurred in some GPZ series bores for pH. All other parameters were compliant with the criteria outlined in the WMP. A discussion of groundwater level and water quality results is provided in **Section 7**.

6.1.4 Noise Predictions Against the EA

The results of the noise impact assessment identified that noise impacts from the operations will meet the existing development consent criteria at all locations and time of day periods except receiver location 11 (Monitoring Location - N3) where a minor 1 dB exceedance is predicted at night (Umwelt, 2015).

No noise monitoring exceedances were recorded during the report period and all results remained below impact assessment criteria. A discussion of noise monitoring results recorded during the report period is provided in **Section 6.6** and all noise monitoring reports are presented in **Appendix 1**.

6.2 Meteorological Monitoring

Lynwood Quarry has continued to maintain a weather station (M1) since 3 January 2020. The site uses this meteorological monitoring data to inform daily operations as per the Development Consent.

A summary of meteorological results for the report period are outlined in **Table 13**.

Table 13: Meteorological Monitoring Results Summary 2021

Month	Total Rainfall (mm)	Minimum Temperature (°C)	Maximum Temperature (°C)
January	66.4	7.5	36.7
February	99.0	9.8	29.1
March	184.8	3.5	29.5
April	2.6	-0.2	26.3
May	110.0	-2.3	21.3
June	43.2	-3.9	17.5
July	21.2	-5.0	17.0
August	59.2	-2.3	21.2
September	22.2	-0.5	21.6
October	42.6	2.3	25.9
November	204.2	4.9	24.1
December	84.4	4.6	30.5
Annual TOTAL	939.8		

The site received a total of 939.8 mm of rainfall over the 2021 report period. The highest monthly rainfall occurred in November, with 204.2 mm falling during this period. Lynwood received the least amount of monthly rainfall in April with only 2.6 mm received at the site.

The minimum recorded temperature in the region occurred in July (-5°C). The maximum temperature at Lynwood Quarry was 36.7°C in January 2021.

6.3 Air Quality

6.3.1 Environmental Management Measures

Lynwood's AQMP was revised in 2020 in consultation with the EPA and was waiting on approval into 2021. Holcim received comments on the revised management plan in January 2020 and September 2020.

The air quality monitoring network consists of five dust deposition gauges (DD5, DD8, DD11, D12, DD13) and two High Volume Air Samplers (HVAS1 and HVAS2), which are used to measure depositional dust and particulate matter <math><10\mu\text{m}</math> (PM_{10}), respectively. Dust monitoring locations are provided in **Figure 3**.

Lynwood trialled the use of an automatic water spray system in the site production area in 2021. The automatic water sprays were purposed as a dust suppression system. The automatic system continues to be used as an effective dust mitigation measure.

During 2020 monitoring and air quality management on site aligned with the revised AQMP (2020). This revised AQMP is waiting for approval by DPE, with the draft last updated in September 2020.

6.3.2 Performance Criteria

Holcim is required to ensure that dust and particulate emissions do not cause exceedances of the criteria specified in the Development Consent. The air quality assessment criteria specified in the Development Consent are provided in **Table 14**.

Table 14: Air quality impact assessment criteria

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual average	90 $\mu\text{g}/\text{m}^3$
Particulate matter <math><10\mu\text{m}</math> (PM_{10})	Annual average	30 $\mu\text{g}/\text{m}^3$
	24 hour average	50 $\mu\text{g}/\text{m}^3$
Deposited dust	Annual average (maximum total)	4 $\text{g}/\text{m}^2/\text{month}$
	Annual average (maximum increase)	2 $\text{g}/\text{m}^2/\text{month}$

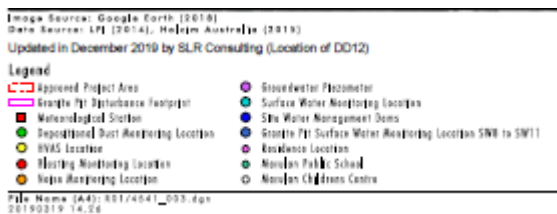
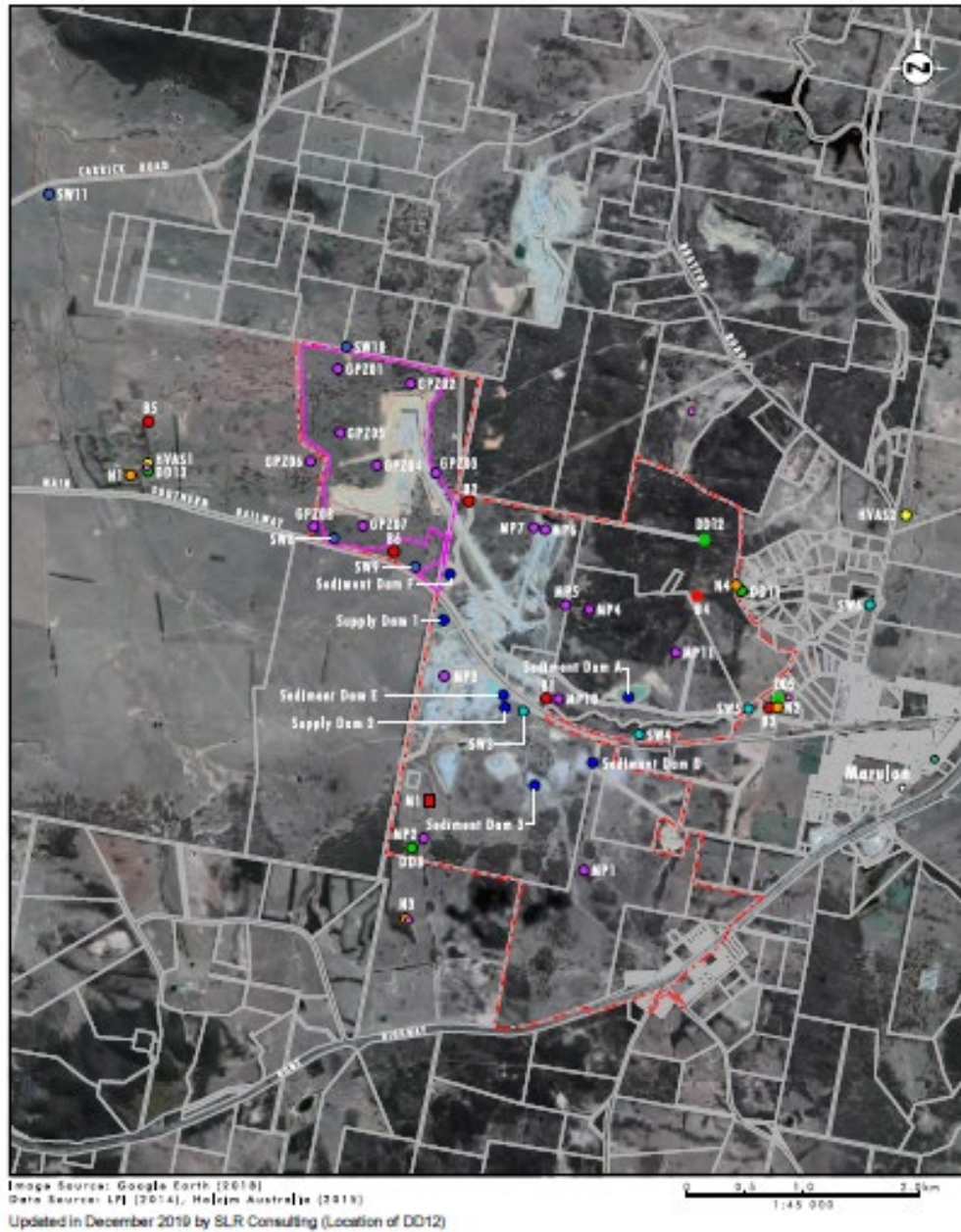


Figure 3: Environmental Monitoring Network (SLR, 2019)

6.3.3 Environmental Outcomes

6.3.3.1 Depositional Dust

As noted in **Table 15**, depositional dust monitoring during the report period took place on a monthly basis. All sampling sites were compliant with Development Consent criteria for annual average total deposited dust and ranged between 0.7 – 1.7 g/m²/month.

It should be noted that in the early months of 2020 Australia experienced unprecedented bushfire events which may have impacted air quality results at the site. Elevated results for total insoluble solids as well as ash content in January 2020 reflect the impact of a bushfire that occurred 5km from site. Samples at all gauges in March were affected by rainwater and are thus excluded from the annual average.

No samples could be collected in June 2021 due to the sampling program being interrupted by Covid-19 restrictions. Results for depositional dust across the 2021 period were considerably below the criteria targets, hence we have not called this missed sampling event a non-compliance.

Some gauges in February and April were contaminated by insects and bird faeces in the gauges. These results are excluded from the annual average. Therefore, the annual averages for DD5, DD11, and DD14 are calculated from ten samples. The annual average for DD6 is calculated from nine samples. All other annual averages are calculated using 11 samples.

Table 15: 2021 Depositional Dust Monitoring Results

Month	Total Insoluble Solids (g/m ² /month)						
	DD5	DD6	DD8	DD11	DD12	DD13	DD14
January	0.7	0.5	1.7	0.6	0.6	2.1	1.5
February	NS	NS	1.7	0.8*	1.1	0.9	NS
March	2.7	0.3	0.4	0.4	0.7	0.8	0.5
April	0.6	NS	0.3	0.6	0.4	1.2	0.6
May	0.9	9.0	0.2	0.4	2.0	0.2	0.6
June	-	-	-	-	-	-	-
July	0.6	0.7	0.2	1.0	0.7	0.3	0.6
August	0.4	0.8	0.2	0.7	0.3	0.3	0.2
September	0.3	1.7	0.3	3.4	0.3	0.3	1.1
October	0.7	0.8	0.5	1.5	0.7	0.6	0.5
November	0.9	1.0	0.6	1.0	0.7	1.5	0.8
December	0.9	0.7	1.1	3.5	1.8	1.1	1.2
Annual Average	0.9	1.7	0.7	1.3	0.9	0.9	0.8
Minimum	0.3	0.3	0.2	0.4	0.3	0.2	0.2
Maximum	7.4	9.0	1.7	3.5	2.0	2.1	1.5

Note: Contaminated samples are marked with an asterisk (*) and have been removed from the annual average. NS indicates where a sample was invalidated due to contamination. No samples were collected for June 2021.

6.3.3.2 PM₁₀/ TSP

PM₁₀ monitoring via HVAS units 1 (Lockyersleigh) and 2 (Brayton Road) was undertaken during the report period. There were 50 sampling events at HVAS 1 and 61 sampling events at HVAS 2 in the report period, as shown in **Table 16**.

Table 16: 2021 PM₁₀ Compliance Summary

Category	HVAS 1	HVAS 2
Total number of HVAS monitoring rounds required in 2021	62	62
Number of completed monitoring rounds	50	61
Number of incomplete monitoring rounds, contamination, or equipment failure.	5	1
Number of valid samples	45	60

There were zero instances of the HVAS exceeding the short term 24-hour average criteria of 50 µg/m³ in 2021. Those sampling events which were impacted by equipment failure are presented in **Table 17**. Monitoring records note there were few instances of minor contamination to samples, however the results were still valid.

Table 17: Summary of Non-Compliant or Invalid PM₁₀ Monitoring Results

Date	PM ₁₀ (µg/m ³)	Cause
HVAS1		
March 30, 2021	NS	HVAS did not run on correct schedule and reverted to previous sampling schedule. Fixed on 8 April 2021.
April 11, 2021	NS	HVAS did not run. Issue was recorded.
June 22, 2021	NS	HVAS did not run. Issue was recorded.
July 22, 2021	NS	HVAS did not run. Unit recalibrated due to recurring issues.
HVAS2		
August 2, 2021	NS	HVAS did not run. Issue was recorded.

Table 18 and **Table 19** display the PM₁₀ monitoring results at HVAS 1 and HVAS 2, respectively.

Table 18: HVAS 1 2021 PM₁₀ Monitoring Results

HVAS 1 (Lockyersleigh)			
Sampling Date	PM10	TSP	Compliance Status
January 5, 2021	9.5	23.8	Compliant
January 11, 2021	8.2	20.4	Compliant
January 17, 2021	11.7	29.2	Compliant
January 23, 2021	18.4	46.1	Compliant
February 4, 2021	12.1	30.3	Compliant
January 29, 2021	2.0	5.1	Compliant
February 10, 2021	7.4	18.4	Compliant

HVAS 1 (Lockyersleigh)			
Sampling Date	PM10	TSP	Compliance Status
February 16, 2021	2.8	6.9	Compliant
February 22, 2021	6.8	17.1	Compliant
February 28, 2021	10.9	27.3	Compliant
March 6, 2021	14.6	36.4	Compliant
March 12, 2021	2.4	6.0	Compliant
March 18, 2021	1.7	4.3	Compliant
March 30, 2021	NA	NA	Missed sampling
April 8, 2021	4.4	11.1	Compliant
April 17, 2021	2.0	5.1	Compliant
April 23, 2021	17.6	43.9	Compliant
April 29, 2021	0.8	2.0	Compliant
April 11, 2021	NA	NA	Missed sampling
May 29, 2021	5.8	14.6	Compliant
June 10, 2021	4.5	11.4	Compliant
June 22, 2021	NA	NA	Missed sampling
July 28, 2021	7.8	19.5	Compliant
July 22, 2021	NA	NA	Missed sampling
August 4, 2021	3.5	8.8	Compliant
August 9, 2021	6.9	17.4	Compliant
August 15, 2021	4.7	11.7	Compliant
August 21, 2021	5.9	14.7	Compliant
August 27, 2021	5.0	12.4	Compliant
September 2, 2021	15.5	38.7	Compliant
September 8, 2021	5.2	13.1	Compliant
September 14, 2021	3.4	8.6	Compliant
September 20, 2021	7.9	19.7	Compliant
September 26, 2021	5.6	14.0	Compliant
October 2, 2021	2.3	5.7	Compliant
October 8, 2021	15.1	37.8	Compliant
October 14, 2021	7.4	18.4	Compliant
October 20, 2021	3.3	8.1	Compliant
October 26, 2021	9.3	23.2	Compliant
November 1, 2021	9.6	24.1	Compliant
November 7, 2021	6.0	15.1	Compliant
November 13, 2021	0.0	0.0	Compliant
November 19, 2021	14.2	35.5	Compliant
November 25, 2021	5.0	12.4	Compliant
December 1, 2021	9.2	23.0	Compliant
December 7, 2021	16.3	40.7	Compliant
December 13, 2021	3.9	9.7	Compliant
December 19, 2021	5.6	14	Compliant
December 25, 2021	11.7	29.3	Compliant
December 31, 2021	3.7	9.4	Compliant

HVAS 1 (Lockyersleigh)			
Sampling Date	PM10	TSP	Compliance Status
Minimum	0.0	0.0	
Annual Average	7.3	18.4	Compliant
Maximum	18.4	46.1	

Note: Samples impacted by contamination or damaged equipment are marked with an asterisk (*). NS indicates the result could not be retrieved.

Table 19: HVAS 2 2021 PM10 Monitoring Results

HVAS 2 (Brayton Road)			
Sampling Date	PM10	TSP	Compliance Status
January 5, 2021	10.6	26.4	Compliant
January 11, 2021	8.4	21.0	Compliant
January 17, 2021	11.9	29.8	Compliant
January 23, 2021	22.4	56.1	Compliant
January 29, 2021	2.8	6.9	Compliant
February 4, 2021	14.9	37.2	Compliant
February 10, 2021	8.5	21.4	Compliant
February 16, 2021	3.9	9.7	Compliant
February 22, 2021	6.1	15.2	Compliant
February 28, 2021	10.6	26.4	Compliant
March 6, 2021	2.4	6.0	Compliant
March 12, 2021	9.2	22.9	Compliant
March 18, 2021	3.6	8.9	Compliant
March 24, 2021	6.5	16.1	Compliant
March 30, 2021	14.0	35.0	Compliant
April 5, 2021	16.2	40.4	Compliant
April 17, 2021	12.5	31.2	Compliant
April 23, 2021	13.0	32.4	Compliant
April 29, 2021	26.2	65.6	Compliant
April 11, 2021	7.3	18.3	Compliant
May 5, 2021	1.9	4.8	Compliant
May 11, 2021	5.8	14.4	Compliant
May 17, 2021	4.1	10.1	Compliant
May 23, 2021	6.6	16.4	Compliant
May 29, 2021	7.5	18.7	Compliant
June 28, 2021	5.5	13.7	Compliant
June 4, 2021	5.3	13.4	Compliant
June 10, 2021	4.7	11.8	Compliant
June 16, 2021	7.1	17.8	Compliant
July 4, 2021	3.1	7.7	Compliant
July 10, 2021	6.5	16.1	Compliant
July 16, 2021	3.6	9.1	Compliant
July 22, 2021	5.7	14.1	Compliant
July 28, 2021	8.1	20.1	Compliant

HVAS 2 (Brayton Road)			
Sampling Date	PM10	TSP	Compliance Status
August 2, 2021	NA	NA	Missed sampling
August 3, 2021	4.7	11.7	Compliant
August 9, 2021	8.9	22.3	Compliant
August 15, 2021	9.2	23.0	Compliant
August 21, 2021	12.4	30.9	Compliant
August 27, 2021	7.3	18.1	Compliant
September 2, 2021	14.1	35.3	Compliant
September 8, 2021	6.8	16.9	Compliant
September 14, 2021	4.2	10.4	Compliant
September 20, 2021	12.5	31.2	Compliant
September 26, 2021	6.6	16.4	Compliant
October 2, 2021	4.0	10.0	Compliant
October 8, 2021	14.1	35.2	Compliant
October 14, 2021	6.5	16.3	Compliant
October 20, 2021	5.9	14.7	Compliant
October 26, 2021	8.0	20.0	Compliant
November 1, 2021	10.6	26.6	Compliant
November 7, 2021	6.3	15.7	Compliant
November 13, 2021	2.5	6.3	Compliant
November 19, 2021	18.0	45.0	Compliant
November 25, 2021	5.1	12.8	Compliant
December 1, 2021	7.6	18.9	Compliant
December 7, 2021	9.3	23.4	Compliant
December 13, 2021	10.0	24.9	Compliant
December 19, 2021	8.7	21.8	Compliant
December 25, 2021	13.8	34.6	Compliant
December 31, 2021	8.7	21.7	Compliant
Minimum	1.9	4.8	
Average	8.5	21.3	Compliant
Maximum	26.2	65.6	

Note: Samples impacted by contamination or damaged equipment are marked with an asterisk (*). NS indicates the result could not be retrieved.

6.3.4 Trends in data

6.3.4.1 Depositional Dust

A summary of annual average monitoring results from 2014 to 2021 is provided in **Figure 3**. Gauges DD11, DD12 and DD13 were installed in December 2016 following a revision to the depositional dust monitoring network and the approval of the Development Consent (Mod 4). As a result, limited data is available to compare against historical operations. Gauges DD5 and DD8 provide a longer-term comparison of monitoring results.

As shown in **Figure 4**, a comparison of depositional dust monitoring results indicates all sites were compliant with the development consent against maximum allowable annual increase criteria. Depositional dust results continue to be below the impact assessment criteria of 4g/m²/month at all sites. All gauges decreased in annual average from 2020. This continues from the decrease in levels in 2020 at DDG5 and DDG11. Results are generally lower than previous years.

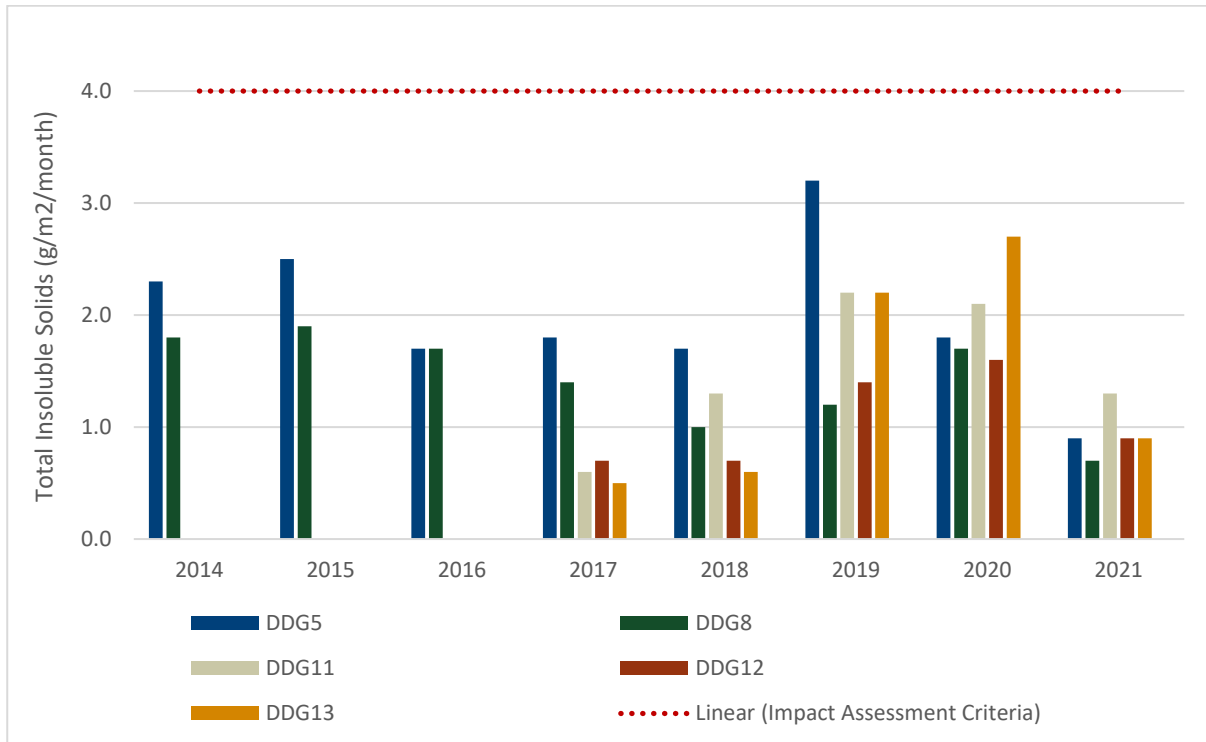


Figure 4: Historical Depositional Dust Monitoring

6.3.4.2 PM₁₀

Annual average PM₁₀ monitoring results from this report period to 2011 are provided in **Figure 5**. All results are below the annual average impact assessment criteria. As seen in **Figure 5**, a gap in data occurs in 2013 for HVAS 2 as a result of the unit not recording the required number of samples due to power supply issues.

The 2021 annual averages at HVAS 1 and HVAS 2 were 7.3 µg/m³ and 8.5 µg/m³, respectively. Annual averages at HVAS 1 and HVAS 2 in 2019 are higher than all other years represented. High 2019 results were attributed to excessive dust generated by drought conditions and particulate matter from heavy bushfire smoke. 2020 and 2021 results are more consistent with levels seen prior to 2019.

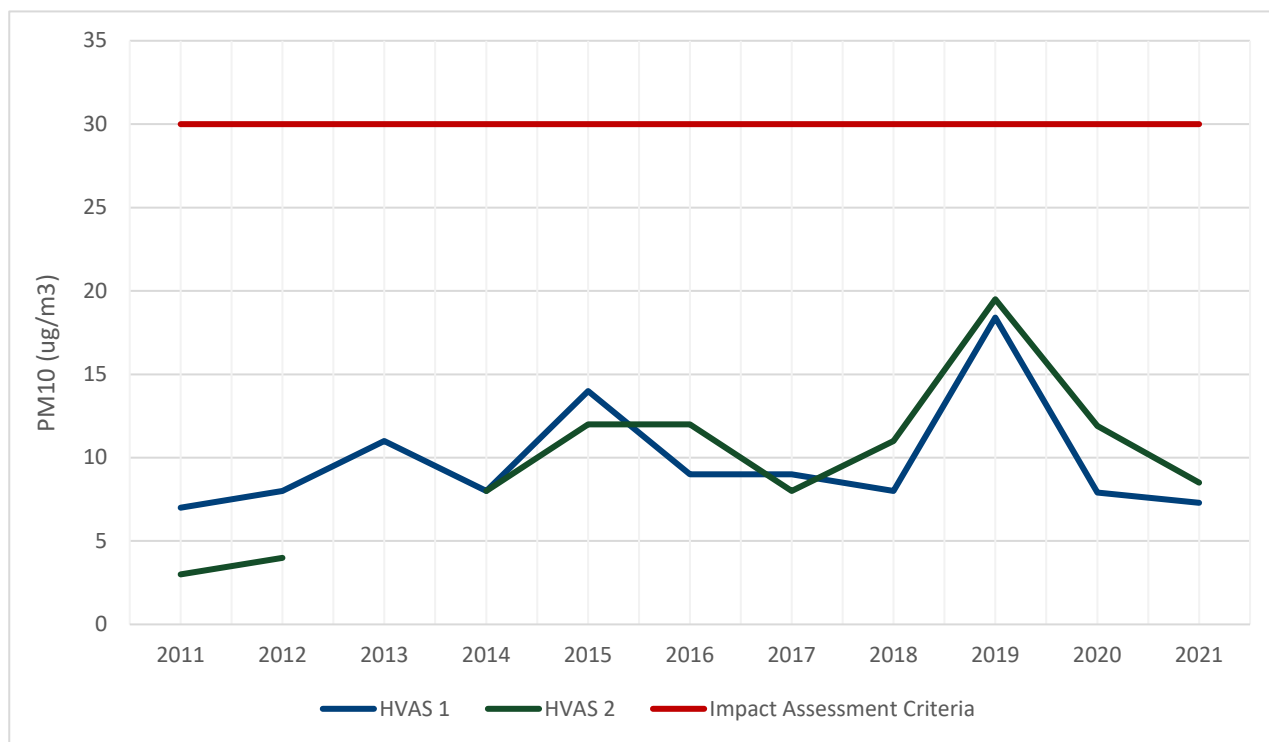


Figure 5: Historical PM₁₀ Monitoring Results

6.3.5 Proposed Improvements for the Next Report Period

Lynwood is progressing towards the replacement of HVAS equipment with Beta Attenuation Monitoring (BAM) units. Investigation of alternative air quality monitoring commenced in 2020 as the reliability of HVAS equipment became an ongoing issue for the site. Lynwood will continue to investigate improved monitoring equipment in 2022.

No further improvement measures are proposed for the next reporting period.

6.4 Surface Water

6.4.1 Environmental Management Measures

Lynwood has developed and implemented a Surface Water Monitoring Program in accordance with the requirements of the Development Consent. The overall Water Management Plan (including component plans) was revised in 2020, with DPE approving the WMP on 16 November 2020. This includes a revision of trigger levels which have been outlined in this Annual Review.

The SWMP provides details on:

- Baseline water quality data;
- Surface water impact criteria;
- Monitoring surface water flow and quality;
- Surface water impact trigger levels and management actions; and
- Erosion and sediment controls implemented onsite.

Surface water management infrastructure at the Quarry was established during the initial construction and operational phase of the Quarry. The water management system includes a series of clean water diversion drains, catch drains and sedimentation dams. These structures have been constructed to minimise the interaction between clean and dirty water and to provide controls to treat captured dirty water to a standard acceptable for discharge off-site. There were no changes to the on-site water management system during 2021, with the most recent changes being minor and completed in 2019.

As of September 2021, on the approval of the Riparian Management Plan for Joarimin Creek Catchment Area, quarterly inspections of Joarimin Creek undertaken by Holcim staff commenced. The riparian quality inspections assess sediment and erosion controls, creek stability, and riparian zone conditions.

6.4.2 Performance Criteria

6.4.2.1 Surface Water Monitoring Criteria/Trigger Levels

Trigger levels have been updated and included in the 2020 Water Management Plan within the Surface Water Monitoring Program. These new trigger levels are outlined in **Table 20** and have been based on an extended period of monitoring data from Lynwood surface water (SW) locations.

Table 20: Surface Water Criteria – Revised 2020 Criteria from Surface Water Management Plan

Water Quality	Trigger Value			
Variable	³ SW 1 and 2 (Marulan Creek) SW 3 and 4 Joarimin Creek SW 7 Lockyersleigh Creek	Joarimin Creek (SW4-SW6)	SW8 to SW11	⁴ Site Water Management System Dams (excluding SW5, SW6 and SW8 to SW11)
pH	No longer monitored. No trigger levels proposed.	5.3 to 9.7	6.4 to 7.8	6.5 to 8.5 ¹
Electrical Conductivity		Maximum of 3255 µS/cm	Maximum of 3922 µS/cm	No criteria listed in the Development Consent. No trigger levels proposed.
Oil and Grease		10 mg/L or none visible	10 mg/L or none visible	10 mg/L or none visible ¹
Total Suspended Solids		Less than 320 mg/L	Less than 320 mg/L ²	50 mg/L ¹

Notes:

¹ Triggers marked with ¹ are from Schedule 3 Condition 17;

² For SW8 to 11 there has been very few samples obtained. The highest TSS level recorded across a total of four sampling events has been low (16 mg/L). Holcim have therefore used the Joarimin Creek TSS range for the TSS trigger value for SW8 to 11.

³ SW1 – 3 are no longer monitored, hence there are no proposed criteria. SW7 is also no longer monitored.

