

2022 Annual Review

1 January 2022 – 31 December 2022

Rooty Hill Distribution Centre

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Title Block

Name of operation	Rooty Hill Distribution Centre
Name of operator	Holcim (Australia) Pty Ltd
Development consent / project approval #	PA 05_0051
Name of holder of development consent / project approval	Holcim (Australia) Pty Ltd
Annual Review start date	1 January 2022
Annual Review end date	31 December 2022
<p>I, Michael Ensor, certify that this audit report is a true and accurate record of the compliance status of Rooty Hill Distribution Centre for the period of 1 January 2022 – 31 December 2022 and that I am authorised to make this statement on behalf of Holcim (Australia) Pty Ltd.</p> <p><i>Note.</i></p> <p>a) _ <i>The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</i></p> <p>b) _ <i>The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</i></p>	
Name of authorised reporting officer	Michael Ensor
Title of authorised reporting officer	Site Supervisor
Signature of authorised reporting officer	
Date	31/03/2023

1 Statement of Compliance

See **Table 1** for the statement of commitments for the 1 January 2022 to 31 December 2022 reporting period for the Rooty Hill Distribution Centre (RHDC). **Table 3** details the non-compliances of the relevant approvals identified within the reporting period. **Table 2** presents the compliance status key used for the summary of non-compliances shown in **Table 3**.

Table 1: Statement of Commitments

Relevant Approval	Were all conditions complied with?
Project Approval 05_0051	No – See Table 3 for more details.

Table 2: Compliance Status Key for Table 3

Risk level	Colour code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of 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)

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

Table 3: Summary of Non-Compliances in 2022

Relevant approval	Condition	Condition Description	Compliance status	Relevant Section in this Annual Review and Comment
PA 05_0051 MOD 2	5.5 c) Soil and Water Management Plan	<p>Soil and Water Management Plan</p> <p>c) a Soil and Water Management Plan to detail measures to manage and mitigate the impacts of stormwater runoff from and within the site. The Plan must be consistent with the Stormwater Management Plan for the catchment (or the guideline contained in Managing Urban Stormwater: Council Handbook (DECCW) should a plan for the catchment not exist). The Plan should include, but not necessarily be limited to:</p> <p>i) details of the monitoring requirements of this approval, specifically the requirements of condition 1.1 of this approval; and</p> <p>ii) details of any contingency measures that would be followed to ensure the protection of groundwater and neighbouring waterways should any non-compliance be detected or during an accident or emergency situation at the site that could result in the contamination of surface water or groundwater; and</p> <p>iii) evidence of compliance with the targets in Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) October 2000.</p>	Low Non-Compliance	<p>Section 7 Water Management</p> <p>AE6 monitoring location for surface water could not be undertaken during the 2022 reporting period due to construction works being conducted at the Blacktown International Sports Park. The site was not accessible during this time.</p>
PA 05_0051 MOD 2	2.8A Air Quality	The Proponent must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do	Low Non-Compliance	Section 6.3 Air Quality

Relevant approval	Condition	Condition Description	Compliance status	Relevant Section in this Annual Review and Comment																		
		<p>not cause exceedances of the criteria in Table 2 at any residence on privately-owned land.</p> <table><thead><tr><th>Pollutant</th><th>Averaging Period</th><th>Criterion</th></tr></thead><tbody><tr><td>Particulate Matter < 10 µm (PM10)</td><td>Annual</td><td>a, d 25 µg/m³</td></tr><tr><td>Particulate Matter < 10 µm (PM10)</td><td>24 hour</td><td>b, d 50 µg/m³</td></tr><tr><td>Particulate Matter < 2.5 µm (PM2.5)</td><td>Annual</td><td>a, d 8 µg/m³</td></tr><tr><td>Particulate Matter < 2.5 µm (PM2.5)</td><td>24 hour</td><td>b, d 25 µg/m³</td></tr><tr><td>Total suspended particulates (TSP)</td><td>Annual</td><td>a, d 90 µg/m³</td></tr></tbody></table> <p><i>Note:</i> “Reasonable and feasible avoidance measures” includes, but is not limited to,</p>	Pollutant	Averaging Period	Criterion	Particulate Matter < 10 µm (PM10)	Annual	a, d 25 µg/m³	Particulate Matter < 10 µm (PM10)	24 hour	b, d 50 µg/m³	Particulate Matter < 2.5 µm (PM2.5)	Annual	a, d 8 µg/m³	Particulate Matter < 2.5 µm (PM2.5)	24 hour	b, d 25 µg/m³	Total suspended particulates (TSP)	Annual	a, d 90 µg/m³		<p>HVAS 1 PM₁₀ Annual Average was exceeded, recording an average 33.2µg/m³ which is above the allowed criteria of 25µg/m³.</p> <p>HVAS 1 PM₁₀ 24-hour exceedances occurred on:</p> <ul style="list-style-type: none">• 12 April 2022;• 6 May 2022• 18 May 2022• 11 June 2022• 29 June 2022• 2 November 2022• 8 November 2022• 8 December 2022 <p>HVAS 2 PM₁₀ 24-hour exceedance occurred on:</p> <ul style="list-style-type: none">• 11 June 2022 <p>There were missed PM10 sampling events between January and April due to the removal of the HVAS2 device from the Blacktown City Council property for redevelopment. The new PM10 location was commissioned in May 2022.</p>
Pollutant	Averaging Period	Criterion																				
Particulate Matter < 10 µm (PM10)	Annual	a, d 25 µg/m³																				
Particulate Matter < 10 µm (PM10)	24 hour	b, d 50 µg/m³																				
Particulate Matter < 2.5 µm (PM2.5)	Annual	a, d 8 µg/m³																				
Particulate Matter < 2.5 µm (PM2.5)	24 hour	b, d 25 µg/m³																				
Total suspended particulates (TSP)	Annual	a, d 90 µg/m³																				

Relevant approval	Condition	Condition Description	Compliance status	Relevant Section in this Annual Review and Comment
		<p><i>the operational requirements in conditions 2.8, 3.1(b) and 5.3(d) to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.</i></p> <p><i>a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).</i></p> <p><i>b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development.</i></p> <p><i>c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.</i></p> <p><i>d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.</i></p>		The missed sampling events were reported to DPE and EPA.

2 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, as seen in **Figure 1**. 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 officially commenced operations on 1 October 2015. The RHDC facility is the primary unloading and distribution centre for construction materials extracted from Lynwood Quarry (located in Marulan, NSW) into the Greater Sydney market.

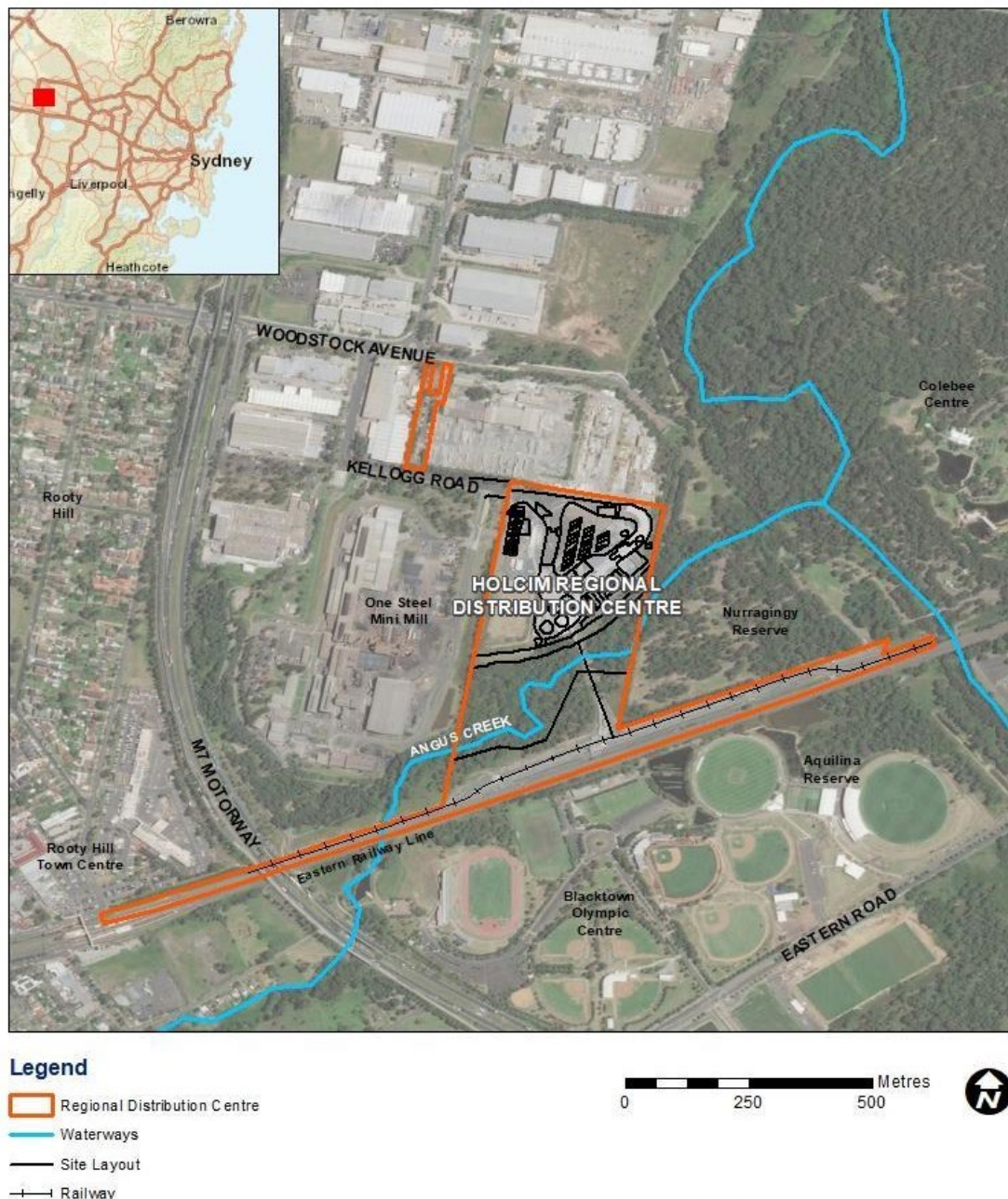


Figure 1: Rooty Hill Distribution Centre locality and primary features.

In accordance with Condition 6.3 (Annual Performance Monitoring) of the modified Project Approval 05_0051 the site is required to undertake an Annual Review of the site. These Annual Review

requirements are presented in **Table 4** This Annual Review will cover a reporting period of 1 January 2022 to 31 December 2022.

Table 4: Annual Review Requirements

Condition	Section addressed in Annual Review
The Proponent must, throughout the life of the project, prepare and submit to the Secretary, an Annual Review. The Annual Review must 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 Annual Review must include, but not necessarily be limited to:	
a) details of compliance with the conditions of this approval;	Section 1 & 6
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 addressed and resolved;	Section 9
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;	Section 6, 7.1, and 8.1
d) results of all environmental monitoring required under this approval and other approvals, including interpretations and discussion by a suitably qualified person; and	Section 6, 7, & 8
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.	Section 1, 6, & 11

This Annual Review has been prepared following the NSW Government's *Annual Review Guidelines: Post-approval requirements for State Significant Mining Developments* (October 2015).

2.1 Key Personnel

RHDC Site Supervisor

Michael Ensor
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Acting Environment Manager - NSW

Rob Townsend
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3 Approvals

RHDC operates under the approvals listed in **Table 5**. The original Project Approval 05_0051 was modified in 2011 (MOD 1) to approve alterations to site layout. In 2017, the Project Approval was modified (MOD 2) to secure a larger area for material storage and handling.

Table 5: Approvals for RHDC Operations

Approval	Regulatory Authority	Date of Approval
MOD 2 to PA 05_0051	Department of Planning, Industry & Environment (DPIE).	29 June 2017
MOD 1 to PA 05_0051	Department of Planning.	22 March 2011
L&E Court Decision No. 10406 of 2006.	Department of Planning & Environment (DP&E).	26 April 2006

On 18 June 2020 the EPA approved Holcim's application to surrender the Environment Protection Licence (EPL) 20672 for RHDC. EPL 20672 is no longer applicable to the RHDC.

4 Operations Summary

All operations undertaken at RHDC during the reporting period were undertaken in general accordance with the Project Approval. 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.

RHDC has approval to operate 24 hours a day, seven days a week. The site contained all construction activities within the hours specified in Condition 2.2 of the Project Approval during this report period. The timeframes are as follows:

- a) 7:00am to 6:00pm, Mondays to Fridays,
- b) 8:00am to 1:00pm on Saturdays, and
- c) At no time on Sundays or public holidays.

Table 6 includes a summary of the product distributed from RHDC in each calendar year which apply to this Annual Review reporting period. The site has not exceeded amounts outlined in Condition 1.4 Limits of Approval of the Project Approval.

Table 6: Annual Production Summary

Material	Approval Limit	2018	2019	2020	2021	2022
Concrete Production (m ³)	200,000	68,700	53,547	94,722	77,746	75,906

In accordance with the Operational Environmental Management Plan, road trucks are covered when leaving the site. Compliance against this condition is audited and training is provided to drivers through the induction process. Random or “spot” audits inspect the internal and external road conditions to ensure trucks are not carrying material out onto public roads.

4.1 Next Reporting Period

It is anticipated that RHDC will continue to operate within the current footprint and scope of the existing operations.

Development activities proposed to be carried out at RHDC in 2023 include:

- Stockpiling of product;
- Operation of the concrete batching plant; and
- Loading and unloading of product by truck and train.

5 Actions Required from Previous Annual Review

Holcim did not receive a letter from DPE following the submission of the 2021 Annual Review in March 2022.

5.1 Update on Proposed Actions from 2021 Annual Review

Table 7 provides an update on the actions proposed by Holcim in the previous Annual Review.

Table 7: Actions from Previous Annual Review 2021

Improvement Measure	Activities	Actions Taken in the Reporting Period
Air Quality Monitoring	Commence air quality monitoring program as per the approved OEMP. This update includes updated air quality monitors and relocations of these monitors.	Approved by EPA and DPE however during 2022 the cost of the device increased and caused a delay in funding approval and was subsequently not updated in 2022.
Independent Environmental Audit (IEA) Actions	Continue actions on the recommendations from the 2021 IEA Action Plan to close out improvement actions and non-compliances.	All recommendations from the 2021 IEA Action Plan have been closed out in 2022.

6 Environmental Performance

6.1 Meteorological Monitoring

A summary of monthly rainfall was retrieved from the Bureau of Meteorology (BOM) Station 067066 Erskine Park Reservoir, as presented in **Table 8**. Rooty Hill continued to review daily and forecast meteorological conditions to manage activities undertaken on site. Holcim anticipates on-site meteorological monitoring will be retrieved from the new Dust Sentry monitor once installed in 2023.

Table 8: Monthly Rainfall at Erskine Park Reservoir (BOM Station 067066)

Month	Rainfall (mm)
January	119.0
February	203.0
March	507.0
April	91.0
May	65.0
June	2.0
July	358.0
August	20.0
September	75.0
October	131.0
November	44.0
December	8.0
Annual TOTAL	1623.0

6.2 Noise

6.2.1 EIS Predictions

The Noise Impact Assessment of the 2005 Environmental Assessment Report (EAR) concluded that noise and vibration resulting from construction, traffic, and operations related to the project will comply with the project specific noise criteria for all periods. Furthermore, the maximum noise amenity levels at locations such as Blacktown Olympic Centre or Nurragingy Reserve would not be exceeded for all phases of the project.

The 2017 Environmental Assessment for MOD 2 found that the modification would cause a small increase in the noise levels at the residential receivers, however this increase would not exceed the approved noise criteria levels. No further management measures beyond those already in place were recommended.

6.2.2 Approved Criteria

The project must comply with the noise criteria in Condition 2.3 of the Project Approval as well as the noise monitoring criteria outlined in the Noise Management Plan. These approved criteria are shown in **Table 9**.

Table 9: Approved Noise Criteria (Project Approval 05_0051)

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))	L _{A1} (1 minute) (dB(A))
Any residences in Station Street	39	44	44	39	53
Any Residences in Crawford Road	40	40	39	39	53
Any residences in Mavis Street	35	35	35	35	53
Nurragingy Reserve	When the 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)				

6.2.3 Key Environmental Performance

The results of noise monitoring and assessments must be reported in Annual Reviews. Muller Acoustic Monitoring (MAC) undertook noise monitoring for Holcim in this report period at monitoring locations as per the Project Approval.

It should be noted that the attended noise monitoring does not measure noise in the Morning Shoulder Period, as operational activities are not taking place during this period. Noise monitoring was undertaken at locations representative of the nearest noise sensitive receivers to RHDC.

The frequency of monitoring changed from a quarterly to annual basis in 2020. Holcim conducted the first annual noise monitoring assessment in February 2021. Holcim continued to conduct the annual noise monitoring assessment in the first quarter of the calendar year on February 1, 2022.

Table 10 summarises the noise monitoring results for this reporting period.

Table 10: Noise Monitoring Results and Compliance Summary for 2022.

Assessment Period	Receiver	Noise Criteria		Annual Noise Monitoring	Compliance
				1 February 2022	
Day ^{1, 2}	N1	(LAeq(15 min))	44	<44	✓
	N2		40	<40	✓
	N3		50 (when Nurragingy Reserve is in use)	<50	✓
	N4		55 (when active recreational areas of the Blacktown Olympic Park are in use)	<55	✓
Evening ^{1, 2}	N1	(LAeq(15 min))	44	<44	✓
	N2		39	<39	✓
	N3		50 (when Nurragingy Reserve is in use)	<50	✓
	N4		55 (when active recreational areas of the Blacktown Olympic Park are in use)	<55	✓
Night ^{1, 2}	N1	(LAeq(15 min))	39	<39	✓
	N2		39	<39	✓
	N3		50 (when Nurragingy Reserve is in use)	<50	✓
	N4		55 (when active recreational areas of the Blacktown Olympic Park are in use)	<40	✓
Night ^{1, 2}	N1	(LA ₁ (1min))	53	<50	✓
	N2		53	<50	✓

Note 1: Noise criteria adopted from Project Approval 05_0051. Note 2: 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.

RHDC noise emissions were inaudible during the annual noise monitoring. All noise results were compliant with criteria.

Location N3 contributions included industrial hum and RHDC alarms. RHDC was inaudible and is therefore considered compliant. Extraneous sources audible during the attended surveys included traffic, aircraft, insects, and train noise.

Other extraneous noise sources at other locations included birds, local traffic noise, insects, aircraft noise, the sports park alarm, and trains.

Long-term Trends

Noise monitoring reports from 2015 until the end of this reporting period record no exceedances in noise criteria. Noise emissions from site have been inaudible at the receivers and negligible in comparison to other sources of noise. The noise monitoring results represented in this Annual Review support RHDC's continued compliance with the Project Approval noise criteria.

6.2.4 Management Measures

The Operational Noise Management Protocol as well as the OEMP contain noise management measures including:

- During the morning shoulder and night-time periods, the storage bins are not loaded from an empty state, front end loader reversing alarms are replaced with visual warnings, and conveyor start-up warnings are visual.
- Plant and equipment are maintained, fitted wherever practical with mufflers or noise insulation, and operated efficiently.
- Noise barriers and enclosures are inspected regularly.

6.2.5 Proposed Improvements

There are no further improvements proposed for noise management at RHDC.

6.3 Air Quality

6.3.1 EIS Predictions

The 2005 EAR reported the level of impact from the project to air quality would be acceptable, with no reason for concern regarding the health and safety of those within or in the vicinity of the project area (Volume 2, Section F). The MOD 2 Environmental Assessment (2017) supported these findings in that no exceedances of the 24-hour criteria are predicted to occur in the operational phase of the project.

6.3.2 Approved Criteria

Air quality monitoring at RHDC is compared to the monitoring criteria stipulated in Condition 2.8A of the Project Approval to ensure compliance. There are no air quality criteria outlined in EPL 20672.

Table 11: Air Quality Criteria from Project Approval 05_0051, Condition 2.8A

Pollutant	Averaging Period	Criterion
Particulate Matter < 10 µm (PM ₁₀)	Annual	a, d 25 µg/m ³
Particulate Matter < 10 µm (PM ₁₀)	24 hour	b, d 50 µg/m ³
Particulate Matter < 2.5 µm (PM _{2.5})	Annual	a, d 8 µg/m ³
Particulate Matter < 2.5 µm (PM _{2.5})	24 hour	b, d 25 µg/m ³
Total suspended particulates (TSP)	Annual	a, d 90 µg/m ³

Note:

“Reasonable and feasible avoidance measures” includes, but is not limited to, the operational requirements in conditions 2.8, 3.1(b) and 5.3(d) to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.

a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development.

c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.

6.3.3 Changes to Monitoring and Management in 2021 and 2022

The OEMP was revised in 2021 and was approved by DPE on 27 January 2022. The 2021 OEMP approval letter from DPE is appended in Appendix 4. Through the OEMP, Holcim proposed the following changes to the RHDC Ambient Dust Monitoring Program:

1. Monitor 1 will be a Dust Sentry instrument (particle counter) located near the site administration building and will monitor PM₁₀, PM_{2.5}, and meteorological data.
2. Monitor 2 will be a Dust Sentry instrument (particle counter) located near the Rail Loading Facility. Monitor 2 will monitor PM₁₀ and PM_{2.5}.
3. Depositional dust monitoring will be removed from the dust monitoring program and depositional dust will no longer be recorded

In 2022 following the approval of the OEMP, Holcim was unable to acquire the two Dust Sentry instruments required due to supply chain issues (availability) and a subsequent increase in device cost. As a result, RHDC was not able to transition to the approved Ambient Dust Monitoring Program successfully within the timeline outlined in the OEMP. Instead this transition will occur in 2023.

Further information on the Ambient Dust Monitoring Program at RHDC can be found in Section 3.4.1 of the 2022 OEMP.

6.3.4 Key Environmental Performance

The available PM₁₀ results are summarised in **Table 12** and **Table 13** as discussed in **Section 6.3.3**

Table 12: HVAS1 2022 PM10 Monitoring Results

Sample Date	HVAS 1 (Site Office) PM ₁₀ (µg/m ³)	Compliance Status
6/01/2022	30.7	Compliant
12/01/2022	28.2	Compliant
18/01/2022	15.5	Compliant
24/01/2022	No Sample	-
30/01/2022	No Sample	-
5/02/2022	No Sample	-
11/02/2022	No Sample	-
17/02/2022	No Sample	-
23/02/2022	No Sample	-
1/03/2022	13.8	Compliant
7/03/2022	11.6	Compliant
13/03/2022	18.9	Compliant
19/03/2022	20.7	Compliant
25/03/2022	46.2	Compliant
31/03/2022	40.6	Compliant
6/04/2022	26.3	Compliant
12/04/2022	50.1	Non-Compliant
18/04/2022	19.3	Compliant
24/04/2022	14.3	Compliant
30/04/2022	16.2	Compliant
6/05/2022	111.4	Non-Compliant
12/05/2022	16.9	Compliant
18/05/2022	53.2	Non-Compliant
24/05/2022	38.6	Compliant

Sample Date	HVAS 1 (Site Office) PM ₁₀ (µg/m ³)	Compliance Status
30/05/2022	45.4	Compliant
5/06/2022	7.6	Compliant
11/06/2022	48.7	Compliant
17/06/2022	46	Compliant
23/06/2022	40	Compliant
29/06/2022	No Sample	-
11/07/2022	20.3	Compliant
17/07/2022	23.7	Compliant
23/07/2022	15.1	Compliant
29/07/2022	53.7	Non-Compliant
4/08/2022	20.8	Compliant
6/08/2022	16	Compliant
12/08/2022	15.8	Compliant
22/08/2022	20.8	Compliant
28/08/2022	15.5	Compliant
3/09/2022	19.7	Compliant
9/09/2022	19.6	Compliant
15/09/2022	30.2	Compliant
21/09/2022	48.7	Compliant
27/09/2022	32.5	Compliant
3/10/2022	18.9	Compliant
9/10/2022	13.4	Compliant
15/10/2022	25.4	Compliant
21/10/2022	15.2	Compliant
27/10/2022	29	Compliant
2/11/2022	56.3	Non-Compliant
8/11/2022	59.4	Non-Compliant
14/11/2022	33.6	Compliant
20/11/2022	35.1	Compliant
26/11/2022	30.2	Compliant
2/12/2022	43.1	Compliant
8/12/2022	81.4	Non-Compliant
14/12/2022	78	Non-Compliant
20/12/2022	77.6	Non-Compliant
26/12/2022	18	Compliant
Annual Average	33.2	Non-Compliant
Valid Sample Count	52	
Number of Sampling Events Attempted	59	

*Note: Results exceeding the short-term criteria are in **bold**. Results recorded with an asterisk note those impacted by contamination.*

PM₁₀ 24-hour criteria were exceeded on seven occasions in 2022. These exceedances occurred at HVAS 1 on the following days:

- 12 April 2022;
- 6 May 2022;
- 18 May 2022;
- 29 July 2022;
- 2 November 2022;
- 8 November 2022;
- 8 December 2022.

