

Annual Environmental Management Review (AEMR)

Rooty Hill Distribution Centre

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Table 1 - Site Details

Name of operation	Rooty Hill Distribution Centre
Name of operator	Holcim (Australia) Pty Ltd
Development consent / project approval #	DA No. 05-0051
Name of holder of development consent / project approval	Holcim (Australia) Pty Ltd
Annual Review start date	October 1 2015
Annual Review end date	September 30, 2016
<p>I, Daniel Lidbetter, certify that this audit report is a true and accurate record of the compliance status of Rooty Hill Distribution Centre for the period of September 2015- September 2016 and that I am authorised to make this statement on behalf of Holcim (Australia) Pty Ltd.</p> <p><u>Note.</u></p> <p>a) <u>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.</u></p> <p>b) <u>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).</u></p>	
Name of authorised reporting officer	Daniel Lidbetter
Title of authorised reporting officer	NSW Planning & Environment Coordinator
Signature of authorised reporting officer	
Date	September 28, 2016.

1.0 Statement of compliance

See Table 2 for statement of commitments for the 2015-16 reporting period for the Rooty Hill Distribution Centre (RHDC). Table 3 details the non-compliances identified within the reporting period.

Table 2 - Statement of Commitments

Were all conditions of the relevant approval(s) complied with?	
DA No. 05-0051	NO

Table 3 - Non Compliances

Relevant approval	Condition #	Condition description (summary)	Compliance status	Where addressed in Annual Review
Decision No. 10406 of 2006	2.14	A reserved ambulance bay is marked signage is installed indicating parking spaces available to service vehicles.	Non-compliant	Page 18
Decision No. 10406 of 2006	2.24	Inform NOW (now DPI-Water) that Greening Australia has been contracted and is responsible for vegetation management for the site.	Non-compliant	Page 18
Decision No. 10406 of 2006	2.26	Immediately after planting and seeding (and every year thereafter) submit monitoring reports to DPE.	Non-compliant	Page 18
Decision No. 10406 of 2006	3.4	Provide a copy of the Noise audit report (undertaken by Golder Associates) to the Environmental Protection Authority (EPA).	Non-compliant	Page 18
Decision No. 10406 of 2006	4.2	A site email address is to be installed onto the entrance sign at the site entrance.	Non-compliant	Page 18

Decision No. 10406 of 2006	5.4	Provide a copy of the OEMP to the EPA and Council.	Non-compliant	Page 18
EPL No. 20672.	M1.3	The name of the person who collected the sample is recorded with the other sampling records.	Non-compliant	Page 18
EPL No. 20672.	E2.3	Provide a copy of the Noise audit report (undertaken by Golder Associates) to the Environmental Protection Authority (EPA).	Non-compliant	Page 18

Table 4 - Compliance status key for Table 3

Risk level	Colour code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: <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 conditions)

2.0 Introduction

Holcim (Australia) Pty Ltd (Holcim) is the owner and operator of the Rooty Hill Distribution Centre (RHDC), an aggregate storage and distribution facility located on Lot 1 DP 1150066 at 21 Kellogg Road, Rooty Hill.

A Development Consent was granted in 2006 by the Land and Environment (L&E) Court (Decision No. 10406 of 2006) to construct and operate a distribution centre to receive aggregates by rail from Holcim's Lynwood Quarry.

The RHDC facility is the primary unloading and distribution centre for construction materials extracted from the Lynwood Quarry (located in Marulan, NSW) into the Greater Sydney market.

This Annual Review details the environmental performance of RHDC during the period 1 October 2015 to 30 September 2016 (the reporting period).



Figure 1: Aerial view of the Holcim RHDC project area, located on Lot 1 DP 1150066 on Kellogg Road, Rooty Hill.

Annual Performance Reporting

- 6.3 The Proponent shall, throughout the life of the project, prepare and submit to the Director-General, an **Annual Environmental Management Report (AEMR)**. The AEMR shall review the performance of the project against the Operation Environmental Management Plan (refer to condition 5.4 and condition 5.5 of this approval), the conditions of this approval and other licences and approvals relating to the project. The AEMR shall include, but not necessarily be limited to:
- a) details of compliance with the conditions of this approval;
 - b) a copy of the Complaints Register (refer to condition 4.3 of this approval) for the preceding twelve-month period (exclusive of personal details), and details of how these complaints were address and resolved;
 - c) a comparison of the environmental impacts and performance of the project against the environmental impacts and performance predicted in those documents listed under condition 1.1 of this approval;
 - d) results of all environmental monitoring required under this approval and other approvals, including interpretations and discussion by a suitably qualified person; and
 - e) a list of all occasions in the preceding twelve-month period when environmental performance goals for the project have not been achieved, indicating the reason for failure to meet the goals and the action taken to prevent recurrence of that type of incident.
- 6.4 The Proponent shall submit a copy of the AEMR to the Director-General, DEC and Council every year, with:
- i) the first AEMR to be submitted within twelve months after the commencement of operation of the project; and
 - ii) the second and subsequent AEMRs to be submitted concurrently with the DEC's Annual Return.

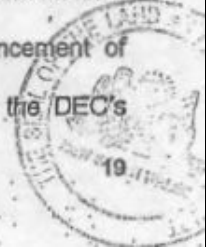


Figure 2: Conditions applicable to the AEMR as listed in approval Decision No. 10406 of 2006.

3.0 Approvals

The site operates under the following approvals listed in the table below:

Table 5 - Approvals for RHDC Operations

Approval	Regulatory Authority
L&E Court Decision No. 10406 of 2006.	Department of Planning & Environment (DP&E).
Modification to DA No. 05-0051	Department of Planning & Environment (DP&E).
EPL No. 20672.	Environmental Protection Authority (EPA)

This Annual Review has been prepared in accordance with Condition 6.3 (Annual Performance Monitoring) of the Development Consent and in accordance with the *Annual Review Guideline: post approvals requirements for state significance mining developments* (October 2015).

4.0 Operations Summary

The RHDC officially commenced operations during the first month of the reporting period. The date of the commencement of operations has been identified as October 1, 2015 with some minor aspects of commissioning having continued during the reporting period.

Tables 4 and 5 include a summary of the operations undertaken during the reporting period against the development consent conditions regarding product transported from Lynwood Quarry into RHDC.

Table 6 - Total Product Distributed (Holcim RHDC)

Material	Approved limit (specify source)	Previous reporting period	This reporting period (actual Tonnes)
Product Distributed- Total	4 Million Tonnes	Nil	669 962.050

Other operations

All operations undertaken at RHDC during the reporting period were undertaken Generally in Accordance with the Development Consent. Fixed and mobile plant are serviced as required by their respective original equipment manufacturer's maintenance schedule and as required to ensure efficient and effective use. Maintenance of compliance based fixed and mobile plant is prioritised as required.

Production data is provided to the Department of Resources and Energy annually.

As a part of the Transport Management Protocol, road trucks are covered when leaving the site. Compliance against this condition is audited fortnightly with training provided to truck drivers through the induction process. Monthly audits also inspect the internal and external road conditions to ensure trucks are not carrying material out onto public roads.

Next reporting period

It is anticipated that RHDC will continue to operate within the current footprint and scope of the existing operations. The site expects the following operations to be undertaken during the next reporting period.

- *Rehabilitation works and vegetation planting on the RHDC site.*
- *Commencement of operations of the Concrete Batch Plant.*
- *Delivery and Distribution of Lynwood Manufactured Sand & Aggregates.*

No changes to the existing operational footprint are scheduled to occur during the next reporting period. All areas of disturbance are sealed and complete with rehabilitation of designated vegetation screening, gardens and buffer areas to remain the same.

5.0 Actions required from previous Annual Review

The RHDC commenced operations on October 1, 2015 with no prior Annual Review having been undertaken for the site. The reporting period covered in this Annual Review is the first during operations for the site with actions required from this review covered in the next reporting period (October 1, 2016-September 2017).

6.0 Environmental Performance

6.1 Noise

Quarterly noise monitoring events took place throughout the reporting period with no exceedances noted during this time. Attachment 1 includes an overview of the results for each quarterly assessment undertaken in accordance with the RHDC Noise Management Plan.

In addition to quarterly monitoring the site undertook a one off noise audit of the site operations. The requirements for the Noise Audit detailed in Condition 3.3 and 3.4 below include:

Condition 3.3

Within 90 days of commencement operations associated with the project and during a period in which the project is operating under normal operating conditions, the Proponent shall conduct a Noise Audit of its operations. This Audit shall:

- a) be undertaken by an appropriate and recognised acoustic engineer, who is independent of, or not associated with, any organisation that has been involved with the acoustic assessment of the application (the subject of this approval), or involved in any supervision or designs associated with the construction of the project;*
- b) assess whether the project is complying with the criteria specified in condition 2.3 of this approval;*
- c) identify what additional measures could be implemented to ensure compliance should any non-compliance be detected; and*
- d) provide details of any complaints received relating to noise generated by the project, and action taken to respond to those complaints.*

identifies any non-compliance with the noise limits imposed under this approval, the Proponent shall detail within 30 days what additional measures would be implemented to ensure compliance, clearly indicating who would implement these measures, when these measures would be implemented, and how the effectiveness of these measures would be measured and reported to the Director- General. These ameliorative measures must be completed, if practicable, within 30 days of submission of the Noise Audit to the Director- General and a second noise audit shall be conducted demonstrating

acoustic compliance. If it is not practicable to completed the ameliorative measures within the 30 day period they should be undertaken in accordance with a timetable approved by the Director- General and the DEC.

Fieldwork for the RHDC Noise Audit was undertaken by Golder Associates over a two day period between the 22nd and 23rd March, 2016. It is noted that the timing of the Noise Audit was required to be undertaken within 90 days of operations commencing at the RHDC (I.e. by 1st January 2016).

This oversight was not initially identified due to management changes at the site in late 2015. Holcim can also confirm that no noise complaints were received, or have been received, from the community or local stakeholders for the RHDC following the commencement of operations.

The Audit was undertaken during regular operating conditions. The results of the Noise Audit found that the site achieved compliance with the criteria listed in the Development Consent at all locations, with the exception of a small portion of land used for the monitoring location within the Nurragingy Reserve.

Table 7- Results of the RHDC Noise Audit (conducted by Golder Associates).

Location	Resultant Distance*	Predicted RHDC Contribution LAeq dB(A)		Relevant Criteria		Compliance with Criteria
		Front End Loading Only	All Sources	Period	LAeq	
Station Street	750	35	37	Day Evening Night	44 44 39	Yes
Crawford Road	1170	30	31	Day Evening Night	40 39 39	Yes
Mavis Street	875	34	35	Day Evening Night	35 35 35	Yes
Nurragingy Reserve	110	56	58	Day Evening#	50 50	No
Colebee Centre	720	36	38	Day Evening Night	50 50 50	Yes
BIS	355	44	46	Day Evening#	55 55	Yes

Notes

* Approximately referenced to front end loading area on day of noise audit.

These locations are not in general accessible during the night period.

Upon further review of the data obtained during the Audit it was determined that the background acoustic environment at the time of the monitoring was predominantly insect noise and that any noise from operations at the RHDC would be imperceptible.

A copy of the Noise Audit has been included as Attachment 2 to this AEMR.

6.2 Air Quality

The site undertook dust management measures throughout operations to ensure compliance with the Air Quality Management Plan as well as the requirements of the EPL No. 20672. Dust management measures installed and operated as required by the Development Consent included:

- Provision and use of a permanent water cart onsite.
- Provision and use of a permanent street sweeper onsite.
- Installation of water cannons on all stockpiles.
- All heavy vehicles exiting the site leave via the wheel wash (located at the weighbridge).
- All heavy vehicles transporting aggregates tarp loads before leaving the site.
- Water sprays and covering of all material conveyors.

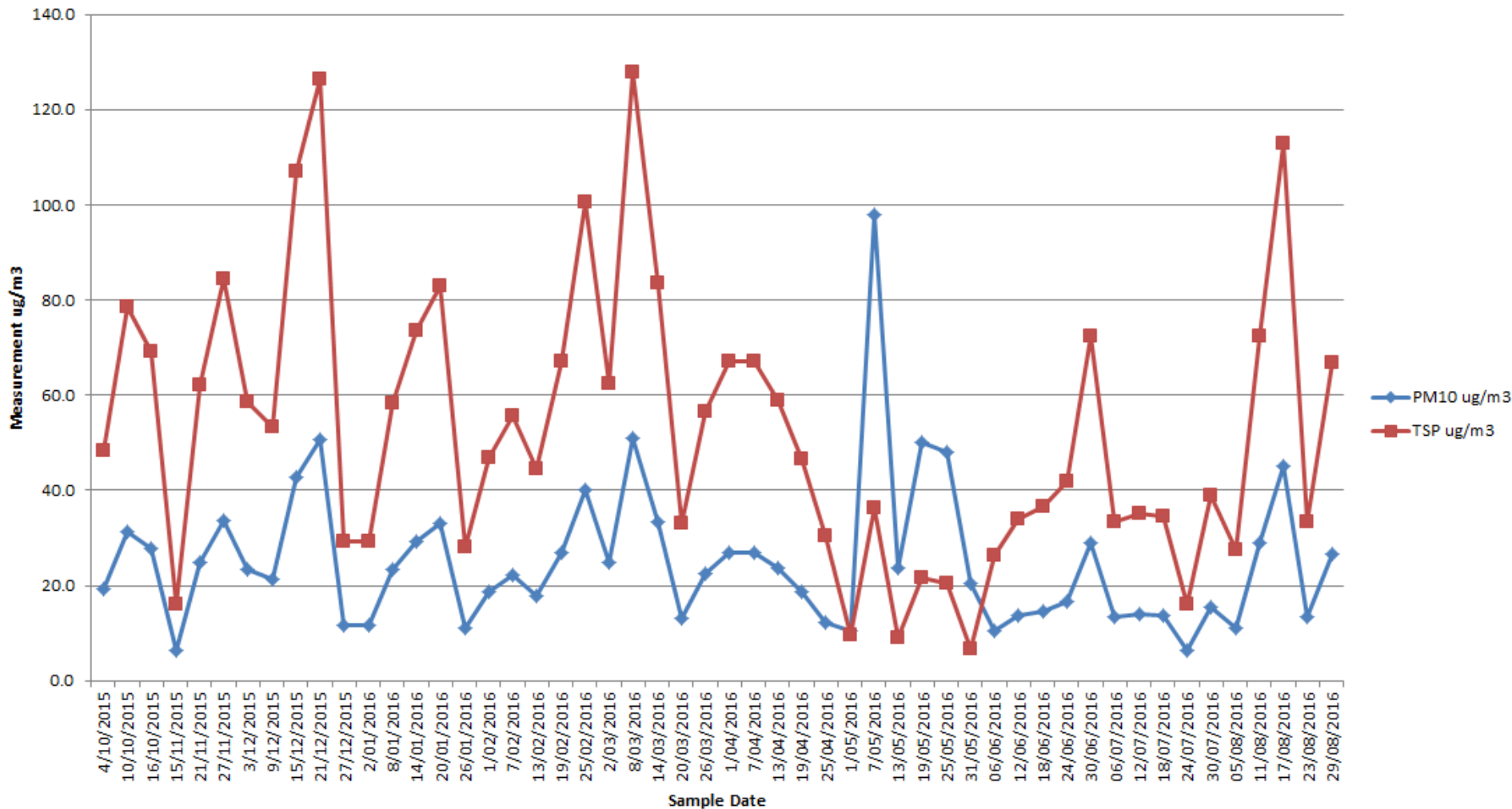
The results of dust deposition and PM10 monitoring undertaken on the site are detailed in tables 7 and 8 below:

Table 8 - Dust Monitoring (Dust Deposition)

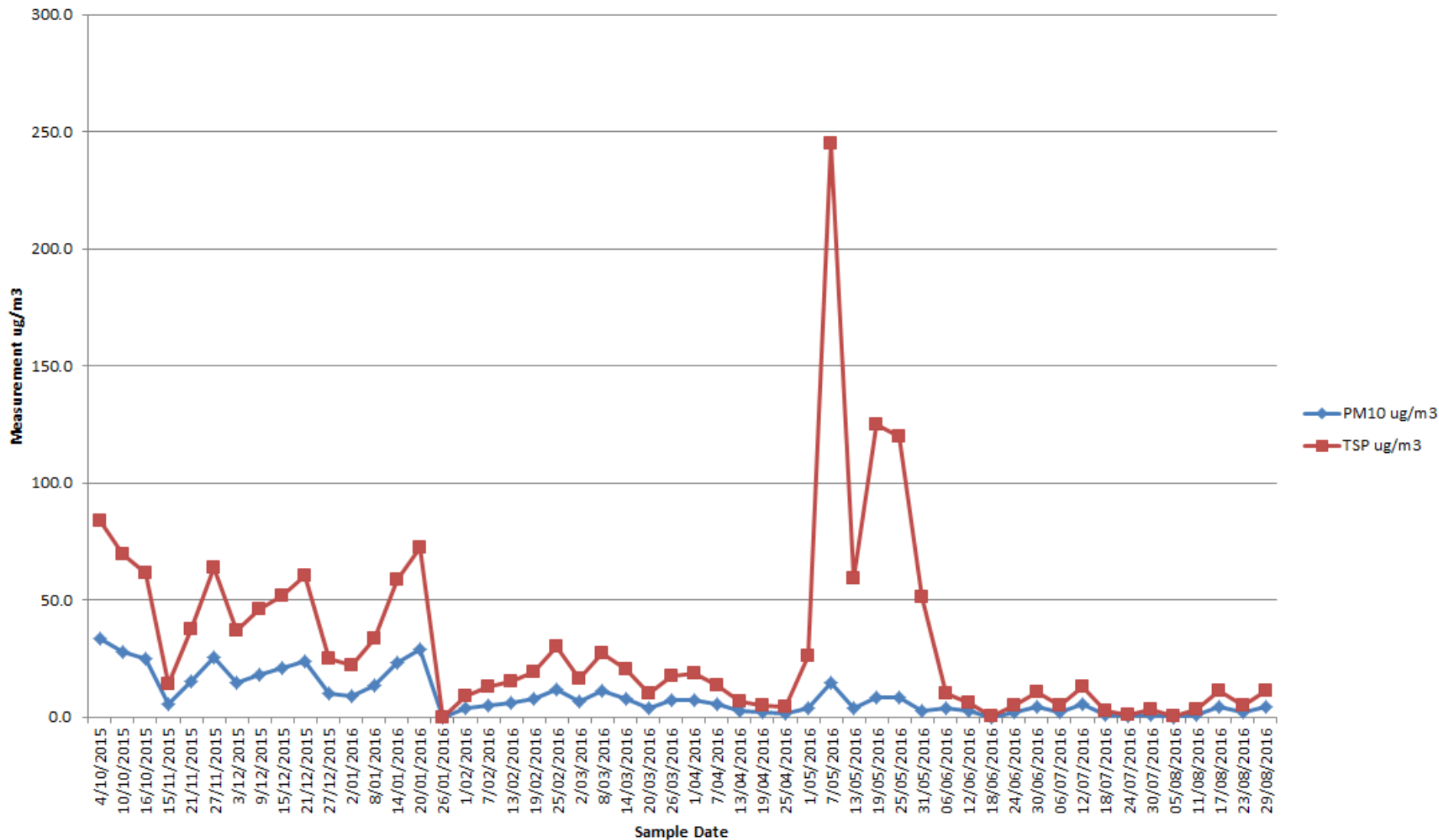
Start Date	End Date	DDG 1	DDG 2	DDG 3
1/09/2015	30/09/2015	1.8	2.3	1.3
30/09/2015	30/10/2015	3.5	3.9	1.3
30/10/2015	1/12/2015	1.4	7.7	1.9
1/12/2015	30/12/2015	1	3	1.5
30/12/2015	2/02/2016	1	1.8	0.8
2/02/2016	29/02/2016	2	2.7	0.9
29/02/2016	31/03/2016	1.6	3.6	0.7
31/03/2016	2/05/2016	2.4	2.9	5.1
2/05/2016	2/06/2016	2.1	4.8	4.4
2/06/2016	1/07/2016	2.4	2.7	1
1/07/2016	1/08/2016	1.5	3.1	1.7
1/08/2016	1/09/2016	2.0	2.9	1.3
Annual Average (4g/m2/year)		1.89	3.45	1.83
Result		PASS	PASS	PASS

Table 9 - Dust Monitoring (PM10 and TSP)

HVAS 2- Holcim Site Office



HVAS 1- Blacktown Sports Centre



Date	PM ₁₀ HVAS 1	PM ₁₀ HVAS 2	24 hr Criteria (µg/m ³)	Annual Average Criteria (µg/m ³)	TSP		Annual Average TSP Criterion
					PM ₁₀ HVAS 1	PM ₁₀ HVAS 2	
Average	9.5	24.2	N/A	30	32.8	52.0	90
Maximum	33.6	97.9	50	N/A			

PM10 and TSP samples were undertaken at 2 HVAS units owned and operated by Holcim. HVAS 1 (located at the Blacktown Sports Centre directly south of the site) registered no exceedances during the reporting period.

HVAS 2 (located on the RHDC site) registered 3 exceedances during the reporting period. An overview of these exceedances and the actions undertaken to prevent trends in these results are included in the table below:

Actions undertaken to review these exceedances have been carried out in accordance with the Dust Management Plan (Appendix F RHDC OEMP).

Table 10 - PM10 Exceedances

Date	Result	Overview
21/12/2015	50.6 ug/m3	<p>Cause Wind direction was found to be consistent with dust travelling from the stockpiles to the south and south-east, toward the monitor. A high temperature of 30.7°C was measured during the sampling day, contributing to high dust generating conditions.</p> <p>It was also identified that the water cannons used on stockpiles were not being operated due to maintenance works on the day of the incident. These cannons are operating in accordance with the consent.</p> <p>Actions Ensure dust emissions from stockpiles and roads are controlled during dry, hot conditions to reduce the likelihood of exceedances in the depositional and / or PM10 criteria.</p>
8/03/2016	51.1 ug/m3	<p>Cause The wind direction was found to be consistent with dust travelling from the stockpiles to the south and south-east, toward the monitor.</p> <p>It was also identified that the water cannons used on stockpiles were not being operated due to maintenance works on the day of the incident. These cannons are operating in accordance with the consent.</p> <p>Actions Ensure dust emissions from stockpiles and roads are controlled during dry hot conditions to reduce the likelihood of exceedances in the depositional and / or PM10 criteria.</p>
7/05/2016	97.7 ug/m3	<p>Cause Initial report from the air quality consultant identified that she was</p>

		<p>struck by how black the filter was compared to other samples. This black substance is not consistent with previous samples containing dust from RHDC.</p> <p>Upon closer review the weather patterns logged in the site weather station identified that the predominant winds throughout the month were from the north- west (Humes and OneSteel properties) which is thought to have also attributed to the exceedance.</p> <p>Actions The following actions were undertaken to ensure that no further exceedances were observed.</p> <ul style="list-style-type: none"> - Discuss dust prevention measures with Humes Pipes & Onesteel (northern boundary neighbour to ensure emissions are not crossing the site boundary). - Ensure that all Holcim RHDC dust prevention measures are being undertaken, this includes the use of the Watercart, Streetsweeper and Water Cannons daily during operations.
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Based on the results of all PM10 monitoring undertaken during the reporting period the exceedances registered at HVAS 2 have been deemed to be anomalies based on the following criteria:

- The Annual average for PM10 at this location is well below the maximum limit (50 ug/m3).
- Dust deposition from adjoining properties (Humes & Onesteel) were attributed to 1 event (exceedance on May 7, 2016).
- The 3 events were caused by a combination of dry windy weather conditions with the failure of site dust suppression systems. The dust suppression systems are now installed and operational across the whole site with no exceedances when controls have been in place.

A copy of all PM10, TSP and depositional monitoring has been included as Attachment 3 to this report.

6.3 Traffic Management

Holcim staff have undertaken regular reviews of traffic management during the reporting review to ensure that all components of the OEMP are met.

- RHDC Traffic Management Plan.
- RHDC Transport Code of Conduct (for Heavy Vehicles).

A breakdown of the results for fortnightly monitoring as well as Quarterly inspections have been included in the table below:

Table 11 - Traffic Management Reporting (by Quarter)

Reporting Period	Outcome
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Quarter 1 Oct- Dec 2015	<p>Fortnightly inspections indicated a single instance of a driver stopping on Kellogg Road to remove truck tarp (rather than using on site tie down area). This has been addressed. No other non-compliances with the Construction Traffic Management Plan were noted by the Environmental Representative.</p> <p>Quarterly traffic monitoring did not note any non-compliances with the Traffic Management Plan, and at no time were trucks found to be queuing on the local road network.</p>
Quarter 2 Jan- Mar 2016	<p>Fortnightly inspections observed zero non-compliance with the Construction Traffic Management Plan.</p> <p>Quarterly traffic monitoring did not note any non-compliances with the Traffic Management Plan, and at no time were trucks found to be queuing on the local road network.</p>
Quarter 3 April- June 2016	<p>Monthly inspections observed zero non-compliance with the Construction Traffic Management Plan.</p> <p>Quarterly traffic monitoring did not note any non-compliances with the Traffic Management Plan, and at no time were trucks found to be queuing on the local road network.</p>

6.4 Water Management

6.4.1 Quarterly Surface Water

Water Quality monitoring was undertaken in Angus Creek throughout the reporting period with rain event monitoring and Quarterly intervals undertaken by Jacobs Consultants. A breakdown of the Quarterly event observations are detailed in the table below:

Table 13 - Quarterly Water Observations

Reporting Period	Outcome
Quarter 1 Oct- Dec 2015	<p>Water quality monitoring of Angus Creek and Eastern Creek was carried out during September 2015. Exceedances of site specific trigger levels were observed for pH (sites AE1, AE5 and AE6), and electrical conductivity (site AE6).</p> <p>Comparison between a control site and downstream locations indicated that Holcim operations were unlikely to have influenced water quality during the monitoring period.</p>
Quarter 2 Jan- Mar 2016	<p>Water quality monitoring of Angus Creek and Eastern Creek was carried out during January 2016. At some locations site specific trigger values were exceeded, these included turbidity, dissolved oxygen, total nitrogen and total phosphorus.</p> <p>Comparison between a control site and downstream locations indicated that Holcim operations were unlikely to have influenced water quality during the monitoring period.</p>

	Wet Weather water quality monitoring of Angus Creek and Eastern Creek was carried out in January 2016. At some locations site specific trigger values were exceeded, these included turbidity, dissolved oxygen, total nitrogen and total phosphorus. However, none of these exceedances were attributed to Holcim Operations.
Quarter 3 April- June 2016	Wet Weather water quality monitoring of Angus Creek and Eastern Creek was carried out in June 2016. At some locations site specific trigger values were exceeded, these included turbidity, dissolved oxygen, total nitrogen and total phosphorus. However, none of these exceedances were attributed to RHDC Operations.

A copy of the water quality results have been included as Attachment # to this report.

6.4.2 Macro-invertebrates

An assessment of the Macroinvertebrate communities in Angus Creek was undertaken during the reporting period by Jacobs Consultants. Macroinvertebrate communities in Angus Creek were found to be in poor ecological condition, consistent with previous years monitoring. No further works are required under Holcim's OEMP.

Dry weather water quality monitoring of Angus Creek and Eastern Creek was carried out in April 2016. At some locations OEMP limits were exceeded for dissolved oxygen, total phosphorus and pH. A review undertaken by Jacobs Consultants into the results from these samples found that , none of these exceedances were attributed to RHDC Operations. These findings are discussed further in Jacobs Quarterly Report (included as Attachment 2).

A copy of the Bi-Annual results for Terrestrial Ecology and Macro-invertebrates survey are included in the Quarter 1 report (Attachment # of this report).

6.5 Summary of Environmental Performance

A summary of the performance of environmental management measures and sampling results are detailed in the table below.

Table 12 – Environmental performance

Aspect	Approval criteria / EIS prediction	Performance during the reporting period	Trend / key management implications	Implemented/ proposed management actions
Noise	EIS predictions are all below development consent criteria	Met the Development Consent Criteria	Consistently meets criteria	None Required
Air quality	EIS predictions are all below development consent criteria	Meets the OEMP criteria.	Has consistently met criteria recently, with exception to 3 events at HVAS 2 during the reporting period.	Actions implemented (monitoring of dust suppression actions will continue into the next reporting period).
Traffic Mgt	EIS predictions are all below development consent criteria	Met the Development Consent Criteria	Consistently meets criteria	None Required

Water Mgt	EIS predictions are all below development consent criteria	Does not meet the OEMP criteria.	Sampling and analysis has confirmed that these results are not caused by Holcim operations.	No further actions required by Holcim.
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7.0 Rehabilitation and Landscape Management

Bushland Management works were commenced at the same time as the landscape plantings during the reporting period but only as a minor component per month. These works were undertaken in accordance with the performance criteria of the Vegetation Management Plan (VMP), being;

- Certification that plant stock is of local botanical provenance.
- In sites of high resilience, demonstration of natural regeneration after triggering the soil seedbank prior to replanting.
- Gradual improvement at site of plant establishment with the aim of achieving 80% establishment of each species after five years since initial planting.
- Gradual reduction in weed density to 5% of the total area of each management zone.
- Gradual extension of native plant cover in each management zone through natural regeneration.
- Maintenance or reduction of erosion within construction areas in the riparian zone indicating stability and condition of any stream works.

The VMP divided treatment areas during the reporting period into 4 Management Zones, the VMP describes these areas as:

1. Zone 1 – River Flat Eucalypt Forest EEC with high density (>75%) of woody and herbaceous herbs (approx 3.8ha) – moderate resilience. This zone also includes the protection of the threatened Juniper- leaved Grevillea.
2. Zone 2a – Cumberland Plain Woodland critically endangered ecological community with medium density (25-50%) of woody, climbing and herbaceous weeds (approx 1ha) – moderate resilience
3. Zone 2b – Cumberland Plain Woodland critically endangered ecological community with low density (6-25%) of mainly climbing and herbaceous weeds (approx 1.9ha) – high resilience
4. Zone 3 – Disturbed /cleared grassland zone with very high density (95%) of mainly grassy weeds (approx 1ha) – low resilience. This is also the site of the Cumberland Plain Woodland Ecological Offset.

Work undertaken to date at the site has been assessed by contractors Greening Australia who have determined that approximately 55% of the bushland area meets the Vegetation Management Plan (VMP) target condition of less than 5% weed cover.

Contractor Management over the next 3 months (YED 2016) will see approximately a further 20% of the site to drop below 5% weed cover in accordance with the VMP.

Actions for the next reporting period

Bushland management works will continue to occur in line with Section 9.2 of the VMP. These works will include:

1. Commencement of secondary weed management within the footprint of current management areas with a focus upon declared noxious species *Asparagus asparagoides* (Bridal creeper), *Hypericum perforatum* (St. John's Wort), *Bryophyllum delagoense* (Mother of Millions) and *Rubus fruticosus* (Blackberry).
2. Extend primary focus upon noxious woody weeds *Ligustrum lucidum* (Large-leaf Privet), *Ligustrum sinense* (Small-Leaf Privet), *Olea europaea* sbsp. *africana* (African Olive), *Cestrum*

parqui (Green Cestrum) and Opuntia stricta (prickly Pear). This will occur in areas of priority VMU 1, VMU 3, VMU 2 and VMU 4

3. Identify and plan for revegetation requirements within the Angus Creek Remnant Area.
4. Continue to maintain landscape plantings with the RHDC footprint, this includes:
 - The eastern storm water basin to reduce the weed levels to an acceptable condition. This work will require the identification of surviving revegetated and regenerating native species.
 - Management of competitive exotic cover to promote the growth of native species and spot/halo spraying around revegetation, with a follow up hand weeding
 - The western stormwater retention basin and the north eastern sound wall revegetation require larger scale weed control. Weeds will be treated via herbicide application, the dead biomass brush cut down forming a mulch layer and subsequent revegetation works being carried out to re-establish native species in sparse areas.
 - Fixed monitoring quadrats be established to capture baseline vegetation data at commencement of the new year and reassessed at the next AEMR.

In addition to these works, monthly monitoring will be set up to allow Greening Australia to submit a report with the monthly site outcomes to Holcim. The report includes the following detail:

1. Capture what works have been undertaken within VMU's and general landscape areas.
2. How much work was carried out in each of the VMU's, What weed species were treated, what treatment method(s) were applied, the area covered and how much time was taken to do so.

8.0 Community

Holcim has maintained community engagement measures during the reporting period by undertaking the following activities in accordance with Condition 4.1, 4.2 & 4.3 of the Development Consent:

- Maintenance of a website (containing publicly available documents).
- A telephone number, email and postal address (on the website) for community complaints and feedback.
- A copy of the Complaints Register is maintained on the company website.
- All documents and items displayed on the website are regularly updated by Holcim staff.

The RHDC Community Liaison Group has not been held during the reporting period due to a decline in responses from past members and no new applications. It is anticipated that the site will undertake a recruitment and re-development for the Liaison Group during the next reporting period.

A review of the Holcim Safety, Health & Environment (SHE) reporting database (INX) did not identify any complaints from external stakeholders during the reporting period. A copy of the register has been included as Attachment 4 to this report.

9.0 Independent Audit

Condition 3.5 (Independent Environmental Auditing) of the RHDC Development Consent directed Holcim to commission an independent person or team to undertake an Independent Environmental Audit six months after the commencement of operations on the site.

This audit was completed by EMM consultants on March 31, 2016 and submitted to the Department of Planning & Environment (DP&E).

The Auditors identified 10 Non-Compliances which were all Category 2 (NC2) being low risk and categorised as isolated absence of environmental management controls. A copy of these Non-compliant items and closeout status are further detailed in the table below.

Table 15- Independent Audit Recommendations Status

Condition No.	Recommendation	Status
2.14	A reserved ambulance bay is marked signage is installed indicating parking spaces available to service vehicles.	Complete August 11, 2016
2.24	Inform NOW (now DPI-Water) that Greening Australia has been contracted and is responsible for vegetation management for the site.	To be Completed October 15, 2016
2.26	Immediately after planting and seeding (and every year thereafter) submit monitoring reports to DPE.	To be Completed October 15, 2016
3.4	Provide a copy of the Noise audit report (undertaken by Golder Associates) to the Environmental Protection Authority (EPA).	Complete June 3, 2016.
4.2	A site email address is to be installed onto the entrance sign at the site entrance.	To be Completed October 15, 2016
5.4	Provide a copy of the OEMP to the EPA and Council.	Complete June 3, 2016.
M1.3	The name of the person who collected the sample is recorded with the other sampling records.	Complete June 3, 2016.
E2.3	Provide a copy of the Noise audit report (undertaken by Golder Associates) to the Environmental Protection Authority (EPA).	Complete June 3, 2016.

10.0 Incidents and non compliance

The site has identified 10 non-compliant items through the recent Independent Audit. The 3 actions remaining will be closed out by October 15, 2016 during the next reporting period.

11.0 Other reportable information

The site has commenced construction of the Concrete Batch Plant. This construction has been undertaken in accordance with conditions of the Development Consent and will operate in accordance with the existing OEMP.

12.0 Activities to be completed in the next reporting period

RHDC implements an incremental continuous improvement management strategy across all of its operations including environmental management. As the site has moved into operations, there is a greater opportunity to streamline processes, increase internal auditing and document control as well as embed standard monitoring, measuring and reporting.

Within the next reporting period all management plans will be reviewed to ensure consistency with the environmental management of operations on the site. Monitoring locations and criteria will also be reviewed to ensure the site is clearly measuring meaningful outcomes.

The following activities are planned for the next reporting period:

1. Production to commence from the Concrete Batch Plant.
2. Re-commencement of the Community Liaison Group.
3. Commencement of planting for tubestock (in accordance with the VMP).
4. Review all monitoring locations, frequency and criteria for environmental sampling undertaken at RHDC in accordance with the Operational Environmental Monitoring Plan.
5. Review all of the protocols, plans and strategies associated with the Operational Environmental Management Plan.

Attachment 1: RHDC Quarterly Environmental Reports (Jacobs Consultants)



Rooty Hill RDC

Holcim Australia

Quarterly environmental monitoring report - Q3/4 2015

| Final v1

27 January 2016



Rooty Hill RDC

Project no: IA08000
 Document title: Quarterly environmental monitoring report - Q3/4 2015
 Document No.:
 Revision: Final v1
 Date: 27 January 2016
 Client name: Holcim Australia

 Project manager: Ben Ison
 Author: Ben Ison
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Document history and status

Revision	Date	Description	By	Review	Approved
Draft A	20/01/2016	Practice review	B Ison	L Spencer	20/01/2016
Final v0	20/01/2016	Final issued to Holcim	B Ison		20/01/2016
Final v1	27/01/2016	Final review issued to Holcim	B Ison		27/01/2016

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Appendix A. Air quality and meteorology monitoring reports

- A.1 September 2015
- A.2 October 2015
- A.3 November 2015
- A.4 December 2015

Appendix B. Quarterly noise monitoring report - Q4 2015

Appendix C. Ecology and water quality monitoring report – Q4 2015

Appendix D. Terrestrial ecology monitoring report – Q4 2015

1. Introduction

This document provides a summary of environmental monitoring undertaken during operations at the Rooty Hill Regional Distribution Centre during the months of September to December 2015. The monitoring has been undertaken in accordance with the Project Approval consisting of: Environmental Assessment Reports and Statement of Commitments (SoCs), the Minister's Conditions of Approval (MCoAs), and all management plans and strategies.

2. Background

Construction of the Regional Distribution Centre was completed in August 2015, with operations commencing shortly thereafter. Typical onsite operations include the following activities:

- Aggregate deliveries by rail
- Aggregate loading to stockpiles (from conveyor and loaders)
- Heavy vehicle loading

Reporting is carried out monthly, with a summary report issued each quarter. This initial report covers four months, in order to bring the reporting period into line with a standard calendar quarter.

3. Complaints

No complaints have been received to date for the project.

4. Monitoring

Environmental monitoring undertaken during the monitoring period of 1 September to 31 December 2015 consisted of attended noise, meteorological conditions, air quality, water quality, road traffic, riparian health and macro-invertebrates. All monitoring was undertaken by specialist consultants and all laboratory work was conducted by NATA (or equivalent) accredited testing facilities. The detailed monitoring reports are attached as appendices to this report.

Table 1 provides a summary of the environmental monitoring undertaken during the monitoring period.

If you have any questions or require any additional information, please contact Brian Cassel, Holcim Site Manager, on 02 8886 5402.

Table 1 Summary of Quarterly Environmental Monitoring September to December 2015

Parameter	Method	Frequency	Date	Discussion/Compliance Status	Actions	Reference
Air quality PM ₁₀	Dust PM10 High volume air sampler	Every 6 days	September 2015	PM ₁₀ dust sampling results for September 2015 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8	Continuation of existing dust management practices, targeting emission sources	Appendix A1
			October 2015	PM ₁₀ dust sampling results for October 2015 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8		Appendix A2
			November 2015	PM ₁₀ dust sampling results for November 2015 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8		Appendix A3
			December 2015	The PM ₁₀ sampling unit on site recorded a single reading above the air quality limits outlined in Minister's Condition of Approval 2.8. This was likely to be attributable to Holcim activities.	The PM10 exceedance was not reported to regulators due to the anomalous nature of the event and the minor nature of the exceedance. Furthermore, high temperatures and winds within the area were likely to have contributed to the result.	Appendix A4
Dust Deposition	Dust deposition gauges	Monthly	September 2015	Dust deposition results for September 2015 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8	Continuation of existing dust management practices, targeting emission sources	Appendix A1
			October 2015	Dust deposition results for October 2015 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8		Appendix A2
			November 2015	A single dust gauge result exceeded the annual average air quality limits outlined in Minister's Condition of Approval 2.8. This site was at Blacktown sports centre and unlikely to be related to Holcim activities. As the criteria are an annual goal, this does not constitute an exceedance.		Appendix A3
			December 2015	Dust deposition results for December 2015 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8	Appendix A4	
Meteorological Conditions	On site weather station	Daily	September 2015	Meteorological data recorded for September 2015.	Monitoring of meteorological conditions to continue.	Appendix A1
			October 2015	Due to a software error, meteorological data was not collected between the 20 October and 10 November.		Appendix A2
			November 2015	Due to a software error, meteorological data was not collected between the 20 October and 10 November.		Appendix A3
			December 2015	Meteorological data recorded for December 2015.		Appendix A4
Noise	Attended and unattended operational noise monitoring at 4 locations	Quarterly	October 2015	Operational noise levels compliant with noise criteria outlined in Minister's Condition of Approval 2.3	Quarterly monitoring of operational noise levels to continue.	Appendix B

Water Quality	Water quality testing of Angus Creek at 6 monitoring locations	Quarterly	August 2015	<p>Water quality monitoring of Angus Creek and Eastern Creek was carried out during September 2015. Exceedances of site specific trigger levels were observed for pH (sites AE1, AE5 and AE6), and electrical conductivity (site AE6).</p> <p>Comparison between a control site and downstream locations indicated that Holcim operations were unlikely to have influenced water quality during the monitoring period.</p>	Water quality monitoring of Angus Creek and Eastern Creek to continue under operational monitoring regime	Appendix C
Parameter	Method	Frequency	Date	Discussion/Compliance Status	Actions	Reference
Macro-Invertebrate Angus Creek	Monitoring of diversity of families SIGNAL 2 score using AUSRIVAS protocols at 6 monitoring locations	Bi-annually	September 2015	<p>Macro invertebrate results indicated sites were severely impaired, with fewer families of taxa seen than would be expected. This is in line with previous years monitoring results and indicates there are substantial impacts on water and/or habitat quality.</p> <p>These results are representative of a catchment influenced by mixed rural and urban land uses and show no impact from Holcim operations.</p>	Macro-Invertebrate monitoring to continue bi-annually.	Appendix C
Riparian Health and condition	NSW biometric vegetation condition benchmark methodology at 6 monitoring locations	Quarterly	August 2015	<p>Similar to previous seasons, riparian conditions at all sites were stable but exhibit seasonal variation. Succession of groundcover at some sites appears to be dominated by exotic species following the dieback of native species. Instream and bank conditions at monitoring locations appear to vary with wet weather events which transport instream structures to and from monitoring locations.</p> <p>There was no evidence of impact from Holcim operations on the riparian zone.</p>	Riparian health and condition monitoring to continue under operational monitoring regime.	Appendix D
Traffic	Traffic inspections and monitoring	Fortnightly and quarterly	<p>Fortnightly inspections</p> <p>Quarterly monitoring</p>	<p>Fortnightly inspections indicated a single instance of a driver stopping on Kellogg Road to remove truck tarp (rather than using on site tie down area). This has been addressed. No other non-compliances with the Construction Traffic Management Plan were noted by the Environmental Representative.</p> <p>Quarterly traffic monitoring did not note any non-compliances with the Traffic Management Plan, and at no time were trucks found to be queuing on the local road network.</p>	Monitoring to continue under operational monitoring regime.	-

Appendix A. Air quality and meteorology monitoring reports

A.1 September 2015

A.2 October 2015

A.3 November 2015

A.4 December 2015

Appendix B. Quarterly noise monitoring report - Q4 2015

Appendix C. Ecology and water quality monitoring report – Q4 2015

Appendix D. Terrestrial ecology monitoring report – Q4 2015



Rooty Hill RDC

Holcim Australia

Quarterly environmental monitoring report – Q2 2016

Final Report

22 September 2016



Rooty Hill RDC

Project no: IA089300
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 Document No.: 1
 Revision: Final report
 Date: 22 September 2015
 Client name: Holcim Australia

 Project manager: Greer Laing
 Author: Greer Laing
 File name: J:\IE\Projects\04_Eastern\IA089300\21 Deliverables\Quarterly reports\2016 Q2\Quarterly Environmental Monitoring Report_Q2_2016_FINAL.docx

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Document history and status

Revision	Date	Description	By	Review	Approved
Draft A	21/09/2016	Practice review	G Laing	B Ison	22/09/2016

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Appendix A. Air quality and meteorology monitoring reports

A.1 April 2016

A.2 May 2016

A.3 June 2016

Appendix B. Quarterly noise monitoring report – Q2 2016

Appendix C. Water quality monitoring report – Q2 2016

Appendix D. Terrestrial ecology monitoring report – Q2 2016

1. Introduction

This document provides a summary of environmental monitoring undertaken at operations at the Rooty Hill Regional Distribution Centre during the months of April to June 2016. The monitoring has been undertaken in accordance with the Project Approval which incorporates: Environmental Assessment Reports and Statement of Commitments (SoCs), the Minister's Conditions of Approval (MCoAs), and all management plans and strategies.

2. Background

Construction of the Regional Distribution Centre was completed in August 2015, with operations commencing shortly thereafter. Typical onsite operations include the following activities:

- Aggregate deliveries by rail.
- Aggregate loading to stockpiles (from conveyor and loaders).
- Heavy vehicle loading.

Reporting is carried out monthly, with a summary report issued each quarter. This report covers the second quarter of 2016.

3. Complaints

No complaints have been received to date for the project.

4. Monitoring

Environmental monitoring undertaken during the monitoring period of 1 April to 30 June 2016 consisted of attended noise, meteorological conditions, air quality, water quality, road traffic, riparian health and macro-invertebrates. All monitoring was undertaken by specialist consultants and all laboratory work was conducted by NATA (or equivalent) accredited testing facilities. The detailed monitoring reports are attached as appendices to this report.

Table 1 provides a summary of the environmental monitoring undertaken during the monitoring period.

Table 1 Summary of Quarterly Environmental Monitoring April to June 2016

Parameter	Method	Frequency	Date	Discussion / Compliance Status	Actions	Reference
Air Quality (PM ₁₀)	Dust PM ₁₀ using high volume air sampler	Every 6 days	April 2016	PM ₁₀ dust sampling results for April 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8.	Continuation of existing dust management practices, targeting emission sources.	Appendix A1
			May 2016	One exceedance of the PM ₁₀ criteria was measured during May 2016. The site office high volume air sampler measured 97.9 µg/m ³ of PM ₁₀ on 19 May 2016.		Appendix A2
			June 2016	PM ₁₀ dust sampling results for June 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8.		Appendix A3
Air Quality (dust deposition)	Dust deposition gauges	Monthly	April 2016	Dust deposition results for April 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8	Continuation of existing dust management practices, targeting emission sources.	Appendix A1
			May 2016	Dust deposition results for May 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8		Appendix A2
			June 2016	Dust deposition results for June 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8		Appendix A3
Meteorological Conditions	On site weather station	Daily	April 2016	Meteorological data recorded for April 2016.	Monitoring of meteorological conditions to continue.	Appendix A1
			May 2016	Meteorological data recorded for May 2016.		Appendix A2
			June 2016	Meteorological data recorded for June 2016.		Appendix A3
Noise	Attended and unattended operational noise monitoring at 4 locations	Quarterly	April 2016	Operational noise levels compliant with noise criteria outlined in Minister's Condition of Approval 2.3	Quarterly monitoring of operational noise levels to continue.	Appendix B
Water Quality	Water quality testing of Angus Creek at 6 monitoring locations	Quarterly	April 2016	Dry weather water quality monitoring of Angus Creek and Eastern Creek was carried out in April 2016. At some locations OEMP limits were exceeded for dissolved oxygen, total phosphorus and pH. However, none of these exceedances were attributed to RHDC Operations.	Water quality monitoring of Angus Creek and Eastern Creek to continue under operational monitoring regime	Appendix C

Parameter	Method	Frequency	Date	Discussion / Compliance Status	Actions	Reference
Macro-Invertebrate Angus Creek	Monitoring of diversity of families SIGNAL 2 score using AUSRIVAS protocols at 6 monitoring locations	Bi-annually	April 2016	Macroinvertebrate communities in Angus Creek were in poor ecological condition, consistent with previous years monitoring.	Macro-Invertebrate monitoring to continue bi-annually.	Appendix C
Riparian Health and condition	NSW biometric vegetation condition benchmark methodology at 6 monitoring locations.	Quarterly	May 2016	Overall, there was no evidence of a detrimental impact on riparian habitat condition from activities within the RDC. The weed control works undertaken as part of the Vegetation Management Plan should serve to increase the riparian condition within the RDC.	Monitoring to continue under operational monitoring regime.	Appendix D
Traffic	Traffic inspections and monitoring	Monthly and quarterly	Monthly inspections	Monthly inspections observed zero non-compliance with the Construction Traffic Management Plan.	Monitoring to continue under operational monitoring regime.	-
			Quarterly monitoring	Quarterly traffic monitoring did not note any non-compliances with the Traffic Management Plan, and at no time were trucks found to be queuing on the local road network.	Monitoring to continue under operational monitoring regime.	-

Appendix A. Air quality and meteorology monitoring reports

A.1 April 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
MONTHLY ENVIRONMENTAL MONITORING REPORT**

Aspect Air Quality and Meteorology

Date April 2016

SUMMARY

Monitoring period 1 – 30 April 2016

Parameters monitored in period Dust (PM₁₀) / TSP^a
Depositional Dust
Local Meteorology

^a Derived from PM₁₀

Exceedance summary

- No measured exceedances of the PM₁₀ criteria were recorded during April 2016.
- The monthly dust deposition volume was above the annual criteria during April 2016 at DDG3, the monitoring point nearest the rail loading operation. This does not constitute an exceedance of the criteria because the assessment is based on an annual average, which remains below the criteria.