⁴ Criteria associated with site water dams are only applicable during discharge events offsite from these dams (controlled discharge dams).

6.4.3 Environmental Outcomes

There were no discharges from Lynwood Quarry during the report period. Surface water quality sampling was undertaken at Sediment Dam E, Sediment Dam F, and Supply Dam 1 in addition to the required monitoring points presented below.

Surface Water Monitoring Program

Lynwood is required to conduct surface water monitoring across the site on a monthly basis at monitoring locations consistent with those shown in **Figure 3**. Surface water monitoring records captured during the report period are provided in a summary provided in **Table 21**. Surface water monitoring is undertaken when an appropriate volume of water is available to enable a representative sample to be obtained.

Table 21: Summary of Results – Surface Water 2021

Site	EC (µs/cm)			pH			TSS (mg/L)			Oil & Grease (mg/L)			P (mg/L)			N (mg/L)			Flow
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	
Sediment Dam E	348.0	553.4	723.0	8.2	9.0	9.7	10.0	88.7	210.0	5.0	6.7	14.0	0.0	0.1	0.5	0.9	2.1	4.9	Flow (0), No Flow (12)
Sediment Dam F	457.0	608.3	820.0	7.5	8.7	10.6	1.2	10.1	35.0	5.0	5.8	10.0	0.0	0.1	0.5	0.8	4.2	16.0	Flow(1), No Flow (11)
Sediment Dam G1	533.0	671.5	893.0	8.3	9.0	9.7	3.0	18.4	73.0	5.0	6.0	11.0	0.0	0.1	0.5	4.5	7.1	9.5	Flow (0), No Flow (12)
Supply Dam	401.0	571.5	732.0	8.0	9.0	9.9	2.8	10.6	32.0	5.0	6.4	14.0	0.0	0.1	0.5	0.7	2.0	3.9	Flow (0), No Flow (12)
SW4	84.0	595.4	867.0	6.0	6.6	7.1	7.2	29.8	98.0	5.0	7.9	20.0	0.0	0.1	0.5	0.2	1.3	6.1	Flow (4), No Flow (8)
SW5	111.0	754.3	1410.0	7.0	7.5	8.0	2.7	9.7	27.0	5.0	5.7	13.0	0.0	0.1	0.5	0.2	0.9	2.4	Flow (8), No Flow (4)
SW6	169.0	640.9	1050.0	7.0	7.3	7.9	2.2	9.1	21.0	5.0	6.5	12.0	0.0	0.1	0.1	0.0	1.4	6.9	Flow (7), No Flow (5)
SW8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Flow(0), No Flow(5)
SW9	238.0	1091.8	1890.0	6.9	7.4	7.9	4.2	64.7	230.0	5.0	6.0	12.0	0.0	0.2	0.6	1.1	3.5	21.0	Flow (1), No Flow (11)
SW10	119.0	2750.3	4830.0	6.7	7.0	7.2	19.0	118.4	540.0	5.0	6.8	13.0	0.1	0.3	0.8	0.2	1.6	6.7	Flow (10), No Flow (2)
SW11	369.0	2717.2	6510.0	7.0	7.5	7.8	1.2	36.4	190.0	5.0	6.2	10.0	0.0	0.2	0.5	0.2	1.0	4.8	Flow (5), No Flow (7)

Note: Minimum and maximum values which are below or above the trigger values are in **bold**.

SW4

Monitoring at SW4 recommenced in 2021. A summary of SW4 monitoring results is provided in **Table 21**. Surface water results were generally compliant in 2021. Monthly monitoring at SW4 found pH, electrical conductivity, and total suspended solids levels were within trigger values.

Oil and grease at SW4 in September was recorded as visible and measured at 13 mg/L. In October the total oil and grease was 20 mg/L, however oil and grease was not visible. This is an exceedance in the trigger levels outlined in the Surface Water Monitoring Program and **Table 20**.

The maximum nitrogen result for 2021 (6.1 mg/L in May) was elevated when compared to historical results. However, it should be noted there was no flow and vegetation growing around the area at the time of sampling. Phosphorous levels were consistent with previous years.

SW5

A summary of SW5 monitoring results is presented in **Table 21**. Water flow was observed at SW5 for eight out of the 12 sampling events in 2021. The frequency of water flow has increased from 2019 when a flow was observed on three occasions.

The pH at SW5 ranged from a minimum of 7 in January to a maximum of 8 in October 2021. pH did not exceed the trigger levels outline in **Table 20**.

Electrical conductivity was within the trigger level range in 2021. The annual average at SW5 was 754.3 $\mu\text{S}/\text{cm}$ which is an increase from the 2020 average of 578.4 $\mu\text{S}/\text{cm}$. However, the EC results at SW5 are consistent with historical values.

SW5 total suspended solids did not exceed the trigger value in 2021.

In the October sample, oil and grease was noted to be not visible, however total oil and grease equalled 13 mg/L. This was an exceedance in total oil and grease trigger level.

Nitrogen and phosphorous levels did not differ from historical trends.

SW6

A summary of SW6 monitoring results is provided in **Table 21**. Monitoring was undertaken on 12 occasions during the report period. Water was flowing at SW6 for more than half of the sampling events in 2021.

pH results were within the minimum and maximum trigger values for Joarimin Creek and consistent with long-term results.

Electrical conductivity and total suspended solids were within trigger levels.

Oil and grease for September was not visible, but was measured to be 12 mg/L. This is an exceedance of the total oil and grease trigger, 10 mg/L.

The maximum nitrogen sample (6.9 mg/L) occurred in June 2021 and was higher than historical results. It should be noted the water at SW6 was not flowing and there was vegetation around the sample site, as these factors may have influenced the nitrogen levels. The nitrogen levels at SW6 for the rest of 2021 did not approach this level.

Average nitrogen and phosphorous levels were within long-term trends for SW6.

SW8

A summary of SW8 monitoring results is provided in **Table 21**. Monitoring of flow and oil and grease were conducted on five occasions in 2021. Sampling events were undertaken in August, September, October, November, and December. There was no flow observed at SW8 for all of these sampling events.

There was no visible oil and grease at SW8 during sampling in 2021.

No pH, TSS, or EC monitoring results were recorded for SW8 in 2021 as per the Surface Water Monitoring Program. This is a non-compliance with Surface Water Monitoring Program because no pH, TSS, or EC results were recorded during the 2021 sampling events. This is a non-compliance with the implementation of the Water Management Plan.

SW9

A summary of SW9 monitoring results is provided in **Table 21**. Monitoring was undertaken on 12 occasions in 2021, with water flow only observed during the May sampling event.

The SW9 annual average pH is 7.4. In July and August, the pH result was 7.9 which exceeds the maximum trigger of 7.8.

There were no exceedances for Electrical conductivity and total suspended solids in 2021.

There was one exceedance in total oil and grease in 2021. Total oil and grease was 12 mg/L in September, however oil and grease were not visible during the sampling event.

Phosphorous and nitrogen levels at SW9 in 2021 were consistent with long-term data trends. The maximum phosphorous value, 0.62 mg/L occurred in November and is elevated compared to historical results outlined in the Surface Water Monitoring Program. It should be noted there was no flow at SW9 at the time of sampling.

SW10

A summary of SW10 monitoring results is provided in **Table 21**.

All pH results at SW10 were within the trigger levels outlined in **Table 20**.

Monthly monitoring undertaken at SW10 identified there were three exceedances in the electrical conductivity in 2021. January, February, and March saw samples of 3924 $\mu\text{S}/\text{cm}$, 4580 $\mu\text{S}/\text{cm}$, and 4830 $\mu\text{S}/\text{cm}$ respectively.

Total suspended solids exceeded the trigger levels in December, with a result of 540 mg/L. All other TSS results were below the trigger level of 320 mg/L.

Total oil and grease exceeded the trigger level in December as well, with a result of 13 mg/L. The monitoring results note oil and grease was also visible.

Phosphorous and nitrogen levels were consistent with 2019 and 2020 results. The maximum phosphorous value was 0.78 mg/L in February. The maximum nitrogen result of 2.79 mg/L was taken in June. No water flow was noted during both sampling events.

SW11

A summary of SW11 monitoring results is provided in **Table 21**.

Monthly monitoring at SW11 found all pH, TSS, and oil and grease results were within the trigger levels.

Electrical conductivity trigger levels were exceeded in March, July, and August 2021. The results for these months were 6501 $\mu\text{S}/\text{cm}$, 3930 $\mu\text{S}/\text{cm}$, and 4110 $\mu\text{S}/\text{cm}$ respectively. It should be noted EC results at SW10, also on Lockyersleigh Creek, were elevated in March also.

2021 results at SW11 are generally consistent with 2020 results. There was a reduction in the annual TSS average in 2021 from 2020. Nitrogen and phosphorous maximums and annual averages in 2021 were significantly lower than those seen in 2020 and were more consistent with previous levels.

6.4.4 Trends in Data

Oil and grease levels exceeded the trigger levels a number of times in 2021 at both Joarimin and Lockyersleigh Creek locations. Oil and grease results from the previous report period noted that the parameter had increased compared to 2018 results. The exceedances in the trigger levels were identified by Holcim and a review of monitoring notes was completed. An inspection of the surface water monitoring points in September, October, and December was undertaken by Holcim as per the Water Management TARP. There was low flow during the exceedance sampling events and inconsistency between visibility observations. Holcim informed DPE and EPA of these results. No further mitigation actions were required.

Electrical conductivity and total suspended solids were generally consistent with long-term results. 2021 pH results were also consistent with long-term results.

The results for SW9, SW10 and SW11 could not be compared to previous monitoring data due to dry conditions experienced during the 2019 monitoring period and continuing dry conditions in 2020.

Phosphorous and nitrogen levels were generally consistent with long term results and were reduced compared to 2020 results.

6.4.5 Proposed Improvements

Holcim propose to continue to monitor the oil and grease levels across Joarimin Creek and Lockyersleigh Creek sampling locations to identify any emerging trends. Holcim will continue to monitor unusual monitoring results and investigate exceedances in 2022.

There were no additional surface water improvements identified in this report period. Holcim will continue to compare results against longer term trends and trigger levels from the WMP.

6.5 Groundwater

6.5.1 Environmental Management Measures

The Lynwood Quarry Water Management Plan (WMP) was revised and approved by DPE in 2020. This 2020 WMP includes a revision of trigger levels which are used in this annual review. Lynwood has developed and implemented a Groundwater Monitoring Program (GMP) in accordance with the requirements of the Development Consent.

The GMP provides details on:

- Baseline water quality;
- Groundwater Impact Criteria;
- Monitoring regional groundwater level and quality; and
- Groundwater impact trigger levels and management actions.

The groundwater water management system includes a series of piezometers and groundwater monitoring bores.

6.5.2 Performance Criteria

6.5.2.1 Groundwater Inflow and Level Monitoring

As outlined in the Water Management Plan (2020) and Groundwater Monitoring Program, groundwater level monitoring will be reviewed against long-term monitoring trends and further compared against drawdowns predicted within the Lynwood Quarry EIS (Umwelt, 2005) and Modification EA (Umwelt, 2015). Triggers for groundwater depth are shown in **Table 22**.

6.5.2.2 Groundwater Quality Monitoring Criteria/Trigger Levels

Trigger levels have been updated in the 2020 WMP and are included in **Table 22**. These new trigger levels are based on an extended period of monitoring data from Lynwood GW locations.

Groundwater monitoring is required to occur quarterly.

Table 22: Groundwater Monitoring Criteria (WMP, 2020)

Parameter	Minimum Trigger	Maximum Trigger	General comment
MP Bores			
Depth to groundwater (metres)	1.64	28.05	This was the minimum and maximum levels since regular monitoring commenced in 2010
EC (µS/cm)	No minimum trigger required	11,521	This was the highest EC reading since monitoring commenced for the MP bores.
pH	4.2	9.5	These were the highest and lowest pH readings since monitoring commenced for the MP bores.
Sulphate (mg/L)	No minimum trigger required	152	This was the maximum level recorded since monitoring commenced for sulphate.
Total Nitrogen (mg/L)	No minimum trigger required	2.20	This was the maximum level recorded since monitoring commenced for total nitrogen.
Total Phosphorus(mg/L)	No minimum trigger required	3.02	This was the maximum levels recorded since monitoring commenced for total phosphorus.
GPZ Bores			
Depth to groundwater (metres)	2.13	23.9	This was the minimum and maximum levels since regular monitoring commenced of GPZ bores in April 2017.
EC (µS/cm)	No minimum trigger	8,020	This was the highest EC reading since monitoring commenced for the GPZ bores.
pH	6.1	7.8	These were the highest and lowest pH readings since monitoring commenced for the GPZ bores.
Sulphate (mg/L)	No minimum trigger required	76	This was the maximum levels recorded since monitoring commenced for the GPZ bores.
Total Nitrogen (mg/L)	No minimum trigger required	5.0	This was the maximum levels recorded since monitoring commenced for the GPZ bores.
Total Phosphorus (mg/L)	No minimum trigger required	1.20	This was the maximum levels recorded since monitoring commenced for the GPZ bores.

6.5.3 Environmental Trends and Outcomes

Lynwood conducts groundwater monitoring via a network of monitoring bores across site on a quarterly basis. A summary of groundwater monitoring results is provided in **Table 23**. Further monitoring results are presented in **Appendix 2**.

Monitoring was undertaken at the required frequency for all monitoring bore sites with the exception of GPZ2 at which monitoring ceased after Quarter 2 of 2020 due to the extension of the pit over this area.

Table 23: Summary of Quarterly Results – Groundwater 2021

Site	Depth to Water Level (m)			pH			EC (μ S/cm)			Sulphate (mg/L)			Total Nitrogen (mg/L)			Total Phosphorous (mg/L)		
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
MP Bores																		
MP1	1.98	2.06	2.17	6.6	6.9	7.0	717	1092	1390	21.0	30.8	53.0	0.20	0.20	0.20	17.00	17.00	17.00
MP2	16.37	16.55	16.73	6.2	6.5	6.8	231	324	487	2.0	4.3	5.0	0.19	0.19	0.19	0.10	0.10	0.10
MP4	18.83	19.07	19.43	6.4	6.6	6.9	303	445	541	2.9	13.2	40.0	0.02	0.02	0.02	0.22	0.22	0.22
MP5	16.59	19.56	21.00	6.6	6.9	7.2	464	703	793	2.0	9.5	26.0	0.02	0.02	0.02	0.09	0.09	0.09
MP7	17.57	17.89	18.20	6.6	6.9	7.2	6660	7375	8790	39.0	32.5	36.0	0.02	0.02	0.02	0.01	0.01	0.01
MP10	4.80	4.94	5.08	7.1	7.5	7.8	6400	7548	9890	24.0	34.3	58.0	0.02	0.02	0.02	0.02	0.02	0.02
MP11	11.07	11.58	12.04	7.1	7.4	7.6	444	637	733	2.0	9.8	27.0	0.02	0.02	0.02	0.04	0.04	0.04
GPZ Bores																		
GPZ1	11.22	11.66	11.03	7.6	7.9	8.3	600	885	1010	7.7	17.25	44	0.02	0.02	0.02	1	1	1
GPZ2	GPZ02 inaccessible due to pit extension of the pit.																	
GPZ5	8.59	8.66	8.79	7.7	8.0	8.3	3240	3948	5220	3.1	6.1	10.0	0.02	0.02	0.02	1	1	1
GPZ6	5.37	5.70	6.00	7.1	7.4	7.8	664	1329	1770	24.0	31.8	41.0	4.9	4.9	4.9	0.57	0.57	0.57
GPZ8	8.24	8.43	8.75	7.0	7.4	7.7	1960	2438	3270	2.0	5.1	8.2	0.02	0.02	0.02	0.11	0.11	0.11

Note: Minimum and maximum results that fall outside of the groundwater monitoring criteria are in **bold**.

6.5.3.1 Depth to Groundwater

Groundwater levels at MP series bores remained within the historical range of depth and were consistent with those for 2020. The average depth to groundwater for the MP bores in 2021 remained within approximately 1 metre of the 2020 average depth to groundwater.

Groundwater levels at the GPZ bores were also consistent with baseline levels and previous results. There was some slight recharge at GPZ1, GPZ6, and GPZ8 in 2021 compared to 2020 levels.

All groundwater depth results were well within the monitoring criteria triggers.

6.5.3.2 pH

The MP bores were consistently between 6 and 8 pH for the quarterly monitoring in 2021. The most acidic (minimum) result was 6.2 pH at MP2, which can be compared to the 2020 minimum also at MP2 of 5.9.

All pH results at MP series bores were well within the monitoring criteria.

GPZ bores were also near neutral in 2021, however tended to range between 7.0 and 8.0. There were no significant changes in annual averages between 2020 and 2021 at any of the monitoring points, with the largest change being 0.7 units at MP10.

There were multiple exceedances in the GPZ series bores pH maximum trigger in 2021. The pH results at GPZ1 exceeded the maximum trigger of 7.8 in quarter 1 and 4 of 2021, at 8.3 and 8.2 respectively. pH results at GPZ5 also exceeded the maximum trigger in quarters 1 and 4 2021, at 8.3 and 8.2 respectively. These results are exceedances with the trigger values outlined in the WMP. As per the Water Management TARP in the WMP, Lynwood noted these exceedances and compared these results to previous quarterly results to determine any potential issues. As these exceedances do not relate to further trends in pH results at these GPZ bores, Holcim did not report these to DPE.

Holcim will continue to assess trends in groundwater results to identify when further mitigation measures are required.

6.5.3.3 Electrical Conductivity

The electrical conductivity levels varied between each MP series bore. However, all 2021 samples were within the trigger levels and historical range of 231 $\mu\text{S}/\text{cm}$ to 9,890 $\mu\text{S}/\text{cm}$.

GPZ series bores were compliant with the maximum trigger for EC. GPZ1's minimum result of 600 $\mu\text{S}/\text{cm}$ was less than the minimum value of 604 $\mu\text{S}/\text{cm}$ from the historical results for GPZ series bores. The average EC at GPZ5 and GPZ8 increased compared to 2020 results.

All results for electrical conductivity were compliant.

6.5.3.4 Nutrients

Sulphate

The sulphate levels in the MP bores over 2021 were compliant with the sulphate maximum trigger value. The sulphate results over 2021 were generally consistent with 2020 averages, with the exception of MP2 which reached levels more similar to 2019 results. However, sulphate levels were generally consistent with historical results.

For all GPZ bores, the 2021 annual average for sulphate was similar to values in 2020. GPZ bores ranged from 2.0 mg/L to 44.0 mg/L which complies with the trigger values.

Total Nitrogen

All MP monitoring sites were well within the trigger levels. MP series bores ranged from a minimum of 0.02 mg/L to a maximum of 0.2 mg/L. These 2021 results have generally decreased when compared to 2020 results for total nitrogen.

All GPZ series bores remained within the total nitrogen trigger levels in the report period. GPZ1, GPZ5, and GPZ8 results were consistently 0.02 mg/L.

Total nitrogen levels were elevated compared to 2020 results at GPZ6, however these did not exceed the maximum trigger levels.

Phosphorous

All total phosphorous monitoring results at MP series bores were below the maximum trigger level of 3.02 mg/L. This is consistent with the results of previous years.

The phosphorous levels at GPZ series bores were below the maximum trigger value of 1.2 mg/L for 2021. These results are less than results seen at GPZ1, GPZ2, GPZ5, and GPZ6 in 2020, and return to levels seen in 2019.

All groundwater bores were compliant with total phosphorous criteria.

6.5.4 Proposed Improvements

Future Annual Reviews will continue to compare results against longer term trends and trigger levels from the WMP. In particular, Lynwood will the pH levels at GPZ1 and GPZ5 in 2022.

Holcim are committed to continuously improving groundwater data collection at Lynwood Quarry.

6.6 Noise

6.6.1 Environmental Management Measures

The Lynwood Noise Management Plan (NMP) was implemented in this reporting period. The NMP has been prepared in accordance with the Development Consent and outlines measures for monitoring and managing noise emissions at Lynwood Quarry. The NMP also outlines a range of design controls, ongoing operational controls, and a noise monitoring program which the site has undertaken in 2021.

6.6.2 Performance Criteria

Noise impact assessment criteria for monitoring are specified in the Development Consent are outlined in **Table 24** below.

Table 24: Noise Criteria

Location	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)	
	dBA, LA _{eq(15min)}	dBA, LA _{eq(15min)}	dBA, LA _{eq(15min)}	dBA, LA _{1(1min)}
1	35	35	35	45
2	35	35	35	45
3	35	35	35	45
4	35	37	35	46
5	35	35	35	46
6	35	37	36	46
7	38	38	35	55
8	39	38	36	55
9	39	39	37	56
10	42	42	40	53
11	35	35	35	47
12	37	37	36	47
13	40	38	37	47
14	35	35	35	47
15	35	35	35	47
16	35	35	35	45

6.6.3 Environmental Outcomes

Attended noise monitoring was conducted on a quarterly basis during the report period. Attended noise monitoring was conducted by Muller Acoustic Consulting at four representative monitoring locations surrounding the site during quarrying activities. These noise monitoring reports are provided in **Appendix 1**. Noise monitoring locations are generally considered representative of the nearest private receivers in various directions of the operational area.

Noise monitoring was undertaken on the following dates:

- 9 and 11 February 2021;
- 26 and 27 May 2021;
- 27 and 29 July 2021; and
- 19 and 21 October 2021.

Noise monitoring occurred at the locations shown in **Figure 3** and listed in **Table 25**. As noted in the Lynwood Quarry NMP (SLR, 2020), monitoring at these locations are considered representative of all locations assessed as part of the Noise Impact Assessment (Umwelt, 2015).

The noise monitoring results from 2021 are summarised in **Table 26**. There were no exceedances in the noise criteria during the quarterly monitoring. Quarry noise such as haul truck movements, processing noise, site alarms, or reverse alarms were audible during some assessments, however, did not exceed noise criteria. Extraneous sources of noise included birds, insects, distant traffic, aircraft, and wind.

Further discussion on the findings is found in the MAC Noise Monitoring Assessment reports in **Appendix 1**.

Table 25: Noise Monitoring locations

Location	Address
N1	Residence west of the project area
N2	End of Maclura Drive, Marulan
N3	Residence to the south of the site
N4	North-eastern boundary of the project area at rural residential subdivision, (Dorsett Road).

Table 26: Noise Monitoring Summary

Location	Criteria	Q1	Q2	Q3	Q4	Compliance Status
Day dBA, LA_{eq}(15min)						
N1	35	<33	<35	<25	<30	Compliant
N2	35	<30	<35	<30	<30	Compliant
N3	35	32	<35	<30	<35	Compliant
N4	35	<30	<37	<30	<37	Compliant – Refer to reports on external sources.
Evening dBA, LA_{eq}(15min)						
N1	35		<30	<30	<35	Compliant
N2	35		<37	<30	<37	Compliant – Refer to reports on external sources.
N3	35		<35	<35	<35	Compliant
N4	37		<37	<30	<30	Compliant
Night dBA, LA_{eq}(15min)						
N1	35	<30	<30	<30	NS	Compliant
N2	35	<30	35	<36	<36	Compliant – Refer to reports on external sources.
N3	35	<35	<35	35	<35	Compliant
N4	35	<30	31	<36	<30	Compliant – Refer to reports on external sources.
Night dBA, LA1(1min)						
N1	45	<40	<40	<45	NS	Compliant
N2	46	<40	<46	<46	<46	Compliant
N3	47	<47	<45	<47	<47	Compliant
N4	47	<40	<40	<47	<47	Compliant

Note: NS indicates where equipment failure occurred, and results could not be captured. For grey cells, no operations were occurring during this monitoring time (evening and night).

6.6.4 Trends in Data

Monitoring results recorded during the report period indicates noise levels continue to trend below noise impact assessment criteria as stipulated within Development Consent. There have been no noise exceedances against the noise impact assessment criteria since the 2016 report period. The raw noise monitoring results are included in **Appendix 1**.

6.6.5 Proposed Improvements

No additional management or mitigation measures are proposed to be implemented which are outside of the existing approved NMP.

6.7 Biodiversity

6.7.1 Environmental Management Measures

Lynwood takes a multifaceted approach to managing biodiversity values within the broader landscape with biodiversity and rehabilitation management controls detailed in the Lynwood Quarry Rehabilitation and Landscape Management Plan (RLMP). Areas managed in accordance with the RLMP include habitat management areas, riparian zones, and wildlife corridors. Pre-clearance inspections are undertaken to identify the presence of habitat features such as tree hollows or stags and fauna within the disturbance area that can be relocated. Pre-clearance surveys also identify if nest boxes are required to be installed following the removal of habitat features within the disturbance boundary.

6.7.2 Performance Criteria

As noted in **Section 5.0** and in accordance with Schedule 3 Condition 48A of the Development Consent, Lynwood must retire Biodiversity Credits to the satisfaction of the Secretary and OEH. A summary of Biodiversity Credits required to be retired by Lynwood is summarised in **Table 27** below. It is noted that the current status of credits which have been retired are detailed in **Table 28**.

Table 27: Summary of Biodiversity Credits to be Retired

Credit Type	Credits to be Retired
Ecosystem Credits	
HN614 Yellow Box – Blakey’s Red Gum grassy woodland on the tablelands. South Eastern Highland Bioregion	2,124
HN570 Red Stringybark – Brittle Gum – Inland Scribbly Gum dry open forest of the tablelands. South Eastern Highlands Bioregion	881
HN515 Broad-leaved Peppermint – Ribbon Gum grassy open forest in the north-east of the South Eastern Highlands Bioregion	33
Total	3,038
Species Credits	
Squirrel Glider (<i>Petaurus norfolcensis</i>)	1,725
Total	1,725

6.7.3 Environmental Outcomes

Lynwood retired a total of 3,669 Biodiversity Credits during 2018. Zero biodiversity credits were retired in 2019. An outcome of the 2020 IEA was for Lynwood to continue consultation with DPE regarding biodiversity credits and the process of retiring these, which Lynwood continues to consult for and pursue.

A summary of the credits retired in 2018 and the number of credits required to be retired into the future (credit balance) is detailed in **Table 28**.

In accordance with the Development Consent and Lynwood Quarry Extraction Quarry Area Modification Biodiversity Assessment Report (2015), pre-clearing and post-clearing reports were prepared to identify significant habitat features when clearing was undertaken.

Ecological monitoring was undertaken by an external contractor during the reporting period. In 2021 Holcim engaged SLR to perform ecological monitoring to satisfy requirements outlined in the Rehabilitation and Landscape Management Plan.

Ecological monitoring occurred in Spring 2021 including at the amenity bund, retained Box-Gum Woodland, Habitat Management Area, and Biodiversity Offset Area. Nest box monitoring for the site's 38 nest boxes was undertaken by ecologists over two days in Winter 2021.

Table 28: Summary of Retired Biodiversity Credits

Credit Type	Credits Retired (2018)	Stage of Retirement	Credit Balance
HN614 Yellow Box – Blakey's Red Gum grassy woodland on the tablelands. South Eastern Highland Bioregion	1,063	Partially retired – credits retired for years 2016 – 2030 (inclusive)	1,061
HN570 Red Stringybark – Brittle Gum – Inland Scribbly Gum dry open forest of the tablelands. South Eastern Highlands Bioregion	881	Complete	0
HN515 Broad-leaved Peppermint – Ribbon Gum grassy open forest in the north-east of the South Eastern Highlands Bioregion	0	Not required – Area not be disturbed until 2036.	33
Squirrel Glider (<i>Petaurus norfolcensis</i>)	1,725	Complete	0

6.7.4 Trends in Data

Biodiversity performance at Lynwood has been sound through 2021 and previous reporting periods.

Lynwood continues to consult with authorities on the status of conservation areas as well as appropriate Management Plans for these areas.

6.7.5 Proposed Improvements or Actions Next Reporting period

From 2022, Holcim will engage with ecologists on implementing Landscape Function Analysis within the rehabilitation and landscape monitoring program.

No additional management, mitigation measures or monitoring is proposed to be implemented outside of the scope of the approved RLMP.

6.8 Weeds and Feral Animals

6.8.1 Weeds

The dominant weed species that have been found previously within the site include Fireweed (*Chamerion angustifolium*), *Optunia sp.*, Serrated tussock (*Nassella trichotoma*), Blackberry (*Rubus fruticosus*) and St John's Wort (*Hypercium perforate*). Weed management is conducted in accordance with the Rehabilitation and Landscape Management Plan.

Lynwood site staff undertook weed inspections during the report period. Ecological monitoring was also undertaken, as discussed in **Section 6.7**.

Weed inspections found Serrated tussock, St John's Wort, and Blackberry in multiple areas of the site including the offset area. However, previous weed spraying was evident during March 2021 monitoring with individual weeds dying back.

Weed spraying continued in 2021.

Lynwood will assess the opportunity to undertake aerial weed spraying on site in 2022. No additional management measures outside of the existing approved RLMP are proposed for implementation during the next report period.

6.8.2 Feral Animals

Lynwood undertook feral animal inspections in 2021. No feral animal management activities took place at Lynwood Quarry during the report period. However, a pest service was engaged in the audit period to bait pest species of rodents in and around the administration areas of the site.