Holcim believe that these exceedances are a result of a moved HVAS monitoring location, and that these exceedances are not related to site. Holcim will review the performance of the relocated HVAS unit as part of the AQMP review required following production of this annual report. Rooty Hill Distribution Centre received a site inspection by a Senior DPE Compliance Officer on 8 February 2022 and was happy with performance. No correspondence was received in follow up.

The annual average at HVAS 1 was 33.2 µg/m³, which exceeds the annual average criteria of 20 µg/m³. This is a non-compliance with Condition 2.8A of the Approval.

Table 13: HVAS 2 PM10 Monitoring Results 2022

Sample Date	HVAS 2 (Blacktown Sports Centre) PM ₁₀ (µg/m ³)	Compliance Status
6/05/2022	No Sample	-
12/05/2022	14.3	Compliant
18/05/2022	24	Compliant
24/05/2022	13.8	Compliant
30/05/2022	12.5	Compliant
5/06/2022	6.6	Compliant
11/06/2022	64.5	Non-Compliant
17/06/2022	22.9	Compliant
23/06/2022	23.8	Compliant
29/06/2022	No Sample	-
11/07/2022	14.5	Compliant
17/07/2022	28.3	Compliant
23/07/2022	9.1	Compliant
29/07/2022	19.3	Compliant
4/08/2022	15.6	Compliant
10/08/2022	14.1	Compliant
16/08/2022	14.3	Compliant
22/08/2022	30.1	Compliant
28/08/2022	14.5	Compliant

Sample Date	HVAS 2 (Blacktown Sports Centre) PM ₁₀ (µg/m ³)	Compliance Status
3/09/2022	10.1	Compliant
9/09/2022	12.5	Compliant
15/09/2022	18.8	Compliant
21/09/2022	28.9	Compliant
27/09/2022	23.7	Compliant
3/10/2022	14.2	Compliant
9/10/2022	6.9	Compliant
15/10/2022	18.1	Compliant
21/10/2022	25.2	Compliant
27/10/2022	29	Compliant
2/11/2022	22.5	Compliant
8/11/2022	24.5	Compliant
14/11/2022	29.4	Compliant
20/11/2022	37.7	Compliant
26/11/2022	16.8	Compliant
2/12/2022	24.2	Compliant
8/12/2022	43.8	Compliant
14/12/2022	26.2	Compliant
20/12/2022	31.7	Compliant
26/12/2022	15	Compliant
Annual Average	21.7	Compliant
Contaminated Samples	2	
Valid Sample Count	36	Full monitoring program interrupted in 2022 due to forced removal of HVAS.
Number of Sampling Events Attempted	38	

It should be noted that there are no results recorded between January and April in the 2022 reporting period. There were only 36 valid samples that could be retrieved for the monitoring program at HVAS 2. This is due to the removal of the HVAS2 device from the Blacktown City Council property due to redevelopment. The new PM₁₀ location was commissioned in May 2022.

It should be noted that only 36 valid samples could be retrieved for the monitoring program at HVAS 2. As a results, there were 38 attempted samples, with two samples invalidated. The sample taken on 6 May 2022 was found without a filter. Similarly, the sample on 29 June 2022 was found without a filter.

There was one 24-hour exceedance in the samples retrieved from HVAS 2 in 2022. This exceedance occurred 11 June 2022. The annual average at HVAS 2 was 21.4 µg/m³ which is below the annual criteria value. This is compliant with the limits of the Approval.

Long-Term Trends

Table 14 summarises the long-term PM₁₀ results at RHDC. Note, the location of monitors has changed between 2021 and 2022. HVAS 1 has increased since the 2015-2016 reporting period but 2022 results were consistent with the previous three years. HVAS 2 results have generally been consistent across the project lifetime, with the exception of a small decrease in 2021. The annual average HSVAS 2 for 2022 was consistent the previous years.

Holcim will review the performance of the relocated HVAS unit as part of the AQMP review required following production of this annual report.

Table 14: Long-term PM₁₀ Results

Monitor	PM ₁₀ Annual Average (µg/m ³)					
	October 2015 - September 2016	July 2017 - June 2018	2019 (contaminated samples removed)	2020 (contaminated samples removed)	2021 (contaminated samples removed)	2022 (contaminated samples removed)
HVAS 1	9.5	30.2	35.2	36.1	32.4	33.2
HVAS 2	24.2	25.0	23.3	20.3	17.2 (January 2021 – September 2021)	21.7

6.3.5 Management Measures

The site undertook dust management measures throughout operations to ensure compliance with the Project Approval. The update to the OEMP introduced a new monitoring program for air quality at RHDC which improved the dust monitoring program at site. Consultation with air quality experts was undertaken in this update, with this being appended to the 2021 OEMP.

Dust management measures undertaken as per the approval and OEMP include:

- Provision and use of a permanent water cart onsite.
- Provision and use of a permanent street sweeper onsite.
- Installation and use of water cannons on all stockpiles.
- All heavy vehicles exiting the site leave via the wheel wash (located at the weighbridge).
- Trucks cover loads at all times, except for during loading and unloading;
- Water sprays and covering of all material conveyors.
- Stockpile spray maintenance.
- Internal roads are swept to minimise dust and sediment tracking.
- Staff training for dust control measures, including recognising dust as a hazard of high priority for resolution.
- Scope of works for monitoring contractors to include cleaning and general maintenance of samplers.
- Site speed limits are signed and enforceable at all times.

6.3.6 Proposed Improvements

Proposed improvements for the next reporting period include the installation of the Dust Sentry monitor and meteorological station. It should be noted the method of PM₁₀ and PM_{2.5} monitoring will change once particle counter instruments are acquired and installed at RHDC. It is intended that the new air quality instruments will improve of PM₁₀ and PM_{2.5} monitoring and capable of measuring all particle sizes and capable of integrating meteorology sensors to inform adverse dust generating conditions and

likely sources of elevated dust concentrations. This will provide fast provision and understanding of results through alerts, online data access and negating the need for laboratory analysis. The new instruments will satisfy and meet environmental obligations at RHDC.

6.4 Traffic Management

6.4.1 EIS Predictions

In Appendix D of Volume 3 of the 2005 EAR, a traffic assessment found that the existing road network around the project area would be sufficient for the performance of project-associated traffic. Furthermore, pedestrian safety was not found to be impacted as a result of the project. It was also noted that road upgrades may be necessary within the lifetime of the project. The 2010 and 2017 environmental assessments did not find any additional impacts to traffic volumes or routes as a result of RHDC operations.

6.4.2 Approved Criteria

Traffic management is outlined in the RHDC Transport Code of Conduct and the 2021 OEMP. The Project Approval outlines requirements for traffic in Conditions 2.11 - 2.21A (Traffic and Transport).

6.4.3 Key Environmental Performance

There were no traffic incidents or non-compliances at RHDC within this Annual Review period. Holcim continue to execute traffic management measures consistent with the Project Approval.

6.4.4 Management Measures

Management measures for traffic are outlined in the OEMP. Some of these key controls include:

- The Transport Code of Conduct and site driver requirements must always be complied with.
- Vehicles must be maintained and serviced regularly.
- Site roads and access must be monitored and kept in good order including in terms of road condition and sediment tracking.
- Speeds are limited to 20km/hr and traffic routes are signed.

6.4.5 Proposed Improvements

Holcim staff are responsible for regularly reviewing traffic management against the Transport Code of Conduct and OEMP. The site will continue to conduct traffic monitoring and management measures committed to within the approved OEMP in the next reporting period.

7 Water Management

7.1 EIS Predictions

7.1.1 Surface Water Quality

The Executive Summary from the 2005 EAR stated that *“the proposed RHDC would not materially change the drainage patterns on the site”* and there would be no negative impact on Angus Creek from the project. Furthermore, modelling that was presented in the 2005 EAR showed there would be minor changes to flood levels as a result of the project.

Section 6.4 of the 2017 Environmental Assessment for MOD 2 outlines the negligible impact to the site surface water management systems that the small increase in runoff volume the RHDC Modification would create.

7.1.2 Aquatic Ecology

The Aquatic Ecology Impact Assessment (Volume 2, Section E) in the 2005 EAR found that there were no endangered ecological communities or threatened species within the riparian areas of the site. Angus Creek and Eastern Creek were categorised as disturbed lowland creeks.

7.1.3 Groundwater

The 2005 EAR found the RHDC would have minimal to no impact on the groundwater as a result of altered water flows due to increased impervious surfaces and not allowing potential sources of contamination to pass through such as spilled oils, fuels, or other chemicals stored on site.

7.2 Approved Criteria

The Project Approval requires surface water management at RHDC, including the expectation that Holcim follows best-practice guidelines for urban stormwater management. Holcim is expected to operate in accordance with:

- Protection of the Environment Operations Act 1997.
- Draft Guidelines – Watercourse Crossing Design and Construction (DPI Water).
- Why do Fish Need to Cross the Road? – Fish Requirements for Waterway Crossings (2004, NSW Fisheries).
- Policy and Guidelines for Fish Friendly Waterway Crossings (2004, NSW Fisheries).
- Water Sensitive Urban Design and Integrated Water Cycle Management, Blacktown Development Control Plan (2015).
- Sensitive Urban design Technical Guidelines for Western Sydney (upper Parramatta River Catchment Trust, 2004).
- Managing Urban Stormwater Soils and Construction: Volume 1 (the ‘Blue Book’) by Landcom.

As per Condition 2.28A (Aquatic Ecology) of the Project Approval as well as the Statement of Commitments, RHDC conduct a surface water and aquatic ecology monitoring program in Angus Creek and Eastern Creek which also includes monitoring locations in Nurragingy Reserve. Water quality monitoring and visual assessments for habitat and vegetation are required to occur as per the monitoring program.

Table 15 shows the site-specific criteria for water quality parameters in dry weather from the OEMP and Soil and Water Management Plan.

Table 15: ANZECC Guidelines (RHDC Soil and Water Management Plan).

Monitoring Location	Turbidity (NTU)	Dissolved Oxygen (% sat)	Electrical Conductivity (µS/cm)	pH	Total Nitrogen	Total Phosphorous
AE1	49	22 – 53	1243 – 3827	7.6 – 8.5	1.52	0.16
AE2	42	22 – 47	1267.8 – 4016	7.5 – 8.6	2	0.16
AE3	45.0	24-2554	1181 – 4164	7.5 – 8.9	2.2	0.24
AE4	68	33-49	824 – 1643	7.3 – 8.7	3.18	0.2
AE5	91	32 – 51	791 – 1522	7.3 – 8.7	2.94	0.18
AE6	183	32 – 62	1771 – 5400	7.7 – 9	5.1	0.74

7.3 Key Environmental Performance

RHDC has conducted water monitoring as per the RHDC Operational Environmental Management Plan, the Soil and Water Management Plan, and Operational Monitoring Program. Water quality and aquatic ecology monitoring was undertaken by Niche Environment and Heritage in this reporting period. These reports can be found in **Appendix 2**.

Monitoring occurred on the following dates:

- 4 March 2022
- 16 June 2022
- 9 August 2022
- 20 December 2022

7.3.1 Surface Water Quality

A summary of the 2022 water quality monitoring results is presented in **Table 16**.

Table 16: 2022 Water Quality Results Summary

Sampling period	Sampling Site	Temperature (°C)	Turbidity	Dissolved Oxygen (% sat)	Electrical Conductivity (µS/cm)	pH	Total (TKN + Nitrogen NOx) (mg/L)	Total Phosphorous (mg/L)
ANZECC (2000) Default Trigger Levels for Lowland Streams			6 - 50	80 - 110	125 - 2200	6.5 - 8	500	50
March 2022	AE1	22.63	5.5	68.6	416	7.61	0.8	0.45
	AE2	22.64	7.6	57.1	403	7.47	0.8	0.4
	AE3	22.65	8.7	60.1	399	7.41	0.8	0.27
	AE4	22.58	144.5	68.1	407	7.38	1.2	0.21
	AE5	22.8	35.8	64.6	406	7.12	1.1	0.15
	AE6	-	-	-	-	-	-	-
June 2022	AE1	14.44	1.6	84.0	1422	9.13	0.9	0.06
	AE2	14.66	1.1	76.3	1373	8.71	0.8	0.06
	AE3	14.57	15.9	69.4	1356	8.28	0.9	0.07
	AE4	14.22	83.6	87.5	752	8.26	1.8	0.28
	AE5	14.26	121.7	87.3	741	8.2	1.4	0.26
	AE6	-	-	-	-	-	-	-
August 2022	AE1	10.39	2.0	75.8	2208	7.9	2.2	0.05
	AE2	10.32	7.2	71.3	2500	8.0	1.9	0.03
	AE3	10.11	4.4	70.1	2633	8.0	1.9	0.05
	AE4	9.39	100.3	78.9	1329	7.6	1.3	0.13
	AE5	9.33	105.5	78.2	1294	7.6	1.2	0.13
	AE6	-	-	-	-	-	-	-
December 2022	AE1	18.75	5.7	50.2	951	7.47	1.0	0.07
	AE2	19.02	6.3	47.5	919	7.44	1.1	0.06
	AE3	19.07	20.5	45.9	902	7.39	1.0	0.06

Sampling period	Sampling Site	Temperature (°C)	Turbidity	Dissolved Oxygen (% sat)	Electrical Conductivity (µS/cm)	pH	Total (TKN + Nitrogen NOx) (mg/L)	Total Phosphorous (mg/L)
ANZECC (2000) Default Trigger Levels for Lowland Streams			6 - 50	80 - 110	125 - 2200	6.5 - 8	500	50
	AE4	19.70	184.6	74.5	679	7.32	2.8	0.15
	AE5	19.83	124.8	74.9	689	7.34	1.3	0.1
	AE6	-	-	-	-	-	-	-

Note: NS stands for Not Sampled. Values outside of the ANZECC (2000) DTLs are in **bold**

It should be noted that sampling site AE6 could not be accessed during the 2022 reporting period due to construction works being conducted at the Blacktown International Sports Park.

Water quality monitoring was undertaken on four occasions in 2022, with the results summarised in **Table 18** above. The water quality monitoring during 2022 found all physiochemical and nutrient parameters were within the ANZECC criteria for the monitoring sites, with the exception of dissolved oxygen, turbidity, pH. And electrical conductivity.

Dissolved oxygen was below the ANZECC criteria of 80-110% for the majority of samples in all quarters. Low dissolved oxygen has been a consistent feature at the Angus Creek and Eastern Creek sites.

Turbidity was elevated in Eastern Creek, which has been observed over several monitoring events and is considered to be within background levels for the creek. Angus Creek was within ANZECC guidelines indicating that there has been no suspended solid runoff from the Holcim site.

Electrical conductivity levels exceeded during quarter 3 for all sites. However there was a decrease in electrical conductivity during quarter 4 at all sampling site's which likely reflects the influence of above-average rainfall inputs to the stream systems in the period before sampling.

Long-term Trends

There were exceedances in turbidity and dissolved oxygen levels in 2022, which continued from results seen in 2021.

pH has continued to approach neutral since the beginning of 2017. However, pH was slightly exceeded the trigger levels 6.4-8 for Lowland Streams at sites for all sites in quarter 2 of 2022. The highest exceedance was at sampling location AE1 with an exceedance of 9.13.

Comparisons between the control upstream location as well as sampling sites in downstream Angus Creek across multiple reporting periods have concluded that the RHDC site is unlikely to be the cause of these exceedances in the local water quality profile. Water quality or poor environmental conditions observed are the result of existing catchment disturbances unrelated to the site.

With this in mind , this Annual Review does not consider these water quality exceedances as a non-compliance against Condition 5.5 Operation Environmental Management Plan of the Project Approval.

7.3.2 Aquatic Ecology

Aquatic ecology was monitored as per the bi-annual macroinvertebrate monitoring program. The same sampling sites were used for macroinvertebrate sampling. Across this Annual Review period the stream habitats exhibited a macroinvertebrate profile which indicates pollution, as supported by the SIGNAL2 assessments.

The number of taxa ranged from 4 to 7 in the 2022 monitoring events. The greater number of taxa in spring were observed in Angus Creek site (AE1) and (AE3) in autumn. The greater number of taxa were observed in Eastern Creek site (AE5) for both spring and autumn. SIGNAL2 scores continued to indicate that the creek system has a dominance of pollution-tolerant taxa, possibly indicating moderate to severe pollution. No pollution sensitive macroinvertebrate families were observed during this round of monitoring during the 2022 monitoring events.

Throughout 2022, Eastern Creek had low SIGNAL2 scores below 3. The Angus Creek site had slightly higher SIGNAL2 scores above 3, except for (AE1) and (AE2) during the May 2022 macroinvertebrate sampling period with scores below 3. This indicates that no sites have favourable habitat, and all

locations are exhibiting some form of pollution or natural stress. No pollution sensitive macroinvertebrate families were found at the time of monitoring.

There is a variety of upstream impacts and land use activities that are likely to affect stream health conditions in these waterways and, as such, the low scores observed are likely the result of a combination of natural and anthropogenic catchment stressors, which is common in disturbed Western Sydney streams. During the Aquatic Ecology report, no endangered ecological communities or threatened species were identified within the riparian areas of the site.

In summary, the reports by Niche Environment and Heritage found that it was highly unlikely that RHDC affected the stream ecology of the Angus Creek and Eastern Creek waterways. Multiple activities occurring upstream to the site have a higher potential to impact creek health than RHDC operations.

Long-term Trends

The health of aquatic ecology has not seen significant improvement nor decline from 2015 to 2022. SIGNAL2 scores were consistent between 2020 and 2021. Macro-invertebrate monitoring has consistently shown the aquatic ecology in the local waterways are in poor ecological condition. Monitoring reports have consistently reported there is no physiochemical or ecological evidence to suggest RHDC has affected the downstream environment.

7.4 Management Measures

RHDC implement multiple management measures to maintain surface water quality and control storm water across the project area. The management measures for water on the site include:

- Storm water management measures (such as swales, detention basins, and gross pollutant traps) constructed to have minimal impacts to the flood regime and are regularly maintained.
- Silt traps and HumeCeptors in place to capture runoff.
- Maintenance of detention basins on the northern side of the project area.
- Maintenance of a truck wash facilities.
- Minimisation of freshwater demand by storing and recycling water collected on site.

7.5 Proposed Improvements

There are no improvements suggested for water Management at RHDC for the next reporting period. Holcim will continue to collect surface water quality data to monitor and build the profile of the water quality at Angus Creek and Eastern Creek, and thus improve the site-specific monitoring parameters.

8 Rehabilitation and Landscape Management

8.1 EIS Predictions

The 2005 EAR stated that the project would require the removal of the Endangered Ecological Communities under the Threatened Species Conservation Act, including areas of Cumberland Plain Woodland and River-flat Eucalypt Forest. Threatened species, including *Grevillea juniperina* ssp. *juniperina* and the Cumberland Plain Land Snail, were identified outside of the development area.

8.2 Approved Criteria

The RHDC *Vegetation Management Plan* is to be implemented as per Condition 2.24 (Flora and Fauna) of the Project Approval. Rehabilitation monitoring is required in accordance with Condition 2.25. MOD 1 of the Project Approval outlines the need to implement a post-construction rehabilitation program, which includes a weed control program and planting local native species.

8.3 Key Environmental Performance

As a result of the findings of the EAR (2005), a Compensatory Habitat Package was agreed upon between Holcim, the Office of Environment and Heritage, and the Sydney Western Parklands Trust in July 2011 satisfying Condition 2.27 of PA 05_0051. Furthermore, RHDC's landscape management plans and procedures designed to control project impacts to surrounding threatened species.

The primary rehabilitation works undertaken in this reporting period was the maintenance of vegetated areas. Herbaceous weed activities such as mowing, herbicide spraying, slashing, and hand weeding were undertaken in the main planting bed adjacent to the front office, entrance gates, central sound wall and unloader parking, pathway and surrounding workshop. Species treated include *Cenchrus setaceus* and *Juncus acutus*. Woody weed activity included trimming back overhanging branches. Species treated include *Celtis orientalis*, *Cestrum parqui*, *Lantana camara*, *Ligustrum lucidum*, *Ligustrum sinense*, *Solanum mauritianum* and *Ochna serrulate*. Vines were all hand weeded/stem treated throughout the North-Eastern section of the zone, to inhibit growth into canopy species and inhibit seeding/flowering potential. species treated include *Araujia sericifera*, *Passiflora caerulea*, and *Passiflora suberosa*.

Grevillea juniperina subsp. *juniperina* monitoring was undertaken in September 2022.

A summary of the 2022 juniperina monitoring results is presented in **Table 17**.

Table 17: *Grevillea juniperin* monitoring results.

Zone 1	Oct-17	Sep-22	Difference
South-East	60	98	30
North-East	115	85	-30

October 2017 data was taken from the 2017 Annual Report. There were many emerging specimens pushing through the grassland, with many more small seedlings possibly uncoun-
ted.

Reasoning for changes in numbers: Drought conditions seen in the past 5 years possibly caused some die off of juvenile and seedling plants and prevented germination. The North – East section of Zone 1 is less shaded than the South – East section, with full sun exposure in the area.

8.4 Management Measures

The actions committed to within the VMP must be undertaken to achieve its performance criteria. The key management controls include:

- The use of local native species for rehabilitation vegetation.
- Monitoring the performance of plantings.
- Weed management.
- General maintenance of riparian areas, rehabilitated areas, and Juniper-leaved Grevillea populations.

8.5 Proposed Improvements

There are no further improvements proposed for rehabilitation at RHDC for the next reporting period. At this operational stage of the project, Holcim will continue to identify areas for improvement in vegetation and landscape management for the site.

9 Summary of Environmental Performance

A summary of the performance of environmental management measures and sampling is detailed in **Table 18** below.

Table 18: Summary of Environmental Performance at RHDC

Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / Key management implications	Implemented / Proposed management actions
Noise	EAR predictions are all below the Project Approval criteria.	All noise monitoring results were compliant with the Project Approval.	All noise monitoring results were compliant with criteria.	No further improvements proposed for noise management.
Air Quality	EAR (2005) and EA (2015) predictions are below the Project Approval criteria.	HVAS 1 exceeded allowed annual average performance criteria. This has been discussed in Section 1 and 11.	Air quality results remain consistent with the historical results.	Implement the Air Quality monitoring program as per the approved OEMP. This includes using new air quality monitors more appropriate to the site.
Traffic	EAR predictions are consistent with the Project Approval conditions.	Met Project Approval criteria consistently.	Site consistently meets criteria.	No further improvements proposed for traffic management.
Water	EAR predictions are consistent with Project Approval conditions.	<p>Majority of water quality results consistent with the <i>Soil and Water Management Plan</i>.</p> <p>Sampling site AE6 surface water monitoring could not be accessed during the 2022 reporting period due to construction works being conducted at the Blacktown International Sports Park. This is a non-compliance with the Soil and Water Management Plan monitoring requirements.</p>	Exceedances in OEMP water quality criteria and ANZECC guidelines not attributed to RHDC. Therefore, this is not considered a non-compliance with the Project Approval.	Continue monitoring as per the OEMP. No further actions required.

Aspect	Approval Criteria / EIS Prediction	Performance during the reporting period	Trend / Key management implications	Implemented / Proposed management actions
Biodiversity and Rehabilitation	EAR predictions are consistent with Project Approval criteria.	Consistent with Project Approval.	All biodiversity and rehabilitation actions were done in accordance with the VMP, OEMP, and Project Approval in 2022.	No proposed actions for 2022. Continue biodiversity and rehabilitation management as per the 2021 VMP appended to the 2021 OEMP.

10 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 Project Approval:

- 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.

Holcim has also communicated with the local community through periodic newsletters which provide information on the status of the project and its possible impacts. During previous reporting periods the RHDC Community Liaison Group was arranged to engage stakeholders. However, from 2017 and into this reporting period there has been no demand from community stakeholders for this group to be reassembled. RHDC staff continues to look for opportunities to engage with stakeholders.

In 2022, RHDC engaged with the local community, specifically the neighbouring Nurragingy Reserve Miniature Railway Community project. RHDC donated 17.42t of bedding sand and 17.42t of 20mm aggregate. RHDC continue to work with project representatives.

10.1 Complaints

All complaints received by RHDC are documented by Holcim and incorporated into RHDC's complaints register. An external complaints register is made available to the public on Holcim's website, via the link:

<https://www.holcim.com.au/community-complaint-register>

There were zero community complaints regarding RHDC in 2018, 2019, 2020, 2021 and this continued in 2022.

11 Independent Audit

After the approval of MOD 2 of the Project Approval, Condition 3.5A (Independent Environmental Auditing) directs Holcim to commission an independent expert to conduct an Independent Environmental Audit (IEA) of the project within one year, and every three years hence.

The IEA required within one year of the MOD 2 approval date (29 June 2017) was held on 12 December 2017. The 2017 IEA addressed Condition 3.5A but focused on Condition 3.5 of the Project Approval due to RHDC operating under MOD 1 for the majority of the audit period. The 2017 Audit Action Plan was developed to resolve non-compliances. All actions from this IEA Action Plan were closed out during this report period.

Holcim engaged an independent auditor to satisfy Condition 3.5A of the Approval in 2021. The IEA site inspection occurred on 17 November 2021.