1. Monitoring Locations

The monitoring locations at the Rooty Hill Regional Distribution Centre (RDC) for air quality and meteorology are shown in **Figure 1** and consist of:

- Dust monitoring (PM₁₀): Blacktown International Sportspark (formally Olympic Park)
Holcim Site office
- Dust monitoring (Depositional): Locations 1 to 3
- Meteorology: Blacktown International Sportspark (formally Olympic Park)

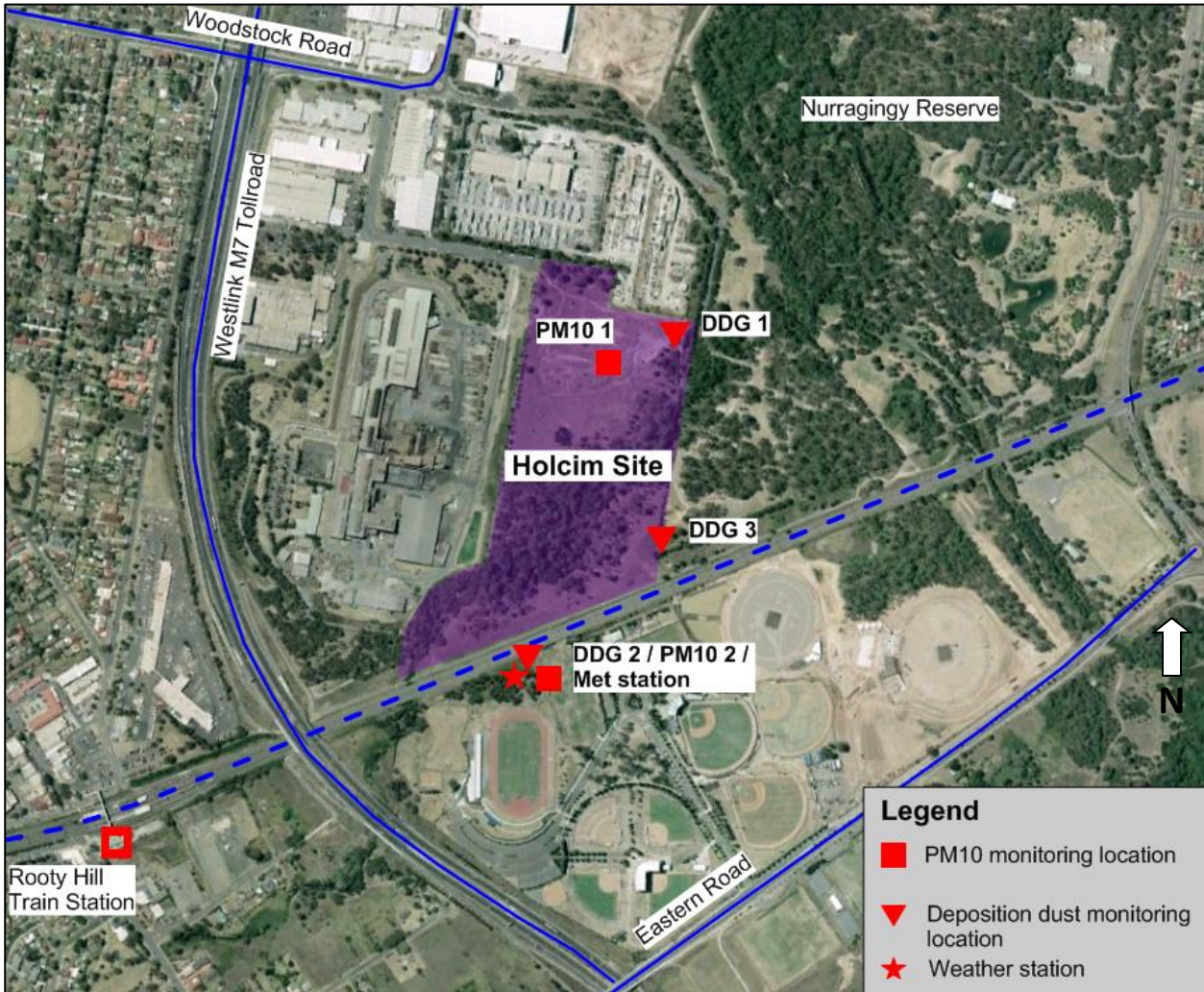


Figure 1 Monitoring locations

2. Monitoring Methodology

Dust

Air quality (dust) monitoring was undertaken using two Ecotech High Volume Air Samplers (HVAS) with Particulate Matter - 10µm (PM₁₀) sampling heads. The HVASs were operated on one-day-in-six in accordance with *AS/NZS 3580.9.6:2003 Methods for sampling and analysis of ambient air, Method 9.6: Determination of suspended particulate matter (PM₁₀) – High volume sampler with size selective inlet - Gravimetric method.*

Calibration of the unit is checked on a monthly basis, in accordance with operating instructions for the unit and *AS/NZS 3580.9.6:2003.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Monitoring Plan.

Depositional dust was monitored in accordance with *AS/NZS 3580.10.1:2003 Methods for sampling and analysis of ambient air Method 10.1: Determination of particulate matter – Deposited matter – Gravimetric method*.

Local Meteorology

Meteorological conditions were monitored using a Davis Vantage Pro2 Plus monitoring unit. This unit was positioned in accordance with *AS2923-1987 Ambient air – Guide for measurement of horizontal wind for air quality applications*.

The Davis Vantage Pro2 plus meteorological station does not satisfy the accuracy requirements of AS 3580.14-2011 for wind speed and direction measurements. However, no monitoring standards are specified in the Project Approval and the accuracy of the proposed unit is considered sufficient for the purposes of impact management.

The integrity of the meteorological monitoring station is checked every six days.

3. Guidelines

Air Quality

Air quality (dust) criteria within the Project Conditions of Approval, specifically Statement of Commitment (SoC) 4.1 and the Operational Environmental Management Plan (OEMP) mirror those in the NSW EPA document *Approved methods for the modelling and assessment of air pollutants in New South Wales* (DEC 2005). The air quality assessment criteria are outlined in **Table 1**, which apply cumulatively (that is, due to all sources of emissions and not just the contribution from the project).

Table 1 Air Quality Criteria

Pollutant	Averaging period	Concentration
PM ₁₀	24 hours	50 ug/m ³
	Annual	30 ug/m ³
TSP	Annual	90 ug/m ³
Deposited dust	Annual	4 g/m ² /month*

* *Depositional dust criteria contained in the NSW EPA methods specify a maximum contribution of 2g/m²/month, up to a maximum total depositional dust level of 4g/m²/month. This criterion assumes a typical existing load of 2g/m²/month, prior to the start of site operations.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Environmental Monitoring Plan.

Meteorology

SoC 3.3, 10.4 and 15.3 requires Holcim monitor local meteorological conditions at the site. To comply with the SoC the following parameters must be monitored:

- Daily air temperature
- Solar radiation
- Daylight hours
- Daily rainfall
- Daily evaporation
- Continuous wind speed and direction

4. Monitoring results

Air Quality

PM₁₀ / TSP

There were no measured exceedances of the PM₁₀ 24-hour criteria during the April 2016 monitoring period.

Table 2 HVAS Unit 1 (BSC) April 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
1/04/2016	7.5	50	18.8	NA
7/04/2016	5.5	50	13.8	NA
13/04/2016	2.6	50	6.5	NA
19/04/2016	2.0	50	5.0	NA
25/04/2016	1.8	50	4.5	NA
Annual average (to date)	12.8		32.0	

Table 3 HVAS Unit 2 (Site office) April 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
1/04/2016	26.8	50	67.0	NA
7/04/2016	26.8	50	67.0	NA
13/04/2016	23.6	50	59.0	NA
19/04/2016	18.6	50	46.5	NA
25/04/2016	12.2	50	30.5	NA
Annual average (to date)	23.8		59.6	

Depositional Dust

The monthly dust deposition volume was above the annual criteria during April 2016 at DDG3; reported as 5.1 g/m²/month. This does not constitute an exceedance of the criteria because the annual average, 1.7 g/m²/month remains below the annual average goal of 4 g/m²/month.

Table 4 Depositional Dust Gauge Results April 2016

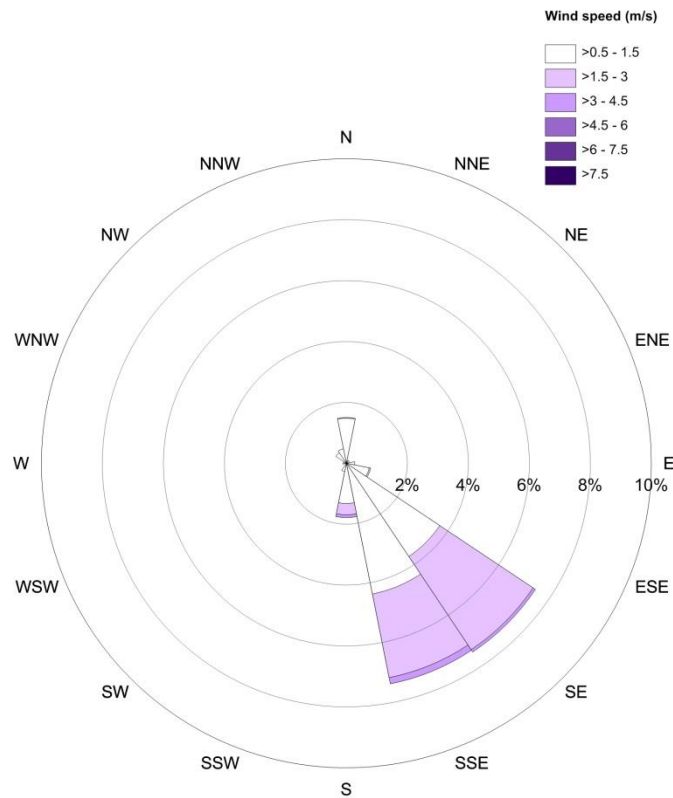
Location	Total Insoluble Matter (g/m ² /month)			Goal (annual average)
	1	2	3	
31/03/2016 to 2/5/2016	2.4	2.9	5.1	NA
Annual average	1.8	3.5	1.7	4 g/m ² /month

Local Meteorology

A wind rose showing the proportion of direction and strength of winds throughout the reporting period is below. A complete data set, including, humidity, temperature and rainfall is provided separately.

The prevailing winds during the monitoring period were predominately from the south-east and south-south-east. Calm conditions occurred often during the monitoring period. Under these conditions, dust impacts are more likely to affect receivers to the north west of the site. This area does not contain any residential properties.

Figure 2: April 2016 Wind rose, Blacktown International Sports Centre meteorological station



A.2 May 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
MONTHLY ENVIRONMENTAL MONITORING REPORT**

Aspect Air Quality and Meteorology

Date May 2016

SUMMARY

Monitoring period 1 – 31 May 2016

Parameters monitored in period Dust (PM₁₀) / TSP^a
 Depositional Dust
 Local Meteorology

^a Derived from PM₁₀

Exceedance summary

- There was one measured exceedance of the PM₁₀ criteria on 7 May 2016 at the site office monitor (97.9 µg/m³). An average concentration equivalent to the criteria (50 µg/m³) was measured on at the site office on 19 May 2016.
- The monthly dust deposition volume was above the annual criteria value during May 2016 at DDG2 and DDG3. This does not constitute an exceedance of the criteria because the assessment is based on an annual average, which remains below the criteria at all dust deposition monitoring locations.

1. Monitoring Locations

The monitoring locations at the Rooty Hill Regional Distribution Centre (RDC) for air quality and meteorology are shown in **Figure 1** and consist of:

- Dust monitoring (PM₁₀): Blacktown International Sportspark (formally Olympic Park)
Holcim Site office
- Dust monitoring (Depositional): Locations 1 to 3
- Meteorology: Blacktown International Sportspark (formally Olympic Park)

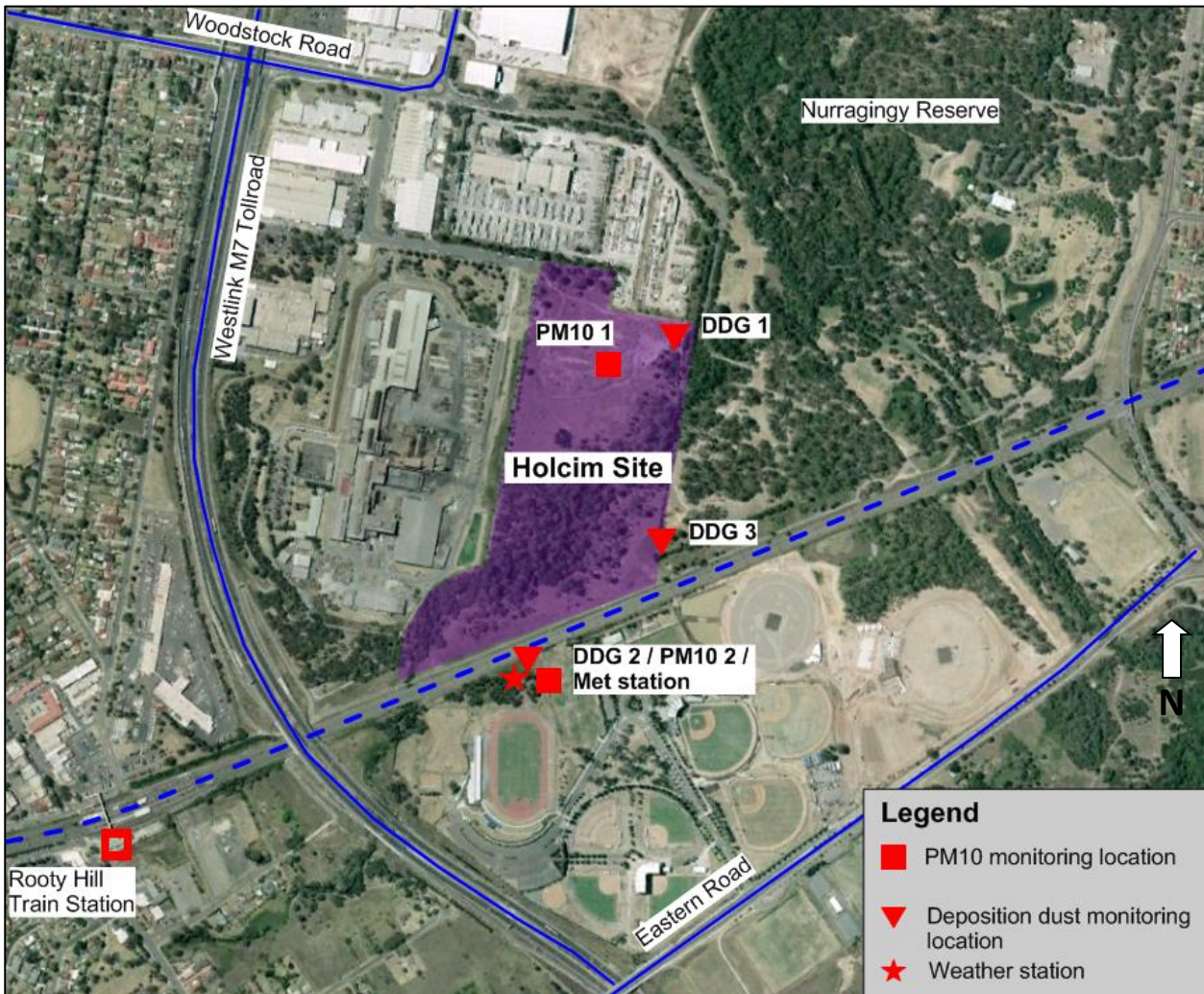


Figure 1 Monitoring locations

2. Monitoring Methodology

Dust

Air quality (dust) monitoring was undertaken using two Ecotech High Volume Air Samplers (HVAS) with Particulate Matter - 10µm (PM₁₀) sampling heads. The HVASs were operated on one-day-in-six in accordance with *AS/NZS 3580.9.6:2003 Methods for sampling and analysis of ambient air, Method 9.6: Determination of suspended particulate matter (PM₁₀) – High volume sampler with size selective inlet - Gravimetric method.*

Calibration of the unit is checked on a monthly basis, in accordance with operating instructions for the unit and *AS/NZS 3580.9.6:2003.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Monitoring Plan.

Depositional dust was monitored in accordance with *AS/NZS 3580.10.1:2003 Methods for sampling and analysis of ambient air Method 10.1: Determination of particulate matter – Deposited matter – Gravimetric method*.

Local Meteorology

Meteorological conditions were monitored using a Davis Vantage Pro2 Plus monitoring unit. This unit was positioned in accordance with *AS2923-1987 Ambient air – Guide for measurement of horizontal wind for air quality applications*.

The Davis Vantage Pro2 plus meteorological station does not satisfy the accuracy requirements of AS 3580.14-2011 for wind speed and direction measurements. However, no monitoring standards are specified in the Project Approval and the accuracy of the proposed unit is considered sufficient for the purposes of impact management.

The integrity of the meteorological monitoring station is checked every six days.

3. Guidelines

Air Quality

Air quality (dust) criteria within the Project Conditions of Approval, specifically Statement of Commitment (SoC) 4.1 and the Operational Environmental Management Plan (OEMP) mirror those in the NSW EPA document *Approved methods for the modelling and assessment of air pollutants in New South Wales* (DEC 2005). The air quality assessment criteria are outlined in **Table 1**, which apply cumulatively (that is, due to all sources of emissions and not just the contribution from the project).

Table 1 Air Quality Criteria

Pollutant	Averaging period	Concentration
PM ₁₀	24 hours	50 µg/m ³
	Annual	30 µg/m ³
TSP	Annual	90 µg/m ³
Deposited dust	Annual	4 g/m ² /month*

* *Depositional dust criteria contained in the NSW EPA methods specify a maximum contribution of 2g/m²/month, up to a maximum total depositional dust level of 4g/m²/month. This criterion assumes a typical existing load of 2g/m²/month, prior to the start of site operations.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Environmental Monitoring Plan.

Meteorology

SoC 3.3, 10.4 and 15.3 requires Holcim monitor local meteorological conditions at the site. To comply with the SoC the following parameters must be monitored:

- Daily air temperature
- Solar radiation
- Daylight hours
- Daily rainfall
- Daily evaporation
- Continuous wind speed and direction

4. Monitoring results

Air Quality

PM₁₀ / TSP

There was one measured exceedance of the PM₁₀ 24-hour criteria during the May 2016 monitoring period. It occurred on 7 May 2016 at the site office high volume sampler. On the 19 May 2016, PM₁₀ at the site office recorded a 24-hour average of 50.0 µg/m³ which is equivalent to the limit of air quality criteria.

Table 2 HVAS Unit 1 (BSC) May 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
1/05/2016	3.8	50	67.0	NA
7/05/2016	14.5	50	67.0	NA
13/05/2016	3.6	50	59.0	NA
19/05/2016	8.6	50	46.5	NA
25/05/2016	8.2	50	30.5	NA
31/05/2016	2.7	50	9.5	NA
Annual average (to date)	21.6		54.1	

Table 3 HVAS Unit 2 (Site office) May 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
1/05/2016	10.4	50	26.0	NA
7/05/2016	97.9	50	244.8	NA
13/05/2016	23.8	50	59.5	NA
19/05/2016	50.0	50	125.0	NA
25/05/2016	48.0	50	120.0	NA
31/05/2016	20.5	50	51.3	NA
Annual average (to date)	17.0		42.6	

Depositional Dust

The monthly dust deposition volume was above the annual criteria during May 2016 at DDG2 and DDG3; reported as 4.8 g/m²/month and 4.4 g/m²/month respectively. These values do not constitute an exceedance of the criteria because the annual average at both monitoring locations remains below the annual average goal of 4 g/m²/month.

Table 4 Depositional Dust Gauge Results May 2016

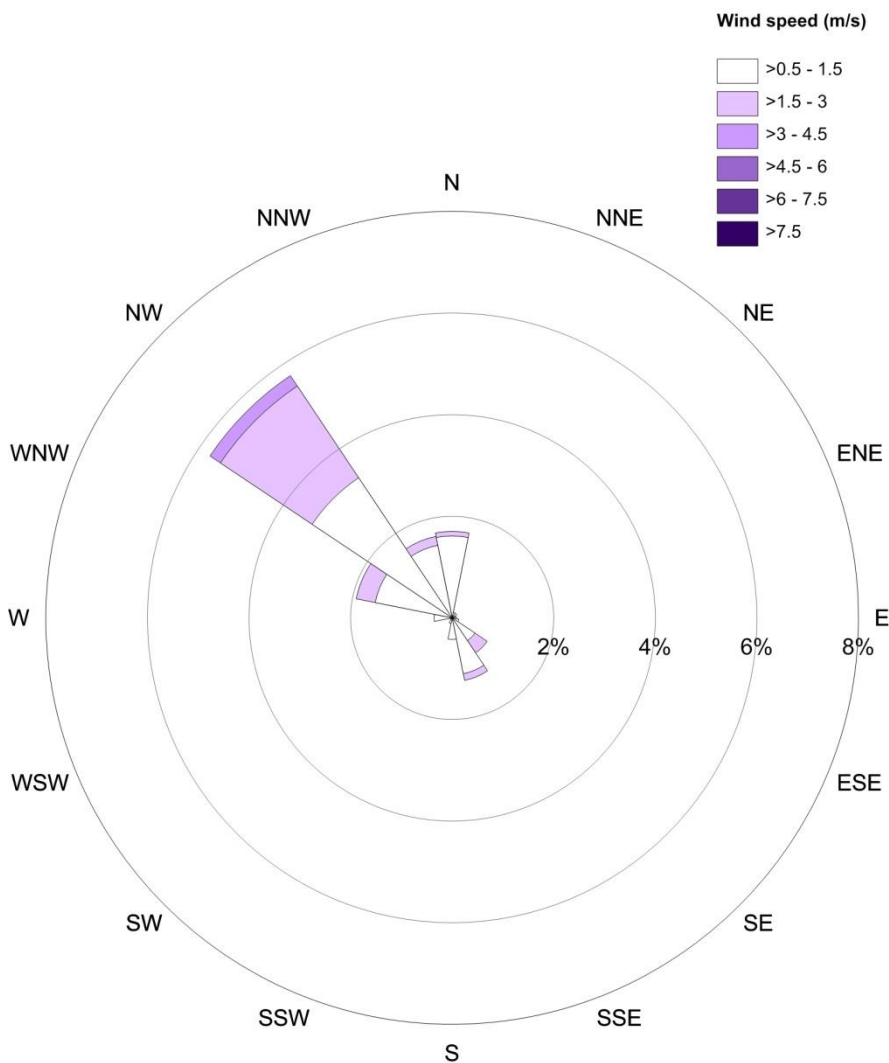
Location	Total Insoluble Matter (g/m ² /month)			Goal (annual average)
	1	2	3	
2/5/2016 to 2/6/2016	2.1	4.8	4.4	NA
Annual average	1.9	3.6	2.0	4 g/m ² /month

Local Meteorology

A wind rose showing the proportion of direction and strength of winds throughout the reporting period is below. A complete data set, including, humidity, temperature and rainfall is provided separately.

The prevailing winds during the monitoring period were predominately from the north-west. Calm conditions occurred often during the monitoring period. Under these conditions, dust impacts are more likely to affect receivers to the south-east of the site.

Figure 2: May 2016 Wind rose, Blacktown International Sports Centre meteorological station



A.3 June 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
MONTHLY ENVIRONMENTAL MONITORING REPORT**

Aspect Air Quality and Meteorology

Date June 2016

SUMMARY

Monitoring period 1 – 30 June 2016

Parameters monitored in period Dust (PM₁₀) / TSP^a
 Depositional Dust
 Local Meteorology

^a Derived from PM₁₀

Exceedance summary

- There were no measured exceedances of the PM₁₀ criteria during June 2016.
- There were no measured exceedances of the dust deposition criteria during June 2016.

1. Monitoring Locations

The monitoring locations at the Rooty Hill Regional Distribution Centre (RDC) for air quality and meteorology are shown in **Figure 1** and consist of:

- Dust monitoring (PM₁₀): Blacktown International Sportspark (formally Olympic Park)
Holcim Site office
- Dust monitoring (Depositional): Locations 1 to 3
- Meteorology: Blacktown International Sportspark (formally Olympic Park)

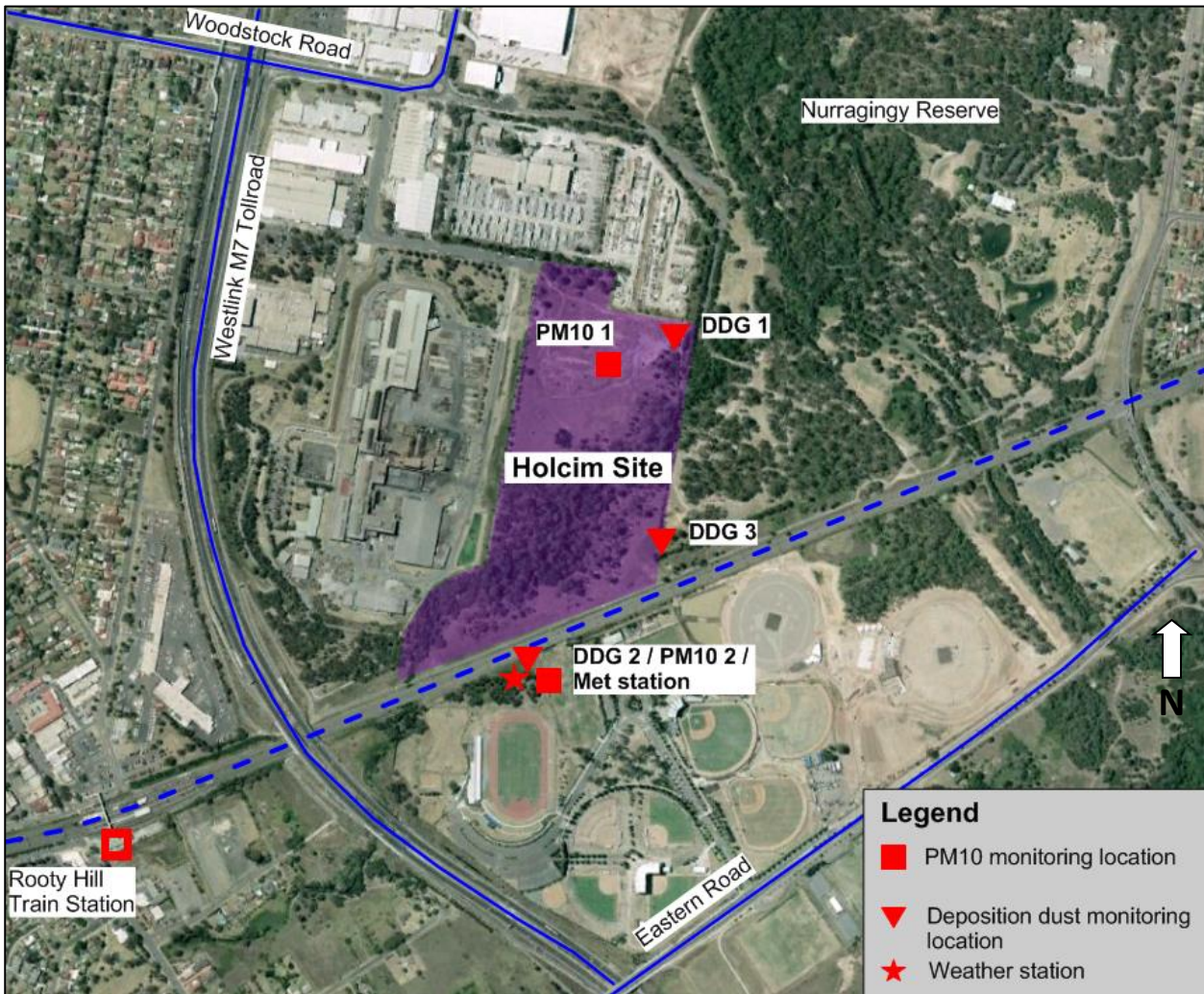


Figure 1 Monitoring locations

2. Monitoring Methodology

Dust

Air quality (dust) monitoring was undertaken using two Ecotech High Volume Air Samplers (HVAS) with Particulate Matter - 10µm (PM₁₀) sampling heads. The HVASs were operated on one-day-in-six in accordance with *AS/NZS 3580.9.6:2003 Methods for sampling and analysis of ambient air, Method 9.6: Determination of suspended particulate matter (PM₁₀) – High volume sampler with size selective inlet - Gravimetric method.*

Calibration of the unit is checked on a monthly basis, in accordance with operating instructions for the unit and *AS/NZS 3580.9.6:2003.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Monitoring Plan.

Depositional dust was monitored in accordance with *AS/NZS 3580.10.1:2003 Methods for sampling and analysis of ambient air Method 10.1: Determination of particulate matter – Deposited matter – Gravimetric method*.

Local Meteorology

Meteorological conditions were monitored using a Davis Vantage Pro2 Plus monitoring unit. This unit was positioned in accordance with *AS2923-1987 Ambient air – Guide for measurement of horizontal wind for air quality applications*.

The Davis Vantage Pro2 plus meteorological station does not satisfy the accuracy requirements of AS 3580.14-2011 for wind speed and direction measurements. However, no monitoring standards are specified in the Project Approval and the accuracy of the proposed unit is considered sufficient for the purposes of impact management.

The integrity of the meteorological monitoring station is checked every six days.

3. Guidelines

Air Quality

Air quality (dust) criteria within the Project Conditions of Approval, specifically Statement of Commitment (SoC) 4.1 and the Operational Environmental Management Plan (OEMP) mirror those in the NSW EPA document *Approved methods for the modelling and assessment of air pollutants in New South Wales* (DEC 2005). The air quality assessment criteria are outlined in **Table 1**, which apply cumulatively (that is, due to all sources of emissions and not just the contribution from the project).

Table 1 Air Quality Criteria

Pollutant	Averaging period	Concentration
PM ₁₀	24 hours	50 µg/m ³
	Annual	30 µg/m ³
TSP	Annual	90 µg/m ³
Deposited dust	Annual	4 g/m ² /month*

* *Depositional dust criteria contained in the NSW EPA methods specify a maximum contribution of 2g/m²/month, up to a maximum total depositional dust level of 4g/m²/month. This criterion assumes a typical existing load of 2g/m²/month, prior to the start of site operations.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Environmental Monitoring Plan.

Meteorology

SoC 3.3, 10.4 and 15.3 requires Holcim monitor local meteorological conditions at the site. To comply with the SoC the following parameters must be monitored:

- Daily air temperature
- Solar radiation
- Daylight hours
- Daily rainfall
- Daily evaporation
- Continuous wind speed and direction

4. Monitoring results

Air Quality

PM_{10} / TSP

There were no measured exceedances of the PM_{10} 24-hour criteria during the June 2016 monitoring period at either monitoring location.

Table 2 HVAS Unit 1 (BSC) June 2016 PM_{10} and TSP Results

Date	PM_{10} ($\mu\text{g}/\text{m}^3$)		TSP	
	Measured result	Criteria	Calculated result ($PM_{10} \times 2.5$)	Criteria
06/06/2016	4.0	50	10.0	NA
12/06/2016	2.5	50	6.3	NA
18/06/2016	<0.1	50	0.3	NA
24/06/2016	2.1	50	5.3	NA
30/06/2016	4.3	50	10.8	NA
Annual average (to date)	11.2		38.7	

Table 3 HVAS Unit 2 (Site office) June 2016 PM_{10} and TSP Results

Date	PM_{10} ($\mu\text{g}/\text{m}^3$)		TSP	
	Measured result	Criteria	Calculated result ($PM_{10} \times 2.5$)	Criteria
06/06/2016	10.5	50	26.3	NA
12/06/2016	13.6	50	34.0	NA
18/06/2016	14.6	50	36.5	NA
24/06/2016	16.7	50	41.8	NA
30/06/2016	29.0	50	72.5	NA
Annual average (to date)	25.3		52.9	

Depositional Dust

No exceedances of the monthly dust deposition volume were recorded during June 2016. The annual average dust deposition volume is below the annual average goal of $4 \text{ g}/\text{m}^2/\text{month}$ at all monitoring locations.

Table 4 Depositional Dust Gauge Results June 2016

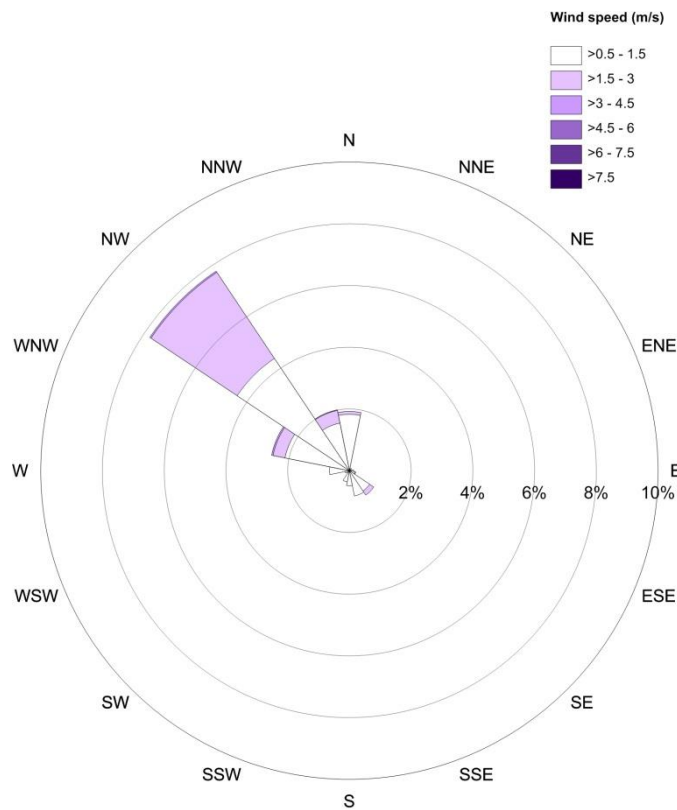
Location	Total Insoluble Matter ($\text{g}/\text{m}^2/\text{month}$)			Goal (annual average)
	1	2	3	
2/6/2016 to 1/7/2016	2.4	2.7	1	NA
Annual average	1.9	3.5	1.9	$4 \text{ g}/\text{m}^2/\text{month}$

Local Meteorology

A wind rose showing the proportion of direction and strength of winds throughout the reporting period is below. A complete data set, including, humidity, temperature and rainfall is provided separately.

The prevailing winds during the monitoring period were predominately from the north-west. Calm conditions occurred often during the monitoring period. Under these conditions, dust impacts are more likely to affect receivers to the south-east of the site.

Figure 2: June 2016 Wind rose, Blacktown International Sports Centre meteorological station



Appendix B. Quarterly noise monitoring report – Q2 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
MONTHLY ENVIRONMENTAL MONITORING REPORT**

Aspect	Operational Noise
Date	10 May 2016

SUMMARY

Monitoring period	1 April to 30 June 2016 (Q2)
Parameters monitored in period	Operational noise
Exceedance summary	No attributable exceedances of the operational noise criteria were recorded in Q2 2016.
Action required	None

1. Monitoring Locations

The monitoring locations at the Rooty Hill Regional Distribution Centre (RDC) for operational noise monitoring are shown in **Figure 1** and consist of:

- n Knox Road (Crawford Road)
- n Station Street
- n Blacktown International Sports Centre
- n Nurranginy Reserve

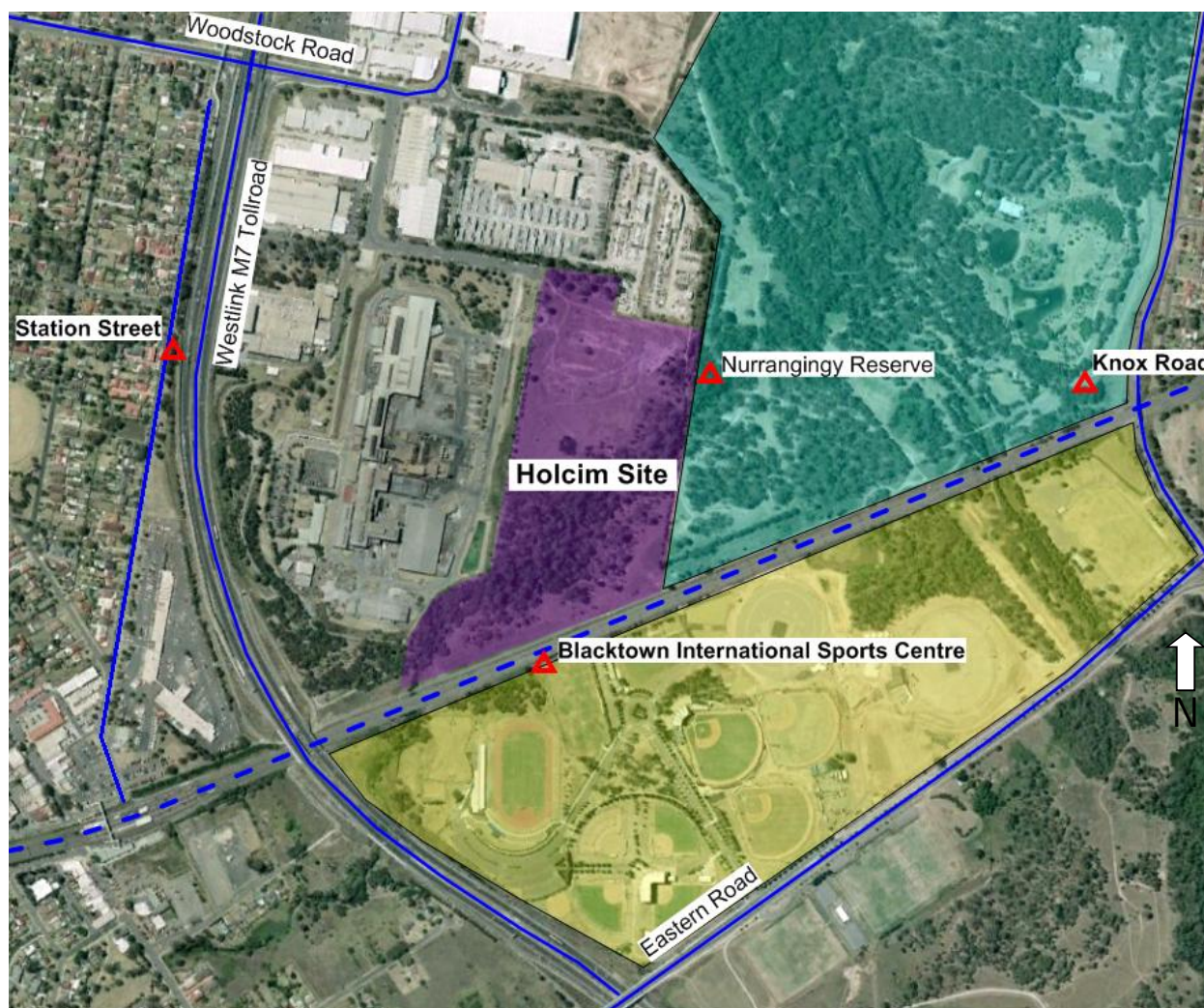


Figure 1 Noise monitoring locations

2. Monitoring Methodology

2.1 Attended noise monitoring

Operational site noise was monitored for 15 minute attended periods during day times when the site was in use. As no evening or night work was proposed for this monitoring period, attended monitoring was not conducted during these periods.

Monitoring was carried out in accordance with the requirements set out in the EPA (2000) *Industrial Noise Policy* and *AS1055 Acoustics: Description and measurement of environmental noise*. Attended monitoring was carried out using a SVAN 958 Type 1 Sound Level Meter by an appropriately qualified personnel. Calibration of the unit was checked before and after each monitoring period, and the drift was below 0.5dB.

2.2 Unattended noise monitoring

In addition to attended noise monitoring, unattended monitoring was conducted for approximately one week. This monitoring was carried out using NGARA Type 1 noise loggers, and recorded 0.1 second L_{Aeq} noise levels in addition to an audio recording for the purposes of noise source identification.

Monitoring locations were selected in accordance with the Operational Noise Management Plan and are representative of all nearest noise sensitive receivers to the Holcim site.

3. Site noise criteria

The noise criteria for each location are outlined in the Operational Noise Management Plan (OEMP) for the site, and are based on the Ministers Conditions of Approval (MCoA 5.5a). These criteria are provided in **Table 1**.

Table 1 Operational noise criteria

Location	Morning shoulder 6am-7am Monday to Saturday and 6am-8am Sundays and public holidays	Day 7am-6pm Monday to Saturday and 8am-6pm Sundays and public holidays	Evening 6pm-10pm Monday to Sunday	Night 10pm-7am Monday to Saturday and 10pm-8am Sunday	
	L _{Aeq} (15 minute) dB(A)	L _{Aeq} 15 minute, dB(A)	L _{Aeq} 15 minute, dB(A)	L _{Aeq} 15 minute, dB(A)	LA1 1 minute, dB(A)
Any residences in Station Street	39	44	44	39	53
Any residences in Crawford Road (Knox Road)	40	40	39	39	53
Any residences in Mavis Street	35	35	35	35	53
Nurragingy Reserve	When Reserve is in use – L _{Aeq} 50 dB(A)				
Colebee Centre	When the Centre is in use – L _{Aeq} 50 dB(A)				
Blacktown Olympic Park (Active recreation areas)	When active recreational areas of the Park are in use – L _{Aeq} 55 dB(A)				

4. Noise monitoring results

During the week of both attended and unattended noise monitoring, the following activities were underway on the Holcim site:

1. Daytime Loading of trucks, general site activities
2. Evening 04/04/2016 Train departing 19:00
06/04/2016 Train departing 21:10
3. Night time No works undertaken

4.1 Attended noise monitoring results

The results of attended construction noise monitoring are presented in **Table 6**.

Night time attended monitoring was carried out during the unloading of an aggregate delivery train. At this time site conveyors were in operation and wagon vibrators were in use.

n Table 6 Attended Noise Monitoring Results Q2 2016

Location	Start	Holcim contribution L _{Aeq} (15 minute) dB(A)	L _{Aeq}	L _{A90}	Criteria L _{Aeq} (15 minute) dB(A)	Notes
Daytime - Wednesday 6 April 2016						
Knox Road	9:45	Inaudible	53.6	46.9	40	Knox Road constant (45-55), birds
Blacktown International Sports Centre	11:15	<40	65.3	54.4	55	Holcim – occasional reversing beepers Birds, distant car alarm / sirens, sports carnival (speakers, starters gun) trains (65-70), M7 constant (45-55), birds, cicadas
Station Street	10:15	Inaudible	53.6	59.6	44	M7 - constant (50-55), birds, local traffic (55-60)
Nurranginy Reserve	10:45	40 - 48	48.0	51.9	50	Local traffic (occasional 55-60), birds, distant traffic Holcim - Squawkers (45-52), dumping aggregate material (brief - 50), loaders (40-45)
Evening – Wednesday 6 April 2016						
Knox Road	19:15	Inaudible	52.5	45.6	39	Knox Road (40-50), distant traffic, crickets, occasional train pass-bys
Blacktown International Sports Centre	19:45	55 - 60	60.6	54.0	-	Centre not in use (Holcim locomotive approximately 70dB(A) with peaks to 80dB(A))
Station Street	20:15	Inaudible	54.9	51.1	44	M7 - constant (50-55), occasional heavy vehicle peaks, crickets
Nurranginy Reserve	20:45	45	51.8	48.6	-	Reserve not in use (Train pass-bys, reversing beepers, continuous industrial (conveyor?) noise (45-50))
Night						
Knox Road	-	No work	-	-	-	No work on site during evening hours
Blacktown International Sports Centre	-	No work	-	-	-	Centre not in use
Station Street	-	No work	-	-	-	No work on site during evening hours
Nurranginy Reserve	-	No work	-	-	-	Reserve not in use

4.2 Unattended noise monitoring results

Detailed monitoring results are presented in **Appendix A**, and a discussion of the results is presented below in **Table 7**.

Representative audio recordings of periods of exceedances have been examined in order to identify the noise source.

n **Table 7 Unattended Noise Monitoring Results Q2 2016**

	Criteria L _{Aeq} (15 minute)	Monitored noise level L _{Aeq} (period)	Estimated Holcim contribution L _{Aeq} dB(A)	Notes
Knox Road				
Day	40	53.6	Inaudible	Knox Rd traffic (40-55), birds, trains, local traffic
Evening	39	50.7	Inaudible	Knox Rd traffic (45-50), birds, trains
Night	39	52.6	Inaudible	Distant traffic - possibly M7 (40), trains, occasional traffic Knox Rd (peaks)
Station Street				
Day	44	55.0	Inaudible	M7 - especially heavy vehicles (50-60), local traffic
Evening	39	50.4	Inaudible	M7 - especially heavy vehicles (50-60), local traffic , crickets
Night	39	57.6	Inaudible	M7 - especially heavy vehicles (45-55), crickets
Blacktown International Sports Centre				
Day	55	61.0	<40	M7 (45-50), trains (65-70), sports carnivals (BISC), birds, HVAS (70 7/4 & 13/4) Occasional reversing beepers - possibly Holcim or BISC (50)
Evening	55	60.7	Generally inaudible	Generally inaudible During rail unloading: Holcim locomotive approximately 70dB(A) with peaks to 80dB(A)
Night	-	58.7	Inaudible	M7 (40-45), trains (65-70), crickets, train pass-bys
Nurrangyngy Reserve				
Day	50	49.5	<40	M7 (46), crickets, birds Holcim - Squawkers (45-52), dumping aggregate material (brief - 50), loaders (40-45)
Evening	-	48.0	Generally inaudible	Distant M7 (40), crickets, trains During rail unloading: reversing beepers, continuous industrial (conveyor?) noise (45-50)
Night	-	51.3	Inaudible	Distant M7 (40), crickets, animals in undergrowth, trains

5. Noise monitoring discussion

No attributable exceedences of construction noise management levels were observed during Q2 2016 monitoring.

Noise contributions from the Holcim site were inaudible at all times at both Station Street and Knox Road / Crawford Road.

Noise contributions from the Holcim site were below the operational site criteria during all observed time periods at both BISC and Nurranginy Reserve. It is noted that noise criteria at the BISC are only applicable when the site is in use. Where the site is in use during an evening / night time rail delivery, marginal exceedences may occur at this location.

6. Recommendations

Total noise levels at all sites were consistently higher than site noise criteria during all time periods. This was apparent even when the site was not audible or in operation. This is clearly demonstrated during evening and night time operations when the site was not in use.

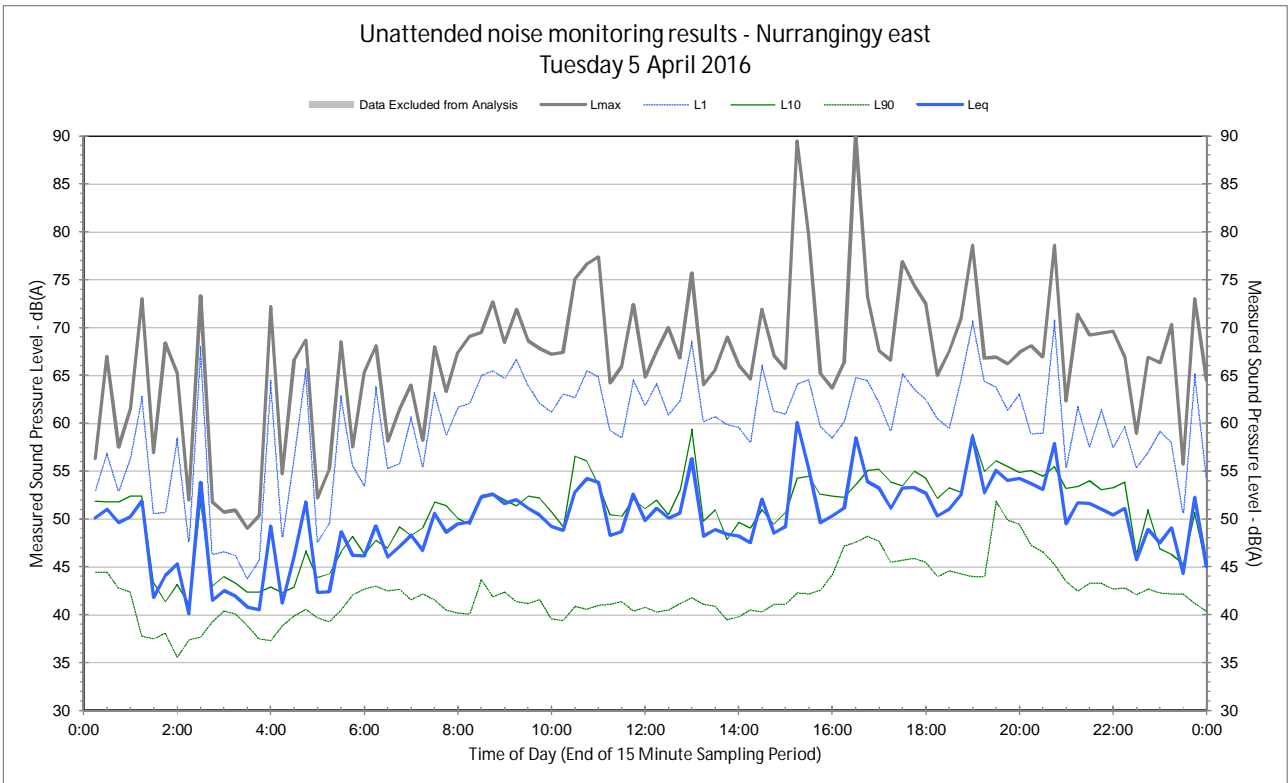
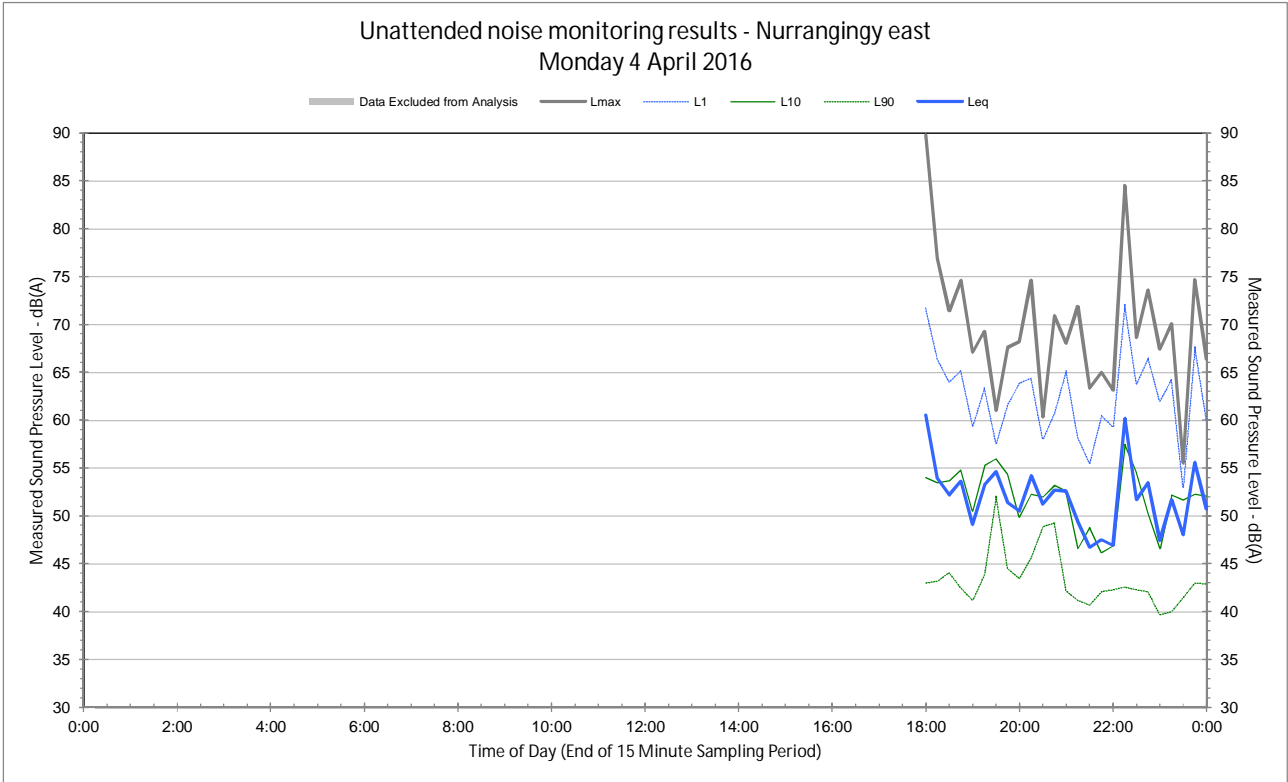
Previous monitoring undertaken during the (approximate) 3 year site construction period reinforce the conclusion that overall background noise in the vicinity of the project site has increased substantially since project criteria were set. Additionally at no time has site noise been audible at either Knox Road or Station Street.