The high rainfall and vegetation growth in 2021 created favourable conditions for pest populations in the report period. Findings of the rehabilitation and ecological monitoring noted an opportunity to monitor for feral animals such as foxes, cats, and rabbits to determine the prevalence of pests.

It is proposed Holcim will assess the need to undertake pest control measures in 2022 for rabbits and foxes on site.

6.9 Blasting and Vibration

6.9.1 Environmental Management Measures

The BMP was revised in 2020, with this sent to DPE for comment and approval. The 2020 BMP sets out the criteria, monitoring frequencies, and management measures for blasting during quarrying operations.

Blast monitoring is undertaken at six monitoring locations (refer to **Figure 6.1**). The summary of 2021 blasts in **Table 29** shows that all blasts met airblast overpressure and ground vibration impact criteria for the report period.

6.9.2 Performance Criteria

Blasting performance criteria is set out in the EPL and Development Consent as outlined in **Table 29**.

Table 29: Blast Criteria Summary

Airblast Overpressure Criteria		
Location	Level (dB)	Allowable Exceedance
Residence on Privately owned land	115	5% of the total number of blasts over a period of 12 months
	120	0%
Ground Vibration Impact Assessment Criteria		
Location	Peak Particle Velocity (mm/s)	Allowable Exceedance
Residence on Privately owned land	5	5% of the total number of blasts over a period of 12 months
	10	0%
Main Southern Railway Line	25	0%
Reservoir*		Not applicable
Gas Pipeline	100	0%

* Reservoir is not constructed. Blast monitoring not undertaken at this location.

6.9.3 Environmental Outcomes

A summary of blast monitoring performance during the report period is provided in **Table 30**. Blast monitoring data is provided in **Appendix 2**. All blasts during the report period were undertaken between 9 am – 5 pm Monday – Saturday. No blasts were undertaken on Sundays or Public Holidays. Results from blast monitors during the report period did not exceed the blast criteria in **Table 29**.

There was a total of 86 blasts in 2021. This is slightly less than 2020's total number of 90 blasts.

Table 30: Blast Monitoring 2021 Summary

Parameter Summary		Number of Blasts	Percentage of Blasts
Total Number of Blasts		86	N/A
Blasts in Ignimbrite Pit		0	0%
Blasts in Granite Pit		86	100%
Blasts exceeding allowable Overpressure criteria		0	0%
Blasts exceeding allowable Ground Vibration criteria		0	0%
Blasts triggering Overpressure measurement	B4 Resident	0	0%
	B5 Resident	11	13%
Blasts triggering Ground Vibration measurement	B4 Resident	0	0%
	B5 Resident	13	15%
	Southern Railway Line	41	48%
	Gas Pipeline	41	48%
Blasts with Data Captured		86	100%

6.9.4 Trends in Data

Blasting results continued to trend below compliance limits during the report period with this also being the case in previous Annual Review periods.

6.9.5 Proposed Improvements

No additional blast management improvements are proposed outside the current approved BMP during the next report period.

6.10 Waste Management

There were no changes to waste management practices during the report period. Waste streams at Lynwood Quarry are collected and disposed of by licenced waste contractors on an as-required basis. Holcim record when waste is collected from site and as well as volumes collected. A summary of the types and quantities of waste generated during the report period is provided in **Table 31**.

Table 31: Long-term Summary of Waste Generation

Waste Category	2021	2020	2019	2018
Cardboard (t)	0.04	0.37	1.8	47
General Waste (t)	56.92	48.8	54.7	201.1
Steel (t)	88.68	84	90.28	106.96
Rubber (t)	<i>Included in General Waste</i>	<i>Included in General Waste</i>	<i>Included in General Waste</i>	14.24
Wood (t)	0	4.1	4.5	3.24
Oily Water (t)	0	-	<i>Included in Used Oil</i>	5.36
Used Oil (L)	0	-	46,100	42,760
Oil Filter (number of bins)	0	18	20	24
Rags (number of bins)	<i>Included in General Waste</i>	<i>Included in General Waste</i>	<i>Included in General Waste</i>	1
Grease (L)	0	40,000 used in 2020	0	4

The amount of waste generated by the site decreased significantly between 2018 and 2019. This trend of declining waste continued from 2020 when 48.8t of general waste was generated compared to 54.7 t in 2019. There was a small increase in the total waste removed from the site in 2021. While there was an increase in cardboard, steel, and general waste collected from site, the increase is considered insignificant. Lynwood continues to assess ways to reduce waste generation.

6.11 Indigenous Heritage

An Aboriginal Heritage Management Plan (AHMP) (Umwelt 2018) has been prepared in accordance with the Development Consent. Lynwood Quarry also holds an Aboriginal Heritage Impact Permit (AHIP #1100264) for Quarry operation. The AHMP and AHIP set out relevant monitoring frequencies and management measures required during quarrying operations. Results of Aboriginal Heritage monitoring undertaken are discussed in the sections below.

6.11.1 Results of Aboriginal Heritage Site Monitoring

In compliance with the requirements of the Development Consent, the Lynwood Quarry AHMP (Umwelt 2011) and AHIP (#1100264) (including relevant permit variations), Lynwood Quarry is required to undertake monitoring of Aboriginal sites located in proximity to the impact footprint boundary within the Ignimbrite Pit and Granite Pit areas. On a triennial basis, Holcim is required to monitor all the Aboriginal sites within the broader Lynwood Quarry project area.

Monitoring process is undertaken in either November or December each year and reported to the Office of Environment and Heritage (OEH).

The annual site monitoring on the Lynwood Quarry project area was conducted on the 29 and 30 November 2021.

6.11.2 Meetings of the Aboriginal Heritage Management Committee

The Aboriginal Heritage Management Committee's (AHMC's) ongoing role is to provide guidance and contribute to indigenous related activities and initiatives at Lynwood Quarry as well as review the implementation of the AHMP.

The Aboriginal Heritage Management plan requires the AHMC to meet on at least a six-monthly basis. During the report period AHMC meetings were held on the 4 May and 30 November 2021. It should be noted, the timing of these meetings was interrupted due to Covid-19 restrictions.

Discussions at the AHMC Meetings centred around fuel loads and fire risk, weed management, and updates to site signage.

6.11.3 Keeping Place Contract Development

A meeting was held with the AHMC on 26 November 2018 to discuss the process for the construction and operation of the Keeping Place. At this time, a draft process was agreed and discussions with the AHMC are still ongoing.

Progress towards finalisation of the agreed process for the Keeping Place construction and management was ongoing in this reporting period. A modification application for the site approval was submitted on 23 December 2021. Holcim is awaiting a response, therefore the result of the modification application will be reported on in the next Annual Review.

6.11.4 Revisions to the Aboriginal Heritage Management Plan

In accordance with the conditions of MOD 4, Holcim was required to revise its AHMP to include management requirements for Aboriginal sites and potential archaeological deposits within the Granite Pit area. The revised AHMP (Umwelt 2018b) was prepared in 2017 and provided to the registered Aboriginal

parties for their review in early 2018. Following registered Aboriginal party review the AHMP was finalised and provided to DPE (now DPE) in July 2018.

During 2021, Holcim was in the process of updating the Lynwood Quarry Aboriginal Heritage Management Plan. The Management Plan was submitted for comment and approval by DPE.

6.12 Non-Indigenous Heritage

No additional European Heritage management actions were undertaken during the 2021 report period. Actions from the Old Marulan European heritage report were reviewed and completed in 2017.

There are no proposed actions concerning European heritage for the next report period.

6.13 Bushfire Management

Bushfire hazards are managed in accordance with the Rehabilitation and Landscape Management Plan (RLMP).

Measures and safeguards included in the RLMP to minimise bushfire risk at Lynwood Quarry include:

- Fire breaks in the form of access and haul roads, rail lines, electricity easements, quarry pits and out-of-pit emplacement areas;
- Fuel reduction activities, as required, in consultation with the local Rural Fire Service;
- Selective grazing to assist with management of fuel loads;
- Asset protection zones in the form of hardstand areas, lawn and bare earth around the quarry's permanent infrastructure;
- A range of onsite firefighting equipment including two water carts, fire hydrants and hose reels, to be used as required, and extinguishers located on infrastructure, mobile equipment and light vehicles;
- Availability of water through the site water management system; and
- Emergency preparedness training for all quarry personnel.

No bushfires occurred in proximity to the site in 2021. Fuel reduction activities were undertaken to reduce the risk of severe bushfires in future reporting periods.

6.14 Public Safety

Access to the site by members of the public is via contact at the quarry office where visitors or contractors can only be escorted by site personnel around the site. Warning signs have been placed on extremities of operations to make members of the public are aware of quarrying operations.

There were no incidents related to public safety during the report period.

During the reporting period it was identified that some maintenance of signage was required. This signage update was completed.

7.0 Water Management

7.1 Water Management System

Lynwood manages site inflows such as runoff, groundwater inflow, and external water sourced from Johnniefields Quarry Dam as well as discharge events as per the Water Management Plan (2020) (WMP). Lynwood is committed to the minimisation of water consumption through strategies outlined in the WMP including:

- Continued construction of water management devices to achieve the aims of the WMP;
- Vegetating non-operational areas;
- Calibration of water use for product quality; and
- The use of misting in fixed plant to reduce water used by dust suppression sprays.

As shown in **Figure 3** the Lynwood water management system consists of a number of onsite storage dams and diversion drains. Control structures have been constructed to minimise the interaction between clean and dirty water and to provide controls to treat captured dirty water to a standard acceptable for discharge off site. In addition to the storage of external water, storage dams are used to opportunistically capture run-off from the disturbed catchment area along with any groundwater seepage into the quarry pits. In 2019 a new stormwater sediment dam, G1, with capacity of 26 ML, was constructed at the Granite Pit. There were no changes to the water management system in 2021.

7.2 Water Take and Discharge

7.2.1.1 External Water Use

Water imported onto the project site on an “as needs” basis is continually tracked against its licenced allocation. In 2021 there was no water pumped from the Johnniefields Dam for use onsite. This is compliant with the water sourcing limit under the landholder’s agreement.

Table 32 provides a summary of water take during the report period. There was no water take from licensed bores.

Table 32: 2021 Water Take Summary

Water Licence	Water sharing plan, source and management zone (as applicable)	Entitlement	Passive take/ inflows (ML)	Active pumping	Total (units)
WAL: 25575 (continuing, unregulated river) 10UA119159 (expires May 2025) Reference: 10AL102708 Other reference numbers: 10WA102709 (lower Wollondilly management zone), 10BL164515.	Upper Nepean and Upstream Warragamba Water source.	130 units (ML) of which Holcim have access to 80 ML due to a landholder agreement.	0	0 ML	0 ML

7.2.1.2 Licenced Discharges

Lynwood did not undertake any controlled or any uncontrolled discharges from site during the report period.

7.3 Erosion and Sedimentation

7.3.1 Environmental Management Measures

The WMP Erosion and Sediment Control (ESC) Plan provides a framework for the management of erosion and sedimentation at Lynwood. ESC measures are implemented to minimise impact on the surrounding environment. All ESC measures at Lynwood are designed and constructed to the standard consistent with:

- Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004); and
- Managing Urban Stormwater – Soils and Construction, Volume 2E Mines and Quarries (DECC 2008d).

ESC structures and clean water diversions were constructed and maintained during the development of the Granite Pit. No sediment dams were mined through or decommissioned during this report period.

7.3.2 Proposed Improvements

No additional management or mitigation measures are proposed to be implemented which are outside of the existing WMP (2020) and RLMP (2018).

8.0 Rehabilitation

As with all quarry operations, the progression of the quarry pit will be based on market demand and will therefore be subject to change. The progression of the rehabilitation of the site is therefore also subject to market demand. Whilst every opportunity will be taken to rehabilitate areas not required for future operational use, rehabilitation opportunities were limited during the report period as the works undertaken during the report period focussed on continued quarrying activities.

Rehabilitation of the Granite Pit benches will commence once the resource is exhausted and sufficient areas are available for rehabilitation. Due to the extent of the resource within the Granite Pit, rehabilitation of final benches will commence in approximately 30 years. Backfilling is proposed for the Lynwood Pit resulting in no final void located in this area. Once rehabilitated, these areas will be monitored and managed until self-sustaining. Final rehabilitation areas will achieve the rehabilitation completion criteria specified in the RLMP (2018).

Ongoing opportunities for rehabilitation will be limited to rehabilitation following haul road construction, the western amenity bund, and the southern edge of the overburden emplacement area. Where appropriate, temporary land shaping, seeding and other revegetation works may be undertaken in disturbed areas to minimise the potential for offsite impacts associated with the migration of windblown dust, particularly from stockpiles and stripped soil surfaces not required for operational use. Topsoil stockpiles are temporarily stabilised via seeding to minimise the potential for loss of soil through wind or rainfall erosion.

8.1 Status of Quarrying and Rehabilitation

There were limited opportunities for rehabilitation at Lynwood Quarry during 2021 due to the operational status of the project.

Construction of the visual amenity bund to the west of the Granite Pit also commenced in late 2018, continued throughout 2020, and was delayed due to adverse weather in 2021. Sections of the bund were temporarily stabilised in 2021.

Topsoil stockpiles were seeded with the aim of establishing ground cover and reducing soil substrate loss via erosion. This material is planned for use in the rehabilitation of the site following the completion of quarrying operations.

The total quarry footprint increased in 2021 due to the addition of conservation areas in the Lynwood Quarry area. The total active disturbance increased during the report period as operations progressed within the Granite Pit and associated emplacement area. Construction of the visual amenity bund to the west of the Granite Pit was continued into the report period from 2020, however this construction is ongoing into 2022 due to delays in 2021.

There was almost 4 hectares of rehabilitation commenced in 2021.

The rehabilitation status for Lynwood Quarry is presented in **Table 33**.

Table 33: Rehabilitation Status

Quarry Area Type	Previous Report Period (actual) 2018 (ha)	Previous Report Period (actual) 2019 (ha)	Previous Report Period (actual) 2020 (ha)	Report Period (actual) 2021 (ha)	Next Report Period (forecast) 2022 (ha)
A. Total quarry footprint (all areas including active disturbance areas and rehabilitation areas)	36	42	42	62.4	70
B. Total active disturbance (areas within the footprint still requiring rehabilitation)	208	216	216	236	244
C. Land being prepared for rehabilitation	0	0	0	3.85	5
D. Land under active rehabilitation*	0	0	11	15	20
E. Completed rehabilitation (areas that have achieved completion criteria and been signed-off by DRG)	0	0	0	0	1

*Conservation area currently undergoing active rehabilitation as well as the amenity bund cover included in this area type.

8.2 Post Rehabilitation Land Uses

The proposed final land use aims to emulate the pre-mining environment. The final land use will enhance local and regional ecological linkages throughout the pit and surface infrastructure areas and with the adjacent surrounding landscape. The primary objective of site revegetation and regeneration is to create a stable final landform with acceptable post-quarrying land use.

8.3 Rehabilitation Activities

Ecological monitoring of revegetated areas, fauna, and nest boxes was completed in 2021 as per the approved RLMP.

An update of the RLMP commenced in 2021 to resolve non-compliances identified during the preparation of the 2020 EPBC Compliance Report. Ecological assessments of the Box-Gum Woodland commenced in 2021, including site visits occurring on 7 and 8 December 2021. The studies will continue into 2022.

Rehabilitation of 11ha within the Conservation Area was undertaken in 2019 and continued into 2020. Tree planting over an area of several hectares was undertaken in 2020 to establish a windbreak for product stockpiles.

The rehabilitation monitoring was undertaken to assess fauna assemblages, establish baseline conditions for retained vegetation, and monitor vegetation health.

9.0 Community

9.1 Community Engagement

9.1.1 Community Consultative Committee Meetings

Two community consultative committee (CCC) meetings were held in 2021 with meetings on 13 May and 27 November. The timing of these meetings was slightly impacted by Covid-19 restrictions; however the meetings were able to be held in person.

In 2021, the meetings provided updates on the general operations at site, community engagement, complaints received by the site, environmental updates, and an outline on actions for the next 6 months. The outcomes of both CCC meetings are detailed in the meeting notes available on the Lynwood Quarry website (<https://www.holcim.com.au/lynwood>).

9.1.2 Community Activities

Lynwood Quarry supported several community-based activities during the report period. These activities are presented in **Table 34**. The site also supports the Chamber of Commerce, Goulburn and District Show Jumping Club, and Gibraltarr Road residents. Activities of the Quarry are promoted through articles in the local newspaper (Discover Marulan), Community Information Sessions, and a Community Perception Survey.

Table 34: 2021 Community Engagement Activities and Sponsorship

Community Activity	Amount Funded in 2021
Goulburn Mulwaree Council Australia Day BBQ	\$500
Gunning Campdraft	\$500
Towrang Valley Progress Assoc Australia Day BBQ	\$500
Goulburn Agriculture, Pastoral and Horticultural Society	\$2,000
Marulan Football Club	\$3,500
Goulburn & District Showjumping Competition	\$1,000

Many community events were cancelled in the report period due to the Covid-19 pandemic. This impacted the capacity for Lynwood Quarry to engage or sponsor community programs.

9.1.3 Community Investment Fund

The Community Investment Fund (CIF), dedicated to the communities of Marulan and surrounds, is designed to improve the quality of life of the members of the Holcim workforce, their families and the community. The CIF has been designed to improve economic, cultural and social development throughout

the region. Lynwood Quarry budgets a total of \$50,000.00 annually for projects which contribute to the goals of the community.

Lynwood's 2015-2019 CIF Plan was last updated in the 2020 report period. Both the current CIF Plan and CIF Application Form are available to the public on the Lynwood Quarry website.

Appendix 4 lists the approved CIF funded projects since the inception of the CIF. Lynwood will continue to support local community projects in 2022.

9.2 Complaints

In accordance with Condition M5 of the EPL, a community complaints line is operated by Lynwood Quarry during the hours of operation. The complaints line is 1300 657 051 which is also displayed on the Lynwood Quarry website. This contact point provides the community with a mechanism by which to raise any concerns that they have with operations at Lynwood Quarry.

The Lynwood Quarry Environment Management Strategy (EMS) was updated and approved by DPE in 2020. It details the complaints management and dispute resolution procedures for the site. The Quarry Manager is responsible for the implementation of the complaints management process so that complaints are responded to in a timely manner. Investigation findings and corrective actions implemented are communicated to the complainant as appropriate.

A summary of complaints received by Lynwood Quarry between 2014 and 2021 is presented in **Table 35**. Lynwood Quarry received a total of 2 complaints during the reporting period. The two complaints received related to lighting impacts in the evening from the site. Complaints continued to reduce in 2021. The complaints in 2021 were made on the following dates:

- 3 July 2021; and
- 5 July 2021 (ongoing for 2 weeks).

These complaints were managed in accordance with the complaints management and dispute resolution procedure detailed in the EMS (2020). Both complaints were closed out and no further actions were implemented.

As a result of consistent community complaints regarding air quality in previous report periods, Lynwood has consulted with EPA and DPE on the improvement of air quality controls, as well as incorporated Pollution Reduction Program (PRP) titled "Lynwood Dust Management Improvement Plan" into the EPL. A notice of variation of EPL 12939 from the EPA was sent to the Lynwood Quarry Manager on 28 August 2020 to confirm the site's satisfactory fulfilment of the requirements of this PRP and thus its removal from the EPL. The site has also updated its Air Quality Management Plan and is waiting for this to be approved by DPE. The reduction of air quality complaints in 2020 from 2019 and 2018 is testament to Lynwood's implementation of air quality management strategies. The installation of a new BAM monitor occurred 7 October 2021 for the purpose of measuring PM_{2.5}. The EPA sent confirmation of their satisfaction with this measure on 18 October 2021.

Lynwood Quarry maintains a Complaints Register to record complaints received from the community, with the register contained on the Lynwood Quarry website (<https://www.holcim.com.au/lynwood>).

Table 35: Comparison of complaints for Lynwood 2014 - 2021

Complaint Type	2014	2015	2016	2017	2018	2019	2020	2021
Noise	0	0	0	1	2	4	0	0
Air quality (dust)	0	1	0	1	6	41	2	0
Blasting	0	2	1	1	0	0	3	0
Traffic	0	0	0	0	0	0	1	0
Water	0	0	0	0	0	0	0	0
Other	3	0	0	0	0	2	1	2
Total	3	2	1	3	8	47	7	2

10.0 Independent Audit

An Independent Environmental Audit (IEA) was conducted within this reporting period on 29 September 2020 as per Condition 11 of DA 128-5-2005. This was the fourth IEA for the quarry.

An IEA Action Plan was created in response to this IEA and is attached in **Appendix 3**. The IEA Report by Kleinfelder and IEA Action Plan were submitted to DPE on 23 December 2020.

The next IEA is due in September 2023.

11.0 Incidents and Non-Compliances during the Report Period

Lynwood Quarry notified DPE of non-compliances in the reporting period. A summary of these incidents and any internal or external actions undertaken by Lynwood to correct non-compliances or prevent future incidents is presented in **Table 36**.

Table 36: Summary of Incidents

Non-Compliance	Date	Explanation and Comments
<u>Air Quality Monitoring</u> PM10 sampling event missed on 24/03/2021 due to flooding causing HVAS 1 to become inaccessible.	March 2021	Holcim notified DPE of an inability to capture Lockersleigh HVAS data due to flooding. As a result there was no data captured for 24 March 2021. DPE acknowledged the receipt of this notification on 7/04/2021.
<u>Air Quality Monitoring</u> HVAS 1 did not sample every six days in 2021. 50 24-hour PM10 samples were taken in 2021 at HVAS 1.	March – July 2021	HVAS 1 software error impacted sampling schedule, and therefore samples were not taken by unit on the correct dates. Monitoring contractor reported issue and followed up on unit errors across March to July 2021 to resolve the issues. Resolution of unit errors and calibration were delayed due to Covid-19 restrictions preventing timely attendance to site.
<u>Air Quality Monitoring</u> Depositional Dust monitoring was missed in June 2021 due to Covid-19 restrictions preventing access to the site.	June 2021	Depositional dust monitoring is a monthly requirement from the Consent. The June 2021 could not be recorded due to interruptions from Covid-19. However, depositional dust results were consistently below the Consent criteria for all other months in 2021.
<u>Groundwater Quality Monitoring</u> pH, TSS, or EC were not monitored at surface monitoring location SW8 on a quarterly basis.	Throughout 2021	Full monitoring was not undertaken at SW8 across 2021, resulting in some absent results. This is a low non-compliance because the full monitoring schedule outlined in the WMP was not implemented.

In 2021 Lynwood received two infringement notices against the EPBC approval. A desktop review was undertaken in the first half of 2021. The offence was identified on 30 July 2021 and infringement notices issued on 9 November 2021. The offences related to Conditions 2, 7, and 8 of the EPBC Approval 2012/6560. Holcim has been dealing with this matter separately.

12.0 Activities to be Completed in the Next Report Period

Lynwood Quarry proposes to undertake a range of activities during the 2022 report period related to continued quarrying operations and also related to completion of actions required as a result of the 2020 IEA. Actions proposed to be undertaken by Holcim at Lynwood Quarry during 2022 include:

- Implementation of approved environmental Management Plans;
- Undertake nest box and fauna monitoring in accordance with the Lynwood Quarry Rehabilitation and Landscape Management Plan;
- Finalise the Development Approval for the construction and management of the Keeping Place;
- Continued extraction within the Granite Pit; and
- Continue works associated with construction of the visual amenity bund to the west of the Granite Pit.

APPENDIX 1
Noise Monitoring Reports

Noise Monitoring Assessment

Lynwood Quarry, Marulan, NSW
Quarter 1 Ending March 2021.



Document Information

Noise Monitoring Assessment

Lynwood Quarry, Marulan, NSW

Quarter 1 Ending March 2021

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APPENDIX A - GLOSSARY OF TERMS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Lynwood Quarry (the 'quarry'), Marulan, NSW.

The monitoring has been conducted in accordance with the Lynwood Noise Management Plan (NMP) and in general accordance with the Noise Policy for Industry (NPI), at four representative monitoring locations. This assessment has been undertaken for the quarterly period ending March 2021, and forms part of the annual noise monitoring program to address conditions outlined in the Development Consent.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Lynwood Quarry Noise Management Plan (NMP), 2016;
- Lynwood Quarry Environmental Protection Licence (EPL), 2013 (12939);
- Lynwood Quarry, Development Consent, 2005 (DA128-5-2005); and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

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

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2 Noise Criteria

The Lynwood Quarry Noise Management Plan (NMP), outlines the applicable noise criteria for residential receivers L1 – L16 surrounding the quarry, and are presented in **Table 1**.

Table 1 Noise Criteria ¹				
Location	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LA1(1min)
L1	35	35	35	45
L2	35	35	35	45
L3	35	35	35	45
L4	35	37	35	46
L5	35	35	35	46
L6	35	37	36	46
L7	38	38	35	55
L8	39	38	36	55
L9	39	39	37	56
L10	42	42	40	53
L11	35	35	35 ¹	47
L12	37	37	36	47
L13	40	38	37	47
L14	35	35	35	47
L15	35	35	35	47
L16	35	35	35	45

Note 1: Noise criteria adopted from the EPL.

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3 Methodology

3.1 Locality

The quarry is located near Marulan, NSW approximately 4km west of the town centre. Receivers in the locality surrounding the quarry are primarily rural and residential. The quarry is surrounded by rural properties to the west, with the Hume Highway situated to the east and south of the site. Highway traffic is a dominant noise source in the area along with rural noise. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan in **Figure 1** and presented in **Table 2**.

Table 2 Monitoring Location Addresses

NMP ID	EPL ID	Address	Criteria dB			
			Day	Evening	Night	Night
			LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
N1	L1	1114 Carrick Road, Marulan	35	35	35	45
N2	L6	End of Maclura Drive, Marulan	35	37	36	46
N3	L11	Northern Boundary, 16038 Hume Highway, Marulan ¹	35	35	35 ²	47
N4	L12	Corner of Dorsett and Suffolk Road, Marulan	37	37	36	47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Intermediate noise monitoring point.

Note 2: Noise criteria adopted from the EPL.

3.2 Assessment Methodology

The attended noise measurements were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the Lynwood Quarry EPL. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 9 February 2021 and Thursday 11 February 2021. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA.

Noise measurements were of 15-minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Measurements were conducted at four locations (N1-N4) on Tuesday 9 February 2021 and Thursday 11 February 2021 to satisfy the requirements of the NMP.

Extraneous noise sources were excluded from the analysis to determine the $L_{Aeq}(15min)$ quarry noise contribution for comparison against the relevant criteria. In the event of quarry attributed noise being above criteria, prevailing meteorological conditions for the monitoring period are sourced from the onsite meteorological station and analysed in accordance with Fact Sheet D of the NPI to determine the stability category present at the time of each attended measurement.

Where the quarry is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.

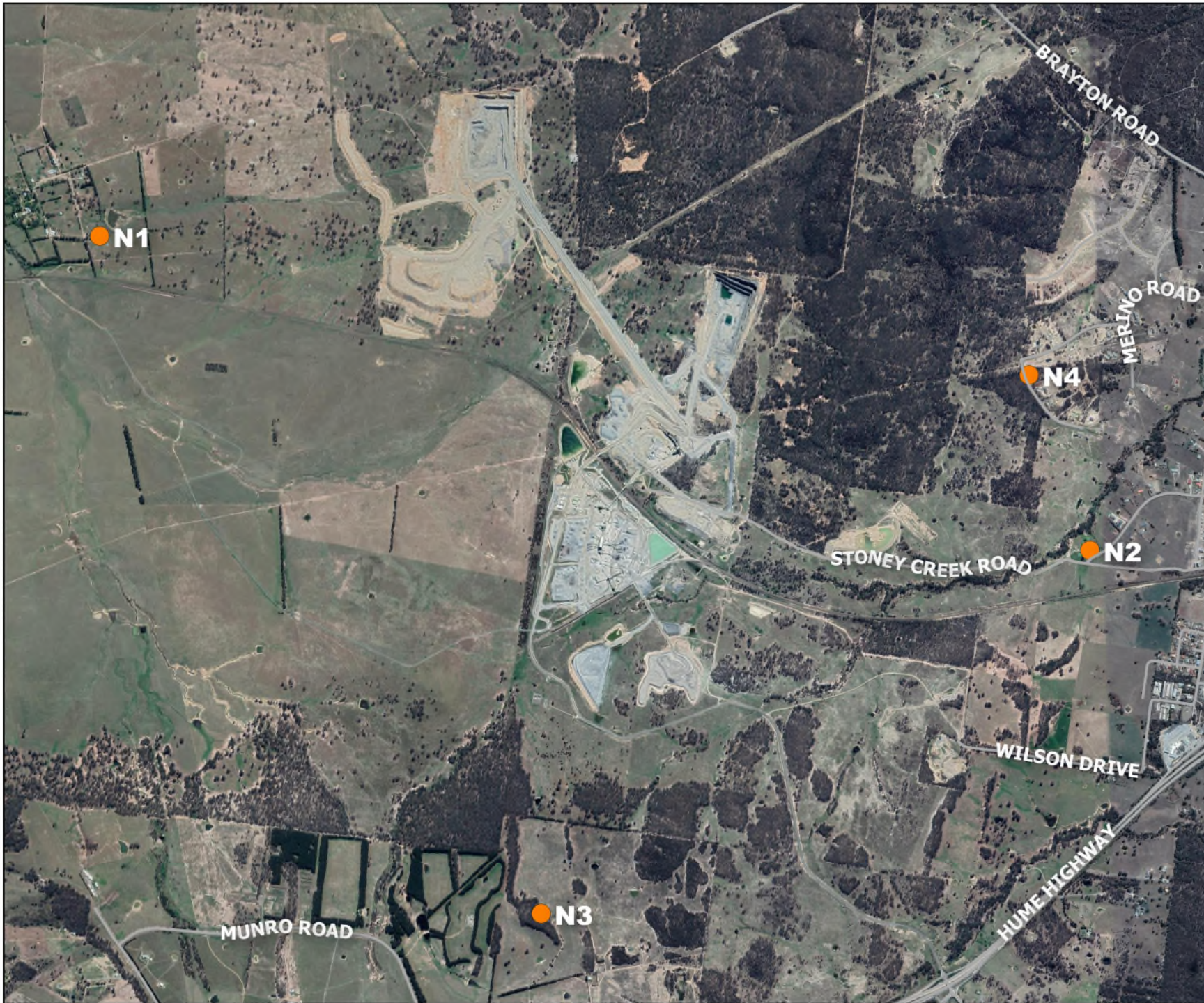


FIGURE 1
Site Locality
MAC180611-02
Holcim Lynwood Quarry

KEY

- Noise Monitoring Locations



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4 Results

4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N1 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
09/02/2021	14:46 (Day)	66	38	32	WD: SE WS: 1.5m/s Rain: Nil	Wind 29-43
						Birds 26-48
						Operator 55-66
						Quarry – Haul Trucks 26-33 (Multiple movements 7-10 minute duration)
Lynwood Quarry L _{Aeq} (15min) Contribution						<33
11/02/2021	23:59 (Night)	55	39	29	WD: N WS: <0.5m/s Rain: Nil	Insects 28-36
						Distant Traffic <25-28
						Train 30-55
						Quarry Not Audible
Lynwood Quarry L _{Aeq} (15min) Contribution						<30
Lynwood Quarry L _{A1} (1min) Contribution						<40

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N2 for the NMA are presented in **Table 4**.

Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
09/02/2021	13:38 (Day)	55	41	37	WD: S WS: 0.5m/s Rain: Nil	Distant Traffic 35-44
						Birds 32-50
						Train 35-55
						Quarry Not Audible
		Lynwood Quarry L _{Aeq} (15min) Contribution				<30
11/02/2021	22:57 (Night)	58	43	37	WD: SW WS: 0.5m/s Rain: Nil	Insects 35-45
						Distant Traffic 32-46
						Residential Noise 30-32
						Train 35-58
						Quarry Not Audible
		Lynwood Quarry L _{Aeq} (15min) Contribution				<30
		Lynwood Quarry L _{A1} (1min) Contribution				<40

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N3 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N3							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA	
		L _{Amax}	L _{Aeq}	L _{A90}			
09/02/2021	12:51 (Day)	48	38	35	WD: SW WS: 0.5m/s Rain: Nil	Distant Traffic 33-40	
						Birds 30-48	
						Quarry – Haul Trucks <30 (3 movements, 2-4 minute duration)	
						Quarry – Reverse Alarms <30 (multiple 3-5 second durations)	
						Quarry – Vehicles enter/exit Site 30-35 (3 movements, 2-3 minute duration)	
						Quarry – Loader <30 (multiple movements 6-8 minute duration)	
						Lynwood Quarry L _{Aeq} (15min) Contribution	32
						Insects 38-50	
						Distant Traffic <35-42	
						Operator 54	
11/02/2021	22:20 (Night)	54	43	39	WD: SE WS: 0.5m/s Rain: Nil	Quarry – Alarms <30 (multiple 3-5 second durations)	
						Quarry – Train Loading 30-35 (6-8 minute duration)	
						Quarry – Train Shunting 35-45 (5 second duration)	
						Quarry – Hum <30 (constant duration)	
						Lynwood Quarry L _{Aeq} (15min) Contribution	<35
						Lynwood Quarry L _{A1} (1min) Contribution	<47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N4 for the NMA are presented in **Table 6**.

Table 6 Operator-Attended Noise Survey Results – Location N4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA						
		L _{Amax}	L _{Aeq}	L _{A90}								
09/02/2021	14:04 (Day)	58	39	35	WD: SE WS: 1.0m/s Rain: Nil	Train 35-50						
						Birds 30-58						
						Distant Traffic 30-38						
						Wind 30-43						
						Quarry Not Audible						
Lynwood Quarry L _{Aeq} (15min) Contribution						<30						
11/02/2021	23:20 (Night)	51	42	34	WD: SW WS: 0.5m/s Rain: Nil	Insects 32-51						
						Distant Traffic 30-40						
						Quarry Not Audible						
						Lynwood Quarry L _{Aeq} (15min) Contribution						<30
						Lynwood Quarry L _{A1} (1min) Contribution						<40

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

5 Discussion

5.1 Discussion of Results - Location N1

Monitoring on Tuesday 9 February 2021 identified quarry noise was audible during the daytime measurement with quarry noise contributions estimated to satisfy the relevant daytime noise limits. Monitoring on Thursday 11 February 2021 identified quarry noise was inaudible during night-time measurements with quarry noise contributions estimated to satisfy the relevant night-time noise limits. Audible quarry noise sources included the haul truck movements. Extraneous noise sources measured included birds, traffic, train, insects, operator noise, and wind.

5.2 Discussion of Results - Location N2

Monitoring on Tuesday 9 February 2021 and Thursday 11 February 2021 identified quarry noise was inaudible during both daytime and night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits. Extraneous noise sources measured included birds, traffic, train, insects, and residential noise.

5.3 Discussion of Results - Location N3

Monitoring on Tuesday 9 February 2021 and Thursday 11 February 2021 identified that quarry noise was audible during both daytime and night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits. Quarry noise sources audible during the survey included the site alarms, vehicle reverse alarms vehicles entering/exiting site, loader movements, haul truck movements, trains loading and shunting and general site hum. Extraneous noise sources included birds, traffic, operator noise and insects.

5.4 Discussion of Results - Location N4

Monitoring on Tuesday 9 February 2021 and Thursday 11 February 2021 identified quarry noise was inaudible during both daytime and night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits. Extraneous noise sources measured included wind, insects, birds, traffic, and trains.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Lynwood Quarry, Marulan, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria during Quarter 1, ending March 2021.

Attended noise monitoring was undertaken on Tuesday 9 February 2021 and Thursday 11 February 2021 at four representative monitoring locations. The assessment has identified that noise emissions generated by Lynwood Quarry were audible at two locations, however quarry noise emissions were below the relevant noise criteria, satisfying the applicable noise criteria throughout the survey period.

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Appendix A - Glossary of Terms

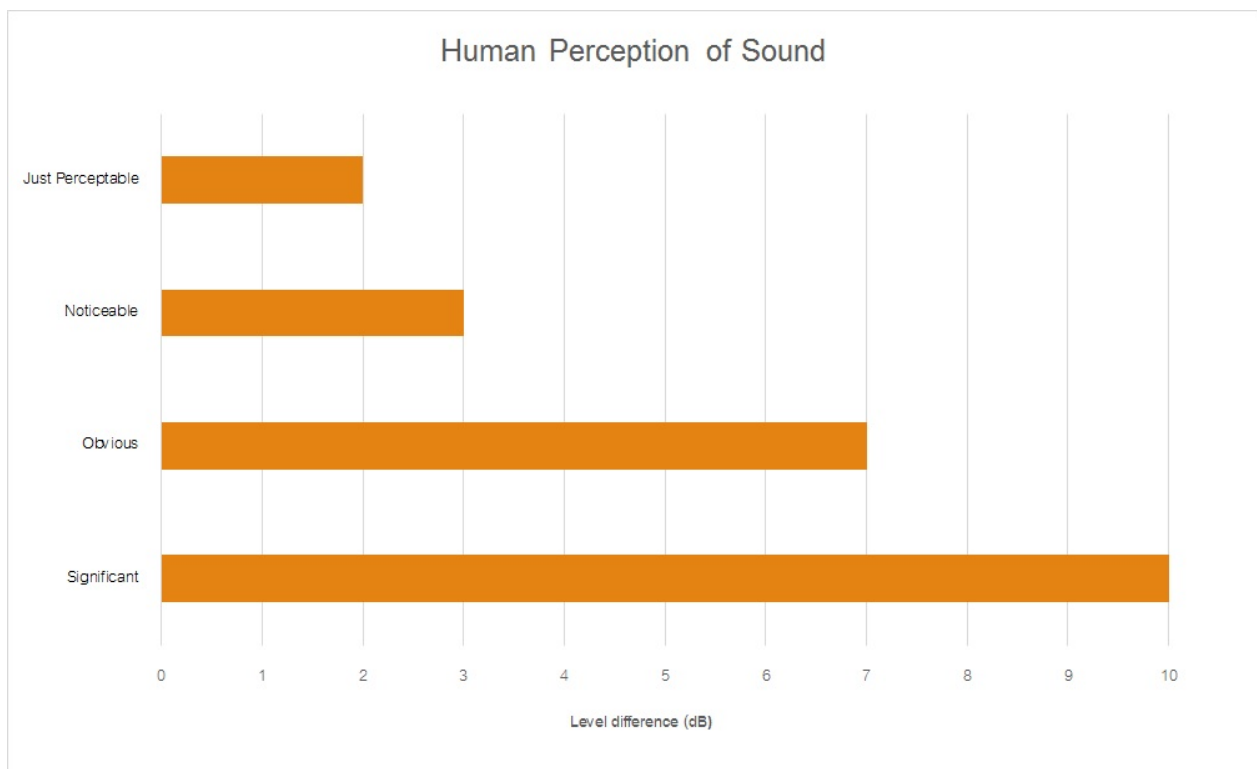
Table A1 provides a number of technical terms have been used in this report.

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 LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
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), dB(L)	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.
LAm _{ax}	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 (LW)	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ 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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Noise Monitoring Assessment

Lynwood Quarry, Marulan, NSW
Quarter 2 Ending June 2021.



Document Information

Noise Monitoring Assessment

Lynwood Quarry, Marulan, NSW

Quarter 2 Ending June 2021

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APPENDIX A - GLOSSARY OF TERMS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Lynwood Quarry (the 'quarry'), Marulan, NSW.

The monitoring has been conducted in accordance with the Lynwood Noise Management Plan (NMP) and in general accordance with the Noise Policy for Industry (NPI), at four representative monitoring locations. This assessment has been undertaken for the quarterly period ending June 2021, and forms part of the annual noise monitoring program to address conditions outlined in the Development Consent.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Lynwood Quarry Noise Management Plan (NMP), 2016;
- Lynwood Quarry Environmental Protection Licence (EPL), 2013 (12939);
- Lynwood Quarry, Development Consent, 2005 (DA128-5-2005); and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

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

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2 Noise Criteria

The Lynwood Quarry Noise Management Plan (NMP), outlines the applicable noise criteria for residential receivers L1 – L16 surrounding the quarry, and are presented in **Table 1**.

Table 1 Noise Criteria ¹				
Location	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LA1(1min)
L1	35	35	35	45
L2	35	35	35	45
L3	35	35	35	45
L4	35	37	35	46
L5	35	35	35	46
L6	35	37	36	46
L7	38	38	35	55
L8	39	38	36	55
L9	39	39	37	56
L10	42	42	40	53
L11	35	35	35 ¹	47
L12	37	37	36	47
L13	40	38	37	47
L14	35	35	35	47
L15	35	35	35	47
L16	35	35	35	45

Note 1: Noise criteria adopted from the EPL.

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3 Methodology

3.1 Locality

The quarry is located near Marulan, NSW approximately 4km west of the town centre. Receivers in the locality surrounding the quarry are primarily rural and residential. The quarry is surrounded by rural properties to the west, with the Hume Highway situated to the east and south of the site. Highway traffic is a dominant noise source in the area along with rural noise. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan in **Figure 1** and presented in **Table 2**.

Table 2 Monitoring Location Addresses

NMP ID	EPL ID	Address	Criteria dB			
			Day	Evening	Night	Night
			LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
N1	L1	1114 Carrick Road, Marulan	35	35	35	45
N2	L6	End of Maclura Drive, Marulan	35	37	36	46
N3	L11	Northern Boundary, 16038 Hume Highway, Marulan ¹	35	35	35 ²	47
N4	L12	Corner of Dorsett and Suffolk Road, Marulan	37	37	36	47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Intermediate noise monitoring point.

Note 2: Noise criteria adopted from the EPL.

3.2 Assessment Methodology

The attended noise measurements were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the Lynwood Quarry EPL. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Wednesday 26 May 2021 and Thursday 27 May 2021. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA.

Noise measurements were of 15-minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Measurements were conducted at four locations (N1-N4) on Wednesday 26 May 2021 and Thursday 27 May 2021 to satisfy the requirements of the NMP.

Extraneous noise sources were excluded from the analysis to determine the $L_{Aeq}(15min)$ quarry noise contribution for comparison against the relevant criteria. In the event of quarry attributed noise being above criteria, prevailing meteorological conditions for the monitoring period are sourced from the onsite meteorological station and analysed in accordance with Fact Sheet D of the NPI to determine the stability category present at the time of each attended measurement.

Where the quarry is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.

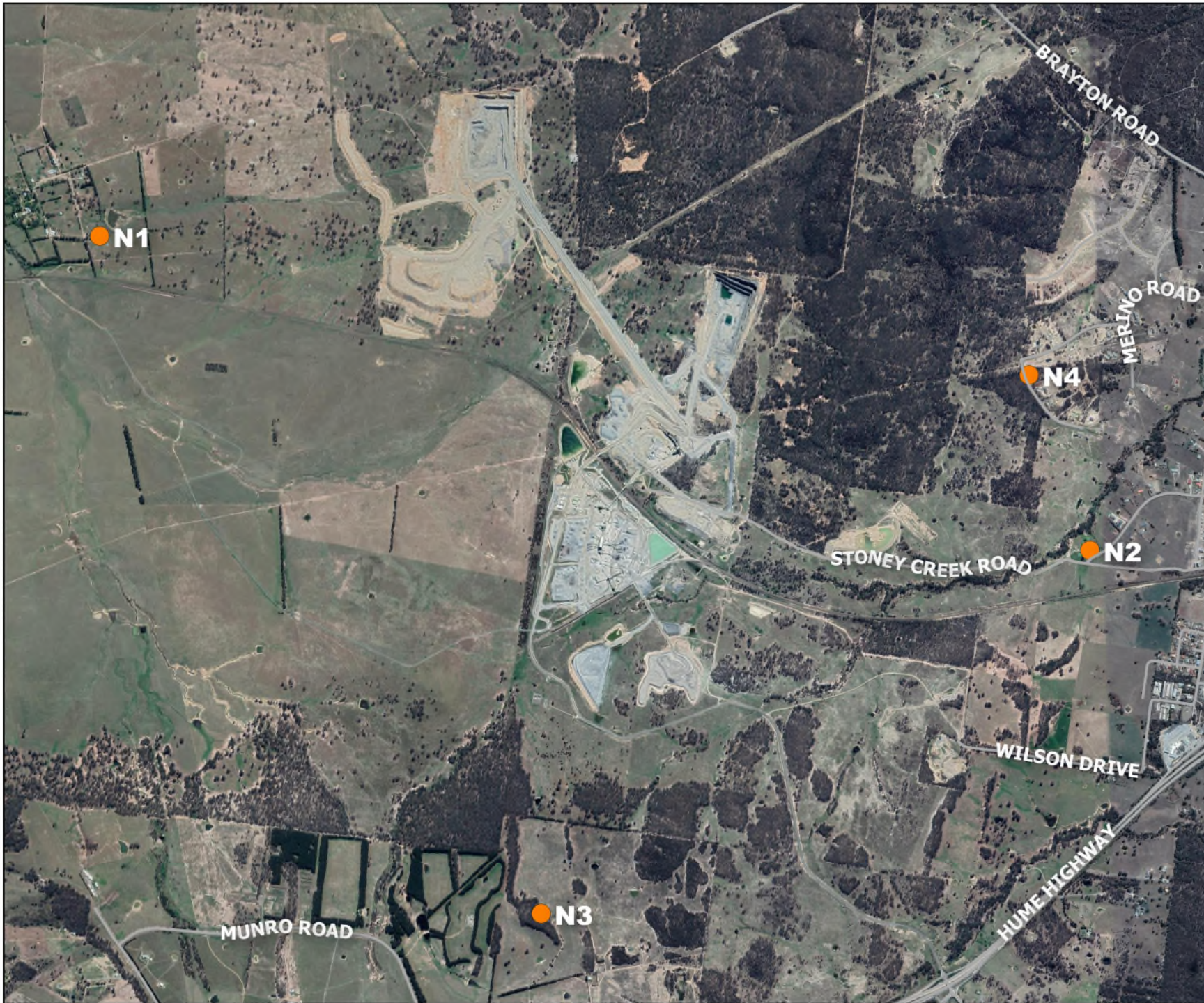


FIGURE 1
Site Locality
MAC180611-02
Holcim Lynwood Quarry

KEY

- Noise Monitoring Locations



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4 Results

4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N1 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
27/05/2021	10:20 (Day)	63	45	40	WD: W WS: 3.0m/s Rain: Nil	Wind 36-63
						Birds 33-53
						Aircraft 40-51
						Quarry Inaudible
Lynwood Quarry L _{Aeq} (15min) Contribution						<35
26/05/2021	20:03 (Evening)	55	38	34	WD: SW WS: 2.0m/s Rain: Nil	Wind 30-55
						Train 30-51
						Insects <32
						Quarry Inaudible
Lynwood Quarry L _{Aeq} (15min) Contribution						<30
26/05/2021	23:13 (Night)	71	37	33	WD: SW WS: 1.5m/s Rain: Nil	Wind 30-47
						Distant Traffic <28
						Insects <31
						Operator 71
						Quarry Inaudible
Lynwood Quarry L _{Aeq} (15min) Contribution						<30
Lynwood Quarry L _{A1} (1min) Contribution						<40

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N2 for the NMA are presented in **Table 4**.

Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
27/05/2021	09:04 (Day)	60	41	39	WD: W	Wind 37-60
					WS: 1.5m/s	Distant Traffic 34-40
					Rain: Nil	Aircraft 34-52
						Birds 34-37
Lynwood Quarry L _{Aeq} (15min) Contribution						Quarry Inaudible
						<35
26/05/2021	21:03 (Evening)	53	42	40	WD: SW	Wind 39-53
					WS: 1.5m/s	Distant Traffic 36-41
					Rain: Nil	Insects <36
						Quarry Inaudible
Lynwood Quarry L _{Aeq} (15min) Contribution						<37
27/05/2021	00:14 (Night)	48	40	37	WD: W	Wind 30-48
					WS: 1.0m/s	Distant Traffic 33-44
					Rain: Nil	Quarry Haul Trucks 30-38
						(5-8 minute total duration)
Lynwood Quarry L _{Aeq} (15min) Contribution						35
Lynwood Quarry L _{A1} (1min) Contribution						<46

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N3 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N3						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
27/05/2021	08:28 (Day)	55	42	40	WD: W WS: 1.0m/s Rain: Nil	Wind 38-48
						Distant Traffic 35-40
						Insects <35
						Birds 35-55
						Quarry FEL/Reverse Alarms <34 (infrequent 5-10s durations)
Lynwood Quarry L _{Aeq} (15min) Contribution						<35
26/05/2021	21:40 (Evening)	49	42	38	WD: SW WS: 1.5m/s Rain: Nil	Wind 34-49
						Distant Traffic 37-44
						Insects <34
						Quarry FEL/Reverse Alarms <34 (infrequent 5-10s durations)
						Lynwood Quarry L _{Aeq} (15min) Contribution
26/05/2021	22:20 (Night)	49	40	38	WD: SW WS: 1.0m/s Rain: Nil	Wind 33-49
						Distant Traffic 36-43
						Insects <33-35
						Quarry FEL/Reverse Alarms <34 (infrequent 5-10s durations)
						Lynwood Quarry L _{Aeq} (15min) Contribution
Lynwood Quarry L _{A1} (1min) Contribution						<45

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N4 for the NMA are presented in **Table 6**.

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
27/05/2021	09:41 (Day)	72	48	38	WD: W	Wind 36-58
					WS: 2.0m/s	Traffic 33-72
					Rain: Nil	Birds 33-46
						Quarry Inaudible
		Lynwood Quarry L _{Aeq} (15min) Contribution				<37
26/05/2021	20:40 (Evening)	64	44	41	WD: SW	Wind 39-64
					WS: 2.5m/s	Traffic 36-44
					Rain: Nil	Insects <36
						Quarry Inaudible
		Lynwood Quarry L _{Aeq} (15min) Contribution				<37
26/05/2021	23:51 (Night)	50	39	36	WD: W	Wind 33-50
					WS: 1.0m/s	Traffic 30-38
					Rain: Nil	Insects <30
						Quarry Haul Trucks <30-33 (3-5 minute total duration)
		Lynwood Quarry L _{Aeq} (15min) Contribution				31
		Lynwood Quarry L _{A1} (1min) Contribution				<40

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

5 Discussion

5.1 Discussion of Results - Location N1

Monitoring on Wednesday 26 May 2021 and Thursday 27 May 2021 identified quarry noise was inaudible during daytime, evening and night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits.

Extraneous noise sources measured included birds, distant traffic, train, insects, operator noise and wind.

5.2 Discussion of Results - Location N2

Monitoring on Wednesday 26 May 2021 and Thursday 27 May 2021 identified quarry noise was inaudible during daytime and evening measurements and audible during night-time measurement with quarry noise contributions estimated to satisfy the relevant noise limits.

Quarry noise sources measured included haul truck movements. Extraneous noise sources included aircraft, birds, distant traffic, insects and wind.

5.3 Discussion of Results - Location N3

Monitoring on Wednesday 26 May 2021 and Thursday 27 May 2021 identified that quarry noise was just audible during daytime, evening and night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits.

Quarry noise sources audible during the survey front end loader movements and reverse alarms. Extraneous noise sources included birds, distant traffic insects and wind.

5.4 Discussion of Results - Location N4

Monitoring on Wednesday 26 May 2021 and Thursday 27 May 2021 identified quarry noise was inaudible during daytime and evening measurements and just audible during night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits.

Quarry noise sources measured included haul truck movements. Extraneous noise sources included birds, traffic, insects and wind.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Lynwood Quarry, Marulan, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria during Quarter 2, ending June 2021.

Attended noise monitoring was undertaken on Wednesday 26 May 2021 and Thursday 27 May 2021 at four representative monitoring locations. The assessment has identified that noise emissions generated by Lynwood Quarry were audible at three locations, however quarry noise emissions were below the relevant noise criteria, satisfying the applicable noise criteria throughout the survey period.

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Appendix A - Glossary of Terms

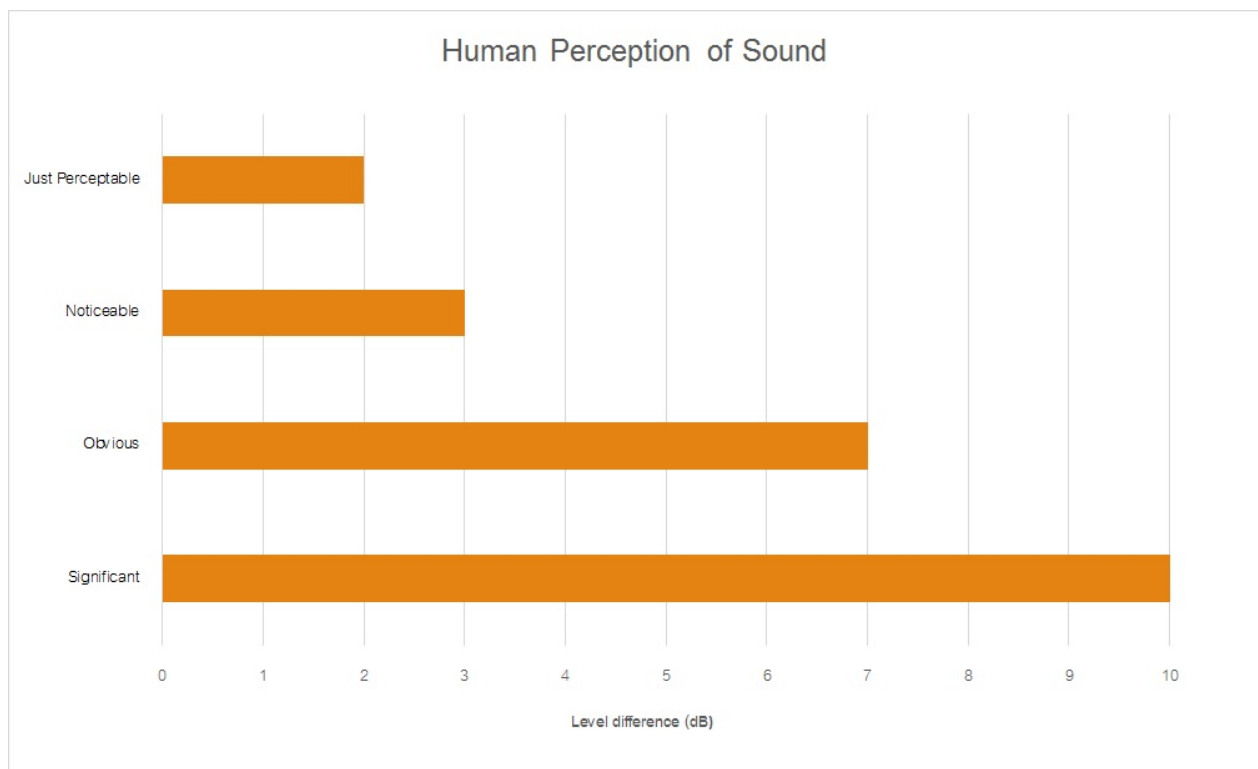
Table A1 provides a number of technical terms have been used in this report.

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 LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
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), dB(L)	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.
LAm _{ax}	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 (LW)	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ 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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Noise Monitoring Assessment

Lynwood Quarry, Marulan, NSW
Quarter 3 Ending September 2021.



Document Information

Noise Monitoring Assessment

Lynwood Quarry, Marulan, NSW

Quarter 3 Ending September 2021

Prepared for: Holcim (Australia) Pty Ltd



Prepared by: Muller Acoustic Consulting Pty Ltd

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APPENDIX A - GLOSSARY OF TERMS

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for Lynwood Quarry (the 'quarry'), Marulan, NSW.

The monitoring has been conducted in accordance with the Lynwood Noise Management Plan (NMP) and in general accordance with the Noise Policy for Industry (NPI), at four representative monitoring locations. This assessment has been undertaken for the quarterly period ending September 2021, and forms part of the annual noise monitoring program to address conditions outlined in the Development Consent.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Lynwood Quarry Noise Management Plan (NMP), 2016;
- Lynwood Quarry Environmental Protection Licence (EPL), 2013 (12939);
- Lynwood Quarry, Development Consent, 2005 (DA128-5-2005); and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

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

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2 Noise Criteria

The Lynwood Quarry Noise Management Plan (NMP) outlines the applicable noise criteria for residential receivers L1 – L16 surrounding the quarry, and are presented in **Table 1**.

Table 1 Noise Criteria ¹				
Location	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LA1(1min)
L1	35	35	35	45
L2	35	35	35	45
L3	35	35	35	45
L4	35	37	35	46
L5	35	35	35	46
L6	35	37	36	46
L7	38	38	35	55
L8	39	38	36	55
L9	39	39	37	56
L10	42	42	40	53
L11	35	35	35 ¹	47
L12	37	37	36	47
L13	40	38	37	47
L14	35	35	35	47
L15	35	35	35	47
L16	35	35	35	45

Note 1: Noise criteria adopted from the EPL.

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3 Methodology

3.1 Locality

The quarry is located near Marulan, NSW approximately 4km west of the town centre. Receivers in the locality surrounding the quarry are primarily rural and residential. The quarry is surrounded by rural properties to the west, with the Hume Highway situated to the east and south of the site. Highway traffic is a dominant noise source in the area along with rural noise. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan in **Figure 1** and presented in **Table 2**.

Table 2 Monitoring Location Addresses

NMP ID	EPL ID	Address	Criteria dB			
			Day	Evening	Night	Night
			LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
N1	L1	1114 Carrick Road, Marulan	35	35	35	45
N2	L6	End of Maclura Drive, Marulan	35	37	36	46
N3	L11	Northern Boundary, 16038 Hume Highway, Marulan ¹	35	35	35 ²	47
N4	L12	Corner of Dorsett and Suffolk Road, Marulan	37	37	36	47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Intermediate noise monitoring point.

Note 2: Noise criteria adopted from the EPL.

3.2 Assessment Methodology

The attended noise measurements were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the Lynwood Quarry EPL. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 27 July 2021 and Thursday 29 July 2021. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA.

Noise measurements were of 15-minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Measurements were conducted at four locations (N1-N4) on Tuesday 27 July 2021 and Thursday 29 July 2021 to satisfy the requirements of the NMP.