The resultant Audit Action Plan detailing recommendations from the IEA is found in Appendix 5. Holcim are continuing to resolve recommendations and actions from the IEA as detailed in the Audit Action Plan.

12 Incidents and Non-Compliances

Incidents and non-compliances at RHDC in this Annual Review reporting period are summarised in **Table 19**.

Table 19: Summary of Incidents and Non-Compliances

Date	Incident/Non-Compliance	Action
Throughout the period	<p>Condition 2.8A Air Quality</p> <p>Annual Exceedance in PM₁₀ recorded at HVAS 1</p> <p>Short-term exceedances in PM₁₀ at HVAS 1.</p> <ul style="list-style-type: none"> • 12 April 2022; • 6 May 2022; • 18 May 2022; • 29 July 2022; • 2 November 2022; • 8 November 2022; and • 8 December 2022. <p>Short-term exceedances in PM₁₀ at HVAS 2</p> <ul style="list-style-type: none"> • 11 June 2022 <p>In 2022 following the approval of the OEMP, Holcim was unable to acquire the two Dust Sentry instruments required due to</p>	<p>Continuous monitoring of ambient dust concentrations (PM₁₀) will be undertaken at two locations at a minimum.</p> <p>Holcim will make changes to the Air Quality Monitoring Program at RHDC based on consultation with air quality experts.</p>

	<p>changes in the availability and cost. As a result, RHDC was not able to transition to the approved Ambient Dust Monitoring Program successfully.</p>	
Throughout the period	<p>Condition 5.5 c) Soil and Water Management Plan</p> <p>AE6 monitoring location for surface water could not be undertaken during the 2022 reporting period due to construction works being conducted at the Blacktown International Sports Park. The site was not accessible during this time.</p>	<p>Holcim will continue to implement the soil and water monitoring program at RHDC.</p>

13 Activities to be completed in the next reporting period

The DPE Annual Review Guidelines require the Annual Review to outline actions proposed during the next reporting period. The next reporting period will cover 1 January 2023 to 31 December 2023. The activities to be completed in the next report period are detailed in **Table 20** .

Table 20: Improvement Actions for 2023

Improvement Measure	Activities
Air Quality Monitoring	Implement the air quality monitoring program as per the approved OEMP. This update includes updated air quality monitors and relocations of these monitors.
Independent Environmental Audit Actions	Continue actions on the recommendations from the 2021 IEA Action Plan to close out improvement actions and non-compliances.

14 Appendices

Appendix 1 – Noise Monitoring Reports

Annual Noise Monitoring Assessment

Rooty Hill Distribution Centre, Rooty Hill, NSW
February 2022



Document Information

Annual Noise Monitoring Assessment

Rooty Hill Distribution Centre, Rooty Hill, NSW

February 2022

Prepared for: Holcim (Australia) Pty Ltd



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MAC180611-01RP10	Final	10 February 2022	Louis Abell		Rod Linnett	

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APPENDIX A – GLOSSARY OF TERMS		

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Holcim (Australia) Pty Ltd (Holcim) to complete a Noise Monitoring Assessment (NMA) for the Holcim Regional Distribution Centre (RDC), at Rooty Hill, NSW.

This assessment has been undertaken at four representative monitoring locations as part of the Noise Monitoring Program (NMP) to address conditions outlined in the Development Consent.

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

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Rooty Hill RDC Operational Noise Management Plan (NMP), 2019;
- Rooty Hill, Consolidated Consent, 2017 (Mod 2);
- Australian Standard AS 1055:2018 - Acoustics - Description and Measurement of Environmental Noise; and
- Australian Standard AS/NZS IEC 61672.1:2019 (AS 61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring;

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

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2 Noise Criteria

The noise criteria for each receiver location outlined in the NMP and consolidated consent for the RDC are presented in **Table 1**.

Table 1 Noise Criteria, dBA						
Location	Monitoring Location	Morning Shoulder ^{1,2}	Day ^{1,2}	Evening ^{1,2}	Night ^{1,2}	
		LAeq(15min)	LAeq(15min)	LAeq(15min)	LAeq(15min)	LA1(1min)
Any residences in Station Street	N1	39	44	44	39	53
Any residences in Coughlan Crescent	N2	40	40	39	39	53
Any residences in Mavis Street	N1/N4	35	35	35	35	53
Nurragingy Reserve	N3	When Reserve is in use – 50dB, LAeq				
Colebee Centre	N3	When the Centre is in use – 50dB, LAeq				
Blacktown Olympic Park (Active recreation areas)	N4	When active recreational areas of the Park are in use – 55dB, LAeq				

Note 1: Noise criteria adopted from NMP.

Note 2: 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.

The RDC is located at Rooty Hill, NSW approximately 1km east of the railway station and town centre. Receivers in the locality surrounding the RDC are primarily industrial, recreational and urban residential. The RDC is bounded by the railway line to the south, industry to the west and recreational areas to the east. The residential areas potentially affected by noise from the operation are to the east, beyond the Nurragingy Reserve in Doonside, NSW (Crawford Street and Knox Road); and to the west, beyond industrial zones and the M7 Motorway in Station Street, Rooty Hill, NSW. Road traffic from the M7 Motorway is a dominant noise source in the area along with urban hum and railway noise.

Monitoring locations were selected in accordance with the NMP and are representative of the nearest noise sensitive receivers to the RDC.

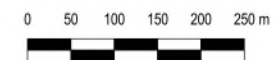
The operational compliance monitoring locations with respect to the RDC are presented in the locality plan shown in **Figure 1** and **Table 1** along with the relevant noise criteria for each location.



FIGURE 1
Site Locality
MAC180611-01
Holcim Rooty Hill DC

KEY

- Noise Monitoring Locations
- Site Location



3 Methodology

Noise monitoring consisted of attended monitoring during the daytime, evening and night time periods.

3.1 Attended Noise Monitoring

Attended noise monitoring was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018 and the RDC Consolidated Consent. The measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 1 February 2022. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1:2019. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed $\pm 0.5\text{dBA}$.

Attended noise monitoring was conducted for 15-minutes in duration during the daytime, evening and night time periods over one day. Where possible, throughout each measurement the operator(s) quantified the contribution of each significant noise source.

Extraneous noise sources were excluded from the analysis to determine the $\text{LA}_{\text{eq}}(15\text{min})$ RDC noise contribution for comparison against the relevant criteria. Where the RDC was inaudible, the RDC contribution is estimated to be at least 10dB below the ambient noise level.

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4 Results

4.1 Attended Noise Monitoring Results

4.1.1 Attended Assessment Results - Location N1

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N1 for the NMA are presented in **Table 2**.

Table 2 Operator-Attended Noise Survey Results – Location N1

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA					
		L _A max	L _A eq	L _A 90							
01/02/2022	14:07 (Day)	72	58	53	WD: NE WS: 1.1m/s Rain: Nil	Motorway traffic 55-62					
						Local traffic 60-72					
						Birds 40-45					
						Aircraft 60-63					
						Insects 51-60					
						RDC inaudible					
RDC L _A eq(15min) Contribution					<44						
01/02/2022	19:58 (Evening)	76	58	50	WD: N WS: 0.2m/s Rain: Nil	Motorway traffic 50-71					
						Local traffic 50-76					
						Birds 45-58					
						Insects 45-48					
						Aircraft 46-74					
						RDC inaudible					
RDC L _A eq(15min) Contribution					<44						
02/02/2022	23:14 (Night)	78	55	44	WD: N WS: 0.1m/s Rain: Nil	Motorway traffic 48-76					
						Local traffic 54-78					
						Insects 40-43					
						RDC inaudible					
						RDC L _A eq(15min) Contribution					<39
						RDC L _A 1(1min) Contribution					<50

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

4.1.2 Attended Assessment Results - Location N2

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N2 for the NMA are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Location N2						
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _A max	L _A eq	L _A 90		
01/02/2022	14:33 (Day)	85	58	45	WD: NE	Distant traffic 45-52
					WS: 0.3m/s	Local traffic 60-85
					Rain: Nil	Train 56-59
						Insects 50-55
						RDC inaudible
RDC L _A eq(15min) Contribution						<40
01/02/2022	20:24 (Evening)	74	64	58	WD: N	Distant traffic 50-55
					WS: 0.2m/s	Local traffic 50-74
					Rain: Nil	Insects 60-63
						Domestic noise 50-58
						Train 58-67
RDC L _A eq(15min) Contribution						<39
01/02/2022	22:49 (Night)	67	45	41	WD: N	Distant traffic 40-46
					WS: 0.1m/s	Train 46-50
					Rain: Nil	Insects 40-42
						Local impact 67
						RDC inaudible
RDC L _A eq(15min) Contribution						<39
RDC L _A 1(1min) Contribution						<50

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

4.1.3 Attended Assessment Results - Location N3

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N3 for the NMA are presented in **Table 4**.

Table 4 Operator-Attended Noise Survey Results – Location N3

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _A max	L _A eq	L _A 90		
01/02/2022	15:02 (Day)	77	61	47	WD: NE WS: 0.2m/s Rain: Nil	Local traffic 60-77
						Birds 50-55
						Aircraft <45
						Insects 63-71
						Train 60-67
						RDC industrial hum 40-43
RDC alarm (90 secs) 38-46						
RDC L _A eq(15min) Contribution						<50
01/02/2022	20:45 (Evening)	68	50	45	WD: N WS: <0.1m/s Rain: Nil	Distant traffic 45-50
						Insects 45-48
						Train 57-68
						RDC industrial hum<35
RDC L _A eq(15min) Contribution						<50
01/02/2022	22:30 (Night)	71	53	46	WD: N WS: 0.1m/s Rain: Nil	Distant traffic 50-56
						Insects <40
						Aircraft 45-54
						Train 54-71
						RDC inaudible
RDC L _A eq(15min) Contribution						<50

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

4.1.4 Attended Assessment Results - Location N4

The monitored noise level contributions and observed meteorological conditions for each assessment period at location N4 for the NMA are presented in **Table 5**.

Table 5 Operator-Attended Noise Survey Results – Location N4

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
01/02/2022	15:32 (Day)	65	56	51	WD: NE	Distant traffic <50-53
					WS: 0.6m/s	Train 53-65
					Rain: Nil	Insects 56-58
						Aircraft <55
						RDC inaudible
RDC L _{Aeq} (15min) Contribution						<55
01/02/2022	21:07 (Evening)	62	53	51	WD: N	Distant traffic 45-52
					WS: 0.1m/s	Insects 48-52
					Rain: Nil	Train 52-62
						RDC inaudible
					RDC L _{Aeq} (15min) Contribution	
01/02/2022	22:09 (Night)	92	58	49	WD: N	Local traffic 55-92
					WS: 0.1m/s	Insects 38-42
					Rain: Nil	Alarm (Sports park) 49-50
						RDC inaudible
					RDC L _{Aeq} (15min) Contribution	

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

5 Discussion

5.1 Discussion of Results - Location N1

RDC noise emissions were inaudible during all attended measurements conducted on Tuesday 1 February 2022. RDC noise contributions were estimated to satisfy the relevant noise criteria for all periods. Extraneous noise sources included birds, local traffic noise, insects, and aircraft noise with ambient noise levels dominated by motorway traffic noise.

5.2 Discussion of Results - Location N2

RDC noise emissions were inaudible during all attended measurements conducted on Tuesday 1 February 2022. RDC noise contributions were estimated to satisfy the relevant noise criteria for all periods. Extraneous sources measured include traffic, birds, aircraft, trains, and insects.

5.3 Discussion of Results - Location N3

RDC noise emissions were audible during day and evening measurements conducted on Tuesday 1 February 2022. RDC contributions included industrial hum and RDC alarms. RDC noise was inaudible during the night period. RDC noise contributions were estimated to satisfy the relevant noise criteria for all periods. Extraneous sources audible during the attended surveys included traffic, aircraft, insects and train noise.

5.4 Discussion of Results - Location N4

RDC noise emissions were inaudible during all attended measurements conducted on Tuesday 1 February 2022. RDC noise contributions were estimated to satisfy the relevant noise criteria for all periods. Extraneous noise sources included local traffic, birds, traffic, the sports park alarm and trains.

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6 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Holcim (Australia) Pty Ltd for the Regional Distribution Centre (RDC), at Rooty Hill, NSW. The assessment was completed to review compliance against relevant noise criteria which is required to be completed annually as part of the RDC NMP.

Attended noise monitoring was conducted on Tuesday 1 February 2022. The assessment has identified that noise emissions generated by RDC were audible at Nurragingy Reserve (N3) during the day and evening period, at levels below the relevant criteria. Noise emissions generated by RDC were inaudible at all other monitoring locations during the attended monitoring period. All measurements satisfied the relevant noise criteria at all assessed residential receivers.

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Appendix A – Glossary of Terms

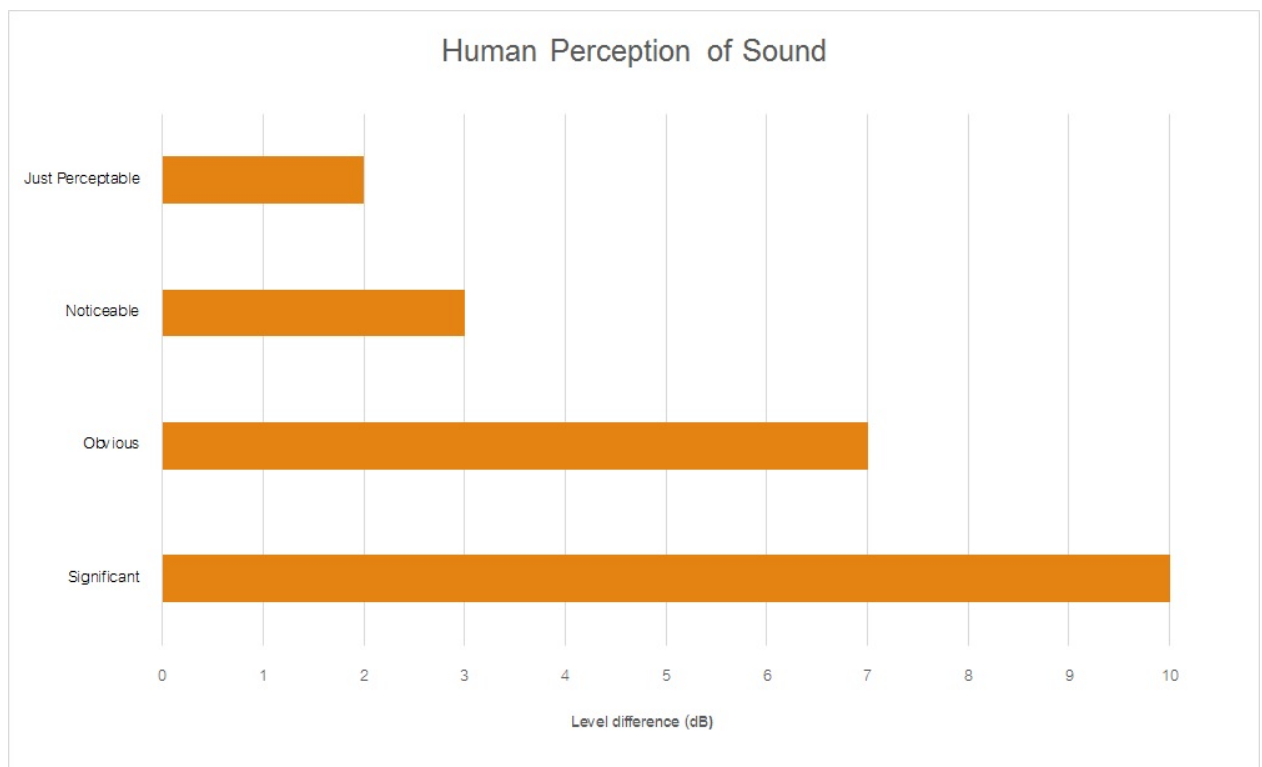
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAm _{ax}	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	<p>This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by:</p> $= 10 \cdot \log_{10} (W/W_0)$ <p>Where: W is the sound power in watts and W₀ is the sound reference power at 10⁻¹² watts.</p>

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

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

Figure A1 – Human Perception of Sound



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Appendix 2 – Water Quality and Aquatic Ecology Reports by Niche Environment and Heritage

Holcim Regional Distribution Centre Rooty Hill NSW

Aquatic Ecology Monitoring

Prepared for Holcim | 20 December 2022



Document control

Project number	Client	Project manager	LGA
7273	Holcim	David Wilkinson	Hills Shire

Version	Author	Review	Status	Date
D1	David Wilkinson	Luke Stone	Draft	19/12/2022
R0	David Wilkinson		Final	20/12/2022

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1. Introduction

1.1 Background

This document presents the results of the visual and stream health assessment of Angus Creek and Eastern Creek, undertaken as part of the Holcim Regional Distribution Centre (RDC) (the Project) aquatic ecology monitoring program (hereafter referred to as the monitoring program). The monitoring program, including quarterly visual monitoring, bi-annual aquatic survey, and reporting, is required under condition 2.28 of the Project approval.

The aim of the monitoring program is to compare sites downstream of the RDC to upstream sites and determine whether the RDC is affecting stream health in receiving waterways, adjacent to or downstream of the Project.

This report presents the results of bi-annual Macroinvertebrate monitoring undertaken on 15 November 2022 in spring 2022. Aquatic ecology monitoring and visual monitoring of stream conditions was conducted at five sites: Three sites on Angus Creek and two sites on Eastern Creek.

2. Methods

1.1 Location of sampling sites

A total of five sites were sampled on Angus Creek and Eastern Creek (Figure 1, Table 1). Three sites were located on Angus Creek (one upstream and two downstream of the Project) and two sites were located on Eastern Creek (one upstream and one downstream of the Project). At the time of spring 2022 monitoring (15 November 2022), AE6 could not be accessed due to construction works being conducted at the Blacktown International Sports Park.

Table 1: Survey sites

Site name	Location	Site status	Latitude	Longitude
AE1	Angus Creek upstream near property boundary	Upstream control site	-33.76798576	150.8516665
AE2	Angus Creek downstream –near property boundary in Nurragingy Reserve.	Potential downstream impact site	-33.76563506	150.854665
AE3	Angus Creek upstream of Eastern Creek confluence in Nurragingy Reserve.	Potential downstream impact site	-33.76496807	150.8554235
AE4	Eastern Creek downstream of Angus Creek in Nurragingy Reserve	Potential downstream impact site	-33.76419362	150.8576059
AE5	Eastern Creek upstream of Angus Creek in Nurragingy Reserve	Upstream control site	-33.76411307	150.8570044
AE6	Angus Creek upstream above railway.	Upstream control site	-33.77017801	150.8499068



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0 150
m
GDA 1994 MGA Zone 56

Location of sites

Holcim Regional Distribution Centre - Aquatic Monitoring

Niche PM: Matthew Russell
Niche Proj. #: 6645
Client: Holcim

Figure 1

1.2 Field methods

The field survey was undertaken on 15 November 2022 by Aquatic Ecologist David Wilkinson and Ecology Assistant Lily Cains. The field methods were consistent with standardised techniques for field sampling as prescribed by AUSRIVAS (Turak *et al.* 2000). The AUSRIVAS method of sampling both pools and riffles were modified for this program, as no suitable in-stream riffle features were present.

2.1.1 Visual assessment

A description of aquatic habitat was also produced using the NSW AUSRIVAS proforma field recording form. The survey is a rapid visual assessment used to describe the habitat based on the following parameters:

- Geomorphology
- Channel diversity
- Bank stability
- Riparian vegetation and adjacent land use
- Water quality
- Macrophytes
- Local impacts and land use practices.

2.1.2 Water quality

Physio-chemical field measurements

Surface water quality was measured in situ using a Yeokal 618 water quality probe at each site. The following variables were recorded:

- Temperature (°C)
- Conductivity (µS/cm)
- pH
- Dissolved oxygen (DO % saturation and mg/L)
- Turbidity (NTU).

Alkalinity (mg CaCO₃/L) was measured with a standard field titration kit.

Water quality data were compared with the ANZG (2018) default trigger values (DTVs) of physical and chemical stressors for protection of slightly upland aquatic ecosystems in South-Eastern Australia.

Water sampling

Water samples were taken at each location and sent to the NATA accredited ALS laboratories to test for Total Phosphorus (TP), Total Nitrogen (TN), Nitrogen Oxides (NO_x), and Total Kjeldahl Nitrogen (TKN). The results were compared with ANZG (2018) DTVs for TP, TN and NO_x.

Physicochemical water quality results are provided in the reports associated with each round of monitoring. A collated list of all physicochemical water quality results recorded as part of the program at the time of reporting can be found in the Winter 2022 Visual Monitoring Report, dated 28 July 2022 (Niche 2022).

2.1.3 Macroinvertebrates

Samples were collected from pool edges for a length of 10 metres, either as a continuous line or in disconnected segments. Sampling in segments was undertaken to ensure the sub-habitats such as macrophyte beds, bank overhangs, submerged branches and root mats were appropriately sampled.

Segmented sampling was also employed where pool length was short, and it was logistically difficult to sample in a continuous line (e.g. in-stream logs). A 250 µm dip net was drawn through the water with short sweeps towards the bank to dislodge benthic fauna while scraping submerged rocks and debris, sides of the stream bank and the bed substrate. Further sweeps in the water column targeted suspended fauna. Each sample was rinsed from the net onto a white sorting tray from which animals were picked using forceps, pipettes and or paint brushes. Each tray was picked for a minimum period of 40 minutes, after which they were picked at 10-minute intervals for either a total of one hour or until no new specimens had been found. Care was taken to collect cryptic and fast-moving animals, in addition to those that were conspicuous or slow. The macroinvertebrates collected at each site were placed into a labelled jar containing 70% ethanol.

Laboratory methods-invertebrate identification

Macroinvertebrate samples were identified to family level with the exception of Oligochaeta (to class), Polychaeta (to class), Ostracoda (to subclass), Nematoda (to phylum), Nemertea (to phylum), Acarina (to order) and Chironomidae (to subfamily). Keys used to identify fauna included:

- Dean, J., Rosalind, M., St Clair, M., and Cartwright, D. (2004) Identification keys to Australian families and genera of caddis-fly larvae (Trichoptera). Cooperative Research Centre for Freshwater Ecology.
- Gooderham, J. and Tsyrlin, E. (2002) The Waterbug Book: A guide to the Freshwater Macroinvertebrates of Temperate Australia. CSIRO Publishing.
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- Madden, C. (2010) Key to genera of Australian Chironomidae. Museum Victoria Science Reports 12, 1-31.
- Madden, C. (2011) Draft identification key to families of Diptera larvae of Australian inland waters. La Trobe University.
- Smith, B. (1996) Identification keys to the families and genera of bivalve and gastropod molluscs found in Australian inland waters. Murray Darling Freshwater Research Centre.
- Online resource - <http://www.mdfrc.org.au/bugguide/>.

2.2 Data analysis

2.2.1 SIGNAL2 (Stream Invertebrate Grade Number Average Level) scores

The revised SIGNAL2 biotic index developed by Chessman (2003a, b) was used to determine the “environmental quality” of sites. This method assigns grade numbers to each macroinvertebrate family or taxa found, based largely on their response to a range of environmental conditions (Table 2). The sum of all grade numbers for that habitat is then divided by the total number of families recorded in each habitat to calculate the SIGNAL2 index. A weighted SIGNAL2 score was also calculated (see Chessman 2003b). The SIGNAL2 index therefore uses the average sensitivity of macroinvertebrate families to present a snapshot of biotic integrity at a site. Table 3 provides a broad guide for interpreting the health of the site according to the SIGNAL2 score of the site.

Table 2: SIGNAL 2 grade and the level of pollution tolerance

SIGNAL2 grade (individual taxa)	Pollution tolerance
10-8	Indicates a greater sensitivity to pollution
7-5	Indicates a sensitivity to pollution
4-3	Indicates a tolerance to pollution

SIGNAL2 grade (individual taxa)	Pollution tolerance
2-1	Indicates a greater tolerance to pollution

Table 3: Guide to interpreting the SIGNAL2 scores

SIGNAL2 score	Habitat quality
Greater than 6	Healthy habitat
Between 5 and 6	Mild pollution
Between 4 and 5	Moderate pollution
Less than 4	Severe pollution

*Note that SIGNAL2 scores are indicative only and that pollution does not refer to just anthropogenic pollution. Environmental stress may result in poor water quality occurring naturally in waterways. Low family richness and the occurrence of pollution tolerant invertebrates can give a low SIGNAL2 score even when they are in natural condition.

3. Results

1.1 Rainfall

Sampling was conducted on 15 November 2022. Antecedent rainfall since the start of the month was 35 millimetres (mm) (Figure 2). There was 28 millimetres of rain the day prior to sampling, and no rain fell on the day of sampling. Despite this level of rainfall, at the time of monitoring, water levels within Eastern Creek had returned to nominal levels. The water level at the time of sampling was low to moderate with no visible flow besides sites AE1 and AE2. Significant rainfall consistently occurred throughout 2022, with sampling conditions considered to reflect the prevailing weather conditions in spring 2022.