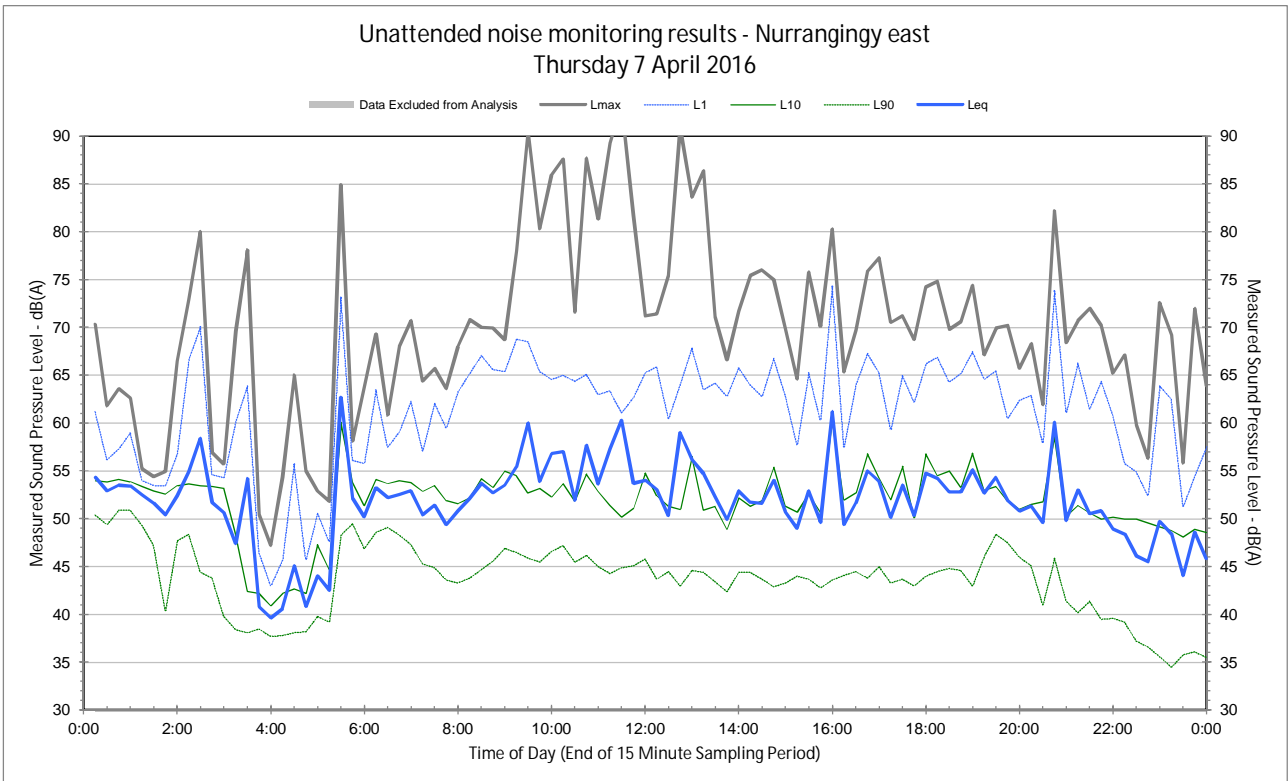
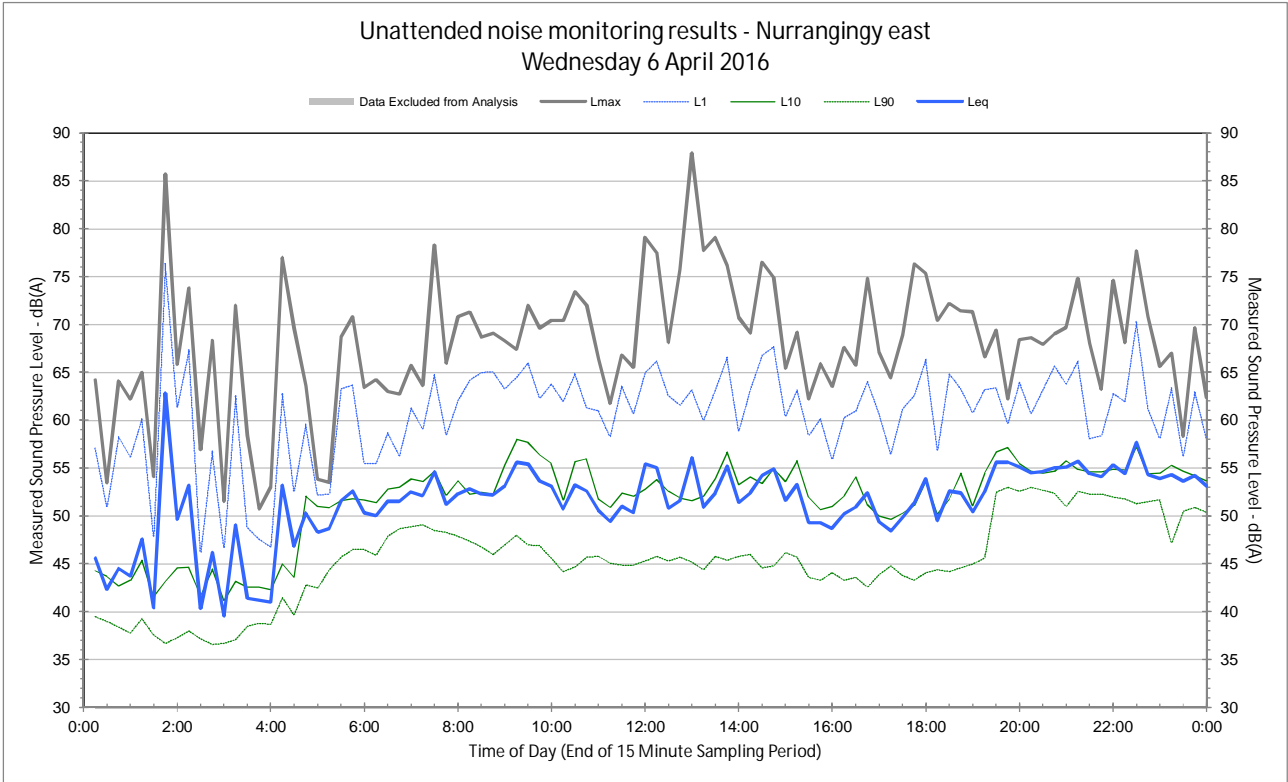
On this basis it may be prudent to investigate the modification of project noise criteria contained within the site's developmental consent.

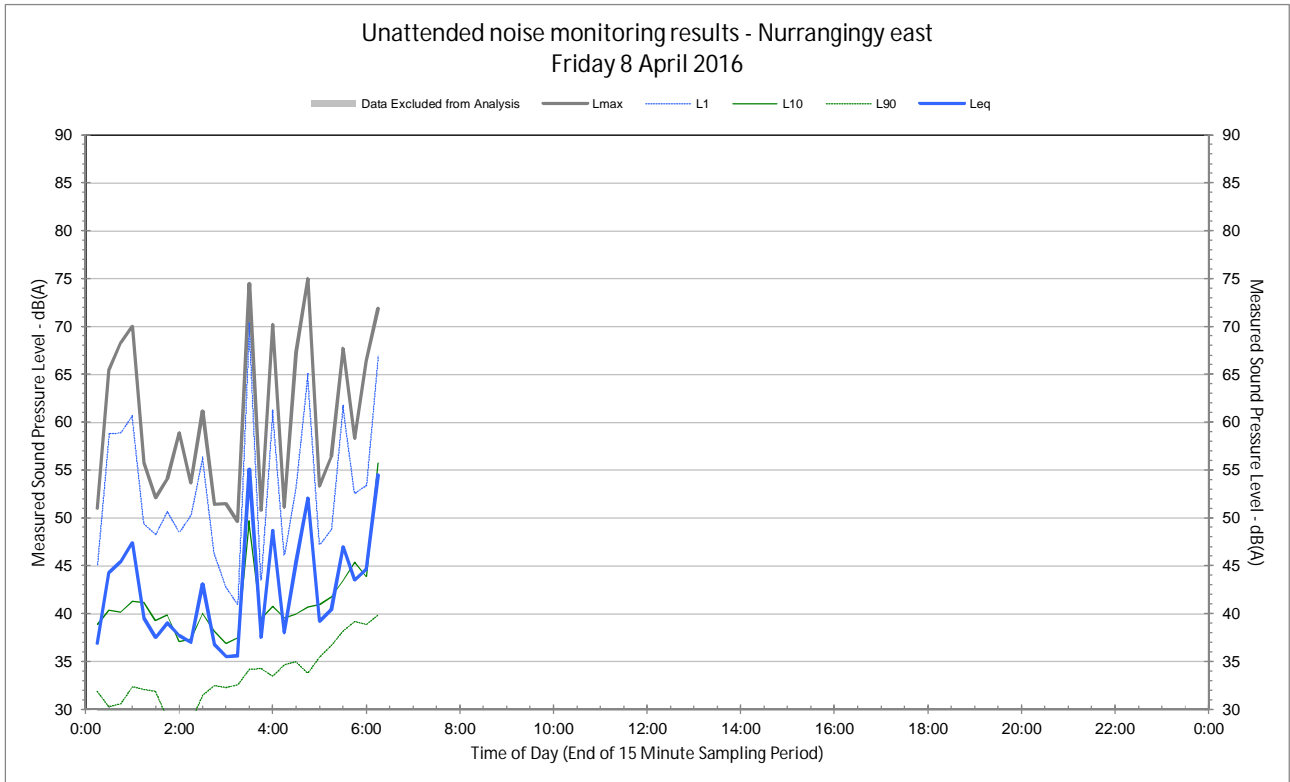
Appendix A - Detailed unattended noise monitoring results

A.1 Knox Road

Unattended noise monitoring results - Nurranginy east											
6:00:00 PM to 10:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Monday 4 April 2016	68.1	61.3	55.2	52.5	47.7	43.4	42.4	41.1	39.6	51.8	51.9
Tuesday 5 April 2016	67.8	61.5	55.4	54.3	48.6	44.2	43.3	42.2	40.9	52.6	53.8
Wednesday 6 April 2016	69.2	63.2	56.1	54.7	53.6	52.3	51.4	48.5	43.5	54.6	54.2
Thursday 7 April 2016	70.1	64.4	54.6	51.9	47.9	44.6	43.9	42.2	38.5	52.3	53.5
Median	68.7	62.3	55.3	53.4	48.2	44.4	43.6	42.2	40.2	52.5	53.6
10:00:00 PM to 7:00:00 AM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Monday 4 April 2016	64.6	56.1	50.1	46.9	43.1	40.5	39.9	39.1	37.8	47.7	50.3
Tuesday 5 April 2016	64.2	56.9	50.8	45.2	42.7	40.8	40.2	39.1	37.9	48.5	51.1
Wednesday 6 April 2016	63.7	57.4	54.3	53.7	52.0	48.0	46.1	42.5	40.3	52.7	53.7
Thursday 7 April 2016	59.8	53.4	45.3	41.0	36.5	34.3	33.6	32.6	31.2	44.3	47.0
Median	63.9	56.5	50.4	46.0	42.9	40.6	40.0	39.1	37.8	48.1	50.7
7:00:00 AM to 6:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Monday 4 April 2016	67.9	62.3	55.2	52.1	45.3	41.2	40.4	39.3	38.1	50.9	52.4
Tuesday 5 April 2016	69.4	62.6	55.1	52.7	48.0	45.4	44.8	43.9	43.0	52.3	52.6
Wednesday 6 April 2016	73.0	64.3	55.6	52.4	47.1	44.4	43.8	42.9	42.0	53.3	54.7
Thursday 7 April 2016											
Median	69.4	62.6	55.2	52.4	47.1	44.4	43.8	42.9	42.0	52.3	52.6

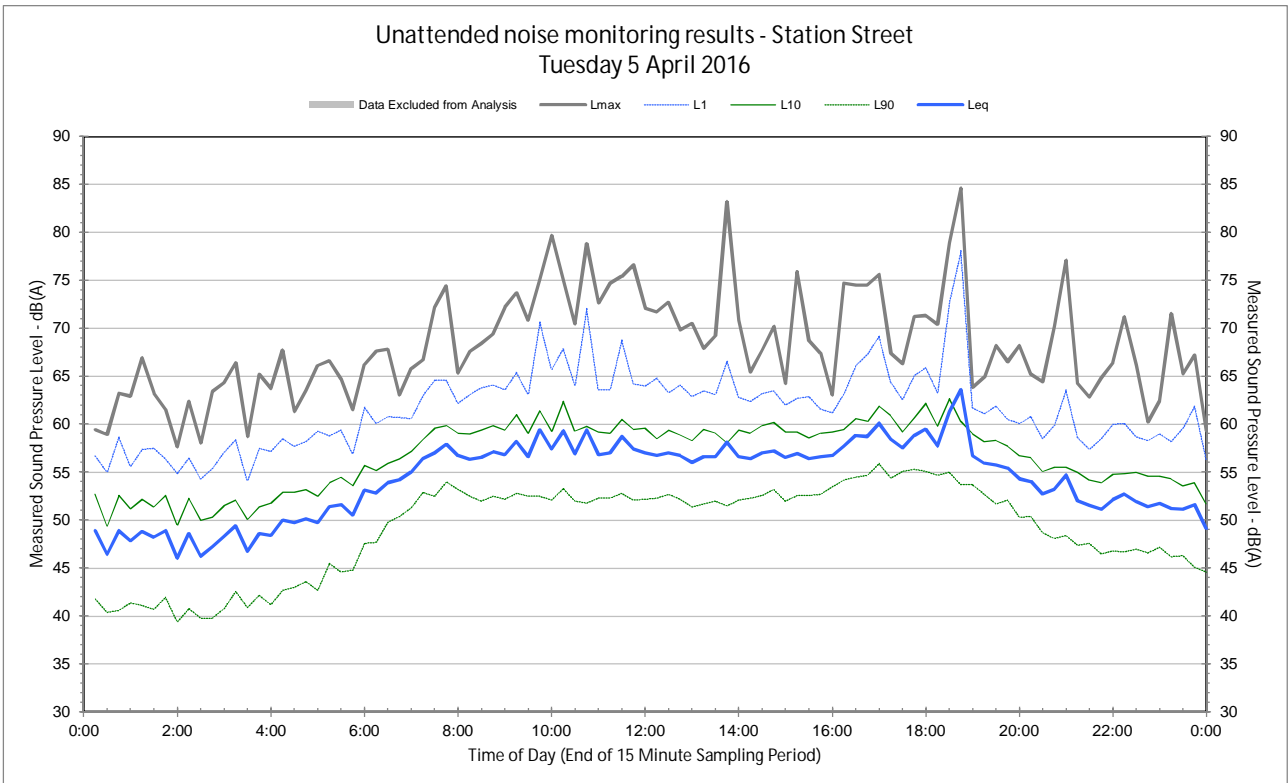
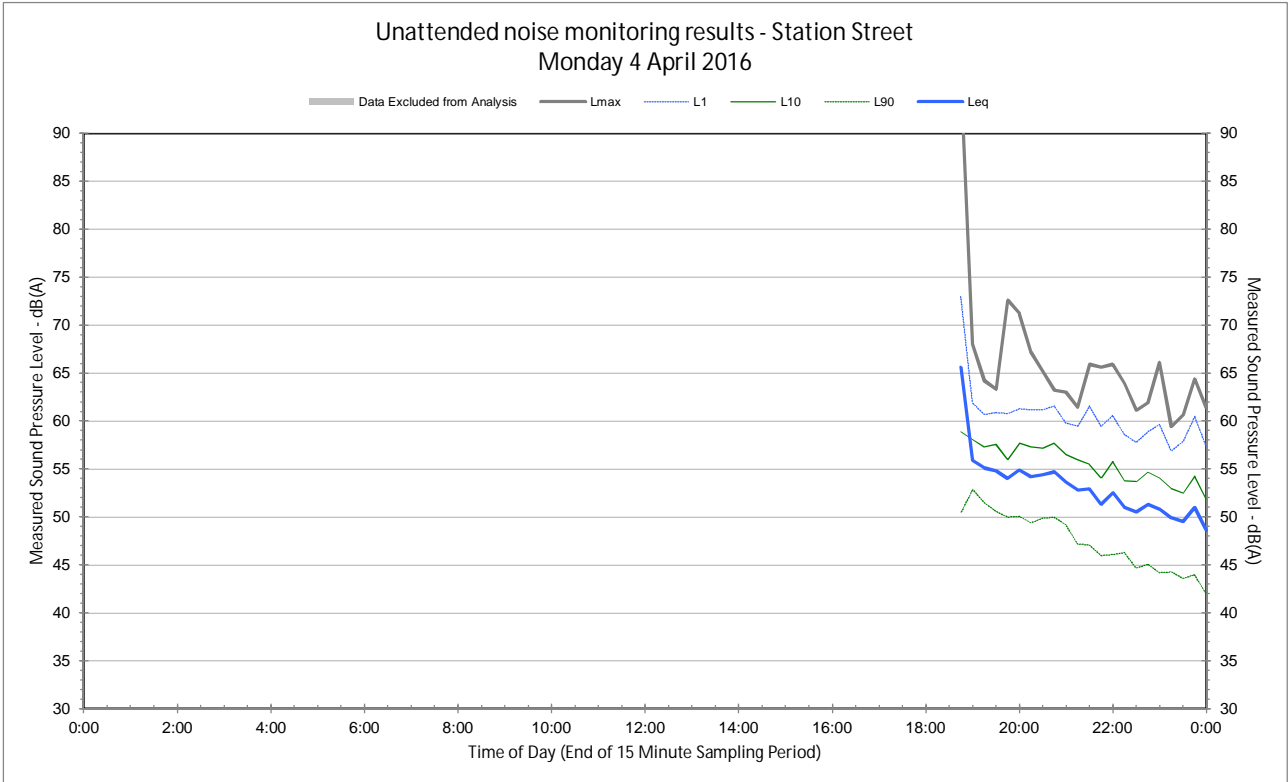


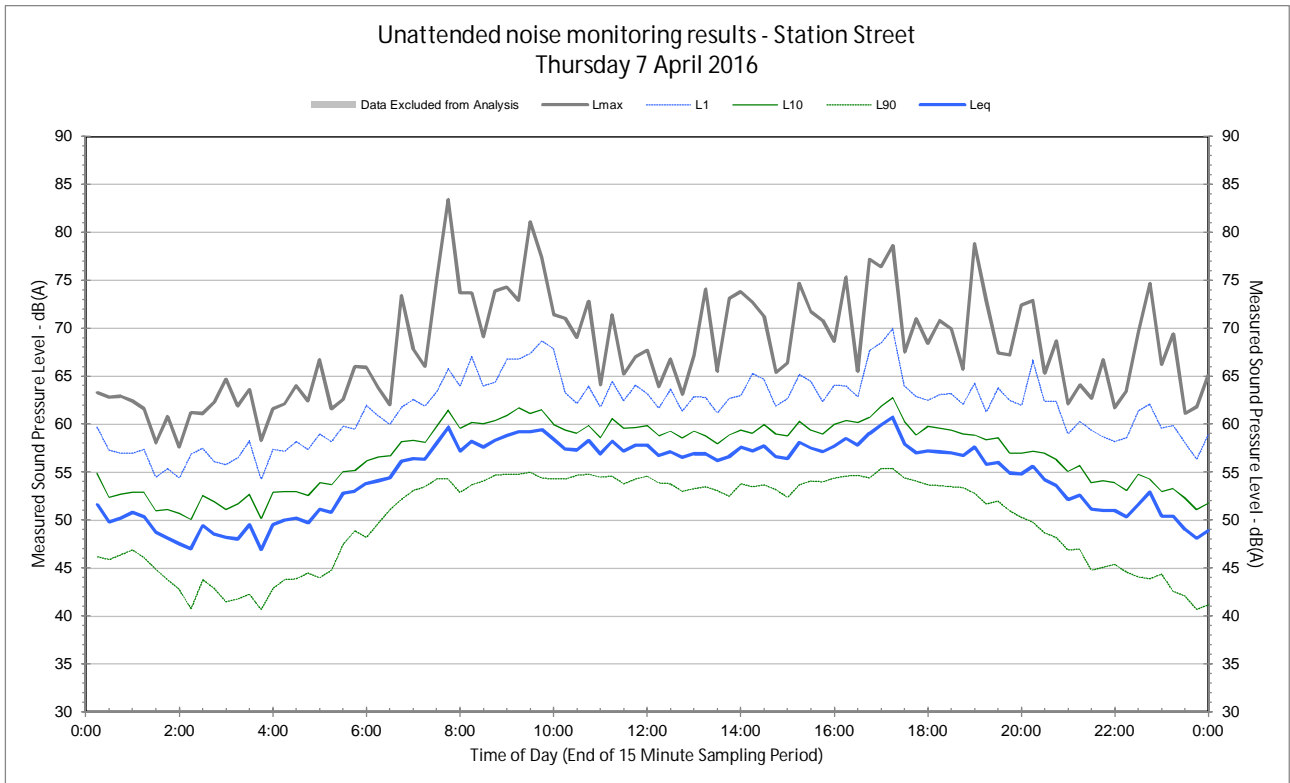
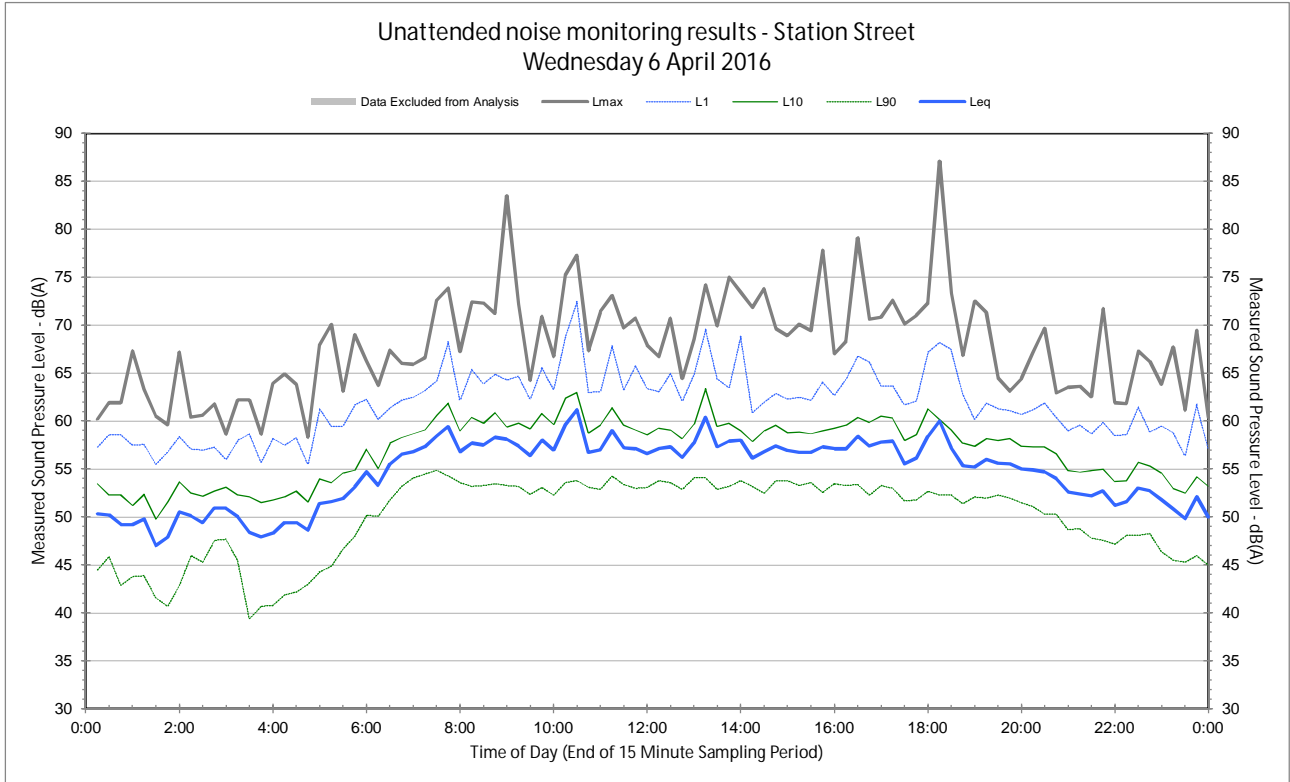


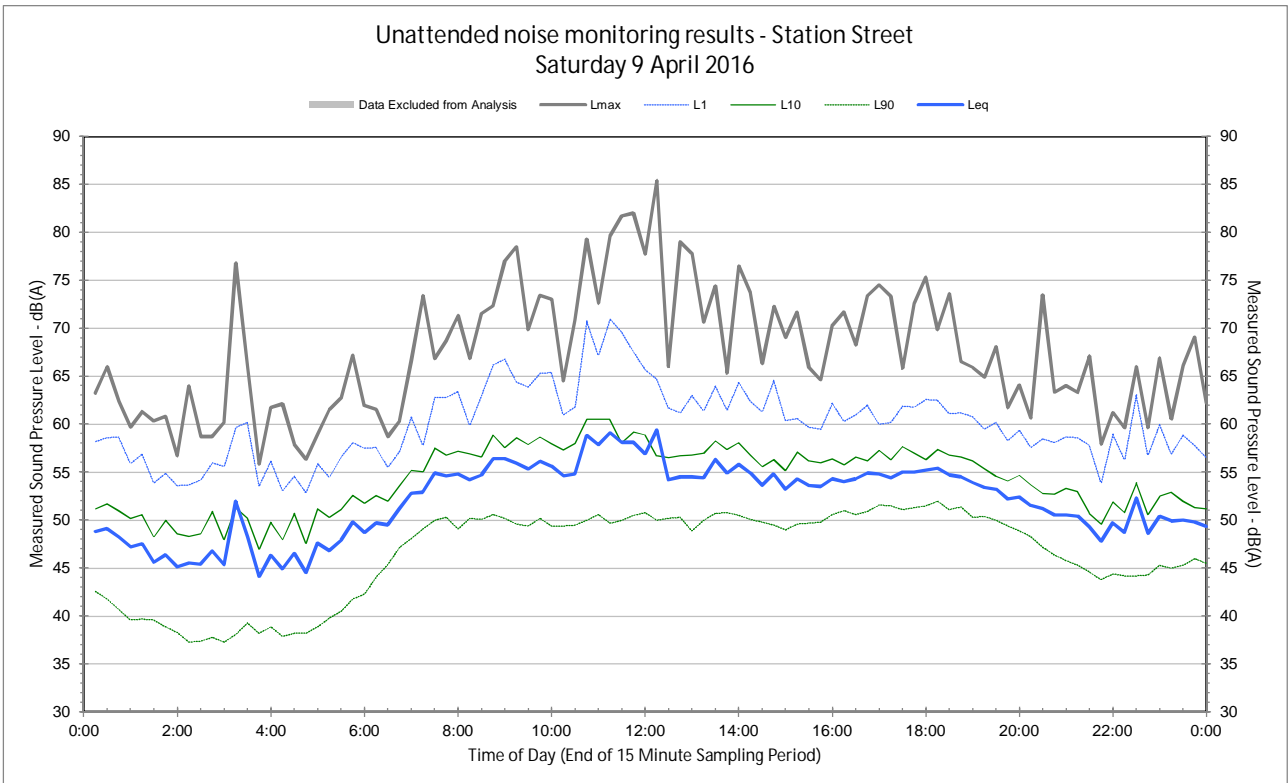
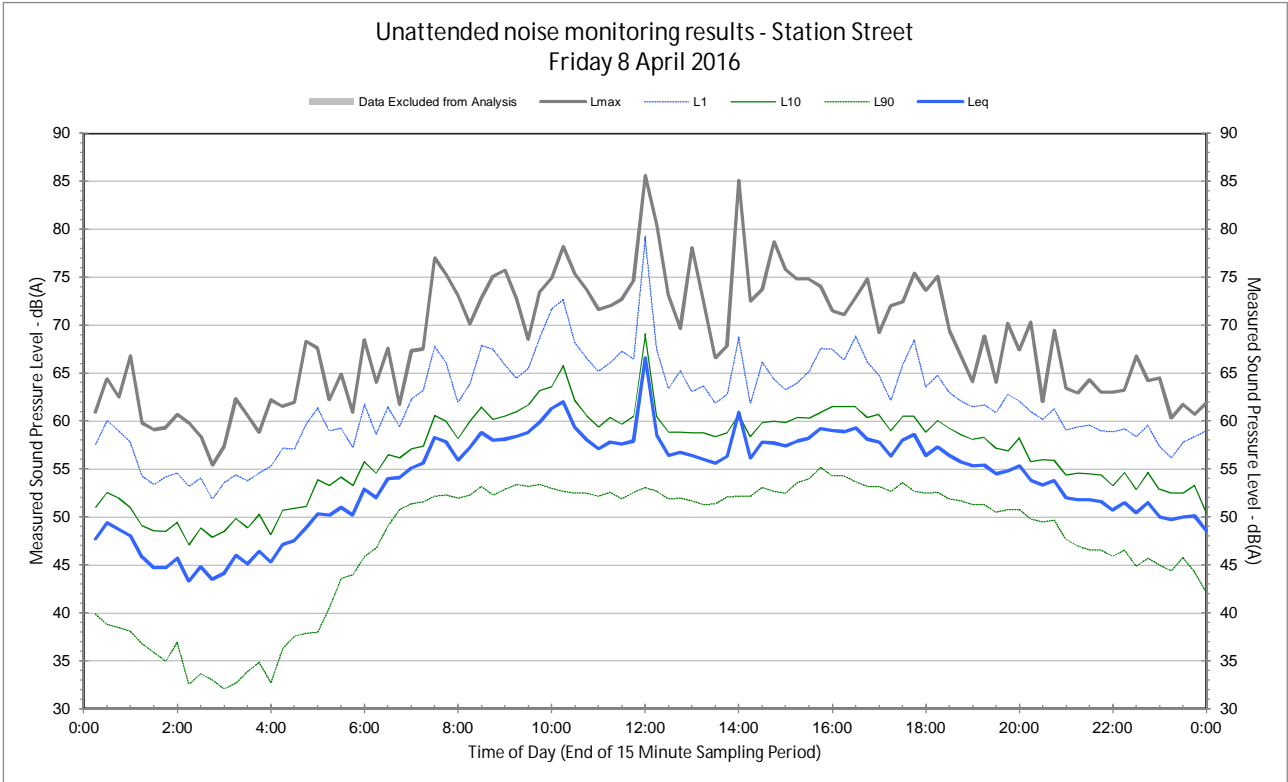


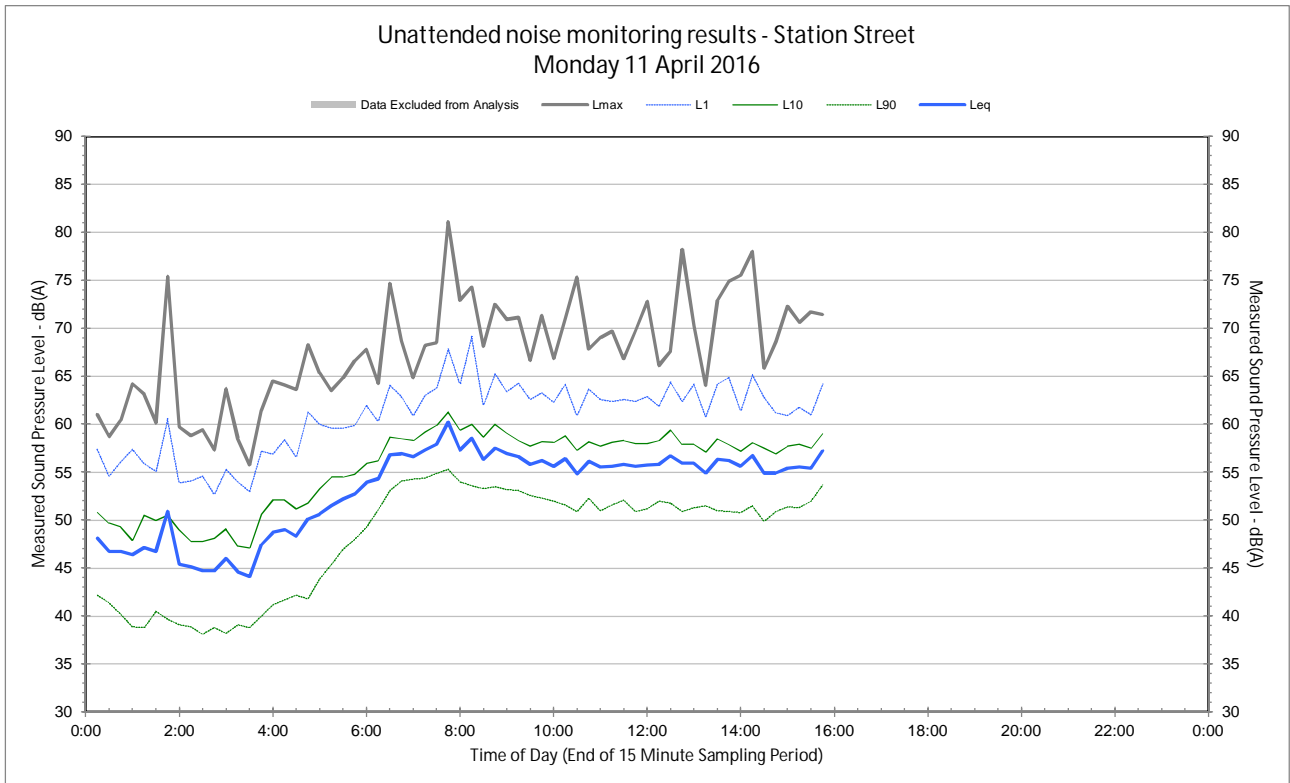
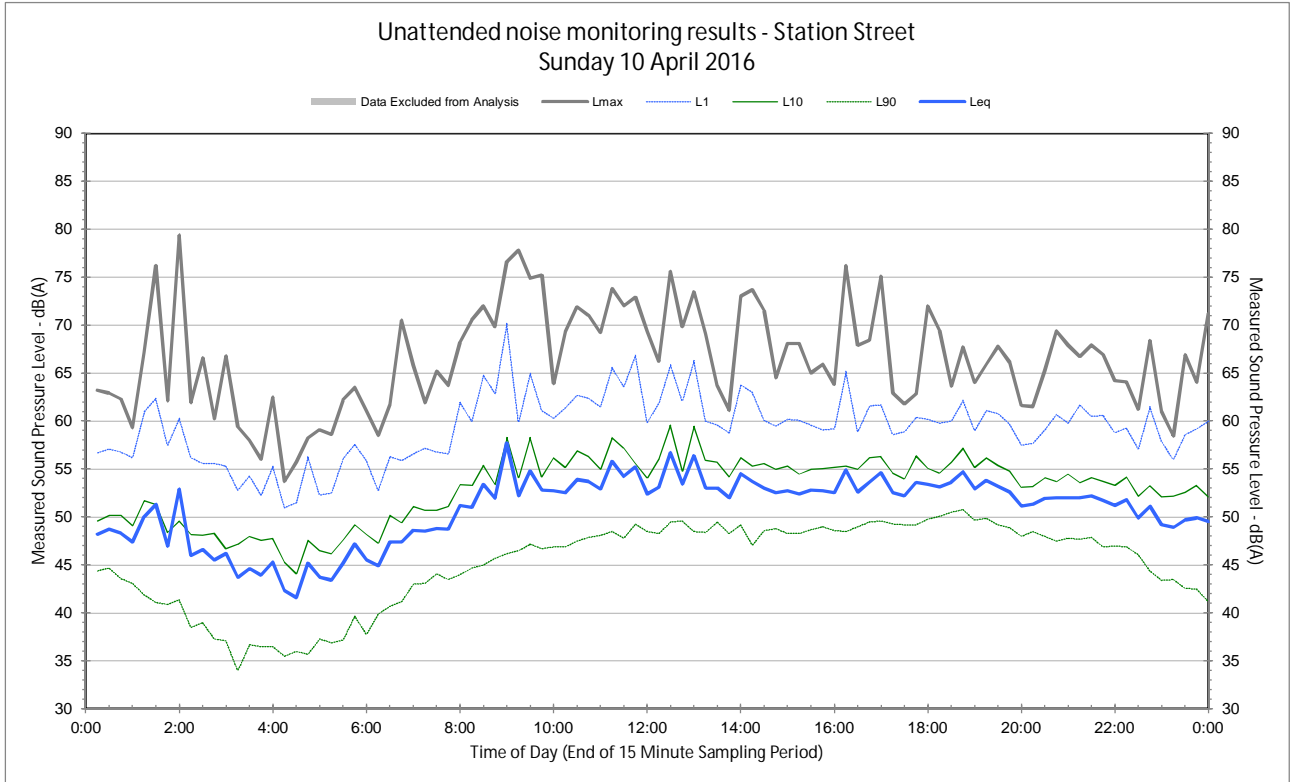
A.2 Station Street

Unattended noise monitoring results - Station Street											
	Lmax (10th Percentile)	L1 (10th Percentile)	L5 (10th Percentile)	L10 (10th Percentile)	L50 (10th Percentile)	L90 (10th Percentile)	L95 (10th Percentile)	L99 (10th Percentile)	Lmin (10th Percentile)	Leq (10th Percentile)	Leq - over period
6:00:00 PM to 10:00:00 PM											
Monday 4 April 2016	63.1	59.6	57.3	55.6	50.0	46.4	45.5	44.0	42.6	52.6	57.0
Tuesday 5 April 2016	64.0	58.5	55.9	54.5	50.1	47.1	46.5	45.4	44.2	51.8	56.8
Wednesday 6 April 2016	62.7	58.9	56.4	54.8	50.4	47.7	47.0	46.2	45.5	52.3	55.2
Thursday 7 April 2016	62.4	58.9	56.0	54.0	49.0	45.3	44.5	43.1	41.3	51.1	55.0
Friday 8 April 2016	63.0	59.1	55.8	54.4	49.9	46.6	45.9	44.5	43.1	51.7	54.4
Saturday 9 April 2016	60.9	57.7	53.5	51.3	47.5	44.5	43.6	42.4	41.2	49.5	52.4
Sunday 10 April 2016	62.6	58.3	54.7	53.3	49.7	47.3	46.7	45.4	44.1	51.3	52.6
Monday 11 April 2016											
Median	62.7	58.9	55.9	54.4	49.9	46.6	45.9	44.5	43.1	51.7	55.0
10:00:00 PM to 7:00:00 AM											
Monday 4 April 2016	59.2	55.2	52.2	50.2	44.0	40.5	39.7	38.4	37.3	47.0	50.4
Tuesday 5 April 2016	59.5	56.2	53.4	51.6	45.2	41.2	40.7	39.7	38.7	48.4	51.6
Wednesday 6 April 2016	60.6	55.6	52.5	51.1	45.6	42.1	41.1	40.3	39.3	48.1	51.5
Thursday 7 April 2016	59.0	53.7	50.5	48.5	40.1	32.9	32.2	30.9	30.3	44.7	49.7
Friday 8 April 2016	58.3	53.7	50.4	48.2	42.0	37.9	37.1	36.0	34.8	45.2	48.7
Saturday 9 April 2016	58.1	52.4	48.3	46.6	40.5	36.3	35.4	34.7	34.0	43.7	48.0
Sunday 10 April 2016	58.6	54.1	50.8	47.9	41.9	38.8	38.3	37.3	36.5	44.9	50.9
Monday 11 April 2016											
Median	59.0	54.1	50.8	48.5	42.0	38.8	38.3	37.3	36.5	45.2	50.4
7:00:00 AM to 6:00:00 PM											
Monday 4 April 2016	66.4	62.5	59.9	58.7	54.9	52.0	51.2	49.8	48.2	56.4	57.6
Tuesday 5 April 2016	66.8	62.1	59.8	58.6	55.2	52.4	51.8	50.5	49.0	56.5	57.7
Wednesday 6 April 2016	65.4	61.9	60.0	58.8	55.6	53.1	52.5	51.3	50.1	56.6	57.9
Thursday 7 April 2016	69.3	62.9	60.2	58.8	54.7	51.9	51.1	49.6	48.0	56.2	58.7
Friday 8 April 2016	65.9	60.1	57.4	56.1	52.2	49.4	48.6	47.2	45.3	53.7	55.6
Saturday 9 April 2016	63.1	58.8	55.8	53.4	48.3	44.8	43.9	42.7	41.3	51.4	53.5
Sunday 10 April 2016	66.7	61.1	58.7	57.4	53.9	50.9	50.0	48.4	46.9	55.1	56.4
Monday 11 April 2016											
Median	66.4	61.9	59.8	58.6	54.7	51.9	51.1	49.6	48.0	56.2	57.6



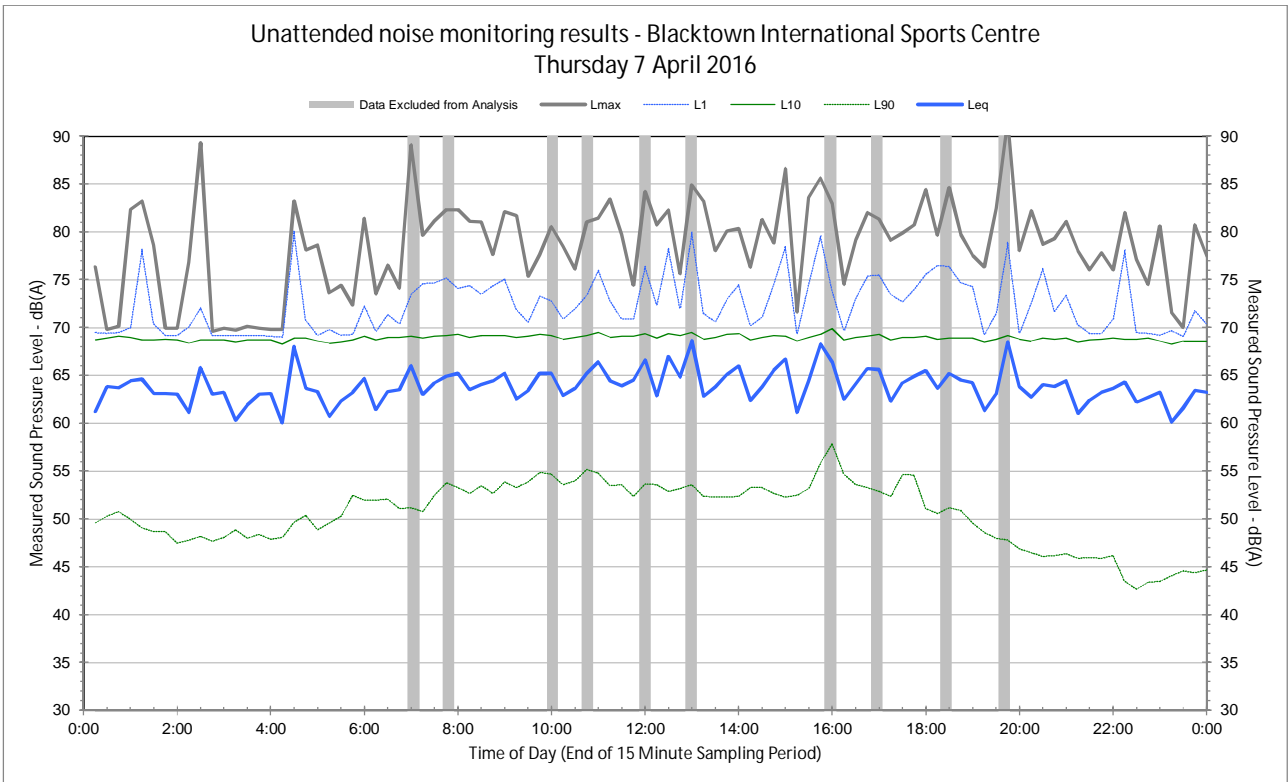
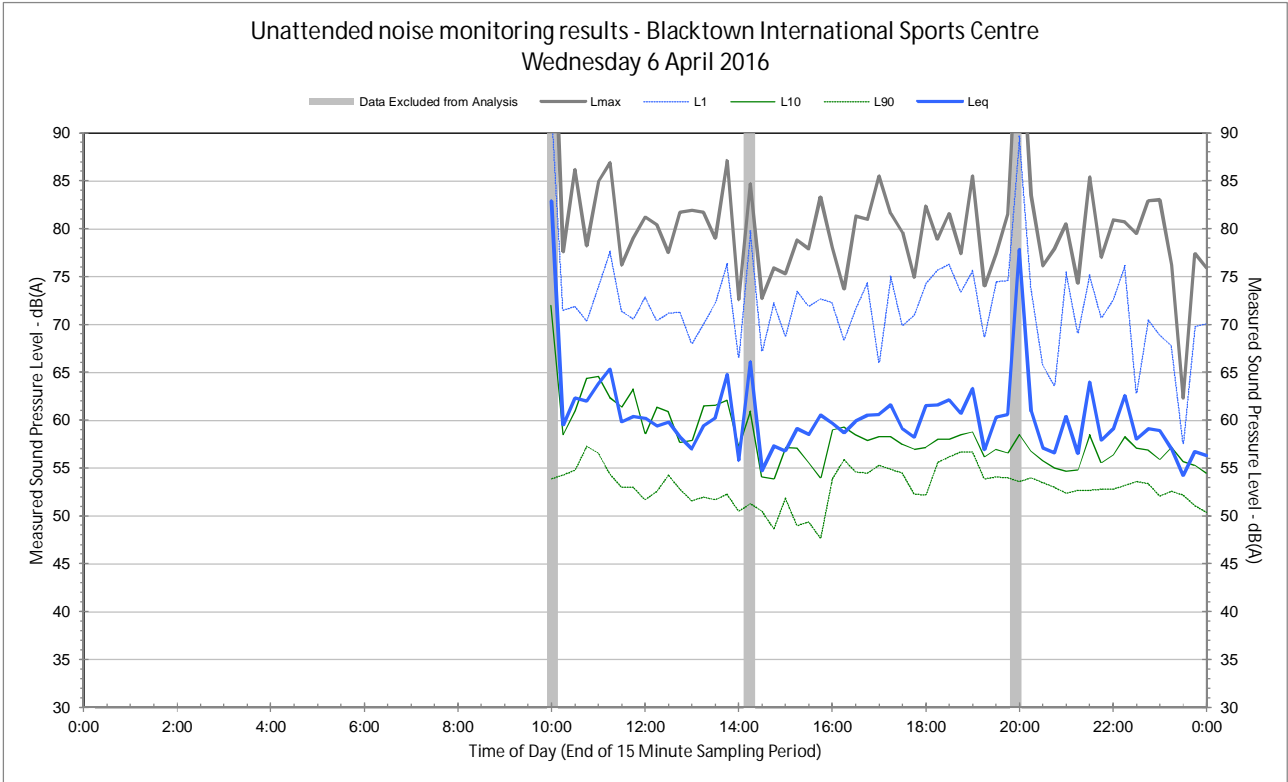


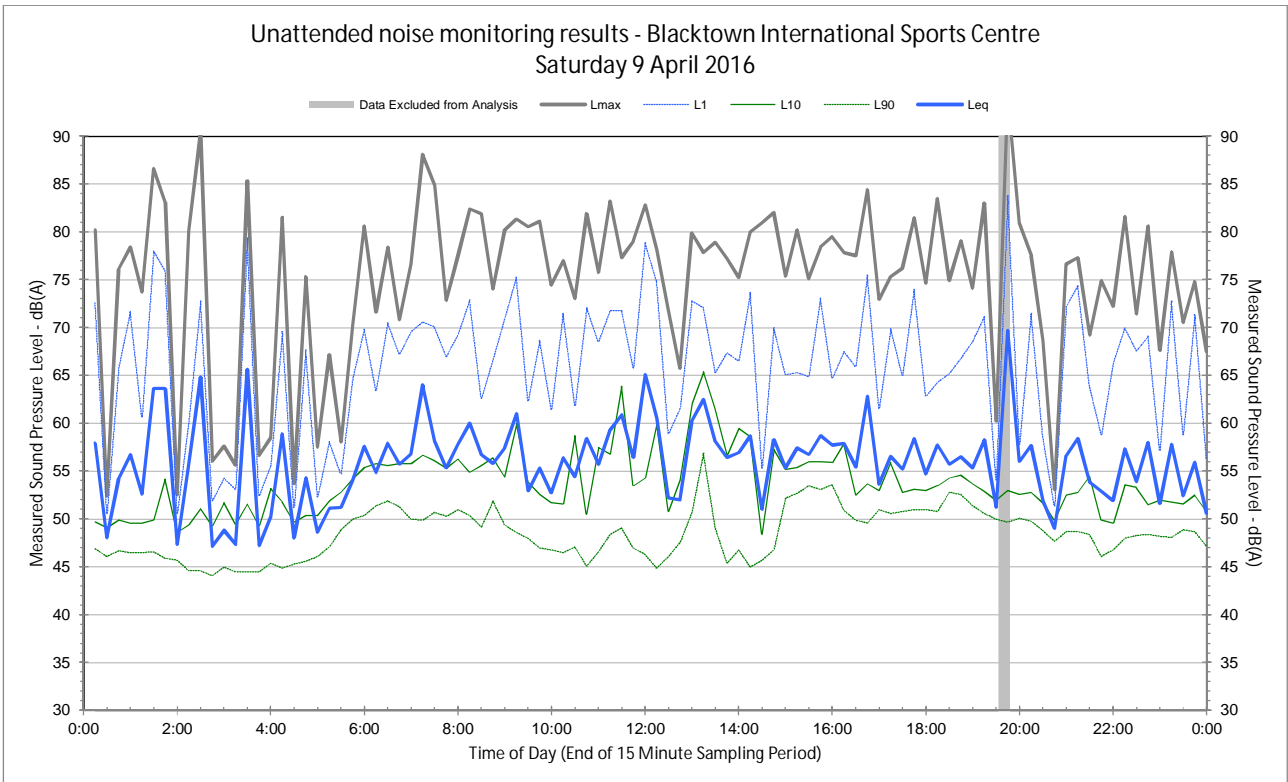
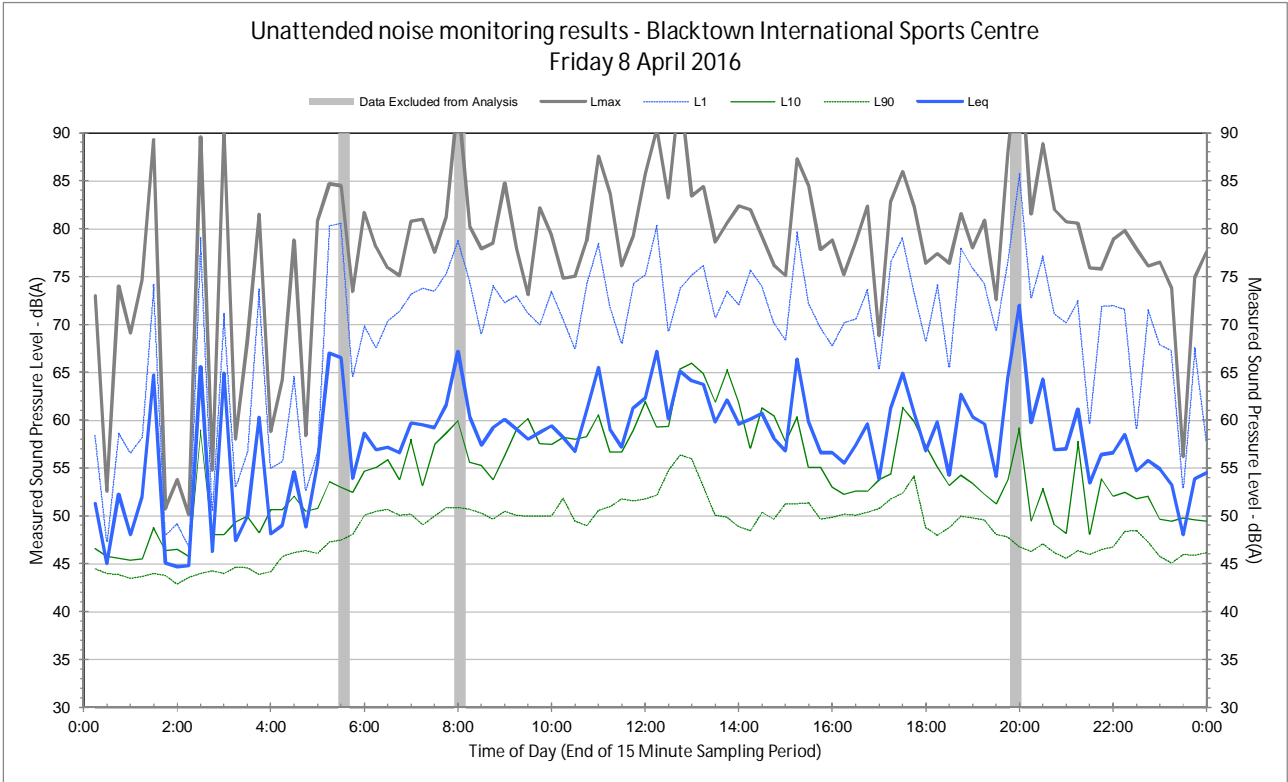