Extraneous noise sources were excluded from the analysis to determine the $L_{Aeq}(15min)$ quarry noise contribution for comparison against the relevant criteria. In the event of quarry attributed noise being above criteria, prevailing meteorological conditions for the monitoring period are sourced from the onsite meteorological station and analysed in accordance with Fact Sheet D of the NPI to determine the stability category present at the time of each attended measurement.

Where the quarry is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.

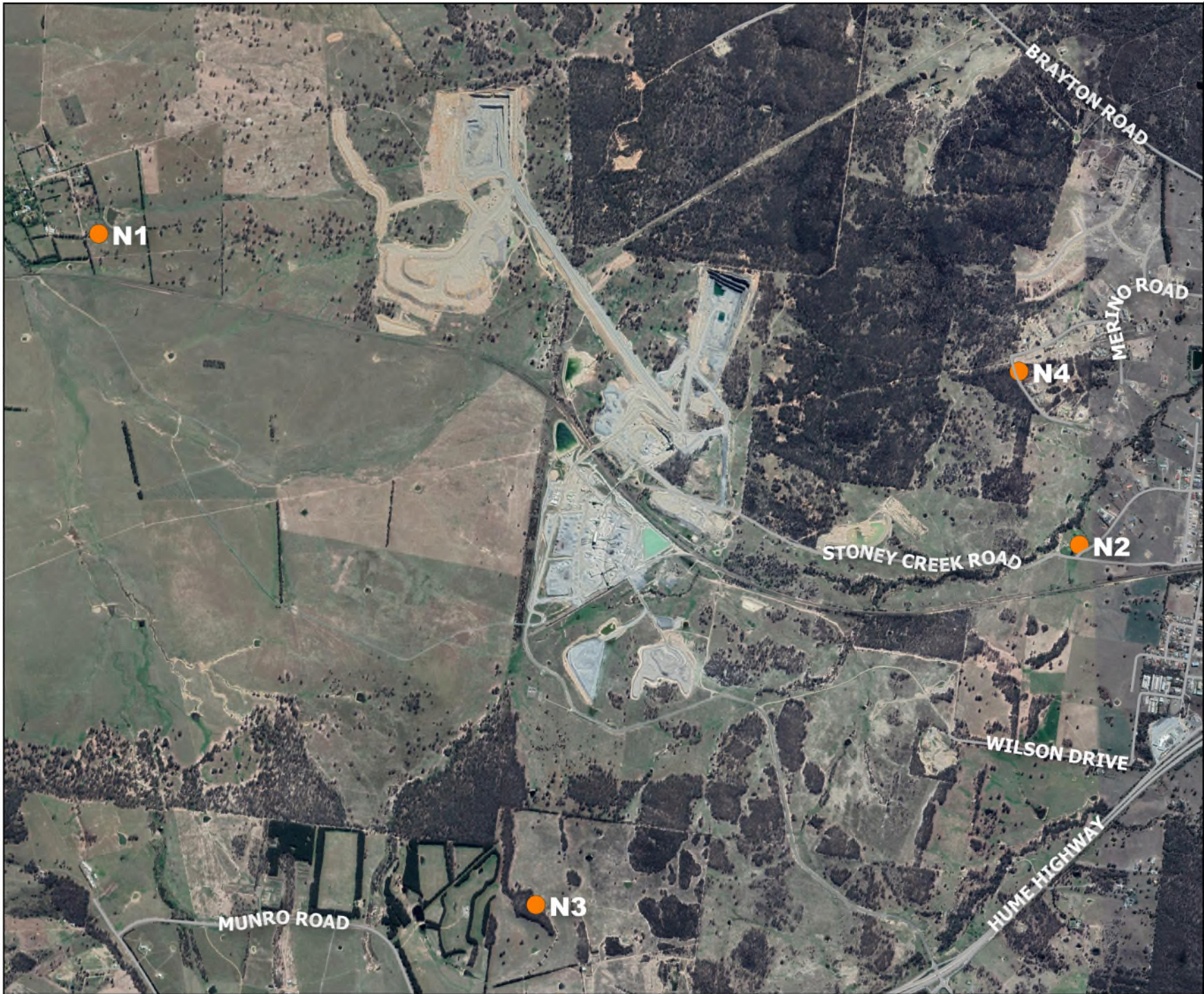


FIGURE 1
Site Locality
MAC180611-02
Holcim Lynwood Quarry

KEY

● Noise Monitoring Locations



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4 Results

4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N1 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N1						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
27/07/2021	15:00 (Day)	69	47	31	WD: W WS: 1.5m/s Rain: Nil	Wind in Tress 28-46
						Birds 25-69
						Livestock 35-30
						Train 35-57
Lynwood Quarry L _{Aeq} (15min) Contribution						<25
29/07/2021	21:44 (Evening)	69	50	39	WD: NW WS: 1.5m/s Rain: Nil	Insects 34-39
						Wind in Trees 37-48
						Train 40-69
						Quarry Inaudible
Lynwood Quarry L _{Aeq} (15min) Contribution						<30
29/07/2021	22:10 (Night)	46	37	33	WD: NW WS: 1.0m/s Rain: Nil	Insects 31-39
						Wind in Trees 28-46
						Quarry Inaudible
						Lynwood Quarry L _{Aeq} (15min) Contribution
Lynwood Quarry L _{A1} (1min) Contribution						<45

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N2 for the NMA are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N2

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
27/07/2021	13:56 (Day)	51	39	36	WD: W WS: 1.5m/s Rain: Nil	Wind in Trees 33-47
						Birds 30-51
						Aircraft 30-40
						Residential Noise 35-43
Lynwood Quarry L _{Aeq} (15min) Contribution						<30
29/07/2021	20:47 (Evening)	57	42	38	WD: W WS: <0.5m/s Rain: Nil	Insects 35-44
						Distant Traffic 32-40
						Train 35-56
						Aircraft 35-57
Lynwood Quarry L _{Aeq} (15min) Contribution						<30
29/07/2021	23:17 (Night)	68	52	38	WD: W WS: 0.5m/s Rain: Nil	Insects 37-43
						Distant traffic 34-40
						Train 35-68
						Quarry Haul Trucks <34-37 (3-5 minute total duration)
Lynwood Quarry L _{Aeq} (15min) Contribution						<36
Lynwood Quarry L _{A1} (1min) Contribution						<46

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N3 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N3						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
27/07/2021	13:19 (Day)	63	45	37	WD: W WS: 2.0m/s Rain: Nil	Wind in Trees 35-52
						Birds 32-63
						Quarry Processing <30 (Multiple 3-5 second durations)
Lynwood Quarry LA _{eq} (15min) Contribution						<30
29/07/2021	20:07 (Evening)	49	42	40	WD: W WS: 1.0m/s Rain: Nil	Insects 38-49
						Distant Traffic 35-46
						Wind in Trees <38
Lynwood Quarry LA _{eq} (15min) Contribution						<35
29/07/2021	23:58 (Night)	53	41	37	WD: W WS: 0.5m/s Rain: Nil	Insects 35-42
						Distant Traffic 32-44
						MAC Operator 53
Lynwood Quarry LA _{eq} (15min) Contribution						35
Lynwood Quarry LA ₁ (1min) Contribution						<47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N4 for the NMA are presented in **Table 6**.

Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
27/07/2021	14:20 (Day)	58	38	33	WD: NW WS: 1.5m/s Rain: Nil	Wind in Trees 30-49
						Birds 30-40
						Train 35-46
						Distant traffic <30
						MAC Operator 58
						Quarry Inaudible
						Lynwood Quarry L _{Aeq} (15min) Contribution <30
29/07/2021	21:10 (Evening)	50	36	33	WD: NW WS: 0.5m/s Rain: Nil	Insects 32-38
						Distant Traffic 30-35
						Train 30-45
						MAC Operator 50
						Quarry Inaudible
						Lynwood Quarry L _{Aeq} (15min) Contribution <30
29/07/2021	22:52 (Night)	50	39	36	WD: NW WS: 1.0m/s Rain: Nil	Insects 33-36
						Wind in Trees 30-38
						Distant Traffic 30-35
						MAC Operator 50
						Quarry Haul Trucks 30-44 (10-13 minute total duration)
						Quarry Alarms <33-36 (Infrequent 3-5 second durations)
						Lynwood Quarry L _{Aeq} (15min) Contribution <36
						Lynwood Quarry L _{A1} (1min) Contribution <47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

5 Discussion

5.1 Discussion of Results - Location N1

Monitoring on Tuesday 27 July 2021 and Thursday 29 July 2021 identified quarry noise was inaudible during daytime, evening and night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits.

Extraneous noise sources measured included birds, livestock, passing trains, insects and wind.

5.2 Discussion of Results - Location N2

Monitoring on Tuesday 27 July 2021 and Thursday 29 July 2021 identified quarry noise was inaudible during daytime and evening measurements and occasionally just audible during the night-time measurement with quarry noise contributions estimated to satisfy the relevant noise limits.

Quarry noise sources measured included haul truck movements. Extraneous noise sources included aircraft, birds, passing trains, distant traffic, residential noise, insects and wind.

5.3 Discussion of Results - Location N3

Monitoring on Tuesday 27 July 2021 and Thursday 29 July 2021 identified that quarry noise was just audible during daytime and evening measurements and audible during night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits.

Quarry noise sources audible during the survey trucks entering and exiting site, processing, site alarms and haul truck movements. Extraneous noise sources included birds, MAC operator noise, distant traffic, insects and wind.

5.4 Discussion of Results - Location N4

Monitoring on Tuesday 27 July 2021 and Thursday 29 July 2021 identified quarry noise was inaudible during daytime and evening measurements and audible during night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits.

Quarry noise sources measured included haul truck movements and site alarms. Extraneous noise sources included birds, traffic, distant train pass-bys, MAC operator noise, insects and wind.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Lynwood Quarry, Marulan, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria during Quarter 3, ending September 2021.

Attended noise monitoring was undertaken on Tuesday 27 July 2021 and Thursday 29 July 2021 at four representative monitoring locations. The assessment has identified that noise emissions generated by Lynwood Quarry were audible at three locations, however quarry noise emissions were below the relevant noise criteria, satisfying the applicable noise criteria throughout the survey period.

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Appendix A - Glossary of Terms

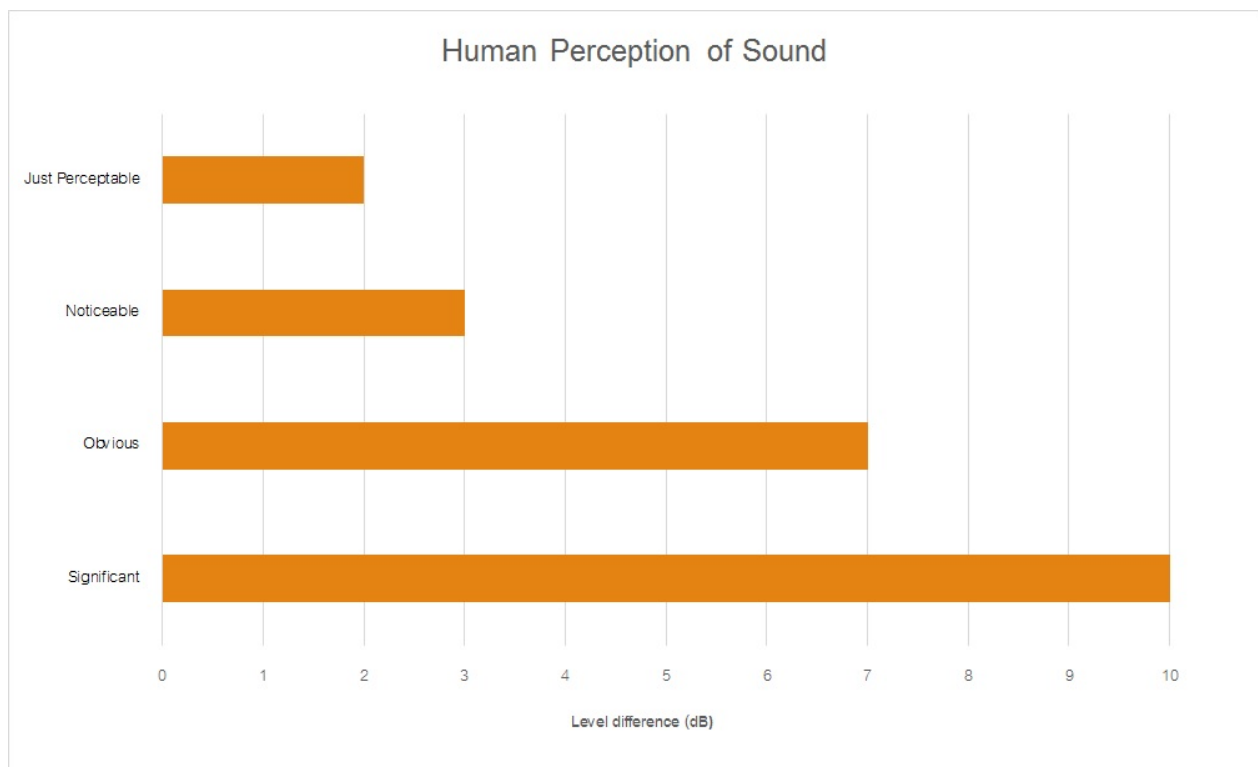
Table A1 provides a number of technical terms have been used in this report.

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 LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
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), dB(L)	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.
LAm _{ax}	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 (LW)	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ 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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Noise Monitoring Assessment

Lynwood Quarry, Marulan, NSW
Quarter 4 Ending December 2021.



Document Information

Noise Monitoring Assessment

Lynwood Quarry, Marulan, NSW

Quarter 4 Ending December 2021

Prepared for: Holcim (Australia) Pty Ltd



Prepared by: Muller Acoustic Consulting Pty Ltd

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Document ID	Status	Date	Prepared By	Signed	Reviewed By	Signed
MAC180611-02RP14	Final	10 November 2021	Kristian Allen		Rod Linnett	

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6 CONCLUSION 19

APPENDIX A - GLOSSARY OF TERMS

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1 Introduction

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- Lynwood Quarry Environmental Protection Licence (EPL), 2013 (12939);
- Lynwood Quarry, Development Consent, 2005 (DA128-5-2005); and
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A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 Noise Criteria

The Lynwood Quarry Noise Management Plan (NMP) outlines the applicable noise criteria for residential receivers L1 – L16 surrounding the quarry, and are presented in **Table 1**.

Table 1 Noise Criteria ¹				
Location	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)	
	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LA1(1min)
L1	35	35	35	45
L2	35	35	35	45
L3	35	35	35	45
L4	35	37	35	46
L5	35	35	35	46
L6	35	37	36	46
L7	38	38	35	55
L8	39	38	36	55
L9	39	39	37	56
L10	42	42	40	53
L11	35	35	35 ¹	47
L12	37	37	36	47
L13	40	38	37	47
L14	35	35	35	47
L15	35	35	35	47
L16	35	35	35	45

Note 1: Noise criteria adopted from the EPL.

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3 Methodology

3.1 Locality

The quarry is located near Marulan, NSW approximately 4km west of the town centre. Receivers in the locality surrounding the quarry are primarily rural and residential. The quarry is surrounded by rural properties to the west, with the Hume Highway situated to the east and south of the site. Highway traffic is a dominant noise source in the area along with rural noise. The monitoring locations with respect to the quarry and assessed receivers are presented in the locality plan in **Figure 1** and presented in **Table 2**.

Table 2 Monitoring Location Addresses

NMP ID	EPL ID	Address	Criteria dB			
			Day	Evening	Night	Night
			LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
N1	L1	1114 Carrick Road, Marulan	35	35	35	45
N2	L6	End of Maclura Drive, Marulan	35	37	36	46
N3	L11	Northern Boundary, 16038 Hume Highway, Marulan ¹	35	35	35 ²	47
N4	L12	Corner of Dorsett and Suffolk Road, Marulan	37	37	36	47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Intermediate noise monitoring point.

Note 2: Noise criteria adopted from the EPL.

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The attended noise measurements were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the Lynwood Quarry EPL. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 19 October 2021 and Thursday 21 October 2021. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA.

Noise measurements were of 15-minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. Measurements were conducted at four locations (N1-N4) on Tuesday 19 October 2021 and Thursday 21 October 2021 to satisfy the requirements of the NMP.

Extraneous noise sources were excluded from the analysis to determine the $L_{Aeq}(15min)$ quarry noise contribution for comparison against the relevant criteria. In the event of quarry attributed noise being above criteria, prevailing meteorological conditions for the monitoring period are sourced from the onsite meteorological station and analysed in accordance with Fact Sheet D of the NPI to determine the stability category present at the time of each attended measurement.

Where the quarry is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.

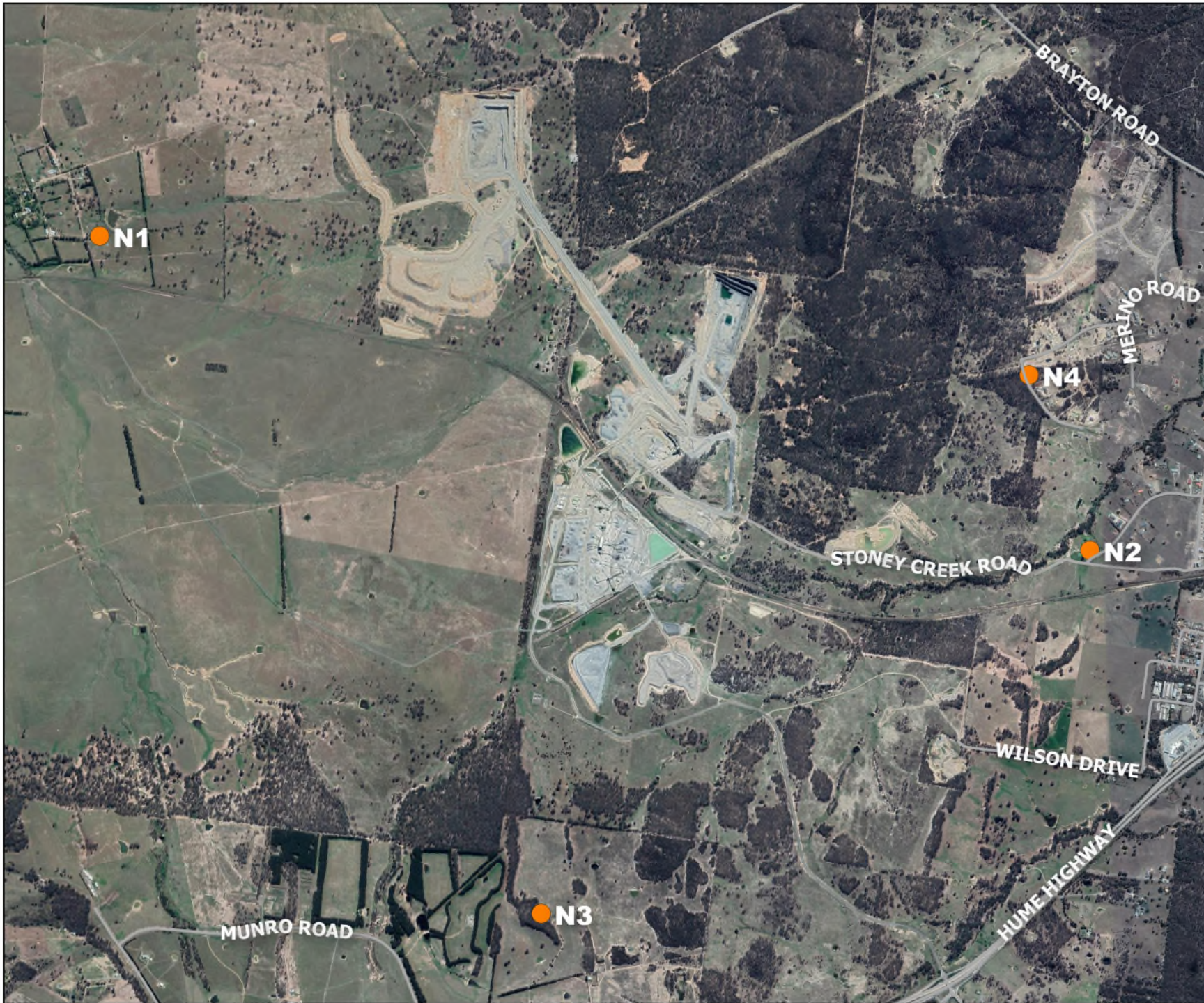


FIGURE 1
Site Locality
MAC180611-02
Holcim Lynwood Quarry

KEY

- Noise Monitoring Locations



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4 Results

4.1 Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N1 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N1						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
19/10/2021	14:35 (Day)	53	42	36	WD: S WS: 2.5m/s Rain: Nil	Wind in Trees 30-53
						Birds 27-40
						Quarry - Haul Trucks <30
						(Barely to Just Audible 25% of measurement)
Lynwood Quarry L _{Aeq} (15min) Contribution						<30
21/10/2021	19:52 (Evening)	66	48	41	WD: SE WS: 0.5m/s Rain: Nil	Insects 38-45
						Birds 35-51
						Train 40-66
						Quarry – Haul Trucks <35-38 (Just Audible 50% of measurement)
Lynwood Quarry L _{Aeq} (15min) Contribution						<35
21/10/2021	(Night)	-	-	-	WD: WS: m/s Rain: Nil	No Measurements due to instrument Issues
						Lynwood Quarry L _{Aeq} (15min) Contribution
Lynwood Quarry L _{A1} (1min) Contribution						-

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.2 Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N2 for the NMA are presented in **Table 4**.

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
19/10/2021	13:29	58	40	33	WD: SW	Wind In Trees 30-48
	(Day)				WS: 1.5m/s	Birds 27-57
					Rain: Nil	Train 35-58
						Quarry Inaudible
		Lynwood Quarry L _{Aeq} (15min) Contribution				<30
21/10/2021	20:53	57	46	42	WD: SE	Traffic 36-57
	(Evening)				WS: <0.5m/s	Insects 39-43
					Rain: Nil	Dogs Barking 36-45
						Quarry Inaudible
		Lynwood Quarry L _{Aeq} (15min) Contribution				<37
21/10/2021	22:42	50	44	41	WD: SE	Traffic 36-50
	(Night)				WS: <0.5m/s	Insects 39-45
					Rain: Nil	Quarry Inaudible
		Lynwood Quarry L _{Aeq} (15min) Contribution				<36
		Lynwood Quarry L _{A1} (1min) Contribution				<46

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.3 Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N3 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N3						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
19/10/2021	12:52 (Day)	67	45	39	WD: SW WS: 2.0m/s Rain: Nil	Wind In Trees 36-54
						Birds 33-67
						Distant Traffic 33-43
						Quarry – Trucks Enter/Exit Site (2 Movements, ~20 second durations)
Lynwood Quarry L _{Aeq} (15min) Contribution						<35
21/10/2021	21:36 (Evening)	51	44	42	WD: S WS: <0.5m/s Rain: Nil	Traffic 37-51
						Insects 40-45
						Quarry – Processing <35 (Just Audible 75% Measurement)
						Quarry – Haul trucks <35 (Just Audible 25% Measurement)
Lynwood Quarry L _{Aeq} (15min) Contribution						<35
21/10/2021	22:00 (Night)	50	44	42	WD: S WS: <0.5m/s Rain: Nil	Traffic 37-50
						Insects 40-45
						Quarry – Processing <35 (Just Audible 75% Measurement)
						Quarry – Haul trucks <35 (Just Audible 25% Measurement)
Lynwood Quarry L _{Aeq} (15min) Contribution						<35
Lynwood Quarry L _{A1} (1min) Contribution						<47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.4 Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each assessment period at Location N4 for the NMA are presented in **Table 6**.

Date	Time (hrs)	Descriptor (dBA re 20 μ Pa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
19/10/2021	13:52 (Day)	79	55	41	WD: SW	Wind In Trees 38-53
					WS: 2.0m/s	Birds 35-43
					Rain: Nil	Residential Noise 35-42
						Traffic 35-79
						Quarry Inaudible
Lynwood Quarry L _{Aeq} (15min) Contribution						<37
21/10/2021	20:30 (Evening)	51	39	36	WD: SE	Traffic 30-51
					WS: <0.5m/s	Insects 33-36
					Rain: Nil	Quarry Inaudible
Lynwood Quarry L _{Aeq} (15min) Contribution						<30
21/10/2021	23:05 (Night)	49	37	35	WD: SE	Traffic 30-49
					WS: 0.5m/s	Insects 32-38
					Rain: Nil	Quarry Inaudible
					Lynwood Quarry L _{Aeq} (15min) Contribution	
Lynwood Quarry L _{A1} (1min) Contribution						<47

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

5 Discussion

5.1 Discussion of Results - Location N1

Monitoring on Tuesday 19 October 2021 and Thursday 21 October 2021 identified quarry noise was just audible during daytime and evening measurements with quarry noise contributions estimated to satisfy the relevant noise limits. No night measurements were conducted at this location due to instrument issues, however previous measurements indicated that insect noise was most likely the dominant noise source throughout the night period

Quarry noise sources measured included haul truck movements. Extraneous noise sources measured included birds, passing trains, insects and wind.

5.2 Discussion of Results - Location N2

Monitoring Tuesday 19 October 2021 and Thursday 21 October 2021 identified quarry noise was inaudible during daytime, evening and night-time measurement with quarry noise contributions estimated to satisfy the relevant noise limits.

Extraneous noise sources included birds, passing trains, traffic, dogs barking, insects and wind.

5.3 Discussion of Results - Location N3

Monitoring on Tuesday 19 October 2021 and Thursday 21 October 2021 identified that quarry noise was barely to just audible during daytime, evening measurements and night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits.

Quarry noise sources audible during the survey trucks entering and exiting site, processing, site alarms, reverse alarms and haul truck movements. Extraneous noise sources included birds, traffic, insects and wind.

5.4 Discussion of Results - Location N4

Monitoring on Tuesday 19 October 2021 and Thursday 21 October 2021 identified quarry noise was inaudible during daytime, evening and night-time measurements with quarry noise contributions estimated to satisfy the relevant noise limits.

Extraneous noise sources included birds, traffic, residential noise, insects and wind.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Holcim (Australia) Pty Ltd at the Lynwood Quarry, Marulan, NSW. The assessment was completed to assess the quarry's compliance with the relevant noise criteria during Quarter 4, ending December 2021.

Attended noise monitoring was undertaken on Tuesday 19 October 2021 and Thursday 21 October 2021 at four representative monitoring locations. The assessment has identified that noise emissions generated by Lynwood Quarry were audible at two locations, however quarry noise emissions were below the relevant noise criteria, satisfying the applicable noise criteria throughout the survey period.

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Appendix A - Glossary of Terms

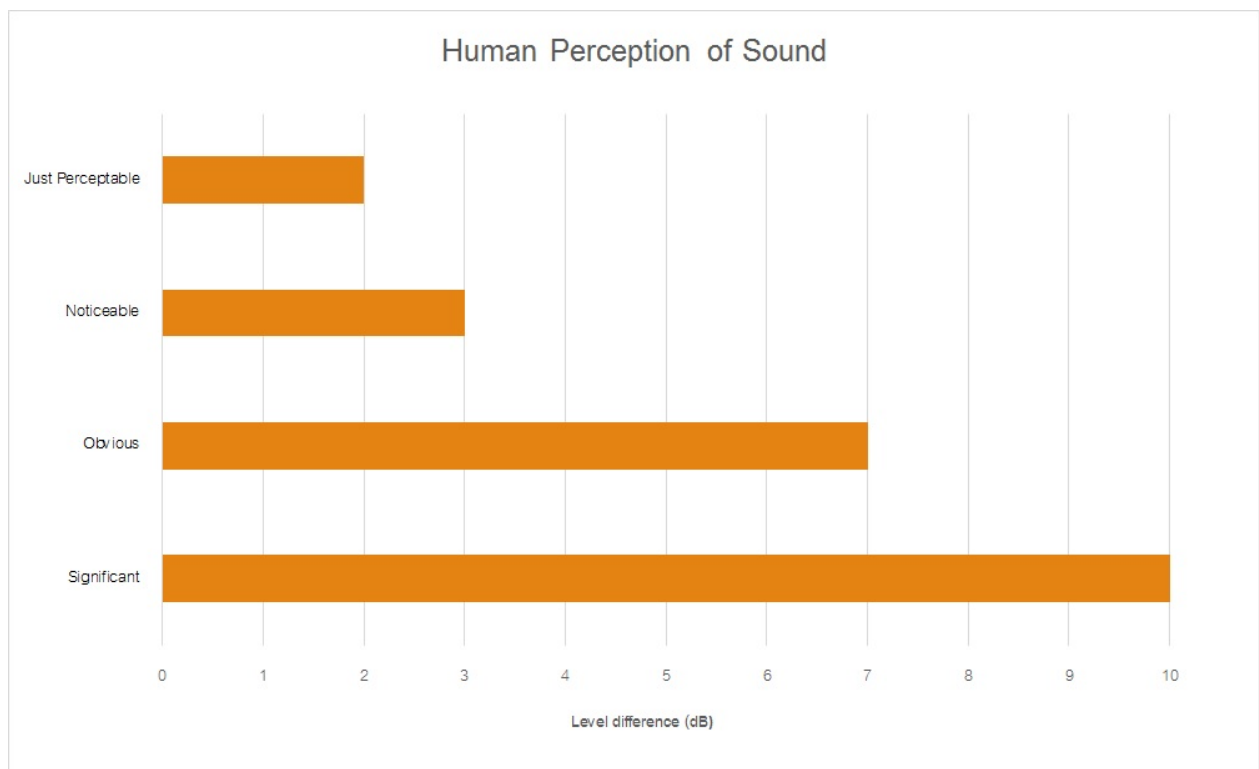
Table A1 provides a number of technical terms have been used in this report.