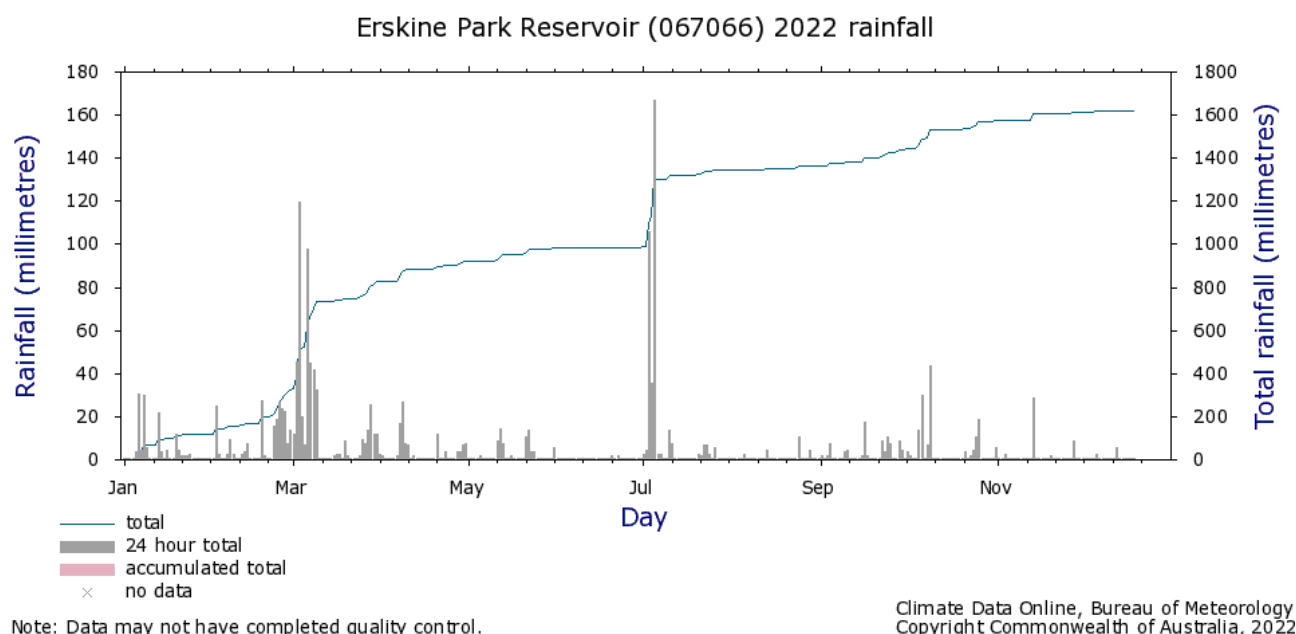


Figure 2: Rainfall January to December 2022.

3.1 Visual observations

Results of the visual survey including photographs of each site are provided in Annex 1. Overall, the streams were visibly in moderate condition for urban waterways within the locality. The upper banks of Angus Creek remain heavily vegetated with ground cover vegetation, including native riparian species. The lower steep banks above the water level are showing continued levels of erosion due to heavy flows from rainfall events. Some sections of site AE1 and AE2 have the beginning of undercutting of the bank. Angus Creek AE1 and both Eastern Creek sites (AE4 and AE5) continue to have very little organic matter on the edges of the pools which has been previously observed (Niche 2022). The upper banks of AE4 and AE5 were unstable and were showing signs of erosion from flows coming from the park land and upstream. The riparian ground cover of sites AE4 and AE5 has yet to regrow. All sites continue to have large amounts of plastic-based rubbish present in the systems, observed within the water and on the banks. The water was observed to be clear in upstream Angus Creek site AE1 and downstream sites AE2 and AE3, while both Eastern Creek sites appeared turbid (Annex 1).

3.2 Water quality

3.2.1 Physio-chemical

Field collected physicochemical water quality results are shown in Table 4. Electrical conductivity (EC) readings were within ANZG DTVs for all sites, the levels recorded in spring 2022 were also lower than that recorded during the winter visual monitoring (Niche 2022). Sites within Angus Creek had higher EC than

Eastern Creek with EC levels ranging from 679-951 $\mu\text{S}/\text{cm}$ with AE1 recording the highest reading. Sites within Eastern Creek had consistent EC levels ranging 679-689 $\mu\text{S}/\text{cm}$ with AE5 having the highest. Turbidity levels were within ANZG DTVs at all sites, except for the Eastern Creek sites AE4 and AE5, which had readings of 184.6 and 124.8 NTU respectively. Dissolved oxygen was below DTVs for all sites; however, this is common for small streams in Western Sydney. The pH readings were within the DTVs at all Angus Creek sites and Eastern Creek sites. Alkalinity was higher at the Angus Creek sites than Eastern Creek site AE5, but generally comparable to site AE4. Angus Creek alkalinity was relatively consistent ranging from 100-140 CaCO_3/L , with AE1 having the highest. Eastern Creek was also relatively consistent, ranging from 60-100 CaCO_3/L , with AE4 having the highest.

Table 4: Field physio chemical water quality results

Site	Stream	Temp (C°)	Electrical conductivity ($\mu\text{S}/\text{cm}$)	Turbidity (NTU)	Dissolved Oxygen (% sat)	pH*	Alkalinity (mg CaCO_3/L)
AE1	Angus Creek	18.75	951	5.7	50.2	7.47	140
AE2	Angus Creek	19.02	919	6.3	47.5	7.44	100
AE3	Angus Creek	19.07	902	20.5	45.9	7.39	100
AE4	Eastern Creek	19.7	679	184.6	74.5	7.32	100
AE5	Eastern Creek	19.83	689	124.8	74.9	7.34	60
AE6*	Angus Creek	-	-	-	-	-	-

ANZG default trigger values (DTV) for lowland streams: Electrical conductivity (125-2200 $\mu\text{S}/\text{cm}$), Turbidity (6-50 NTU), pH (6.5-8), Dissolved Oxygen (80-110%). Text in bold indicate those variables that exceed the default trigger values.

*Site was inaccessible due to construction activities in the area.

3.2.2 Nutrients

Total Phosphorus, Total Nitrogen and Nitrogen Oxides levels were above ANZG DTVs for lowland streams for all Angus Creek and Eastern Creek sites. (Table 5).

Table 5: Nutrients - laboratory results

Site	Stream	Total Phosphorous (TP) (mg/L)	Total Nitrogen TN (TKN + NOx) (mg/L)	Nitrogen Oxides (NOx) (mg/L)	Total Kjeldahl Nitrogen (TKN) (mg/L)
AE1	Angus Creek	0.07	1.0	0.47	0.5
AE2	Angus Creek	0.06	1.1	0.5	0.6
AE3	Angus Creek	0.06	1.0	0.5	0.5
AE4	Eastern Creek	0.15	2.8	0.46	2.3
AE5	Eastern Creek	0.1	1.3	0.47	0.8
AE6*	Angus Creek	-	-	-	-

ANZG default trigger values (DTV) for lowland streams: TP (0.05 mg/L), TN (0.5 mg/L), NOx (0.02 mg/L). Text in bold indicate those variables that exceed the default trigger values.

*Site was inaccessible due to construction activities in the area.

3.3 Macroinvertebrates and SIGNAL2 scores

SIGNAL2 results for the five sampled sites are provided in Table 6. Raw data is provided in Annex 2.

The number of taxa was low, ranging from 5-7, with the most taxa (7) observed in Angus Creek site AE3 and Eastern Creek site AE5. The least taxa (5) observed was in Eastern Creek site AE4. The SIGNAL2 scores indicate that the creek has a dominance of pollution-tolerant taxa, possibly indicating moderate to severe levels of pollution (Table 3). No pollution sensitive macroinvertebrate families were observed during this round of monitoring. All sites except for AE3 had a lower SIGNAL2 scores than the previous macroinvertebrate sampling period in May 2022 (Niche 2022). Site AE4 had the same score as the previous round of monitoring.

The SIGNAL2 bi-plot (Figure 3), indicates that no sites have favourable habitat and all locations are exhibiting some form of pollution or natural stress. Upstream Angus Creek site AE3 had the highest SIGNAL2 score of any site from both creeks, however, is still considered low. (Table 6).

Table 6: Number of taxa and weighted SIGNAL2 scores

Site	Number of taxa	SIGNAL2 weighted scores
AE1	6	2.77
AE2	6	2.36
AE3	7	3.78
AE4	5	2.33
AE5	7	2.85
AE6	-	-

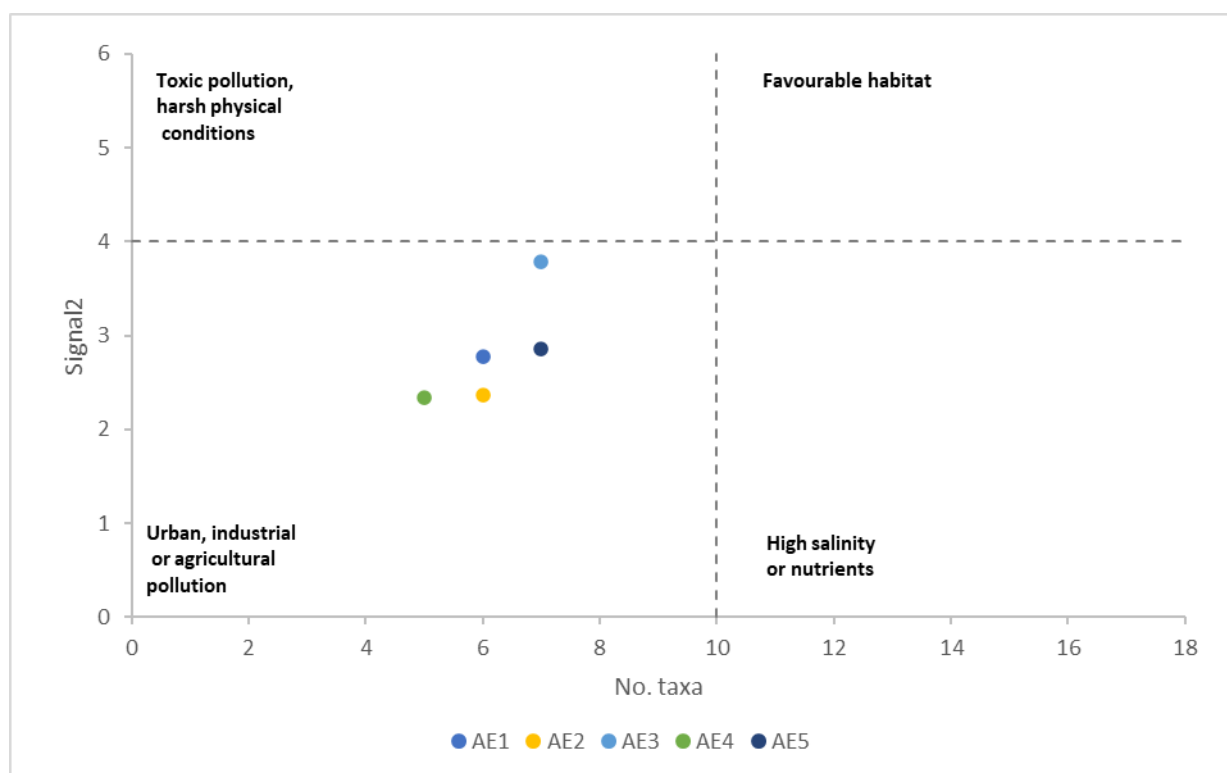


Figure 3: SIGNAL2 score and number of taxa bi-plot.

4. Discussion and conclusion

All sites showed a decrease in electrical conductivity levels in spring 2022 in comparison to the previous monitoring (winter 2022), although the levels recorded at all Angus Creek and Eastern Creek sites were within the ANZG DTVs. This likely reflects the influence of above-average rainfall inputs to the stream systems in the period before sampling. Turbidity in Angus Creek was low while Eastern Creek sites AE4 and AE5 had elevated turbidity levels, which has been observed on most monitoring occasions. All sites showed dissolved oxygen levels below ANZG DTVs, however that is to be expected of disturbed urban streams in the locality. All sites in Angus Creek and Eastern Creek had a pH reading within the ANZG DTVs. Additionally, all nutrients' analytes were above the ANZG DTVs for all five sites surveyed this monitoring period. The exceedance in nutrient parameters have been routinely observed over the monitoring program in both upstream and downstream sites in Angus and Eastern creeks. The data indicates that Holcim RDC is not affecting the receiving environment and any exceedance in water quality or poor environmental conditions observed are the result of existing catchment disturbances unrelated to the site.

Low numbers of taxa were observed in spring 2022, across downstream and upstream sites. This pattern was also observed in the previous monitoring period (autumn 2022) (Niche 2022). This is likely to reflect the influence of above-average rainfall inputs to the stream systems in the period before sampling and throughout 2022. Low SIGNAL2 scores (<4) were recorded at all sites and no pollution sensitive macroinvertebrate families were found at the time of monitoring. Considering the SIGNAL2 scores and the water quality results both upstream and downstream were similar, it is unlikely that the RDC is affecting stream ecology. Furthermore, there is a variety of upstream impacts and land use activities that are likely to affect stream health conditions in these waterways and, as such, the low scores observed are likely the result of a combination of natural and anthropogenic catchment stressors, which is common in disturbed Western Sydney streams. Overall, the two streams appear to be in reasonable health for urban waterways. There are no physicochemical or ecological evidence suggesting that the RDC is affecting the downstream environment.

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Online resources:

<http://ausrivas.ewater.com.au/>

<http://www.mdfrc.org.au/bugguide/>

Annex 1- Visual observations – November 2022

AE1: Angus Creek Upstream



A: Upstream



B: Downstream

	Attribute	AE1 UPSTREAM
Riparian	Vegetation	The dominant tree species comprised Swamp Oak (<i>Casuarina glauca</i>) and Broad-leaf Privet (<i>Ligustrum lucidum</i>). Groundcover was dominated by <i>T. fluminensis</i> .
	Stream shading	Moderate shading
	Exotic vegetation	<i>L. lucidum</i> and <i>T. fluminensis</i>
Stream characteristics	Modal width	3 m
	Bank condition	Slightly vegetated banks and stable. Slight erosion and undercutting of lower bank.
	Substrate	Fine sediment; silt. Hardened clay bottom.
	Flow/depth	Moderate flow/ ~1 m
	Macrophytes/algae	Macrophytes not present.
	Water quality observations	Clear water
Comments		Weeds and rubbish present. Lack of organic material in channel.

AE2: Angus Creek



A: Upstream



B: Downstream

	Attribute	AE2 DOWNSTREAM
Riparian	Vegetation	Dominant tree species included (<i>C. glauca</i>). Dominant groundcover was <i>T. fluminensis</i> and mixture of exotic and native grasses and herbs.
	Stream shading	Moderate shading
	Exotic vegetation	<i>T. fluminensis</i> and other groundcover species.
Stream characteristics	Modal width	2 m
	Bank Condition	Slightly unstable and heavily vegetated by groundcover
	Substrate	Silt and bedrock / concrete
	Flow/depth	Moderate flow/<1 m
	Macrophytes/algae	Emergent macrophytes present – Bulrush (<i>Typha</i> sp.), <i>Cyprus</i> sp. <i>Potamogeton crispus</i>
	Water quality observations	Clear water
Comments		Weeds and rubbish. Metallic rubbish in system. Concrete rubble in system.

AE3: Angus Creek Downstream



A: Upstream



B: Downstream

	Attribute	AE3 DOWNSTREAM
Riparian	Vegetation	Dominant tree species was <i>C. glauca</i>). Dominant grass/herb species was <i>T. fluminensis</i>
	Stream shading	Moderate shading
	Exotic vegetation	<i>L. Lucidum</i> , <i>T. fluminensis</i>
Stream characteristics	Modal width	4 m
	Bank Condition	Stable, steep, exposed in sections, slight visible erosion.
	Substrate	Fine sediment, organic matter on banks
	Flow/depth	Low flow/~1 metre
	Macrophytes/algae	Ribbon Weed (<i>Vallisneria</i> sp.)
	Water quality observations	Visually water appeared slightly opaque (but within DTVs)
Comments		

AE4: Eastern Creek Downstream



A: Upstream



B: Downstream

	Attribute	AE4 DOWNSTREAM
Riparian	Vegetation	Dominant canopy species included <i>C. glauca</i>) and Prickly-leaved Tea Tree (<i>Melaleuca styphelioides</i>). Dominant mid-storey species were <i>C. glauca</i> <i>L. lucidum</i>). Dominant groundcover was the exotic <i>T. fluminensis</i>
	Stream shading	Moderate
	Exotic vegetation	<i>L. lucidum</i> and <i>T. fluminensis</i>
Stream characteristics	Modal width	8 m
	Bank condition	Unstable banks
	Substrate	Fine sediment
	Flow/depth	Moderate flow/>1m
	Macrophytes/algae	Macrophytes not present
	Water quality observations	Visually very turbid
Comments		

AE 5: Eastern Creek Upstream



A: Upstream



B: Downstream

	Attribute	AE5 UPSTREAM
Riparian	Vegetation	Dominant overstorey species was <i>C. glauca</i> . Dominant grass/herb was <i>Lomandra</i> (<i>Lomandra longifolia</i>) and groundcover <i>T. fluminensis</i> .
	Stream shading	Moderate
	Exotic vegetation	<i>T. fluminensis</i>
Stream characteristics	Modal width	12 m
	Bank condition	Unstable
	Substrate	Fine sediment and large woody debris.
	Flow/depth	Moderate flow/ >1 m
	Macrophytes/algae	Macrophytes not present.
	Water quality observations	Visually very turbid
Comments		Lots of large woody debris and plastic based rubbish

Annex 2 Macroinvertebrate data – November 2022

SITE	AE1	AE2	AE3	AE4	AE5
Acarina	0	5	0	0	2
Chironominae	1	0	1	62	18
Dytiscidae	0	0	0	1	1
Glossophionidae	0	2	1	0	0
Hemicorduliidae	1	0	6	0	1
Hydrobiidae	28	2	70	1	0
Megapodagrionidae	0	0	1	1	0
Oligochaeta	2	2	0	0	4
Physidae	20	92	2	1	3
Stratiomyidae	1	1	0	0	0
Tanypodinae	0	0	4	0	0
Veliidae	0	0	0	0	7

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Holcim Regional Distribution Centre

Rooty Hill NSW

Aquatic Ecology Monitoring

Prepared for Holcim 9 August 2022



Document control

Project number	Client	Project manager	LGA
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1. Introduction

1.1 Background

This document reports on results of the visual and stream health assessment of Angus Creek and Eastern Creek as part of the Holcim Regional Distribution Centre (RDC) (the Project) aquatic ecology monitoring program (hereafter referred to as the monitoring program). The monitoring program, including quarterly visual monitoring, bi-annual aquatic survey, and reporting, is required under condition 2.28 of the Project approval.

The aim of the monitoring program is to compare downstream sites to upstream sites and determine whether the RDC is affecting stream health adjacent to or downstream of the Project.

This report presents the results of quarterly monitoring undertaken on 19 July 2022. Water quality monitoring and visual monitoring of stream condition was conducted at five sites: three sites on Angus Creek and two sites on Eastern Creek.

2. Methods

2.1 Location of sampling sites

A total of five sites were sampled on Angus Creek and Eastern Creek (Figure 1, Table 1). Three sites were located on Angus Creek (one upstream and two downstream of the Project) and two sites were located on Eastern Creek (one upstream and one downstream of the Project). At the time of July monitoring AE6 could not be accessed due to construction works being conducted at the Blacktown International Sports Park.

Table 1: Survey sites

Site name	Location		Latitude	Longitude
AE1	Angus Creek upstream near property boundary	Control	-33.76798576	150.8516665
AE2	Angus Creek downstream –near property boundary in Nurragingy Reserve.	Potential impact	-33.76563506	150.854665
AE3	Angus Creek upstream of Eastern Creek confluence in Nurragingy Reserve.	Potential impact	-33.76496807	150.8554235
AE4	Eastern Creek downstream of Angus Creek in Nurragingy Reserve	Potential impact	-33.76419362	150.8576059
AE5	Eastern Creek upstream of Angus Creek in Nurragingy Reserve	Control	-33.76411307	150.8570044
AE6	Angus Creek upstream above railway.	Control	-33.77017801	150.8499068



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2.2 Field methods

The field survey was undertaken on 19 July 2022 by Aquatic Ecologist David Wilkinson. The field methods were consistent with standardised techniques for field sampling.

2.2.1 Visual assessment

A description of aquatic habitat was also produced using the AUSRIVAS proforma. The survey is a rapid visual assessment used to describe the habitat based on the following parameters:

- Geomorphology
- Channel diversity
- Bank stability
- Riparian vegetation and adjacent land use
- Water quality
- Macrophytes
- Local impacts and land use practices.

2.2.2 Water quality

Physio-chemical field measurements

Surface water quality was measured in situ using a Yeokal 618 water quality probe at each site. The following variables were recorded:

- Temperature (°C)
- Conductivity (µS/cm)
- pH
- Dissolved oxygen (DO % saturation and mg/L)
- Turbidity (NTU).

Alkalinity (mg CaCO₃/L) was measured with a standard titration kit. Water quality data were compared with the ANZG (2018) default trigger values (DTVs) of physical and chemical stressors for protection of slightly upland aquatic ecosystems in South-Eastern Australia.

Water sampling

Water samples were taken at each location and sent to ALS laboratories to test for Total Phosphorus (TP), Total Nitrogen (TN) (Nitrogen Oxides (NO_x) + Total Kjeldahl Nitrogen (TKN)). The results were compared with ANZG (2018) DTVs for TP, TN and NO_x.

3. Program review

Niche undertakes regular technical reviews of our methodology and reports as part of our commitment to providing accurate advice and ongoing improvement.

Through one such review we have identified an error in the reported units of measurement provided in previous reports as part of the monitoring program for the Project. Specifically, the use of mg/L instead of µg/L for Total Nitrogen (TN) Nitrogen oxides (NOx) and Total Phosphorous (TP). The result of this is that a number of values for these parameters in the past have been reported as within DTV guidelines, whereas in fact they have exceeded guidelines.

It is important to note that the monitoring results do not indicate that these exceedances are a result of site operations.

It is also important to note that it does not invalidate the findings of past reports, or impair the ability of future reports, to address the aim of the water quality monitoring program, which is that *“Monitoring of water quality would be undertaken to ensure no contamination as a result of site operations”*.

Identification of this error does not change the interpretation of the monitoring results described in previous reports, with nutrient levels within impact monitoring sites comparable to upstream control sites. In other words, that any elevated nutrient levels identified are reflective of the overall degraded nature of streams in the locality and catchment scale processes, not influenced by site operations.

A review of the water quality sampling data report to date has been completed and a corrected table is provided in Section 4.3.2, which will serve as the point of reference for future reports. The findings of the most recent round of sampling are discussed in the context of all monitoring data collected to date in Annex 2.

Niche will continue to undertake regular reviews of our methodology and reports.

4. Results

4.1 Rainfall

Sampling was conducted on 19 July 2022. Antecedent rainfall since the start of the month was 336 millimetres (mm) (Figure 2: Rainfall January to). There was no rain the week prior to sampling, and no rain fell on the day of sampling. The water level at the time of sampling was low to moderate with no visible flow besides sites AE1 and AE2.

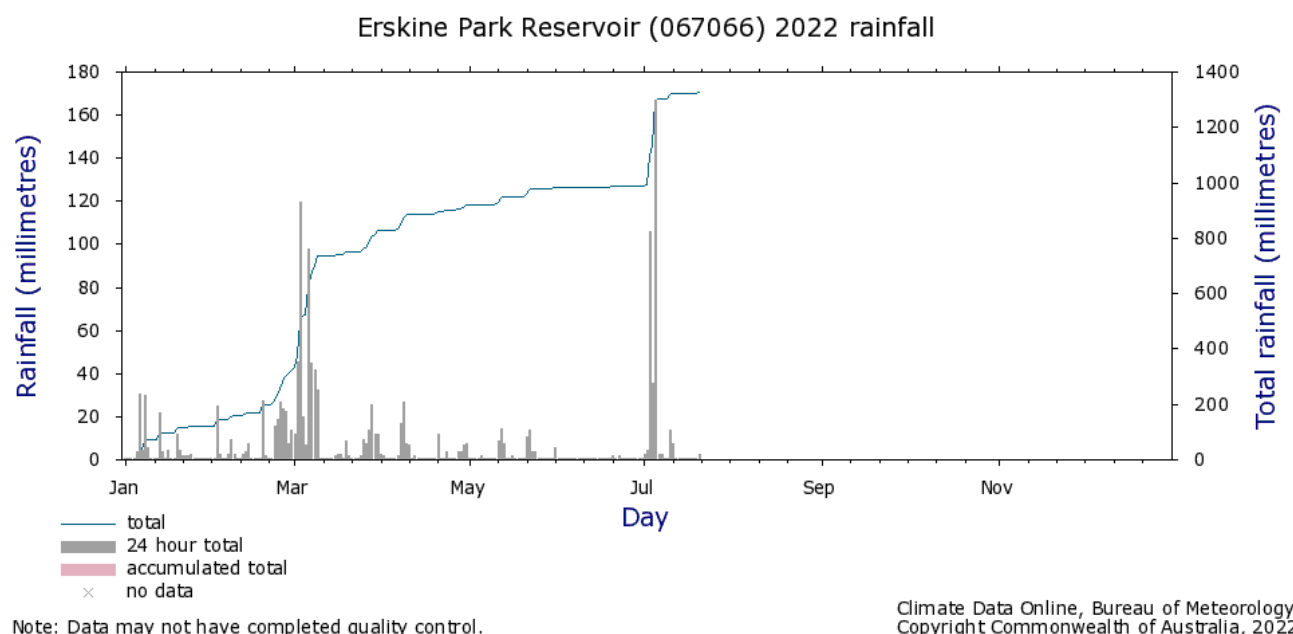


Figure 2: Rainfall January to July 2022.