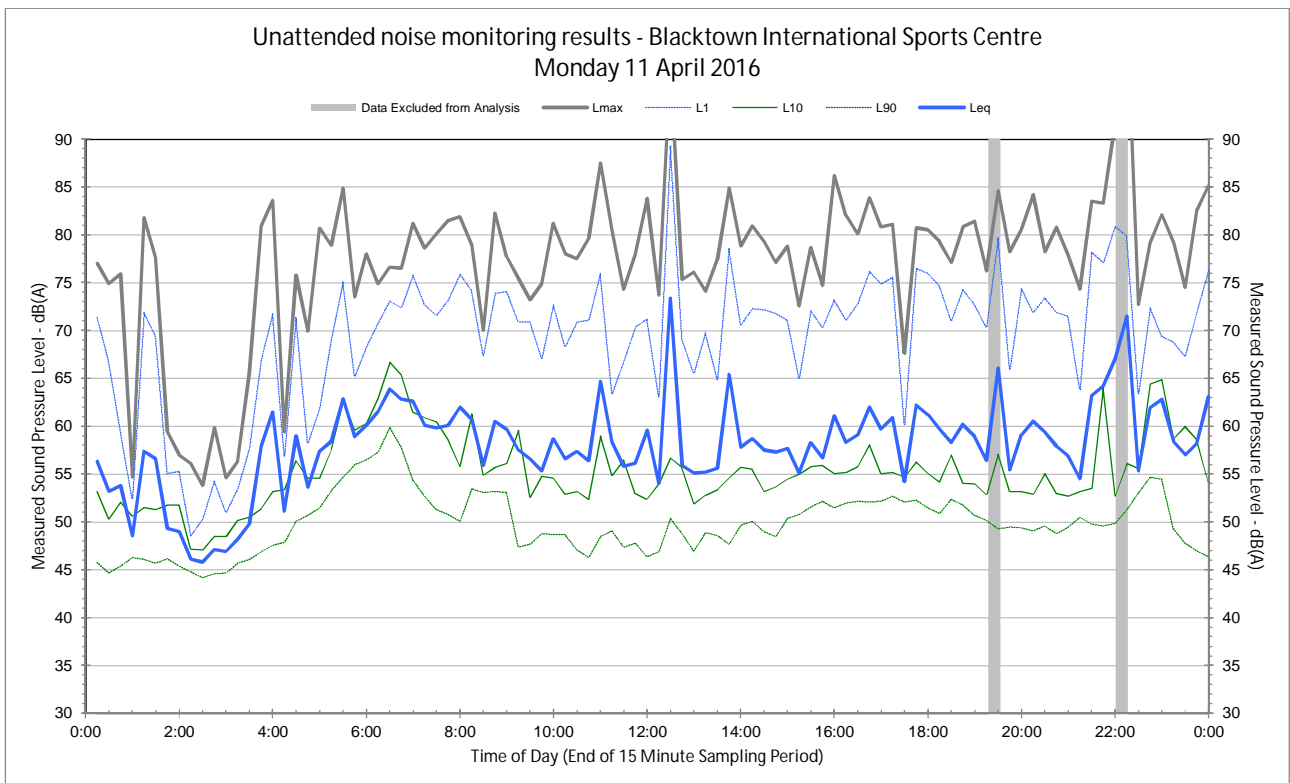
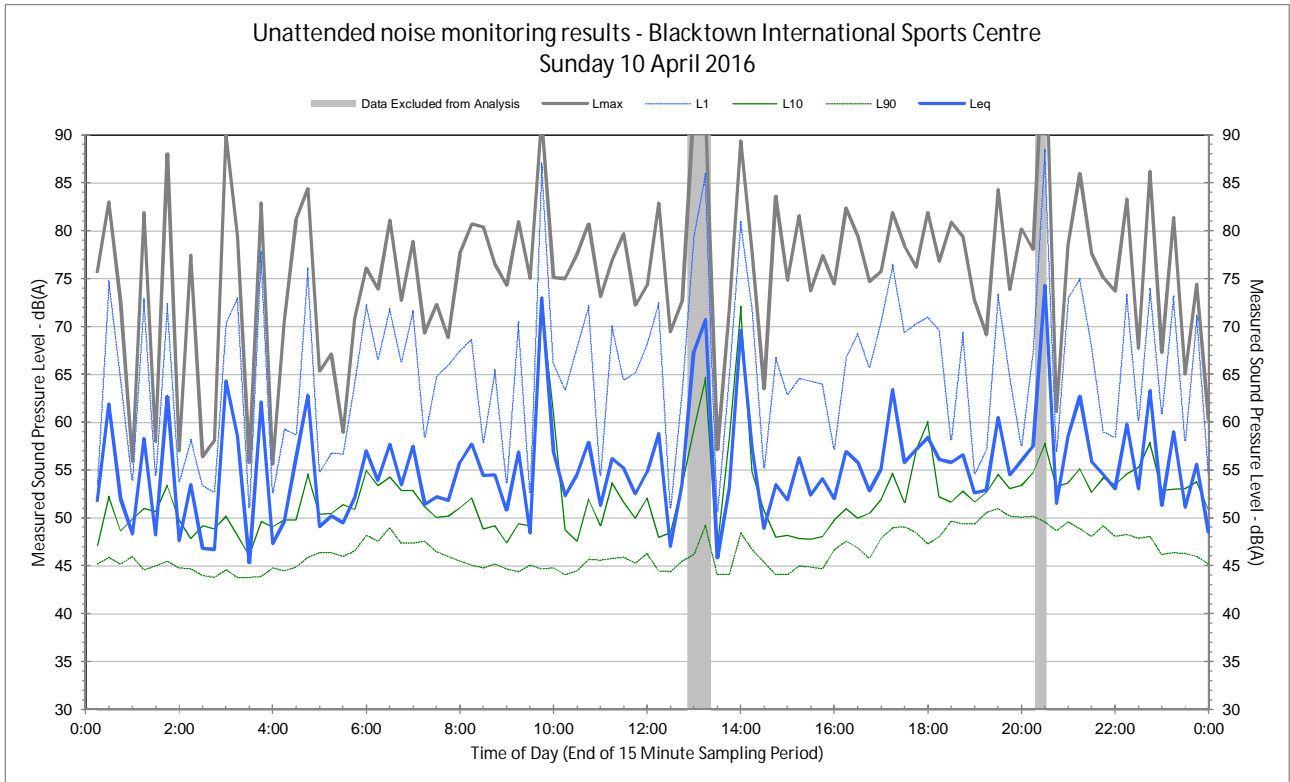


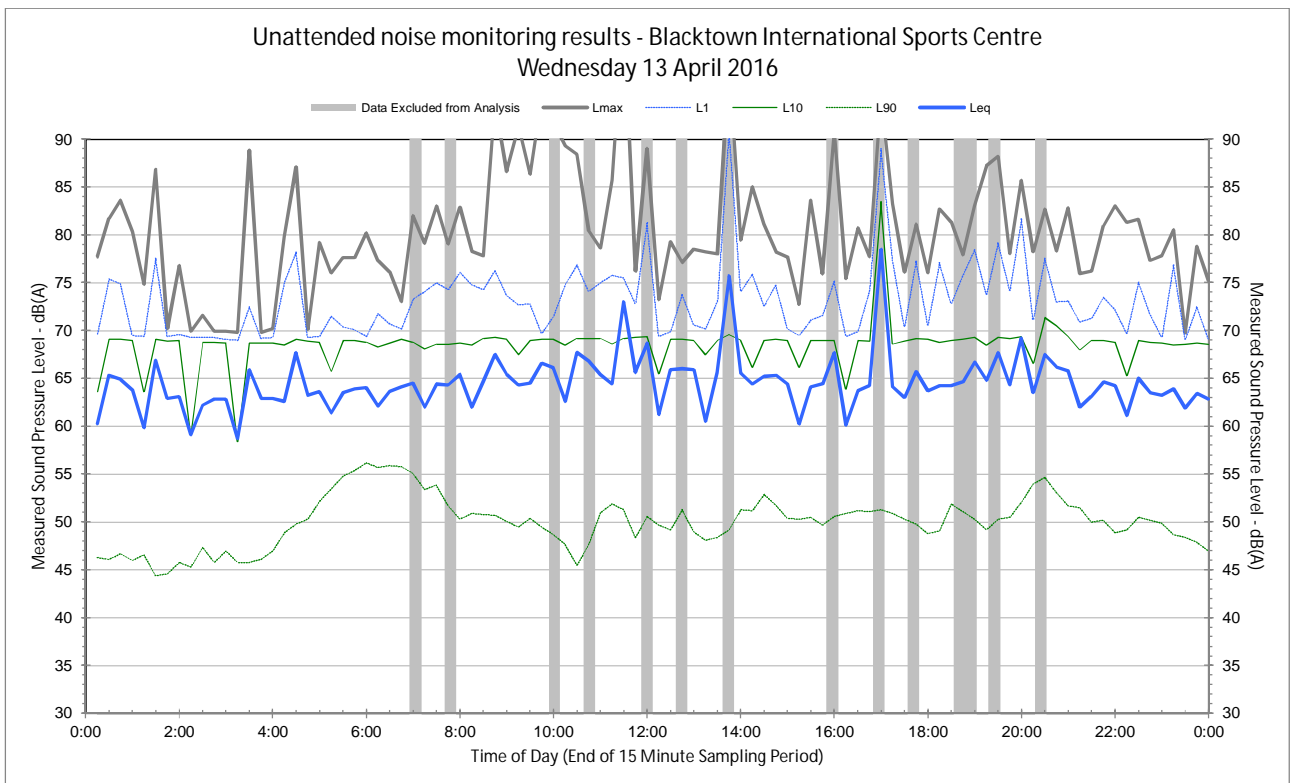
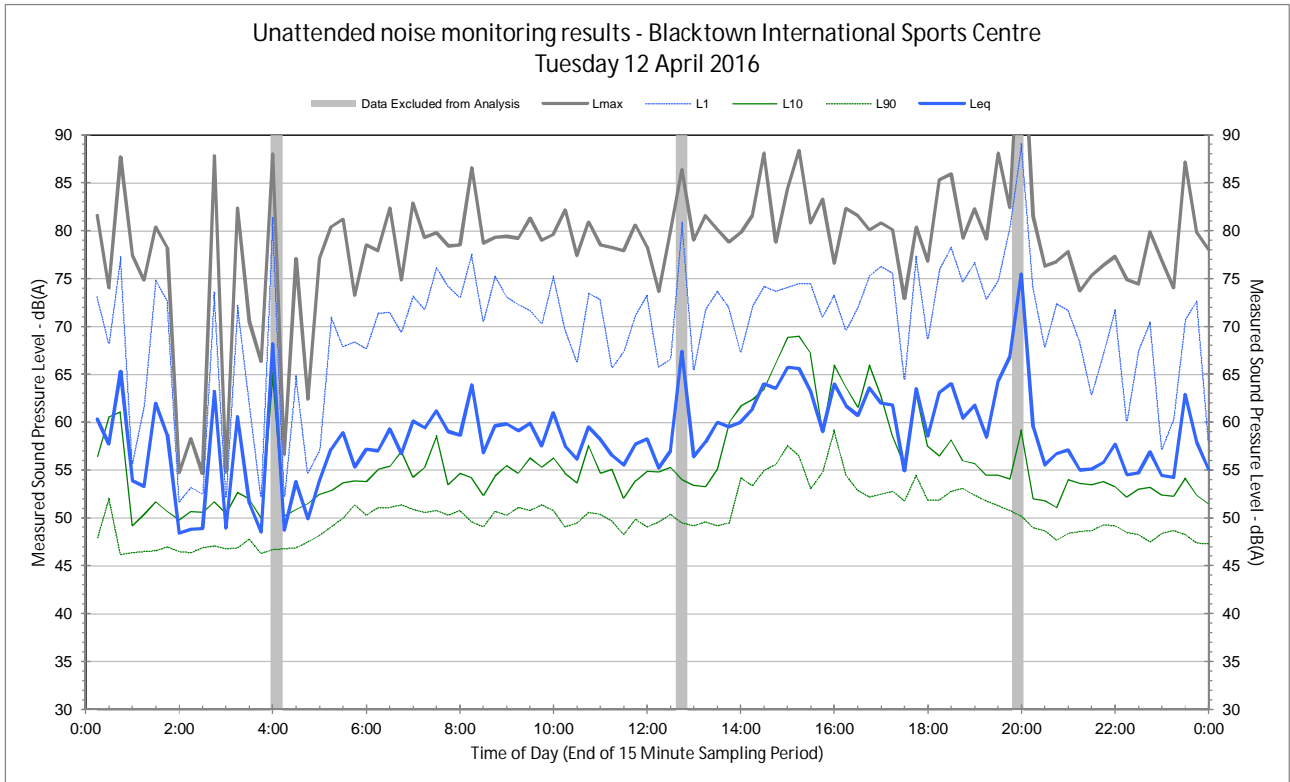
A.3 Blacktown International Sports Centre

Unattended noise monitoring results - Blacktown International Sports Centre											
	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
7:00:00 AM to 6:00:00 PM											
Wednesday 6 April 2016	79.6	71.5	61.2	58.5	55.0	52.8	52.2	51.4	50.7	59.8	60.5
Thursday 7 April 2016	80.3	73.3	69.4	69.1	55.5	53.3	52.8	52.1	51.3	64.2	64.6
Friday 8 April 2016	80.2	73.4	62.0	58.0	52.3	50.4	50.2	49.5	48.8	59.6	61.1
Saturday 9 April 2016	78.3	68.0	57.4	55.8	51.8	49.3	48.7	47.9	47.0	57.2	58.5
Sunday 10 April 2016	76.4	65.9	53.0	50.4	47.3	45.5	45.0	44.5	43.8	54.5	60.1
Monday 11 April 2016	78.9	71.4	57.4	55.1	52.1	50.1	49.6	48.8	47.6	58.3	61.2
Tuesday 12 April 2016	79.8	72.3	61.7	55.5	52.6	50.8	50.4	49.9	49.2	59.5	60.8
Wednesday 13 April 2016	79.3	73.1	69.2	69.0	52.6	50.4	50.1	49.5	48.4	64.4	65.3
Median	79.5	71.9	61.5	56.9	52.5	50.4	50.2	49.5	48.6	59.6	61.0
6:00:00 PM to 10:00:00 PM											
Wednesday 6 April 2016	78.9	73.8	58.1	56.6	54.8	53.9	53.7	53.2	52.1	60.4	60.5
Thursday 7 April 2016	78.4	71.6	69.1	68.8	48.2	46.5	46.2	45.9	45.4	63.6	63.4
Friday 8 April 2016	80.6	72.5	57.5	52.9	48.8	47.1	46.8	46.1	45.4	59.6	60.0
Saturday 9 April 2016	74.9	65.2	54.1	52.8	50.8	49.8	49.6	49.2	48.2	55.7	55.7
Sunday 10 April 2016	77.6	64.9	54.3	53.3	51.2	49.4	49.1	48.7	48.2	55.9	57.0
Monday 11 April 2016	80.5	72.7	56.7	53.2	51.2	49.8	49.4	49.0	48.4	59.1	60.9
Tuesday 12 April 2016	79.1	72.9	56.6	54.0	51.1	49.3	48.8	48.3	47.6	58.4	61.1
Wednesday 13 April 2016	81.1	73.1	69.4	69.0	53.8	51.0	50.4	49.0	47.9	64.3	65.1
Median	79.0	72.6	57.1	53.7	51.2	49.6	49.3	48.9	48.1	59.4	60.7
10:00:00 PM to 7:00:00 AM											
Wednesday 6 April 2016	75.9	69.5	68.9	68.7	52.0	50.0	49.6	48.9	47.8	63.0	62.7
Thursday 7 April 2016	74.6	67.6	53.4	50.8	45.5	44.3	44.0	43.7	43.2	56.6	60.1
Friday 8 April 2016	75.1	65.3	52.1	50.4	47.8	46.1	45.8	45.4	44.8	54.4	57.5
Saturday 9 April 2016	73.3	64.5	52.5	50.9	47.6	46.0	45.6	45.0	44.3	53.5	56.9
Sunday 10 April 2016	74.9	66.0	54.8	53.2	49.1	46.4	46.0	45.5	45.0	56.0	58.1
Monday 11 April 2016	77.7	68.3	55.1	53.3	49.2	47.7	47.3	46.7	46.0	57.1	58.7
Tuesday 12 April 2016	76.8	69.5	69.0	68.7	49.8	47.4	47.0	46.5	45.8	62.9	62.8
Wednesday 13 April 2016											
Median	75.1	67.6	54.8	53.2	49.1	46.4	46.0	45.5	45.0	56.6	58.7



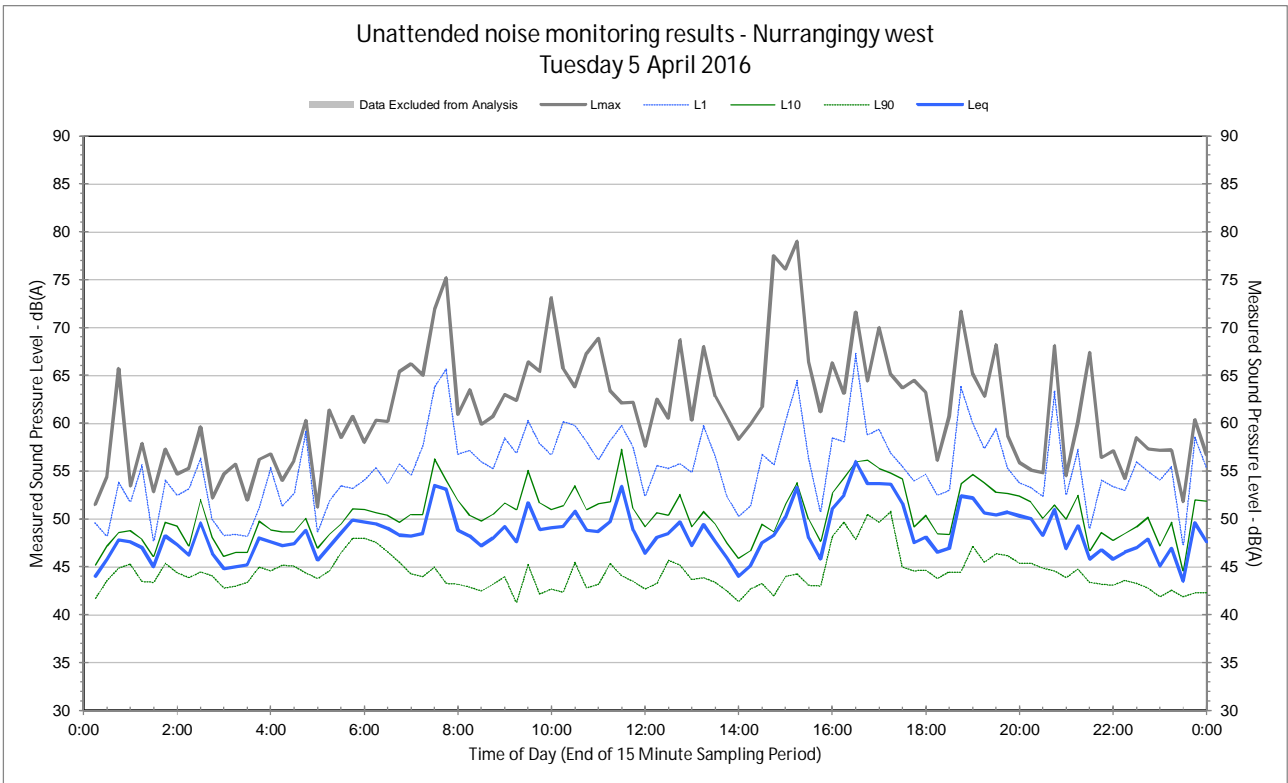
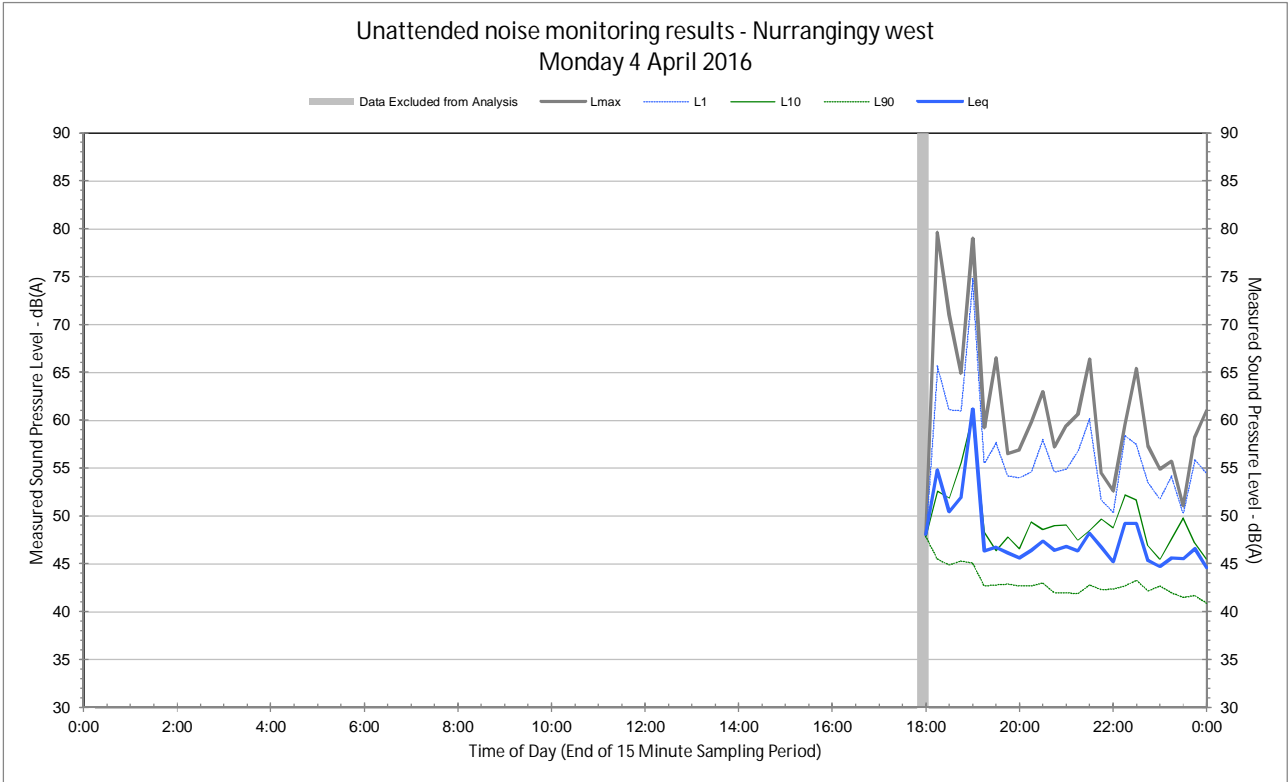


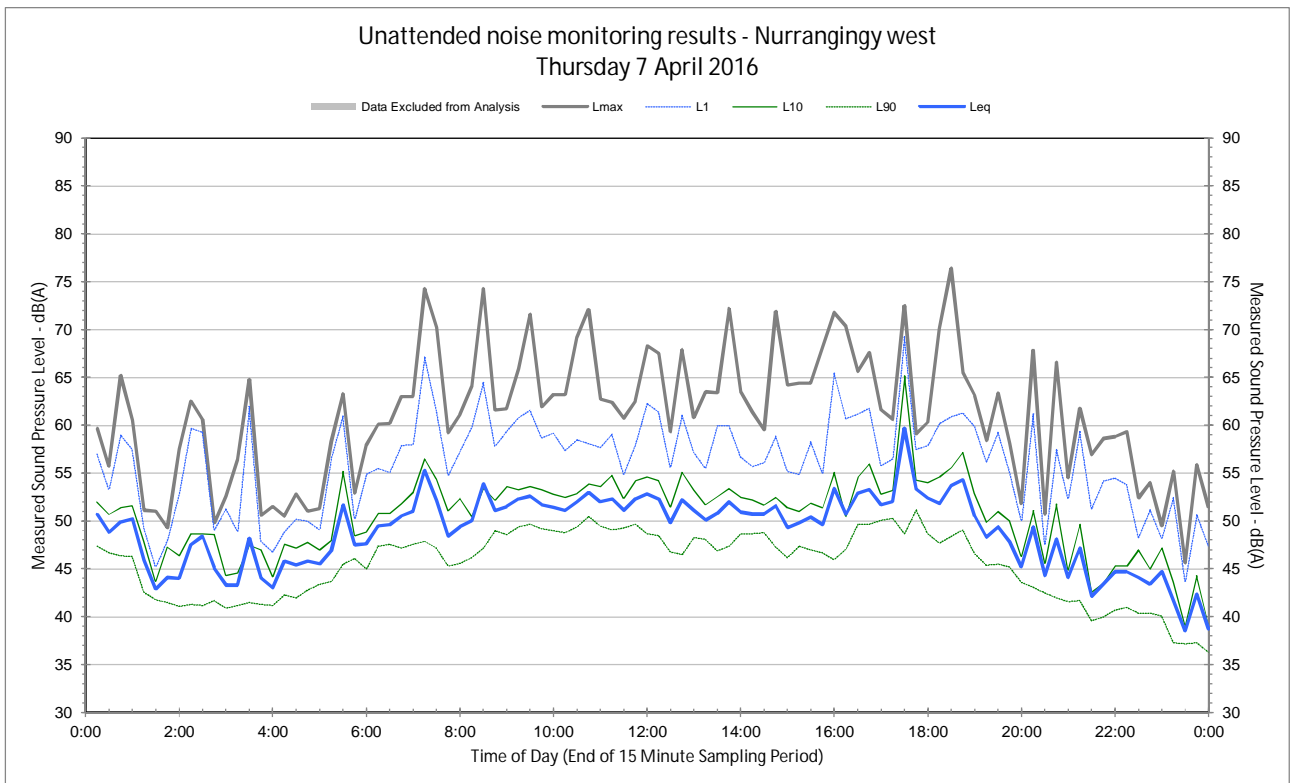
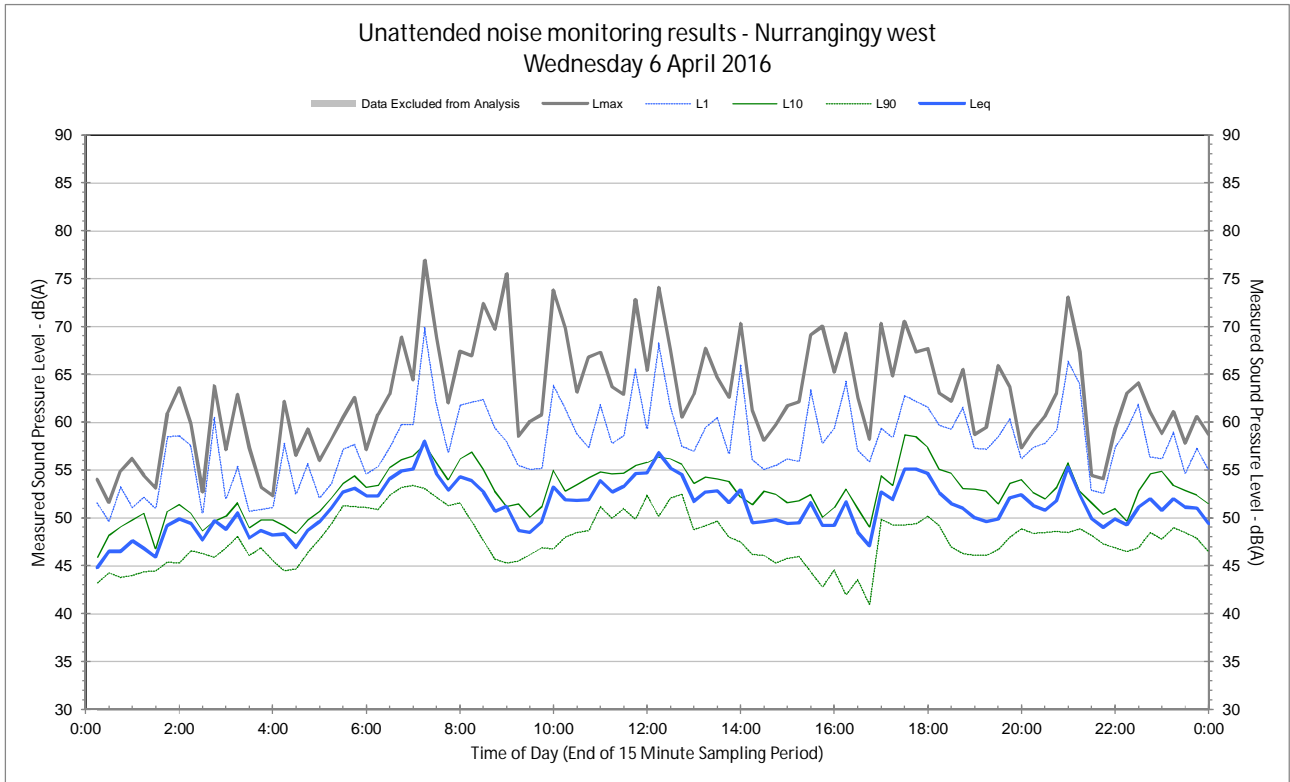


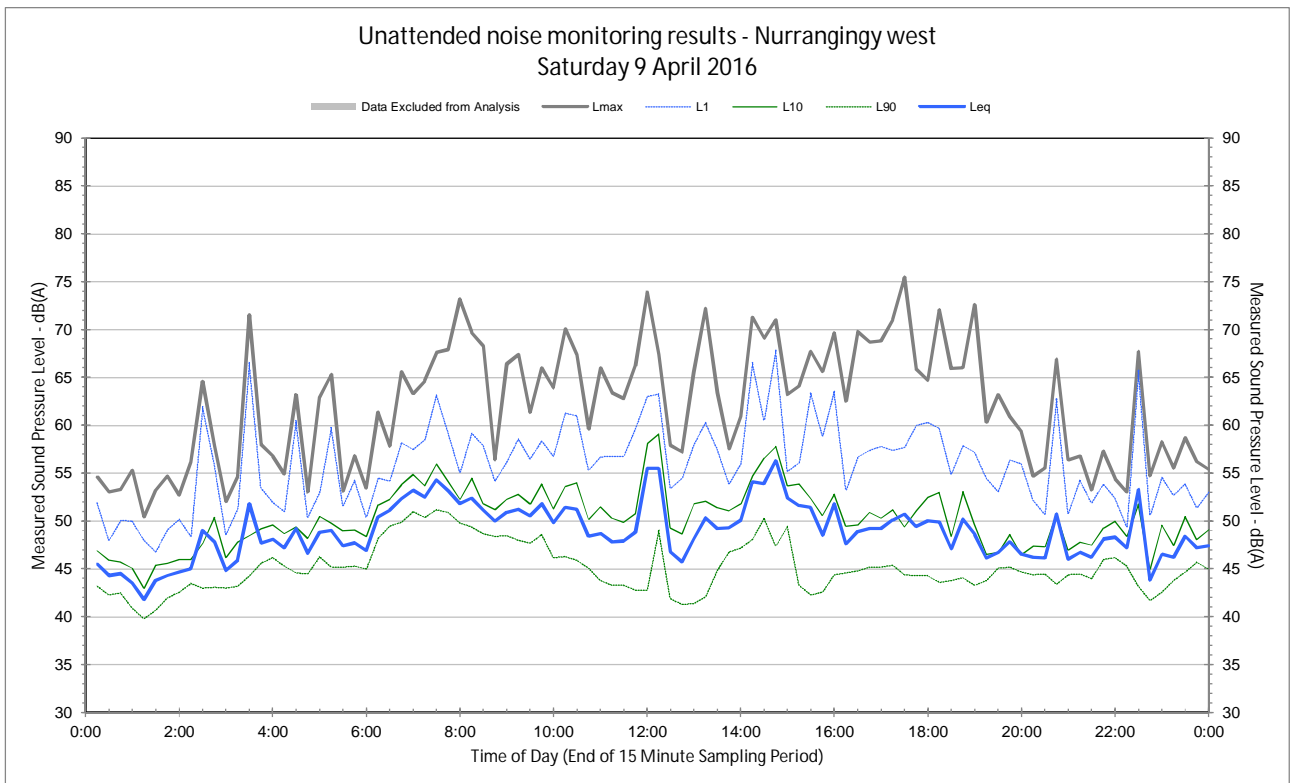
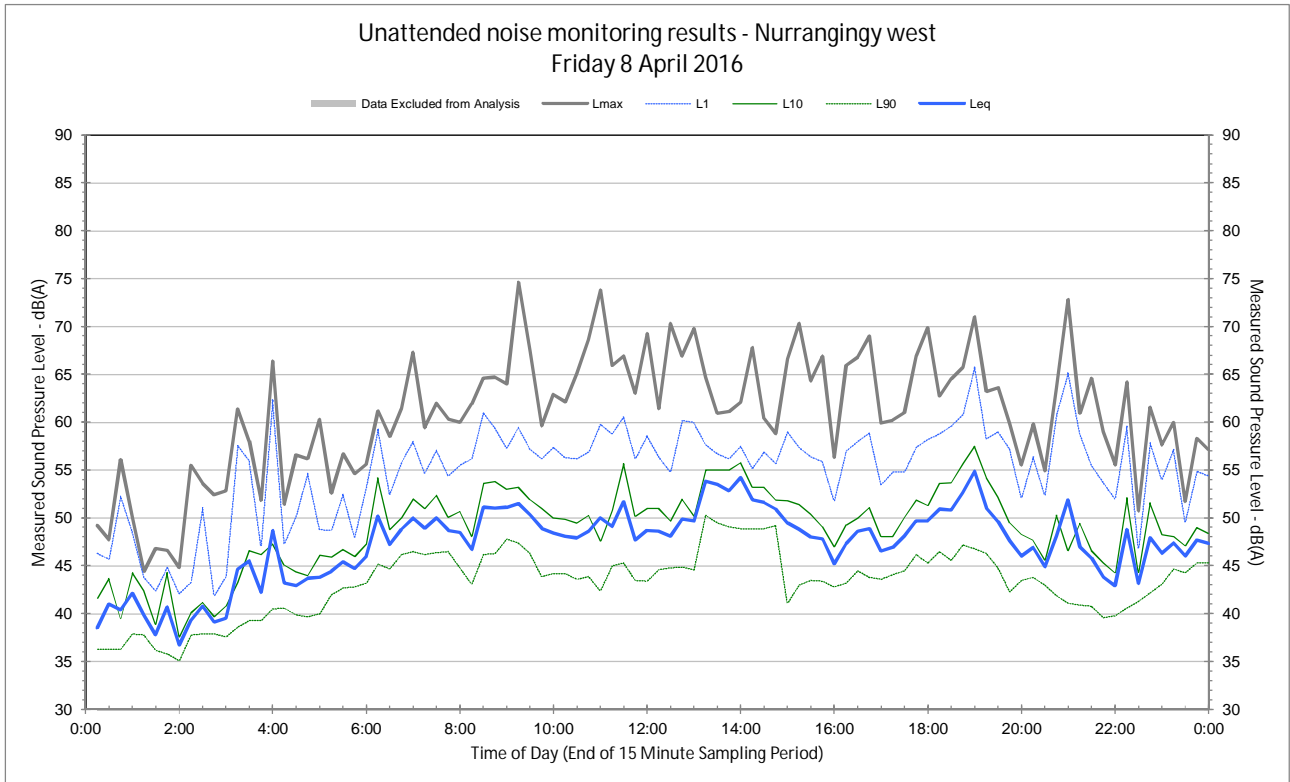


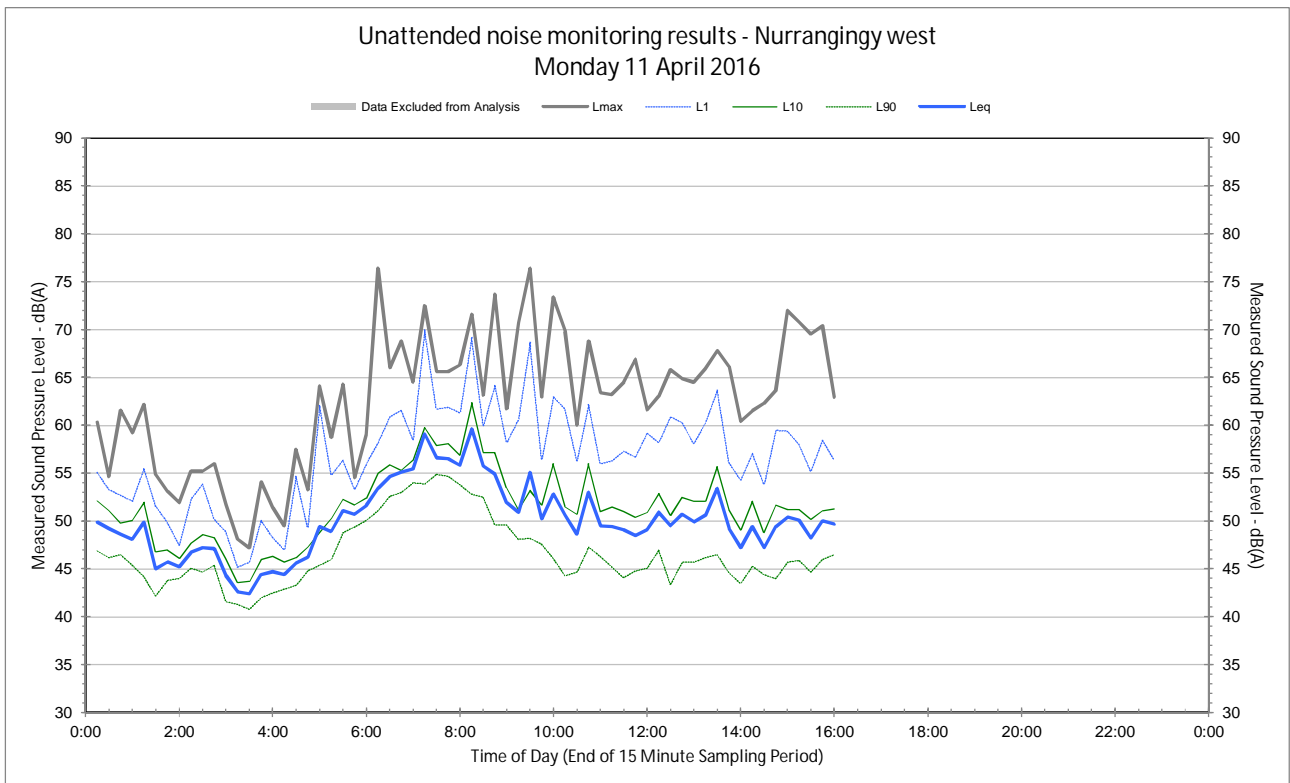
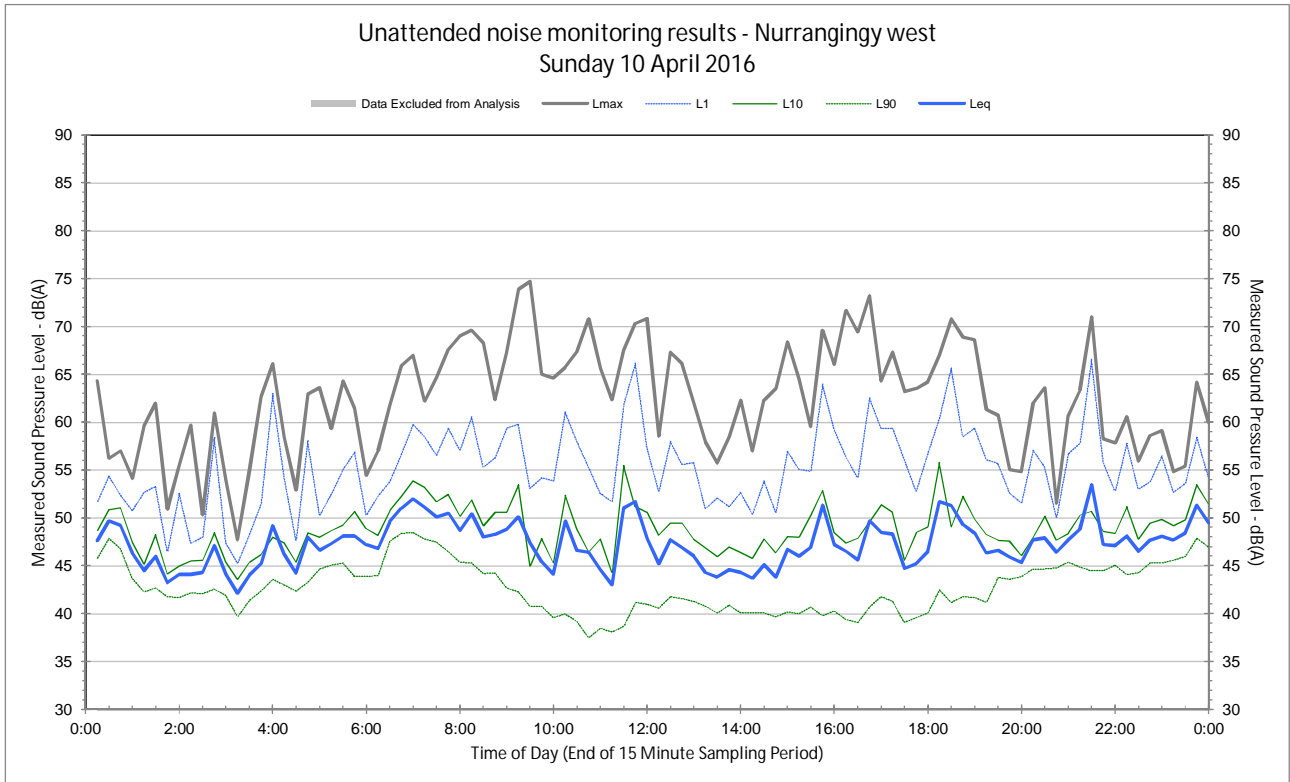
A.4 Nurranginy Reserve

Unattended noise monitoring results - Nurranginy west											
6:00:00 PM to 10:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Monday 4 April 2016	60.2	56.2	50.6	48.9	44.5	42.8	42.5	42.2	41.7	46.7	51.8
Tuesday 5 April 2016	59.4	54.0	52.5	51.7	46.5	44.7	44.4	44.0	43.5	49.7	49.5
Wednesday 6 April 2016	61.4	58.2	54.8	52.9	49.5	48.1	47.9	47.5	46.9	51.2	51.5
Thursday 7 April 2016	60.3	56.9	52.2	50.0	44.7	43.4	43.0	42.4	41.8	48.0	49.2
Friday 8 April 2016	63.0	58.6	53.2	49.5	45.0	43.3	43.0	42.5	41.7	47.9	49.7
Saturday 9 April 2016	59.8	54.4	49.6	48.1	45.5	44.4	44.3	43.8	43.3	46.9	47.9
Sunday 10 April 2016	61.7	56.4	51.3	48.5	45.9	44.2	43.9	43.5	42.9	47.7	48.8
Monday 11 April 2016											
Median	60.3	56.4	52.2	49.5	45.5	44.2	43.9	43.5	42.9	47.9	49.5
10:00:00 PM to 7:00:00 AM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Monday 4 April 2016	57.1	53.4	50.0	48.7	45.9	44.2	43.8	43.2	42.4	47.3	47.4
Tuesday 5 April 2016	57.3	54.8	51.8	50.0	47.4	45.5	45.2	44.4	43.7	48.5	49.9
Wednesday 6 April 2016	58.5	55.1	51.7	48.8	47.0	45.3	44.8	44.3	43.5	48.3	48.7
Thursday 7 April 2016	54.3	48.8	46.4	44.4	40.8	39.3	39.1	38.6	37.9	43.1	44.3
Friday 8 April 2016	56.8	52.5	49.9	48.4	45.7	44.3	44.0	43.5	42.7	47.4	48.0
Saturday 9 April 2016	58.4	52.6	49.3	48.3	45.7	43.7	43.3	42.6	41.7	47.0	47.6
Sunday 10 April 2016	56.8	53.5	51.0	49.7	46.8	45.4	45.0	44.5	43.8	48.1	49.5
Monday 11 April 2016											
Median	57.1	53.4	50.0	48.7	45.9	44.3	44.0	43.5	42.7	47.4	48.0
7:00:00 AM to 6:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Monday 4 April 2016	63.8	56.9	53.6	51.1	46.5	43.6	43.1	42.6	41.8	48.8	50.3
Tuesday 5 April 2016	66.9	59.4	55.3	53.9	50.7	48.6	48.1	47.3	46.2	52.3	52.8
Wednesday 6 April 2016	63.8	58.4	54.7	53.2	50.1	48.7	48.3	47.7	46.8	51.7	52.3
Thursday 7 April 2016	64.7	57.0	53.0	51.0	46.8	44.7	44.4	43.7	43.1	48.9	49.9
Friday 8 April 2016	66.3	57.9	53.8	51.8	48.2	45.3	45.0	44.0	43.2	50.4	51.3
Saturday 9 April 2016	65.7	56.2	51.3	48.7	43.1	40.7	40.1	39.3	38.4	46.8	47.8
Sunday 10 April 2016	65.7	59.3	54.2	51.7	48.2	46.1	45.6	44.8	43.8	50.3	52.9
Monday 11 April 2016											
Median	65.7	57.9	53.8	51.7	48.2	45.3	45.0	44.0	43.2	50.3	51.3









Appendix C. Water quality monitoring report – Q2 2016



Rooty Hill Regional Distributional Centre

HOLCIM

Aquatic Ecology Annual Report

Q4 2015 | 1

Document history and status

Revision	Date	Description	By	Review	Approved
1	29/08/2016	Draft	S Douglass	M Verhoeven	S Douglass

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments
1	1	30/08/2016	Brian Cassel / Dan Lidbetter	Draft report for comment

Rooty Hill Regional Distributional Centre

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Author: Sarah Douglass
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Rooty Hill Distribution Centre Environmental Monitoring

Aspect	Macroinvertebrates and Surface Water Quality
Date	11, 12, 16 April 2016

Summary

Monitoring period	Autumn 2016
Parameters monitored	<ul style="list-style-type: none"> a) pH (units) b) Turbidity (NTU) c) Temperature (°C) d) Dissolved oxygen (DO) (% saturation, mg/L) e) Electrical conductivity (EC) (µS/cm) f) ORP (mV) g) Total nitrogen (TN) (mg/L) h) Total phosphorus (TP) (mg/L) i) Macroinvertebrates
Monitoring event	AUSRIVAS macroinvertebrate monitoring and routine dry weather water quality sampling
Exceedance of assessment criteria	<p>Yes.</p> <ul style="list-style-type: none"> • Dissolved Oxygen (DO) at AE4, AE5, AE6. • Electrical Conductivity (EC) at AE1, AE2, AE3 and AE4 • pH at AE1 and AE2 • Total Phosphorus (TP) at AE5
Action required	None
Points for consideration	<ul style="list-style-type: none"> • pH was below the OEMP limits at AE1 and AE2, but was still within the ANZECC/ARMCANZ (2000) guidelines. • Dissolved Oxygen saturation was very low throughout the study area. DO was outside the OEMP limits at AE4 but was still an improvement of the upstream reference site AE5, suggesting RHDC operations were not responsible. • Electrical Conductivity concentrations were below the OEMP limits at AE1, AE2, AE3 and AE4, but were still within the ANZECC/ARMCANZ (2000) guidelines. • TP concentrations exceeded the OEMP limits at the upstream Eastern Creek reference site AE5. This site is not affected by RHDC operations. • Macroinvertebrate communities in Angus Creek were in poor ecological condition, consistent with previous years monitoring.
Compliance Summary	Dry weather water quality monitoring of Angus Creek and Eastern Creek was carried out in April 2016. At some locations OEMP limits were exceeded for dissolved oxygen, total phosphorus and pH. However, none of these exceedances were attributed to RHDC Operations.

Background

Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by Holcim to undertake operational monitoring of water quality and aquatic ecology of waterways in the vicinity of the Regional Distribution Centre (RDC) located at Kellogg Road, Rooty Hill NSW. The assessment was undertaken on 11, 12 and 16 April 2016 and forms part of the environmental monitoring associated with the Operational Monitoring Plan. It has been undertaken in compliance with Minister's Conditions of Approval (MCoA) 2.28A, 3.1, 5.4 & 5.5. Further details regarding the monitoring background, methodology and historical results are provided in the Environmental Management Plan and previous Aquatic Ecology and Water Quality Reports from January 2013 to September 2015.

Results - Water quality

Mean water quality results from sampling on 11, 12 and 16 April 2016 are provided in **Table 0-1** together with:

- OEMP limits (Site Specific Trigger Values) that were approved by the Department of Planning for use during the operational monitoring period (Refer to Appendix C). A summary of the impact sites' compliance with the OEMP limits is provided in provided in **Table 0-2**.
- ANZECC/ARMCANZ (2000) default trigger values for slightly disturbed ecosystems in south-east Australia lowland rivers.