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 LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
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), dB(L)	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.
LAm _{ax}	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 (LW)	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 : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W ₀ 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 2
Environmental Monitoring Results

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
SW5							
1/07/2004	740	6.9	NS	NS	0.01	3	NS
3/08/2004	793	6.8	NS	NS	0.01	3.4	NS
3/09/2004	NS	NS	NS	NS			NS
8/10/2004	281	6.2	NS	NS	0.02	1.4	NS
2/11/2004	270	6.9	NS	NS	0.02	1.4	NS
30/11/2004	NS	NS	NS	NS	0.01	1.3	NS
6/01/2005	272	7	NS	NS	0.02	2	NS
2/02/2005	266	6.3	NS	NS	0.08	2	NS
2/03/2005	235	6.7	NS	NS	0.02	1.2	NS
8/04/2005	363	6.5	NS	NS	0.01	0.87	NS
5/05/2005	395	6.7	NS	NS	0.02	0.88	NS
2/06/2005	405	6.8	NS	NS	0.02	1.1	NS
6/07/2005	333	6.7	NS	NS	0.01	1	NS
3/08/2005	498	6.6	NS	NS	0.01	0.81	NS
8/09/2005	547	6.8	NS	NS	0.01	0.81	NS
13/10/2005	301	6.7	NS	NS	0.01	1	NS
2/11/2005	379	6.6	NS	NS	0.01	0.99	NS
1/12/2005	279	6.4	NS	NS	0.01	1.1	NS
5/01/2006	919	6.4	NS	NS	0.02	1.6	NS
2/02/2006	574	6.7	NS	NS	0.04	1.6	NS
2/03/2006	708	7	NS	NS	0.07	2	NS
7/04/2006	828	7.3	NS	NS	0.01	1.6	NS
3/05/2006	910	7.1	NS	NS	0.01	2.1	NS
8/06/2006	287	6	NS	NS	0.03	1.8	NS
6/07/2006	399	6.4	NS	NS	0.01	0.75	NS
3/08/2006	566	6.6	NS	NS	0.01	0.95	NS
7/09/2006	635	6.8	NS	NS	0.01	1.3	NS
5/10/2006	732	6.5	NS	NS	0.01	1.3	NS
2/11/2006	946	6.8	NS	NS	0.03	2	NS
4/12/2006	1362	6.8	NS	NS	0.05	2.6	NS
11/01/2007	310	6.4	NS	NS	0.02	2.2	NS
9/02/2007	416	6.8	NS	NS	0.02	2.8	NS
2/03/2007	468	6.3	NS	NS	0.01	1.6	NS
13/04/2007	469	6.3	NS	NS	0.02	1.4	NS
2/05/2007	491	6.6	NS	NS	0.01	1.4	NS
6/06/2007	506	6.6	NS	NS	0.02	1.9	NS
9/07/2007	326	7.3	NS	NS	0.01	1.4	NS
15/08/2007	748	6.5	NS	NS	0.02	0.88	NS
6/09/2007	845	6.9	NS	NS	0.01	0.88	NS
12/10/2007	1049	6.6	NS	NS	0.02	1.1	NS
8/11/2007	272	6.2	NS	NS	0.03	1.3	NS

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
6/12/2007	530	6.2	NS	NS	0.03	1.1	NS
10/01/2008	398	6.4	NS	NS	0.02	1.4	NS
7/02/2008	386	6.3	NS	NS	0.01	1.2	NS
6/03/2008	445	6.6	NS	NS	0.03	1.3	NS
11/04/2008	414	6.5	NS	NS	0.01	1.3	NS
8/05/2008	441	6.7	NS	NS	0.12	1.1	NS
4/06/2008	442	6.7	NS	NS	0.01	1.2	NS
3/07/2008	454	7.3	NS	NS	0.03	1.2	NS
20/02/2009	404	6.5	NS	NS	0.01	1.8	NS
30/07/2009	319	6.5	NS	NS	0.02	0.99	NS
8/01/2010	378	5.8	NS	NS	0.02	2.3	NS
1/07/2010	333	6.2	NA	NA	0.05	0.96	
19/07/2010	333	6.2	NS	NS	0.01	0.96	NS
1/12/2010	464	6.3	9	1	0.07	1.6	Moderate
15/12/2010	464	6.3	NS	NS	0	1.6	Moderate
1/01/2011	778	6.2	4	1	0.05	1.2	Moderate
12/01/2011	778	6.2	NS	NS	0	1.2	Moderate
1/02/2011	618	6.1	14	1	0.13	1.4	Low
10/02/2011	618	6.1	NS	NS	0	1.4	Low
1/03/2011	569	6.2	7	1	0.05	1.2	Low
10/03/2011	569	6.2	NS	NS	0	1.2	Low
1/04/2011	944	6	5	1	0.03	0.8	Low
6/04/2011	944	6	NS	NS	0	0.8	NS
1/05/2011	1000	6.7	10	1	0.03	0.74	Low
1/06/2011	932	6.8	13	1	0.03	0.73	Low
13/07/2011	865	6.6	7	1	0.03	0.75	Low
12/08/2011	820	6.6	17	1	0.04	0.79	Moderate
8/09/2011	603	6.6	40	1	0.07	1.1	Moderate
6/10/2011	674	6.2	33	1	0.07	1.1	Low
7/11/2011	725	6.7	9	1	0.05	0.98	Low
9/12/2011	736	7.2	29	1	0.06	1	Moderate
10/01/2012	766	6.6	25	1	0.07	1.1	Moderate
13/02/2012	448	6.8	810	1	0.24	2.7	Moderate
16/03/2012	208	7.5	140	1	0.1	1.3	Flood
16/04/2012	146	6	530	1	0.13	1.5	Moderate
14/05/2012	335	7.1	97	1	0.08	1.2	Moderate
13/06/2012	380	6.2	34	1	0.06	1.3	Moderate
12/07/2012	1137	6.5	52	1	0.04	1.1	Moderate
24/08/2012	760	6.8	22	1	0.04	1	Low
18/09/2012	795	6.3	18	1	0.04	1.1	Low
30/10/2012	141.5	6.6	36	5	0.05	0.9	Very Low
27/11/2012	1461	6.1	10	5	0.05	5.6	Very Low

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
17/12/2012	968	5.3	15	5	0.05	2.6	No Flow
29/01/2013	202.8	5.6	140	5	0.07	2.5	Fast Flow
28/02/2013	202.3	6.4	76	5	0.09	2	Med to Fast
21/03/2013	480	6.1	17	5	0.09	2.1	No Flow
18/04/2013	402.1	6.7	17	5	0.09	2.5	No Flow
22/05/2013	518	7.3	7	5	0.07	2.5	No Flow
19/06/2013	1137	6.5	52	1	0.04	1.1	Moderate
19/07/2013	447	7.34	100	5	0.05	1.4	NS
19/08/2013	504	7.43	15	5	0.05	0.4	NS
24/09/2013	442	6.62	25	5	0.05	1.2	NS
26/11/2013	283	6.59	71	5	0.08	2.7	NS
21/01/2014	235	6	28	1	0.12	2.2	NS
18/02/2014	265	6	48	1	0.11	1.7	NS
20/03/2014	361	6	56	1	0.11	1.4	NS
29/04/2014	600	6	20	1	0.08	1.8	NS
21/05/2014	622	6	23	1	0.1	1.6	NS
16/06/2014	875	6	43	1	0.04	0.86	NS
18/07/2014	75	7	11	1	0.04	0.83	NS
22/08/2014	355	6	39	1	0.07	1.4	NS
19/09/2014	356	6.7	25	1	0.06	1.4	NS
24/10/2014	199	6	21	1	0.08	1.4	NS
20/11/2014	330	6.4	39	1	0.11	1.9	NS
17/12/2014	273	6.2	62	1	0.09	1.7	NS
20/01/2015	340	6.4	14	1	0.08	1.8	NS
20/02/2015	308	6.7	29	1	0.1	1.4	NS
20/03/2015	383	6.9	7	1	0.09	1.3	NS
20/04/2015	319	6.3	130	1	0.1	2.1	NS
18/05/2015	533	6.9	13	1	0.05	1.1	NS
21/07/2015	326	6	11	1	0.04	1.29	NS
27/08/2015	172	6.2	44	1	0.08	2.02	NS
16/09/2015	224	5.9	34	1	0.1	1.15	NS
19/10/2015	261	6.5	15	1	0.08	1.46	NS
20/11/2015	986	6.4	4	1	0.02	0.75	NS
17/12/2015	NS	NS	NS	NS	NS	NS	NS
20/01/2016	1360	6.2	7	1	0.06	1.17	NS
23/02/2016	556	7.1	12	1	0.08	1.65	NS
20/04/2016	NS	NS	NS	NS	NS	NS	NS
24/05/2016	NS	NS	NS	NS	NS	NS	NS
23/06/2016	354	6.4	18	1	0.04	1.98	NS
21/07/2016	501	6.8	23	1	0.07	2.78	Flood
22/08/2016	603	7.1	6	1	0.03	1.14	Low

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
27/09/2016	477	7.4	8	1	0.09	2.27	Moderate
24/10/2016	905	7	7	1	0.02	1	Low
21/11/2016	NS	NS	NS	NS	NS	NS	ponding no flow no sample
15/12/2016	NS	NS	NS	NS	NS	NS	pooling no flow
20/03/2017	908	7.5	23	1	0.05	2.59	Moderate
20/04/2017	1200	7.7	4	1	0.02	1.22	Low
25/05/2017	1040	7.62	20	1	0.03	1.34	Low
19/06/2017	1080	7.6	13	1	0.03	2.66	Low
25/07/2017	1280	7.89	4	1	0.02	0.74	Low
24/08/2017	1240	7.69	5	1	0.02	1.18	Low
22/09/2017	1340	7.66	6	1	0.02	0.92	No flow. Pooling
19/01/2018	ND	ND	ND	ND	ND	ND	No flow
14/02/2018	ND	ND	ND	ND	ND	ND	No flow
15/03/2018	707	7.54	5	1	0.05	1.33	Low
20/04/2018	818	6.98	95	1	0.51	4.34	Low
18/05/2018	871	7.63	3	1	0.03	1.4	Low
14/06/2018	846	7.66	3	1	0.03	1.36	Low
16/07/2018	NS	NS	NS	NS	NS	NS	Low
13/08/2018	1110	7.73	13	1	0.07	1.74	Low
17/09/2018	ND	ND	ND	ND	ND	ND	Dry
23/10/2018	ND	ND	ND	ND	ND	ND	Dry
15/11/2018	ND	ND	ND	ND	ND	ND	Dry
17/12/2018	892	7.05	13	NS	0.03	3.18	Low
21/01/2019	NS	NS	NS	NS	NS	NS	NF
20/02/2019	NS	NS	NS	NS	NS	NS	NF
18/03/2019	NS	NS	NS	NS	NS	NS	NF
29/04/2019	NS	NS	NS	NS	NS	NS	NF
30/05/2019	NS	NS	NS	NS	NS	NS	NF
14/06/2019	536	7	9	1	0.04	0.86	F
11/07/2019	1000	7.44	5	1	0.02	0.71	F
20/08/2019	NS	NS	NS	NS	NS	NS	NF
18/09/2019	684	6.81	17	1	0.63	1.32	F
15/10/2019	902	7.48	5	1	0.04	NF	
13/11/2019	ND	ND	ND	ND	ND	ND	NF
12/12/2019	ND	ND	ND	ND	ND	ND	NF
3/04/2020	*597	*7.12	*5	*10	*0.05	*1.6	NT
20/05/2020	512	7.12	4	5	0.13	3.4	F

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
11/06/2020	748	7.64	34	7	0.15	3.6	F
30/07/2020	554	7.01	11	5	0.02	0.86	F
25/08/2020	489.3	7.58	5.8	5	0.02	1.11	F
3/09/2020	557	7.49	45	5	0.02	1.1	F
30/10/2020	561	7.26	13	5	0.06	1.1	F
19/11/2020	542	6.82	17	5	0.05	1	F
14/12/2020	645	7.41	12	5	0.03	0.2	F
20/01/2021	901	7.06	8.8	5	0.07	1.5	F
23/02/2021	1020	7.5	6.6	5	0.03	0.5	F
10/03/2021	1050	7.6	9.2	5	0.03	0.96	F
9/04/2021	771	7.4	7.9	5	0.5	0.2	F
7/05/2021	111	7.4	27	5	0.03	0.5	F
2/06/2021	912	7.3	3.4	5	0.01	0.8	NF
1/07/2021	896	7.6	4.4	5	0.02	0.84	NF
2/08/2021	1410	7.3	12	5	0.02	0.2	F
1/09/2021	379	7.5	11	5	0.03	2.37	NF
6/10/2021	475	8	2.7	13	0.01	0.2	F
3/11/2021	609	7.9	13	5	0.03	0.9	F
9/12/2021	506	7	10	5	0.02	2.2	NF
Average	600.77	6.74	37.66	2.38	0.05	1.47	-
Minimum	75.00	5.30	2.70	1.00	0.00	0.20	-
Maximum	1461.00	8.00	810.00	7.00	0.63	5.60	-
SW6							
1/07/2004	2316	7.1	NS	NS	0.01	0.95	NS
3/08/2004	2268	7.1	NS	NS	0.01	0.41	NS
3/09/2004	3255	9.7	NS	NS	0.01	0.47	NS
8/10/2004	488	6.9	NS	NS	0.01	1.1	More water than previous samples
2/11/2004	277	7	NS	NS	0.01	1.2	NS
30/11/2004	NS	NS	NS	NS	0.01	0.89	NS
6/01/2005	575	7	NS	NS	0.01	1	NS
2/02/2005	248	6.4	NS	NS	0.05	1.9	NS
2/03/2005	588	6.5	NS	NS	0.01	0.88	NS
8/04/2005	682	7.2	NS	NS	0.01	0.79	NS
5/05/2005	887	6.9	NS	NS	0.02	0.59	NS
2/06/2005	1290	7.1	NS	NS	0.01	0.95	NS
6/07/2005	352	6.8	NS	NS	0.01	1	NS
3/08/2005	632	6.9	NS	NS	0.01	0.68	NS
8/09/2005	860	7.5	NS	NS	0.01	0.54	NS

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
13/10/2005	529	7	NS	NS	0.01	0.73	NS
2/11/2005	821	7.2	NS	NS	0.01	0.66	NS
1/12/2005	323	6.7	NS	NS	0.01	1.1	NS
5/01/2006	1052	6.6	NS	NS	0.02	0.84	NS
2/02/2006	667	7	NS	NS	0.02	1.2	NS
2/03/2006	1176	6.9	NS	NS	0.04	0.97	Brown oil film on surface.
7/04/2006	1730	7.3	NS	NS	0.01	0.67	NS
3/05/2006	1910	7	NS	NS	0.01	0.61	NS
8/06/2006	2091	6.9	NS	NS	0.01	0.44	NS
6/07/2006	425	6.2	NS	NS	0.02	0.43	NS
3/08/2006	576	6.7	NS	NS	0.01	0.86	NS
7/09/2006	818	6.9	NS	NS	0.01	0.86	NS
5/10/2006	934	6.9	NS	NS	0.01	0.88	NS
2/11/2006	1055	7.2	NS	NS	0.02	1	NS
4/12/2006	1303	7.2	NS	NS	0.03	1	NS
11/01/2007	412	6.6	NS	NS	0.01	1.4	NS
9/02/2007	890	6.9	NS	NS	0.02	1	NS
2/03/2007	309	6.7	NS	NS	0.01	1.3	NS
13/04/2007	612	6.7	NS	NS	0.02	1	NS
2/05/2007	697	6.9	NS	NS	0.01	0.99	NS
6/06/2007	984	6.7	NS	NS	0.02	0.75	NS
9/07/2007	485	7.3	NS	NS	0.01	1.2	NS
15/08/2007	644	7	NS	NS	0.02	0.77	NS
6/09/2007	1260	6.9	NS	NS	0.01	0.66	NS
12/10/2007	1557	7	NS	NS	0.03	0.75	NS
8/11/2007	414	6.4	NS	NS	0.02	1	NS
6/12/2007	351	6.7	NS	NS	0.02	0.97	NS
10/01/2008	307	6.6	NS	NS	0.02	0.91	NS
7/02/2008	378	6.9	NS	NS	0.01	1	NS
6/03/2008	644	6.5	NS	NS	0.02	0.73	NS
11/04/2008	886	7	NS	NS	0.01	0.72	NS
8/05/2008	1017	6.9	NS	NS	0.03	0.63	NS
4/06/2008	970	7.2	NS	NS	0.01	0.66	NS
3/07/2008	971	7.4	NS	NS	0.02	0.71	NS
20/02/2009	1197	6.9	NS	NS	0.01	0.85	NS
30/07/2009	1174	7.1	NS	NS	0.02	0.57	NS
8/01/2010	1149	6.5	NS	NS	0.01	1	NS
1/07/2010	1000	7	NA	NA	0.01	0.62	NS
19/07/2010	1000	7	NS	NS	0.01	0.62	NS
1/12/2010	459	6.5	11	1	0.06	1.6	NS

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
15/12/2010	459	6.5	NS	NS	0	1.6	Moderate
1/01/2011	943	6.9	3	1	0.02	0.98	Moderate
1/02/2011	1182	6.7	4	1	0.07	0.97	Low
1/03/2011	1143	6.7	3	1	0.02	0.89	Low
1/04/2011	973	6.7	3	1	0.02	0.82	Low
1/05/2011	929	7.1	3	1	0.02	0.69	Low
1/06/2011	999	7	2	1	0.01	0.6	Low
13/07/2011	952	7	2	1	0.01	0.55	Low
12/08/2011	1053	7	4	1	0.02	0.58	Moderate
8/09/2011	634	7.3	21	1	0.05	0.91	Moderate
6/10/2011	1003	6.4	4	1	0.01	0.58	Low
7/11/2011	1001	7.3	3	1	0.02	0.76	Low
9/12/2011	1102	7.7	6	1	0.02	0.7	Moderate
10/01/2012	1146	7.1	3	1	0.02	0.72	Low
13/02/2012	916	7.1	9	1	0.06	1	Moderate
16/03/2012	435	7.2	27	1	0.07	1.4	Flood
16/04/2012	2110	6.6	320	1	0.11	1.3	Moderate
14/05/2012	574	7	28	1	0.05	1.1	Moderate
13/06/2012	349	6.5	34	1	0.07	1.2	Moderate
12/07/2012	647	6.5	20	1	0.04	0.91	Moderate
24/08/2012	940	6.6	6	1	0.02	0.78	Low
18/09/2012	1215	6.9	6	1	0.02	0.8	Low
30/10/2012	943	6.3	5	5	0.05	0.8	Med - Low
27/11/2012	1631	6.4	5	5	0.05	1.1	Med-Low
17/12/2012	1096	6.9	7	5	0.05	0.6	Low Flow
29/01/2013	259	5.8	51	5	0.07	1.9	Low Flow
28/02/2013	180	6.4	69	5	0.09	1.4	Low to No Flow
21/03/2013	752	6.5	6	5	0.05	1.5	No to Low Flow
18/04/2013	832	5.5	5	5	0.05	1.9	No to Low Flow
22/05/2013	1048	7.1	5	5	0.05	1.2	No to Low Flow
19/06/2013	1129	7.3	5	5	0.05	0.9	Low to Medium
19/07/2013	634	7.13	46	5	0.05	1.2	NS
19/08/2013	849	7.37	5	5	0.05	0.4	NS
24/09/2013	573	6.89	16	5	0.05	1	NS
15/10/2013	766	7.19	5	5	0.05	0.8	NS
26/11/2013	551	6.74	26	5	0.05	1.8	NS

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
21/01/2014	666	6	4	1	0.04	1.2	NS
18/02/2014	1007	7	4	1	0.02	0.99	NS
20/03/2014	655	6.7	18	1	0.05	1	NS
29/04/2014	702	6.9	9	1	0.04	1.2	NS
21/05/2014	905	6.5	3	1	0.06	0.82	NS
16/06/2014	1029	6.4	4	1	0.01	0.68	NS
18/07/2014	951	6.8	2	1	0.02	0.69	NS
22/08/2014	372	7.3	40	1	0.07	1.4	NS
19/09/2014	244	6.9	10	1	0.03	1	NS
20/11/2014	981	6.6	3	1	0.02	0.92	NS
17/12/2014	404	6.4	80	1	0.08	1.5	NS
20/01/2015	383	6.5	20	1	0.08	1.6	NS
20/02/2015	419	6.8	14	1	0.06	1.1	NS
20/03/2015	816	6.7	3	1	0.03	0.79	NS
20/04/2015	523	6.3	71	1	0.08	1.1	NS
18/05/2015	687	7.2	8	1	0.03	0.92	NS
21/07/2015	332	6.3	16	1	0.06	1.37	Low
27/08/2015	180	6.2	31	1	0.1	1.89	Moderate
16/09/2015	660	6.5	12	1	0.04	1.13	Moderate
19/10/2015	907	6.3	8	1	0.04	0.97	Moderate
20/11/2015	1050	6.7	3	1	0.02	0.78	Low
17/12/2015	1740	6.7	4	1	0.02	0.8	Moderate
20/01/2016	2300	6.6	4	1	0.01	0.61	Low
23/02/2016	678	6.8	6	1	0.04	1.09	Low
20/04/2016	1140	6.9	3	1	0.01	0.82	Low
24/05/2016	935	6.9	2	1	0.01	0.76	Moderate
23/06/2016	361	6.6	16	1	0.05	1.68	Low
21/07/2016	427	6.2	59	1	0.06	2.12	Moderate
22/08/2016	686	6.8	9	1	0.03	0.93	Low
27/09/2016	541	7.2	7	1	0.05	1.95	Moderate
24/10/2016	710	6.8	5	1	0.02	0.83	Low
21/11/2016	710	7	2	1	0.02	0.87	Low
15/12/2016	768	7.1	3	1	0.02	0.9	Low
19/01/2017	859	7.31	3	1	0.02	1.01	Low
17/02/2017	723	7.47	4	1	0.03	1.11	Low
20/03/2017	838	7.27	7	1	0.04	0.98	Low
20/04/2017	1240	7.59	3	1	0.02	0.92	No flow detectable
25/05/2017	1240	7.28	5	1	0.02	0.75	Pooling with no flow

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
19/06/2017	1120	7.41	2	1	0.02	0.67	Low
25/07/2017	1190	7.67	154	1	0.05	0.9	Low
24/08/2017	1150	7.69	2	1	0.02	0.72	Low
22/09/2017	1270	7.79	3	1	0.02	0.71	Low
25/10/2017	1390	7.8	3	1	0.02	0.76	Low
24/11/2017	821	7.59	4	1	0.03	0.92	No Flow Detectable
19/01/2018	1060	7.38	4	1	0.02	0.94	Low
14/02/2018	1200	7.6	5	1	0.02	0.88	Low
15/03/2018	637	7.35	5	1	0.04	0.94	Low
20/04/2018	1030	7.34	4	1	0.02	0.71	Low
18/05/2018	1060	7.78	2	1	0.01	0.72	Low
14/06/2018	1020	7.86	4	1	0.01	0.7	Low
16/07/2018	1020	8	2	1	0.01	0.68	Low
13/08/2018	987	7.9	2	1	0.02	0.55	Low
17/09/2018	1040	7.83	2	1	0.01	0.7	Low
23/10/2018	1100	6.82	6	1	0.03	0.79	Low
15/11/2018	1230	7.66	7	1	0.03	0.8	Low
17/12/2018	NS	NS	NS	NS	NS	NS	Low
21/01/2019	897	7.6	6	1	0.12	1.47	F
20/02/2019	1450	7.5	36	0.9	0.03	0.96	F
18/03/2019	1810	7.6	7	1	0.03	0.88	F
29/04/2019	1510	6.7	5	<1	0.02	0.82	F
30/05/2019	1120	7.4	5	<1	0.89	0.04	F
14/06/2019	533	7	43	<1	0.1	1.21	F
11/07/2019	688	7.18	9	<1	0.04	0.84	F
20/08/2019	746	7.67	5	<1	0.02	0.66	F
18/09/2019	532	7.01	21	<1	0.16	1.52	F
15/10/2019	707	7.26	2	1	0.03	0.74	F
13/11/2019	954	7.79	4	1	0.02	0.67	F
12/12/2019	163	7.58	11	1	0.02	0.69	F
3/04/2020	*906	*6.88	*7.3	*10	*0.13	*2	NT
20/05/2020	498.5	7.19	5.8	5	0.07	1.2	F
11/06/2020	666.9	7.55	25	5	0.04	1.7	F
30/07/2020	325.9	7.4	17	6.8	0.06	12.14	F
25/08/2020	465.9	7.6	2.3	5.6	0.03	0.9	F
3/09/2020	713	7.54	7.7	5	0.03	0.9	F
30/10/2020	657	7.45	5.3	5	0.03	1.2	F
19/11/2020	561	6.97	19	5	0.05	0.4	F
14/12/2020	698	7.93	9.9	5	0.03	0.7	F
20/01/2021	594	7.1	6.5	5	0.08	0.4	F

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
23/02/2021	652	7.3	11	5	0.05	0.6	F
10/03/2021	753	7.4	6.6	5	0.03	0.8	F
9/04/2021	746	7.1	14	5	0.5	0.2	F
7/05/2021	169	6.9	18	7.9	0.18	1.02	F
2/06/2021	681	7.6	5.7	5	0.03	6.9	NF
1/07/2021	980	7.1	6.8	7.6	0.03	1.22	NF
2/08/2021	1050	6.8	5.5	8.7	0.02	0.2	F
1/09/2021	368	8.06	5.9	12	0.04	1.4	F
6/10/2021	503	7.2	2.2	6.7	0.01	0.2	NF
3/11/2021	599	8.7	21	5	0.03	1.7	NF
9/12/2021	596	7.1	5.6	5	0.08	2.7	NF
Average	866.24	7.03	15.03	2.34	0.04	1.04	-
Minimum	163.00	5.50	2.00	0.90	0.00	0.04	-
Maximum	3255.00	9.70	320.00	12.00	0.89	12.14	-
SW8							
19/01/2018	NS	NS	NS	NS	NS	NS	Dry
14/02/2018	NS	NS	NS	NS	NS	NS	NF
15/03/2018	NS	NS	NS	NS	NS	NS	Dry
20/04/2018	NS	NS	NS	NS	NS	NS	Dry
18/05/2018	NS	NS	NS	NS	NS	NS	Dry
14/06/2018	NS	NS	NS	NS	NS	NS	Dry
16/07/2018	NS	NS	NS	NS	NS	NS	Dry
13/08/2018	NS	NS	NS	NS	NS	NS	Dry
17/09/2018	NS	NS	NS	NS	NS	NS	Dry
23/10/2018	NS	NS	NS	NS	NS	NS	Dry
15/11/2018	NS	NS	NS	NS	NS	NS	Dry
17/12/2018	NS	NS	NS	NS	NS	NS	Dry
21/01/2019	NS	NS	NS	NS	NS	NS	NF
20/02/2019	NS	NS	NS	NS	NS	NS	NF
18/03/2019	NS	NS	NS	NS	NS	NS	NF
29/04/2019	NS	NS	NS	NS	NS	NS	NF
30/05/2019	NS	NS	NS	NS	NS	NS	NF
14/06/2019	NS	NS	NS	NS	NS	NS	NF
11/07/2019	380	7.84	16	1	0.08	1.89	F
20/08/2019	NS	NS	NS	NS	NS	NS	NF
18/09/2019	NS	NS	NS	NS	NS	NS	NF
15/10/2019	NS	NS	NS	NS	NS	NS	NF
13/11/2019	NS	NS	NS	NS	NS	NS	NF
12/12/2019	NS	NS	NS	NS	NS	NS	NF
3/04/2020	293	7.86	630	14	0.05	2.9	NF
20/05/2020	208.9	7.47	540	5	0.51	3.3	NF
11/06/2020	296.6	8.7	270	5.4	0.55	4.6	NF