4.2 Visual observations

Results of the visual survey including photographs of each site are provided in Annex 1. Overall, the streams were visibly in reasonable condition for urban waterways. The upper banks of Angus Creek remain heavily vegetated with riparian ground cover. The lower steep banks above the water level are showing continued levels of erosion due to heavy flows from rainfall events. Some sections of site AE1 have the beginning of undercutting of the bank. Angus Creek AE1 and both Eastern Creek sites (AE4 and AE5) continue to have very little organic matter on the edges of the pools which has been previously observed (Niche 2022). At the time of monitoring, Eastern Creeks water level had returned to its normal level. However, the upper banks that were previously inundated, were unstable and were showing signs of erosion from flows coming from the park land. The riparian ground cover that had previously been growing on the lower bank of site AE4 was absent. All sites continue to have large amounts of plastic-based rubbish present in the systems, observed within the water and on the banks. The water was observed to be clear in upstream Angus Creek site AE1 and downstream sites AE2. Site AE3 appeared to have a slight opaqueness in water clarity, while both Eastern Creek sites appeared turbid (Annex 1).

4.3 Water quality

4.3.1 Physio-chemical

Field physio-chemical water quality results are shown in Table 2. Electrical conductivity (EC) was above ANZG DTVs for all Angus Creek sites, while it was within DTVs for both Eastern Creek sites. Sites within Angus Creek had much higher EC than Eastern Creek with EC ranging from 2208-2633 $\mu\text{S}/\text{cm}$ with AE3 having the highest. Sites within Eastern Creek had consistent EC ranging 1294-1329 $\mu\text{S}/\text{cm}$ with AE4 having

the highest. Turbidity was within ANZG DTVs at all sites, except for the Eastern Creek sites AE4 and AE5 which had readings of 105.3 and 100.5 NTU respectively. Dissolved oxygen was below DTVs for all sites; however, this is common for small Western Sydney streams. The pH was within the DTVs at all Angus Creek sites and Eastern Creek sites. Alkalinity was higher in Angus Creek than Eastern Creek. Angus Creek alkalinity was relatively consistent ranging from 240-260 CaCO₃/L with AE2 having the highest. Eastern Creek was also relatively consistent, ranging from 100-120 CaCO₃/L with AE4 having the highest.

Table 2: Field physio chemical water quality results

Site	Stream	Temp (C°)	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen (% sat)	pH*	Alkalinity (mg CaCO ₃ /L)
AE1	Angus Creek	10.39	2208	2	75.8	7.9	240
AE2	Angus Creek	10.32	2500	7.2	71.3	8.0	260
AE3	Angus Creek	10.11	2633	4.4	70.1	8.0	240
AE4	Eastern Creek	9.39	1329	100.3	78.9	7.6	120
AE5	Eastern Creek	9.33	1294	105.5	78.2	7.6	100
AE6*	Angus Creek	-	-	-	-	-	-

ANZG default trigger values (DTV) for lowland streams: Electrical conductivity (125-2200 µS/cm), Turbidity (6-50 NTU), pH (6.5-8), Dissolved Oxygen (80-110%). Text in bold indicate those variables that exceed the default trigger values.

*Site was inaccessible due to construction activities in the area.

4.3.2 Nutrients

Total Nitrogen, Total Phosphorus and Nitrogen Oxides were above ANZG DTVs for lowland streams for all Angus Creek and Eastern Creek sites, with the exception of Total Phosphorous in Angus Creek (Table 3).

Table 3: Nutrients - laboratory results

Site	Stream	Total Phosphorous (TP) (mg/L)	Total Nitrogen TN (TKN + NOx) (mg/L)	Nitrogen Oxides (NOx) (mg/L)	Total Kjeldahl Nitrogen (TKN) (mg/L)
AE1	Angus Creek	0.05	2.2	1.45	0.7
AE2	Angus Creek	0.03	1.9	1.28	0.6
AE3	Angus Creek	0.05	1.9	1.18	0.7
AE4	Eastern Creek	0.13	1.3	0.52	0.8
AE5	Eastern Creek	0.13	1.2	0.64	0.6
AE6*	Angus Creek	-	-	-	-

ANZG default trigger values (DTV) for lowland streams: TP (0.05 mg/L), TN (0.5 mg/L), NOx (0.02 mg/L). Text in bold indicate those variables that exceed the default trigger values.

*Site was inaccessible due to construction activities in the area.

5. Discussion and conclusion

All sites showed an increase in electrical conductivity in winter 2022 in comparison to the previous monitoring (autumn 2022) with all Angus Creek sites being above the ANZG DTVs and both Eastern Creek sites being within ANZG DTVs. Despite some discolouration observed in Site AE3, turbidity in Angus Creek was low. Eastern Creek sites AE4 and AE5 however had elevated turbidity which has been observed on most monitoring occasions. All sites showed dissolved oxygen levels that are to be expected of disturbed urban streams. All sites in Angus Creek and Eastern Creek had a pH reading within the ANZG DTVs. Additionally, all nutrients' analytes were above the ANZG DTVs for all five sites surveyed this monitoring period, with the exception of Total Phosphorous (TP) in Angus Creek which was below. The exceedance in nutrient parameters have been routinely observed over the monitoring program in both upstream and downstream sites in Angus and Eastern creeks (Annex 2). The data indicates that Holcim RDC is not affecting the receiving environment and any exceedance in water quality or poor environmental conditions observed are the result of existing catchment disturbances unrelated to the site.

References

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines.

Niche Environment and Heritage (2022). Holcim Regional Distribution Centre Rooty Hill NSW Aquatic Ecology Monitoring - Autumn. Prepared for Holcim Australia Pty Ltd.

Turak E., Waddell N. and Johnstone G. (2000) NSW AUSRIVAS Sampling and Processing Manual. Department of Environment and Conservation.

Annex 1- Visual observations – July 2022

AE1: Angus Creek Upstream



A: Upstream



B: Downstream

	Attribute	AE1 UPSTREAM
Riparian	Vegetation	The dominant tree species comprised Swamp Oak (<i>Casuarina glauca</i>) and Broad-leaf Privet (<i>Ligustrum lucidum</i>). Groundcover was dominated by <i>Tradescantia fluminensis</i> .
	Stream shading	Moderate shading
	Exotic vegetation	<i>L. lucidum</i> and <i>T. fluminensis</i>
Stream characteristics	Modal width	3 m
	Bank condition	Slightly vegetated banks and stable. Slight erosion of lower bank.
	Substrate	Fine sediment; silt. Hardened clay bottom.
	Flow/depth	Moderate flow/ ~1 m
	Macrophytes/algae	Macrophytes not present.
	Water quality observations	Clear water
Comments		Weeds and rubbish present. Lack of organic material in channel.

AE2: Angus Creek



A: Upstream



B: Downstream

	Attribute	AE2 DOWNSTREAM
Riparian	Vegetation	Dominant tree species included (<i>C. glauca</i>). Dominant groundcover was <i>T. fluminensis</i> and mixture of exotic and native grasses and herbs.
	Stream shading	Moderate shading
	Exotic vegetation	<i>T. fluminensis</i> and other groundcover species.
Stream characteristics	Modal width	2 m
	Bank Condition	Slightly unstable and heavily vegetated by groundcover
	Substrate	Silt and bedrock
	Flow/depth	Moderate flow/<1 m
	Macrophytes/algae	Emergent macrophytes present – Bulrush (<i>Typha</i> sp.), <i>Cyprus</i> sp. <i>Potamogeton crispus</i>
	Water quality observations	Clear water
Comments		Weeds and rubbish. Metallic rubbish in system. Concrete rubble in system.

AE3: Angus Creek Downstream



A: Upstream



B: Downstream

	Attribute	AE3 DOWNSTREAM
Riparian	Vegetation	Dominant tree species was <i>C. glauca</i>). Dominant grass/herb species was Wandering Jew (<i>T. fluminensis</i>)
	Stream shading	Moderate shading
	Exotic vegetation	<i>L. Lucidum</i> , <i>T. fluminensis</i>
Stream characteristics	Modal width	4 m
	Bank Condition	Stable, steep, exposed in sections, slight visible erosion.
	Substrate	Fine sediment, organic matter on banks
	Flow/depth	Low flow/~1 metre
	Macrophytes/algae	Ribbon Weed (<i>Vallisneria</i> sp.)
	Water quality observations	Visually water appeared slightly opaque (but within DTVs)
Comments		

AE4: Eastern Creek Downstream



A: Upstream



B: Downstream

	Attribute	AE4 DOWNSTREAM
Riparian	Vegetation	Dominant canopy species included <i>C. glauca</i>) and Prickly-leaved Tea Tree (<i>Melaleuca styphelioides</i>). Dominant mid-storey species were <i>C. glauca</i> <i>L. lucidum</i>). Dominant groundcover was the exotic <i>T. fluminensis</i>
	Stream shading	Moderate
	Exotic vegetation	<i>L. lucidum</i> and <i>T. fluminensis</i>
Stream characteristics	Modal width	8 m
	Bank condition	Unstable banks
	Substrate	Fine sediment
	Flow/depth	Moderate flow/>1m
	Macrophytes/algae	Macrophytes not present
	Water quality observations	Visually very turbid
Comments		

AE 5: Eastern Creek Upstream



A: Upstream



B: Downstream

	Attribute	AE5 UPSTREAM
Riparian	Vegetation	Dominant overstorey species was <i>C. glauca</i> . Dominant grass/herb was <i>Lomandra</i> (<i>Lomandra longifolia</i>) and groundcover <i>T. fluminensis</i> .
	Stream shading	Moderate
	Exotic vegetation	<i>T. fluminensis</i>
Stream characteristics	Modal width	12 m
	Bank condition	Unstable
	Substrate	Fine sediment and large woody debris.
	Flow/depth	Moderate flow/ >1 m
	Macrophytes/algae	Macrophytes not present.
	Water quality observations	Visually very turbid
Comments		Lots of large woody debris and plastic based rubbish

Annex 2 – Collated Nutrients

Watercourse	Angus Creek			Eastern Creek		Angus Creek
Site	AE1	AE2	AE3	AE4	AE5	AE6
Status	Control	Impact	Impact	Impact	Control	Control
Total Phosphorous (P) (mg/L)						
Autumn 2019	0.08	0.11	0.04	0.1	0.07	0.1
Winter 2019	0.04	0.02	0.07	0.04	0.03	0.01
Spring 2019	0.08	0.11	0.04	0.1	0.07	0.1
Summer 2020	0.18	0.17	0.17	0.55	0.18	0.18
Autumn 2020	0.03	0.02	0.04	0.13	0.19	-
Winter 2020	0.04	0.07	0.07	0.16	0.16	0.03
Spring 2020	0.05	0.04	0.05	0.16	0.18	0.06
Summer 2021	0.08	0.07	0.09	0.1	0.1	0.06
Autumn 2021	0.04	0.04	0.03	0.06	0.13	0.04
Winter 2021	-	-	-	-	-	-
Spring 2021	0.07	0.07	0.06	0.12	0.1	0.09
Summer 2022	0.45	0.4	0.27	0.21	0.15	-
Autumn 2022	0.06	0.06	0.07	0.28	0.26	-
Winter 2022	0.05	0.03	0.05	0.13	0.13	-
Total Nitrogen TN (TKN + NOx) (mg/L)						
Autumn 2019	0.5	0.6	0.6	0.8	0.5	1.1
Winter 2019	0.4	1.1	1.3	0.5	0.4	0.6
Spring 2019	0.5	0.6	0.6	0.8	0.5	1.1
Summer 2020	3.2	3.1	3	2.8	3	3.5
Autumn 2020	1	0.6	0.7	1.2	1.5	-
Winter 2020	1.6	1.8	1.7	1.9	2.7	1.9

Spring 2020	0.7	0.5	0.4	1.2	1.3	1.2
Summer 2021	0.4	0.3	0.5	0.4	0.4	0.7
Autumn 2021	0.7	0.5	0.5	0.7	1.2	0.9
Winter 2021	-	-	-	-	-	-
Spring 2021	1	0.9	0.9	0.12	0.1	0.09
Summer 2022	0.8	0.8	0.8	1.2	1.1	-
Autumn 2022	0.9	0.8	0.9	1.8	1.4	-
Winter 2022	2.2	1.9	1.9	1.3	1.2	-
Nitrogen Oxides (NOx) (mg/L)						
Autumn 2019	0.06	0.29	0.27	0.06	0.1	0.31
Winter 2019	0.03	0.51	0.59	0.11	0.11	0.25
Spring 2019	0.06	0.29	0.27	0.06	0.1	0.31
Summer 2020	1.82	1.7	1.68	0.66	1.59	2.04
Autumn 2020	0.41	0.38	0.37	0.43	0.43	-
Winter 2020	1.19	1.1	1.1	1.1	1.37	1.5
Spring 2020	0.12	0.07	0.04	0.03	0.02	0.6
Summer 2021	0.15	0.14	0.22	0.14	0.14	0.42
Autumn 2021	0.1	0.11	0.11	0.06	0.06	0.48
Winter 2021	-	-	-	-	-	-
Spring 2021	0.62	0.53	0.53	0.2	0.25	0.82
Summer 2022	0.36	0.36	35	0.3	0.32	-
Autumn 2022	0.54	0.5	0.49	0.65	0.63	-
Winter 2022	1.45	1.28	1.18	0.52	0.64	-
Total Kjeldahl Nitrogen (TKN) (mg/L)						
Autumn 2019	0.4	0.3	0.3	0.7	0.4	0.8
Winter 2019	0.4	0.6	0.7	0.4	0.3	0.3

Spring 2019	0.06	0.29	0.27	0.06	0.1	0.31
Summer 2020	1.4	1.4	1.3	2.1	1.4	1.5
Autumn 2020	0.6	0.2	0.3	0.8	1.1	-
Winter 2020	0.4	0.7	0.6	0.8	1.3	0.4
Spring 2020	6	0.4	0.4	1.2	1.3	0.6
Summer 2021	0.3	0.2	0.3	0.3	0.3	0.3
Autumn 2021	0.6	0.4	0.4	0.6	1.1	0.4
Winter 2021	-	-	-	-	-	-
Spring 2021	0.4	0.4	0.4	0.7	0.6	0.6
Summer 2022	0.4	0.4	0.5	0.9	0.8	-
Autumn 2022	0.4	0.3	0.4	1.1	0.8	-
Winter 2022	0.7	0.6	0.7	0.8	0.6	-

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Rehabilitation
Stakeholder consultation and facilitation
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Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)
Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)

Holcim Regional Distribution Centre

Rooty Hill NSW

Aquatic Ecology Monitoring

Prepared for Holcim 16 June 2022



Document control

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1. Introduction

1.1 Background

This document reports on results of the visual and stream health assessment of Angus Creek and Eastern Creek as part of the Holcim Regional Distribution Centre (RDC) (the Project) aquatic ecology monitoring program (hereafter referred to as the monitoring program). The monitoring program, including quarterly visual monitoring, bi-annual aquatic survey, and reporting, is required under condition 2.28 of the Project approval.

The aim of the monitoring program is to compare downstream sites to upstream sites and determine whether the RDC is affecting stream health adjacent to or downstream of the Project.

This report presents the results of bi-annual Macroinvertebrate monitoring undertaken on 26 May 2022. Aquatic ecology monitoring and visual monitoring of stream condition was conducted at five sites: three sites on Angus Creek and two sites on Eastern Creek.

2. Methods

2.1 Location of sampling sites

A total of five sites were sampled on Angus Creek and Eastern Creek (Figure 1, Table 1). Three sites were located on Angus Creek (one upstream and two downstream of the Project) and two sites were located on Eastern Creek (one upstream and one downstream of the Project). At the time of May monitoring AE6 could not be accessed due to construction works being conducted at the Blacktown International Sports Park.

Table 1: Survey sites

Site name	Location	Latitude	Longitude
AE1	Angus Creek upstream near property boundary	-33.76798576	150.8516665
AE2	Angus Creek downstream –near property boundary in Nurragingy Reserve.	-33.76563506	150.854665
AE3	Angus Creek upstream of Eastern Creek confluence in Nurragingy Reserve.	-33.76496807	150.8554235
AE4	Eastern Creek downstream of Angus Creek in Nurragingy Reserve	-33.76419362	150.8576059
AE5	Eastern Creek upstream of Angus Creek in Nurragingy Reserve	-33.76411307	150.8570044
AE6	Angus Creek upstream above railway.	-33.77017801	150.8499068



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2.2 Field methods

The field survey was undertaken on 26 May 2022 by Aquatic Ecologist David Wilkinson and Senior Aquatic Ecologist Luke Stone. The field methods were consistent with standardised techniques for field sampling as prescribed by AUSRIVAS (Turak *et al.* 2000). The AUSRIVAS method of sampling both pools and riffles were modified for this program, as no suitable in-stream riffle features were present.

2.2.1 Visual assessment

A description of aquatic habitat was also produced using the AUSRIVAS proforma. The survey is a rapid visual assessment used to describe the habitat based on the following parameters:

- Geomorphology
- Channel diversity
- Bank stability
- Riparian vegetation and adjacent land use
- Water quality
- Macrophytes
- Local impacts and land use practices.

2.2.2 Water quality

Physio-chemical field measurements

Surface water quality was measured in situ using a Yeokal 611 water quality probe at each site. The following variables were recorded:

- Temperature (°C)
- Conductivity (µS/cm)
- pH
- Dissolved oxygen (DO % saturation and mg/L)
- Turbidity (NTU).

Alkalinity (mg CaCO₃/L) was measured with a standard titration kit.

Water quality data were compared with the Australian and New Zealand Guidelines (ANZG) for Fresh and Marine Water Quality Default Trigger Values (DTVs) for the region as a benchmark for comparison for the program. Currently, no updated ANZG DTVs for the region have been provided. As such the DTVs applied in this report are the ANZECC (2000) physical and chemical stressors for protection of slightly upland aquatic ecosystems in South-Eastern Australia default guideline values, as recommended by the ANZG. This is consistent with previous iterations of the monitoring program.

Water sampling

Water samples were taken at each location and sent to ALS laboratories to test for Total Phosphorus (TP), Total Nitrogen (TN) and (Nitrogen Oxides (NOx) +Total Kjeldahl Nitrogen (TKN)). The results were compared with ANZG (2018) DTVs for TP, TN and NOx.

2.2.3 Macroinvertebrates

Samples were collected from pool edges for a length of 10 metres, either as a continuous line or in disconnected segments. Sampling in segments was undertaken to ensure the sub-habitats such as macrophyte beds, bank overhangs, submerged branches and root mats were appropriately sampled. Segmented sampling was also employed where pool length was short, and it was logistically difficult to

sample in a continuous line (e.g. in-stream logs). A 250 µm dip net was drawn through the water with short sweeps towards the bank to dislodge benthic fauna while scraping submerged rocks and debris, sides of the stream bank and the bed substrate. Further sweeps in the water column targeted suspended fauna.

Each sample was rinsed from the net onto a white sorting tray from which animals were picked using forceps, pipettes and or paint brushes. Each tray was picked for a minimum period of 40 minutes, after which they were picked at 10 minute intervals for either a total of one hour or until no new specimens had been found. Care was taken to collect cryptic and fast moving animals, in addition to those that were conspicuous or slow. The animals collected at each site were placed into a labelled jar containing 70% ethanol.

Laboratory methods-invertebrate identification

Macroinvertebrate samples were identified to family level with the exception of Oligochaeta (to class), Polychaeta (to class), Ostracoda (to subclass), Nematoda (to phylum), Nemertea (to phylum), Acarina (to order) and Chironomidae (to subfamily). Keys used to identify fauna included:

- Dean, J., Rosalind, M., St Clair, M., and Cartwright, D. (2004) Identification keys to Australian families and genera of caddis-fly larvae (Trichoptera). Cooperative Research Centre for Freshwater Ecology.
- Gooderham, J. and Tsyrlin, E. (2002) The Waterbug Book: A guide to the Freshwater Macroinvertebrates of Temperate Australia. CSIRO Publishing.
- Hawking and Theischinger (1999) A guide to the identification of larvae of Australian families and to the identification of ecology of larvae from NSW. Cooperative Research Centre for Freshwater Ecology. Albury NSW.
- Madden, C. (2010) Key to genera of Australian Chironomidae. Museum Victoria Science Reports 12, 1-31.
- Madden, C. (2011) Draft identification key to families of Diptera larvae of Australian inland waters. La Trobe University.
- Smith, B. (1996) Identification keys to the families and genera of bivalve and gastropod molluscs found in Australian inland waters. Murray Darling Freshwater Research Centre.
- Online resource - <http://www.mdfrc.org.au/bugguide/>.

2.3 Data analysis

2.3.1 SIGNAL2 (Stream Invertebrate Grade Number Average Level) scores

The revised SIGNAL2 biotic index developed by Chessman (2003a, b) was used to determine the “environmental quality” of sites. This method assigns grade numbers to each macroinvertebrate family or taxa found, based largely on their response to a range of environmental conditions (Table 2). The sum of all grade numbers for that habitat is then divided by the total number of families recorded in each habitat to calculate the SIGNAL2 index. A weighted SIGNAL2 score was also calculated (see Chessman 2003b). The SIGNAL2 index therefore uses the average sensitivity of macroinvertebrate families to present a snapshot of biotic integrity at a site. Table 3 provides a broad guide for interpreting the health of the site according to the SIGNAL2 score of the site.

Table 2: SIGNAL 2 grade and the level of pollution tolerance

SIGNAL grade	Pollution tolerance
10-8	Indicates a greater sensitivity to pollution
7-5	Indicates a sensitivity to pollution
4-3	Indicates a tolerance to pollution

2-1	Indicates a greater tolerance to pollution
-----	--

Table 3: Guide to interpreting the SIGNAL2 scores

SIGNAL2 score	Habitat quality
Greater than 6	Healthy habitat
Between 5 and 6	Mild pollution
Between 4 and 5	Moderate pollution
Less than 4	Severe pollution

*Note that SIGNAL2 scores are indicative only and that pollution does not refer to just anthropogenic pollution. Environmental stress may result in poor water quality occurring naturally in waterways. Low family richness and the occurrence of pollution tolerant invertebrates can give a low SIGNAL score even when they are in natural condition.

3. Results

3.1 Rainfall

Sampling was conducted on 26 May 2022. Antecedent rainfall since the start of the month was 60 millimetres (mm) (Figure 2), with 29 millimetres falling in the week prior. The water level at the time of sampling was low to moderate and with visible flow.

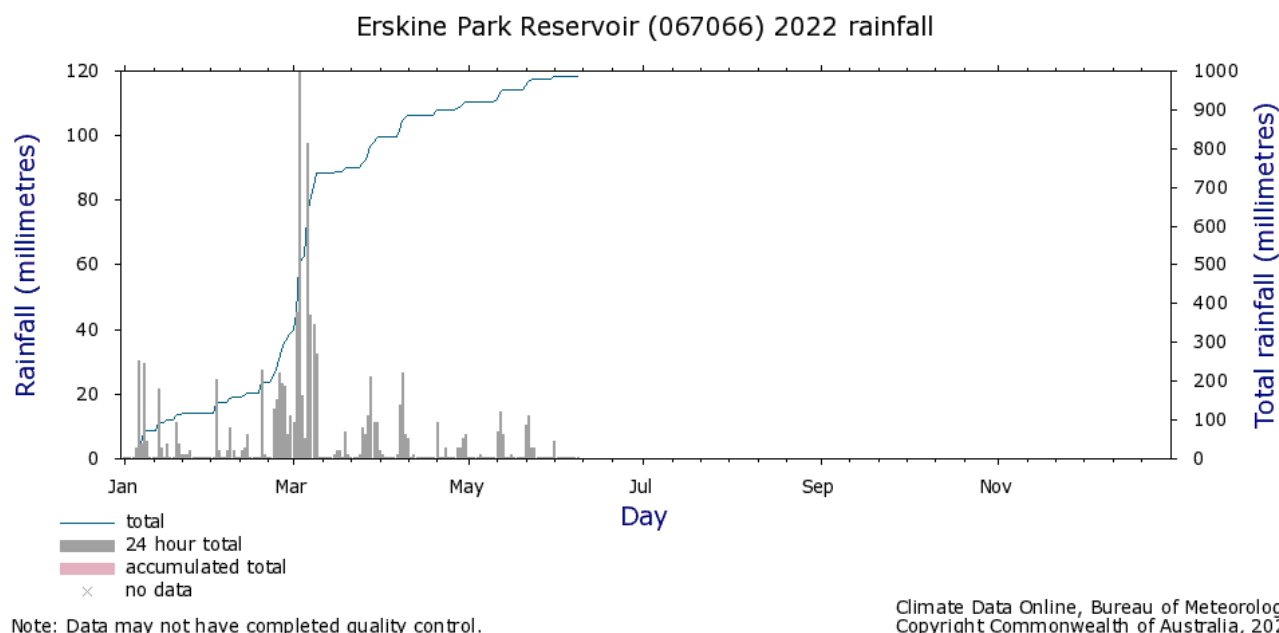


Figure 2: Rainfall January to June 2022

3.2 Visual observations

Results of the visual survey including photographs of each site are provided in Annex 1. Over-all the streams were visibly in moderate condition. The banks of Angus Creek are heavily vegetated with riparian ground cover, however after heavy rain events in early 2022, there is ongoing erosion on the steep banks of the creek. Similar to February monitoring, Angus Creek and Eastern Creek had very little organic matter within pool edges. Eastern Creek still lacks ground cover riparian vegetation and as a result, the exposed banks are being affected by erosion and instability from prolonged submersion due to long periods of heavy rainfall. All sites continue to have large amounts of plastic-based rubbish present in the systems, both in the water and on the banks.