Turbidity was low throughout the study area, with all sites within the OEMP limits. pH at sites AE1 and AE2 was slightly below the OEMP limits, however within the ANZECC/ARMCANZ (2000) guidelines at both sites. Dissolved Oxygen concentration was within the OEMP limits at the downstream impact Angus Creek sites (AE1, AE2 and AE3) but below the dissolved oxygen OEMP limits at the upstream inflow site AE6 and the Eastern Creek sites AE4 and AE5.

Electrical conductivity was below the OEMP limits at the downstream impact Angus Creek sites AE1, AE2, AE3 and Eastern Creek site AE4, however these concentrations were within the ANZECC/ARMCANZ (2000) guidelines. Interestingly, the upstream inflow site AE6 had significantly higher electrical conductivity than the rest of the study area (2838 μ S/cm) which decreased significantly at AE1 (326 μ S/cm). This site was severely disturbed and modified from recent construction works for the 'Angus Creek Stormwater Harvesting Project' (not associated with the RDC compound) resulting in limited aquatic habitat and limited flowing water. The water level at site AE6 was very low, consisting of a small shallow residual pool, suggesting a high dominance of groundwater within the pool.

Total nitrogen (TN) and total phosphorus (TP) were generally low and within the OEMP limits throughout the study area, with the exception of TP at the upstream Eastern Creek reference site AE5 (0.2mg/L) which exceeded the OEMP limit of 0.18mg/L.

Table 0-1 Average dry weather water quality results (11,12,16 April 2016)

Site	Turbidity (NTU)	DO (%sat)	EC (µS/cm)	pH	TN (mg/L)	TP (mg/L)
AE1						
Average	2.4	38.3	326	7.57	0.9	0.03
OEMP limits	49.4	22.34-52.52	1242.598-3826.8	7.604-8.524	1.52	0.164
AE2						
Average	4.8	37.8	378	7.48	1.2	0.04
OEMP limits	41.7	21.92 - 47.052	1267.8 - 4015.998	7.548 - 8.64	2	0.158
AE3						
Average	3.9	29.8	376	7.80	2.2	0.03
OEMP limits	45.0	23.988 - 44.452	1181 - 4165.002	7.478 - 8.86	2.2	0.24
AE4						
Average	14.2	23.4	517	7.81	1.5	0.08
OEMP limits	68.2	33.34 - 49.378	824 - 1643.198	7.252 - 8.674	3.18	0.2
AE5						
Average	23.8	13.5	936	7.78	1.2	0.2
OEMP limits	90.8	31.482 - 51.04	791.398 - 1522.598	7.306 - 8.688	2.94	0.18
AE6						
Average	2.4	19.2	2838	8.03	0.7	0.07
OEMP limits	181.6	32.198 - 62.258	1700.668 - 5399.202	7.73 - 9.02	5.1	0.74
ANZECC/ ARMCANZ (2000) Guidelines	6-50	85-110	125-2200	6.5-8.5	0.5	0.05

Result outside the site specific trigger value

Table 0-2 Water Quality Compliance Summary with OEMP (11,12,16 April 2016)

Site	Temp (°C)	Turbidity (NTU)	DO (%sat)	EC (uS/cm)	ORP (mV)	pH	TN (mg/L)	TP (mg/L)
AE1	✓	✓	✓	Non-compliant with OEMP, but within ANZECC/ARMCANZ (2000) guidelines. Not a RHDC Impact.	✓	Non-compliant with OEMP, but within ANZECC/ARMCANZ (2000) guidelines. Not a RHDC Impact.	✓	✓
AE2	✓	✓	✓	Non-compliant with OEMP, but within ANZECC/ARMCANZ (2000) guidelines. Not a RHDC Impact.	✓	Non-compliant with OEMP, but within ANZECC/ARMCANZ (2000) guidelines. Not a RHDC Impact.	✓	✓
AE3	✓	✓	✓	Non-compliant with OEMP, but within ANZECC/ARMCANZ (2000) guidelines. Not a RHDC Impact.	✓	✓	Non-compliant with OEMP guideline, but better quality than upstream AE6. Not a RHDC Impact	✓
AE4	✓	✓	Non-compliant with OEMP, but better quality than the upstream Eastern Creek site AE5. Not a RHDC impact.	Non-compliant with OEMP, but within ANZECC/ARMCANZ (2000) guidelines. Not a RHDC Impact.	✓	✓	✓	✓
Compliant with OEMP								
Non-compliant with OEMP, but not due to RHDC operations								
Non-compliant with OEMP, potentially RHDC operational impact								

1.1 Macroinvertebrates

During the Autumn 2016 survey, 655 individuals were collected across five sites, and identified to 37 taxonomic groups in accordance with AUSRIVAS methods (Error! Reference source not found. **B**). Reference site AE6 (upstream of the RDC compound) was not sampled due to insufficient water and habitat (refer **Appendix A, Plate 1**). This site was severely disturbed and modified from recent construction works for the 'Angus Creek Stormwater Harvesting Project' (not associated with the RDC compound) resulting in limited aquatic habitat and limited flowing water. Stagnant, shallow pools were present which inhibited the collection of macroinvertebrates.

Site AE1 on Angus Creek had the fewest number of macroinvertebrate taxa collected (8 families), whilst further downstream sites AE2 and AE3 had slightly higher number of taxa (11 and 17 respectively). Seventeen taxa were collected at Eastern Creek site AE4, whilst the upstream Eastern Creek reference site AE5 had the highest number of taxa with 22 families collected. The low taxa richness also translated to low AUSRIVAS OE50 scores, with sites AE1 and AE2 having very low OE50 scores (0 and 0.1 respectively) resulting in the AUSRIVAS Band D 'extremely impaired' ranking. Site AE3 was in slightly better condition (OE50 0.2) with an AUSRIVAS Band C 'severely impaired' ranking. The OE50 scores were higher within Eastern Creek, with upstream Site AE5, having the highest OE50 Score (0.49) and an AUSRIVAS Band B ranking, reflecting the much higher taxa richness present at this site. Whilst AUSRIVAS OE50 scores dropped at the downstream site AE4 (OE50 0.38), the scores remain higher than within Angus Creek indicating that the water quality of Angus Creek is not having a significant impact on Eastern Creek. Rather, differences are likely related to the habitat, rubbish density and flow differences at each site.

The macroinvertebrates taxa collected were generally indicative of disturbed (urban) environments with no pollution sensitive taxa observed within Angus Creek. Two pollution sensitive taxa (SIGNAL Score >6) were collected at Eastern Creek site AE5, the caddis fly larvae *Leptoceridae* and marsh beetle larvae *Scirtidae*. Caddisfly larvae *Leptoceridae* were also observed at Eastern Creek site AE4. Generally the macroinvertebrate community throughout the study area are pollution tolerant, consisting primarily of a variety of different gastropods (snails) and *Diptera* (flies and mosquitos).

Rubbish was observed in the water bodies at all sites (refer photos **Appendix A**) and flow was restricted. Macroinvertebrate assemblages collected suggest biological impairment across the sites, regardless of their proximity to the RDC. There was no obvious trend between upstream and downstream sites in relation to the ongoing operations of the RDC.

Further assessment of the macroinvertebrate community including the calculation of SIGNAL2 will be assessed within the Annual Report following Spring 2016 sampling.

Table 0.3: AusRivAS OE50 scores recorded across sampling sites, autumn 2009 to present

Sampling period		Season	Angus Creek				Eastern Creek	
			AE6	AE1	AE2	AE3	AE5	AE4
Prior to construction	2009	Autumn	0.18	0.10	0.29	0.29	0.58	0.19
	2009	Spring	0.10	0.10	0.19	0.29	0.54	0.48
	2010	Spring	0.57	0.19	0.15	0.29	0.48	0.30
	2011	Autumn	0.09	0.35	0.43	0.26	0.29	0.45
Construction	2012	Spring	0.19	0.29	0.29	0.28	0.49	0.16
	2013	Autumn	0.21	0.19	0.26	0.29	0.73	0.37
	2013	Spring	N/A	0.39	0.39	0.39	0.39	0.47
	2014	Autumn	N/A	0.10	0.17	0.19	0.49	0.44
	2014	Spring	N/A	0.29	0.29	0.48	0.43	0.58
	2015	Autumn	N/A	0.29	0.33	0.11	0.38	0.38
Operation	2015	Spring	N/A	0.10	0.28	0.19	0.57	0.38
	2016	Autumn	N/A	0	0.10	0.20	0.49	0.38
OE50 Band limits			Autumn upper limit			Spring upper limit		
Band X			Infinite			Infinite		
Band A			1.17			1.16		
Band B			0.81			0.83		
Band C			0.46			0.51		
Band D			0.11			0.19		

Recommendations for Future Monitoring

Recommendation 1: AE6 to remain in monitoring program

Since 2012, Site AE6 has had on going disturbances to the aquatic habitat and water quality associated with the Angus Creek 'Stormwater Harvesting Project'. During construction there were numerous impacts to water quality including instream works such as a temporary dam and ford, and the removal of existing habitat to construct an artificial sandstone channel. These works have had considerable impacts to the water quality observed at the site and as such resulted in the high site specific trigger values that were created in October 2015 based on the historic 80th percentile of data at the site. Construction works have since finished at the site, however the site is now subject to stormwater harvesting, which is reducing the amount of flow downstream, primarily during wet weather events which is when the poorest water quality is typically observed. This operation has resulted in the current water quality at AE6 being highly improved compared to historical data, yet being assessed against SSTV's which included a period in which the site was impacted by construction.

The implications of this is that often the downstream impacts sites such as AE1 exceed their SSTV's however, site AE6 is within the SSTV despite often having poorer water quality than the downstream impact sites. At first glance, this makes it appear that RHDC is having an impact on downstream water quality, when actually the water quality has improved downstream. For example, the SSTV for turbidity at AE6 is 181.618 NTU whilst immediately downstream at site AE1 the SSTV is 49.44 NTU. The TN SSTV at site AE6 is 5.1 mg/L whilst immediately downstream at site AE1, the SSTV is 1.52.

Whilst this site is not ideal as a reference site for the RHDC monitoring program, it is the only upstream site of the RHDC, and is essential to give an indication of what the upstream water quality condition is, prior to entering the RHDC site. Care must be taken when assessing against the SSTV's for this site, given the higher SSTV's at this site compared to further downstream.

Recommendation 2: Additional monitoring at RHDC discharge point

Direct discharges from RHDC enter Angus Creek via a drain, immediately adjacent to the RHDC bridge over Angus Creek. During high flows (wet weather) the drainage pipe is flooded by Angus Creek so sampling of the discharge water from RHDC is not possible. However during dry weather the water level is lower, potentially enabling a grab sample to be collected directly from the discharge point to allow comparison of discharge water quality to Angus Creek and to better understand whether RHDC is having an impact on the receiving environment. Therefore Jacobs recommends additional sampling is undertaken at this location for the current monitoring program.



Recommendation 3: Determine point sources along Angus Creek

Numerous point sources (e.g. stormwater drains) enter along Angus Creek and Eastern Creek outside of the RHDC boundaries. These point sources have the ability to impact upon water quality within Angus Creek, however without knowing their location it is difficult to determine whether changes in water quality are directly related to RHDC operations and what impacts are caused by other activities occurring within the catchment. Jacobs proposes a site walk through during dry weather along the entire length of Angus Creek from AE6 to the confluence with Eastern Creek, and from site AE5 on Eastern Creek downstream to AE4 on Eastern Creek. All point sources, drains and other pollution sources within the catchment would be identified and the GPS locations noted to aid in the future interpretation of water quality impacts within the catchment. Furthermore, these locations would again be visited during wet weather monitoring to understand their relative contribution to stormwater inflows.

References

- ANZECC/ARMCANZ. (2000). *Australian Water Quality Guidelines for Fresh and Marine Waters*. Canberra: Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.
- Petersen, R. C. (1992). The RCE: A Riparian, Channel and Environmental Inventory for small streams in the agricultural landscape. *Freshwater Biology*, 27, 295-306.
- Turak, E., Waddell, N., & Johnstone, G. (2004). *NSW AUSRIVAS Sampling and Processing Manual*. Sydney: Department of Environment and Conservation.

Plate 1 Angus Creek - Site AE1



Plate 2 Angus Creek - Site AE2



Plate 3 Angus Creek - Site AE3



Plate 4 Eastern Creek - Site AE4



Plate 5 Eastern Creek - Site AE5



Appendix A. Macroinvertebrate Taxa

Taxa	AE1	AE2	AE3	AE4	AE5
Hydridae				2	5
Clavidae				2	
Dugesiidae		4	3	8	12
Nematoda	1		2	1	
Tataeidae	53	20	245	1	6
Lymnaeidae	1		1		
Planorbidae					1
Physidae				1	4
Glossiphoniidae	49	13	4	1	
Erpobdellidae	1		1		
Oligochaeta	4	2	6	4	7
Oribatida			2	2	
Astigmata			1		
Talitridae		1			
Isotomidae	4				4
Hydraenidae					1
Scirtidae					1
Simuliidae			4		
Stratiomyidae		3	1		1
Tanypodinae		2		1	2
Orthoclaadiinae			1		
Chironominae			1	37	6
Baetidae					2
Corixidae				4	19
Notonectidae				1	1
Coenagrionidae		5	4	4	7
Isostictidae				9	20
Megapodagionidae	3	4	4		
Hemicorduliidae		1	5		6
Libellulidae		2		2	2
Leptoceridae				1	5
Ecnomidae					1
Cladocera		3	2	2	4
Ostracod	3	5	21	3	33
Copepod	1	7	6	5	2
Epiproctophora					2

Appendix B. Water Quality Guidelines

Prior to the construction of the RDC, baseline water quality monitoring indicated that the majority of parameters at each site exceed the recommended ANZECC/ARMCANZ (2000) default trigger values for lowland river ecosystems. Monitoring throughout the construction period also exceeded these default trigger values. As such, the default trigger values are not suitable for comparison against the operational ambient water quality within Angus and Eastern Creeks and an alternative approach recommended by ANZECC/ARMCANZ (2000) to determine site specific trigger values (SSTVs) was adopted. Site specific trigger values were derived from the 80th percentile of baseline data (and the 20th percentile where water quality should fall within a specified range) as per Error! Reference source not found.. These site specific values were approved and endorsed by the NSW Department of Planning and Environment on 19 October 2015.

Mean water quality results were then compared to the SSTV's at each site. Given that some of the SSTVs themselves are outside the recommend ANZECC/ARMCANZ (2000) trigger values, should monitoring results indicate an improvement in a water quality indicator, then the result was also assessed against the ANZECC/ARMCANZ (2000) Guidelines for protection of lowland river aquatic ecosystems (Table C-1)

Table C-1 Site Specific Water Quality Trigger Values & ANZECC/ARMCANZ (2000) guidelines

	Turbidity (NTU)	DO (%sat)	EC (µS/cm)	pH	TN (mg/L)	TP (mg/L)
AE1 SSTV	49.44	22.34-52.52	1242.598-3826.8	7.604-8.524	1.52	0.164
AE2 SSTV	41.666	21.92 - 47.052	1267.8 - 4015.998	7.548 - 8.64	2	0.158
AE3 SSTV	44.998	23.988 - 44.452	1181 - 4165.002	7.478 - 8.86	2.2	0.24
AE4 SSTV	68.182	33.34 - 49.378	824 - 1643.198	7.252 - 8.674	3.18	0.2
AE5 SSTV	90.838	31.482 - 51.04	791.398 - 1522.598	7.306 - 8.688	2.94	0.18
AE6 SSTV	181.618	32.198 - 62.258	1700.668 - 5399.202	7.73 - 9.02	5.1	0.74
ANZECC/ARMCANZ (2000) Guidelines	6-50	85-110	125-2200	6.5-8.5	0.5	0.05

Appendix D. Terrestrial ecology monitoring report – Q2 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
QUARTERLY ENVIRONMENTAL MONITORING REPORT**

Aspect	Terrestrial Ecology
Date	Q2 2016

SUMMARY

Monitoring period	Q2 2016 (Autumn)
Parameters monitored in period	Riparian Health Assessment
Changes from previous monitoring	None
Exceedances of assessment criteria	N/A
Action required	None

1. Introduction

This report details the results of the quarter 2 2016 (autumn) monitoring of riparian health. The monitoring was undertaken by Lukas Clews in accordance with the methods outlined in previous monitoring reports and the EMP.

Monitoring was undertaken at riparian environments across the six sampling sites that are characteristic of the River-flat Eucalypt Forest in the Sydney Basin Bioregion endangered ecological community as listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act). A Site Value assessment under the NSW BioBanking framework was undertaken for each sampling site to quantify the overall condition of the vegetation against established benchmarks for the Biometric vegetation types present in the study area. At each monitoring site a rapid assessment was used to characterise biological structure and function of the stream in order to provide a relative value of stream health against established indicators.

Jacobs ecologists are licensed to conduct field surveys under the National Parks and Wildlife Service Scientific Research Permit SL100044 and the Department of Primary Industries Animal Research Authority (09/1895).

2. Monitoring results – Autumn 2016

Total rainfall for the month preceding the autumn survey was 10.4 mm for the month of May (below average rainfall). May was hot and dry and not typical of autumn conditions. The survey was undertaken at the beginning of June in order to undertake the survey in conditions more representative of autumn. The month of June received 250.2 mm of rainfall in total which was considerably wetter (much higher than the June average of 81.3 mm). All rainfall data recorded at the Seven Hills (Collins St) station no. 67026. By June warmer conditions had subsided and conditions more representative of autumn had established.

2.1 Riparian site value and condition assessments

The condition rating for each of the six monitoring locations (AE1 to AE6) is illustrated in Figure 2-1 for the period up to and including autumn 2016. Gaps in the data represent periods of high rainfall where access to monitoring sites was impeded by localised flooding (i.e. spring 2013).

Variation in site value between sites continues to be seen but site value remains reasonably stable between years within monitoring sites (refer Figure 2-1), with the exception of monitoring periods which experienced flood events. A decrease in site value was seen at sites AE4, AE5 and AE6 in autumn 2016 compared to the previous monitoring event. This variation between summer and autumn seasons has been seen previously during the monitoring program and is due to normal seasonal variation. AE1 within the RDC site increased slightly in site value from summer 2016 to autumn 2016 due to a slight increase in native overstorey cover. This variability is likely to be natural as the change between seasons is not extensive.

Importantly, monitoring site AE1, which is within the Rooty Hill RDC site, consistently scores highly in terms of site value rating compared to the five reference sites (see Table 5-1).

Table 2-1 Site value and condition assessment scores for riparian vegetation in summer 2016

Monitoring site	Site value score	Condition
AE1 (Rooty Hill RDC site)	45	Moderate
AE2	17.5	Low-Moderate
AE3	24.2	Low-Moderate
AE4	51.7	Moderate-High
AE5	32.5	Low-Moderate
AE6	27.5	Low-Moderate

2.2 Riparian, Channel and Environmental Inventory

All monitoring locations were able to be measured in autumn 2016 with scores ranging from 35-39 out of a possible 52 (see Table 5-2 and Figure 5-2). All monitoring sites are ranked as very good under the RCE condition categories which are specific to the RDC and Nurragingy Reserve. Site AE1 experienced an increase in RCE score from last monitoring period.

Table 2-2 RCE score aggregates for monitoring locations

Descriptor	Site Value (0 – very poor, 4 – good)					
	AE1	AE2	AE3	AE4	AE5	AE6
RCE Score (total)	39	37	36	35	35	36
Condition	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good

3. Conclusions

Riparian habitat conditions at all sites remain relatively stable. The only variation observed is likely due to natural seasonal variation. Importantly, the habitat condition within Site AE1 within the RDC is consistent with the control sites in terms of seasonal fluctuation in site value rating. The riparian vegetation at Site AE1 remains in moderate condition. This suggests that construction and operation of the Rooty Hill RDC has not had a detrimental effect on riparian vegetation quality to date. Ongoing bush regeneration works in accordance with the Vegetation Management Plan should increase the site value of AE1 over time (works have been undertaken in other areas apart from the location of Site AE1).

The REC scores remain relatively stable and all sites are ranked as 'very good' according to the RCE condition categories which are specific to the RDC and Nurragingy Reserve. A slight increase in RCE score was seen in site AE1 at the RDC which is attributed to increased scores for stream detritus and stream bottom (likely a result of recent flushing by heavy rains). Across all sites the stream banks are stabilised by a range of native and exotic trees, shrubs and grasses. Site AE6 has banks that are fully stabilised by sandstone blocks. No evidence of loose or unstable stream banks was observed at the monitoring sites (however it is noted that as weed control works progress in the bushland at the RDC the potential for loosening of stream banks exists). There was no evidence of algal blooms or nuisance organisms at any of the sites. Instream and bank conditions at the monitoring locations vary with wet weather events which transport instream structures to and from monitoring locations.

Overall, there was no evidence of a detrimental impact on riparian habitat condition from activities within the RDC. The weed control works undertaken as part of the Vegetation Management Plan should serve to increase the riparian condition within the RDC.

Photos



Photo 1 : The creek bank at Site AE1 showing dense woody weed infestation



Photo 2 : The creek bank at Site AE2 showing woody weed infestation, some scouring and debris from recent heavy rainfall



Photo 3 : The creek bank at Site AE3 showing dense woody weed infestation



Photo 4 : Eastern Creek at AE4 showing murky water from recent heavy rainfall



Photo 5 : Eastern Creek at AE5 showing murky water from recent heavy rainfall and debris



Photo 6 : Site AE6 showing fully stabilised creek banks with sandstone rock armouring



Rooty Hill RDC

Holcim Australia

Quarterly environmental monitoring report - Q1 2016

| Final v1

10 May 2016



Rooty Hill RDC

Project no: IA089300
 Document title: Quarterly environmental monitoring report - Q1 2016
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 Revision: Final v1
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3.	Complaints.....	1
4.	Monitoring.....	1

Appendix A. Air quality and meteorology monitoring reports

- A.1 January 2016
- A.2 February 2016
- A.3 March 2016

Appendix B. Quarterly noise monitoring report – Q1 2016

Appendix C. Water quality monitoring report – Q1 2016

Appendix D. Terrestrial ecology monitoring report – Q1 2016

1. Introduction

This document provides a summary of environmental monitoring undertaken during operations at the Rooty Hill Regional Distribution Centre during the months of January to March 2016. The monitoring has been undertaken in accordance with the Project Approval which incorporates: Environmental Assessment Reports and Statement of Commitments (SoCs), the Minister's Conditions of Approval (MCoAs), and all management plans and strategies.

2. Background

Construction of the Regional Distribution Centre was completed in August 2015, with operations commencing shortly thereafter. Typical onsite operations include the following activities:

- Aggregate deliveries by rail
- Aggregate loading to stockpiles (from conveyor and loaders)
- Heavy vehicle loading

Reporting is carried out monthly, with a summary report issued each quarter. This report covers the first quarter of 2016.

3. Complaints

No complaints have been received to date for the project.

4. Monitoring

Environmental monitoring undertaken during the monitoring period of 1 January to 31 March 2016 consisted of attended noise, meteorological conditions, air quality, water quality, road traffic, riparian health and macro-invertebrates. All monitoring was undertaken by specialist consultants and all laboratory work was conducted by NATA (or equivalent) accredited testing facilities. The detailed monitoring reports are attached as appendices to this report.

Table 1 provides a summary of the environmental monitoring undertaken during the monitoring period.

If you have any questions or require any additional information, please contact Brian Cassel, Holcim Site Manager, on 02 8886 5402.

Table 1 Summary of Quarterly Environmental Monitoring January to March 2016

Parameter	Method	Frequency	Date	Discussion/Compliance Status	Actions	Reference
Air quality PM ₁₀	Dust PM ₁₀ High volume air sampler	Every 6 days	January 2016	PM ₁₀ dust sampling results for January 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8	Continuation of existing dust management practices, targeting emission sources	Appendix A1
			February 2016	PM ₁₀ dust sampling results for February 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8		Appendix A2
			March 2016	One exceedance of the PM ₁₀ criteria was recorded during March 2016. The Site Office high volume air sampler measured 51.1 µg/m ³ of PM ₁₀ on 8 March 2016.		Appendix A3
Dust Deposition	Dust deposition gauges	Monthly	January 2016	Dust deposition results for January 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8	Continuation of existing dust management practices, targeting emission sources	Appendix A1
			February 2016	Dust deposition results for February 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8		Appendix A2
			March 2016	Dust deposition results for March 2016 were compliant with air quality limits outlined in Minister's Condition of Approval 2.8		Appendix A3
Meteorological Conditions	On site weather station	Daily	January 2016	Meteorological data recorded for January 2016.	Monitoring of meteorological conditions to continue.	Appendix A1
			February 2016	Meteorological data recorded for February 2016.		Appendix A2
			March 2016	Meteorological data recorded for March 2016.		Appendix A3
Noise	Attended and unattended operational noise monitoring at 4 locations	Quarterly	January 2016	Operational noise levels compliant with noise criteria outlined in Minister's Condition of Approval 2.3	Quarterly monitoring of operational noise levels to continue.	Appendix B
Water Quality	Water quality testing of Angus Creek at 6 monitoring locations	Quarterly	January 2016	Water quality monitoring of Angus Creek and Eastern Creek was carried out during January 2016. At some locations site specific trigger values were exceeded, these included turbidity, dissolved oxygen, total nitrogen and total phosphorus. Comparison between a control site and downstream locations indicated that Holcim operations were unlikely to have influenced water quality during the monitoring period.	Water quality monitoring of Angus Creek and Eastern Creek to continue under operational monitoring regime	Appendix C
Parameter	Method	Frequency	Date	Discussion/Compliance Status	Actions	Reference
Macro-Invertebrate Angus Creek	Monitoring of diversity of families SIGNAL 2 score using AUSRIVAS protocols at 6 monitoring locations	Bi-annually	Not required	N/A	Macro-Invertebrate monitoring to continue bi-annually.	
Riparian Health and	NSW biometric vegetation condition	Quarterly	February 2016	Similar to previous seasons, riparian conditions at all sites were stable but exhibit seasonal variation. Succession of groundcover at some sites	Riparian health and condition monitoring to continue under	Appendix D

condition	benchmark methodology at 6 monitoring locations			<p>appears to be dominated by exotic species following the dieback of native species. Importantly, the habitat condition within Site AE1 within the RDC is consistent with the control sites in terms of seasonal fluctuation in site value rating.</p> <p>Instream and bank conditions at monitoring locations appear to vary with wet weather events which transport instream structures to and from monitoring locations. However the higher than usual scores recorded during this summer 2016 monitoring period is a result of increased stream bank structure scores and lack of sediment accumulation.</p> <p>There was no evidence of impact from Holcim operations on the riparian zone.</p>	operational monitoring regime.	
Traffic	Traffic inspections and monitoring	Fortnightly and quarterly	Fortnightly inspections	Fortnightly inspections observed zero non-compliance with the Construction Traffic Management Plan.	Monitoring to continue under operational monitoring regime.	-
			Quarterly monitoring	Quarterly traffic monitoring did not note any non-compliances with the Traffic Management Plan, and at no time were trucks found to be queuing on the local road network.		

Appendix A. Air quality and meteorology monitoring reports

A.1 January 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
MONTHLY ENVIRONMENTAL MONITORING REPORT**

Aspect Air Quality and Meteorology

Date January 2016

SUMMARY

Monitoring period 1 – 31 January 2016

Parameters monitored in period Dust (PM₁₀) / TSP^a
Depositional Dust
Local Meteorology

^a Derived from PM₁₀

Exceedance summary

- No exceedances of the PM₁₀ criteria were measured during January 2016.
- No exceedances of the dust deposition criteria were measured during January 2016.

1. Monitoring Locations

The monitoring locations at the Rooty Hill Regional Distribution Centre (RDC) for air quality and meteorology are shown in **Figure 1** and consist of:

- Dust monitoring (PM₁₀): Blacktown International Sportspark (formally Olympic Park)
Holcim Site office
- Dust monitoring (Depositional): Locations 1 to 3
- Meteorology: Blacktown International Sportspark (formally Olympic Park)

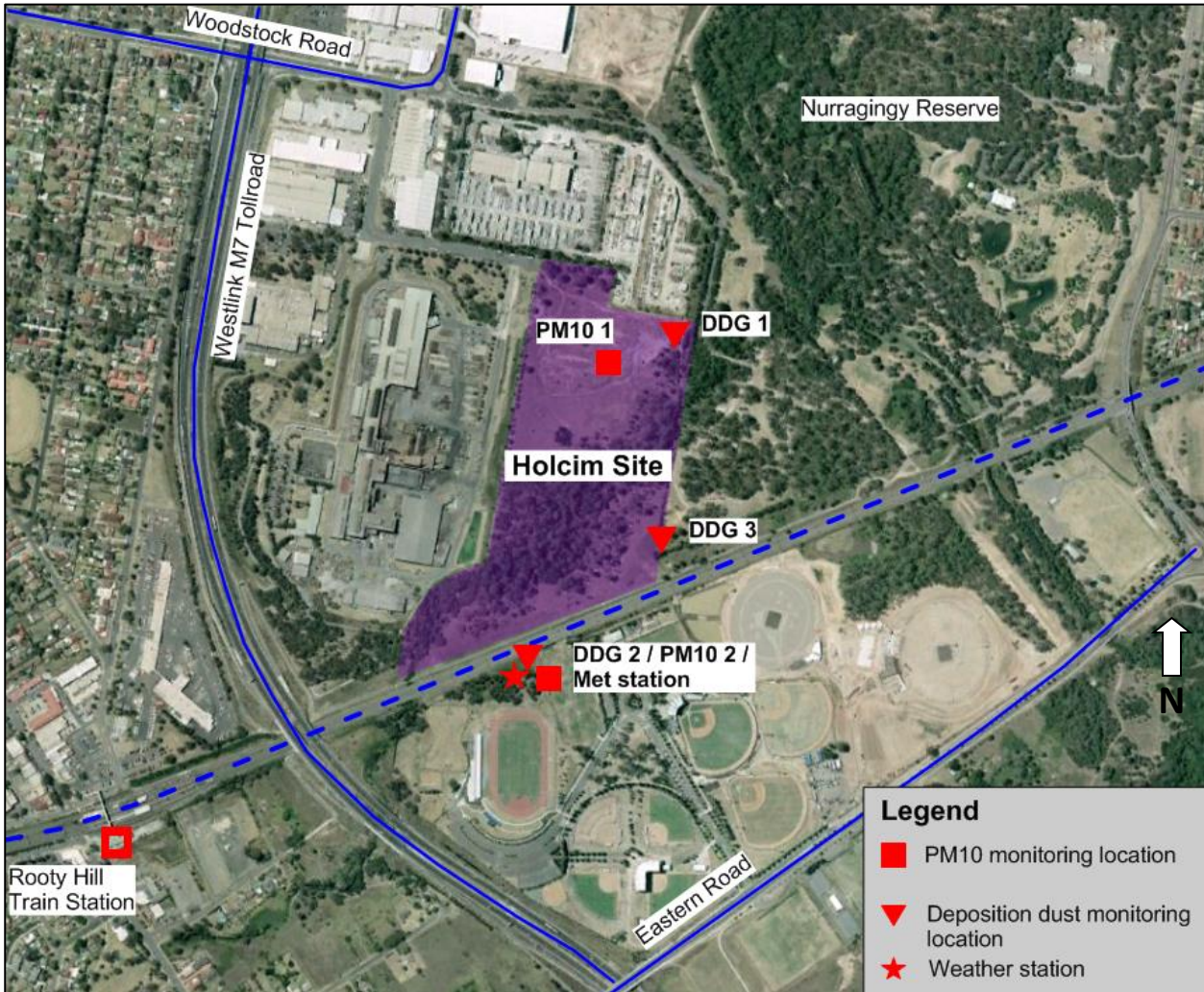


Figure 1 Monitoring locations

2. Monitoring Methodology

Dust

Air quality (dust) monitoring was undertaken using two Ecotech High Volume Air Samplers (HVAS) with Particulate Matter - 10µm (PM₁₀) sampling heads. The HVASs were operated on one-day-in-six in accordance with *AS/NZS 3580.9.6:2003 Methods for sampling and analysis of ambient air, Method 9.6: Determination of suspended particulate matter (PM₁₀) – High volume sampler with size selective inlet - Gravimetric method.*

Calibration of the unit is checked on a monthly basis, in accordance with operating instructions for the unit and *AS/NZS 3580.9.6:2003.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Monitoring Plan.

Depositional dust was monitored in accordance with *AS/NZS 3580.10.1:2003 Methods for sampling and analysis of ambient air Method 10.1: Determination of particulate matter – Deposited matter – Gravimetric method*.

Local Meteorology

Meteorological conditions were monitored using a Davis Vantage Pro2 Plus monitoring unit. This unit was positioned in accordance with *AS2923-1987 Ambient air – Guide for measurement of horizontal wind for air quality applications*.

The Davis Vantage Pro2 plus meteorological station does not satisfy the accuracy requirements of AS 3580.14-2011 for wind speed and direction measurements. However, no monitoring standards are specified in the Project Approval and the accuracy of the proposed unit is considered sufficient for the purposes of impact management.

The integrity of the meteorological monitoring station is checked every six days.

3. Guidelines

Air Quality

Air quality (dust) criteria within the Project Conditions of Approval, specifically Statement of Commitment (SoC) 4.1 and the Operational Environmental Management Plan (OEMP) mirror those in the NSW EPA document *Approved methods for the modelling and assessment of air pollutants in New South Wales* (DEC 2005). The air quality assessment criteria are outlined in **Table 1**, which apply cumulatively (that is, due to all sources of emissions and not just the contribution from the project).

Table 1 Air Quality Criteria

Pollutant	Averaging period	Concentration
PM ₁₀	24 hours	50 ug/m ³
	Annual	30 ug/m ³
TSP	Annual	90 ug/m ³
Deposited dust	Annual	4 g/m ² /month*

* *Depositional dust criteria contained in the NSW EPA methods specify a maximum contribution of 2g/m²/month, up to a maximum total depositional dust level of 4g/m²/month. This criterion assumes a typical existing load of 2g/m²/month, prior to the start of site operations.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Environmental Monitoring Plan.

Meteorology

SoC 3.3, 10.4 and 15.3 requires Holcim monitor local meteorological conditions at the site. To comply with the SoC the following parameters must be monitored:

- Daily air temperature
- Solar radiation
- Daylight hours
- Daily rainfall
- Daily evaporation
- Continuous wind speed and direction

4. Monitoring results

Air Quality

PM₁₀ / TSP

No exceedances of the PM₁₀ 24-hour criteria were measured during the monitoring period at either monitoring site.

A fault occurred with the high-volume air sampler at the Blacktown Sports Centre in late January. The fuse in the instrument was blown after a period of electrical storms in the region. The instrument was fixed but the filter from 26 January 2016 was invalidated from the dataset.

Table 2 HVAS Unit 1 (BSC) January 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
2/01/2016	8.9	50	22.3	NA
8/01/2016	13.4	50	33.5	NA
14/01/2016	23.4	50	58.5	NA
20/01/2016	28.9	50	72.3	NA
26/01/2016	-	50	-	NA
Annual average (to date)	17.8		44.6	

Table 3 HVAS Unit 2 (Site office) January 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
2/01/2016	11.7	50	29.3	NA
8/01/2016	23.3	50	58.3	NA
14/01/2016	29.4	50	73.5	NA
20/01/2016	33.2	50	83.0	NA
26/01/2016	11.2	50	28.0	NA
Annual average (to date)	23.0		57.4	

Depositional Dust

No exceedances of the depositional dust criteria were measured during the January reporting period.

Table 4 Depositional Dust Gauge Results January 2015

Location	Total Insoluble Matter (g/m ² /month)			Goal (annual average)
	1	2	3	
30/12/2015 to 02/02/2016	1	1.8	0.8	NA
Annual average	1.7	3.7	1.4	4 g /m ² /month

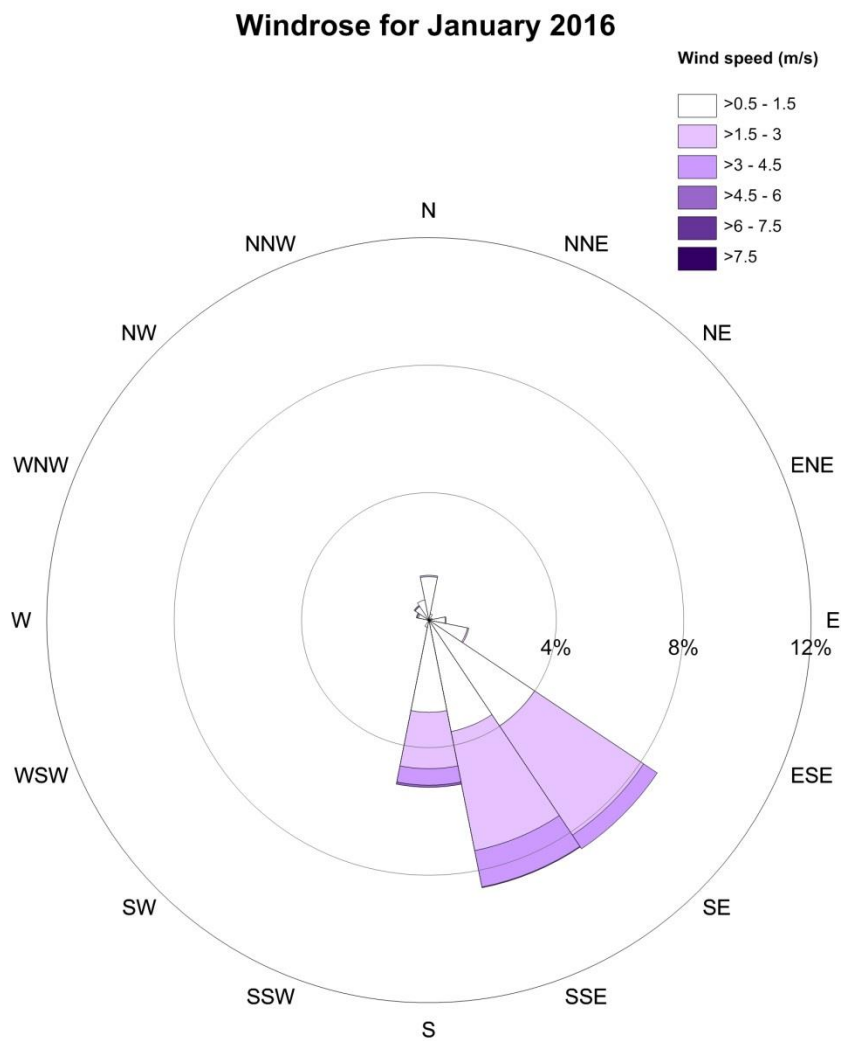
Local Meteorology

A wind rose showing the proportion of direction and strength of winds throughout the reporting period is below. A complete data set, including, humidity, temperature and rainfall is provided separately.

The prevailing winds during the monitoring period were predominately from the SE and SSE. Calm conditions occurred often during the monitoring period.

Under these conditions, dust impacts are more likely to affect receivers to the north west of the site. This area does not contain any residential properties.

Figure 2 January 2016 Windrose, Blacktown International Sports Centre meteorological station



A.2 February 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
MONTHLY ENVIRONMENTAL MONITORING REPORT**

Aspect Air Quality and Meteorology

Date February 2016

SUMMARY

Monitoring period 1 – 29 February 2016

Parameters monitored in period Dust (PM₁₀) / TSP^a
 Depositional Dust
 Local Meteorology

^a Derived from PM₁₀

Exceedance summary

- No exceedances of the PM₁₀ criteria were measured during February 2016.
- No exceedances of the dust deposition criteria were measured during February 2016.

1. Monitoring Locations

The monitoring locations at the Rooty Hill Regional Distribution Centre (RDC) for air quality and meteorology are shown in **Figure 1** and consist of:

- Dust monitoring (PM₁₀): Blacktown International Sportspark (formally Olympic Park)
Holcim Site office
- Dust monitoring (Depositional): Locations 1 to 3
- Meteorology: Blacktown International Sportspark (formally Olympic Park)

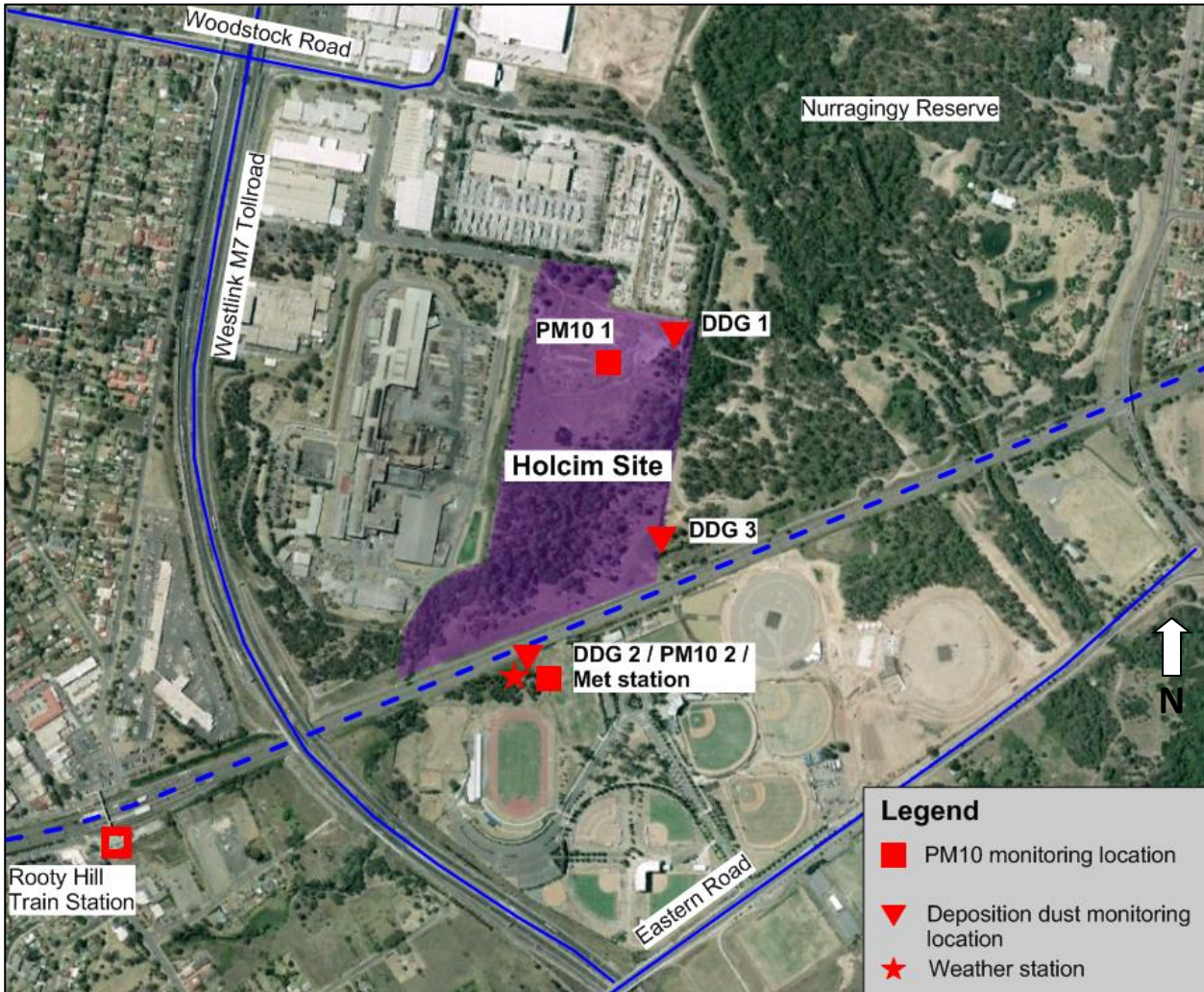


Figure 1 Monitoring locations

2. Monitoring Methodology

Dust

Air quality (dust) monitoring was undertaken using two Ecotech High Volume Air Samplers (HVAS) with Particulate Matter - 10µm (PM₁₀) sampling heads. The HVASs were operated on one-day-in-six in accordance with *AS/NZS 3580.9.6:2003 Methods for sampling and analysis of ambient air, Method 9.6: Determination of suspended particulate matter (PM₁₀) – High volume sampler with size selective inlet - Gravimetric method.*

Calibration of the unit is checked on a monthly basis, in accordance with operating instructions for the unit and *AS/NZS 3580.9.6:2003.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Monitoring Plan.

Depositional dust was monitored in accordance with *AS/NZS 3580.10.1:2003 Methods for sampling and analysis of ambient air Method 10.1: Determination of particulate matter – Deposited matter – Gravimetric method*.

Local Meteorology

Meteorological conditions were monitored using a Davis Vantage Pro2 Plus monitoring unit. This unit was positioned in accordance with *AS2923-1987 Ambient air – Guide for measurement of horizontal wind for air quality applications*.

The Davis Vantage Pro2 plus meteorological station does not satisfy the accuracy requirements of AS 3580.14-2011 for wind speed and direction measurements. However, no monitoring standards are specified in the Project Approval and the accuracy of the proposed unit is considered sufficient for the purposes of impact management.

The integrity of the meteorological monitoring station is checked every six days.

3. Guidelines

Air Quality

Air quality (dust) criteria within the Project Conditions of Approval, specifically Statement of Commitment (SoC) 4.1 and the Operational Environmental Management Plan (OEMP) mirror those in the NSW EPA document *Approved methods for the modelling and assessment of air pollutants in New South Wales* (DEC 2005). The air quality assessment criteria are outlined in **Table 1**, which apply cumulatively (that is, due to all sources of emissions and not just the contribution from the project).

Table 1 Air Quality Criteria

Pollutant	Averaging period	Concentration
PM ₁₀	24 hours	50 ug/m ³
	Annual	30 ug/m ³
TSP	Annual	90 ug/m ³
Deposited dust	Annual	4 g/m ² /month*

* *Depositional dust criteria contained in the NSW EPA methods specify a maximum contribution of 2g/m²/month, up to a maximum total depositional dust level of 4g/m²/month. This criterion assumes a typical existing load of 2g/m²/month, prior to the start of site operations.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Environmental Monitoring Plan.

Meteorology

SoC 3.3, 10.4 and 15.3 requires Holcim monitor local meteorological conditions at the site. To comply with the SoC the following parameters must be monitored:

- Daily air temperature
- Solar radiation
- Daylight hours
- Daily rainfall
- Daily evaporation
- Continuous wind speed and direction

4. Monitoring results

Air Quality

PM₁₀ / TSP

No exceedances of the PM₁₀ 24-hour criteria were measured during the monitoring period at either monitoring site.

Table 2 HVAS Unit 1 (BSC) February 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
1/02/2016	3.7	50	9.3	NA
7/02/2016	5.2	50	13.0	NA
13/02/2016	6.1	50	15.3	NA
19/02/2016	7.6	50	19.0	NA
25/02/2016	12.1	50	30.3	NA
Annual average (to date)	15.7		39.1	

Table 3 HVAS Unit 2 (Site office) February 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
1/02/2016	11.7	50	29.3	NA
7/02/2016	23.3	50	58.3	NA
13/02/2016	29.4	50	73.5	NA
19/02/2016	33.2	50	83.0	NA
25/02/2016	11.2	50	28.0	NA
Annual average (to date)	23.3		58.3	

Depositional Dust

No exceedances of the depositional dust criteria were measured during the February reporting period.

Table 4 Depositional Dust Gauge Results February 2015

Location	Total Insoluble Matter (g/m ² /month)			Goal (annual average)
	1	2	3	
02/02/2015 to 29/02/2016	2	2.7	0.9	N/A
Annual average	1.8	3.6	1.3	4 g /m ² /month

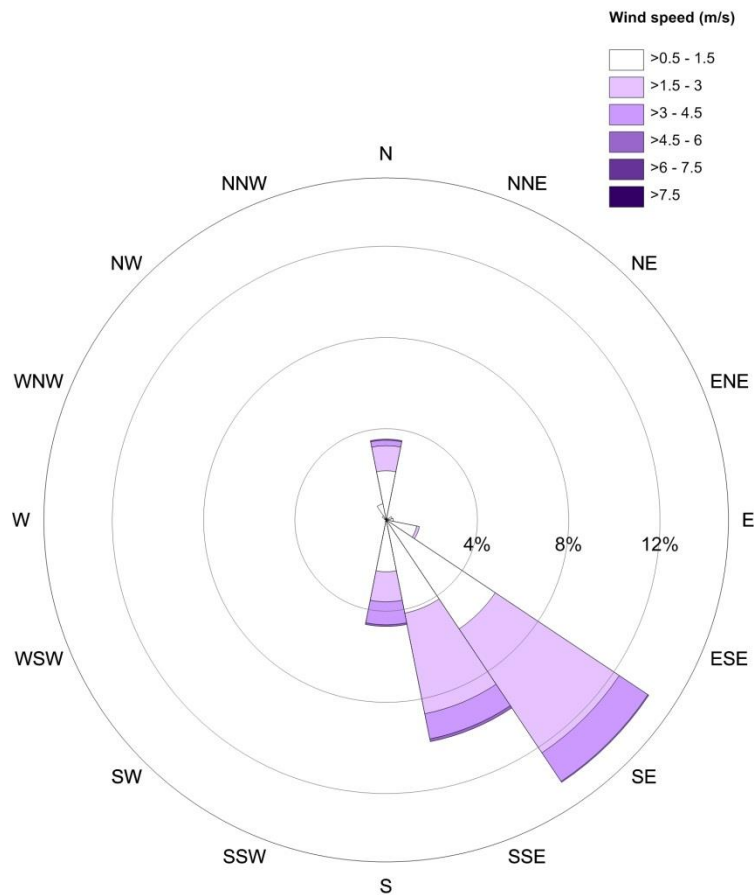
Local Meteorology

A wind rose showing the proportion of direction and strength of winds throughout the reporting period is below. A complete data set, including, humidity, temperature and rainfall is provided separately.

The prevailing winds during the monitoring period were predominately from the south-east and south-south-east. Calm conditions occurred often during the monitoring period.

Under these conditions, dust impacts are more likely to affect receivers to the north west of the site. This area does not contain any residential properties.

Figure 2 February 2016 Windrose, Blacktown International Sports Centre meteorological station



A.3 March 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
MONTHLY ENVIRONMENTAL MONITORING REPORT**

Aspect Air Quality and Meteorology

Date March 2016

SUMMARY

Monitoring period 1 – 31 March 2016

Parameters monitored in period Dust (PM₁₀) / TSP^a
 Depositional Dust
 Local Meteorology

^a Derived from PM₁₀

Exceedance summary

- One exceedance of the PM₁₀ criteria was recorded during March 2016. The Site Office high volume air sampler measured 51.1 µg/m³ of PM₁₀ on 8 March 2016.
- No exceedances of the dust deposition criteria were measured during March 2016.