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
30/07/2020	202.5	7.84	330	5	0.38	2.7	NF
25/08/2020	215.4	8.34	830	7.3	0.39	4.6	NF
3/09/2020	308.2	8.11	170	5	0.08	5.6	NF
30/10/2020	384.1	7.7	79	5	0.08	5	NF
19/11/2020	477.1	8.3	22	5	0.05	5.2	NF
14/12/2020	477.6	7.85	32	5	0.03	5.6	NF
2/08/2021	NS	NS	NS	NS	NS	NS	Dry
1/09/2021	NS	NS	NS	NS	NS	NS	Dry
6/10/2021	NS	NS	NS	NS	NS	NS	Dry
3/11/2021	NS	NS	NS	NS	NS	NS	Dry
9/12/2021	NS	NS	NS	NS	NS	NS	Dry
Average	324.34	8.00	291.90	5.77	0.22	4.14	-
Minimum	202.50	7.47	16.00	1.00	0.03	1.89	-
Maximum	477.60	8.70	830.00	14.00	0.55	5.60	-
SW10							
19/01/2018	NS	NS	NS	NS	NS	NS	Dry
14/02/2018	NS	NS	NS	NS	NS	NS	NF
15/03/2018	NS	NS	NS	NS	NS	NS	Dry
20/04/2018	NS	NS	NS	NS	NS	NS	Dry
18/05/2018	NS	NS	NS	NS	NS	NS	Dry
14/06/2018	NS	NS	NS	NS	NS	NS	Dry
16/07/2018	NS	NS	NS	NS	NS	NS	Dry
13/08/2018	NS	NS	NS	NS	NS	NS	Dry
17/09/2018	NS	NS	NS	NS	NS	NS	Dry
23/10/2018	NS	NS	NS	NS	NS	NS	Dry
15/11/2018	NS	NS	NS	NS	NS	NS	Dry
17/12/2018	NS	NS	NS	NS	NS	NS	Dry
21/01/2019	NS	NS	NS	NS	NS	NS	NF
20/02/2019	NS	NS	NS	NS	NS	NS	NF
18/03/2019	NS	NS	NS	NS	NS	NS	NF
29/04/2019	NS	NS	NS	NS	NS	NS	NF
30/05/2019	NS	NS	NS	NS	NS	NS	NF
14/06/2019	NS	NS	NS	NS	NS	NS	NF
11/07/2019	NS	NS	NS	NS	NS	NS	NF
20/08/2019	NS	NS	NS	NS	NS	NS	NF
18/09/2019	NS	NS	NS	NS	NS	NS	NF
15/10/2019	NS	NS	NS	NS	NS	NS	NF
13/11/2019	NS	NS	NS	NS	NS	NS	NF
12/12/2019	NS	NS	NS	NS	NS	NS	NF
3/04/2020	2840	6.77	5.3	10	0.05	1.6	NF
20/05/2020	2670	6.87	140	5	0.76	0.7	NF
11/06/2020	4087	7.8	100	5	0.8	0.6	NF

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
30/07/2020	2367	6.72	87	8.3	0.38	0.9	NF
25/08/2020	2749	7.24	17	5	0.11	0.7	F
3/09/2020	2871	6.63	42	5.2	0.07	0.7	NF
30/10/2020	2678	6.87	62	5	0.12	0.3	NF
19/11/2020	2936	6.82	750	5.6	0.07	4.56	NF
14/12/2020	3526	7.48	8.1	5	0.13	0.4	NF
20/01/2021	3924	6.83	97	5	0.24	0.6	NF
23/02/2021	4580	7.2	180	5	0.78	0.3	NF
10/03/2021	4830	7.2	93	5	0.54	0.2	NF
9/04/2021	3720	7	33	5	0.5	0.2	NF
7/05/2021	119	7	150	7.3	0.2	1.8	F
2/06/2021	2770	6.8	130	5	0.35	2.79	NF
1/07/2021	3260	7.01	75	6.1	0.33	2.7	F
2/08/2021	3130	6.8	39	5	0.16	0.4	NF
1/09/2021	1940	6.7	44	12	0.1	0.2	NF
6/10/2021	1940	7.1	19	8.4	0.07	0.2	NF
3/11/2021	2310	7	21	5	0.07	6.7	NF
9/12/2021	481	7.1	540	13	0.28	3.7	NF
Average	2844.19	7.00	125.35	6.47	0.29	1.44	-
Minimum	119.00	6.63	5.30	5.00	0.05	0.20	-
Maximum	4830.00	7.80	750.00	13.00	0.80	6.70	-
SW11							
20/04/2017	3130	7.72	8	1	0.04	0.68	No Flow Pooling
25/05/2017	2750	7.64	3	1	0.02	0.5	Low
24/08/2017	3260	7.78	6	1	0.04	0.45	Minimal inflow, no outflow
19/01/2018	NS	NS	NS	NS	NS	NS	Dry
14/02/2018	NS	NS	NS	NS	NS	NS	NF
15/03/2018	NS	NS	NS	NS	NS	NS	Dry
20/04/2018	NS	NS	NS	NS	NS	NS	Dry
18/05/2018	NS	NS	NS	NS	NS	NS	Dry
14/06/2018	NS	NS	NS	NS	NS	NS	Dry
16/07/2018	NS	NS	NS	NS	NS	NS	Dry
13/08/2018	NS	NS	NS	NS	NS	NS	Dry
17/09/2018	NS	NS	NS	NS	NS	NS	Dry
23/10/2018	NS	NS	NS	NS	NS	NS	Dry
15/11/2018	NS	NS	NS	NS	NS	NS	Dry
17/12/2018	NS	NS	NS	NS	NS	NS	Dry
21/01/2019	NS	NS	NS	NS	NS	NS	NF
20/02/2019	NS	NS	NS	NS	NS	NS	NF
18/03/2019	NS	NS	NS	NS	NS	NS	NF

Date	EC	pH	Suspended Solids	Total Oil and Grease	Total Phosphorous	Total Nitrogen	Flow Observations
	µs/cm		mg/L	mg/L	mg/L	mg/L	
ANZECC Criteria	N/A	6.5 to 7.5	50	10	N/A	N/A	N/A
29/04/2019	NS	NS	NS	NS	NS	NS	NF
30/05/2019	NS	NS	NS	NS	NS	NS	NF
14/06/2019	NS	NS	NS	NS	NS	NS	NF
11/07/2019	NS	NS	NS	NS	NS	NS	NF
20/08/2019	NS	NS	NS	NS	NS	NS	NF
18/09/2019	NS	NS	NS	NS	NS	NS	NF
15/10/2019	NS	NS	NS	NS	NS	NS	NF
13/11/2019	NS	NS	NS	NS	NS	NS	NF
12/12/2019	NS	NS	NS	NS	NS	NS	NF
28/02/2020	1720	7.21	82	1	0.21	2.7	F
3/04/2020	2530	7.04	160	10	0.24	0.7	NF
20/05/2020	2206	6.62	900	5	2.5	2.4	NF
11/06/2020	3553	7.12	170	5	0.15	0.7	F
30/07/2020	1873	7.58	4.5	6.8	0.03	1.2	F
25/08/2020	1090	7.53	1.2	5	0.02	0.7	F
3/09/2020	2101	7.4	39	5	0.04	0.7	F
30/10/2020	2292	7.48	6.9	5	0.02	1.3	F
19/11/2020	1673	6.94	160	5	0.05	0.5	NF
14/12/2020	1914	7.32	1900	8.4	14	70	NF
20/01/2021	NS	NS	NS	NS	NS	NS	NF
23/02/2021	3390	7.4	37	5	0.06	1.8	F
10/03/2021	6510	7	190	5	0.37	0.2	NF
9/04/2021	1880	7.5	41	5	0.5	0.2	F
7/05/2021	369	7.5	15	8.7	0.32	0.49	F
2/06/2021	2270	7.6	4.6	5	0.02	0.5	NF
1/07/2021	3930	7.7	2.8	5	0.02	0.6	NF
2/08/2021	4110	7.1	6.2	5	0.01	0.2	F
1/09/2021	1180	7.5	74	10	0.04	1.5	F
6/10/2021	2160	7.8	1.2	7.3	0.01	0.2	NF
3/11/2021	2530	7.5	21	5	0.16	0.9	NF
9/12/2021	1560	7.5	7.8	6.7	0.14	4.8	NF
Average	2499.21	7.40	160.05	5.29	0.79	3.91	-
Minimum	369.00	6.62	1.20	1.00	0.01	0.20	-
Maximum	6510.00	7.80	1900.00	10.00	14.00	70.00	-

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Depth to Water Level					
MP1	m	2.17	2.03	1.98	2.04
MP2		16.73	16.59	16.37	16.52
MP4		19.43	19.17	18.83	18.83
MP5		21	16.59	20.17	20.48
MP7		17.57	17.71	18.2	18.08
MP10		5.08	4.94	4.8	4.93
MP11		12.04	11.62	11.07	11.58
GPZ1		11.76	11.73	11.22	11.93
GPZ2		-	-	-	8.79
GPZ5		8.62	8.59	8.65	8.79
GPZ6		5.99	5.68	5.37	5.74
GPZ8		8.75	8.44	8.24	8.27
pH					
MP1	pH Units	7.0	6.6	6.9	6.9
MP2		6.6	6.4	6.2	6.8
MP4		6.9	6.5	6.4	6.7
MP5		7.0	6.6	6.6	7.2
MP7		7.1	6.6	6.8	7.2
MP10		7.6	7.1	7.4	7.8
MP11		7.6	7.1	7.3	7.6
GPZ1		8.3	7.6	7.6	8.2
GPZ2		-	-	-	-
GPZ5		8.3	7.7	7.7	8.2
GPZ6		7.5	7.1	7.1	7.8
GPZ8		7.6	7.1	7.0	7.7
EC					
MP1	μS/cm	1130	1130	1390	717
MP2		274	487	304	231
MP4		465	470	541	303
MP5		783	770	793	464
MP7		6990	7060	8790	6660
MP10		6850	7010	9890	6400
MP11		686	686	733	444
GPZ1		984	947	1010	600
GPZ2		-	-	-	-
GPZ5		3580	3750	5220	3240
GPZ6		1770	1730	1150	664

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
GPZ8		2420	2100	3270	1960
Sulphate					
MP1	mg/L	53.0	27.0	21.0	22.0
MP2		5.0	5.0	2.0	5.0
MP4		40.0	5.0	2.9	5.0
MP5		26.0	5.0	2.0	5.0
MP7		29.0	34.0	36.0	31.0
MP10		58.0	29.0	24.0	26.0
MP11		27.0	5.0	2.0	5.0
GPZ1		44.0	9.0	8.3	7.7
GPZ2		-	-	-	-
GPZ5		10.0	5.0	3.1	6.3
GPZ6		41.0	32.0	24.0	30.0
GPZ8		8.2	5.0	2.0	5.0
Kjeldahl Nitrogen					
MP1	mg/L	0.0	0.0	0.0	0.0
MP2		0.9	0.9	0.9	0.9
MP4		0.9	0.9	0.9	0.9
MP5		1.3	1.3	1.3	1.3
MP7		0.2	0.2	0.2	0.2
MP10		0.5	0.5	0.5	0.5
MP11		0.6	0.6	0.6	0.6
GPZ1		0.5	0.5	0.5	0.5
GPZ2		-	-	-	-
GPZ5		1.1	1.1	1.1	1.1
GPZ6		2.1	2.1	2.1	2.1
GPZ8		0.7	0.7	0.7	0.7
Total Phosphate					
MP1	mg/L	17.00	17.00	17.00	17.00
MP2		0.10	0.10	0.10	0.10
MP4		0.22	0.22	0.22	0.22
MP5		0.09	0.09	0.09	0.09
MP7		0.01	0.01	0.01	0.01
MP10		0.02	0.02	0.02	0.02
MP11		0.04	0.04	0.04	0.04
GPZ1		1.00	1.00	1.00	1.00
GPZ2		-	-	-	-
GPZ5		1.00	1.00	1.00	1.00
GPZ6		0.57	0.57	0.57	0.57
GPZ8		0.11	0.11	0.11	0.11

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
TDS					
MP1	mg/L	724	721	891	459
MP2		178	317	197	150
MP4		302	306	346	197
MP5		504	493	508	301
MP7		4400	4450	5540	4190
MP10		4320	4410	6230	4030
MP11		439	439	469	289
GPZ1		625	606	645	384
GPZ2		-	-	-	-
GPZ5		2290	2400	3290	2080
GPZ6		1130	1110	735	425
GPZ8		1550	1320	2090	1260
Hardness as CaCO3					
MP1	mg/L	320	200	220	250
MP2		34	50	34	54
MP4		77	57	60	59
MP5		240	190	170	170
MP7		2500	1900	1900	2200
MP10		2100	1700	1700	1800
MP11		280	270	230	270
GPZ1		340	290	350	300
GPZ2		-	-	-	-
GPZ5		150	120	120	130
GPZ6		530	220	210	150
GPZ8		930	740	750	370
Sodium-Filtered					
MP1	mg/L	130	120	110	120
MP2		36	41	30	36
MP4		69	61	60	55
MP5		240	190	170	170
MP7		510	400	410	460
MP10		2100	1700	1700	1800
MP11		38	31	31	30
GPZ1		84	74	77	79
GPZ2		-	-	-	-
GPZ5		790	680	650	740
GPZ6		200	140	140	140
GPZ8		160	130	130	140
Pottasium - Filtered					

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
MP1	mg/L	5	3	2.9	3.1
MP2		5	2.9	2.5	3.2
MP4		5	1.9	1.7	1.6
MP5		5.7	4.7	4.4	4.2
MP7		6.4	5.1	4.9	4.8
MP10		11	8.9	9.1	9.5
MP11		5	1.9	1.9	1.8
GPZ1		5.1	4.8	4.8	4.6
GPZ2		-	-	-	-
GPZ5		9.4	7.7	8.3	8.7
GPZ6		5	2.5	2.4	2.3
GPZ8		7.8	6.8	7	11
Sulphate					
MP1	mg/L	53	27	21	22
MP2		5	5	2	5
MP4		40	5	2.9	5
MP5		26	5	2	5
MP7		29	34	36	31
MP10		58	29	24	26
MP11		27	5	2	5
GPZ1		44	9	8.3	7.7
GPZ2		-	-	-	-
GPZ5		10	5	3.1	6.3
GPZ6		41	32	24	30
GPZ8		8.2	5	2	5
Chloride					
MP1	mg/L	230	220	200	210
MP2		71	91	55	83
MP4		59	63	61	80
MP5		170	120	120	120
MP7		2100	2000	2100	2300
MP10		2000	2000	2300	2200
MP11		46	29	24	31
GPZ1		95	110	93	110
GPZ2		-	-	-	-
GPZ5		750	720	730	780
GPZ6		260	140	130	120
GPZ8		8.2	5	2	5
Iron - Filtered					
MP1	ug/L	0.0077	0.0077	0.0077	0.0077

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
MP2		0.0039	0.0039	0.0039	0.0039	
MP4		0.0011	0.0011	0.0011	0.0011	
MP5		0.006	0.006	0.006	0.006	
MP7		0.0099	0.0099	0.0099	0.0099	
MP10		0.0016	0.0016	0.0016	0.0016	
MP11		0.00093	0.00093	0.00093	0.00093	
GPZ1		0.00094	0.00094	0.00094	0.00094	
GPZ2		-	-	-	-	
GPZ5		0.0003	0.0003	0.0003	0.0003	
GPZ6		0.00005	0.00005	0.00005	0.00005	
GPZ8		0.01	0.01	0.01	0.01	
Silver - Filtered						
MP1		ug/L	0.000005	0.000005	0.000005	0.000005
MP2	0.000005		0.000005	0.000005	0.000005	
MP4	0.000005		0.000005	0.000005	0.000005	
MP5	0.000005		0.000005	0.000005	0.000005	
MP7	0.000005		0.000005	0.000005	0.000005	
MP10	0.000005		0.000005	0.000005	0.000005	
MP11	0.000005		0.000005	0.000005	0.000005	
GPZ1	0.000005		0.000005	0.000005	0.000005	
GPZ2	-		-	-	-	
GPZ5	0.000005		0.000005	0.000005	0.000005	
GPZ6	0.000005		0.000005	0.000005	0.000005	
GPZ8	0.000005		0.000005	0.000005	0.000005	
Aluminium						
MP1	ug/L	0.00005	0.00005	0.00005	0.00005	
MP2		0.00005	0.00005	0.00005	0.00005	
MP4		0.00005	0.00005	0.00005	0.00005	
MP5		0.00005	0.00005	0.00005	0.00005	
MP7		0.00005	0.00005	0.00005	0.00005	
MP10		0.00005	0.00005	0.00005	0.00005	
MP11		0.00005	0.00005	0.00005	0.00005	
GPZ1		0.00005	0.00005	0.00005	0.00005	
GPZ2		-	-	-	-	
GPZ5		0.000005	0.000005	0.000005	0.000005	
GPZ6		0.000005	0.000005	0.000005	0.000005	
GPZ8		0.000005	0.000005	0.000005	0.000005	
Antimony						
MP1	ug/L	0.00005	0.00005	0.00005	0.00005	
MP2		0.00005	0.00005	0.00005	0.00005	

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
MP4		0.00005	0.00005	0.00005	0.00005
MP5		0.00005	0.00005	0.00005	0.00005
MP7		0.00005	0.00005	0.00005	0.00005
MP10		0.00005	0.00005	0.00005	0.00005
MP11		0.00005	0.00005	0.00005	0.00005
GPZ1		0.00005	0.00005	0.00005	0.00005
GPZ2		-	-	-	-
GPZ5		0.000005	0.000005	0.000005	0.000005
GPZ6		0.000005	0.000005	0.000005	0.000005
GPZ8		0.000005	0.000005	0.000005	0.000005
Barium					
MP1	ug/L	0.00024	0.00024	0.00024	0.00024
MP2		0.00004	0.00004	0.00004	0.00004
MP4		0.0001	0.0001	0.0001	0.0001
MP5		0.00022	0.00022	0.00022	0.00022
MP7		0.00061	0.00061	0.00061	0.00061
MP10		0.00044	0.00044	0.00044	0.00044
MP11		0.00075	0.00075	0.00075	0.00075
GPZ1		0.0002	0.0002	0.0002	0.0002
GPZ2		-	-	-	-
GPZ5		0.00036	0.00036	0.00036	0.00036
GPZ6		0.00017	0.00017	0.00017	0.00017
GPZ8		0.0027	0.0027	0.0027	0.0027
Beryllium					
MP1	ug/L	0.000001	0.000001	0.000001	0.000001
MP2		0.000001	0.000001	0.000001	0.000001
MP4		0.000001	0.000001	0.000001	0.000001
MP5		0.000001	0.000001	0.000001	0.000001
MP7		0.000001	0.000001	0.000001	0.000001
MP10		0.000001	0.000001	0.000001	0.000001
MP11		0.000001	0.000001	0.000001	0.000001
GPZ1		0.000001	0.000001	0.000001	0.000001
GPZ2		-	-	-	-
GPZ5		0.000001	0.000001	0.000001	0.000001
GPZ6		0.000001	0.000001	0.000001	0.000001
GPZ8		0.000001	0.000001	0.000001	0.000001
Boron					
MP1	ug/L	0.00007	0.00007	0.00007	0.00007
MP2		0.00004	0.00004	0.00004	0.00004
MP4		0.00006	0.00006	0.00006	0.00006

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
MP5		0.00006	0.00006	0.00006	0.00006	
MP7		0.00006	0.00006	0.00006	0.00006	
MP10		0.00006	0.00006	0.00006	0.00006	
MP11		0.00005	0.00005	0.00005	0.00005	
GPZ1		0.00007	0.00007	0.00007	0.00007	
GPZ2		-	-	-	-	
GPZ5		0.00007	0.00007	0.00007	0.00007	
GPZ6		0.00005	0.00005	0.00005	0.00005	
GPZ8		0.00005	0.00005	0.00005	0.00005	
Boron						
MP1	ug/L	0.00007	0.00007	0.00007	0.00007	
MP2		0.00004	0.00004	0.00004	0.00004	
MP4		0.00006	0.00006	0.00006	0.00006	
MP5		0.00006	0.00006	0.00006	0.00006	
MP7		0.00006	0.00006	0.00006	0.00006	
MP10		0.00006	0.00006	0.00006	0.00006	
MP11		0.00005	0.00005	0.00005	0.00005	
GPZ1		0.00007	0.00007	0.00007	0.00007	
GPZ2		-	-	-	-	
GPZ5		0.00007	0.00007	0.00007	0.00007	
GPZ6		0.00005	0.00005	0.00005	0.00005	
GPZ8		0.00005	0.00005	0.00005	0.00005	
Cadmium						
MP1		mg/L	0.0002	0.0002	0.0002	0.0002
MP2	0.0002		0.0002	0.0002	0.0002	
MP4	0.0002		0.0002	0.0002	0.0002	
MP5	0.0002		0.0002	0.0002	0.0002	
MP7	0.0002		0.0002	0.0002	0.0002	
MP10	0.0002		0.0002	0.0002	0.0002	
MP11	0.0002		0.0002	0.0002	0.0002	
GPZ1	0.0002		0.0002	0.0002	0.0002	
GPZ2	-		-	-	-	
GPZ5	0.0002		0.0002	0.0002	0.0002	
GPZ6	0.0002		0.0002	0.0002	0.0002	
GPZ8	0.0002		0.0002	0.0002	0.0002	
Chromium						
MP1	mg/L		0.001	0.001	0.001	0.001
MP2		0.001	0.001	0.001	0.001	
MP4		0.001	0.001	0.001	0.001	
MP5		0.001	0.001	0.001	0.001	

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
MP7		0.001	0.001	0.001	0.001
MP10		0.001	0.001	0.001	0.001
MP11		0.001	0.001	0.001	0.001
GPZ1		0.001	0.001	0.001	0.001
GPZ2		-	-	-	-
GPZ5		0.001	0.001	0.001	0.001
GPZ6		0.001	0.001	0.001	0.001
GPZ8		0.001	0.001	0.001	0.001
Cobalt					
MP1	ug/L	0.000001	0.000001	0.000001	0.000001
MP2		0.000002	0.000002	0.000002	0.000002
MP4		0.000002	0.000002	0.000002	0.000002
MP5		0.000004	0.000004	0.000004	0.000004
MP7		0.000001	0.000001	0.000001	0.000001
MP10		0.000003	0.000003	0.000003	0.000003
MP11		0.000001	0.000001	0.000001	0.000001
GPZ1		0.000001	0.000001	0.000001	0.000001
GPZ2		-	-	-	-
GPZ5		0.000001	0.000001	0.000001	0.000001
GPZ6		0.000001	0.000001	0.000001	0.000001
GPZ8		0.000012	0.000012	0.000012	0.000012
Manganese					
MP1	ug/L	0.00072	0.00072	0.00072	0.00072
MP2		0.00056	0.00056	0.00056	0.00056
MP4		0.00056	1.00056	2.00056	3.00056
MP5		0.0013	0.0013	0.0013	0.0013
MP7		0.0051	0.0051	0.0051	0.0051
MP10		0.00061	0.00061	0.00061	0.00061
MP11		0.0014	0.0014	0.0014	0.0014
GPZ1		0.00083	0.00083	0.00083	0.00083
GPZ2		-	-	-	-
GPZ5		0.00073	0.00073	0.00073	0.00073
GPZ6		0.000013	0.000013	0.000013	0.000013
GPZ8		0.0066	0.0066	0.0066	0.0066
Molybdenum					
MP1	ug/L	0.000005	0.000005	0.000005	0.000005
MP2		0.000005	0.000005	0.000005	0.000005
MP4		0.000005	0.000005	0.000005	0.000005
MP5		0.000005	0.000005	0.000005	0.000005
MP7		0.000005	0.000005	0.000005	0.000005

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
MP10		0.000006	0.000006	0.000006	0.000006
MP11		0.000005	0.000005	0.000005	0.000005
GPZ1		0.000015	0.000015	0.000015	0.000015
GPZ2		-	-	-	-
GPZ5		0.00047	0.00047	0.00047	0.00047
GPZ6		0.000005	0.000005	0.000005	0.000005
GPZ8		0.00001	0.00001	0.00001	0.00001
Nickel					
MP1	ug/L	0.000001	0.000001	0.000001	0.000001
MP2		0.000005	0.000005	0.000005	0.000005
MP4		0.000004	0.000004	0.000004	0.000004
MP5		0.000003	0.000003	0.000003	0.000003
MP7		0.000001	0.000001	0.000001	0.000001
MP10		0.000012	0.000012	0.000012	0.000012
MP11		0.000001	0.000001	0.000001	0.000001
GPZ1		0.000001	0.000001	0.000001	0.000001
GPZ2		-	-	-	-
GPZ5		0.000001	0.000001	0.000001	0.000001
GPZ6		0.000001	0.000001	0.000001	0.000001
GPZ8		0.000006	0.000006	0.000006	0.000006
Lead					
MP1	ug/L	0.000001	0.000001	0.000001	0.000001
MP2		0.000001	0.000001	0.000001	0.000001
MP4		0.000001	0.000001	0.000001	0.000001
MP5		0.000001	0.000001	0.000001	0.000001
MP7		0.000001	0.000001	0.000001	0.000001
MP10		0.000001	0.000001	0.000001	0.000001
MP11		0.000001	0.000001	0.000001	0.000001
GPZ1		0.000001	0.000001	0.000001	0.000001
GPZ2		-	-	-	-
GPZ5		0.000001	0.000001	0.000001	0.000001
GPZ6		0.000001	0.000001	0.000001	0.000001
GPZ8		0.000001	0.000001	0.000001	0.000001
Selenium					
MP1	ug/L	0.000001	0.000001	0.000001	0.000001
MP2		0.000001	0.000001	0.000001	0.000001
MP4		0.000001	0.000001	0.000001	0.000001
MP5		0.000001	0.000001	0.000001	0.000001
MP7		0.000001	0.000001	0.000001	0.000001
MP10		0.000001	0.000001	0.000001	0.000001

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
MP11		0.000001	0.000001	0.000001	0.000001
GPZ1		0.000001	0.000001	0.000001	0.000001
GPZ2		-	-	-	-
GPZ5		0.000001	0.000001	0.000001	0.000001
GPZ6		0.000001	0.000001	0.000001	0.000001
GPZ8		0.000001	0.000001	0.000001	0.000001
Zinc					
MP1	ug/L	0.000005	0.000005	0.000005	0.000005
MP2		0.000005	0.000005	0.000005	0.000005
MP4		0.000005	0.000005	0.000005	0.000005
MP5		0.000005	0.000005	0.000005	0.000005
MP7		0.000005	0.000005	0.000005	0.000005
MP10		0.000005	0.000005	0.000005	0.000005
MP11		0.000005	0.000005	0.000005	0.000005
GPZ1		0.000005	0.000005	0.000005	0.000005
GPZ2		-	-	-	-
GPZ5		0.000005	0.000005	0.000005	0.000005
GPZ6		0.000005	0.000005	0.000005	0.000005
GPZ8		0.000005	0.000005	0.000005	0.000005
Mercury					
MP1	ug/L	0.000001	0.000001	0.000001	0.000001
MP2		0.000001	0.000001	0.000001	0.000001
MP4		0.000001	0.000001	0.000001	0.000001
MP5		0.000005	0.000005	0.000005	0.000005
MP7		0.000001	0.000001	0.000001	0.000001
MP10		0.000001	0.000001	0.000001	0.000001
MP11		0.000001	0.000001	0.000001	0.000001
GPZ1		0.000001	0.000001	0.000001	0.000001
GPZ2		-	-	-	-
GPZ5		0.000001	0.000001	0.000001	0.000001
GPZ6		0.000001	0.000001	0.000001	0.000001
GPZ8		0.000001	0.000001	0.000001	0.000001
WAD Cyanide					
MP1	ug/L	0.000005	0.000005	0.000005	0.000005
MP2		0.000005	0.000005	0.000005	0.000005
MP4		0.000005	0.000005	0.000005	0.000005
MP5		0.000005	0.000005	0.000005	0.000005
MP7		0.000005	0.000005	0.000005	0.000005
MP10		0.000005	0.000005	0.000005	0.000005
MP11		0.000005	0.000005	0.000005	0.000005

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
GPZ1		0.000005	0.000005	0.000005	0.000005	
GPZ2		-	-	-	-	
GPZ5		0.000005	0.000005	0.000005	0.000005	
GPZ6		0.000005	0.000005	0.000005	0.000005	
GPZ8		0.000005	0.000005	0.000005	0.000005	
Calcium						
MP1	mg/L	62	32	33	40	
MP2		6.4	9.2	5.1	7.9	
MP4		14	9.1	9.8	8.8	
MP5		75	57	53	54	
MP7		750	460	430	500	
MP10		390	310	310	310	
MP11		98	90	83	87	
GPZ1		77	74	76	73	
GPZ2		-	-	-	-	
GPZ5		31	23	18	23	
GPZ6		110	43	38	27	
GPZ8		190	150	150	150	
Magnesium						
MP1		mg/L	40	30	34	36
MP2	6.2		8.6	5.1	8.3	
MP4	11		9.9	8.6	9	
MP5	13		12	9.8	9.2	
MP7	300		180	190	220	
MP10	280		220	230	240	
MP11	8.6		7.3	6.3	13	
GPZ1	36		26	40	28	
GPZ2	-		-	-	-	
GPZ5	17		16	19	17	
GPZ6	64		27	28	20	
GPZ8	110		86	91	91	
Bicarbonate as CaCO3						
MP1	mg/L		190	190	190	190
MP2		24	24	24	24	
MP4		140	140	140	140	
MP5		27	27	27	27	
MP7		310	310	310	310	
MP10		280	280	280	280	
MP11		360	360	360	360	
GPZ1		320	320	320	320	