3.3 Water quality

3.3.1 Physio-chemical

Field physio-chemical water quality results are shown in Table 4. Electrical conductivity (EC) was within ANZG for all sites, although was elevated compared to the previous February monitoring (Niche 2022). The sites in Angus Creek and Eastern Creek had relatively consistent EC, with AE1 having the highest at 1422 $\mu\text{S}/\text{cm}$. Angus Creek had values higher than the upstream site of Eastern Creek (AE4 752 $\mu\text{S}/\text{cm}$) as well as the inflow point of Angus Creek (AE5 741 $\mu\text{S}/\text{cm}$). Turbidity was within ANZG DTVs at all sites, except for the Eastern Creek sites AE4 and AE5 which had readings of 83.6 NTU and 121.7 NTU respectively. Dissolved oxygen was below DTVs for sites AE2 and AE3, however this is common for small Western Sydney streams. The pH was above the DTVs at all sites. Alkalinity was consistent, in all Angus Creek and Eastern Creek sites, with Eastern Creek being roughly half that of Angus Creek.

Table 4: Field physio chemical water quality results

Site	Stream	Temp (C°)	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen (% sat)	pH*	Alkalinity (mg CaCO ₃ /L)
AE1	Angus Creek	14.44	1422	1.6	84	9.13	200
AE2	Angus Creek	14.66	1373	1.1	76.3	8.71	200
AE3	Angus Creek	14.57	1356	15.9	69.4	8.28	260
AE4	Eastern Creek	14.22	752	83.6	87.5	8.26	120
AE5	Eastern Creek	14.26	741	121.7	87.3	8.2	100
AE6*	Angus* Creek	-	-	-	-	-	-

ANZG default trigger levels (DTVs) for lowland streams: Electrical conductivity (125-2200 µS/cm), Turbidity (6-50 NTU), pH (6.5-8), Dissolved Oxygen (80-110%). Text in bold indicate those variables that exceed the default trigger values.

*Site AE6 was inaccessible due to construction activities in area.

3.3.2 Nutrients

Total Nitrogen, Total Phosphorus and Nitrogen Oxides were within ANZG for lowland streams (Table 5).

Table 5: Nutrients - laboratory results

Site	Stream	Total Phosphorous (TP) (mg/L)	Total Nitrogen TN (TKN + NO _x) (mg/L)	Nitrogen Oxides (NO _x) (mg/L)	Total Kjeldahl Nitrogen (TKN) (mg/L)
AE1	Angus Creek	0.06	0.9	0.54	0.4
AE2	Angus Creek	0.06	0.8	0.5	0.3
AE3	Angus Creek	0.07	0.9	0.49	0.4
AE4	Eastern Creek	0.28	1.8	0.65	1.1
AE5	Eastern Creek	0.26	1.4	0.63	0.8
AE6*	Angus Creek*	-	-	-	-

ANZG default trigger levels (DTVs) for lowland streams: TP (50mg/L), TN (500 mg/L), NO_x (20 mg/L). Text in bold indicate those variables that exceed the default trigger values.

*Site AE6 was inaccessible due to construction activities in area.

3.4 Macroinvertebrates – SIGNAL 2

SIGNAL2 results for the six sampled sites are provided in Table 6. Raw data is provided in Annex 2.

The number of taxa was very low, ranging from 4-7, with the most taxa (7) observed in Angus Creek site AE1 and Eastern Creek site AE5. The least taxa (4) observed was in Eastern Creek site AE4. The SIGNAL2 scores indicate that the creek has a dominance of pollution-tolerant taxa, possibly indicating moderate to severe pollution (Table 3). No pollution sensitive macroinvertebrate families were observed during this round of monitoring. All sites had a higher SIGNAL2 score than the previous macroinvertebrate sampling period in November 2021 (Niche 2021), except for site AE1 which was worse and site AE4 which had the same scores.

The SIGNAL2 bi-plot (Figure 3), indicates that no sites have favourable habitat and all locations are exhibiting some form of pollution or natural stress. Upstream Angus Creek site AE1 had the highest SIGNAL2 score of any site from both Creeks however, is still considered low. (Table 6).

Table 6: Number of taxa and weighted SIGNAL2 scores

Site	Number of taxa	SIGNAL2 weighted scores
AE1	7	3.16
AE2	6	3.37
AE3	6	3.58
AE4	4	2.33
AE5	7	2.78
AE6	-	-

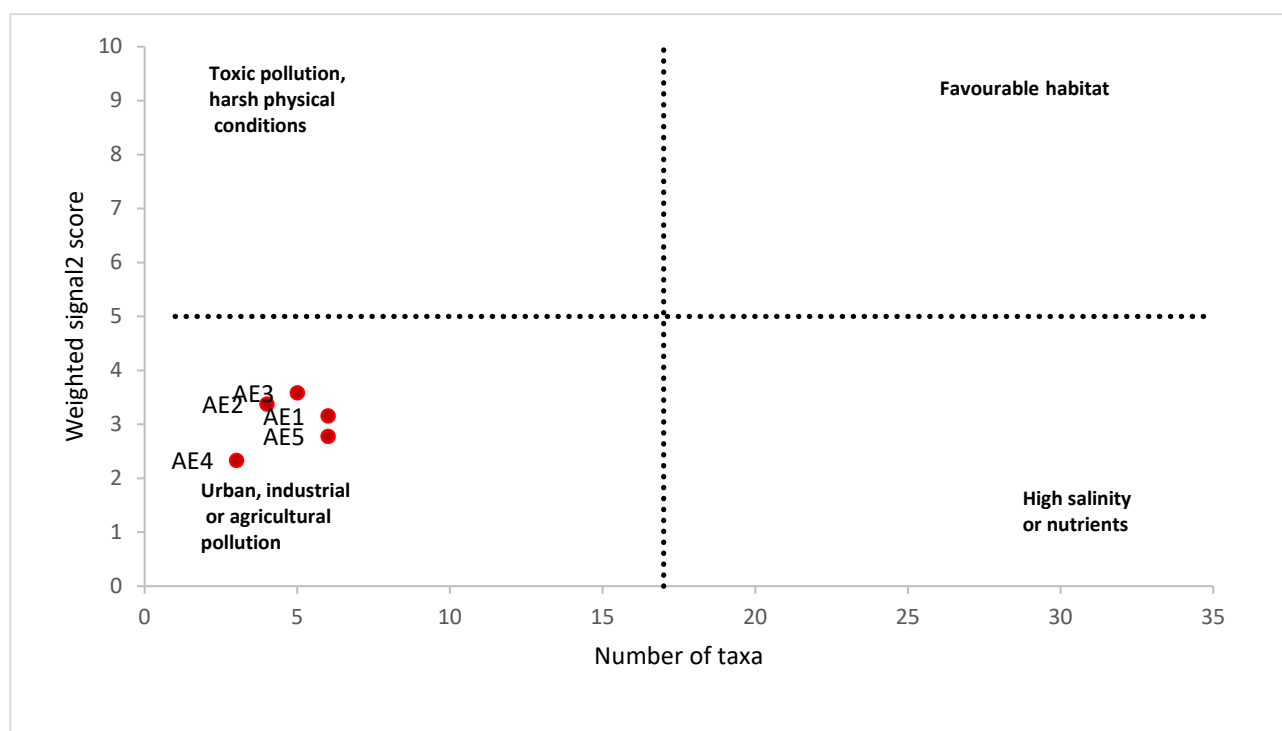


Figure 3: SIGNAL2 score and number of taxa bi-plot.

4. Discussion and Conclusion

All sites showed an increase in electrical conductivity this season in comparison to the previous monitoring (February 2022), however all sites being within the ANZG DTVs. Turbidity in Angus Creek was clear and Eastern Creek had elevated turbidity above ANZGs which has been routinely observed throughout the monitoring program. All sites had low dissolved oxygen levels however this is expected in disturbed Western Sydney streams. Sites in Angus Creek and Eastern Creek (including upstream sites) had a pH reading above the ANZG DTVs indicating a general response to catchment conditions and does not indicate any impact from the RDC. All nutrients' analytes were within ANZG DTVs for all five sites surveyed this monitoring period.

Low numbers of taxa were observed in autumn 2022 however this was also observed in the previous monitoring period (spring 2021) (Niche 2021). Low SIGNAL2 scores (<4) were recorded at all sites and no pollution sensitive macroinvertebrate families were found at the time of monitoring. Considering the SIGNAL2 scores and the water quality results both upstream and downstream were similar, it is unlikely that the RDC is affecting stream ecology. Furthermore, there is a variety of upstream impacts and land use activities that are likely to affect the stream and, as such, the low scores observed are likely the result of a combination of natural and anthropogenic catchment stressors, which is common in disturbed Western Sydney streams. Overall, the two streams appear to be in reasonable health for urban waterways. There are no physicochemical or ecological evidence suggesting that the RDC is affecting the downstream environment.

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Online resources

<http://ausrivas.ewater.com.au/>

<http://www.mdfrc.org.au/bugguide/>

Annex 1- Visual observations – May 2022

AE1: Angus Creek upstream



A: Upstream



B: Downstream

	Attribute	AE1 UPSTREAM
Riparian	Vegetation	The dominant tree species comprised Swamp Oak (<i>Casuarina glauca</i>) and Broad-leaf Privet (<i>Ligustrum lucidum</i>). Groundcover was dominated by Trad (<i>Tradescantia fluminensis</i>).
	Stream shading	Moderate shading
	Exotic vegetation	<i>L. lucidum</i> and <i>T. fluminensis</i>
Stream characteristics	Modal width	3 metres
	Bank condition	Slightly vegetated banks, slightly unstable. Slight erosion of lower and upper bank.
	Substrate	Fine sediment; Silt. Hardened clay bottom.
	Flow/depth	Moderate Flow/ ~1 metre
	Macrophytes/algae	Macrophytes not present.
	Water quality observations	Clear water
Comments		Weeds and rubbish present.

AE2: Angus Creek



A: upstream

B: Downstream

	Attribute	AE2 DOWNSTREAM
Riparian	Vegetation	Dominant tree species included (<i>C. glauca</i>). Dominant groundcover was (<i>T. fluminensis</i>) and mixture of exotic and native grasses and herbs.
	Stream shading	Moderate shading
	Exotic vegetation	<i>T. fluminensis</i> and other groundcover species.
Stream characteristics	Modal width	2 metres
	Bank Condition	Stable. Ground cover impacted by recent high flow
	Substrate	Silt and bedrock
	Flow/depth	Moderate flow/<1 metre
	Macrophytes/algae	Emergent macrophytes present – Bulrush (<i>Typha</i> sp.)
	Water quality observations	Clear water
Comments		Weeds and rubbish. Metallic rubbish in system. Concrete rubble in system. Macrophytes damaged by high flows

AE3: Angus Creek downstream



A: Upstream

B: Downstream

	Attribute	AE3 DOWNSTREAM
Riparian	Vegetation	Dominant tree species was <i>C. glauca</i>). Dominant grass/herb species was Wandering Jew (<i>T. fluminensis</i>)
	Stream shading	Moderate shading
	Exotic vegetation	<i>L. Lucidum</i> , <i>T. fluminensis</i>
Stream characteristics	Modal width	4 metres
	Bank Condition	Stable, steep, exposed in sections, slight visible erosion.
	Substrate	Fine sediment, organic matter on banks
	Flow/depth	Low flow/~1 metre
	Macrophytes/algae	Macrophytes not present
	Water quality observations	Water has slight opaque tint (previously observed)
Comments		Small amount of plastic rubbish.

AE4: Eastern Creek downstream



A: Upstream



B: Downstream

	Attribute	AE4 DOWNSTREAM
Riparian	Vegetation	Dominant canopy species included <i>C. glauca</i>) and Prickly-leaved Tea Tree (<i>Melaleuca styphelioides</i>). Dominant mid-storey species were <i>C. glauca</i> <i>L. lucidum</i>). Dominant groundcover was the exotic <i>T. fluminensis</i>
	Stream shading	Moderate
	Exotic vegetation	<i>L. lucidum</i> and <i>T. fluminensis</i>
Stream characteristics	Modal width	7 metres
	Bank condition	Exposed banks, erosion present. Slightly unstable
	Substrate	Fine sediment
	Flow/depth	moderate flow/>1m
	Macrophytes/algae	Macrophytes not present
	Water quality observations	Very turbid
Comments		European Carp present. Inflow from higher drainage lines

AE 5: Eastern Creek upstream



A: Upstream



B: Downstream

	Attribute	AE5 UPSTREAM
Riparian	Vegetation	Dominant overstorey species was <i>C. glauca</i> . Dominant grass/herb was <i>Lomandra</i> (<i>Lomandra longifolia</i>) and groundcover <i>T. fluminensis</i> .
	Stream shading	Moderate
	Exotic vegetation	<i>T. fluminensis</i>
Stream characteristics	Modal width	5 metres
	Bank condition	Exposed but stable. Slight active erosion present. Flood scouring present
	Substrate	Fine sediment and large woody debris.
	Flow/depth	Moderate flow/ >1 metre
	Macrophytes/algae	Macrophytes not present.
	Water quality observations	Very turbid
Comments		Lots of large woody debris and plastic based rubbish. European Carp present.

Annex 2 Macroinvertebrate data – May 2022

SITE	AE1	AE2	AE3	AE4	AE5
Atyidae	0	0	0	0	1
Chironominae	0	0	0	0	2
Coenagrionidae	7	0	2	0	0
Corixidae	0	0	0	19	10
Ecnomidae	0	0	0	1	2
Glossophionidae	0	2	1	0	0
Hydrobiidae	106	34	83	1	0
Libellulidae	8	5	4	0	1
Megapodagrionidae	3	0	0	0	0
Oligochaeta	3	21	2	0	2
Physidae	8	0	0	0	0
Sialidae	1	2	0	0	0
Simuliidae	0	3	3	0	0
Veliidae	0	0	0	4	1

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Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)

Holcim Regional Distribution Centre

Rooty Hill NSW

Aquatic Ecology Monitoring

Prepared for Holcim 4 March 2022



Document control

Project number	Client	Project manager	LGA
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1. Introduction

1.1 Background

This document reports on results of the visual and stream health assessment of Angus Creek and Eastern Creek as part of the Holcim Regional Distribution Centre (RDC) (the Project) aquatic ecology monitoring program (hereafter referred to as the monitoring program). The monitoring program, including quarterly visual monitoring, bi-annual aquatic survey, and reporting, is required under condition 2.28 of the Project approval.

The aim of the monitoring program is to compare downstream sites to upstream sites and determine whether the RDC is affecting stream health adjacent to or downstream of the Project.

This report presents the results of quarterly monitoring undertaken on 22 February 2022. Water quality monitoring and visual monitoring of stream condition was conducted at five sites: three sites on Angus Creek and two sites on Eastern Creek.

2. Methods

2.1 Location of sampling sites

A total of five sites were sampled on Angus Creek and Eastern Creek (Figure 1, Table 1). Three sites were located on Angus Creek (one upstream and two downstream of the Project) and two sites were located on Eastern Creek (one upstream and one downstream of the Project). At the time of February monitoring AE6 could not be accessed during this round of monitoring due to constructions works being conducted at the Blacktown International Sports Park.

Table 1: Survey sites

Site name	Location	Latitude	Longitude
AE1	Angus Creek upstream near property boundary	-33.76798576	150.8516665
AE2	Angus Creek downstream –near property boundary in Nurragingy Reserve.	-33.76563506	150.854665
AE3	Angus Creek upstream of Eastern Creek confluence in Nurragingy Reserve.	-33.76496807	150.8554235
AE4	Eastern Creek downstream of Angus Creek in Nurragingy Reserve	-33.76419362	150.8576059
AE5	Eastern Creek upstream of Angus Creek in Nurragingy Reserve	-33.76411307	150.8570044
AE6	Angus Creek upstream above railway.	-33.77017801	150.8499068



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2.2 Field methods

The field survey was undertaken on 22 February 2022 by Aquatic Ecologist David Wilkinson. The field methods were consistent with standardised techniques for field sampling.

2.2.1 Visual assessment

A description of aquatic habitat was also produced using the AUSRIVAS proforma. The survey is a rapid visual assessment used to describe the habitat based on the following parameters:

- Geomorphology
- Channel diversity
- Bank stability
- Riparian vegetation and adjacent land use
- Water quality
- Macrophytes
- Local impacts and land use practices.

2.2.2 Water quality

Physio-chemical field measurements

Surface water quality was measured in situ using a Yeokal 611 water quality probe at each site. The following variables were recorded:

- Temperature (°C)
- Conductivity (µS/cm)
- pH
- Dissolved oxygen (DO % saturation and mg/L)
- Turbidity (NTU).

Alkalinity (mg CaCO₃/L) was measured with a standard titration kit. Water quality data were compared with the ANZG (2018) default trigger values (DTVs) of physical and chemical stressors for protection of slightly upland aquatic ecosystems in South-Eastern Australia.

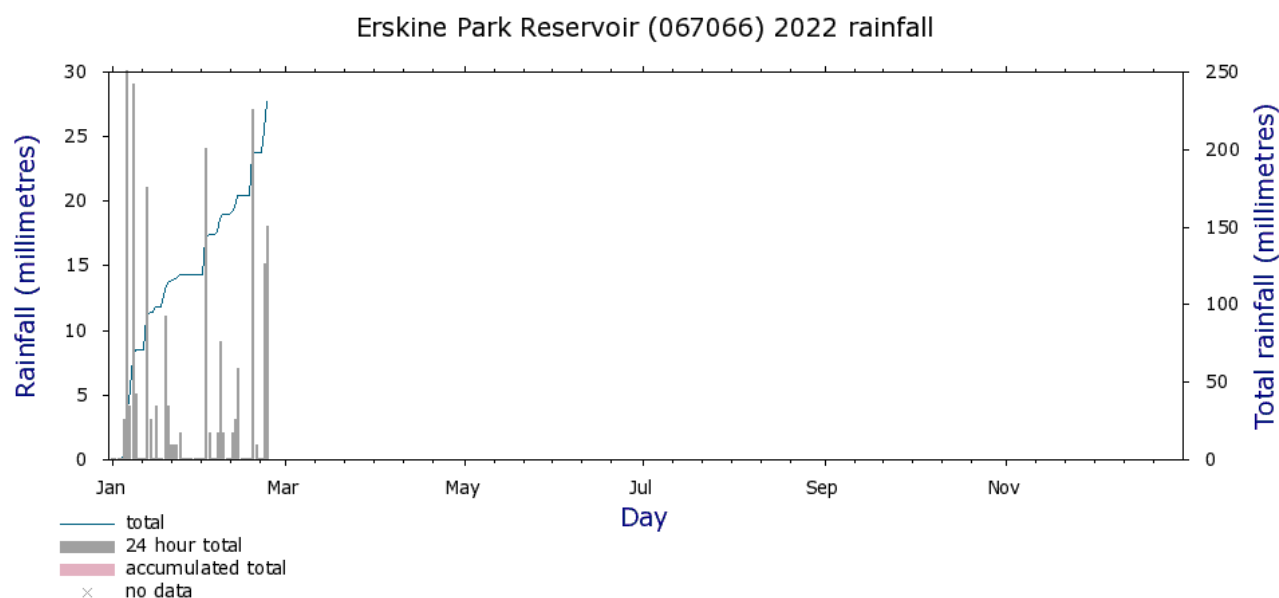
Water sampling

Water samples were taken at each location and sent to ALS laboratories to test for Total Phosphorus (TP), Total Nitrogen (TN) (Nitrogen Oxides (NO_x) + Total Kjeldahl Nitrogen (TKN)). The results were compared with ANZG (2018) DTVs for TP, TN and NO_x.

3. Results

3.1 Rainfall

Sampling was conducted on 22 February 2022. Antecedent rainfall since the start of the month was 94 millimetres (mm) (Figure 2). Four days prior to sampling there was a rain event that totalled 27mm of rain. As well as 15mm falling on the day of the sampling. The water level at the time of sampling was moderate-high and with visible flow.



Note: Data may not have completed quality control.

Climate Data Online, Bureau of Meteorology
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Figure 2: Rainfall January to February 2022.

3.2 Visual observations

Results of the visual survey including photographs of each site are provided in Annex 1. Overall the streams were visibly in reasonable condition for urban waterways. The banks of Angus Creek remain heavily vegetated with riparian ground cover, the ongoing erosion of the steep banks observed from previous monitoring occasions appears to be stabilising as the banks are gradually growing back vegetation that was stripped during previous flooding events at site AE1. Angus Creek AE1 and both Eastern Creek sites (AE4 and AE5) continue to have very little organic matter on the edges of the pools which was observed from the previous survey in November. At the time of monitoring Eastern Creek was still inundated from overbank flows and it appeared that the bank side riparian ground cover was exhibiting die back. The edges of the bank were also unstable from prolonged periods of overbank flows. All sites continue to have large amounts of plastic-based rubbish present in the systems, observed within the water and on the banks (especially in the trash and debris boom at the convergence of Angus Creek and Eastern Creek, AE5). The water was observed to be clear in upstream Angus Creek site AE1 and downstream sites AE2. Site AE3 appeared to have a slight opaqueness in water clarity, while both Eastern Creek sites appeared turbid (Annex 1).

3.3 Water quality

3.3.1 Physio-chemical

Field physio-chemical water quality results are shown in Table 2. Electrical conductivity (EC) was within ANZG DTV for all sites. Sites within Angus Creek and Eastern Creek had consistent EC ranging 399-416 $\mu\text{S}/\text{cm}$ with AE1 having the highest. Turbidity was within ANZG DTVs at all sites, except for the Eastern

Creek site AE4 which had readings of 144.5 NTU. Dissolved oxygen was below DTVs for all sites; however, this is common for small Western Sydney streams. The pH was within the DTVs at all Angus Creek sites and Eastern Creek sites. Alkalinity was relatively consistent, within each water way; Angus Creek ranged 80-110 CaCO₃/L and Eastern Creek (100 CaCO₃/L).

Table 2: Field physio chemical water quality results

Site	Stream	Temp (C°)	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved Oxygen (% sat)	pH*	Alkalinity (mg CaCO ₃ /L)
AE1	Angus Creek	22.63	416	5.5	68.6	7.61	100
AE2	Angus Creek	22.64	403	7.6	57.1	7.47	110
AE3	Angus Creek	22.65	399	8.7	60.1	7.41	80
AE4	Eastern Creek	22.58	407	144.5	68.1	7.38	100
AE5	Eastern Creek	22.8	406	35.8	64.6	7.12	100
AE6*	Angus Creek	-	-	-	-	-	-

ANZG default trigger values (DTV) for lowland streams: Electrical conductivity (125-2200 µS/cm), Turbidity (6-50 NTU), pH (6.5-8), Dissolved Oxygen (80-110%). Text in bold indicate those variables that exceed the default trigger values.

*Site was inaccessible due to construction activities in the area.

3.3.2 Nutrients

Total Nitrogen, Total Phosphorus and Nitrogen Oxides were within ANZG DTVs for lowland streams for all Angus Creek and Eastern Creek sites (Table 3).

Table 3: Nutrients - laboratory results

Site	Stream	Total Phosphorous (TP) (mg/L)	Total Nitrogen TN (TKN + NOx) (mg/L)	Nitrogen Oxides (NOx) (mg/L)	Total Kjeldahl Nitrogen (TKN) (mg/L)
AE1	Angus Creek	0.45	0.8	0.36	0.4
AE2	Angus Creek	0.4	0.8	0.36	0.4
AE3	Angus Creek	0.27	0.8	0.35	0.5
AE4	Eastern Creek	0.21	1.2	0.3	0.9
AE5	Eastern Creek	0.15	1.1	0.32	0.8
AE6*	Angus Creek	-	-	-	-

ANZG default trigger values (DTV) for lowland streams: TP (50mg/L), TN (500 mg/L), NOx (20 mg/L). Text in bold indicate those variables that exceed the default trigger values.

*Site was inaccessible due to construction activities in the area.