1. Monitoring Locations

The monitoring locations at the Rooty Hill Regional Distribution Centre (RDC) for air quality and meteorology are shown in **Figure 1** and consist of:

- Dust monitoring (PM₁₀): Blacktown International Sportspark (formally Olympic Park)
Holcim Site office
- Dust monitoring (Depositional): Locations 1 to 3
- Meteorology: Blacktown International Sportspark (formally Olympic Park)

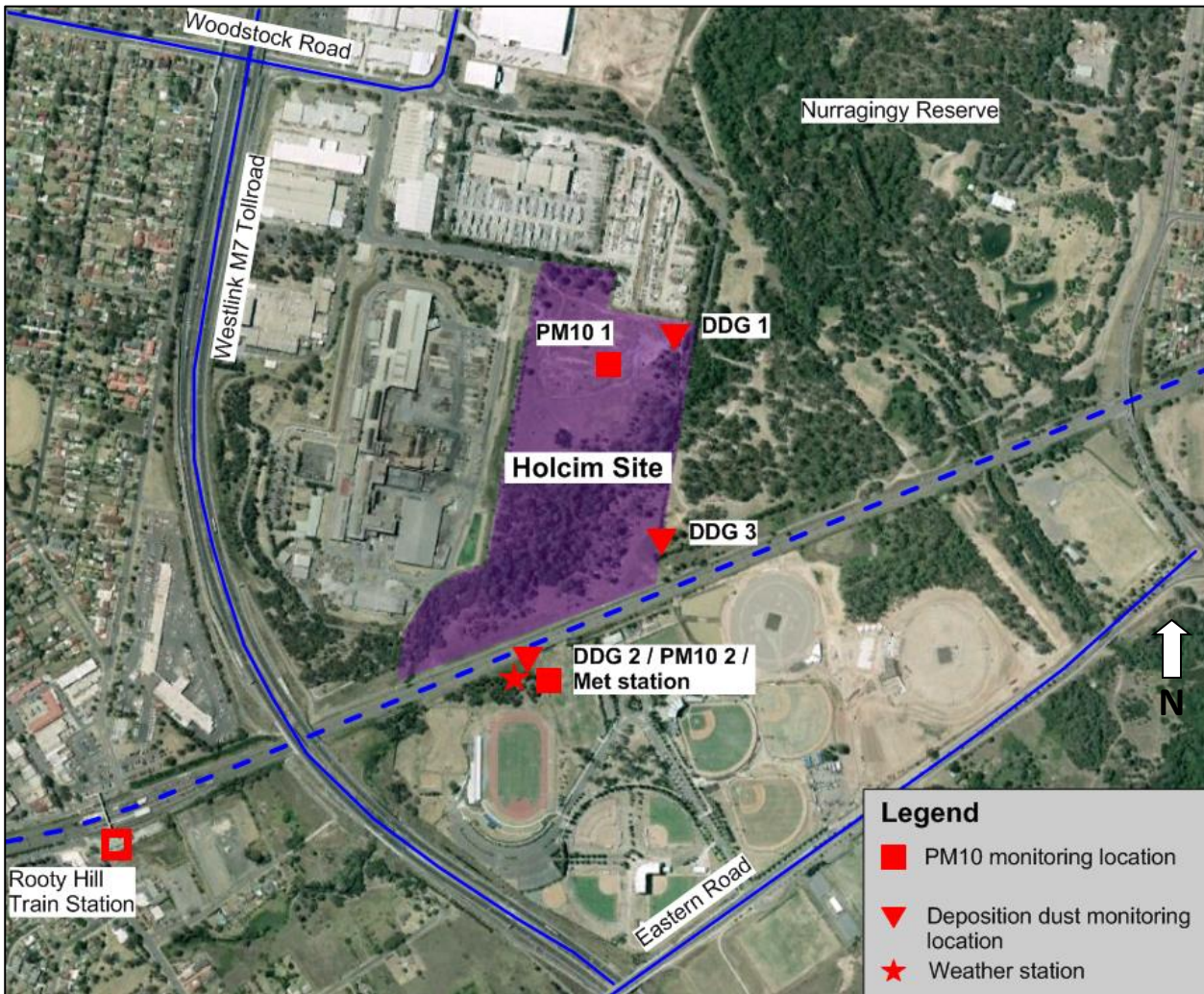


Figure 1 Monitoring locations

2. Monitoring Methodology

Dust

Air quality (dust) monitoring was undertaken using two Ecotech High Volume Air Samplers (HVAS) with Particulate Matter - 10µm (PM₁₀) sampling heads. The HVASs were operated on one-day-in-six in accordance with *AS/NZS 3580.9.6:2003 Methods for sampling and analysis of ambient air, Method 9.6: Determination of suspended particulate matter (PM₁₀) – High volume sampler with size selective inlet - Gravimetric method.*

Calibration of the unit is checked on a monthly basis, in accordance with operating instructions for the unit and *AS/NZS 3580.9.6:2003.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Monitoring Plan.

Depositional dust was monitored in accordance with *AS/NZS 3580.10.1:2003 Methods for sampling and analysis of ambient air Method 10.1: Determination of particulate matter – Deposited matter – Gravimetric method*.

Local Meteorology

Meteorological conditions were monitored using a Davis Vantage Pro2 Plus monitoring unit. This unit was positioned in accordance with *AS2923-1987 Ambient air – Guide for measurement of horizontal wind for air quality applications*.

The Davis Vantage Pro2 plus meteorological station does not satisfy the accuracy requirements of AS 3580.14-2011 for wind speed and direction measurements. However, no monitoring standards are specified in the Project Approval and the accuracy of the proposed unit is considered sufficient for the purposes of impact management.

The integrity of the meteorological monitoring station is checked every six days.

3. Guidelines

Air Quality

Air quality (dust) criteria within the Project Conditions of Approval, specifically Statement of Commitment (SoC) 4.1 and the Operational Environmental Management Plan (OEMP) mirror those in the NSW EPA document *Approved methods for the modelling and assessment of air pollutants in New South Wales* (DEC 2005). The air quality assessment criteria are outlined in **Table 1**, which apply cumulatively (that is, due to all sources of emissions and not just the contribution from the project).

Table 1 Air Quality Criteria

Pollutant	Averaging period	Concentration
PM ₁₀	24 hours	50 ug/m ³
	Annual	30 ug/m ³
TSP	Annual	90 ug/m ³
Deposited dust	Annual	4 g/m ² /month*

* *Depositional dust criteria contained in the NSW EPA methods specify a maximum contribution of 2g/m²/month, up to a maximum total depositional dust level of 4g/m²/month. This criterion assumes a typical existing load of 2g/m²/month, prior to the start of site operations.*

TSP will not be directly monitored, and instead will be calculated by application of a conversion factor (PM₁₀ x 2.5 = TSP), in accordance with the site Operational Environmental Monitoring Plan.

Meteorology

SoC 3.3, 10.4 and 15.3 requires Holcim monitor local meteorological conditions at the site. To comply with the SoC the following parameters must be monitored:

- Daily air temperature
- Solar radiation
- Daylight hours
- Daily rainfall
- Daily evaporation
- Continuous wind speed and direction

4. Monitoring results

Air Quality

PM₁₀ / TSP

There was one measured exceedance of the PM₁₀ 24-hour criteria during the monitoring period. It occurred at the Site Office high-volume air sampler, measuring 51.1 µg/m³ on 8 March 2016.

Table 2 HVAS Unit 1 (BSC) March 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
2/03/2016	6.6	50	16.5	NA
8/03/2016	11.0	50	27.5	NA
14/03/2016	8.1	50	20.3	NA
20/03/2016	4.1	50	10.3	NA
26/03/2016	7.1	50	17.8	NA
Annual average (to date)	14.1		35.1	

Table 3 HVAS Unit 2 (Site office) March 2016 PM₁₀ and TSP Results

Date	PM ₁₀ (ug/m ³)		TSP	
	Measured result	Criteria	Calculated result (PM10 x 2.5)	Criteria
2/03/2016	25.0	50	62.5	NA
8/03/2016	51.1	50	127.8	NA
14/03/2016	33.4	50	83.5	NA
20/03/2016	13.2	50	33.0	NA
26/03/2016	22.6	50	56.5	NA
Annual average (to date)	24.2		60.6	

Depositional Dust

No exceedances of the depositional dust criteria were measured during the March 2016 reporting period.

Table 4 Depositional Dust Gauge Results March 2016

Location	Total Insoluble Matter (g/m ² /month)			Goal (annual average)
	1	2	3	
29/02/2016 to 31/03/2016	1.6	3.6	0.7	N/A
Annual average	1.8	3.6	1.2	4 g/m ² /month

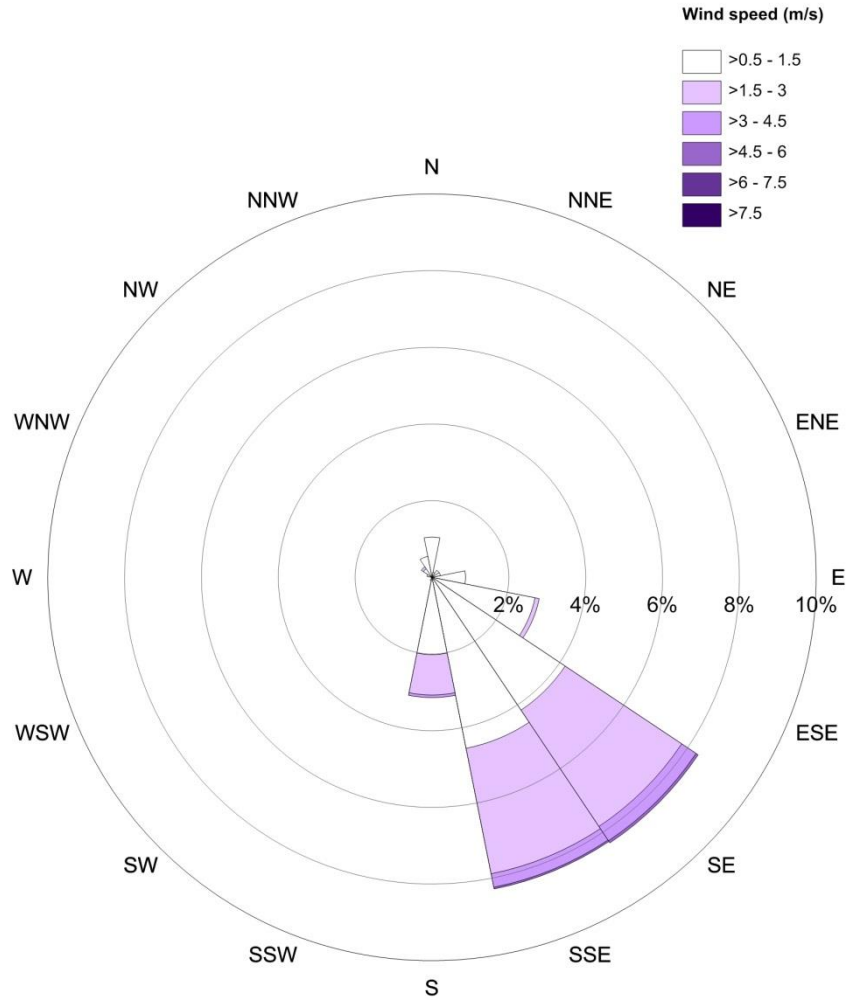
Local Meteorology

A wind rose showing the proportion of direction and strength of winds throughout the reporting period is below. A complete data set, including, humidity, temperature and rainfall is provided separately.

The prevailing winds during the monitoring period were predominately from the south-east and south-south-east. Calm conditions occurred often during the monitoring period. Under these conditions, dust

impacts are more likely to affect receivers to the north west of the site. This area does not contain any residential properties.

Figure 2: March 2016 Wind rose, Blacktown International Sports Centre meteorological station



Appendix B. Quarterly noise monitoring report – Q1 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
MONTHLY ENVIRONMENTAL MONITORING REPORT**

Aspect	Operational Noise
Date	1 February 2016

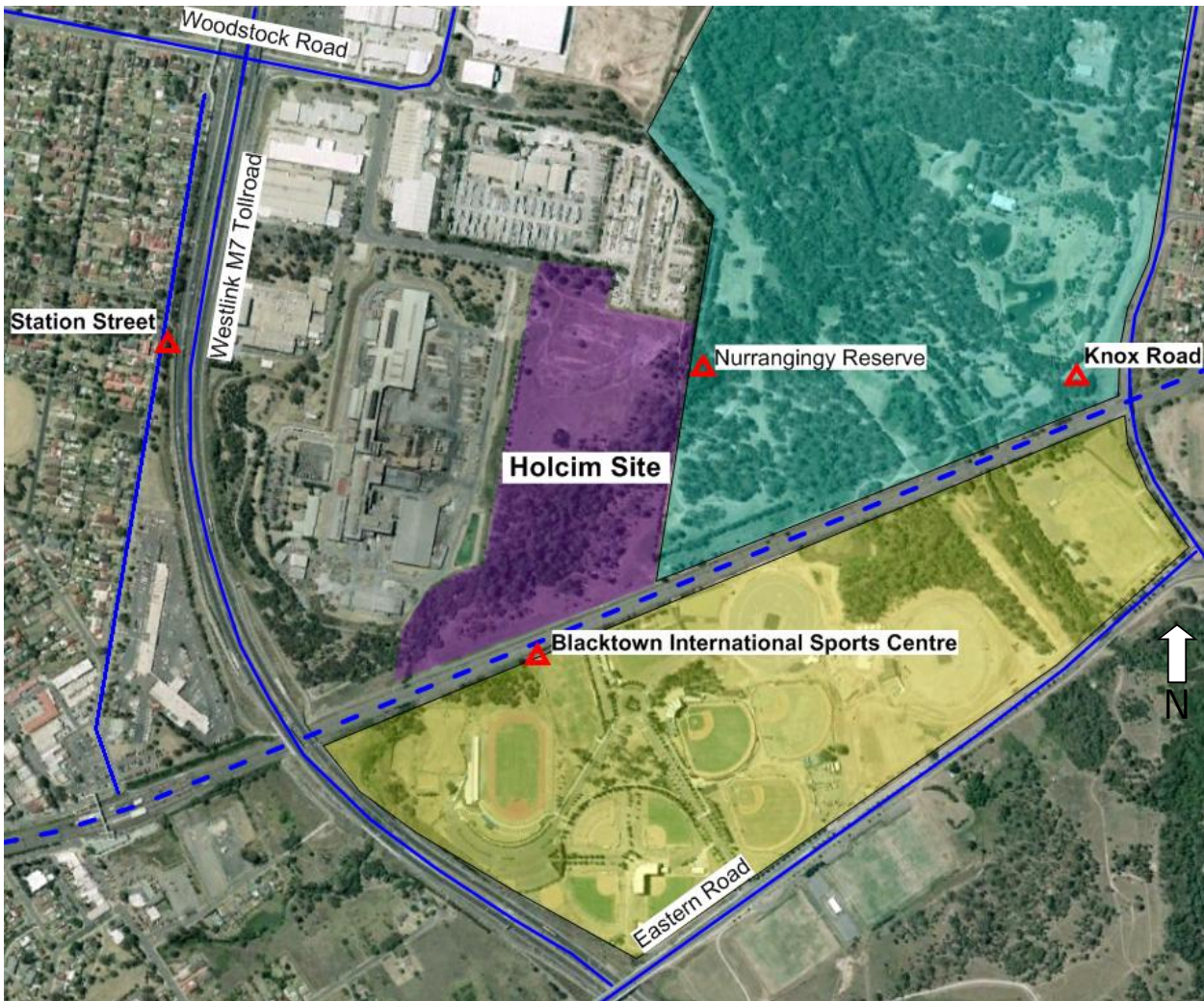
SUMMARY

Monitoring period	1 January to 31 March 2016 (Q1)
Parameters monitored in period	Operational noise
Exceedance summary	No attributable exceedances of the operational noise criteria were recorded in Q1 2016.
Action required	None

1. Monitoring Locations

The monitoring locations at the Rooty Hill Regional Distribution Centre (RDC) for operational noise monitoring are shown in **Figure 1** and consist of:

- Knox Road (Crawford Road)
- Station Street
- Blacktown International Sports Centre
- Nurranginy Reserve



■ Figure 1 Noise monitoring locations

2. Monitoring Methodology

2.1 Attended noise monitoring

Operational site noise was monitored for 15 minute attended periods during day times when the site was in use. As no evening or night work was proposed for this monitoring period, attended monitoring was not conducted during these periods.

Monitoring was carried out in accordance with the requirements set out in the EPA (2000) *Industrial Noise Policy* and *AS1055 Acoustics: Description and measurement of environmental noise*. Attended monitoring was carried out using a SVAN 958 Type 1 Sound Level Meter by appropriately qualified personnel. Calibration of the unit was checked before and after each monitoring period, and the drift was below 0.5dB.

2.2 Unattended noise monitoring

In addition to attended noise monitoring, unattended monitoring was conducted for an approximate one week period. This monitoring was carried out using NGARA Type 1 noise loggers, and recorded 0.1 second L_{Aeq} noise levels in addition to an audio recording for the purposes of noise source identification.

Monitoring locations were selected in accordance with the Operational Noise Management Plan and are representative of all the nearest noise sensitive receivers to the Holcim site.

3. Site noise criteria

The noise criteria for each location are outlined in the Operational Noise Management Plan (OEMP) for the site, and are based on the Ministers Conditions of Approval [MCoA 5.5a)]. These criteria are provided in **Table 1**.

■ **Table 1 Operational noise criteria**

Location	Morning shoulder 6am-7am Monday to Saturday and 6am-8am Sundays and public holidays	Day 7am-6pm Monday to Saturday and 8am-6pm Sundays and public holidays	Evening 6pm-10pm Monday to Sunday	Night 10pm-7am Monday to Saturday and 10pm-8am Sunday	
	L _{Aeq} (15 minute) dB(A)	L _{Aeq} 15 minute, dB(A)	L _{Aeq} 15 minute, dB(A)	L _{Aeq} 15 minute, dB(A)	LA1 1 minute, dB(A)
Any residences in Station Street	39	44	44	39	53
Any residences in Crawford Road (Knox Road)	40	40	39	39	53
Any residences in Mavis Street	35	35	35	35	53
Nurragingy Reserve	When Reserve is in use – L _{Aeq} 50 dB(A)				
Colebee Centre	When the Centre is in use – L _{Aeq} 50 dB(A)				
Blacktown Olympic Park (Active recreation areas)	When active recreational areas of the Park are in use – L _{Aeq} 55 dB(A)				

4. Noise monitoring results

During the week of both attended and unattended noise monitoring, the following activities were underway on the Holcim site:

1. Daytime Loading of trucks, general site activities
2. Evening No activities on site
3. Night time No activities on site

4.1 Attended noise monitoring results

The results of attended construction noise monitoring are presented in **Table 6**.

Night time attended monitoring was carried out during the unloading of an aggregate delivery train. At this time site conveyors were in operation and wagon vibrators were in use.

■ **Table 6 Attended Noise Monitoring Results Q1 2016**

Location	Start	Holcim contribution L _{Aeq} (15 minute) dB(A)	L _{Aeq}	L _{A90}	Criteria L _{Aeq} (15 minute) dB(A)	Notes
Daytime - Wednesday 13/01/2016						
Knox Road	15:00	Inaudible	53.7	42.8	40	Knox Road constant (45-55), birds
Blacktown International Sports Centre	15:30	Inaudible	55.4	51.1	55	Trains (65-70), M7 constant (45-55), birds, cicadas
Station Street	13:30	Inaudible	55.7	52.6	44	M7 - constant (55-60), birds, cicadas
Nurranginy Reserve	14:00	40	51.3	44.5	50	Local traffic (55-60), birds, cicadas Holcim - Squawkers (45-52), occasional trucks, dumping aggregate material (brief - 50), loaders (40-45)
Evening						
Knox Road	-	No work	-	-	-	No work on site during evening hours
Blacktown International Sports Centre	-	No work	-	-	-	Centre not in use
Station Street	-	No work	-	-	-	No work on site during evening hours
Nurranginy Reserve	-	No work	-	-	-	Reserve not in use
Night						
Knox Road	-	No work	-	-	-	No work on site during evening hours
Blacktown International Sports Centre	-	No work	-	-	-	Centre not in use
Station Street	-	No work	-	-	-	No work on site during evening hours
Nurranginy Reserve	-	No work	-	-	-	Reserve not in use

4.2 Unattended noise monitoring results

Detailed monitoring results are presented in **Appendix A**, and a discussion of the results is presented below in **Table 7**.

Representative audio recordings of periods of exceedances have been examined in order to identify the noise source.

■ Table 7 Unattended Noise Monitoring Results Q1 2016

	Criteria L _{Aeq} (15 minute)	Monitored noise level L _{Aeq} (period)	Estimated Holcim contribution L _{Aeq} dB(A)	Notes
Knox Road				
Day	40	54.7	Inaudible	Knox Rd traffic (40-50), birds, trains, local traffic, cicadas
Evening	39	53.0	No work	Knox Rd traffic (45-50), birds, trains
Night	39	51.8	No work	Distant traffic - possibly M7 (40), trains, occasional traffic Knox Rd (peaks)
Station Street				
Day	44	58.6	Inaudible	M7 - especially heavy vehicles (55-60), local traffic, cicadas
Evening	39	54.4	No work	M7 (50), local traffic , crickets
Night	39	50.9	No work	M7 - especially heavy vehicles (46-50), crickets
Blacktown International Sports Centre				
Day	55	62.3	<40	M7 (45-50), trains (65-70), players on field (BISC), frogs, crickets, birds, cicadas, HVAS (70 13/1 & 19/1) Occasional reversing beepers - possibly Holcim or BISC (50)
Evening	55	61.9	No work	M7 (45-50), trains (65-70), players on field (BISC), frogs, train passbys
Night	-	62.4	No work	M7 (40-45), trains (65-70), frogs, train passbys
Nurranginy Reserve				
Day	50	52.3	<40	M7 (46), crickets, birds, cicadas Holcim - occasional squawkers (45 L_{Amax}), dumping material (brief 50-55)
Evening	-	52.3	No work	Distant M7 (40), crickets, trains
Night	-	48.6	No work	Distant M7 (40), crickets, animals in undergrowth, trains

5. Noise monitoring discussion

No attributable exceedences of construction noise management levels were observed during Q1 2016 monitoring.

Noise contributions from the Holcim site were inaudible at all times at both Station Street and Knox Road / Crawford Road.

Noise contributions from the Holcim site were well below the operational site criteria during all observed time periods at both BISC and Nurrangingy Reserve.

No work was underway outside of day time hours during this monitoring period.

6. Recommendations

It is understood that loaders are being acoustically treated, with the specific aim of reducing noise emissions to Nurrangingy reserve. This will further reduce Holcim noise contributions at areas east of the site.

Total noise levels at all sites were consistently higher than site noise criteria during all time periods. This was apparent even when the site was not audible or in operation.

Previous monitoring undertaken during the (approximate) 3 year site construction period reinforce the conclusion that overall background noise in the vicinity of the project site has increased substantially since project criteria were set. Additionally at no time has site noise been audible at either Knox Road or Station Street.

On this basis it may be prudent to investigate the modification of project noise criteria contained within the site's developmental consent.

Appendix A - Detailed unattended noise monitoring results

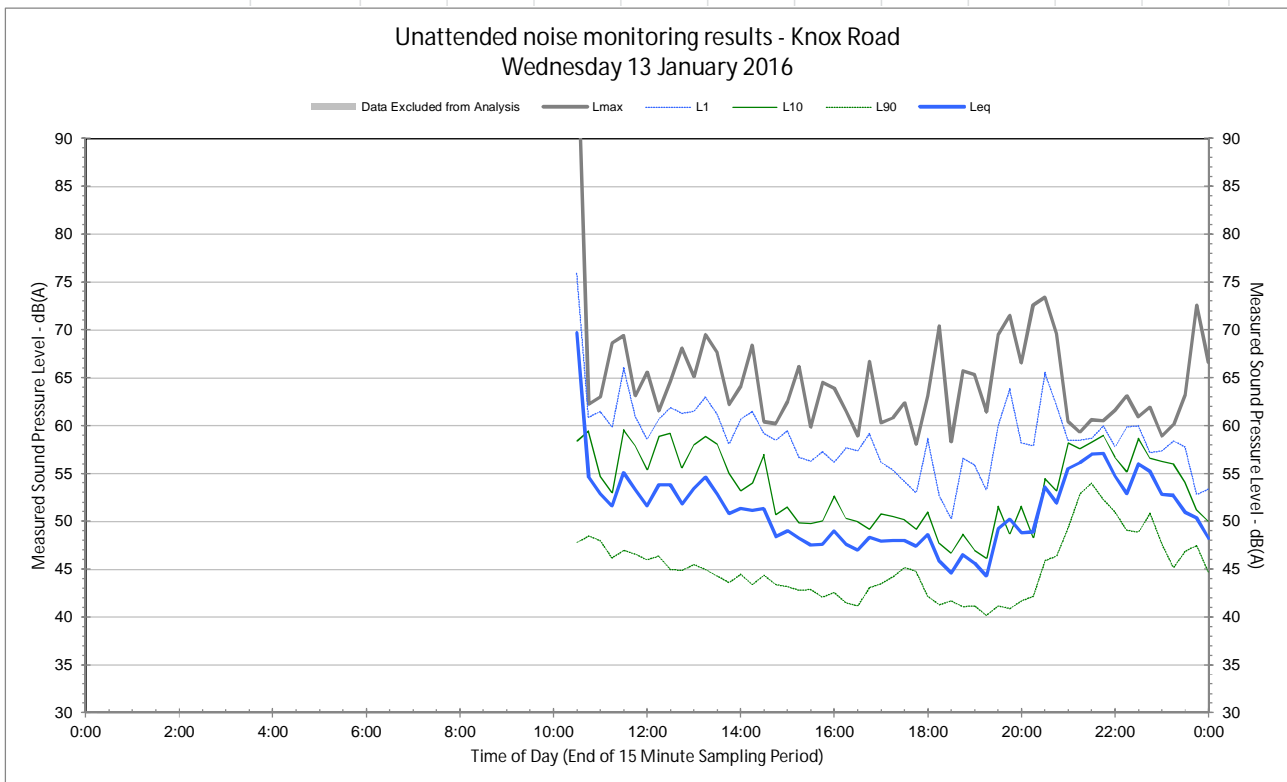
A.1 Knox Road

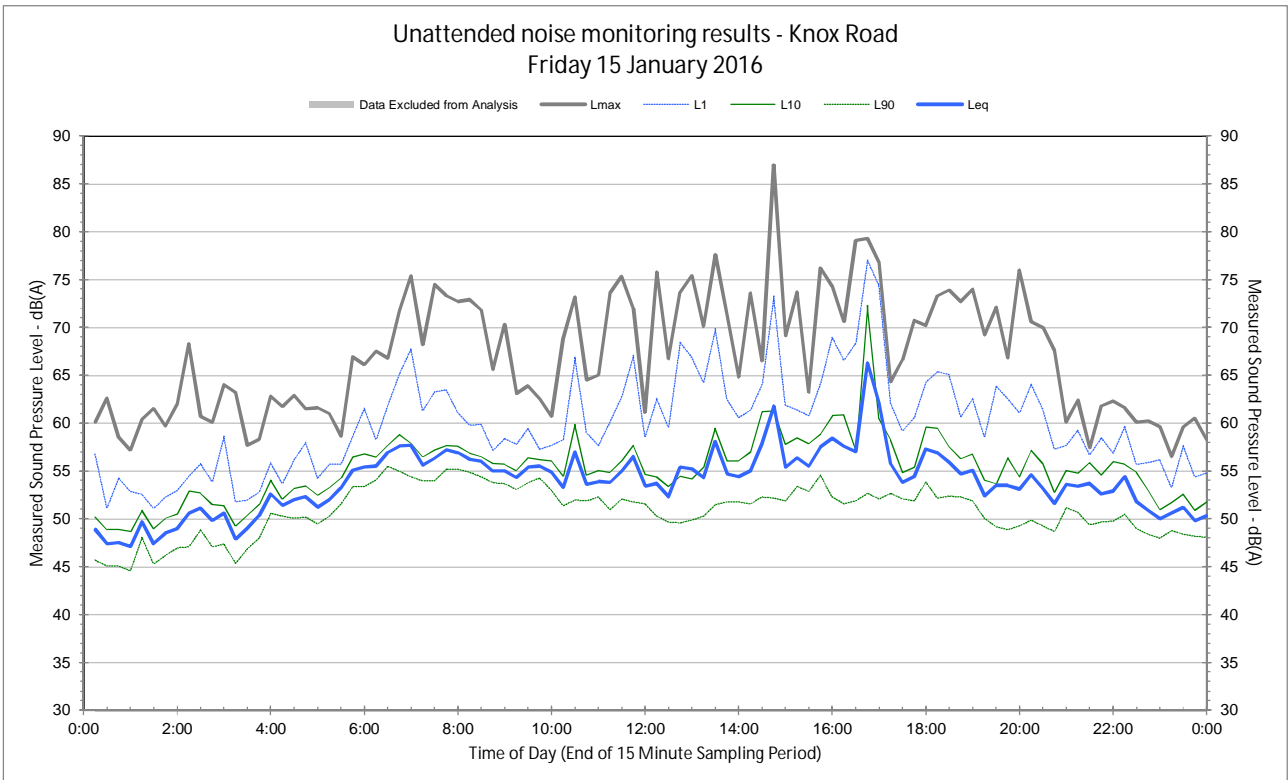
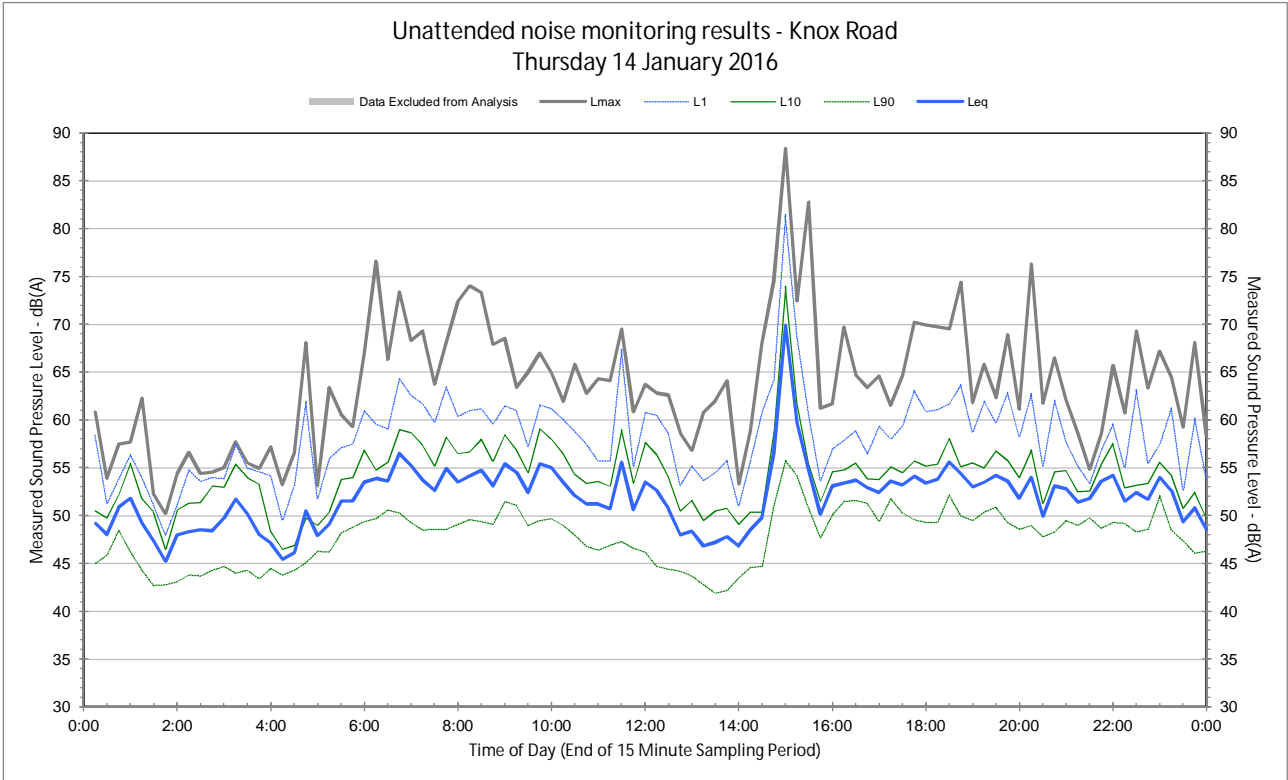
Unattended noise monitoring results - Knox Road

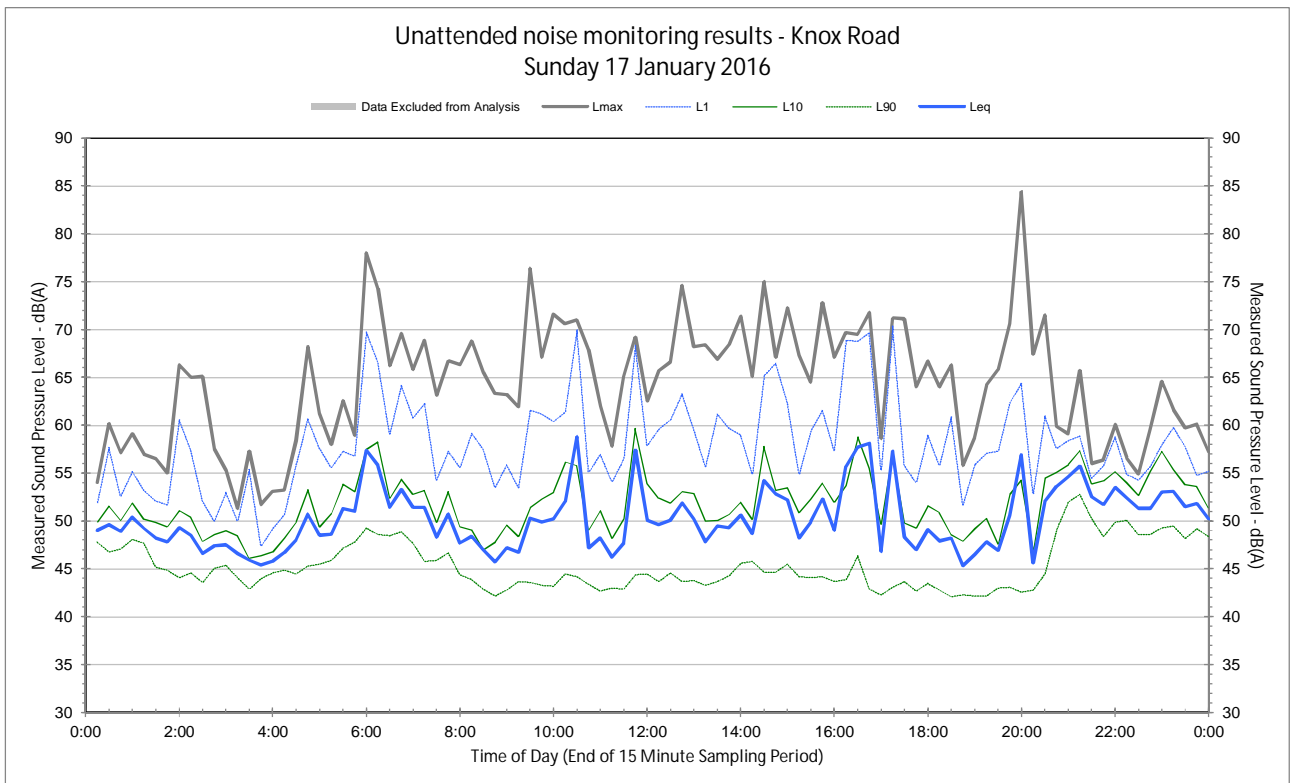
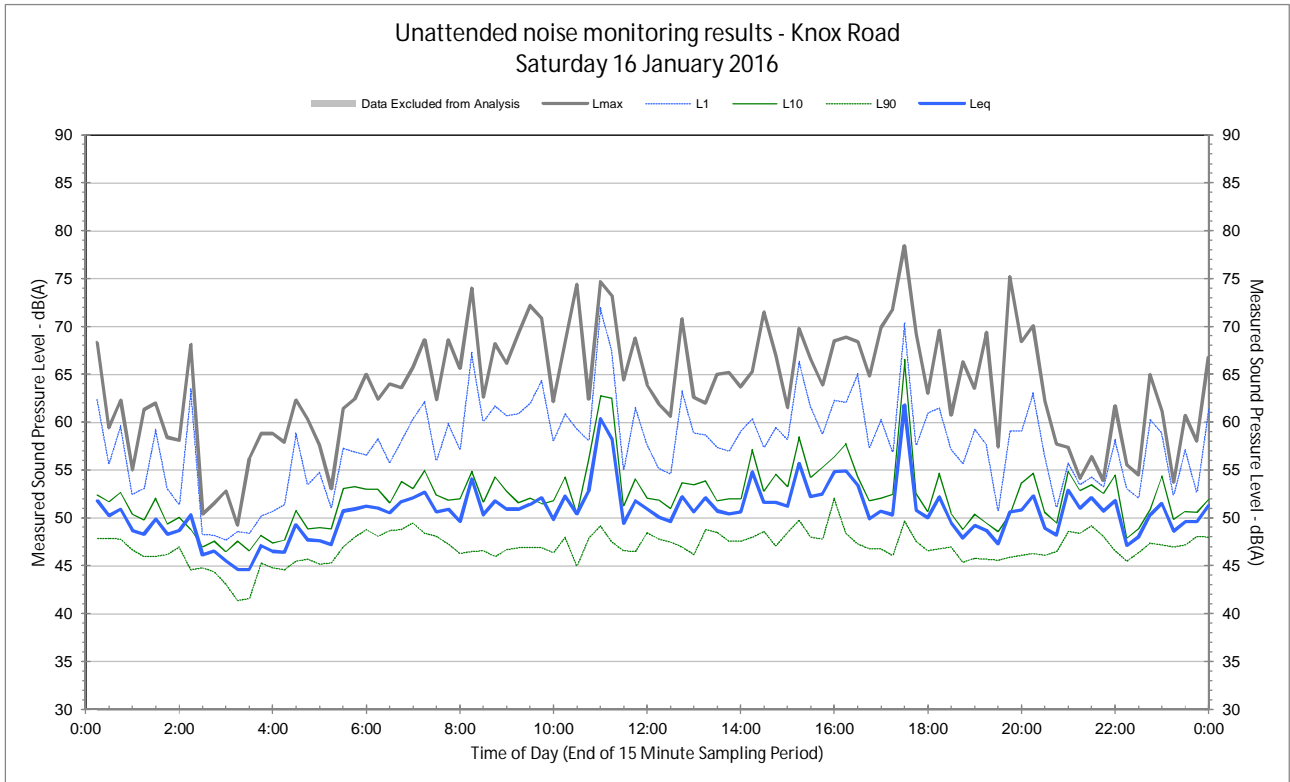
7:00:00 AM to 6:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	63.1	59.2	56.7	53.2	46.9	44.4	43.8	42.9	42.1	51.1	56.4
Thursday 14 January 2016	64.7	59.5	56.5	55.2	51.4	49.0	48.3	47.5	46.5	53.2	56.3
Friday 15 January 2016	71.0	61.7	57.9	56.5	54.1	52.2	51.8	51.3	50.5	55.5	57.1
Saturday 16 January 2016	67.6	60.0	55.4	52.8	49.2	47.5	47.1	46.4	45.7	51.3	53.4
Sunday 17 January 2016	67.2	59.3	54.2	52.0	46.3	43.8	43.4	42.7	41.8	49.8	52.0
Monday 18 January 2016	63.9	61.1	59.3	57.9	48.8	44.7	44.2	43.3	42.3	53.9	54.7
Tuesday 19 January 2016	65.7	60.5	58.7	57.1	50.3	45.7	45.0	43.9	42.6	53.6	56.9
Wednesday 20 January 2016	62.5	57.4	55.2	53.9	49.6	47.0	46.3	45.3	44.1	51.3	51.2
Thursday 21 January 2016	63.2	59.5	57.9	57.3	51.7	44.4	44.1	43.7	43.0	53.9	53.8
Median	64.7	59.5	56.7	55.2	49.6	45.7	45.0	43.9	43.0	53.2	54.7

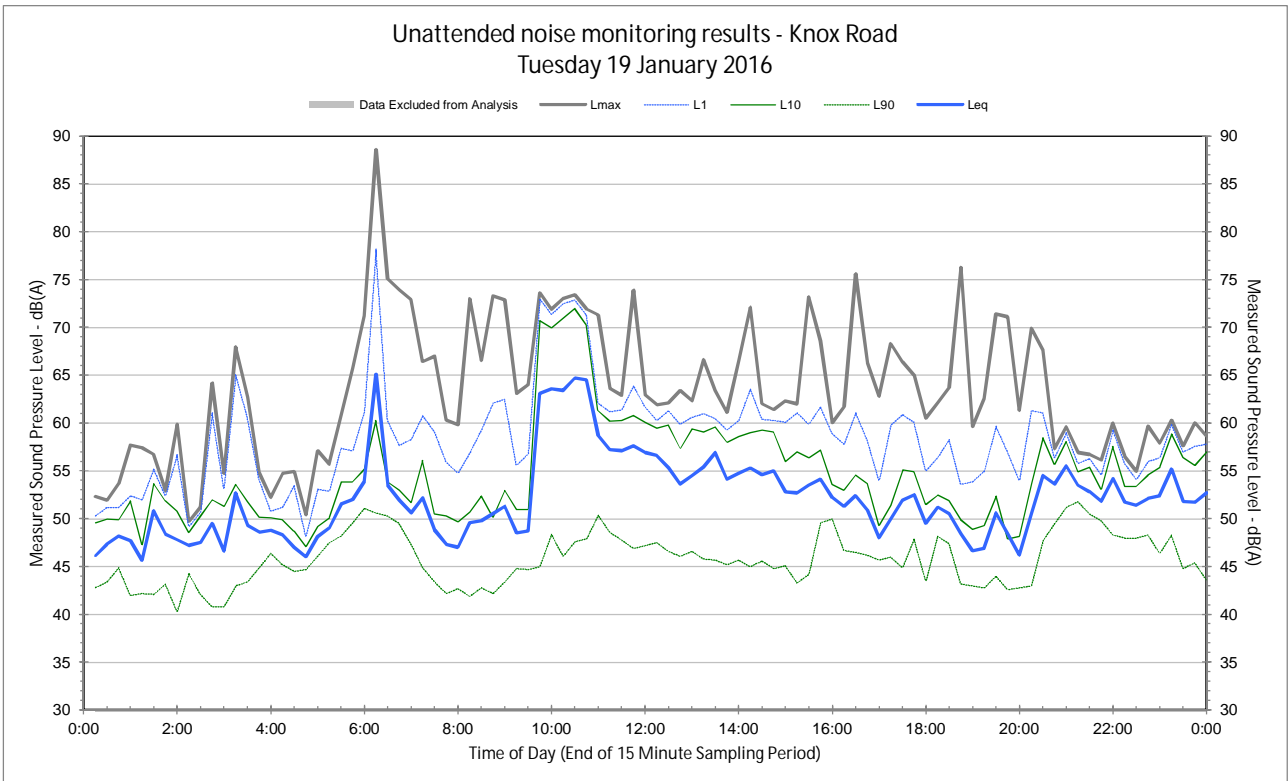
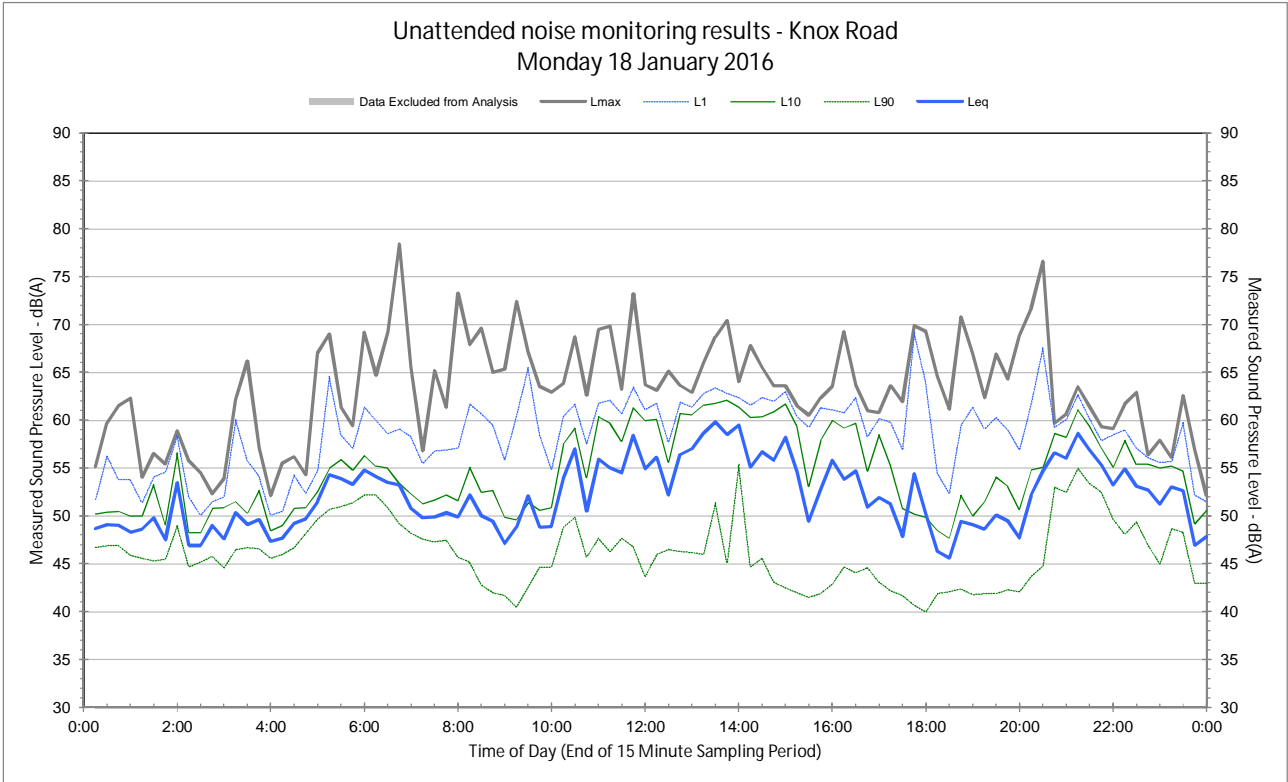
6:00:00 PM to 10:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	65.5	58.4	54.0	51.6	44.7	42.0	41.5	40.8	39.9	49.7	52.7
Thursday 14 January 2016	64.0	59.7	56.5	55.3	51.9	49.3	48.7	47.9	47.0	53.6	53.4
Friday 15 January 2016	69.6	60.9	56.8	55.9	51.6	49.9	49.5	48.9	48.1	53.5	54.0
Saturday 16 January 2016	62.0	56.9	52.8	51.6	48.0	46.4	46.0	45.5	44.8	50.7	50.6
Sunday 17 January 2016	64.1	57.5	54.8	53.4	45.1	43.1	42.8	42.1	41.4	51.2	52.0
Monday 18 January 2016	63.9	59.4	56.3	54.5	46.3	43.1	42.5	41.6	40.7	51.2	53.6
Tuesday 19 January 2016	61.7	56.4	54.4	52.8	50.0	47.6	46.8	45.6	44.6	50.9	51.8
Wednesday 20 January 2016	61.4	58.3	55.6	54.4	50.5	48.4	47.9	46.9	46.1	52.7	53.3
Thursday 21 January 2016											
Median	64.0	58.3	55.2	53.9	49.0	47.0	46.4	45.5	44.7	51.2	53.0

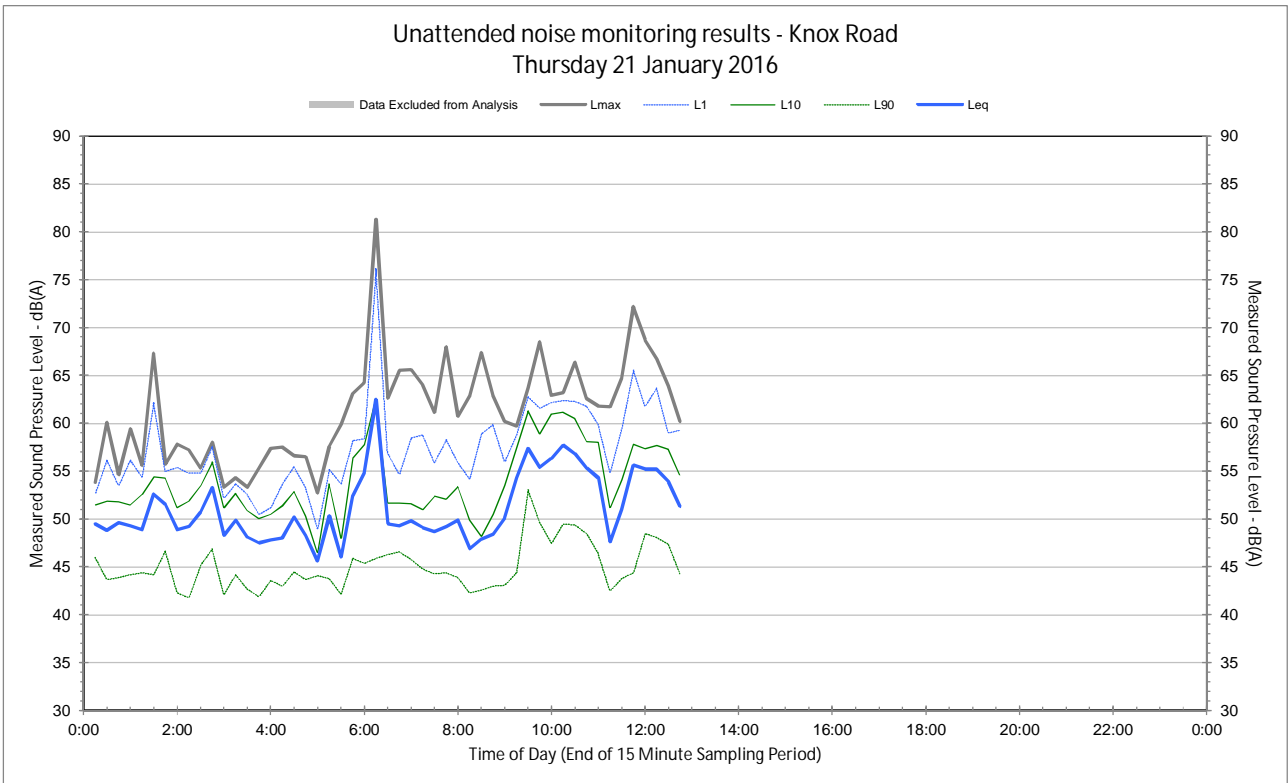
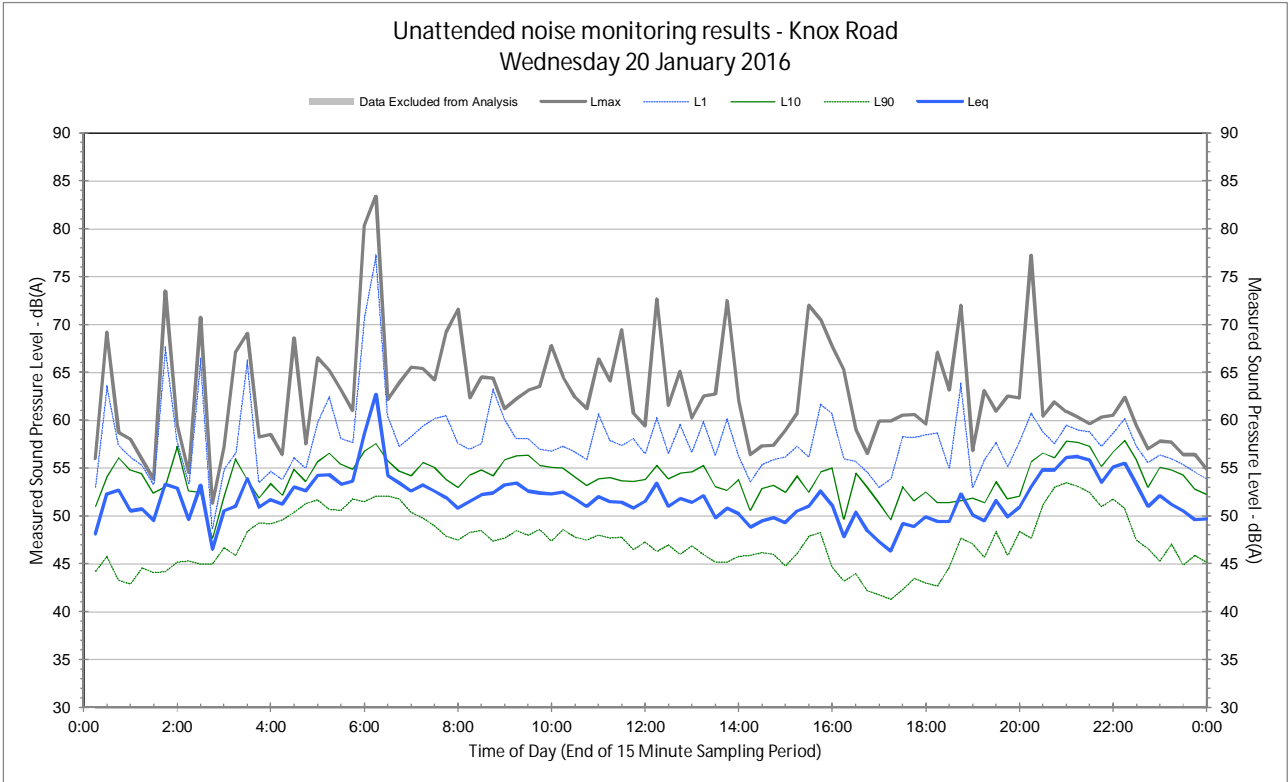
10:00:00 PM to 7:00:00 AM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	59.1	55.5	53.9	53.1	47.4	45.6	45.2	44.5	43.7	50.3	51.4
Thursday 14 January 2016	61.9	55.6	53.6	52.6	50.1	48.4	48.0	47.4	46.7	51.2	52.4
Friday 15 January 2016	59.9	55.3	52.3	51.0	48.7	47.0	46.5	46.0	45.4	50.0	49.8
Saturday 16 January 2016	58.7	55.5	51.4	50.3	47.8	46.6	46.4	45.8	45.1	49.0	50.3
Sunday 17 January 2016	59.5	54.9	53.3	52.5	49.5	48.2	47.8	46.8	46.1	50.3	51.2
Monday 18 January 2016	57.0	54.7	52.2	51.8	48.0	44.9	44.3	43.5	42.7	48.9	52.9
Tuesday 19 January 2016	59.6	57.2	55.6	54.7	50.8	48.0	46.9	45.5	44.7	52.5	53.7
Wednesday 20 January 2016	57.5	55.1	53.5	52.5	48.4	44.7	44.1	43.4	42.8	49.7	52.1
Thursday 21 January 2016											
Median	59.3	55.4	53.4	52.5	48.5	46.8	46.4	45.7	44.9	50.1	51.8