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	
GPZ2		-	-	-	-	
GPZ5		750	750	750	750	
GPZ6		470	470	470	470	
GPZ8		370	370	370	370	
Ammonia as N						
MP1	mg/L	0.01	0.01	0.01	0.01	
MP2		0.08	0.08	0.08	0.08	
MP4		0.02	0.02	0.02	0.02	
MP5		0.34	0.34	0.34	0.34	
MP7		0.05	0.05	0.05	0.05	
MP10		0.01	0.01	0.01	0.01	
MP11		0.2	0.2	0.2	0.2	
GPZ1		0.01	0.01	0.01	0.01	
GPZ2		-	-	-	-	
GPZ5		0.28	0.28	0.28	0.28	
GPZ6		0.01	0.01	0.01	0.01	
GPZ8		1.2	1.2	1.2	1.2	
Nitrate as N						
MP1		mg/L	0.02	-	-	-
MP2	0.19		-	-	-	
MP4	0.02		-	-	-	
MP5	0.02		-	-	-	
MP7	0.02		-	-	-	
MP10	0.02		-	-	-	
MP11	0.02		-	-	-	
GPZ1	0.02		-	-	-	
GPZ2	-		-	-	-	
GPZ5	0.02		-	-	-	
GPZ6	4.9		-	-	-	
GPZ8	0.02		-	-	-	
Kjeldahl Nitrogen						
MP1	mg/L	0.3	-	-	-	
MP2		0.9	-	-	-	
MP4		0.9	-	-	-	
MP5		1.3	-	-	-	
MP7		0.2	-	-	-	
MP10		0.5	-	-	-	
MP11		0.6	-	-	-	
GPZ1		0.5	-	-	-	
GPZ2		-	-	-	-	

Location	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
GPZ5		1.1	-	-	-
GPZ6		2.1	-	-	-
GPZ8		0.7	-	-	-
Phosphorus as P					
MP1	mg/L	0.3	-	-	-
MP2		0.9	-	-	-
MP4		0.9	-	-	-
MP5		1.3	-	-	-
MP7		0.2	-	-	-
MP10		0.5	-	-	-
MP11		0.6	-	-	-
GPZ1		0.5	-	-	-
GPZ2		-	-	-	-
GPZ5		1.1	-	-	-
GPZ6		2.1	-	-	-
GPZ8		0.7	-	-	-

APPENDIX 3
IEA Action Plan

Lynwood Non - Compliance Summary									
Ref No.	Schedule	Parameter	Condition No.	Condition	Auditor's Comments	Compliance	Non - Compliance ID	Holcim's comments	Completion Date
DA18	SCHEDULE 2 GENERAL ADMINISTRATIVE CONDITIONS	Production data	13 (a)	(a) provide annual quarry production data to DRG using the standard form for that purpose; and	The only evidence of reporting production data provided to the auditor is via the Annual Report to DPIE as per Condition 13(a) below.	Non-compliant	NC1	Provide annual production data to DRG using the standard form for that purpose. Reported in the Annual review to DPIE. Site is compliant but will be using DRG format during the submission of Annual report in March 2021.	March 2021
DA62	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	AIR QUALITY (Incorporates OEH GTA) - Impact Assessment Criteria	12	Particulate matter < 10 µm (PM10) Averaging period: 24 hour Criterion 50 ug/m3	The 2018 and 2019 AERs both report that equipment failure resulted in samples not being collected as required due to power supply issues. Equipment has since been upgraded to provide for a more stable power supply. Equipment performance should continue to be monitored to ensure compliance with the averaging periods. While non-compliant, no further actions are recommended following the upgrade.	Non-compliant	NC2	Site is compliant . However equipment performance will continue to be monitored.	-
DA196	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Rehabilitation Bond	48	Within 3 months of each Independent Environmental Audit (see Condition 11 in Schedule 5) after the lodgement of the rehabilitation bond, the Applicant must review, and if necessary revise the sum of the bond to the satisfaction of the Secretary. This review must consider:	The auditor has not been provided any evidence of a bond review occurring following the previous audit.	Non-compliant	NC3	The rehabilitation bond has been updated in Dec 2020 and will be revised to the satisfaction of the Secretary. Incorporated CPI and the future 5 year disturbance forecast.	Jan 2021
DA197	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Rehabilitation Bond	48 (a)	(a) the effects of inflation;	The auditor has not been provided any evidence of a bond review occurring following the previous audit.	Non-compliant	NC4	Finalised the process of bond value post the IEA audit. Updated Bank Guarantee will be provided to the secretary in Dec / Jan 2021.	Jan 2021

DA198	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Rehabilitation Bond	48 (b)	(b) any changes to the total area of disturbance; and	The auditor has not been provided any evidence of a bond review occurring following the previous audit.	Non-compliant	NC5	Updated Bond has been established. Will be sent to the secretary for review. Existing compliance planners that were set in 2021 also includes the cue for bond revision.	Jan 2021
DA199	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Rehabilitation Bond	48 (c)	(c) the performance of the rehabilitation against the completion criteria of the Rehabilitation and Landscape Management Plan.	The auditor has not been provided any evidence of a bond review occurring following the previous audit.	Non-compliant	NC6	The rehabilitation bond has been updated and will be revised to the satisfaction of the Secretary. Incorporated CPI and the future 5 year disturbance forecast.	Jan 2021
DA204	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Retirement of Biodiversity Credits	48A (c)	Credit type: Ecosystem credits: HN614 Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion Credits to be retired: 2124	The 2019 AER states: "DPIE noted that that Holcim was granted an extension to the retirement of biodiversity credits and that the credits were to be retired in June 2018, no biodiversity credits have been retired in 2019. Obligations around biodiversity credits will continue to be addressed in the 2020 annual review period". No evidence has been seen of how this may have been addressed throughout the 2020 annual review period.	Non-compliant	NC7	Consult with DPIE for how to close out the issue of non-retirement of credits.	April 2021
DA206	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Retirement of Biodiversity Credits	48A (c)	Credit type: Ecosystem credits: HN515 Broad-leaved Peppermint – Ribbon Gum grassy open forest in the north-east of the South Eastern Highlands Bioregion Credits to be Retired 33	The 2019 AER states: "DPIE noted that that Holcim was granted an extension to the retirement of biodiversity credits and that the credits were to be retired in June 2018, no biodiversity credits have been retired in 2019. Obligations around biodiversity credits will continue to be addressed in the 2020 annual review period". No evidence has been seen of how this may have been addressed throughout the 2020 annual review period.	Non-compliant	NC8	Consult with DPIE for how to close out the issue of non-retirement of credits.	April 2021

DA207	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Retirement of Biodiversity Credits	48A (c)	Credit type: Ecosystem credits: Total: 3038 (2124 + 881 + 33)	The 2019 AER states: "DPIE noted that that Holcim was granted an extension to the retirement of biodiversity credits and that the credits were to be retired in June 2018, no biodiversity credits have been retired in 2019. Obligations around biodiversity credits will continue to be addressed in the 2020 annual review period". No evidence has been seen of how this may have been addressed throughout the 2020 annual review period.	Non-compliant	NC9	Consult with DPIE for how to close out the issue of non-retirement of credits.	April 2021
DA288	SCHEDULE 5 ENVIRONMENTAL	REPORTING - Annual Review	10	The Applicant must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 7 of Schedule 5) and any interested person upon request.	While the AERs are publicly available on the Holcim website, there is no evidence that that the AERs in the reporting period were submitted directly to Council.	Non-compliant	NC10	A list of agencies that receive the AERs is included in the AERs.	March 2021
DA327	Appendix 7	APPENDIX 7: DETAILED HERITAGE CONDITIONS	9(e)	The progress on the archaeological works on site is systematically video recorded,	Videos are not able to be located and it is assumed that photographs were taken instead.	Non-compliant	NC11	Close this issue out with DPIE to avoid ongoing non-compliance issues at each audit. Ensure photos are taken during any future archaeological works on site. No videos were taken as reported in the last audit in 2018. A letter will be sent to DPIE stating that no videos were taken and it is only photos.	Jan 2021

SOC25	APPENDIX 11	APPENDIX 11: STATEMENT OF COMMITMENTS (Final May 2016) - Modification Project Management and Mitigation Measures - Surface Water	N/A (SOC)	Holcim Australia will update the Lynwood Quarry Water Management Plan. This will include an update to the Lockyersleigh Creek Riparian Area Management Plan.	The Water Management Plan is currently awaiting approval and contains management measures regarding Lockyersleigh Creek, however the Lockyersleigh Creek Riparian Area Management Plan has not been updated since 2011 to reflect any updates to the WMP or otherwise.	Non-Compliant	NC12	The Lockyersleigh Creek Riparian Area Management Plan has been updated. This will be shared with DPIE for review.	Submit to DPIE in Dec 2020
EPL34	N/A (EPL)	which were provided by the complainant or, if no such details were provided, a note to that effect; d) the nature of the complaint; e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and f) if no action was taken by the licensee, the reasons why no action was taken.	M4.2	The record must include details of the following: a) the date and time of the complaint; b) the method by which the complaint was made; c) any personal details of the complainant	The 'summarised event report listing' provided to the auditor as evidence does not include: e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and f) if no action was taken by the licensee, the reasons why no action was taken.	Non-Compliant	NC13	For each incident recorded, include the actions taken, or if no action taken state why not.	Due to nature of the incidents, a summary listing has been given to preserve personal information. If necessary, we can provide a full report with names blanked.
DA28	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	NOISE (Incorporates OEH GTA) - Noise Mitigation Measures	4 (b)	(b) implement all reasonable and feasible measures to minimise road transportation noise associated with the development;	7 noise complaints are reported in the InControl register. 2 are described as closed and 5 are described as submitted. No significant detail is provided on the nature of the noise complaint. No exceedences have been reported at the times of these complaints.	Compliant	Record the detail of the noise complaint and ensure that they are closed out.	Completed	-

DA34	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	NOISE (Incorporates OEH GTA) - Operating Hours	5	Blasting Monday-Saturday: 9am to 5pm Sunday and Public Holidays: None	<p>The 2018 and 2019 AERs report compliance.</p> <p>One InControl community complaint is recorded regarding blasting: House shook some time between 13: 00 & 14:00 on 6th August 2019</p> <p>Incident is recorded but is not listed as closed in InControl.</p> <p>No exceedences are reported in the Blast monitoring report.</p>	Compliant	Ensure incidents listed in InControl are closed out.	Completed	-
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DA59	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	AIR QUALITY (Incorporates OEH GTA) - Impact Assessment Criteria	12	<p>The Applicant must ensure that dust generated by the development does not cause additional exceedances of the criteria listed in Tables 6-8 at any residence that exists on the date of this consent, or on more than 25 percent of any privately owned land.</p>	<p>2005 EIS Appendix 5. Pages 16 - 18 provides predictions of air quality at 8 locations for 7 years in the 30 year period. 2005 EIS section 5.8.5 of the main text found that only one vacant property may be potentially dust affected.</p> <p>The InControl Incident register details numerous dust complaints received from the community, a number of which relate to dust experienced at residences. A number of these complaints are not listed as 'closed'.</p> <p>Both the 2018 and 2019 AERs list non-compliances regarding air quality monitoring due to equipment failure, however exceedances of the criteria are not recorded. Short term PM10 exceedances are recorded in 2018 but are correlated to regional dust events.</p> <p>Equipment has been upgraded in early 2020 with a change to the solar power supply.</p> <p>The Air Quality Management Plan was revised in 2020 with approval received from DPIE on 11/03/2020.</p>	Compliant	Close out all dust complaints in the incident register.	Completed	-
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DA84	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	SURFACE AND GROUND WATER (Incorporates NOW and OEH GTAs) - Sediment Dams	18 (a)	(a) Sediment Dams A, B and F are capable of treating the 90th percentile 5-day rainfall event; and	The water management plan was revised in 2020. The dams listed in Table 5 are approved and were conceptual dams based on modelling undertaken as part of the initial Lynwood Quarry EIS (Umwelt, 2005) and the Lynwood Quarry Modification EA (Umwelt, 2015). This table was updated in February 2020 based on the status of dams. Dam A is now a water harvesting Dam. Dam F is specified as both sediment and water storage and has minimum design criteria of 90th percentile 5-day rainfall. Dam B is no longer listed.	Compliant	Clarity should be sought around this condition if dams are now assigned different labels, or alternatively the WMP should be updated to state whether these criteria are met if still required to do so		
DA88	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	SURFACE AND GROUND WATER (Incorporates NOW and OEH GTAs) - Operating Conditions	19 (b)	(b) ensure that the accumulated sediment in all the Sediment Dams is kept below 30% of their design capacity;	WMP (2020) states All sediment dams will be managed to ensure that accumulated sediment is kept below 30% of the dam design capacity.	Compliant	Suggestion to mark levels at 30 % if feasible, or incorporate program for checking levels systematically.	Program in place to check the levels by sites. Completed.	-
DA183	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Rehabilitation and Landscape Management Plan	44 (c)	describe in detail the measures that would be implemented over the next 5 years to rehabilitate and manage the landscape on the site;	The 2018 plan is an update of the 2016 plan which describes rehabilitation between 2016 and 2021.	Compliant	The Rehabilitation and Landscape Management Plan will need to be updated to manage for the next five year period within the next 12 months.	Rehabilitation and Landscape Management Plan will be updated to reflect the 2020 plan.	June 2021
DA193	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	REHABILITATION AND LANDSCAPING - Rehabilitation and Landscape Management Plan	46	Within 3 months of the Independent Environmental Audit (see Condition 11 in Schedule 5), the Applicant shall update the Rehabilitation and Landscape Management Plan to the satisfaction of the Secretary.	The current plan is dated May 2018. The previous audit was scheduled for 2017 but was not finalised until 2019 due to delays. As this current plan was updated during this timeframe and following commencement of the audit process, it is considered adequate, although technically non-compliant.	Compliant	Ensure that the Rehabilitation and Landscape Management Plan is updated to the satisfaction of the secretary within 3 months of this audit.	Forecast and schedule in Compliance planner. Update the Rehabilitation Management Plan with the recent ecology and rehabilitation monitoring of the site (minor edits).	Feb 2021

DA220	SCHEDULE 3 - SPECIFIC ENVIRONMENTAL CONDITIONS	VISUAL IMPACT - Waste Management	54	The Applicant must ensure that all wastes generated or stored at the site are assessed, classified and managed in accordance with the Assessment, Classification and Management of Liquid and Non-liquid Waste (OEH) guideline, or its successor (incorporates OEH GTA).	Waste Management and Minimisation Strategy Section 3.0 purpose and scope) states that "This Waste Management and Minimisation Strategy (WMMS) has been developed to ensure compliance with Condition 53, Schedule 3 of DA 128-5-2005." The document then presents both condition 53 and 54.	Compliant	Edit wording of Waste Management and Minimisation Strategy to explicitly capture condition 54.	Will incorporate in the waste management section	June 2021
DA252	SCHEDULE 5 ENVIRONMENTAL	Evidence of Consultation	1A (b)	(b) submit evidence of this consultation as part of the relevant document;	Various revised Management plans contain 'Consultation' sections. RLMP (2018) now has agency consultation in Appendix 9, Noise Management Plan provides it in Appendix 1. Not all revised plans provide the actual consultation (e.g. blast management plan 2020), but do allude to it in the document.	Compliant	Append agency consultation to all future revisions of management plans.	Compliance planner to include this.	Feb 2021
DA253	SCHEDULE 5 ENVIRONMENTAL	Evidence of Consultation	1A (c)	(c) describe how matters raised by the authority have been addressed and any matters not resolved; and	Various revised Management plans contain 'Consultation' sections which summarise the consultation held. RLMP (2018) now has agency consultation in Appendix 9, Noise Management Plan provides it in Appendix 1. Not all revised plans provide the actual consultation (e.g. blast management plan 2020), but do allude to it in the document.	Complaint	Append agency consultation to all future revisions of management plans.	Compliance planner to include this.	Feb 2021

DA254	SCHEDULE 5 ENVIRONMENTAL	Evidence of Consultation	1A (d)	(d) include details of any outstanding issues raised by the authority and an explanation of disagreement between any public authority and the Applicant.	Various revised Management plans contain 'Consultation' sections which summarise the consultation held. RLMP (2018) now has agency consultation in Appendix 9, Noise Management Plan provides it in Appendix 1. Not all revised plans provide the actual consultation (e.g. blast management plan 2020), but do allude to it in the document and provide pertinent points.	Compliant	Append agency consultation to all future revisions of management plans.	Compliance planner to include this.	Feb 2021
DA255	SCHEDULE 5 ENVIRONMENTAL	MANAGEMENT PLAN REQUIREMENTS	2 (a)	(a) detailed baseline data;	This condition was introduced in MOD4 (May 2016) so does not apply to plans prepared prior to this time. Plans revised since this date contain baseline data.	Compliant	Provide previously collected detailed baseline data in any future management plan revisions.	Incorporate previous data in management plan reviews	-
DA259	SCHEDULE 5 ENVIRONMENTAL	MANAGEMENT PLAN REQUIREMENTS	2 (e)	(e) a contingency plan to manage any unpredicted impacts and their consequences;	This condition was introduced in MOD4 (May 2016) so does not apply to plans prepared prior to this time.	Compliant	Provide contingency plans in any future management plan revisions.	Will be incorporated in future updates.	July 2021
DA262	SCHEDULE 5 ENVIRONMENTAL	MANAGEMENT PLAN REQUIREMENTS	2 (h)	(h) a protocol for periodic review of the plan.	This condition was introduced in MOD4 (May 2016) so does not apply to plans prepared prior to this time.	Compliant	Future updates to plans prepared prior to MOD4 should provide a protocol for periodic review	Will be incorporated in future updates.	July 2021
DA268	SCHEDULE 5 ENVIRONMENTAL	REVISION OF STRATEGIES, PLANS & PROGRAMS	5	Within 3 months of the submission of an: (a) incident report under condition 8 below; (b) Annual Review under condition 10 below; (c) audit report under condition 11 below; and (d) any modifications to this consent, the Applicant must review, and if necessary revise, the strategies, plans, and programs required under this consent, to the satisfaction of the Secretary.	Sighted signed 'Evidence of Internal Review' forms indicating review process of all management plans was underway, or complete with a required action. 2018 AER states: During the 2018 report period, management plans were not updated three months after the submission of the Annual Review. It is noted this was corrected in the following reporting period (2019) so assumed to be closed out.	Note	Establish a register to ensure accurate tracking of strategy, plan and program updates against required timeframes. Master register has these data.	Completed . Compliance Planner for the site with all the program updates and consent and EPL requirements scoped out for each year. All the management plan requirement are also scoped out.	-

DA276	SCHEDULE 5 ENVIRONMENTAL	REPORTING - Incident Reporting	8	The Applicant must notify, at the earliest opportunity, the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the development, the Applicant must notify the Secretary and any other relevant agencies as soon as practicable after the Applicant becomes aware of the incident. Within 7 days of the date of the incident, the Applicant must provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.	Incidents appear to be managed as per the requirements.	Compliant	PIRMP should be amended to include notification of the Secretary following an emergency incident, as per the requirements of this condition.	Completed in Dec 2020 and uploaded on the website. Will include the notification to Secretary emergency pathway.	Feb 2021
DA286	SCHEDULE 5 ENVIRONMENTAL	REPORTING - Annual Review	10 (h)	(h) calculate the number of additional BioBanking (or equivalent) credits that will need to be purchased, before that clearing can be done; and	AERs present how the number of credits required per stage of development have been calculated for the granite pit and how those credits are being progressively retired.	Compliant	Future Annual Environmental Reviews should include information on the additional BioBanking (or equivalent) credits that will need to be purchased or note that no additional credits are required.	Holcim will incorporate these in the Annual Reviews.	March 2021

SOC28	APPENDIX 11	APPENDIX 11: STATEMENT OF COMMITMENTS (Final May 2016) - Modification Project Management and Mitigation Measures - Surface Water	N/A (SOC)	<ul style="list-style-type: none"> Monitoring of water imported to site, water used on site and water discharged following the guidelines for Water Reporting Requirements for Mines (NSW Office of Water, undated), where applicable. 	<p>The WMP (2011) states Holcim will monitor all water used on site, imported to site and overflows from sediment dams. The WMP (2011) does not state if this is in line with following the guidelines for Water Reporting Requirements for Mines (NSW Office of Water, undated).</p> <p>The draft revised WMP (2020) lists guideline used in Section 3.2 but does not refer to Water Reporting Requirements for Mines (NSW Office of Water, undated).</p>	Compliant	The revised WMP (2020) should state if the guidelines for Water Reporting Requirements for Mines (NSW Office of Water, undated) have been used in the WMP (2020) development.	The Water Management Plan has been updated and approved in October 2020. New revision will include the guidelines.	Oct 2021
SOC29	APPENDIX 11	APPENDIX 11: STATEMENT OF COMMITMENTS (Final May 2016) - Modification Project Management and Mitigation Measures - Surface Water	N/A (SOC)	<ul style="list-style-type: none"> The existing surface water monitoring program will be updated to include four additional sites as shown in Figure 2.2 of the Response to Submissions report. The final details of the proposed surface water monitoring program will be contained within the updated Water Management Plan. 	<p>The WMP has been further revised in 2020 and is still pending approval. The Surface Water Monitoring Program is appended to the revised WMP and awaiting approval.</p> <p>The previous audit found: The Surface Water Monitoring Program (2018) has since been revised and is currently going through the approval process as part of the Water Management Plan 2018*. It does not include SW1 and SW2 surface water monitoring locations which were in the original Figure (Figure 2.2 of the RTS report) as these related to construction of the Hume Highway intersection is complete.</p> <p>The 2018 and 2019 AERs, do not provide evidence that the requirement of SOC 27 has been met during the audit period.</p>	Compliant	Close out revision to Water Management Plan and include relevant updates to surface water monitoring program.	Completed. Comprehensive report with surface and Ground water MP included in 1 report.	-

SOC30	APPENDIX 11	APPENDIX 11: STATEMENT OF COMMITMENTS (Final May 2016) - Modification Project Management and Mitigation Measures - Surface Water	N/A (SOC)	<ul style="list-style-type: none"> The water quality parameters and frequency of sampling will remain as for the existing approved operations. Flow monitoring will continue to be undertaken by visual observation of the flows during water quality sampling (flow, no-flow). 	<p>The auditor has only been provided the 2011 revision of the Surface Water Monitoring Program. The previous audit suggests the most recent revision is from 2018 and suggest compliance.</p> <p>The website contains only the 2011 revision of the Surface Water Monitoring Program.</p>	Compliant	The website should be updated to show most recent revision of the Surface Water Monitoring Program if it was indeed approved.	Completed (WMP)	-
SOC31	APPENDIX 11	APPENDIX 11: STATEMENT OF COMMITMENTS (Final May 2016) - Modification Project Management and Mitigation Measures - Groundwater	N/A (SOC)	<p>Holcim Australia will extend the current groundwater monitoring program, which includes both groundwater level and quality, to include the new monitoring piezometers that were constructed for the Granite Pit during the exploration drilling phase. Details of these locations are provided in Appendix 9 of the EA (MOD 4). These bores will be monitored until they are progressively removed by the progression of the Granite Pit or as otherwise refined via the Water Management Plan.</p>	<p>The previous IEA indicates that the Groundwater Management Plan was updated in compliance with the commitment, however the updated plan has not been published on the Holcim website. The auditor was not provided the 2018 revision of the GWMP. The wider Water Management Plan (2020) has been updated and is pending approval. A groundwater Monitoring Program is appended to this.</p>	Compliant	Update the website to contain the revised Groundwater Management Plan (2018), or 2020 once approved.	Completed - Comprehensive WMP. Uploaded on the webpage.	-

SOC37	APPENDIX 11	APPENDIX 11: STATEMENT OF COMMITMENTS (Final May 2016) - Modification Project Management and Mitigation Measures - Trust and Reputation	N/A (SOC)	<ul style="list-style-type: none"> Existing engagement to continue as appropriate, with a focus on respectful, honest and open communications. 	<p>CCC feedback: The committee is working well and acting as an important conduit for community issues and communicating the environmental compliance for the construction and operations of the quarry. This sentiment is also held by members, who appreciate the opportunity to provide feedback to Holcim's project team and management.</p> <p>Holcim always provides the CCC with a thorough update on the quarry, including any milestones, planning updates, construction works, environmental performance, site operations and community relations activities.</p>	Compliant	Last update to 'Information Updates' page online appears to be 2015. This page should be updated or merged with other pages that provide the more recent information such as Annual Reviews etc or with the 'Community Link' Lynwood Page which has the most recent update of December 2019.	No, the webpage was upto date. https://www.holcim.com.au/about-us/community-link/lynwood/our-community	-
SOC45	APPENDIX 11	APPENDIX 11: STATEMENT OF COMMITMENTS (Final May 2016) - Modification Project Management and Mitigation Measures - Visual Amenity	N/A (SOC)	<ul style="list-style-type: none"> Lighting – quarry operations on the surface including topsoil stripping, overburden extraction and overburden emplacement will be daytime operations only (consistent with current development consent conditions) and therefore do not have any potential to result in lighting impacts. 	One complaint has been recorded in InControl regarding fugitive light emissions on 20/02/2019. No details of the complaint are recorded, and it is not stated to be 'closed'. It is unclear if this complaint relates to topsoil stripping.	Complaint	Close out the complaint from 20/02/2019 Recommendation: Ensure that enough detail is recorded for complaints in InControl.	Completed	-
SOC61	APPENDIX 11	APPENDIX 11: STATEMENT OF COMMITMENTS (Final May 2016) - Modification Project Management and Mitigation Measures - Gas Pipeline Hazards	N/A (SOC)	<ul style="list-style-type: none"> pipelines will be designed in accordance with relevant standards 	The auditor has not been provided a copy of any specifications of the pipelines. It is assumed that this would be covered by construction certificates which are up to date. Considered closed by compliance in previous audit.	Compliant	Ensure pipelines are designed in accordance with relevant standards.	Noted.	-

EPL38	N/A EPL	N/A EPL	M5.2	The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.	Environmental or community enquiries phone number is featured on Holcim's website: http://www.holcim.com.au/about-us/community-link/lynwood/contact-details (viewed 23/10/20)	Compliant	State clearly on the webpage that this number should be used if a community member has a complaint	Active complaints line number has been clearly stated on the webpage. Web page updated.	-
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APPENDIX 4

Approved CIF-Funded Projects since CIF Inception

Project Name	Total Approved
Bungonia: Sustaining the present through the past	\$8,000
Marulan Community Hall Upgrade	\$2,500
Marulan School Projects Room	\$15,000
Restoration of historical culvert	\$12,010
Computer hardware for archiving and cataloguing	\$2,500
Meridian mosaic installation	\$2,000
Tallong Memorial Hall Refurbishment	\$13,318
Marulan Road Safety	\$1,770
Towrang Hall Floor Refurbishment	\$14,230
Extension to GMC Road Safety Day	\$2,000
Insectivorous Bat Flight Centre	\$15,912
Increase in funds for GMC project - Road Safety	\$2,000
Thermal Imaging Camera	\$1,890
Tallong Community Memorial Walk	\$8,323
Tallong Hall project	\$5,133
Toilet Block for RFS	\$15,790
Community Sign at Towrang	\$11,923
Local Schools Co creating a sustainable future	\$4,000
Bungonia Community Engagement Program	\$4,500
Marulan Highway Signage	\$8,190
Promotions for Australia Day Committee	\$2,613
Muulii Murra (beautiful place)	\$2,800
MHS Archive & Research Facility	\$15,862
Marulan Public School Playground Upgrade	\$ 15,000 (funded in 2019, in progress as of October 2020)
Tallong Public School Playground Upgrade	\$ 15,000 (funded in 2019)
Marulan RFS - Training Room Extension	\$ 10,000 (funded in 2019)
Big Hill RFS - Thermal Imaging Camera	\$ 2,403 (funded in 2019)

Project Name	Total Approved
Tallong Community Focus Group – Defibrillator	\$ 2,572 (funded in 2019)
Marulan Kite Festival	\$3,000 (funded in 2020, however the event was cancelled)
Marulan Pony Club	\$1,500 (funded in 2020)
Goulburn & District Show Jumping Club	\$500 (funded in 2020)
Tallong Apple Festival	\$2,000 (funded in 2020)
Marulan Christmas Carols	\$3,500 (funded in 2020)
Goulburn Hockey Club	\$3,000 (funded in 2020)
Goulburn Cricket	\$3,000 (funded in 2020)
Marulan Soccer Club	\$5,000 (funded in 2020)
Goulburn Rugby	\$3,000 (funded in 2020)
Mayoral Charity Golf Day	\$5,000 (funded in 2020)
Goulburn Australia Day BBQ	\$1,000 (funded in 2020)
Tallong Public School Father’s Day	\$600 (funded in 2020)
Lion’s Club BBQ	\$500 (funded in 2020)
Marulan Australia Day BBQ	\$1,500 (funded in 2020)
Goulburn Mulwaree Council Australia Day BBQ	\$500 (funded in 2021)
Gunning Campdraft	\$500 (funded in 2021)
Towrang Valley Progress Assoc Australia Day BBQ	\$500 (funded in 2021)
Goulburn Agriculture, Pastoral and Horticultural Society	\$2,000 (funded in 2021)
Marulan Football Club	\$3,500 (funded in 2021)
Goulburn & District Showjumping Competition	\$1,000 (funded in 2021)