4. Discussion and conclusion

All sites showed a decrease in electrical conductivity in summer 2022 in comparison to the previous monitoring (spring 2021) with all sites being within the ANZG DTVs and relatively consistent. Despite some discolouration observed in Site AE3, turbidity in Angus Creek was low. Eastern Creek site AE4 however had elevated turbidity which has been observed on most monitoring occasions, while Eastern Creek site AE5 has relatively low turbidity in comparison to previous monitoring (Niche 2021). All sites showed dissolved oxygen levels that are to be expected of disturbed urban streams. All sites in Angus Creek and Eastern Creek had a pH reading within the ANZG DTVs. Additionally, all nutrients' analytes were within ANZG DTVs for all five sites surveyed this monitoring period.

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Online resources

<http://ausrivas.ewater.com.au/>

Annex 1- Visual observations – February 2022

AE1: Angus Creek upstream



A: Upstream



B: Downstream

	Attribute	AE1 UPSTREAM
Riparian	Vegetation	The dominant tree species comprised Swamp Oak (<i>Casuarina glauca</i>) and Broad-leaf Privet (<i>Ligustrum lucidum</i>). Groundcover was dominated by Wandering Jew (<i>Tradescantia fluminensis</i>).
	Stream shading	Moderate shading
	Exotic vegetation	<i>L. lucidum</i> and <i>T. fluminensis</i>
Stream characteristics	Modal width	3 m
	Bank condition	Slightly vegetated banks and stable. Slight erosion of lower bank.
	Substrate	Fine sediment; silt. Hardened clay bottom.
	Flow/depth	Moderate flow/ ~1 m
	Macrophytes/algae	Macrophytes not present.
	Water quality observations	Clear water
Comments		Weeds and rubbish present. Lack of organic material in channel.

AE2: Angus Creek



A: upstream



B: Downstream

	Attribute	AE2 DOWNSTREAM
Riparian	Vegetation	Dominant tree species included (<i>C. glauca</i>). Dominant groundcover was (<i>T. fluminensis</i>) and mixture of exotic and native grasses and herbs.
	Stream shading	Moderate shading
	Exotic vegetation	<i>T. fluminensis</i> and other groundcover species.
Stream characteristics	Modal width	2 m
	Bank Condition	Slightly unstable and heavily vegetated by groundcover
	Substrate	Silt and bedrock
	Flow/depth	Moderate flow/<1 m
	Macrophytes/algae	Emergent macrophytes present – Bulrush (<i>Typha</i> sp.), <i>Cyprus</i> sp. <i>Potamogeton crispus</i>
	Water quality observations	Clear water
Comments		Weeds and rubbish. Metallic rubbish in system. Concrete rubble in system.

AE3: Angus Creek downstream



A: Upstream

B: Downstream

	Attribute	AE3 DOWNSTREAM
Riparian	Vegetation	Dominant tree species was <i>C. glauca</i>). Dominant grass/herb species was Wandering Jew (<i>T. fluminensis</i>)
	Stream shading	Moderate shading
	Exotic vegetation	<i>L. Lucidum</i> , <i>T. fluminensis</i>
Stream characteristics	Modal width	4 m
	Bank Condition	Stable, steep, exposed in sections, slight visible erosion.
	Substrate	Fine sediment, organic matter on banks
	Flow/depth	Low flow/~1 metre
	Macrophytes/algae	Ribbon Weed (<i>Vallisneria</i> sp.)
	Water quality observations	Visually water appeared slightly opaque (but within DTVs)
Comments		

AE4: Eastern Creek downstream



A: Upstream



B: Downstream

	Attribute	AE4 DOWNSTREAM
Riparian	Vegetation	Dominant canopy species included <i>C. glauca</i>) and Prickly-leaved Tea Tree (<i>Melaleuca styphelioides</i>). Dominant mid-storey species were <i>C. glauca</i> <i>L. lucidum</i>). Dominant groundcover was the exotic <i>T. fluminensis</i>
	Stream shading	Moderate
	Exotic vegetation	<i>L. lucidum</i> and <i>T. fluminensis</i>
Stream characteristics	Modal width	8 m
	Bank condition	Inundated banks, unstable banks
	Substrate	Fine sediment
	Flow/depth	Moderate flow/>1m
	Macrophytes/algae	Macrophytes not present
	Water quality observations	Very turbid/in flood
Comments		European Carp present.

AE 5: Eastern Creek upstream



A: Upstream

B: Downstream

	Attribute	AE5 UPSTREAM
Riparian	Vegetation	Dominant overstorey species was <i>C. glauca</i> . Dominant grass/herb was <i>Lomandra</i> (<i>Lomandra longifolia</i>) and groundcover <i>T. fluminensis</i> .
	Stream shading	Moderate
	Exotic vegetation	<i>T. fluminensis</i>
Stream characteristics	Modal width	12 m
	Bank condition	Inundated by flood water. Unstable
	Substrate	Fine sediment and large woody debris.
	Flow/depth	Moderate flow/ >1 m
	Macrophytes/algae	Macrophytes not present.
	Water quality observations	Visually very turbid
Comments		Lots of large woody debris and plastic based rubbish. European Carp present.

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Development and activity approvals
Rehabilitation
Stakeholder consultation and facilitation
Project management

Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)
Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)

Appendix 3 – Annual Works Report by Toolijooa Environmental Restoration



Toolijooa Environmental Restoration

Holcim Australia - Rooty Hill Distribution Centre

Bushland Regeneration Report
January 2022 – December 2022

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1. Summary of Works

Zone	Type of Work	Weed Type	Work Description
JANUARY 2022			
Depot	Maintenance	Herbaceous	<ul style="list-style-type: none">All vegetation throughout the depot, including main planting bed adjacent to the front office, entrance gates, central sound wall and unloader parking, snake alley pathway and surrounding workshop, have been hand weeded, mowed and sprayed (using 1.5% Roundup Biactive® + Pulse® or 0.6% Starane Advance® + Pulse®) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improve visual aesthetics and control trip hazards to staff and visitors.Slashed/sheared overhanging vegetation along all pedestrian pathways including adjacent to the main office front door and pedestrian gate, to improve access for workers and visitors.Snake Alley was slashed to improve aesthetics and to also inhibit snake activity adjacent to walkways.
		Other	<ul style="list-style-type: none">Trimmed overhanging branches surrounding electrical boxes adjacent the main office and along the road edges to improve accessibility and line of sight for all vehicle access.
MARCH 2022			
Depot	Maintenance	Herbaceous	<ul style="list-style-type: none">All vegetation throughout the depot, including main planting bed adjacent to the front office, entrance gates, snake alley pathway and surrounding workshop, were hand weeded, mowed, and sprayed (using 1.5% Roundup Biactive® + Pulse®) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improved visual aesthetics

Zone	Type of Work	Weed Type	Work Description
			<p>and controlled trip hazards to staff and visitors. In addition, the conveyer belt walkway was also sprayed to allow staff and contractor access.</p> <ul style="list-style-type: none"> Slashed/sheared overhanging vegetation along all pedestrian pathways including adjacent to the main office front door and pedestrian gate, to improve access for workers and visitors. Snake Alley was slashed to improve aesthetics and to also inhibit snake activity adjacent to walkways. Central section (Graveyard) was slashed throughout to control vegetation growth and to be maintain at low levels throughout.
		Other	<ul style="list-style-type: none"> Trimmed vegetation back with was covering access to the power access pit within the office planting bed, for contractor access.
JUNE 2022			
Depot	Maintenance	Herbaceous	<ul style="list-style-type: none"> All vegetation throughout the depot, including main planting bed adjacent to the front office, snake alley pathway, surrounding workshop, M7 access gate, back access roads and planting bed, were hand weeded, slashed, mowed, or sprayed (using 1.5% Roundup Biactive® + Pulse) to control exotic weed growth and reduce seeding potential throughout the landscaped sections of the depot, as well as improve visual aesthetics and control trip hazards to staff and visitors. Slashed/sheared overhanging vegetation along all pedestrian pathways, including adjacent to the main office front door and

Zone	Type of Work	Weed Type	Work Description
			<p>pedestrian gate, to improve access for workers and visitors.</p> <ul style="list-style-type: none"> Snake Alley was slashed to improve aesthetics and to also minimise snake activity adjacent to walkways. Central sound wall and loader parking bay were slashed to control vegetation growth and to be maintained at low levels throughout.
	Maintenance	Woody	<ul style="list-style-type: none"> Overhanging branches were cut back along the access road to improve vehicle movements.
AUGUST 2022			
Depot	Maintenance	Herbaceous	<ul style="list-style-type: none"> All vegetation throughout the top section of the depot, including main planting bed (adjacent to the front office), snake alley, snake alley pathway, northern bund and the concrete plant have been hand weeded, slashed, mowed, or sprayed (using 1.5% Roundup Biactive® + 0.5% Grazon® + Pulse) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improved visual aesthetics and controlled trip hazards to staff and visitors. Vegetation along the back access roads, underneath the conveyer belt and surrounding the electrical buildings + unloader building, were sprayed (using 1.5% Roundup Biactive® + 0.5% Grazon® + Pulse) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improved visual aesthetics and controlled trip hazards to staff and Slashed/sheared overhanging vegetation along all pedestrian pathways including adjacent to the main office front door and pedestrian gate, to improve access for workers and visitors.

Zone	Type of Work	Weed Type	Work Description
			<ul style="list-style-type: none"> Central Sound Wall and loader parking bay were slashed to control vegetation growth and to be maintain at low levels throughout.
SEPTEMBER 2022			
Depot	Maintenance	Herbaceous	<ul style="list-style-type: none"> All vegetation throughout the top section of the depot (main planting bed adjacent to the front office, snake alley, snake alley pathway, northern bund, the concrete plant) have been hand weeded, slashed, mowed, or sprayed using 1.5% Roundup Biactive® + 0.5% Grazon® + Pulse to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improve visual aesthetics and control trip hazards to staff and visitors. Vegetation along the back access roads (including M7 corner, rail line walkways and surrounding the electrical buildings + unloader building) were sprayed using 1.5% Roundup Biactive® or 1.5% Roundup Biactive® + 0.5% Grazon® + Pulse to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improve visual aesthetics and control trip hazards. Central Sound Wall and loader parking bay were slashed and sprayed using 1.5% Roundup Biactive® to control vegetation growth and to be maintain at low levels throughout. <i>Juncus acutus</i> was sprayed behind the Concrete Plant Bund, adjacent to Western Retention Basin, within the drainage line to inhibit further establishment and inhibit further flowering potential.
OCTOBER 2022			
Depot	Maintenance	Herbaceous	<ul style="list-style-type: none"> Vegetation throughout the top section of the depot, including main planting bed

Zone	Type of Work	Weed Type	Work Description
			<p>(adjacent to the front office), snake alley pathway, central sound wall and the concrete plant have been mowed or sprayed (using 1.5% Roundup Biactive® + Pulse or 0.6% Starane Advanced® + Pulse®) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improved visual aesthetics and controlled trip hazards to staff and visitors.</p> <ul style="list-style-type: none">Vegetation along the back access roads including M7 corner, rail line walkways and surrounding the electrical buildings + unloader building, were mowed or sprayed (using 1.5% Roundup Biactive® + Pulse) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improved visual aesthetics and controlled trip hazards to staff and loader parking bay were sprayed (using 1.5% Roundup Biactive®) to control vegetation growth and to be maintain at low levels throughout.
		Woody	<ul style="list-style-type: none">Stem treated <i>Casuarina glauca</i> specimens behind the unloader building, adjacent to the walkway stairs, to correct a defect from recent inspection.
NOVEMBER 2022			
Depot	Maintenance	Herbaceous	<ul style="list-style-type: none">Vegetation throughout the top section of the depot, including main planting bed (adjacent to the front office), snake alley pathway, central sound wall + loader parking, northern bund (main gate to HUME) and road edges have been slashed/mowed or sprayed (using 1.5% Roundup Biactive® + Pulse or 0.6% Starane Advance® + Pulse®) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improved visual aesthetics and controlled trip hazards to staff and visitors.<i>Cenchrus setaceus</i> clumps were removed throughout the office planting bed, to inhibit

Zone	Type of Work	Weed Type	Work Description
			flowering and seed dispersal.
		Woody	<ul style="list-style-type: none"> Trim back overhanging branches along the roadway leading to the Concrete Plant, to improve driver visibility along the roadway.
1a	Maintenance	Vines	<ul style="list-style-type: none"> <i>Araujia sericifera</i>, <i>Passiflora caerulea</i>, <i>Passiflora suberosa</i> were all hand weeded/stem treated throughout the North-Eastern section of the zone, to inhibit growth into canopy species and inhibit seeding/flowering potential
		Woody	<ul style="list-style-type: none"> Emerging woody weeds were stem treated/hand pulled throughout the North-Eastern section of the zone to inhibit further establishment and seeding potential. Species targeted included <i>Celtis orientalis</i>, <i>Cestrum parqui</i>, <i>Lantana camara</i>, <i>Ligustrum lucidum</i>, <i>Ligustrum sinense</i>, <i>Solanum mauritianum</i>, <i>Ochna serrulata</i>, <i>Olea europaea</i> subsp. <i>cuspidata</i>
DECEMBER 2022			
Depot	Maintenance	Herbaceous	<ul style="list-style-type: none"> Vegetation throughout the top section of the depot, including main planting bed (adjacent to the front office), snake alley pathway, central sound wall + loader parking, northern bund (main gate to HUME) and road edges have been sprayed (using 1.5% Roundup Biactive®) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improved visual aesthetics and controlled trip hazards to staff and visitors. Slashed Vegetation adjacent to the Sydney Trains gate and electrical building, to improve access for Sydney Train personnel and Holcim personnel. Vegetation along the back access road from the sales yard to the unloaded building, plus the access road running parallel with the rails, surrounding the electrical buildings and both sides of the conveyor belt were sprayed (using 1.5% Roundup Biactive®) to control exotic weed growth and seeding potential throughout the landscaped sections of the depot, as well as improved visual aesthetics and controlled trip hazards to staff and

Zone	Type of Work	Weed Type	Work Description
			visitors.
		Woody	<ul style="list-style-type: none"> Trim back overhanging branches along the roadway leading to the Concrete Plant and within the carpark to improve driver visibility along the roadway for safety compliance.

Note:

- All spraying utilised a 1% solution of 'Roundup Biactive®' unless stated otherwise.
- All cut/scrape and painting and drill and stem injecting was done using neat 'Roundup Biactive®'.

2. *Grevillea juniperina* ssp. *juniperina* Monitoring

Grevillea juniperina subsp. *juniperina* monitoring was undertaken in September 2022.

Results as followed:

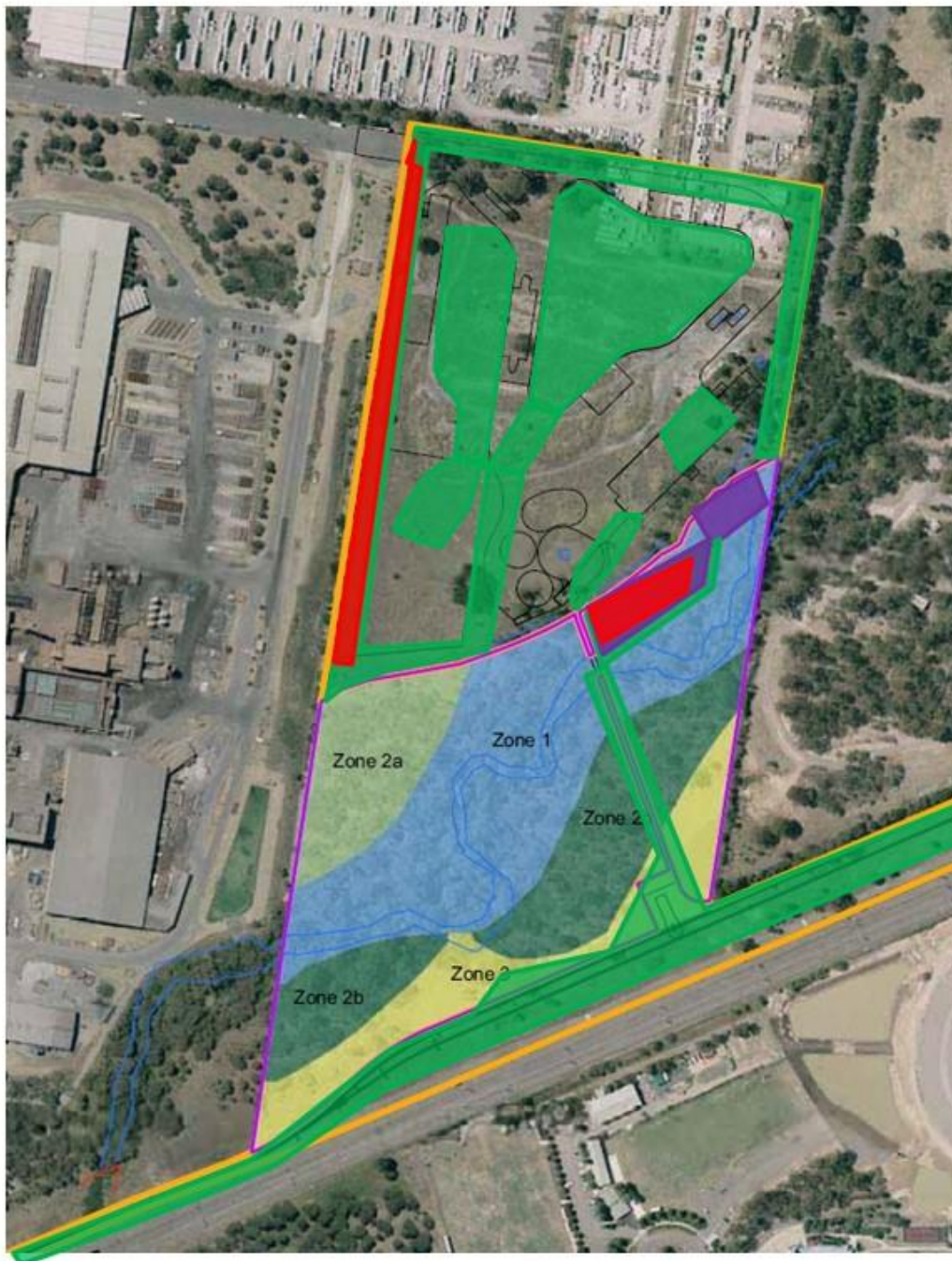
Zone 1	Oct-17	Sep-22	Difference
South - East	60	98	38
North - East	115	85	-30

October 2017 data was taken from the 2017 Annual Report.

There were many emerging specimens pushing through the grassland, with many more small seedlings possibly uncounted.

Reasoning for changes in numbers: Drought conditions seen in the past 5 years possibly caused some die off of juvenile and seedling plants and prevented germination. The North – East section of Zone 1 is less shaded than the South – East section, with full sun exposure in the area

3. Works Mapping



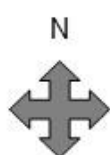
Holcim Rooty Hill Distribution Centre

Species of Major Weeds Treated

2022



Source: Sinclair Knight Mertz



Not to Scale

Herbaceous: *Bidens pilosa*, *Chloris gayana*, *Conyza* sp., *Cynodon dactylon*, *Eragrostis curvula*, *Medicago sativa*, *Onopordum acanthium*, *Paspalum dilatatum*, *Senecio madagascariensis*, *Solanum* spp., *Sonchus oleraceus*, *Typha orientalis*, *Verbena bonariensis*

Vine: *Araujia sericifera*, *Passiflora caerulea*, *Passiflora suberosa*

Woody: *Lantana camara*, *Ligustrum* spp., *Ochna serrulata*, *Olea europaea* subsp. *cuspidata*, *Solanum mauritianum*



4. Recommendations

Bushland

- Continue maintenance of previously revegetated areas and monitor for planting health.
- Push back of vine and woody weeds throughout Zones 1 and 2, focusing on *Ligustrum* spp.
- Continue to monitor health of *Grevillea* population

Landscape

- Continue maintenance as per current specification.

Appendix 4 Approval Letter - Department of Planning and Environment
Operational Environmental Management Plan

Ms Shilpa Shashi
Planning and Environmental Coordinator
Holcim (Australia) Pty Ltd
Level 7, 799 Pacific Highway
CHATSWOOD NSW 2067

27/01/2022

Dear Ms Shashi

**Regional Distribution Centre, Rooty Hill (MP05_0051)
Operation Environmental Management Plan**

I refer to the updated Operation Environmental Management Plan (OEMP) which was submitted in accordance with Condition 5.4 of Schedule 2 of the approval for the Regional Distribution Centre, Rooty Hill (MP05_0051).

The Department has carefully reviewed the document and is satisfied that it meets the requirements of Condition 5.4.

Accordingly, the Planning Secretary has approved the updated OEMP (Revision 3.2, dated January 2022). Please ensure that the approved plan is placed on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact David Koppers on 9373 2869 or at david.koppers@planning.nsw.gov.au.

Yours sincerely



Pamela Morales
Acting Team Leader - Industry
Industry Assessments

As nominee of the Planning Secretary

Appendix 5 - Rooty Hill Distribution Centre
Independent Environmental Audit Action and Response List