A.2 Station Street

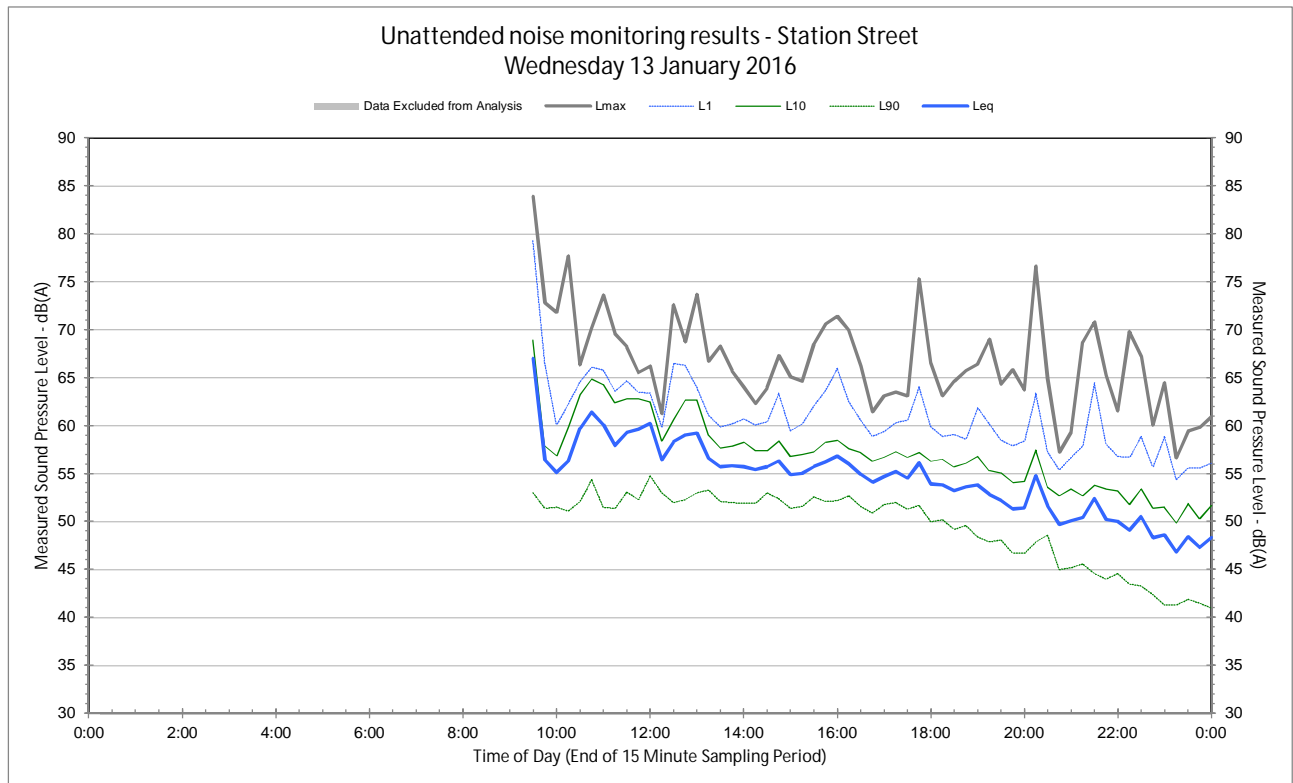
(Note due to a battery error, this logger shut down after 3 days)

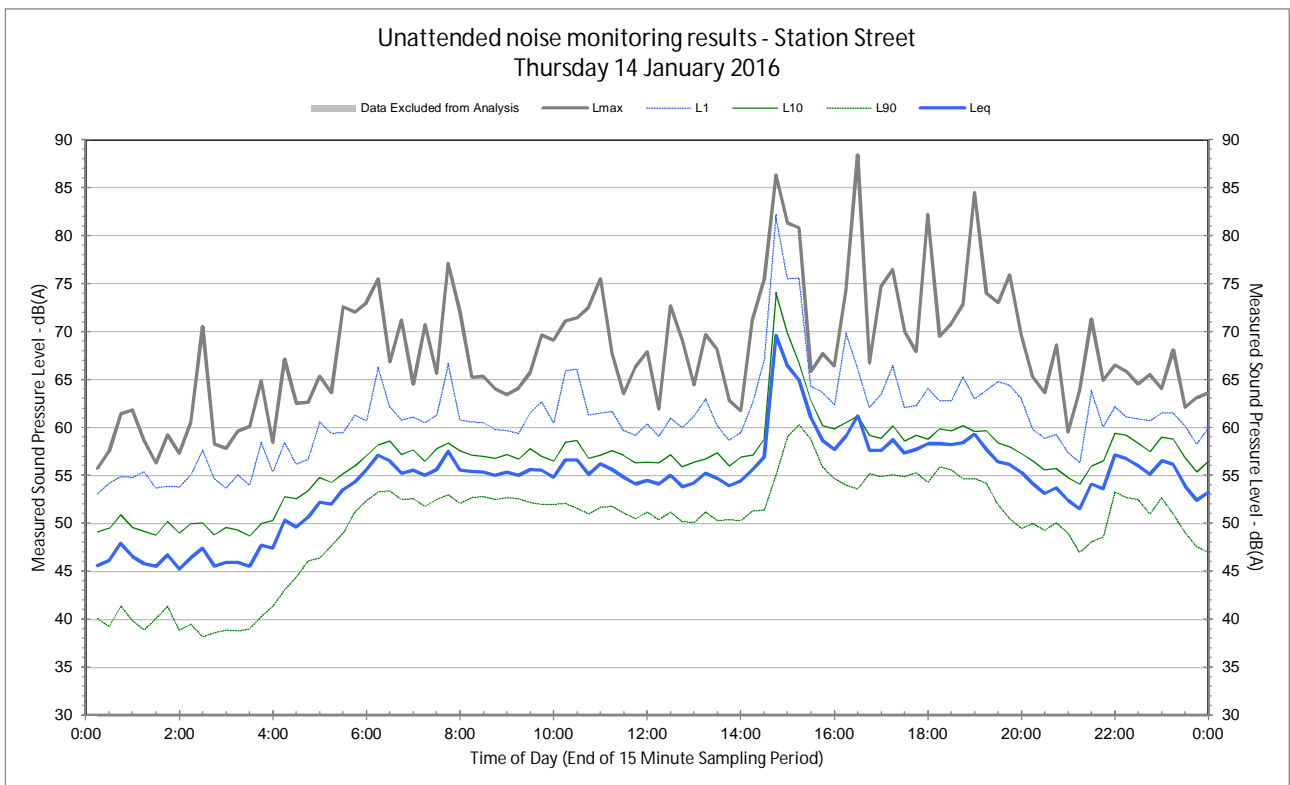
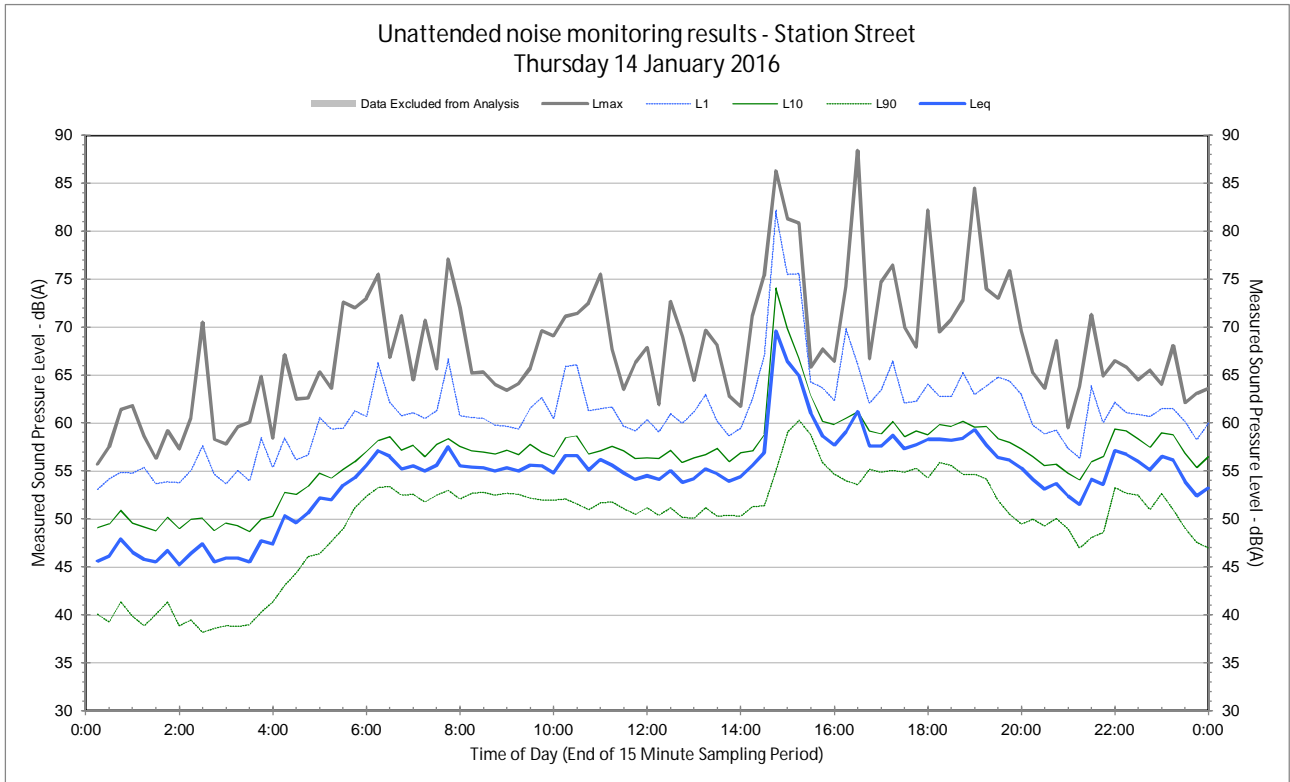
Unattended noise monitoring results - Station Street

7:00:00 AM to 6:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	67.3	62.3	59.3	58.3	54.9	52.0	51.3	49.9	48.8	56.2	58.1
Thursday 14 January 2016	69.1	61.7	58.5	57.5	54.4	52.2	51.7	51.0	49.6	55.6	59.0
Friday 15 January 2016	68.7	63.4	60.9	60.0	57.6	55.7	55.2	54.3	53.3	58.3	58.6
Saturday 16 January 2016											
Median	68.7	62.3	59.3	58.3	54.9	52.2	51.7	51.0	49.6	56.2	58.6

6:00:00 PM to 10:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	65.1	58.5	55.8	54.2	50.1	47.3	46.6	45.0	43.4	51.9	52.2
Thursday 14 January 2016	69.6	62.8	59.2	57.7	53.7	50.3	49.5	48.3	47.3	55.7	56.2
Friday 15 January 2016	66.6	60.0	57.6	56.3	52.9	50.2	49.6	48.4	47.2	54.6	54.4
Saturday 16 January 2016											
Median	66.6	60.0	57.6	56.3	52.9	50.2	49.5	48.3	47.2	54.6	54.4

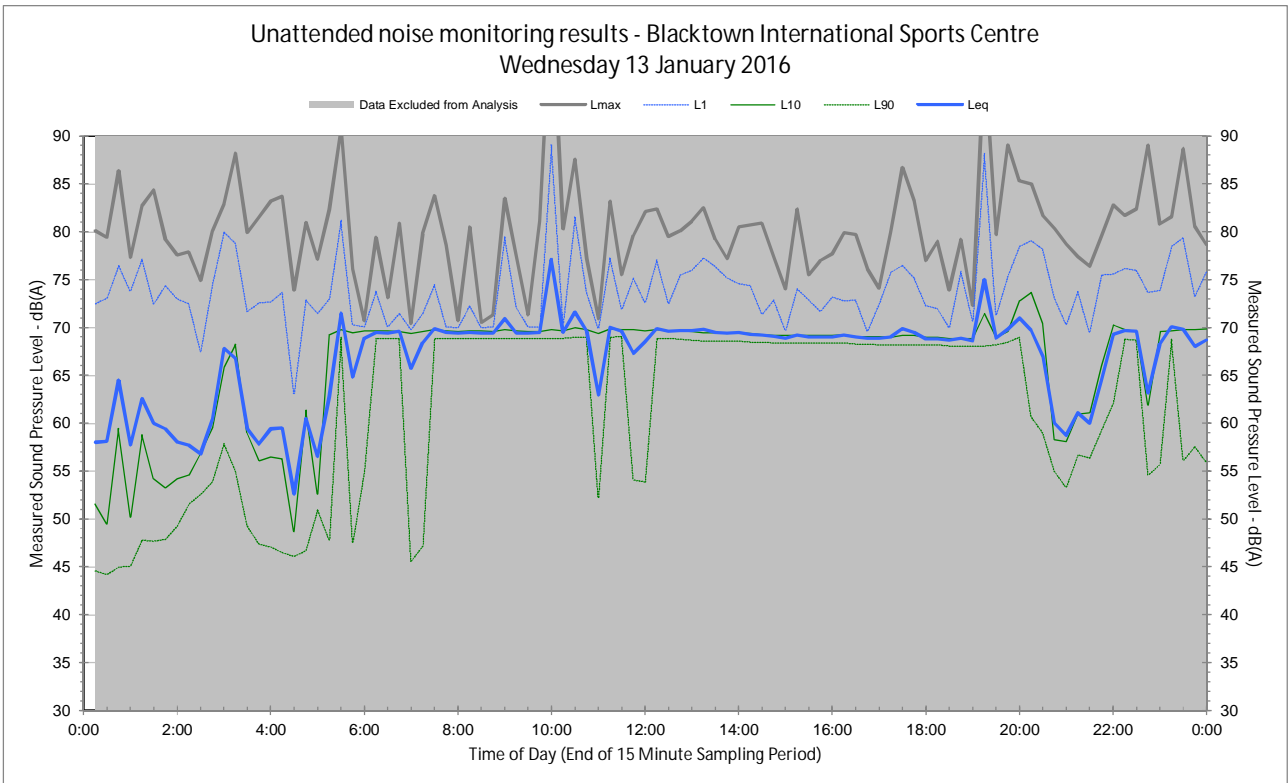
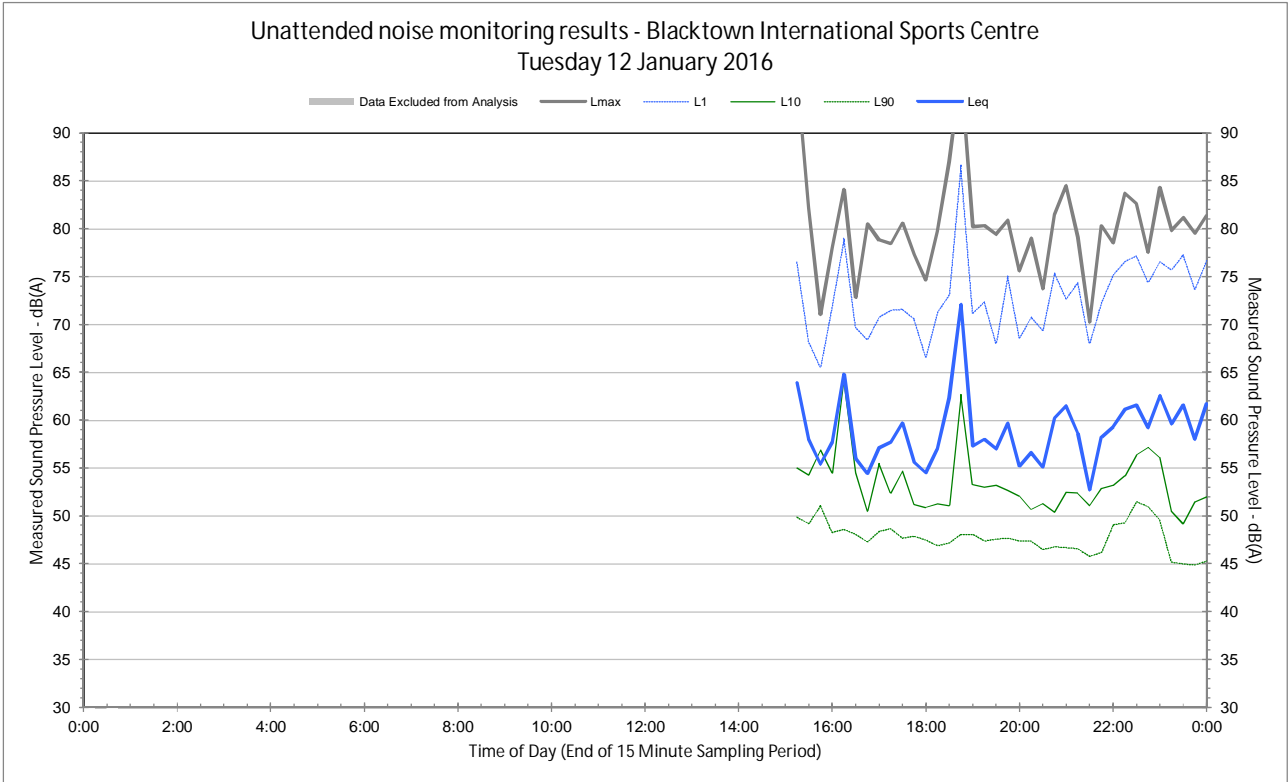
10:00:00 PM to 7:00:00 AM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	61.6	55.9	52.7	51.2	45.4	41.4	40.8	39.3	37.9	48.1	50.9
Thursday 14 January 2016	65.5	60.6	58.2	56.9	52.3	49.1	48.2	46.8	45.7	54.1	56.4
Friday 15 January 2016	61.2	55.4	52.7	51.2	46.9	43.9	43.4	42.2	41.1	48.6	48.8
Saturday 16 January 2016											
Median	61.6	55.9	52.7	51.2	46.9	43.9	43.4	42.2	41.1	48.6	50.9

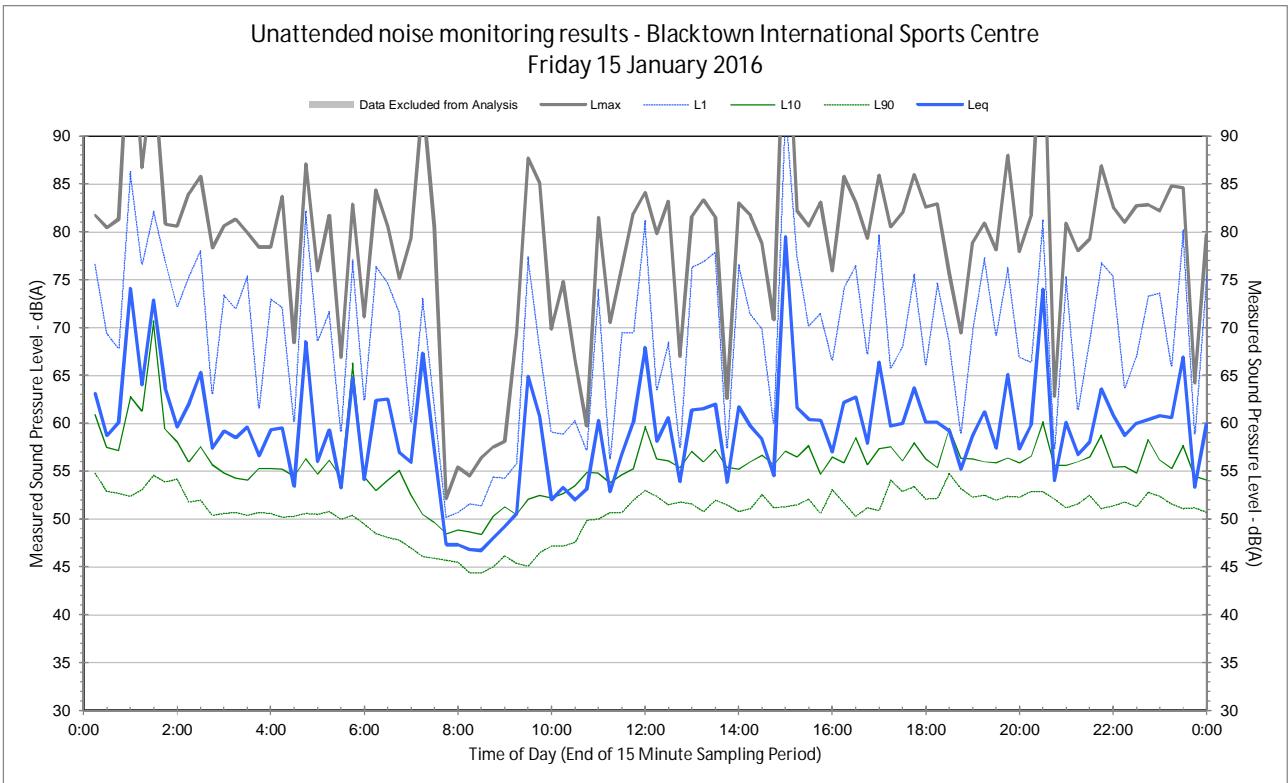
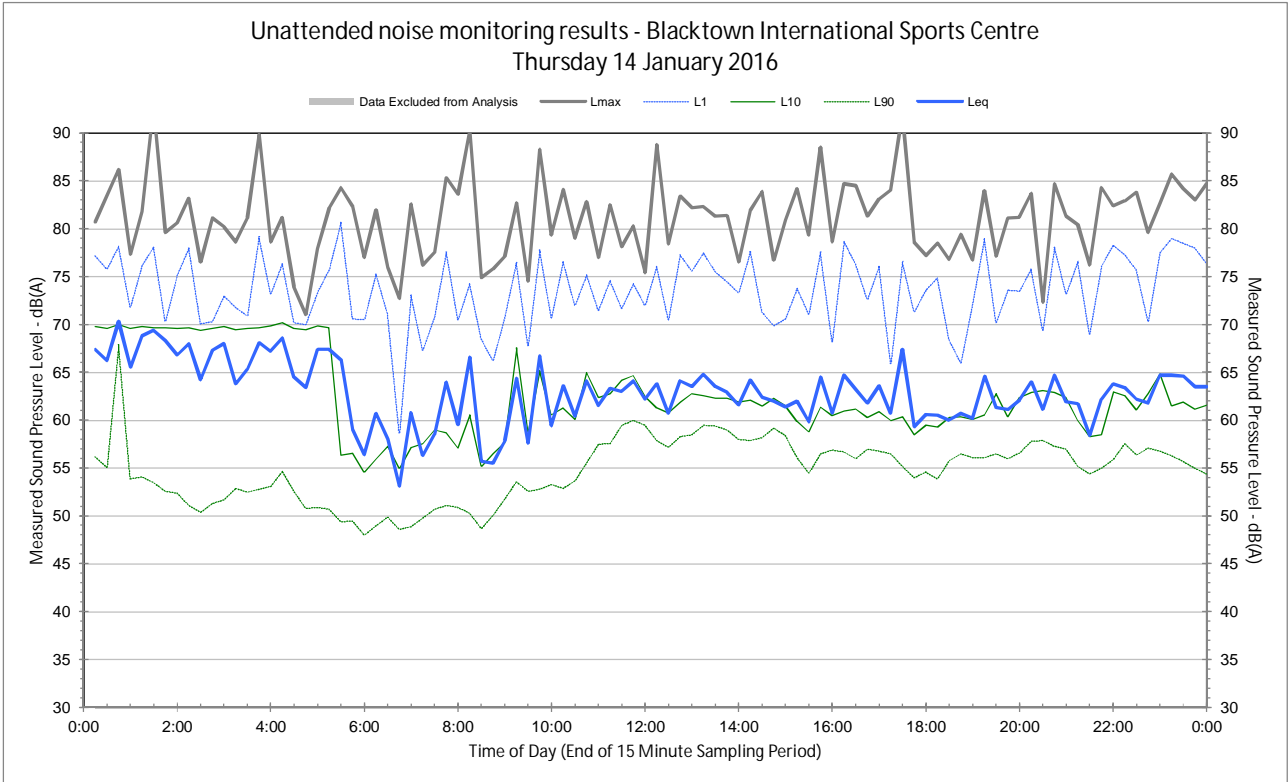


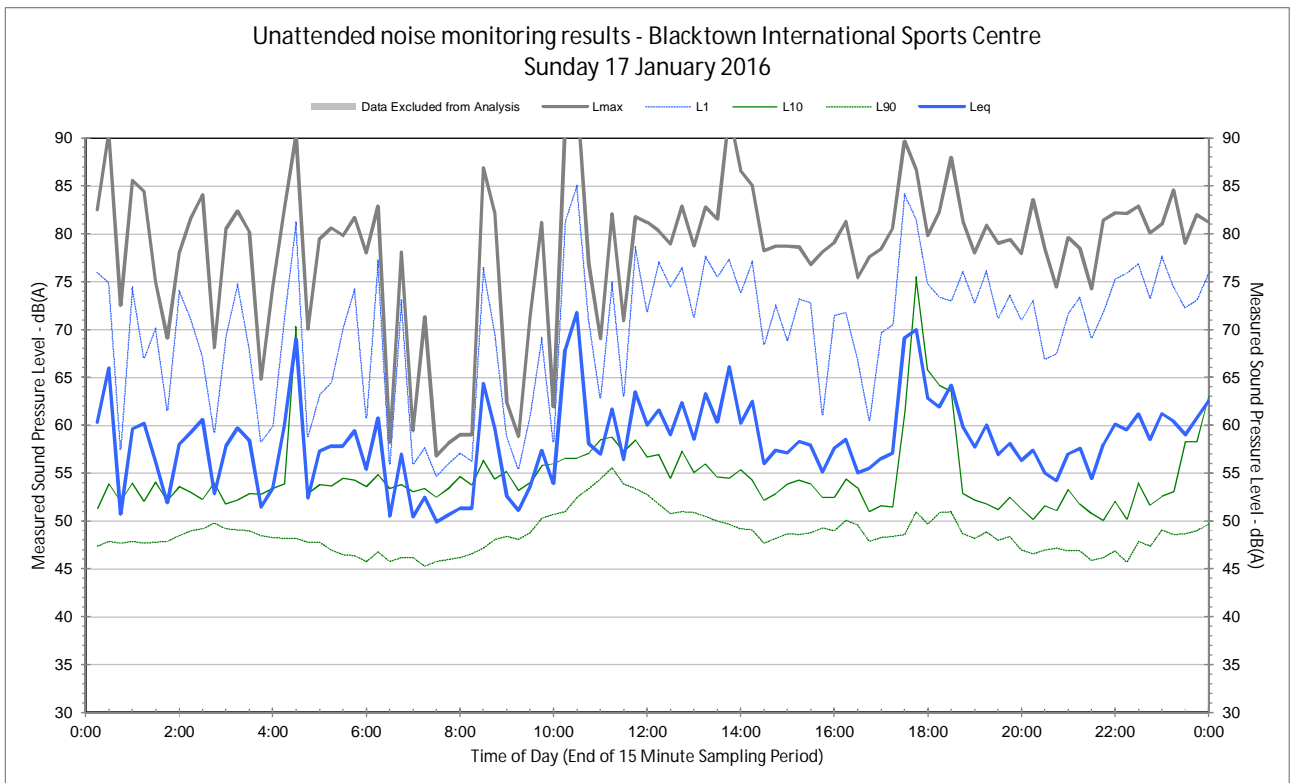
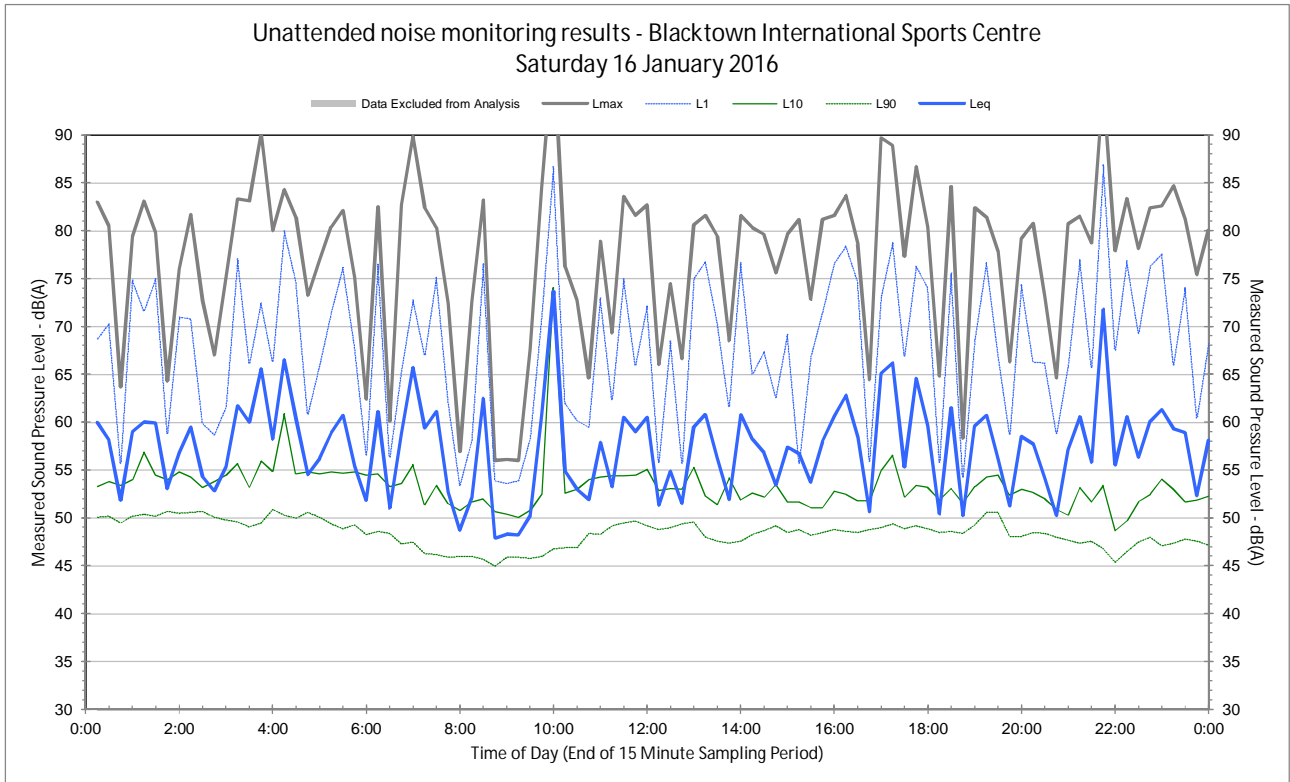


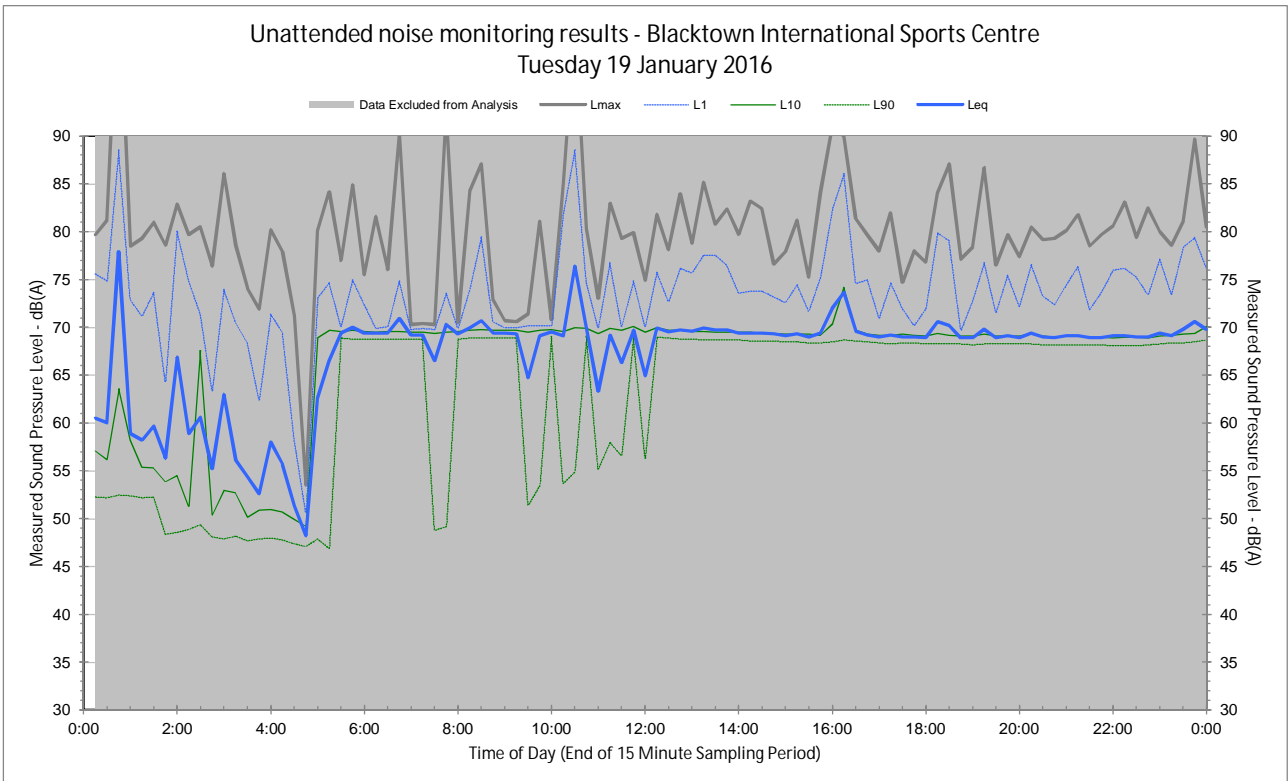
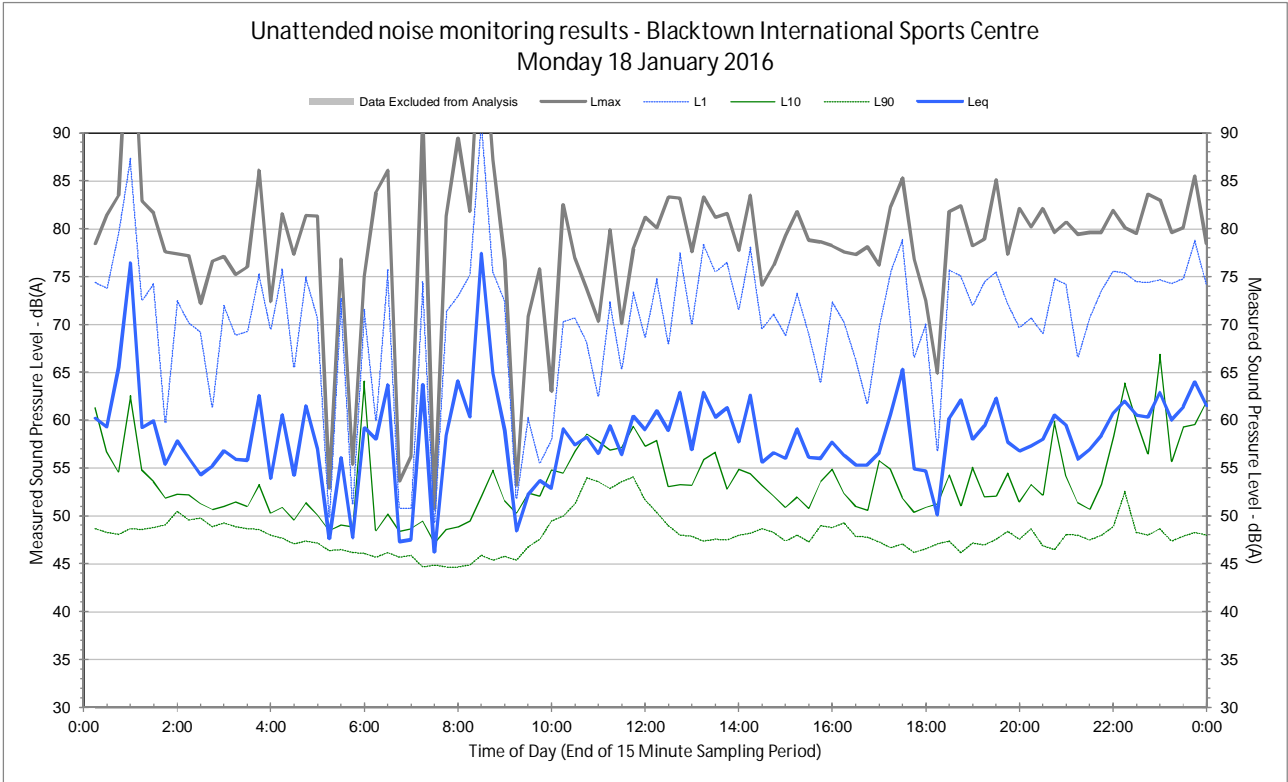
A.3 Blacktown International Sports Centre

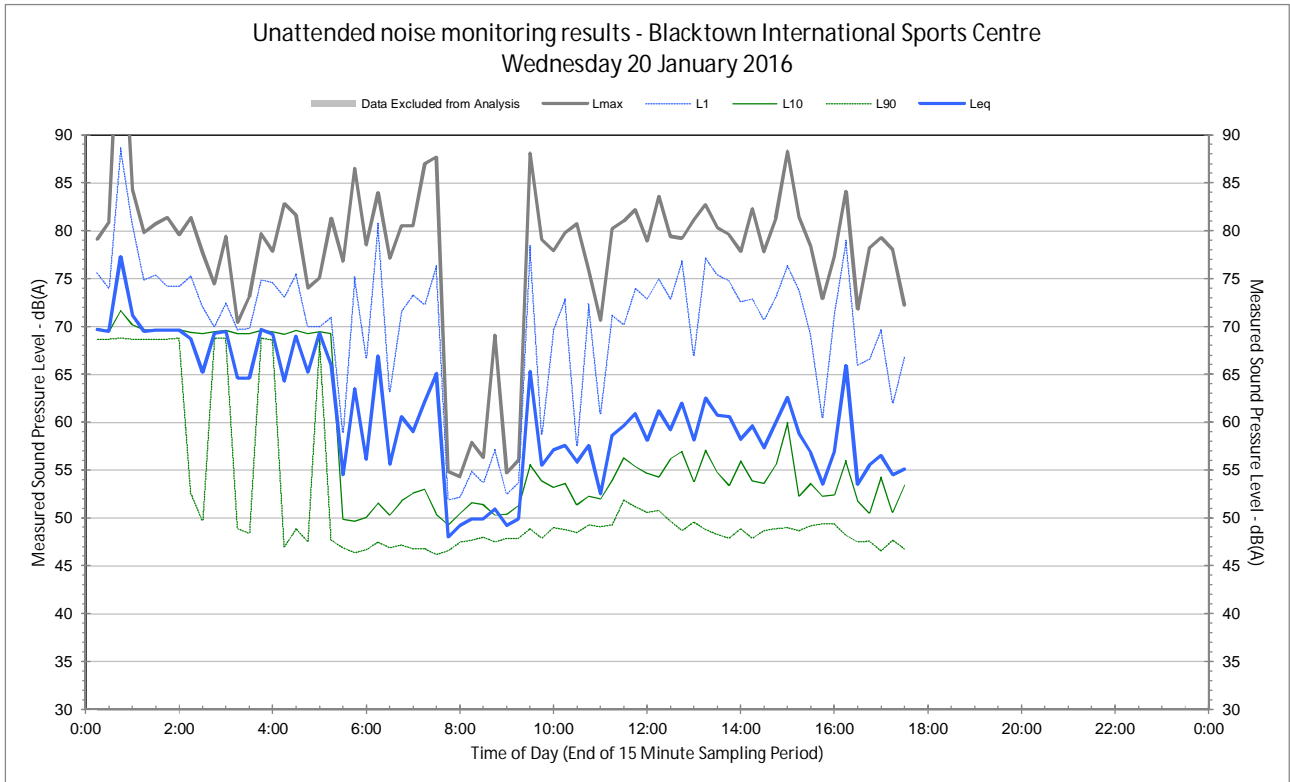
Unattended noise monitoring results - Blacktown International Sports Centre											
	Lmax (75th Percentile)	L1 (75th Percentile)	L5 (75th Percentile)	L10 (75th Percentile)	L50 (75th Percentile)	L90 (75th Percentile)	L95 (75th Percentile)	L99 (75th Percentile)	Lmin (75th Percentile)	Leq (75th Percentile)	Leq - over period
7:00:00 AM to 6:00:00 PM											
Tuesday 12 January 2016	81.0	71.7	59.3	55.1	50.9	48.8	48.5	47.9	47.2	58.4	59.4
Wednesday 13 January 2016											
Thursday 14 January 2016	83.9	76.2	66.4	62.3	59.6	58.1	57.7	57.1	56.3	64.0	62.8
Friday 15 January 2016	83.0	74.6	58.9	56.5	53.6	51.9	51.4	50.8	50.0	61.5	64.9
Saturday 16 January 2016	81.6	74.8	56.3	53.6	50.6	48.9	48.6	48.0	47.3	60.5	61.1
Sunday 17 January 2016	82.1	75.8	60.5	56.6	53.1	50.9	50.5	49.9	49.2	61.9	62.3
Monday 18 January 2016	81.9	74.6	59.8	55.1	50.6	49.1	48.8	48.3	47.5	60.5	63.3
Tuesday 19 January 2016											
Wednesday 20 January 2016	81.3	73.6	61.0	54.8	50.7	49.2	48.9	48.5	48.0	60.5	59.3
Median	81.9	74.6	59.8	55.1	50.9	49.2	48.9	48.5	48.0	60.5	62.3
6:00:00 PM to 10:00:00 PM											
Tuesday 12 January 2016	81.1	74.6	56.5	53.1	49.5	47.6	47.3	46.9	46.3	59.8	62.3
Wednesday 13 January 2016											
Thursday 14 January 2016	82.7	76.2	64.6	62.8	59.1	56.7	56.2	55.3	54.5	62.6	62.1
Friday 15 January 2016	82.7	75.6	58.6	56.5	54.3	52.6	52.2	51.6	50.8	60.9	64.0
Saturday 16 January 2016	81.4	74.7	55.9	53.2	50.1	48.5	48.2	47.8	47.2	59.9	61.7
Sunday 17 January 2016	81.6	73.5	55.8	52.6	50.0	48.5	48.0	47.4	46.7	59.9	58.9
Monday 18 January 2016	82.0	74.9	62.5	54.4	49.5	48.0	47.7	47.3	46.7	60.3	59.1
Tuesday 19 January 2016											
Wednesday 20 January 2016											
Median	81.8	74.8	57.5	53.8	50.1	48.5	48.1	47.6	46.9	60.1	61.9
10:00:00 PM to 7:00:00 AM											
Tuesday 12 January 2016	82.9	76.8	59.9	56.2	51.8	50.0	49.6	48.7	48.1	61.6	60.9
Wednesday 13 January 2016	82.4	76.3	70.0	69.7	69.0	53.2	52.5	51.5	50.4	68.0	66.4
Thursday 14 January 2016	84.1	77.2	66.3	61.4	56.0	54.5	54.0	53.4	52.5	63.8	64.4
Friday 15 January 2016	82.9	73.9	56.8	55.4	52.1	50.7	50.4	49.8	49.1	60.5	60.4
Saturday 16 January 2016	82.5	74.4	55.6	53.9	49.9	48.2	47.9	47.2	46.5	60.0	59.7
Sunday 17 January 2016	82.0	75.1	61.2	54.2	50.2	48.9	48.7	48.2	47.2	60.7	63.1
Monday 18 January 2016	83.2	75.0	68.2	62.5	51.6	48.4	48.1	47.6	47.0	62.2	61.8
Tuesday 19 January 2016	81.4	75.2	70.2	69.6	69.1	68.7	68.6	68.4	68.0	69.5	68.7
Wednesday 20 January 2016											
Median	82.7	75.2	63.7	58.8	52.0	50.3	50.0	49.3	48.6	61.9	62.4