Condition of consent	Requirement	Evidence collected	Independent audit findings and recommendations	Compliance status	Holcim's response
DA 05_0051 as modified (March 2011 Modification and June 2017 Modification)					
1. ADMINISTRATIVE CONDITIONS					
	<p>Terms of approval</p> <p>The Proponent must carry out the project generally in accordance with the:</p> <p>a) Project Application 05_0051;</p> <p>b) Environmental Assessment Report for the Proposed Regional Distribution Centre, Rooty Hill, volumes 1-3, prepared by National Environmental Consulting Services, dated October 2005;</p> <p>c) Response to Issues Raised in Submissions to EAR, prepared by National Environmental Consulting Services, dated February 2006;</p> <p>d) the final Statement of Commitments, submitted by the Proponent to the Department on 17 March 2006; and</p> <p>e) the Environmental Assessment Report - Proposed Minor Modification to Holcim Regional Distribution Centre (RDC), Rooty Hill, NSW prepared by Urmwel (Australia) Pty Limited, dated October 2010, including the Response to Submissions for Proposed Minor Modification to Holcim Regional Distribution Centre (RDC), Rooty Hill, NSW, dated 9 December 2010, and the March 2011 Modification Statement of Commitments shown in Attachment 2;</p> <p>f) the Environmental Assessment Report - Rooty Hill Regional Distribution Centre Minor Modification, prepared by Urmwel (Australia) Pty Limited and dated February 2017, including the Response to Submissions for Proposed Minor Modifications to Holcim Regional Distribution Centre (RDC), Rooty Hill, NSW, dated 16 May 2017; and</p> <p>g) the conditions of this approval.</p> <p>Note: The general layout of the project is shown in Attachment 3.</p>	<p>Major Projects Application DA 05_0051 (DA 05_0051), as modified, and associated assessments.</p> <p>Modification Application DA 05_0051 MOD1 and the accompanying environmental assessment (EA) (2011).</p> <p>Modification Application DA 05_0051 MOD2 and the accompanying EA (2017).</p> <p>Site inspection.</p> <p>Building Certificate for mobile CBP issued by Blacktown City Council on 8 November 2018.</p> <p>Construction Certificate C.C. No: 20190116 issued by Essential Certifiers on 08/11/2018 for the construction of the permanent CBP.</p> <p>DPIE correspondence regarding temporary and mobile, as well as permanent, CBP dated 25 June 2018, 16 July 2018, 4 September 2018, 1 November 2018 and Holcim's responses to each.</p> <p>RHDC IEA 2018.</p>	<p>RHDC IEA 2018 identified that the CBP and the aggregate storage areas are substantially different from the approved facilities. A key issue has been the construction and operation of a temporary mobile CBP, which was inconsistent with approval documentation (refer to Section 5.2.2). Since then, Holcim and DPIE have liaised regarding this matter and Holcim has attempted to rectify this issue.</p> <ul style="list-style-type: none"> Holcim obtained a Building Certificate for the operation of a mobile/temporary CBP issued by Blacktown City Council on 8 November 2018, as per DPIE's instructions. Subsequently, a Construction Certificate was issued for the permanent CBP on 8 November 2018, after which the permanent CBP was constructed and commissioned. The issue of a Construction Certificate is taken to have resolved the issue of the previously reported difference between the consent drawings and the proposed layout of the CBP, however, an Occupation Certificate has not been sighted during this audit. Aggregate storage areas remain unchanged from the last audit, and it is not clear whether this issue has been resolved. <p>Recommendation:</p> <ol style="list-style-type: none"> Actions are taken to ensure that material storage and handling facilities are constructed and operated as approved. This could be through: <ul style="list-style-type: none"> amending existing site components and layout to comply with DA 05_0051 (as modified); and/or seeking advice from relevant regulatory agencies, including DPIE and EPA, on reconciling current operations and site infrastructure with Condition 1.1 of DA 05_0051 (as modified). The non-enclosure of the materials storage bins is the primary anomaly. This option may include the further modification of the Project Approval. Occupation Certificate must be obtained in order to operate the CBP and associated buildings. 	Non-compliant	<p>GIPA will need to be put in for document search for the Occupation Certificate.</p> <p>The recent modification for RHDC was approved under section 75 W of the E P and A Act 1978. The old section 3.3 A was repealed and replaced by section 4.55 and therefore cannot be replaced by section 75 W.</p>
1.3	<p>The Proponent must comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:</p> <p>a) any reports, plans or correspondence that are submitted by the Proponent in accordance with this approval; and</p> <p>b) the implementation of any actions or measures contained in those reports, plans or correspondence submitted by the Proponent.</p>	<p>Discussion with Holcim's Environmental Representatives including Planning and Environment Coordinator NSW/ACT S. Shashi and Site Manager R. Flack (Holcim's audit team) during the audit period.</p> <p>DPIE correspondence regarding temporary/mobile and permanent CBPs dated 25 June 2018, 16 July 2018, 4 September 2018, 1 November 2018 and Holcim's responses to each.</p>	<p>Holcim's audit team confirmed that there were no site requirements relating to reports or plans from the Secretary's office that have been issued within the current audit period (29 November 2018 - 29 November 2021).</p> <p>Correspondence sighted between DPIE and Holcim regarding the temporary and mobile, as well as permanent, CBP noted requirements to obtain a Building Certificate from Blacktown City Council for the temporary and mobile CBP and a Construction and subsequent Occupation Certificate from a private certifier for the permanent CBP.</p> <ul style="list-style-type: none"> A Building Certificate was issued for the mobile/temporary CBP by Blacktown City Council on 9 November 2018. A Construction Certificate No. 20190116 was issued on 8 November 2018 by Essential Certifiers for the permanent CBP. However, no Occupation Certificate was sighted as noted in Condition 1.1. <p>Recommendation: Refer to Condition 1.1.</p>	Non-compliant	GIPA search to be conducted.
1.8	<p>Management Plans/Monitoring Programs</p> <p>With the approval of the Secretary, the Proponent may prepare and submit any management plan or monitoring program required by this approval on a progressive basis. Where a management plan or monitoring program is required before carrying out the project, or any stage of the project, the plans/ programs may be prepared and submitted in relation to either discrete components of the project or for a specified time period.</p>	<p>RHDC Operational Environmental Management Plan 2015 (OEMP 2015).</p> <p>OEMP dated 2019 (OEMP 2019).</p> <p>RHDC OEMP dated October 2021 (OEMP 2021), which includes the following other management plans:</p> <ul style="list-style-type: none"> General Site Management Plan; Noise Management Plan; Traffic Management Plan; Dust Management Plan; Soil and Water Management Plan; Energy Saving Management Plan; Vegetation Management Plan. <p>OEMP 2021 also includes the following Operational Monitoring Plan:</p> <ul style="list-style-type: none"> Noise Monitoring Program; Transport Monitoring Program; Ambient Dust Monitoring Program; Aquatic Ecology and Water Quality Monitoring Program. 	<p>See conditions relevant to management plans in regard to compliance relevant to preparation and submission of management plans.</p> <p>It is important to note that both OEMP 2019 and OEMP 2021 were provided during the audit period, however at different stages throughout the audit period, and therefore both have been considered for audit outcomes.</p> <p>It is our understanding that the latest OEMP 2021 was with DPIE for review/approval in accordance with conditions of consent, at the time of this audit. However, correspondence regarding this process has not been sighted during the audit and therefore cannot be verified.</p> <p>OEMP 2021 under the section 'Stakeholder Consultation' notes "During the review and revision of the 2015 OEMP, a draft OEMP was sent to DPIE for approval. Feedback on this Draft OEMP was received on 18 June 2021 and incorporated into this October 2021 OEMP as outlined in Appendix 9." Appendix 9 shows that DPIE comments were addressed. However, any correspondence regarding the OEMP submission or approval have not been verified.</p> <p>Recommendation: Refer to response for Condition 5.6.</p>	Non-compliant	OEMP was approved in February 2022. All the correspondence with DPIE was shared in the audit.
1.13	<p>Structural Adequacy</p> <p>The Proponent must ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.</p> <p>Notes: Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works.</p> <p>Part 8 of the EP&A Regulation sets out the requirements for the certification of the Project.</p>	<p>Construction Certificate C.C. No: 20190116 issued by Essential Certifiers on 08/11/2018 for the construction of the concrete batching plant.</p> <p>Site observations.</p>	<p>Construction Certificate issued for the construction of a concrete batching plant, with the following architectural plans approved: 1) male-female ambulant toilet, 2) lunchroom plans, 3) control room floor plans, and 4) architectural plans.</p> <p>Site observations indicate that there is no reason to believe that the structural adequacy of the permanent CBP has not been constructed with the relevant requirements of the BCA.</p> <p>Occupational Certificate has not been sighted during the audit (refer to Condition 1.1).</p>	Non-compliant	Please refer to comment above.
2. SPECIFIC ENVIRONMENTAL CONDITIONS					
2.8	<p>The Proponent must design, construct, commission, operate and maintain the project in a manner that minimises dust emissions from the site, as specified in paragraph of the final Statement of Commitments submitted by the Proponent to the Department on 17 March 2006, including:</p> <p>a) all dust control systems for transfer, load out and unloading points, as well as materials handling activities must be designed and operated to comply with a solid particles emission limit of 20 mg/m³ as required by Part 4 of the Protection of the Environment (Clean Air) Regulation 2002;</p> <p>b) all storage bins must be enclosed;</p> <p>c) water spray systems must be installed to service all stockpiles;</p> <p>d) all paved trafficable areas must be swept as required by a permanently stationed street sweeper to minimise dust.</p> <p>e) the application of Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA), where reasonable and practicable, to minimise dust impacts during construction and operation of the project.</p>	<p>Site observations.</p>	<p>Site visit observations:</p> <p>(a) dust control systems in place, including rail unloading building and dust monitoring stations; (b) storage bins are not enclosed as identified and discussed in Condition 1.1;</p> <p>(c) water spray system operating over stockpiles;</p> <p>(d) street sweeper stationary during visit but trafficable areas generally free of loose material; and</p> <p>(e) regular operation of water cart for dust suppression and systems for 3% water addition to incoming raw materials observed.</p> <p>Recommendation: See Condition 1.1 (as relevant to bin enclosure).</p>	Non-compliant	Bin enclosure review to be undertaken. Please see comment for section 1.1 (above)

Condition of consent	Requirement	Evidence collected	Independent audit findings and recommendations	Compliance status	Holcim's response
2.8A	The Proponent must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 2 at any residence on privately-owned land.	INX register. No complaints. DPIE correspondence dated 28 August 2021 regarding RHDC (LEC No 10406 of 2006). 2020 Annual Review (prepared for 1 July 2018 - 31 December 2020).	Holcim operate two HVAS PM10 monitors for the site, which are shown in site photographs of the RHDC IEA 2021 report. The available monitoring reports did not cover the entire audit period (December 2017 - July 2018 and December 2020 to present). However, July 2018 - December 2020 were reported in the 2020 Annual Review. Air quality parameters were exceeded on a few occasions within the audit period: - 3 and 9 April 2018 as recorded in the INX register. - PM10 criteria was exceeded at HVAS 1 on six occasions in 2020, as per the correspondence with DPIE dated 23 August 2021. - DPIE noted that several air quality sampling events in 2019 were missed. - 2020 Annual Review notes that in 2019, the annual average PM10 at HVAS 1 was greater than the Project Approval criteria, and reported a non-compliance with this condition. - A few incidents of excessive dust were recorded in the INX register (6 September 2019, 17 October 2019), however no air quality or dust complaints were received during the audit period. Recommendations: Continue with best practice dust and air quality management on-site, and look into options to enclose product bin storage areas as conceptualised in the initial RHDC design. Refer to Condition 1.1 for further details.	Non-compliant	New dust sentry device in place. All the missed sampling were informed to DPIE due to covid closure. The site was not operational for a period of time. The location of one of the PM10 device was not correct. This was rectified via a proposal submission in 2019. OEMP got approved in February 2022.
2.21A	The number of on-site and truck parking spaces to be provided for the project must be in accordance with sections 5.4.3, 5.4.4 and 5.4.6 of the EAR as follows: a) truck parking: 50 spaces (truck and dog configuration); b) car parking: a total of 310 spaces on the project site and Humes site, as follows: 1) project site: 121 spaces ii) Regional office and laboratory: 189 spaces, of which 84 are to be allocated to the project site staff and visitors and 105 are to be allocated to the staff and visitors to the existing Humes site; c) all car parking spaces must be marked/signposted in accordance with the above allocations. All visitor spaces must be located conveniently in relation to the various administrative offices on the site and must be clearly marked and signposted. d) all car and truck parking spaces must be sealed in a hardstanding material and drained in accordance with the approved stormwater management plan for the project; e) the design and dimensions of all truck and car parking spaces, together with all associated roads and maneuvering areas, must be in accordance with AS2890.2 (2002); f) a detailed car and truck parking plan, at a scale of 1:200, and incorporating the above requirements, must be submitted for the approval of the Secretary prior to the commencement of any works.	Site observations.	This condition has not been met at this stage, as construction of all approved components (eg laboratory) had not been completed on the date of the site audit on 17 November 2021. The status on the date of the site audit was: - there are approximately 14 delineated truck (and dog) parking spaces currently; - there are approximately 38 delineated car parking spaces provided adjacent the site office/administration (including 2 disabled); - all parking areas sealed and drained to the site stormwater system; - truck and vehicle turning and maneuvering areas appear to be constructed in accordance with the AS2890.2 (2002). Based on staff numbers and site observations, there are adequate light vehicles spaces on the site currently. It is understood that Holcim do not propose to develop the Regional office and laboratory site. Therefore the 189 spaces will not be required. Recommendation: The Project Approval should be modified to reflect the number of required parking sites in the absence of a laboratory facility being constructed on site.	Non-compliant	Will consider this in new upcoming project for the site.
2.2B	Immediately after completion of initial planting/seedling and every year thereafter for the duration of the maintenance period the Proponent must submit to the Department a monitoring report addressing the performance criteria as specified in the Vegetation Management Plan, and comment on the stability and condition of any stream works. With each monitoring report, the person responsible for implementing the Vegetation Management Plan must certify in writing that plantings (including follow-up plantings) have been carried out using stock propagated from seed or plant material collected only from native plants from the local botanical provenance.		There is no evidence that any of the monitoring reports were submitted to the DPIE as per the requirement of this condition.	Non-compliant	This was reviewed and shared during the Annual review for Rooty Hill (annually).
3.2	The Proponent must review the Operational Monitoring Program referred to under condition 3.1 on a six-monthly basis, and may, with the agreement of the Secretary, alter the frequency and/ or scope of monitoring provided: a) pollutant/ parameter monitoring has been undertaken for a period of no less than six months (measured from the commencement of operation of the project); b) there has been no exceedance of any limit placed on the subject pollutant or parameter, through this consent or any Environment Protection Licence under the Protection of the Environment Operations Act 1997 within the preceding six-month period; c) there has been no reasonable complaint received from the public in relation to the subject pollutant/ parameter within the preceding six-month period (refer to condition 4.3 of this approval); and d) the EPA raises no objection to the proposed alteration to the frequency of pollutant/parameter monitoring.		There is no evidence that the Operational Monitoring Program has been reviewed on a six-monthly basis. Recommendation: The Operational Monitoring Program should be reviewed following finalisation of this audit and every six months thereafter.	Non-compliant	The OEMP was reviewed and was awaiting approval from DPIE.
3.5A	Within a year of the date of the approval of MOD 2, and every three years thereafter, unless the Secretary directs otherwise, the Proponent must commission and commence, and pay the full cost of an Independent Environmental Audit of the development. This audit must: (a) be led and conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary; (b) include consultation with the relevant agencies; (c) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent and any relevant EPL or necessary water licences for the development (including any assessment, strategy, plan or program required under these approvals); (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, strategy, plan or program required under the abovementioned approvals; and (f) be conducted and reported to the satisfaction of the Secretary.	The previous audit period was completed on 12 December 2017. MOD2 was approved on 29 June 2017. EMM was commissioned to undertake this independent environmental audit on 19 May 2021 (purchase order issued 19 May 2021). RHDC – IEA Submission Extension Request – Service Level Agreement email dated 23 November 2021	(a) to (e) has been fulfilled. MOD2 was approved on 29 June 2017. The previous audit (undertaken for the period 31 March 2016 to 12 December 2017) notes "Given that the majority of the audit period was prior to the approval of MOD2, Condition 3.5 has been applied. However, it is noted that agencies were consulted as part of this audit." There is no evidence that an audit was undertaken within a year of the date of the approval of MOD2, and thus the current audit period is from 13 December 2017 - 17 November 2021. No evidence of the Secretary making available alternative arrangements. EMM Consulting was commissioned to undertake this independent environmental audit on 19 May 2021 (purchase order 4520690232), and activities officially commenced in the week of 16 August 2021. The site inspection was delayed due to State Government public health orders issued during the Covid-19 pandemic lockdown in the Greater Sydney Area. Holcim emailed DPIE on 23 November 2021 notifying DPIE about the delay and seeking an extension for the audit. Recommendation: The next audit should take place three years after this audit (ie November 2024).	Non-compliant	Noted
3.5B	Within 12 weeks of commencing an audit under condition 3.5A, or as otherwise agreed by the Secretary, the Proponent must submit a copy of the audit report to the Secretary and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of these recommendations as required. The Proponent must implement these recommendations, to the satisfaction of the Secretary.	RHDC – IEA Submission Extension Request – Service Level Agreement email dated 23 November 2021	Site audit was delayed due to Covid-19 restrictions. Holcim emailed DPIE on 23 November 2021 notifying DPIE about the delay and seeking an extension for the audit.	Non-compliant	Noted - will aim to meet timelines. Disruptions due to Covid restrictions.
4. COMMUNITY INFORMATION, CONSULTATION AND INVOLVEMENT					
5.2	Construction Environmental Management Plan The Proponent must prepare and implement a Construction Environmental Management Plan to outline environmental management practices and procedures to be followed during the site preparation and construction activities during each stage of the project. The Plan must be consistent with the Department's Guideline for the Preparation of Environmental Management Plans (DIPNR 2004) and must include, but not necessarily be limited to: a) the Management Plans listed under condition 5.3 of this approval; b) the environmental management and mitigation measures outlined in the documents referenced in condition 1.1; and c) complaints handling procedures during construction.		A Construction Environmental Management Plan (CEMP) for the construction of the CBP has not been provided during the audit. There is no evidence to suggest that a CEMP was prepared and implemented during the construction of the CBP.	Non-compliant	GIPA search to be conducted.

Condition of consent	Requirement	Evidence collected	Independent audit findings and recommendations	Compliance status	Holcim's response
5.2	The Plan must be approved by the Secretary prior to the commencement of any site preparation and construction works associated with the project subject to this approval, or within such period otherwise agreed by the Secretary. Construction works associated with any stage of the project subject to this approval must not commence until written approval has been received from the Secretary for that stage. The Proponent must implement the management plan as approved from time to time by the Secretary.		Refer to response to Condition 5.2.	Non-compliant	OEMP approved in February 2022. This was consulted.
5.3	As part of the Construction Environmental Management Plan for the project, required under condition 5.2 of this approval, the Proponent must prepare and implement the following Management Plans: a) a Soil and Water Management Plan to detail measures to minimise dust, erosion and the discharge of sediment and other pollutants to lands and/or waters during construction works associated with the project. The Plan must be prepared in accordance with Landcom's Managing Urban Stormwater: Soils and Construction, 4th edition, March 2004.		Refer to response to Condition 5.2.	Non-compliant	Same as above
5.3	b) a Noise Management Plan to detail measures to minimise noise generated during construction activities associated with the project. The Plan must include, but not necessarily be limited to: i) identification of each work area, site compound and access route (both private and public), and the identification of the specific activities that will be carried out and associated noise sources at these sites; ii) identification of all potentially affected sensitive receivers, and the specification of the noise and vibration criteria for the proposed works (as identified in the documentation listed in condition 1.1); iii) demonstration that the construction methods (including construction traffic noise) will meet the objectives of the EA and noise criteria. This must include an analysis of feasible and reasonable noise mitigation measures that can be implemented to reduce construction noise impacts where the objectives are predicted to be exceeded; iv) a detailed description of what actions and measures would be implemented to ensure that these works would comply with the relevant noise and vibration criteria; v) procedures for notifying residents of construction activities that are likely to effect their noise and vibration amenity, as well as procedures for dealing and responding to noise complaints; vi) a description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be conducted, how the results of this monitoring would be recorded; and vi) if any non-compliance is detected, with the criteria in condition 2.3 or the noise mitigation measures described in the Noise Management Plan, a description of what procedures would be followed to ensure compliance.		Refer to response to Condition 5.2.	Non-compliant	Same as above
5.3	d) a Dust Management Plan to outline measures to minimise and manage any impacts from the construction of the project on local air quality. The Plan must include, but not necessarily be limited to: i) identification of all major sources of dust that may occur as result of the construction of the project; ii) description of the procedures to manage the emission of dust from the sources identified; iii) identification of the locations where monitoring of dust emissions is to be undertaken; iv) procedures for the monitoring of dust emissions from the project, in accordance with any requirements of the EPA; v) protocols for regular maintenance of the construction plant and equipment to minimise the potential for dust emissions; vi) a principal requirement to satisfy the relevant goals specified under condition 2.8 and 2.8A of this approval at all times; vii) a system that allows for periodic assessment and reasonable implementation of Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA) to minimise dust impacts during the construction of the project; viii) a system for regular auditing to ensure the effective implementation and maintenance of mitigation measures required to achieve the air quality goals specified under condition 2.8 and 2.8A of this approval; ix) pro-active and reactive management and response mechanisms for particulate emissions, with specific reference to measures to be implemented and actions to be taken in a timely manner to minimise and prevent reasonably foreseeable elevated air quality impacts on surrounding land uses as a consequence of meteorological conditions during construction of the project or the specific construction works being undertaken at any particular time; and x) description of procedures to be undertaken if any non-compliance is detected. The Proponent must implement the management plan as approved from time to time by the Secretary.		Refer to response to Condition 5.2.	Non-compliant	Same as above
5.6	Within 3 months of the submission of an: a) incident report under condition 6.1 below; (b) Annual Review under condition 6.3 below; c) Independent Environmental Audit under condition 3.5 or condition 3.5B above; and d) any modifications to this consent. e) the Proponent must review the strategies, plans and programs required under this consent, to the satisfaction of the Secretary. The Proponent must notify the Department in writing of any such review being undertaken. Where this review leads to revisions in any such document, then within 6 weeks of the review the revised document must be submitted for the approval of the Secretary. Note: The purpose of this condition is to ensure that strategies, plans and programs are regularly updated to incorporate any measures recommended to improve environmental performance of the development.		OEMP 2021 is currently under review by DPIE and has not been endorsed yet. This audit has identified that management plan(s) and Annual Review(s) are not being completed and submitted to DPIE within the timeframes specified in the conditions. Recommendation: • Annual Reviews, management plans and monitoring programs need to be prepared and/or updated in accordance with the timeframes specified in conditions of consent. • Annual Reviews, management plans and monitoring programs need to be submitted to DPIE and other relevant government agencies, as specified in conditions of consent.	Non-compliant	This was flagged with DPIE prior to the audit.
5.7	Where consultation with any public authority is required by the conditions of this consent, the Proponent must: a) consult with the relevant public authority prior to submitting the required document to the Secretary for approval; b) submit evidence of this consultation as part of the relevant document; c) describe how matters raised by the authority have been addressed and any matters not resolved; and d) include details of any outstanding issues raised by the authority and an explanation of disagreement between any public authority and the Proponent.	PM10 Device relocation - RHDC emails with DPIE and EPA starting December 2019.	As per outcomes of Condition 5.6, consultation has not taken place in accordance with timelines specified in the consent. However, consultation with DPIE and EPA regarding the relocation of PM10 device and EPL surrender, and updating this in the OEMP has been sighted. There is no evidence of formal tracking system for matters raised by authorities.	Non-compliant	Emails were shared with the auditor. DPIE and Holcim have records of this conversation. Also saved in the drive for future reference. Closed.
6. ENVIRONMENTAL REPORTING					
6.3	Annual Performance Reporting The Proponent must, throughout the life of the project, prepare and submit to the Secretary, an Annual Review. The Annual Review must review the performance of the project against the Operation Environmental Management Plan (refer to condition 5.4 and condition 5.5 of Annual Review must 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.	DPIE letter dated 23 August 2021 regarding: RHDC (LEC No 10406 of 2006) Annual Review 1 July 2018 - 31 December 2020	DPIE noted that Holcim "failed to submit the Annual Review for the reporting periods from 1 July 2018 to 31 June 2019 and 1 July 2019 to 31 June 2020 in accordance with Condition 6.4 of the approval and advises that this non-compliance will be followed up separately by the Department." Recommendation: As per DPIE's advice, the Annual Reviews on the calendar year basis with the 2012 Annual Review should be submitted in March 2022.	Non-compliant	Reviewed and the AEMR will be submitted in March 2022.

Condition of consent	Requirement	Evidence collected	Independent audit findings and recommendations	Compliance status	Holcim's response
6.4	The Proponent must submit a copy of the Annual Review to the Secretary, EPA and Council every year, with: i) the first Annual Review to be submitted within twelve months after the commencement of operation of the project; and ii) the second and subsequent Annual Review to be submitted concurrently with the EPA's Annual Return.		Refer to response to Condition 6.3.	Non-compliant	Noted as above.
6.4	The Proponent must make the Annual Review available to the public for inspection upon request.		All Annual Review reports with the exception of Annual Review 2017 have been uploaded to the Holcim RHDC webpage. Recommendation: Refer to Condition 4.1.	Non-compliant	Noted as above.
6.5	The Secretary may require the Proponent to address certain matters in relation to the environmental performance of the project in response to review of the Annual Environmental Report in relation to compliance with this approval and any comments received from the EPA and/or Council. Any reasonable action required to be undertaken must be completed within such period as the Secretary may agree.	DPE letter dated 23 August 2021 regarding: RHDC (LEC No 10406 of 2006) Annual Review 1 July 2018 - 31 December 2020	DPE notes the incidents regarding exceedance of air quality criteria, however no timelines are given for taking action. As per DPE correspondence, "onsite monitoring is required to be undertaken in accordance with the approval and any associated Management Plans, as approved by the Planning Secretary. Any amendments to the parameters required to be monitored, including monitoring frequencies and locations are to be included in the amended respective Management Plans and submitted to the Planning Secretary for approval, prior to implementation." Recommendation: Air quality non-compliances noted in the Annual Review 2020 and in DPE's Letter should be addressed. Annual Reviews, management plans and monitoring programs need to be prepared and/or updated in accordance with the timeframes specified in conditions of consent. Annual Reviews, management plans and monitoring programs need to be submitted to DPE and other relevant government agencies, as specified in conditions of consent.	Non-compliant	OEMP addresses the Air Quality concerns. Dust Sentry device will provide real time data. PM10 relocation was flagged with DPE in 2019. OEMP approved in Feb 2022.
Commitment	Condition of consent	Evidence collected	Independent audit findings and recommendations	Compliance	Holcim's response
Compliance with EA		The original consent (DA 05_0051), Mod 1, Mod 2 documents. 1 Site observations.	See DA 05_0051 Condition 1.1.	Non-compliant	N/A
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5. Monitoring and Recording. M1.3		*Annual Environmental Management Reviews (AEMRs). Phone call with S. Shashi on 23.02.2022.*	*Sample dates recorded Point of collection identified Time of collection and name of person not evident in AEMRs S. Shashi explained that Holcim has a new online system that records each item within the system, and thus hardcopies of this data are not kept. However, evidence was not provided to verify this. Recommendation: Take screenshots and provide evidence for any future audits.	Non-compliant	Noted. This is present in the COAs and lab reports. Additionally this is present in the portal for reference. This is not addressed in AEMR. Have the data available if requested.
6. Reporting Conditions R 1.6		*Holcim website has Annual Returns (Annual Reviews) back to 2009, with 2017 report missing. https://www.holcim.com.au/about-us/community-link/regional-distribution-centre-rdc-rooty-hill-nsw/environmental-monitoring-reports *		Non-compliant	Missing AEMR is updated. DPE was informed about the gap in writing. 2020 AEMR was submitted in a timely manner.
6. Reporting Conditions E2.3		Reports prepared by Muller Acoustic Consulting for the period Q1 2019 to Q1 2021. S. Shashi phone call on 23.02.2022.	Reports prepared by Muller Acoustic Consulting for the noise reports S. Shashi noted that with the EPA portal becoming digitised Recommendation: Holcim should maintain records	Non-compliant	Screen shots will be taken when the data gets uploaded on DPE Major Project portal. This is also present on the website.
APPROVAL OF THE SURRENDER OF LICENCE NO. 20672 - Issued on 18 June 2020 (Notice Number 1594893)					
1	The surrender of licence is approved.				
2	The approval of the surrender is subject to the following conditions:				
2(c)	The content and form of the Annual Return must be in accordance with the applicable reporting conditions in the licence before it was surrendered.	Not verified.		Non-compliant	Both EPA and DPE were present on site to finalise these steps. This Licence surrender was approved on 18 June 2020.
2(d)	The Annual Return must be signed in accordance with the applicable reporting conditions in the licence before it was surrendered.	Not verified.		Non-compliant	DPE was informed about the gap in annual review submission. A consolidated AEMR was provided in 2021. Holcim has submitted the AEMR for 2022.