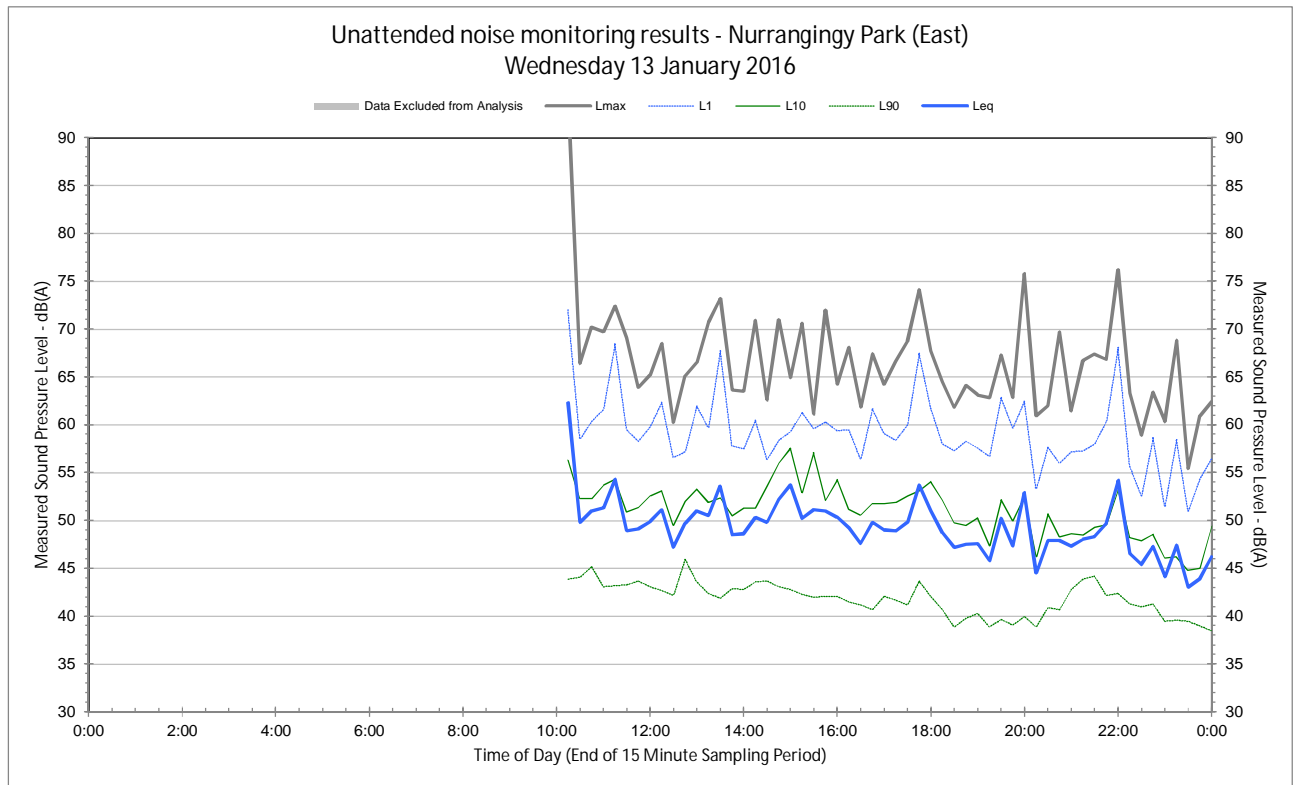


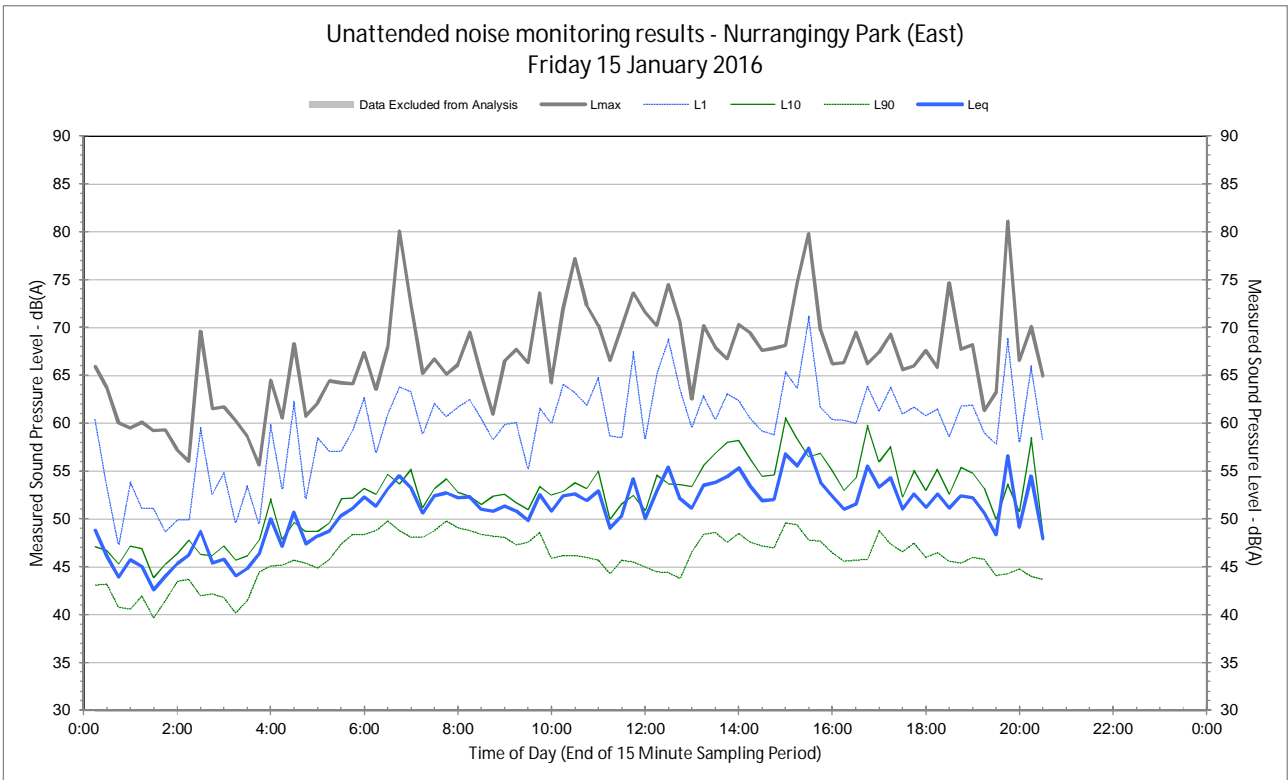
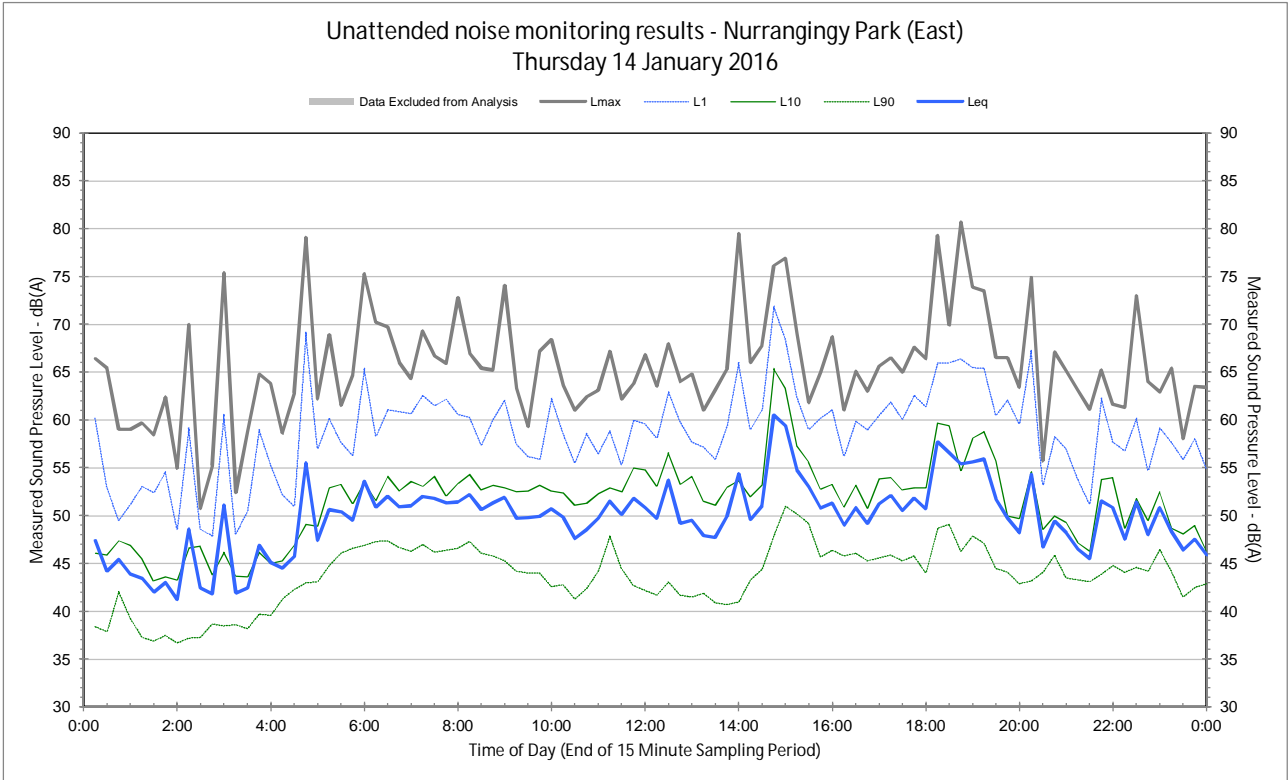


A.4 Nurranginy Reserve

(Note - due to a memory error, this logger shut down after 3 days)

Unattended noise monitoring results - Nurranginy Park (East)											
7:00:00 AM to 6:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	67.6	59.7	54.8	52.4	46.3	42.8	42.1	40.8	39.8	50.3	52.3
Thursday 14 January 2016	65.5	60.0	55.2	53.1	48.3	44.9	44.2	43.0	41.9	50.8	52.2
Friday 15 January 2016	67.9	61.5	56.5	53.7	49.5	47.4	46.7	45.8	44.8	52.4	53.0
Median	67.6	60.0	55.2	53.1	48.3	44.9	44.2	43.0	41.9	50.8	52.3
6:00:00 PM to 10:00:00 PM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	64.3	57.9	52.5	49.7	44.4	40.5	39.7	38.2	37.0	47.9	49.2
Thursday 14 January 2016	66.5	61.3	56.5	53.9	47.0	44.3	44.0	43.3	42.2	51.2	53.1
Friday 15 January 2016	67.1	60.3	56.2	53.5	47.6	45.1	44.5	43.6	42.6	51.7	52.3
Median	66.5	60.3	56.2	53.5	47.0	44.3	44.0	43.3	42.2	51.2	52.3
10:00:00 PM to 7:00:00 AM	Lmax (50th Percentile)	L1 (50th Percentile)	L5 (50th Percentile)	L10 (50th Percentile)	L50 (50th Percentile)	L90 (50th Percentile)	L95 (50th Percentile)	L99 (50th Percentile)	Lmin (50th Percentile)	Leq (50th Percentile)	Leq - over period
Wednesday 13 January 2016	62.6	55.5	48.9	46.7	42.0	39.6	39.2	38.3	37.3	46.0	48.3
Thursday 14 January 2016	63.2	56.4	50.0	48.4	46.0	44.2	43.7	42.9	42.0	47.5	49.0
Friday 15 January 2016	62.9	55.9	49.4	47.6	44.0	41.9	41.4	40.6	39.7	46.7	48.6





Appendix C. Water quality monitoring report – Q1 2016

Rooty Hill Distribution Centre Environmental Monitoring

Aspect	Surface Water Quality
Date	1 February 2016

Summary

Monitoring period	16 January 2016
Parameters monitored	<ul style="list-style-type: none"> • pH (units) • Turbidity (NTU) • Temperature (°C) • Dissolved oxygen (DO) (% saturation, mg/L) • Electrical conductivity (EC) (µS/cm) • ORP (mV) • Total nitrogen (TN) (mg/L) • Total phosphorus (TP) (mg/L)
Monitoring event	Wet weather (43 mm in 24 hours prior to sampling, from Erskine Park Reservoir (weather station #67066), as recorded by Bureau of Meteorology).
Exceedance of assessment criteria	<p>Yes.</p> <ul style="list-style-type: none"> • Turbidity at AE1, AE2, AE3, AE4. • Dissolved Oxygen & conductivity at all sites • Total Nitrogen at AE1 • Total Phosphorus at AE1 and AE2
Action required	None
Points for consideration	<ol style="list-style-type: none"> 1. Conductivity was below the SSTV at each site, but was still within the ANZECC/ARMCANZ (2000) guidelines. 2. Dissolved Oxygen levels had improved and therefore exceeded the notably low SSTV's. 3. TN and TP whilst exceeding the SSTV's at sites AE1 and AE2, were still lower than the concentration observed at the upstream reference site AE6 suggesting Holcim operations were not responsible. 4. Whilst exceeding STTV's, the turbidity at sites AE1, AE2, AE3 and AE4 were lower than the upstream sites AE5 and AE6 suggesting Holcim operations were not responsible. 5. Site AE4 was sampled approximately 100m further downstream of the sampling site due to high flows preventing site access. 6. The deterioration of water quality within the study area is reflective of the preceding rainfall event and not related to Holcim operations.
Compliance Summary	Wet Weather water quality monitoring of Angus Creek and Eastern Creek was carried out in January 2016. At some locations site specific trigger values were exceeded, these included turbidity, dissolved oxygen, total nitrogen and total phosphorus. However, none of these exceedances were attributed to Holcim Operations.

1. Monitoring locations

- AE6 - Angus Creek, 500 m upstream of RDC^
- AE1 - Angus Creek at upstream boundary of RDC
- AE2 - Angus Creek at downstream boundary of RDC
- AE3 - Angus Creek 150m downstream of RDC culvert
- AE4 - Eastern Creek downstream of Angus Creek confluence*
- AE5 - Eastern Creek upstream of Angus Creek confluence^

(^These sites have been adopted as control sites, * AE4 was sampled approximately 100m further downstream of normal sampling site due to high flows.)

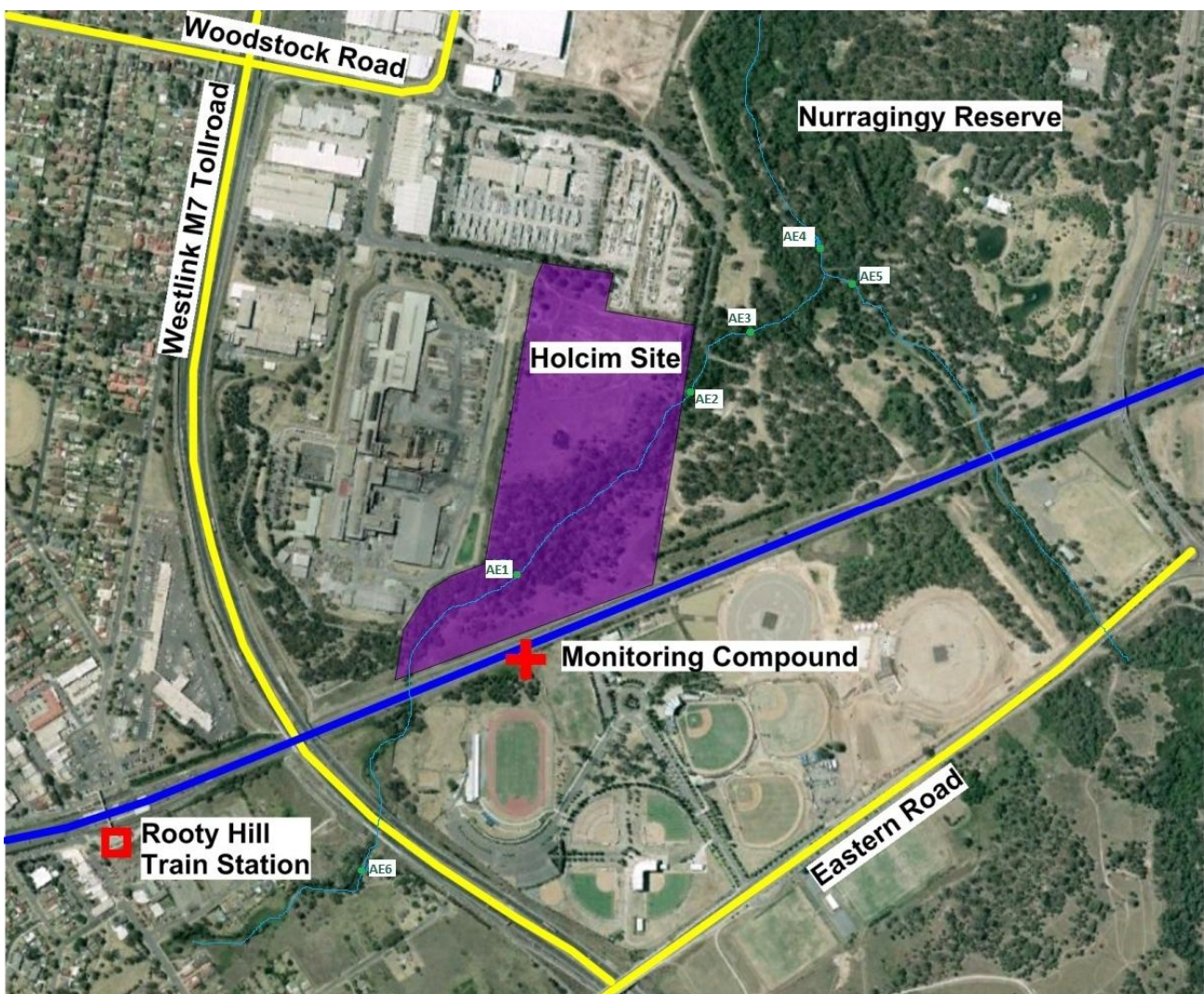


Figure 1 Monitoring site locations

2. Monitoring methods

Water quality sampling was undertaken both in situ and via grab samples. In situ sampling was undertaken using a calibrated YSI Water Quality Probe and a Hach turbidity meter.

Grab samples were collected concurrently with in situ water monitoring at each site for analysis of total nitrogen and total phosphorus. Sampling was conducted in accordance with the Australian/New Zealand standards for water quality sampling (AS/NZS 5667.1:1998).

3. Monitoring results

Prior to the construction of the RDC, baseline water quality monitoring indicated that the majority of parameters at each site exceed the recommended ANZECC/ARMCANZ (2000) default trigger values for lowland river ecosystems. Monitoring throughout the construction period also exceeded these default trigger values. As such, the default trigger values are not suitable for comparison against the operational ambient water quality within Angus and Eastern Creeks and an alternative approach recommended by ANZECC/ARMCANZ (2000) to determine site specific trigger values (SSTVs) was adopted. Site specific trigger values were derived from the 80th percentile of baseline data (and the 20th percentile where water quality should fall within a specified range). These site specific values were approved and endorsed by the NSW Department of Planning and Environment on 19 October 2015. Mean water quality results were then compared to the SSTV's at each site. Given that some of the SSTVs themselves are outside the recommend ANZECC/ARMCANZ (2000) trigger values, should monitoring results indicate an improvement in a water quality indicator, then the result was also assessed against the ANZECC/ARMCANZ (2000) Guidelines for protection of lowland river aquatic ecosystems

Results presented within this report are representative of water quality on 16 January 2016 only.

4. Results

At the time of sampling, the water level was high at all sites, with 43 mm of rainfall occurring in the 24 hours preceding sampling. Water quality was generally reflective of the recent rainfall, with higher than average turbidity and dissolved oxygen, and lower conductivity. Although water quality is generally poor, it did not deteriorate appreciably downstream of the RDC Centre. pH was the only parameter within the SSTV's at all sites.

Nutrients TN and TP were highest at the most upstream Angus Creek site (reference site AE6) with 1.7mg/L and 0.27 mg/L respectively. TN and TP concentrations decreased downstream at site AE1 (1.6mg/L and 0.25mg/L respectively). Downstream of Holcim Operations, TN and TP continued to decrease with both sites AE2 and AE3 having a TN concentration of 0.18mg/L and a TP concentration of 0.2mg/L. Sites AE1 and AE2 exceeded the SSTV's despite having lower nutrient concentrations than the upstream reference site AE6, due to the lower SSTV's at these sites. Within Eastern Creek nutrient concentrations at the upstream site AE5 were low with 1.2mg/L TN and 0.18mg/L TP. At AE4, concentrations increased downstream of the inflow of Angus Creek to 1.3mg/L TN and 0.19mg/L TP. This modest increase suggests that nutrients from Angus Creek could have increased the nutrient concentration within Eastern Creek, however both sites remain well below the appropriate SSTV's.

Mean conductivity on the day of sampling was low throughout the study area, ranging from 160 μ S/cm at AE1 to 444 μ S/cm at AE5. These low concentrations fell below the lower SSTV's due to the increase in rainfall runoff which lowers the conductivity of the waterway. Historically, these sites have had high conductivities due to low water levels and saline groundwater intrusions during dry weather. It should be noted however that the conductivity at each site was within the more conservative ANZECC/ARMCANZ (2000) trigger values (125-2200 μ S/cm).

Mean dissolved oxygen concentrations exceeded the upper SSTV's at each site, within both Angus and Eastern Creek. Within Angus Creek DO was highest at the upstream reference site AE6 (86.4%sat) decreasing with distance downstream to 80.6%sat at site AE3. DO was slightly lower within Eastern Creek with average DO ranging from 58.6%sat at AE5 to 63.9%sat at AE4. The exceedances of the DO SSTV's is reflective of the increased flow that was occurring throughout the catchment following the rainfall event.

Mean turbidity throughout the study area was variable, ranging from 60.6NTU at AE2 to 90.3NTU at AE5. Despite having lower average turbidity's than sites AE6 and AE5, sites AE1, AE2, AE3 and AE4 exceeded the applicable SSTV's due to lower SSTV's for these sites.

Photos of each site are presented in Appendix A.

Table 1 Average wet weather water quality results (16 January 2016)

		Temperature (°C)	Turbidity (NTU)	DO (%sat)	EC (uS/cm)	ORP (mV)	pH	TN (mg/L)	TP (mg/L)
Angus Creek	AE6	19.00	80.0	86.4	206	235	7.87	1.7	0.27
	Guideline	n/a	181.6	32.198 - 62.258	1700.668 - 5399.202	n/a	7.73 - 9.02	5.1	0.74
	AE1	18.70	64.8	83.5	160	206	7.66	1.6	0.25
	Guideline	n/a	49.4	22.34-52.52	1242.598-3826.8	n/a	7.604-8.524	1.52	0.164
	AE2	19.40	60.6	82.0	227	237	7.82	1.8	0.23
	Guideline	n/a	41.7	21.92 - 47.052	1267.8 - 4015.998	n/a	7.548 - 8.64	2	0.158
	AE3	19.40	61.1	80.6	228	241	7.80	1.8	0.23
	Guideline	n/a	45.0	23.988 - 44.452	1181 - 4165.002	n/a	7.478 - 8.86	2.2	0.24
	AE4	20.23	75.3	63.9	425	246	7.56	1.3	0.19
	Guideline	n/a	68.2	33.34 - 49.378	824 - 1643.198	n/a	7.252 - 8.674	3.18	0.2
Eastern Creek	AE5	20.37	90.3	58.6	444	243	7.55	1.2	0.18
	Guideline	n/a	90.8	31.482 - 51.04	791.398 - 1522.598	n/a	7.306 - 8.688	2.94	0.18
	<i>ANZECC Guideline</i>	<i>n/a</i>	<i>6-50</i>	<i>85-110</i>	<i>125-2200</i>	<i>n/a</i>	<i>6.5-8.5</i>	<i>0.5</i>	<i>0.05</i>

Note: Shaded cells denote guideline exceedance; ^ indicates control sites; * missing sample.

Appendix A. Site photographs



AE6 – Angus Creek (reference site)



AE1 – Angus Creek



AE2 – Angus Creek



AE3 – Angus Creek



AE5 – Eastern Creek (reference site)



AE4 – Eastern Creek

Appendix D. Terrestrial ecology monitoring report – Q1 2016

**ROOTY HILL REGIONAL DISTRIBUTION CENTRE
QUARTERLY ENVIRONMENTAL MONITORING REPORT**

Aspect Terrestrial Ecology
Date Q1 2016

SUMMARY

Monitoring period	Q1 2016 (Summer)
Parameters monitored in period	Riparian Health Assessment
Changes from previous monitoring	None
Exceedances of assessment criteria	N/A
Action required	None

1. Monitoring frequency

Jacobs has been engaged to undertake quarterly environmental monitoring for the Rooty Hill Regional Distribution Centre (RDC) since 2012. A historical monitoring schedule is shown in **Table 1-1**.

Table 1-1 Ecological monitoring periods at Rooty Hill RDC.

	Pre-construction (early works)	Construction (Stage 2 works)	Operation (Stage 3 works)
Spring 2012	9, 10 and 11 October 2012		
Summer 2013		16 and 17 January 2013	
Autumn 2013		25 and 26 March 2013	
Winter 2013		24 and 25 July 2013	
Spring 2013		11 and 12 November 2013	
Summer 2014		11 and 12 February 2014	
Autumn 2014		20 and 21 May 2014	
Winter 2014		25 and 26 August 2014	
Spring 2014		25 and 26 November 2014	
Summer 2015		29 March and 1 April 2015	
Autumn 2015		13 May and 10 June 2015	

	Pre-construction (early works)	Construction (Stage 2 works)	Operation (Stage 3 works)
Winter 2015		17 and 18 August 2015	
Spring 2015			13 October 2015
Summer 2016			26 February 2016

2. Monitoring locations

Monitoring locations within the Rooty Hill RDC and the adjacent Nurragingy Nature Reserve include (**Figure 2-1**):

- § Riparian health assessments (^These sites are adopted as control sites):
- AE1 – Angus Creek at upstream boundary of Rooty Hill RDC (Holcim site)
 - AE2 – Angus Creek at downstream boundary of Rooty Hill RDC (Nurragingy Reserve)
 - AE3 – Angus Creek 150 m downstream of Rooty Hill RDC culvert (Nurragingy Reserve)
 - AE4 – Eastern Creek downstream of Angus Creek confluence (Nurragingy Reserve)
 - AE5 – Eastern Creek upstream of Angus Creek confluence^ (Nurragingy Reserve)
 - AE6 – Angus Creek, 500m upstream of the Rooty Hill RDC^.

It is noted the monitoring sites identified in **Figure 2-1** have been located as identified in the Project Approval consisting of Environmental Assessment Reports and Statement of Commitments (SoCs), the Minister’s Conditions of Approval (MCoAs) and all management plans and strategies.

Jacobs ecologists are licensed to conduct field surveys under the National Parks and Wildlife Service Scientific Research Permit SL100044, Fisheries Permit P06/0066.5.0 and the Department of Primary Industries Animal Research Authority (09/1895).



Data sources
 Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

Figure 2-1 Monitoring locations.

3. Monitoring methodology

3.1 Riparian site value assessments – NSW BioBanking framework

The monitoring program involves conducting assessments of the River-flat Eucalypt Forest community (riparian zones) using the NSW Biometric vegetation condition as a benchmark and the BioBanking Assessment Methodology (BBAM) (NSW Office of Environment and Heritage (OEH), 2014) to record condition during each monitoring event. These benchmarks are specified for a suite of vegetation and fauna habitat condition variables for each Biometric vegetation type and can be readily used to assess the current and predicted future condition of native vegetation.

The riparian environments across the six sampling sites are characteristic of the River-flat Eucalypt Forest in the Sydney Basin Bioregion endangered ecological community as listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act). Six riparian sampling sites have been located as identified in the Project Approval as follows (see Error! Reference source not found.):

- § AE1 – Angus Creek at upstream boundary of Rooty Hill RDC (Holcim site)
- § AE2 – Angus Creek at downstream boundary of Rooty Hill RDC (Nurragingy Reserve)
- § AE3 – Angus Creek 150 m downstream of Rooty Hill RDC culvert (Nurragingy Reserve)
- § AE4 – Eastern Creek downstream of Angus Creek confluence (Nurragingy Reserve)
- § AE5 – Eastern Creek upstream of Angus Creek confluence (Nurragingy Reserve)
- § AE6 – Angus Creek, approximately 700 m upstream of the Rooty Hill RDC

Only site AE1 is located within the Rooty Hill RDC site. Sites AE5 and AE6 are used as control sites.

A Site Value assessment under the NSW BioBanking framework was undertaken for each sampling site to quantify the overall condition of the vegetation against established benchmarks for the Biometric vegetation types present in the study area. Survey effort (i.e. the number of sites monitored) and monitoring method followed the NSW BBAM (NSW Office of Environment and Heritage (OEH), 2014). The standard BioBanking plot/transect layout which consists of a 20 m x 20 m plot (0.04 ha) nested within a larger 50 m x 20 m plot with a 50 m line transect was used (**Figure 3-1**).

The field methodology aligns with current industry best practice for describing vegetation condition.

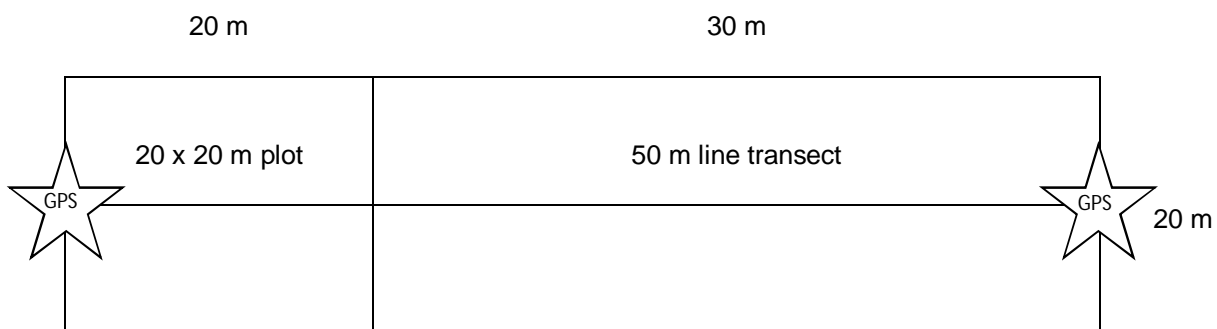


Figure 3-1 Survey plot layout for riparian site value assessments.

The following parameters were recorded within each plot/transect at the six sampling sites:

- § Native plant species richness – the number of indigenous vascular plant species was counted by systematically walking the 20 m x 20 m plot.

- § Native over-storey cover – at 10 points along the 50 m transect (i.e. every 5 m), an estimate of percent foliage cover directly overhead was made for the canopy layer.
- § Native mid-storey cover – at 10 points along the 50 m transect (i.e. every 5 m), an estimate of percent foliage cover in the mid-storey (plants between the over-storey and 1m tall) was made.
- § Native ground cover (grasses, shrubs <1 m, other) – at 50 points along the 50 m transect (i.e. every 1 m) record whether native ground cover intersects that point.
- § Exotic plant cover – measured as total percent foliage cover of all exotics in all strata.
- § Number of trees with hollows – a count of the number of living and dead trees within a 50 x 20 m plot that have at least one hollow.
- § Over-storey regeneration – measured as the proportion of canopy species occurring as regeneration in the entire vegetation patch (juveniles classed as plants with a diameter at breast height of <5 cm).
- § Total length of fallen logs – measured as the total length of logs at least 10 cm in diameter and at least 0.5 m long that are found within the entire 50 m x 20 m plot.

The plot data for each site attribute was compared against the relevant benchmark for the vegetation type, scored and then ranked using the matrix in **Appendix A** (Seidel and Briggs 2008). The final score for each vegetation plot was then assigned an arbitrary condition rating based on this assessment (low = 0 to 16, low-moderate = 17 to 33, moderate = 34 to 50, moderate-high = 51 to 67, high = 68 to 84, very high = 85 to 100). Trends in site value for each of the sites AE1 to AE6 across the four seasons is presented in **Section 5.1**.

3.2 Riparian, Channel and Environmental Inventory

The Riparian, Channel and Environmental (RCE) Inventory was developed to provide a consistent framework for assessing biophysical conditions of small streams in modified agricultural landscapes (Robert & Petersen, 1992). It uses rapid assessment parameters to characterise biological structure and function of streams in order to provide a relative value of stream health against established indicators.

At each of the six sites in the monitoring program and 50 m upstream and downstream of the site the following parameters were recorded within the stream channel and riparian zone:

- § Land-use pattern beyond immediate riparian zone.
- § Width of riparian strip of woody vegetation.
- § Completeness of riparian strip of woody vegetation.
- § Vegetation of riparian zone within 10 m of channel.
- § Stream Bank Structure.
- § Bank undercutting.
- § Channel Form.
- § Riffle/Pool sequence.
- § Retention devices in stream.
- § Channel sediment accumulations.
- § Stream bottom.
- § Stream detritus.

§ Aquatic vegetation.

The original RCE scores ranged from 0-90. An updated RCE was customised and used to better assess riparian, channel and environmental condition specific to the RDC and Nurragingy Reserve. The updated RCE scores range from 0-52 and are divided into the following categories:

- § 0-11: Poor
- § 12-23: Fair
- § 24-34: Good
- § 35-45: Very Good
- § 46-52: Excellent

4. Guidelines

4.1 Riparian health assessment & Riparian, Channel and Environmental Inventory (CoA 1.2.1)

Riparian habitat and condition monitoring forms part of the broader compliance monitoring and reporting associated with the construction of Stage 2 works for the Rooty Hill RDC. It has been undertaken in compliance with the riparian health and condition monitoring obligations which include:

MCoA 2.28A	Monitor aquatic ecology in Angus and Eastern Creeks as outlined in the SoC and expand this monitoring to: <ul style="list-style-type: none"> - ensure that baseline data is collected, including commencement of sampling not less than six months before commencement of construction and the use of control sites - include monitoring of aquatic ecology at four locations within Nurragingy Reserve - not include the site sampled on Eastern Creek (EO1) as a monitoring site, but use at least two other locations.
SoC 7.5	Monitoring including visual site assessment of habitat condition and aquatic vegetation quarterly.
SoC 10.4 and 15.3	Implement the environmental monitoring program for the Angus Creek Corridor.

5. Monitoring results – Summer 2016

Total rainfall for the month preceding the autumn survey was 307.8 mm for the month of January and 61.8 mm for the month of December (recorded at the Seven Hills (Collins St) station no. 67026). The total for December is slightly below average, however the total for January is nearly three times the monthly average since the commencement of data collection in 1950. Total rainfall for February 2016 was 14.8 mm, which is well below the monthly mean of 113.6 mm (Bureau of Meteorology, 2016).

5.1 Riparian site value and condition assessments

The riparian vegetation that is subject to this monitoring is the Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin plant community type (PCT), also known as Cumberland River Flat Forest (CRFF). The condition rating for each of the six monitoring locations (AE1 to AE6) is illustrated in **Figure 5-1** for the period up to and including summer 2016. Gaps in the data represent periods of high rainfall where access to monitoring sites was impeded by localised flooding during the spring survey period (i.e. spring 2013).

As expected, the riparian monitoring sites show varying value between sites and this is a consequence of differing location, differing widths of riparian vegetation, and historic management regime. However, site value tends to remain reasonably stable between years within monitoring sites (refer **Figure 5-1**), with the exception of monitoring periods which experienced flood events. A decrease in site value was seen at sites AE1 and AE3 in summer 20156 compared to the previous monitoring event in spring 2015. All decreases in site value were minimal, with the largest being at Site AE1, which decreased from 50 in spring 2015 to 41.7 in summer 2015 (which is similar to two monitoring seasons before were the site scored 42.5). These score reductions can be attributed to a reduction in the proportion of regenerating canopy species. This may be caused by dieback of saplings at these sites, possibly due to grazing by rabbits or kangaroos, sickness or over-competition from opportunistic weeds species making use of higher than average rainfall between spring 2015 and summer 2016. The rests of the sites AE2, AE4, AE5 and AE6 increased in site value compared with last season. This variation between seasons is likely due to natural seasonal variation where changes in species richness affects assessment scores as a result of annual species dying off in summer and periods of flooding and dry periods. In the case of summer 2016, higher than average rainfall for January is likely the cause of an increase in native species richness across all sites. Importantly, the variation between seasons is not considered to be affected by site works or operation, suggesting that the differences are likely due to natural variation and prevailing environmental conditions.

The condition of the monitoring sites as of summer 2016 varied from 18.3 at AE2 (low-moderate) to 61.7 at AE4 (moderate-high) (refer **Figure 5-1**). Scores for most sites have stayed relatively stable. Site AE1 and AE4 scored the highest in summer 2016 monitoring and other years, just as site AE2 typically scores the lowest. These sites likely consistently score higher than the other sites largely due to the presence of hollow-bearing trees (alive and dead) and the large amount of large woody debris present in the ground layer. These two attributes are weighted highly in the site value scoring system as they are key components of fauna habitat.

Importantly, monitoring site AE1, which is within the Rooty Hill RDC site, consistently scores highly (compared to other sites that experience fluctuations) in terms of site value rating compared to the five sites downstream in the Nurragingy Reserve (refer **Table 5-1**). Site AE3 has consistently maintained a moderate condition between seasons which has also been seen at site AE1 (i.e. maintaining moderate–high condition between seasons). This suggests the Rooty Hill RDC has not had a detrimental effect on the site value and quality of the riparian vegetation to date.

Table 5-1 Site value and condition assessment scores for riparian vegetation in summer 2016.

Monitoring site	Site value score	Condition
AE1 (Rooty Hill RDC site)	41.7	Moderate
AE2	18.3	Low-Moderate
AE3	24.2	Low-Moderate
AE4	61.7	Moderate-High
AE5	45	Moderate
AE6	31.7	Low-Moderate

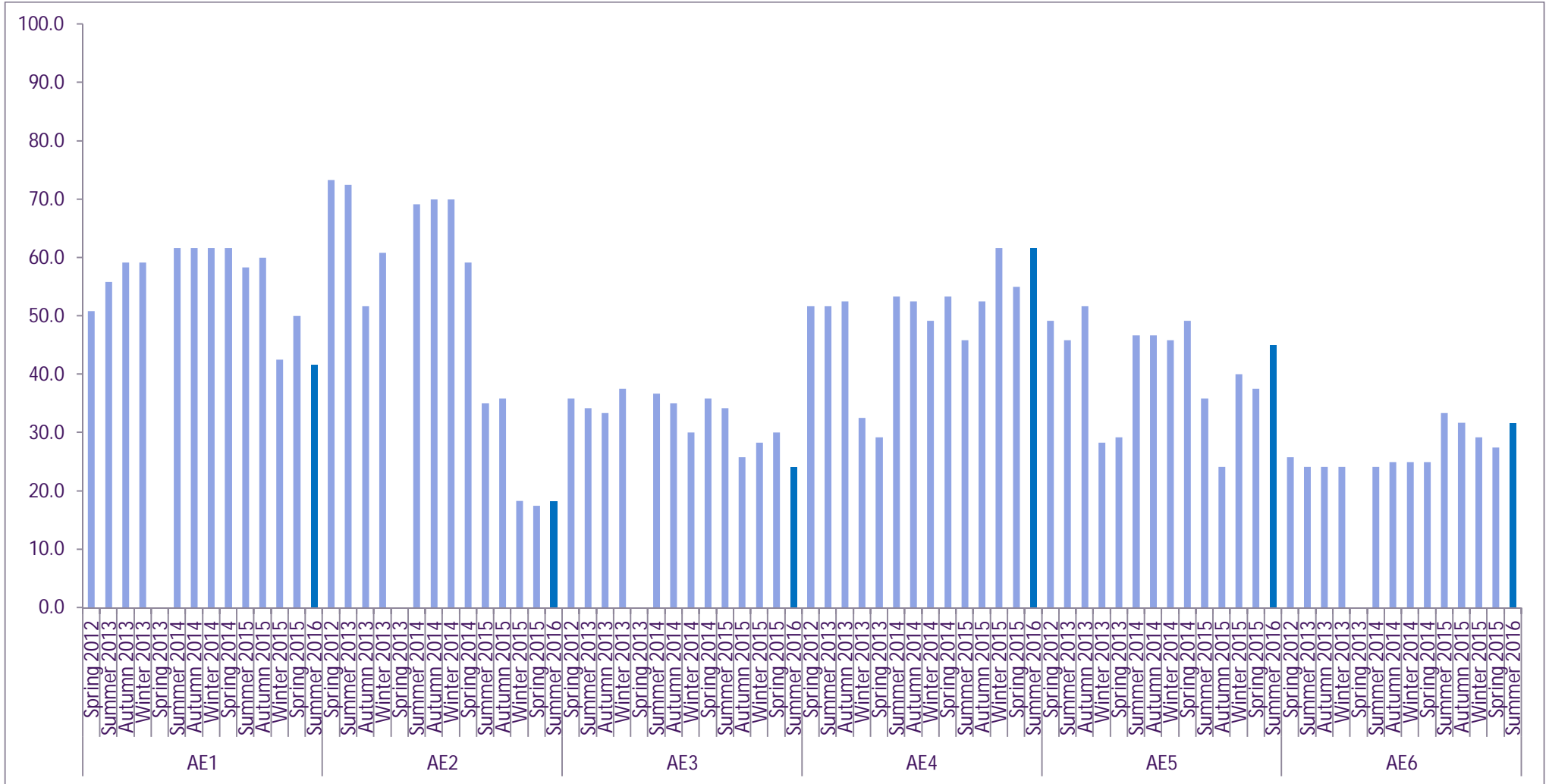


Figure 5-1 Site condition scores for the riparian site value condition assessment (dark blue bars represent results from summer 2016).

5.2 Riparian, Channel and Environmental Inventory

All monitoring locations were able to be measured with scores ranging from 35-38 out of a possible 52. Score aggregates are presented in **Table 5-2**. All sites showed scores higher than the previous monitoring periods (spring 2015). In some cases, scores are markedly higher (**Figure 5-2**), though the increase is consistent with increasing scores over the past year and are not totally out of place with historic variation. The higher scores have caused the sites to go from “good” condition to “very good” condition under the RCE condition criteria which is specific to the RDC and Nurraging Reserve.

Riparian zone condition at sites AE2, AE3, AE4, AE5 and AE6 show a large improvement from the previous monitoring period. The scores recorded in the current monitoring period (summer 2016) are consistently high, which is accentuated by the historically reducing score of the sites as they move further downstream. A review of previous scoring data reveals that the higher scores for summer 2016 can be largely attributed to stream bank structure and channel sediment accumulation. These higher values are not necessarily an indication of improvement but more likely a difference in observer opinion as the categories used in the RCE are coarse. A small change in the score of one category has large impact on overall score. In summer 2016, higher scores for stream bank structure across all sites were recorded and this is deemed appropriate as the stream banks at all sites are stabilised by a range of native and exotic trees, shrubs and grasses. No evidence of loose or unstable stream banks was observed. This is particularly in the case for AE6 where the banks of Angus Creek have been stabilised by sandstone rock armouring creating a completely stable stream bank structure. Likewise, high scores for channel sediment accumulation across all sites is justified as during summer 2016 few sites displayed muddiness that would be consistent with a low score. All other site attributes have remained relatively stable between monitoring periods. There was no evidence of algal blooms or nuisance organisms at any of the sites.

Table 5-2 RCE score aggregates for monitoring locations.

Descriptor	Site Value (0 – very poor, 4 – good)					
	AE1	AE2	AE3	AE4	AE5	AE6
Land-use pattern beyond immediate riparian zone	1	1	1	1	1	1
Width of riparian strip-of-woody vegetation	4	4	3	3	4	3
Completeness of riparian strip of woody vegetation	3	3	3	3	3	3
Vegetation of riparian zone within 10 m of channel	3	3	3	3	3	3
Stream bank structure	4	4	4	4	4	4
Bank undercutting	3	3	3	3	3	4
Channel form	4	4	4	3	4	1
Riffle/Pool sequence	3	3	3	3	2	3
Retention devices in stream	3	3	3	3	2	3
Channel sediment accumulations	2	4	4	4	4	4
Stream bottom	2	2	2	2	2	2
Stream detritus	0	0	0	0	0	0
Aquatic vegetation	4	4	4	4	4	4
RCE Score (total)	36	38	37	36	36	35
Maximum RCE Score*	52	52	52	52	52	52
Condition	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good

*This score relates to the maximum score that could be obtained under the RCE assessment if a river was in high quality condition.

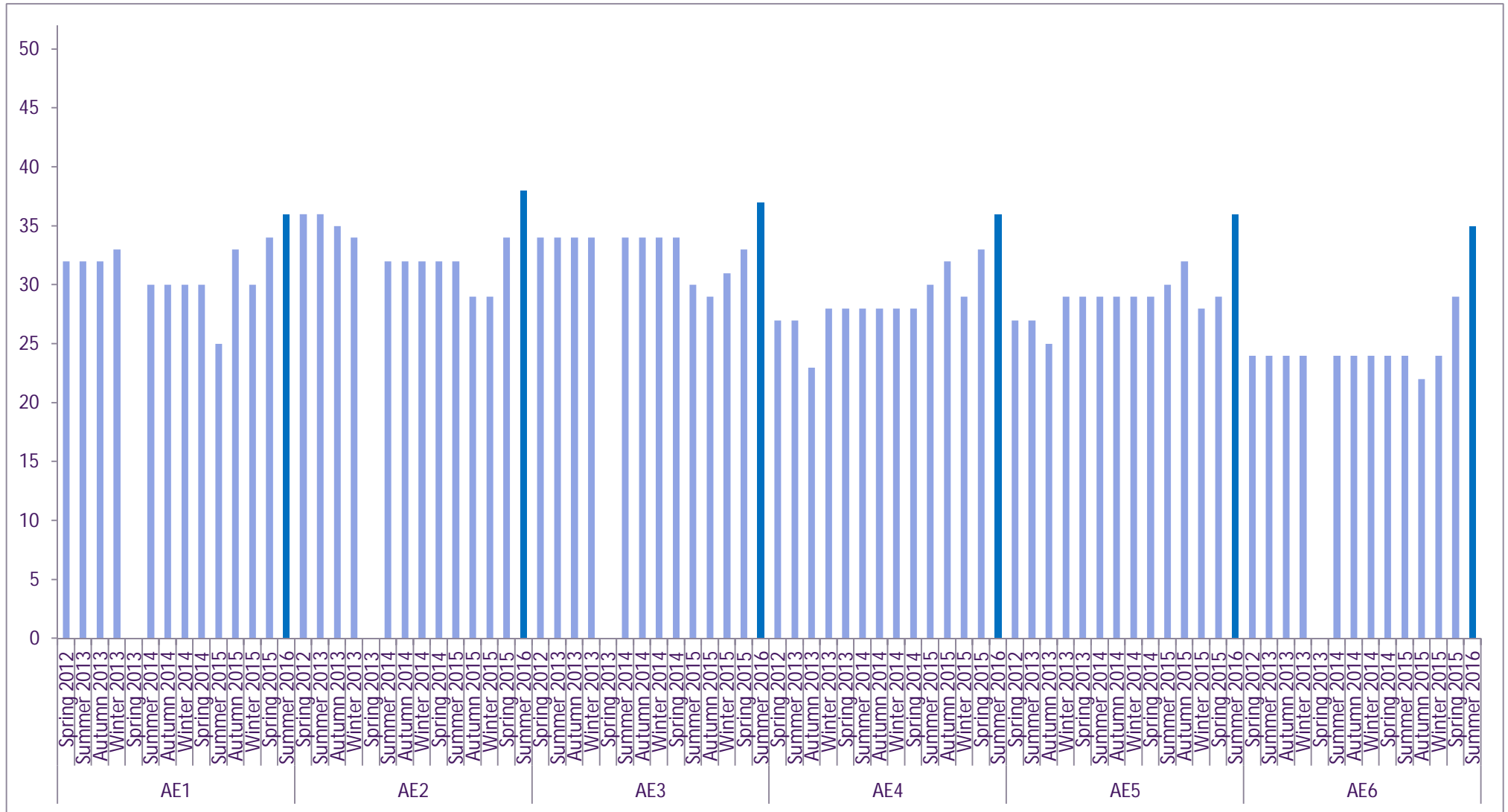


Figure 5-2 Site condition scores for the RCE Inventory (dark blue bars represent results from spring 2015).

6. Conclusions

This report presents the results of the second monitoring period for the operational phase of the RDC.

Riparian habitat conditions at all sites were relatively stable, with some increases which is not unusual considering seasonal variation. Succession of groundcover at some sites appears to be dominated by exotic species following the dieback of native species. Importantly, the habitat condition within Site AE1 within the RDC is consistent with the control sites in terms of seasonal fluctuation in site value rating.

Instream and bank conditions at the monitoring locations appear to vary with wet weather events which transport instream structures to and from monitoring locations. However the higher than usual scores recorded during this summer 2016 monitoring period is a result of increased stream bank structure scores and lack of sediment accumulation.

Overall, there was no evidence of a detrimental impact on riparian habitat condition from activities within the RDC.

7. References

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Appendix A Scoring and Weighting of Site Attributes

Scoring and weighting of the site attributes (adapted from Table 3. of Seidel and Briggs 2008)

Site Attribute	Site Attribute Score (see notes below)				Weighting for site attribute score
	0	1	2	3	
Native Plant Species Richness	0	>0 – <50% of benchmark	50–<100% of benchmark	≥ benchmark	25
Native Over-storey Cover (%)	0–10% or >200% of benchmark	>10–<50% or >150–200% of benchmark	50–<100% or >100–150% of benchmark	within benchmark	10
Native Mid-storey Cover (%)	0–10% or >200% of benchmark	>10–<50% or >150–200% of benchmark	50–<100% or >100–150% of benchmark	within benchmark	10
Native Ground Cover-grasses (%)	0–10% or >200% of benchmark	>10–<50% or >150–200% of benchmark	50–<100% or >100–150% of benchmark	within benchmark	2.5
Native Ground Cover-shrubs (%)	0–10% or >200% of benchmark	>10–<50% or >150–200% of benchmark	50–<100% or >100–150% of benchmark	within benchmark	2.5
Native Ground Cover-other (%)	0– 10% or >200% of benchmark	>10–<50% or >150–200% of benchmark	50–<100% or >100–150% of benchmark	within benchmark	2.5
Exotic Plant Cover (%)	>66%	>33–66%	>5–33%	0–5%	5
Number of Trees with Hollows	0 (unless benchmark includes 0)	>0–<50% of benchmark	50–<100% of benchmark	≥ benchmark	20
Proportion of over-storey species occurring as regeneration	0	>0–<50%	50–<100%	1	12.5
Total Length of Fallen Logs (m)	0–10% of benchmark	>10–<50% of benchmark	50–<100% of benchmark	≥ benchmark	10

Note:

The term ‘*within benchmark*’ means a measurement that is within (and including) the range of measurement identified as the *benchmark* for that vegetation type. The term ‘<*benchmark*’ means a measurement that is less than the minimum measurement in the *benchmark* range. The term ‘>*benchmark*’ means a measurement that is greater than the maximum measurement in the *benchmark* range.

Attachment 3: RHDC Dust Monitoring Results (prepared by Jacobs Consultants)

HVAS PM10 summary									
	HVAS 1 - Blacktown Sports Center			HVAS 2 -Holcim Site Office					
Criteria	50.0	NA		50.0	NA				
Average	9.5	32.8		24.2	52.0				
Date	PM10 ug/m ³	TSP ug/m ³	Notes	PM10 ug/m ³	TSP ug/m ³	Notes			
	<i>(from results)</i>	<i>(PM10 * 2.5)</i>		<i>(from results)</i>	<i>(PM10 * 2.5)</i>				
4/10/2015	33.6	84.0		19.3	48.3				
10/10/2015	27.8	69.5		31.4	78.5				
16/10/2015	24.7	61.8		27.7	69.3				
15/11/2015	5.6	14.0		6.4	16.0				
21/11/2015	15.1	37.8		24.9	62.3				
27/11/2015	25.5	63.8		33.8	84.5				
3/12/2015	14.8	37.0		23.5	58.8				
9/12/2015	18.4	46.0		21.3	53.3				
15/12/2015	20.8	52.0		42.8	107.0				
21/12/2015	24.1	60.3		50.6	126.5				
27/12/2015	10.0	25.0		11.7	29.3				
2/01/2016	8.9	22.3		11.7	29.3				
8/01/2016	13.4	33.5		23.3	58.3				
14/01/2016	23.4	58.5		29.4	73.5				
20/01/2016	28.9	72.3		33.2	83.0				
26/01/2016	-	-	id data. Fuse blown from electrical st	11.2	28.0				
1/02/2016	3.7	9.3		18.7	46.8				
7/02/2016	5.2	13.0		22.3	55.8				
13/02/2016	6.1	15.3		17.8	44.5				
19/02/2016	7.6	19.0		26.8	67.0				
25/02/2016	12.1	30.3		40.2	100.5				
2/03/2016	6.6	16.5		25.0	62.5				
8/03/2016	11.0	27.5		51.1	127.8				
14/03/2016	8.1	20.3		33.4	83.5				
20/03/2016	4.1	10.3		13.2	33.0				
26/03/2016	7.1	17.8		22.6	56.5				
1/04/2016	7.5	18.8		26.8	67.0				
7/04/2016	5.5	13.8		26.8	67.0				
13/04/2016	2.6	6.5		23.6	59.0				
19/04/2016	2.0	5.0		18.6	46.5				
25/04/2016	1.8	4.5		12.2	30.5				
1/05/2016	3.8	26.0		10.4	9.5				

Depositional Dust Summary					
Criteria		4.0 g/m ² /month			
Annual Average	<i>12 month rolling average</i>		1.9	3.5	1.9
Start Date	End Date		DDG 1	DDG 2	DDG 3
1/09/2015	30/09/2015		1.8	2.3	1.3
30/09/2015	30/10/2015		3.5	3.9	1.3
30/10/2015	1/12/2015		1.4	7.7	1.9
1/12/2015	30/12/2015		1	3	1.5
30/12/2015	2/02/2016		1	1.8	0.8
2/02/2016	29/02/2016		2	2.7	0.9
29/02/2016	31/03/2016		1.6	3.6	0.7
31/03/2016	2/05/2016		2.4	2.9	5.1
2/05/2016	2/06/2016		2.1	4.8	4.4
2/06/2016	1/07/2016		2.4	2.7	1
1/07/2016	1/08/2016		1.5	3.1	1.7
1/08/2016	1/09/2016		2.0	2.9	1.3

Attachment 4: RHDC Complaints Register (Holcim INX Database)



Holcim Australia & New Zealand

Summarized Event Report Listing for 01 Oct 2015 to 30 Sep 2016

Event Date	Reference	Status	Event Type	Responsible Manager(s)	Workgroup	Description
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